GJTM is Now Indexed in DOAJ

ISSN 2468-8398
Supplement Issue | 2020

Global Journal of Transfusion Medicine AATM

Official publication of Asian Association of Transfusion Medicine and Santokba Durlabhji Memorial Hospital

XIII. National, I. International Blood Banking & Transfusion Congress of BBTST

8-12 March 2020
Antalya/Turkey

Website: www.aatmweb.org

Dia Pro

octo-hawk

Laboratuvarların ihtiyaçlarını karşılayan

OTOANALİZÖRLER

octo-m

octo-junior

across auto system

- Test prosedür basamaklarını Walk-Away olarak gerçekleştirebilmektedir.
- Gereksinimlere göre hazırlanan tasarımı sayesinde çalışma esnasında testlerin durdurulmasına gereksinim olmadan sürekli yükleme özelliklerine sahiptir.
- Random Access çalışabilme özeliği ile farklı testleri aynı anda yüklemenize olanak sağlar.
- Geniş test paneline sahip olması yanında, istenilen yeni test panellerine hızlı cevap verebilmektedir.
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- Öncelikli numune/numunelere farklı bir açıdan bakarak Acil Numune ve Stat Numune giriş özelliği ile farklılık yaratmaktadır.
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- Uzaktan erişim özelliğine sahiptir.

TEST YÖNTEMLERİ

- Forward Gruplandırma
- Forward & Reverse Gruplandırma
- Reverse Gruplandırma
- Rh ve Rh alt Gruplandırma
- Direkt Coombs
- Cross Match
- Antikor Tarama
- Antikor Tanımlama
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- Zayıf D / Parsiyel D
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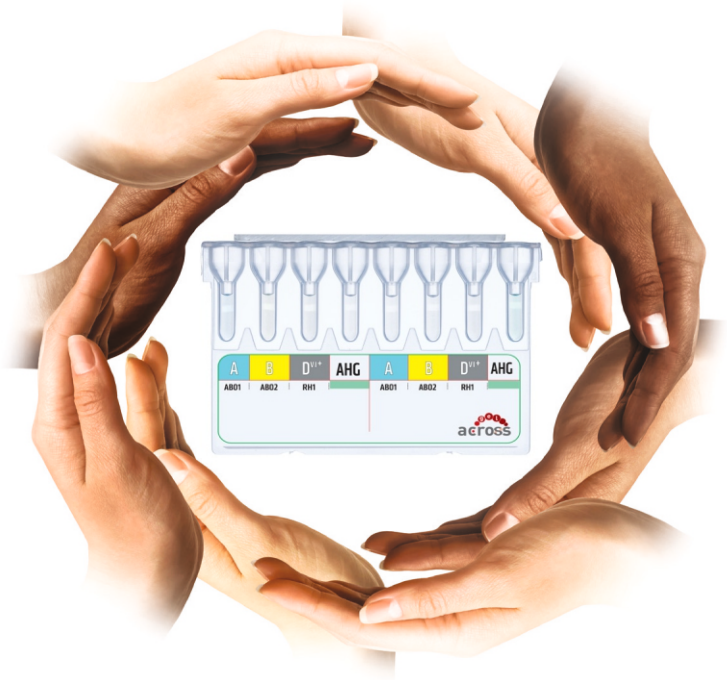

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Global Journal of Transfusion Medicine AATM is a bi-annual peer reviewed international journal published by the Asian Association of Transfusion Medicine (AATM).

Abstracting and indexing information
The journal is registered with the following abstracting partners:
Baidu Scholar, CNKI (China National Knowledge Infrastructure), EBSCO Publishing's Electronic Databases, Exlibris – Primo Central, Google Scholar, Hinari, Infotrieve, Journal Guide, National Science Library, Netherlands ISSN center, OpenJGate, ProQuest, TdNet

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Published by
Wolters Kluwer India Private Limited
A-202, 2nd Floor, The Qube, C.T.S. No.1498A/2 Village Marol,
Andheri (East), Mumbai - 400 059, India
Phone: 91-22-66491818
Website: www.medknow.com

Printed at
Nikeda Art Printers Pvt. Ltd., Bhandup, Mumbai, India

Dear Friends and Colleagues,

On behalf of the Blood Banks and Transfusion Society of Turkey (BBTST) and Turkish Blood Foundation it is a pleasure for us to welcome you to Antalya/Turkey for the 13th National and 1st International Congress of Blood Banks and Transfusion Medicine which is held between 8-12 March 2020.

The Scientific Programme includes panel discussions, conferences, oral, poster presentations and an educational course mainly for the laboratory technicians and the physicians working in the field of Transfusion Medicine. BBTST's aim is to include all involved health care professionals in TransfusionMedicine at our meeting.

In this year's meeting although we have faced travel restrictions due to COVID-19 outbreak we are happy to welcome our friends and more than 700 participants from 24 different countries.

We hope that the meeting will increase our collaboration and knowledge as well as we'll have nice networking opportunities with our colleagues, enjoy Turkish meal and hospitality.

We again welcome you all…

Let's begin!

Nil Banu Pelit
Secretary General of BBTST
and the Congress

Ramazan Uluhan
President of BBTST
and the Congress

Editors

Ramazan ULUHAN

Mahmut BAYIK

Yasemin HEPER

N. Nuri SOLAZ

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Blood Banks and Transfusion Society of Turkey (BBTST)

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Eugene Zhiburt	National Medical Surgieal Center

08 MARCH 2020, SUNDAY

HALL A

15:30-16:30
OPENING CEREMONY


GİRGİN
16:30-17:00
COFFEE BREAK
GİRGİN


17:00 - 18:30
OPENING CONFERENCE I: Importance of International Collaboration in TM; Role of ISBT
Chairpersons: Ramazan Uluhan, Mahmut Bayık
Speaker: Martin Olsson, ISBT President

OPENING CONFERENCE II: Medical Education in Digital Era
Chairpersons: Ramazan Uluhan, Mahmut Bayık
Speaker: Sabri Kemahlı

20:00-21:30
DINNER

09 MARCH 2020, MONDAY

HALL A

08:00-09:00 · ORAL PRESENTATIONS
Chairpersons: Abdurrahman Kara, Sabri Kemahlı
OP-01, OP-02, OP-03, OP-04, OP-05

HALL A

09:00-10:30
PANEL: Education and Training in Transfusion Medicine
Chairpersons: Sabri Kemahlı, Şükran Köse
Informed Consent for Donors and Patients
Servet Uluer Biçeroğlu
Education & Training for Blood Bank Staff
Nesrin Gareayaghi
Education & Training for Clinicians
Funda Tayfun Küpesiz
Education & Training for Nurses
İlknur Güçlü


macopharma
10:30-11:00
COFFEE BREAK
macopharma


HALL A		HALL B
CONFERENCE: PBM Activities in Different Countries **Chairpersons:** Ömer Kurtipek, Yasemin Heper **Speaker:** Aryeh Shander	**11:00-11:45**	**CONFERENCE: Micro RNA's in Macro World** **Chairpersons:** Davut Albayrak, Reha Masatlı **Speaker:** Duran Canatan

09 MARCH 2020, MONDAY

HALL A

11:45 - 12:30
PANEL: Role of Red Cross and Red Crescent in Blood Supply
Chairpersons: Kerem Kınık, Mahmut Bayık
Belgium Red Cross · Marie-Paule Emonds
Turkish Red Crescent · Levent Sağdur

12:30-14:00
LUNCH

HALL A		HALL B
PANEL: Blood Banking in Young's Perspective; ISBT Young Professionals **Chairpersons:** Gamal Gabra, N. Nuri Solaz **ISBT** Arwa Al Riyami **Ghana** Lucy Asamoah-Akuoko **Nepal** Bipin Nepal **Nigeria** Oluwakemi Elizabeth Otokiti **France** Vincent Thonier **Netherlands** Praiseldy Sasongko	**14:00-15:30**	**PANEL: Blood Cell Antibodies** **Chairpersons:** Cengiz Asadov, Gülsüm Özet **Erythrocythe Antibodies** F. Yüce Ayhan **Leukocyte Antibodies** Hülya Bilgen **Platelet Antibodies** Şeniz Göral
	15:30-16:00 **COFFEE BREAK**	
PANEL: Problems of Youngsters in Blood Banks in Turkey **Chairpersons:** Arwa Al Riyami, F. Burcu Belen Apak **Developments in Education and Researches** Özlem Tüfekçi, Asu Fergün Yılmaz **Importance of Transfusion Policy** Yeşim Oymak, Başak Adaklı Aksoy **Collaboration Between Blood Center and Clinician** Berrin Uzun, Tuğba Kula Atik	**16:00-17:30**	**PANEL: New Developments in Apheresis** **Chairpersons:** Bülent Eser, Meral Sönmezoğlu **Multicomponent Apheresis** S. Haldun Bal **Plateletapheresis** Mehmet Yay **Therapeutic Apheresis** Nil Güler **Granulocyte Apheresis** Ekrem Ünal

HALL A

17:30-19:00 · ORAL PRESENTATIONS
Chairpersons: Duran Canatan, Fadile Yıldız Zeyrek
OP-06, OP-07, OP-08, OP-09, OP-10, OP-11, OP-12, OP-13, OP-14, OP-15

20:00-21:30
DINNER

10 MARCH 2020, TUESDAY

HALL A

08:00-09:00 · ORAL PRESENTATIONS
Chairpersons: M. Tevfik Yavuz, Gülsüm Özet
OP-16, OP-17, OP-18, OP-19, OP-20

09:00-10:30
PANEL: Last 50 Years of Transfusion; in Mentor's Perspective
Chairpersons: Şadi Yenen, Gert Matthes
Speakers: Cees Smit Sibinga, Gamal Gabra, Şükrü Cin

Ortho Clinical Diagnostics — **10:30-11:00 COFFEE BREAK** — Ortho Clinical Diagnostics

HALL A		HALL B
CONFERENCE: Blood Groups and Diseases **Chairpersons:** Zöhre Alimirzoyeva, Okan Töre **Speaker:** L.Tufan Kumaş	**11:00-11:45**	**CONFERENCE: Can Umbilical Cord Blood be Used as a Source of Blood Components?** **Chairpersons:** Saim Kerman, Fatma Savran Oğuz **Speaker:** N. Banu Pelit
	11:45-14:00 LUNCH	
PANEL: Blood Banking in Asian Countries: AATM Practices **Chairpersons:** Aparna Singh Shah, Emine Güçhan Alanoğlu **Introduction of Asian Association of Transfusion Medicine** Nabajyoti Choudhury **Blood Banking in India** Nabajyoti Choudhury **Blood Banking in Qatar** Aysha Almalki **Blood Banking in Russia** Eugene Zhiburt **Blood Banking in Sri Lanka** Ananda Gunasekera	**14:00-15:30**	**PANEL: Blood Banking System in Neighbour Countries: Past & Present** **Chairpersons:** M. Tevfik Yavuz, Cees Smit Sibinga **Blood Banking in Kosovo** Bukurije Zhubi **Blood Banking in Montenegro** Gordana Rasovic **Blood Banking in N. Macedonia** Emilija Velkova **Blood Banking in Serbia** Snezana Jovanovic Srzentic **Blood Banking in Bosnia and Herzegovina** Aida Djozo

Ortho Clinical Diagnostics — **15:30-16:00 COFFEE BREAK** — Ortho Clinical Diagnostics

HALL A

16:00-17:30
PANEL: Integration of Transfusion System to EU Regulations; Challenges and Benefits
Chairpersons: Hülya Bilgen, Faten Moftah
Integration of Portuguese Transfusion System to EU Regulations
Mario Chin Tad Muon
Integration of Spanish Transfusion System to EU Regulations
Jose Manuel Cardenas
EU Directives and Regulations About Transfusion; General Overview
Vincenzo de Angelis
Integration of Turkish Transfusion System to EU Regulations
Tuna İlbars

17:30-19:00 · ORAL PRESENTATIONS
Chairpersons: Davut Albayrak, Sebahat Aksaray
OP-21, OP-22, OP-23, OP-24, OP-25, OP-26, OP-27, OP-28, OP-29, OP-30

20:00 - 21:30 DINNER

11 MARCH 2020, WEDNESDAY

HALL A

08:00-09:00 · ORAL PRESENTATIONS
Chairpersons: İmdat Dilek, Rukiye Berkem
OP-31, OP-32, OP-33, OP-34, OP-35

HALL A		HALL B
PANEL: Cellular Therapies **Chairpersons:** Şükrü Cin, Tunç Akkoç **What is CRISPR/Cas 9** Cihan Taştan **Virus Spesific T cells** Ercüment Ovalı **Biomaterials in Cellular Therapies** Vasıf Hasırcı **Somatic Stem Cell Therapies** Ömer Doğru	**09:00-10:30**	**PANEL: Questions About the Quality** **Chairpersons:** Şeyda Keskin, Saba Jamal **Risk Based Decision Making in Transfusion Medicine** Ayşe Esra Karakoç **How Can We Do: Process Control?** Ertan Özyurt **Audit Types for Blood Transfusion Services** Sibel Eldemir **Records of Haemovigilance** Ayla Yavuz
GİRGİN	**10:30-11:00** **COFFEE BREAK**	GİRGİN
CONFERENCE: Pulmonary Transfusion Reactions **Chairpersons:** İdil Yenicesu, İ.Yaşar Avcı **Speaker:** Arzu Akçay	**11:00-11:45**	**CONFERENCE: Immunomodulatory Effects of Transfusion** **Chairpersons:** İmdat Dilek, Nurgül Ceran **Speaker:** Defne Ay Tuncel

HALL A

11:45-12:30
CONFERENCE: Blood Banking at Covid-19 Outbreak
Chairpersons: Yasemin Heper, Meral Sönmezoğlu
Speaker: AATM Presentation

12:30-14:00
LUNCH

PANEL: Pregnancy and Transfusion **Chairpersons:** Ramazan Uluhan, Mahmut Bayık **Physiological Changes in Haemotological Parameters During Pregnancy** Sevil Sadri **Blood Transfusion During Pregnancy** Ece Gül İbrişim **Postpartum Bleedings** Ateş Karateke	**14:00-15:30**	**PANEL: Challenges in Screening Tests** **Chairpersons:** Mahmut Baykan, İlhan Birinci **Algoritms in Screening Tests** Hüsnü Altunay **Turkish Red Crescent Data** Mehmet Bakır Saygan **Ethic and Legal Aspects of Test Results** Rukiye Berkem **Economic Aspects in the World** Gert Matthes
medifol	**15:30-16:00** **COFFEE BREAK**	medifol

11 MARCH 2020, WEDNESDAY

HALL A		HALL B
PANEL: Hemovigilance Practices in Different Countries **Chairpersons:** Yasemin Heper, Jose Manuel Cardenas **Hemovigilance in India** C. Shivaram **Hemovigilance in Nedherlands** Cees Smit Sibinga **Hemovigilance in Croatia** Irena Jukic **Hemovigilance in Sri Lanka** Ananda Gunasekera	16:00-17:30	**PANEL: Transfusion Practices in Haemathopoietic Stem Cell Transplantations** **Chairpersons:** G. Hayri Özsan, Gumral Alakbarova **Transfusion Policy** Nurhilal Büyükkurt **Role of Blood Bank** Melda Özdamar **Transfusion Practices on Transplanted Patients** Adalet Meral Güneş
17:30 - 18:30 **EVALUATION OF THE CONGRESS AND THE COURSE**		
	20:00 - 24:00 **GALA DINNER**	

12 MARCH 2020, THURSDAY

12:00	**CHECK OUT FROM THE HOTEL**

IMPORTANCE OF INTERNATIONAL COLLABORATION IN TM ; ROLE OF ISBT

Chairpersons: **Ramazan Uluhan**
Mahmut Bayık

Speaker: **Martin Olsson**

Martin OLSSON
President of International Society of Blood Transfusion (ISBT)

MEDICAL EDUCATION IN DIGITAL ERA

Chairpersons: **Ramazan Uluhan**
Mahmut Bayık

Speaker: **Sabri Kemahlı**

MEDICAL EDUCATION IN DIGITAL ERA

Sabri KEMAHLI
Yeditepe University, Istanbul, Turkey; Alfaisal University, Riyadh, S.Arabia

INTRODUCTION: In an era when digital technologies have entered every part of our lives, medicine and medical education could not have been spared. Digital technologies are now widely used in medicine from electronic patient records to imaging methods, laboratory investigations and accessing knowledge.
Technological advances and their use in daily life have resulted in changes in many areas. The most striking change and development has occurred in communication, access to information and knowledge.
It will not be an understatement to say that the most important concept marking this age is communication or informatics.

GENERATIONS AND CHARACTERISTICS: The students of this age enter universities having read books for 5000 hours but with a record of playing video games for over 10,000 hours, watched television over 20,000 hours, having received or sent more that 200,000 e-mails or instant messages. Thus we are facing a new generation of students with a vast experience in new technologies.

Generations can be defined according to cultural beliefs, societal behaviours, life experiences within historical perspective and work or career aims as well as chronological age.

There are 5 generations defined since 1920s:
2. Silent generation (born in 1922-1944)
3. Baby boomers (born in 1945-1960)
4. Generation-X (born in 1961-1980)
5. Generation-Y (born in 1981-2000)
6. Generation-Z (born after 2000)

In addition to their chronological ages and the historical events experienced throughout their lives there ate major differences in their characteristics especially related to technology (Table 1).

Table 1: General and communication characteristics of generations:

	Silent generation 1922-1944	**Baby boomers 1945-1960**	**Generation-X 1961-1980**	**Generation-Y 1981-2000**	**Generation-Z After 2000**
General characteristics	Altruism	Research, exploring	Self learners, suspicious	Self-confident, hopeful	Born into technology
	Abiding by rules	Questioning rules	Outcome based	Collective thinking	Inclined to alternative educational methods
	Hard working	Open to change	Impatient	Variability	Able to cope with mutiple stimulants
Aspiration	Home ownership	Job security	Work-life balance	Fredom and flexibility	Security and stability
Attitude towards technology	Largely disengaged	Early adapters	Digital immigrants	Digital natives	Technoholics, entirely dependent on IT
Communication media	Newspaper, radio, letter	TV, telephone	Computer, e-mail, SMS	Internet, smartphones	Handheld (or integrated into clothing) devices
Communication preference	Face-to-face	Face-to-face or telephone	Text message or e-mail	Online and mobile	Facetime

These characteristics also shape the learning characteristics and preferences as shown in table 2.

Table 2: Learning characteristics of generations:

Silent generation 1922-1944	**Baby boomers 1945-1960**	**Generation-X 1961-1980**	**Generation-Y 1981-2000**	**Generation-Z After 2000**
Information dependent	Change in learning style	Self-learning, self-pace	Momentarily and informal	Born into technology. Short attention span but multitasking
Traditional classroom	Learning in classroom + participatory	E-learning	Short memory span	Flipped classrooms; or natural-ecological educational environment far from technology
Very good mentor and teachers	Questions, searches	Technology and media	Technology and media should be combined (webinar, blog, twitter,…)	Interactive learning environment with exploring, reaching knowledge, making presentations
	Wants to know the aims/ objectives	Outcome-based		Project-based topics, assignments themes
	Looks for alternatives	Requires evidence		

It is also possible to classify the generations in a simpler way as 'digital natives' and 'digital immigrants'.

Preferences of digital immigrants:
· Reaching information from limited sources and in a controlled way
· Single or focused tasks
· Usually text-based information
· Need of more private and personal area for self-reflection
· Presentation of knowledge in a linear way and logical fashion, following each other

Preferences of digital natives:
· Reaching information from many sources
· Multi-tasking
· Pictures, voice and video preferred instead of text
· Hyperlink sources
· 'Real time' interaction
· User defined content
· Learning topics related to his/her area and of fun, instantly

EDUCATIONAL STRATEGIES FOR THE DIGITAL AGE: All these developments and changes have necessitated a review of and change in educational strategies. The main principles of education have already been defined in the last 30-40 years as interactive, student-centred and focusing on learning rather than teaching. However new methods had to be developed and implemented making use of new technologies to plan the education of new generations.

The fact that the majority of healthcare workers are now digital natives should be kept in mind when planning and designing educational programmes at every level. Since it is now possible to reach information from anywhere and anytime it should not be preferred to rely on knowledge transfer (lectures) in classrooms only. Teachers should change their roles from information providers to tutors guiding the students to recognize their knowledge gaps in order to learn what is necessary. Interactive methods should be used both in and outside classrooms (including directed self-learning).

The emphasis in classrooms should shift from delivering lectures to discussing and explaining the difficult or complicated concepts with examples and clinical cases. This method necessitates the students to prepare before classes. The ultimate step in this approach is 'flipped classrooms', where the students watch a pre-recorded online

mini-lecture/video of 20-25 minutes at home/before class and come to the class to discuss the topic.

Since it is possible to reach almost all books and journals online as well as other online sources such as web sites of specialist societies, the important problem is the reliability of sources. This leads to the need for identifying, reaching and using the most relevant information and knowledge required in clinical context. Therefore the students should be taught about the importance of reliable sources and should be able to select and use the appropriate sources.

Another important development has been the use of artificial intelligence (AI) and machine learning (ML). AI is not merely a tool like a drug or medical device but a technology which makes it possible to process mega data beyond the limits of human brain. The major difference between human learning and machine learning is that while humans can do generalizations and build complex elations from relatively limited data, machines can learn only by analysing vast amount of data. On the other hand analysing the vast data in electronic health records of millions of patients, which is beyond the limits of humans, and giving definite results is the superiority of machine learning.

AI will undoubtedly affect educators, students and medical education as well as physicians, patients and society. There are publications supporting the idea that medical education should now move from information age to artificial intelligence age.
Considering that the students of today will have to work with AI and ML we have to train them to be ready for these technologies. When they graduate they will also have to deal with the concerns of and answer questions from the patients and society.

The graduates will need to have additional competences such as:
· Explaining the probabilities reached by the use of AI, requiring more effective use of cognitive psychology
· Closer 'collaboration' of humans and machines
· Focusing on simulations to make use of machines in patient care

Blood banking and transfusion medicine has naturally benefited from all these developments. Blood donation, transfusion records, blood centre automation and communication, hemovigilance practices as well as transfusion medicine training are not spared in this new era. Mobile apps have been developed by transfusion societies, blood donor organizations or blood services such as Red Cross to promote and facilitate blood donation. Online or blended training modules and programmes for blood banking and transfusion medicine are available through universities or societies.

CONCLUSION: The digital era had a great impact in all areas and undoubtedly this is just the beginning of greater developments. We have to be prepared for the future and prepare the students to be able to practice in the coming age. The major points to be considered when planning medical education in this new era can be summarized as follows:

· Know the characteristics of students of this era
· Plan curricula to let the students recognize their knowledge gaps and learn accordingly
· Teach to identify and use reliable sources
· Avoid long lectures, decrease lectures
· Focus on interactive methods
· Increase small group discussions and PBL
· Make use of flipped classrooms
· Learn and teach how to get the most out of information technology
· Increase use of simulations and models (mannequins)
· Follow the developments in information technology, artificial intelligence and machine learning and include in curricula and use in medical education
Despite all these technological developments it should never be forgotten that nothing can replace interaction (good history taking, physical examination) with real patients. Even interpretation of laboratory results should not be left to machines only.

Therefore bedside teaching will/should always remain the most important tool for clinical training.

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EDUCATION AND TRAINING IN TRANSFUSION MEDICINE

Chairpersons: **Sabri Kemahlı**
Sükran Köse

Speakers: **Servet Uluer Biçeroğlu**
Nesrin Gareayaghi
Funda Tayfun Küpesiz
İlknur Güçlü

INFORMED CONSENT FOR THE PATIENT AND THE BLOOD DONOR

Servet Uluer BİÇEROĞLU
Ege Üniversitesi, Tıp Fakültesi, Kan Merkezi

Informed consent in medical practice is a process in which a health care provider gives detailed information to a patient about the risks, benefits, and alternatives of a given procedure or intervention so as to enable the patient to participate in decisions about his/her own treatment. Informed consent relies on establishing a clinician-patient relationship that promotes shared decision making. Essential components of the informed consent process include patient competence; patient understanding of risks, benefits, and alternatives; and patient consent given willingly.

Informed Consent for the Patients

Patient involvement and choice about medical treatment has become an important part of medical care. Blood transfusion is a common intervention in the hospital setting and has its own serious risks and complications. Informed consent for blood transfusion is a requirement for the American Association of Blood Banks (AABB) and International Society of Blood Transfusion (ISBT). Specifically, AABB standards indicate that at a minimum, elements of the consent shall include the following: (1) a description of the risks, benefits, and treatment alternatives (including no treatment), (2) the opportunity to ask questions, and (3) the right to accept or refuse transfusion.

According to the Code of Ethics released in 2017 by ISBT, in addition to equitable access to treatment, the patient has a right to expect that her/his autonomy is respected, and that a decision to transfuse is made for her/his benefit and avoids the risk of unnecessary or unreasonable harm to her/him.

· Specific consent must, where feasible, be obtained prior to the transfusion.
· The consent should be informed and information must be provided in a comprehensible way
on the known risks and benefits of blood transfusion and any possible alternative therapies in order to enable a decision whether to accept or refuse the procedure.
· If informed consent cannot be obtained for a reason, the decision of transfusion must be in the best interest of the patient.
· Transfusion therapy must be given under the overall responsibility of a registered healthcare Professional who is competent to do so.
· Patients should be informed if information becomes available following a transfusion that indicates they have, or may have been, harmed by the transfusion.
· Information concerning the patient and the treatment that they receive should be managed in a confidential manner.
· Patients should be treated equitably for the same healthcare condition. This implies that medical decisions relating to transfusion of *blood* should be based on the best available evidence and treatments for patients.
· The patient should, within the constraints of the local health system, receive the most appropriate blood product that is available. As far as possible the patient should receive only those particular products (whole blood, cells, plasma, or plasma derivatives) that are clinically appropriate and afford optimal safety.
· There should be no financial incentive to prescribe *blood*.

In concordance with AABB and ISBT, the National Turkish Guide regarding the use and

production of blood components also states that informed consent should be obtained from patients before transfusion. The patients should be informed about the benefits, risks and long and short term complications. They should be allowed to ask questions and clear explanations should be made by the health professionals in order to make sure that the patient is informed properly. The process ends with the completion of a written consent form which should be signed by the patient. All conscious and component patients above 18 years of age should sign the form themselves otherwise a legal representative should do so. The Blood Transfusion Informed Consent Form shall at least include the following:

· Blood products or derivatives (red blood cells, plasma, platelets and others) could be used and additional process (filtration, washing, and irradiation) could be applied to the blood products.
· The benefits, risks and alternative treatment options should be explained.
· All products will be tested and prepared according to the legal, ethical and best scientific knowledge but they can still face allergic reactions, immunologic and microbiological complications in the short and long term and even death.
· They should be allowed to ask questions.
· The patient or the legal representative signature indicates that they have
  - discussed the risks and benefits of blood transfusion and of any alternative blood product therapies
  - consented to such blood transfusions (blood products or derivatives)

Informed Consent for the Blood Donor

Blood is a medical product of human origin and its availability is strictly dependent on the contribution of the donor who gives blood for the benefit of others with no physical benefit to her/himself. Donor is defined any person who voluntarily gives blood or blood components. According to ISBT code of ethics, the contribution of the donors and their donation must respected and that all reasonable steps are taken to protect their health and safety and that appropriate safeguards are in place to ensure that the products derived from the donation are used appropriately and equitably for the patients. The autonomy and dignity of the donor, including potential donors, must be respected at all times. The donor does not physically benefit from the donation, thus the donor should be exposed to as little harm as possible.

· The donor must expressly provide consent to the donation of *blood*. The consent must be informed. Informed consent should include: knowledge of all known risks associated with the donation, of the subsequent legitimate use of the donation and of how information pertaining to the donor and donation will be treated confidentially. The consent should, where appropriate, include information on possible commercialization of the products derived from the donation and whether the donation might be used for research, quality control or any other purpose.
· Blood donation should be voluntary and non-remunerated.
· Any form of incentive that might influence to donate blood should be discouraged and must be prohibited.
· Information provided by the donor and generated about the donor must be treated confidentially. The donor should be informed in advance of the release of any such information.
· Blood donor selection should be based on current, accepted and regularly reviewed scientific data. Donor selection criteria must be applied to protect the health of recipients and donors. Donors must be made aware of their responsibility not to harm the recipient.
· Donors must be informed if they have, or may have been harmed or in the event that any results or information regarding their donation may have an impact on their health.
· The decision to administer any substance or medicine to a donor for the purpose of increasing the concentration of specific components of the blood or for any other reason should take into account that there is no benefit to the donor. This should only be considered when there is good evidence of specific

benefits to the recipient, or in the context of research approved by an Ethics Committee and when the donor has been informed of all known risks and these have been reduced as far as is possible.
· Anonymity between donor and recipient should be ensured except when both donor and recipient freely and expressly consent otherwise.
· Donated blood should be seen as a 'community good' thus the establishment and running of a
· Blood Service should be based upon not-for-profit principles.
· Blood and blood products should be considered as a public resource. Access to the products should be based on clinical need and discrimination of any type should be avoided.

According to the World Health Organization (WHO) Guidelines, Blood donor counselling is defined as a confidential dialogue between a blood donor and a trained counsellor about issues related to the donor's health and the donation process; it may be provided before, during and after blood donation. There are four stages during the blood donation process when counselling should be provided to all blood donors, as shown in Figure 1.

1. Pre-donation information before an individual registers for blood donation.
2. Pre-donation counselling during the confidential interview for medical history, health and TTI risk assessment.
3. Counselling during blood donation.
4. Post-donation counselling after blood donation and testing of donated blood for blood group serology and markers of infection.

The donor's informed consent to blood donation should be obtained at the pre-donation counselling stage (Figure-1). This consent indicates that the donor has understood the questionnaire, has provided truthful answers, understands his/her blood will be tested for TTI and blood groups, and is willing to donate blood. The steps in obtaining informed consent from the blood donors are described in WHO Guidelines on Blood Donor Counselling.

1. Ensure audio and visual privacy and explain that confidentiality is always respected.
2. Every facility should have a policy in obtaining informed consent and it should be followed.
3. Counselling includes maintaining good communication, listening carefully and addressing the donor's concerns, giving time for them to understand the messages you plan to communicate, and allowing them to make their own decisions.
4. Counter-check with the prospective donor if they would like to consult with another person, such as a family member, before making a decision. Do not pressure them to make a decision before they are ready.
5. Give all the necessary information on the donation process and the related tests that will be performed, including:
    a. The donation process and potential adverse donor reactions
    b. The laboratory tests to be performed (TTI, blood group serology and other) on the donated blood
    c. Information on confidential unit exclusion
    d. The reasons why these tests will be performed
    e. The clinical and prevention benefits of testing for TTI and the potential risks of a positive test result
    f. The referral services that are available in the case of abnormal test results, including whether treatment is available or not
    g. The fact that the test results will be treated confidentially and will not be shared with anyone

other than health-care providers directly involved in providing services to the person concerned (in case a notifiable diseases is involved, it should also be communicated beforehand)

h. The importance of disclosure of the TTI result to other persons who may be at risk of exposure to prevent further spread and to ensure early treatment
i. The information that a sample of the blood might be used for the purposes of quality assurance, additional tests or research.

6. Ask the donor if they have any questions, and answer them.
7. Counter-check whether the donor has understood the consent by asking them to repeat the points that may be difficult or important, or by using other words to reiterate the most important issues.
8. Correct any misunderstandings.
9. Document the informed consent, either on a consent form or, if the consent was oral, add a note in the donor file.

WHO guidelines also indicate that all counselling activities provided by the blood service require regular monitoring and evaluation to ensure compliance with SOPs as part of a quality system, to assess the BTS capacity to provide counselling, and determine their impact on building a pool of regular voluntary non-remunerated blood donors. Both qualitative and/or quantitative methods could be used for monitoring. Donor satisfaction surveys are frequently used. Measuring the average length of various types of counselling sessions is an example of quantitative monitoring. These data can be used as a baseline and to follow-up on the indicators by which counselling can be assessed so that measures can be taken for improvement.

The National Turkish Guide regarding the use and production of blood components indicates that informed consent must be obtained prior donation process and this should be documented by an informed consent form signed by the donor. The informed consent should include the following:

· The reason of applying donor questionnaire and obtaining informed consent before donation.
· They are legally responsible of providing truthful information during donor questionnaire.
· The process of donation and the possible risks should be explained.
· They can ask questions at any time.
· The donor can choose to give up donating blood without providing any reason at any time before, during and after the donation process.
· The donor should comply with the medical advices and guidance of the authorized health professionals.
· The personal information, medical information and the test results of the donor will be treated confidentially.
· All necessary laboratory tests will be done.
· A deferral decision could be made after medical evaluation and laboratory tests.
· The donor will be informed in case of a positive test result.
· Blood products derived could be given to any patient according to the clinical need.
· The donor should understand that by signing the consent form they accept that they have
  - read and understood the information and the questions on the consent form and the donor
  - questionnaire form and accepted that the conditions indicated shall be met.
  - had the chance to ask questions and that their questions were answered clearly. consented the donation process.
  - provided true and actual personal information.
  - understood that they could be deferred permanently in case of any risk in medical evaluation.

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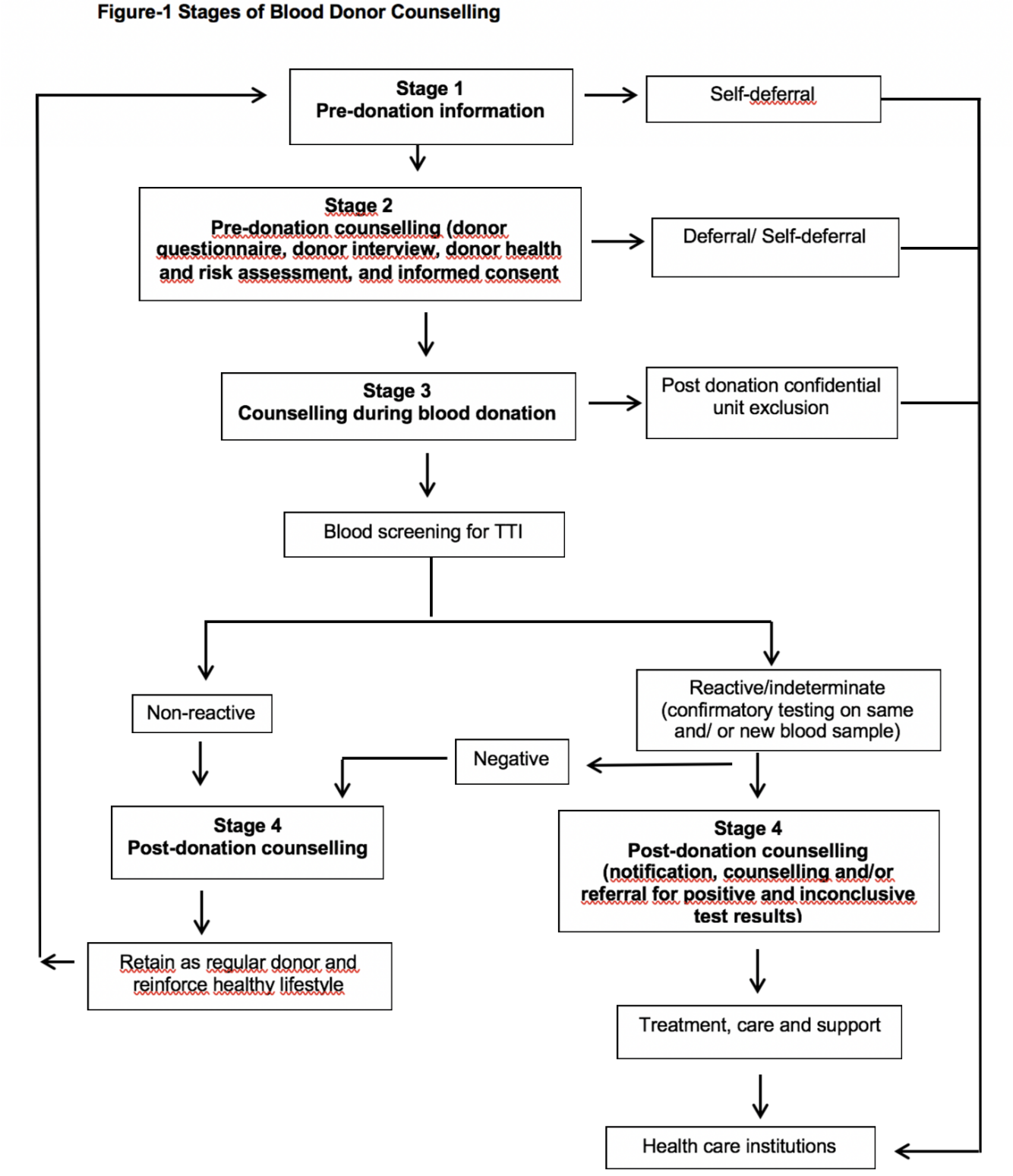
Figure-1 Stages of Blood Donor Counselling



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EDUCATION AND TRAINING FOR BLOOD BANK EMPLOYEES

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In our country, the new "Blood and Blood Products Code" has been published in the Official Journal on 11.04.2007, under the law number 5624. In this regard, "Blood and Blood Products Regulation" number 27074 has been published and came into force on 04.12.2008, allowing Turkey to correspond to European Union Commission's propositions. In this crucial field, supplying and the transfusion of the blood can only be guaranteed by working with qualified personnel. Also, in order to prevent the role conflicts and assure that every position has a qualified personnel working on that specific position, Ministry of Health issued a certificate programme on 04.02.2014 under the name of "Field of Medicine Certificate Educational Standards No:SASES-71 and Last Revision 3" in the Of ficial Journal. The standards specify the eligible personnel that can participate in the programme, which lasts between 40 to 100 workdays (Table1). This certificate programme plays an educational role on the standardization of providing, processing, storing, transporting and tracking safe and sufficient blood products, as well as using the blood products efficiently and properly. National standards and guides have been published on the ministry's e-portal under the name of "Technical Support Project to Strengthen the Blood Supply Chain in Turkey" in 2016, in order to ensure the maintainability. These four extensive guides (National Standards Guide for Blood Service Units, Quality Administration System Guide, Hemovigilance Guide and Preparation and Usage of Blood and Blood Products National Guide), are the core syllabus of the certificate programme. Our programme is supported by our competent professors and their publications, Blood Banks and Transfusion Society of Turkey's publications, and Turkish Red Crescent's contributions. The ones who successfully finish the course, follow the scientific researches and new legislations on this field as well as transfer their new knowledge to their practice, thus improve their institution's quality. Since it is fundamental to obtain the maintainability of training, these educated personnel organise in-service training in their institutions for the other departments to improve themselves as well. These trainings need to be done periodically and should address the communication skills, data management, medical device management, biosafety, stock management etc.

The blood centers which work for 24 hours a day, also carry on laboratory tests in order to ensure the safe blood transfusion. The personnel in charge in such centers who work after hours need to get paid accordingly to prevent the loss of qualified personnel force. This will result in new personnel to apply for the certificate programme and it will reflect as workforce loss to the institution. So, who should apply to the programme, how long is the programme, and how is the evaluation?

CERTIFICATE PROGRAMME APPLICANTS AND THEIR QUALIFICATIONS

Since there is too much demand for the course, the personnel who currently work at a Blood Service Institution will be in priority while accepting.

The following can apply to the programme:
1-Field specialists who;
 a.Completed their Adult Hematology Specialization before the date of 04.06.2013,
 b.Completed their Pediatric Hematology-Oncology Specialization before the date of 09.06.2015,
 c.Graduated from a medical school and completed their Medical Microbiology Specialization before the date of 24.03.2016,
 d.Completed their Infectious Diseases and Clinical Microbiology Specialization,
2-Other Specialists,
3-General practitioners who will work at a blood center,
4-General practitioners who will work at a transfusion center and regional blood centers
5-General practitioners who will work at a regional blood center as the practitioner in charge,
6-Laboratory personnel who will work at a blood center (authorized personnel by the law number of 1219),
7-Personnel who will work at blood centers as phlebotomists:
 a.Laboratory technicians,
 b.Health officer (educated on community health),

c.Nurses,
d.Midwives who are authorized as nurses.

SUBJECTS WORTHY OF NOTICE DURING THE PROGRAMME

1- The participants can not be employed in any other field / institution / center in the course of education programme
2- It is crucial to continue the programme. If a participant is absent in the theoretical part of the course more than 10%, under no circumstances, they are not allowed to participate in the practical lessons and their course gets terminated.
3- If the course is terminated due to the discontinuity of the participant, they are not allowed to take neither the written nor the practical exam.
4- If a person does not start the programme or is terminated according to the matters mentioned above, they are not allowed to apply for the course for another year.

THE SYLLABUS OF THE PROGRAMME

Parallel to the developments in medicine, Blood Center and Medical Transfusion field expands with the other disciplines. As known, these subjects are usually neglected in university programmes, and the participants in our programme do not feel sufficient at the beginning. The best indication to this is the before and after quizzes.
The educational programmes and their durations are prepared according to the participants' qualities. The main three headlines are:

1- Theoretical Education
2- Practical Education
3- Field Application

They all have predetermined durations.
The education programme includes the following topics:

- The History of Blood Banking and Transfusion
- Basics of Immunology
- Standards of Blood Services
- Biosafety Basics for Blood Services
- National Guides for Blood Services
- Selection of the Donors and Donor Gaining Programmes
- Phlebotomy
- Microbiological Screening Methods
- Preparation of the Blood Products
- Storage and Transport of the Blood Products
- Microbiologic Verification Tests
- Donor Apheresis
- ABO Blood Grouping Systems
- Rh Blood Grouping Systems
- Grouping Systems other than ABO-Rh
- Antibody Screening and Identification
- Suitability Tests
- Transfusion in Immunodeficient Patients
- Transfusion in Emergency Situations
- Massive Transfusion
- Infectious Diseases that are Transmitted with Transfusion
- Immunohematological Tests in Newborns
- Transfusion Indications and Choosing of the Component
- Transfusion in Pediatrics
- Transfusion Reactions and Complications
- Autolog and Forwarded Transfusion
- Additional Procedures Applied to the Blood Products (Irradiation, Filter, Washing)
- Quality Control for Blood Service Institutions
- Haemovigilance

- Mandatory Archives and Administrative Legislations
- Inspection of the Blood Services and Preparation for Inspection
- Calibration Activities
- The Equipments Used in Blood Centers - Preparation of Contracts

DURATION OF THE PROGRAMME

(Table 1)

Partiripant Group	Education Programme	Total Education Duration	
		Hours	Work days
Infectious Diseases and Clinical Microbiology Pediatric Hematology-Oncology Adult Hematology Medical Microbiology Specialists	Theoretical Education	40	5
	Practical Education and Field Application in Regional Blood Center	104	13
	Practical Education and Field Application in Transfusion Center	176	22
	Total	320	40
Education Duration for other Specialists	Theoretical Education	40	5
	Practical Education and Field Application in Regional Blood Center	160	20
	Practical Education and Field Application in Transfusion Center	280	60
	Total	480	60
General Practitioners Working in Blood Centers	Theoretical Education	24	3
	Practical Education and Field Application in Regional Blood Center	120	15
	Practical Education and Field Application in Transfusion Center	16	2
	Total	160	20
General Practitioners Working in Blood Centers and Practitioners Working in Blood Centers That Are not in Charge	Theoretical Education	40	5
	Practical Education and Field Application in Regional Blood Center	160	20
	Practical Education and Field Application in Transfusion Center	280	35
	Total	480	60
General Practitioners Working in Regional Blood Centers That Are in Charge	Theoretical Education	40	5
	Practical Education and Field Application in Regional Blood Center	440	55
	Practical Education and Field Application in Transfusion Center	320	40
	Total	800	100
Laboratory Personnel Working At a Blood Center (Authorized Personnel by the Law Number of 1219)	Theoretical Education	40	5
	Practical Education and Field Application in Regional Blood Center	104	13
	Practical Education and Field Application in Transfusion Center	176	22
	Total	320	40
Personnel Working at Blood Centers as Phlebotomists	Theoretical Education	24	3
	Practical Education and Field Application in Regional Blood Center	120	15
	Practical Education and Field Application in Transfusion Center	16	2
	Total	160	20

THE EVALUATION OF THE PROGRAMME

Theoretical education, field applications and practice evaluation forms are evaluated at the end of the education duration with written and oral exams. Certificates are arranged accordingly.

CERTIFICATE VALIDITY PERIOD

The validity period of the certificates are five years as of registration date.

RENEWAL CRITERIA OF THE CERTIFICATES

In order to renew the certificate, the person should apply six months prior to the final date of the certificate, and should document with a superior's signature that they have been working at a licenced blood center institute for the past two years.

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TRANSFUSION MEDICINE TRAINING FOR CLINICIANS

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"Blood Banking and Transfusion Medicine" has not yet been accepted as a separate specialty in our country. Novadays, long life expectancy, development of treatment methods, transfusion of blood components, apheresis and cellular therapy procedures have led to more widespread use. While proper use of blood products can be lifesaving, inappropriate clinical use can result in serious morbidity and even death. In order to eliminate possible errors in transfusion applications, transfusion training is needed to address physicians' areas and needs. Since blood banking and transfusion medicine are a multidisciplinary field, a specific training and qualified trainers are needed with a good schedule.

Education is a systematic process for established purposes to provide specific improvements and improvements in people's thoughts, attitudes, behaviors and lives. The purpose of medical education is to train qualified physicians who can respond to public health and country needs by providing physicians with the knowledge, attitude and skills necessary for a certain competence and who can contribute to the development of medical science. Medical education goes on through life. Speciality, subspecialty, and continuing medical education programs should be established in different aims and objectives in order to gain competencies appropriate to the professional fields of physicians.

Adult students over the age of 25 demand different teaching techniques. Adults are willing to learn when they have the responsibility to learn and to the extent, they need the knowledge. Adults are concerned with the information and education environments that apply to the realities of themselves and their business environment.

In order to improve the education and training provided in medical faculties in our country and to raise them to international standards, the National Core Education Program (NCEP) has been developed for the Curriculum of the Faculty of Medicine. In this curriculum, it is aimed that medical school graduates can transfusion blood products in emergency situations and to refer them to a specialist doctor after making the first intervention by making a preliminary diagnosis when transfusion complications occur.

In the multicenter study conducted by the Turkish Society of Hematology, "Transfusion Medicine and Apheresis Master Class", a questionnaire was applied to 727 of 3009 interns in 13 medical faculties. The questionnaire focused on the safety of blood transfusion administration. The questions were prepared based on learning objectives for transfusion medicine curriculum. A large proportion of medical students did not have adequate theoretical knowledge or self-assessed practical competency in transfusion medicine. When the medical faculty curriculum in our country was examined, it was seen that theoretical and practical educations were not standardized.

Many studies evaluating transfusion medicine education in different countries have revealed a lack of standardization between countries and even within faculties in the same country, at both the undergraduate and postgraduate levels.

When evaluating the current curriculums and training practices in our country and all over the world, it should be taken into consideration that the assistants who will begin specialization training in different disciplines do not have sufficient knowledge of transfusion medicine.

When the postgraduate programs are examined in our country; transfusion medical learning goals are seen in the emergency medicine, pediatrics, general surgery, anesthesiology, pediatric intensive care, pediatric hematology, and hematology specialization areas. However, learning goals have limited for the needs of experts who will work in these areas.

Learning goals for hematologists are as detailed as a transfusion medicine specialist. With the Turkish Society of Hematology study, it was determined that the appropriate time and learning environment to achieve access to these goals cannot be implemented in the educational application.

Transfusion medicine is not included in the education curriculum of areas such as pediatric surgery, internal medicine, orthopedics and traumatology, otolaryngology, plastic and reconstructive surgery, neurosurgery, gynecology and obstetrics, cardiovascular surgery, and oncology where intensive blood transfusion is performed.

Transfusion medicine education is possible with educational programs organized by the ministry of health, associations, and universities. Although transfusion medicine postgraduate and doctorate programs create programs within universities to meet the needs of educated physicians, it is not sufficient.

Transfusion medical applications are one of the most widely used treatment methods. Even if transfusion medicine specialists are enough in number, every clinician should have the knowledge of transfusion medicine appropriate for their field of expertise. Training programs should be created specifically for the elimination of educational deficiencies in the field of transfusion medicine for internal medicine, pediatrics, anesthesia, intensive care, emergency medicine, and surgical branches. It may be a useful step to bring together physicians interested in transfusion medicine and clinicians from different disciplines in joint training programs. Training programs should be made considering the daily work intensity of physicians, thus increasing the attendance and continuity of these programs. Following these training, supporting continuous medical education in this field. Education is different from teaching. After the training, it is assumed that the participants will apply the acquired knowledge in their daily practices, and it is aimed to create a change in skills and attitudes. Therefore, monitoring the attitude and behavior change of physicians in daily transfusion practices can help make education permanent.

There are very successful examples of postgraduate education in the world. At Turkey, training programs can be organized to increase their professional knowledge, administrative skills, and business development skills in the field of blood banking and transfusion medicine, as demonstrated by successful examples in other countries. The number of subjects related to transfusion medicine should be increased in undergraduate and graduate academic programs and the curriculum should be designed according to the learning needs of clinicians.

The educational models, certified courses, and seminars should be structured within local hospital can make a significant contribution to education. The participations in central training programs may be limited due to factors such as physicians' workload, lack of time, and the obligation to travel for the training. For clinicians with the intensive workload and time constraints, distance learning programs may be a good option to address information gaps. Also, the Transfusion Committee at the hospital should increase its periodical audits on transfusion practices and implement feedback strategies to improve blood transfusion surveillance.

EDUCATION AND TEACHING IN TRANSFUSION MEDICINE

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Education and Training for Nurses

The success of health protection, development and improvement efforts is undoubtedly possible by changing people's knowledge, thought and value judgments. In this change, health education makes individuals and communities realize their health problems, and shows the solution and alternative of the problems (1).

The developments in science and technology, as in other fields, require the continuous training of healthcare personnel in order to follow up the innovations instantly and keep up with these innovations (2).

It is known that a significant portion of the transfusion complications seen today, including developed countries , are of human origin. Although the extent of medical errors in our country is not known exactly, it is thought to be in parallel with the world countries.

The transfusion process requires a multidisciplinary study as it has a complex structure that includes many interconnected event chains.

In recent years, many measures have been taken to minimize or even eliminate blood safety and errors in the clinical transfusion process (3).

It is known that conditions affecting patient / blood safety occur mostly in the process after the blood leaves the blood service unit and in the transfusion process.

Error Status and location	%	Source
In the blood bank	13	Sharma , Kumar, Agnihotri (2001)
Out of blood bank	86.99	Sharma , Kumar, Agnihotri (2001)
Life signs are not being followed sufficiently	50	Chatterjee M.Warning (2004)
Blood bag identification errors	55	Fuji and friends (2009)
The errors related to the reporting of transfusion errors are related to nurses in the wards.	75	Callum et al (2004)
Error rate in identity check and blood tube labeling	80	Sharma , Kumar, Agnihotri (2001)
Incorrect communication before transfusion	6	Patient Safety Authority (2010)

Among the conditions that adversely affect the transfusion process, the patient is not identified correctly, inadequate communication, inadequate monitoring, incorrect barcoding and reporting errors

It shows that errors related to blood transfusion are frequently caused by the practitioner and occur during the transfusion process (4,5). According to SHOT annual reports, the most common risk of transfusion is wrong blood transfusion.

Nurses are responsible for ensuring the transfusion of blood and blood products safely and in accordance with national and international standards .
In order to maintain nursing practices effectively , accurately and safely , education is very important before and after graduation.

Education Before Graduation

When the course curricula of public and private universities that provide undergraduate education in our country in the field of nursing are examined, it is seen that the subjects are given under the title of Nursing Care in Blood Transfusion or Blood Diseases (6).

4-year nursing education covers at least 4600 hours of theoretical and practical education. When these programs are analyzed, it is seen that there are 100-150 minutes in the first semester and 50 minutes in the second semester.
In school, more time should be devoted to areas such as transfusion practices that directly affect patient safety in the practical education department as well as theoretical education.

It is very important to ensure that nurses at every stage of transfusion practices have sufficient knowledge before graduation.

Post Graduation Trainings

The Ministry of Health has a Blood Banking and Transfusion Medicine Certified
Training program for nurses who will work as a phlebotomist in the blood service unit . The duration of this training is determined as 20 working days and consists of two stages: theoretical and practical.

In our country, the studies of nurses evaluating their knowledge levels about blood transfusion applications increase rapidly (7).

When the nurses start their work, within the scope of transfusion practices, patient / blood control, use of the transfusion follow-up form, transfusion complications and empty bag destruction trainings are given in collective and individual in-service trainings.

The knowledge levels of nurses regarding blood transfusion practices are influenced by factors such as the number / content of in-service training, the year of study, the department studied, the frequency of transfusion, the level of education, age and communication, and deficiencies.

Although the responsibility of the transfusion decision belongs to the attending physician, patient safety in blood transfusion is the responsibility of all personnel involved in the clinical transfusion process (8).

Sample Application

Istanbul Provincial Directorate of Health Public Hospital Services Department, Turkey Blood Centers and Transfusion Association and the Turkish Blood Foundation in 2014 with the cooperation (in drawer) for nurses,

basic blood banking and transfusion medicine training was conducted. It is aimed to emphasize the importance of traceability and to improve the knowledge and skill levels of nurses in the field of transfusion medicine to ensure transfusion safety. The Çekmece region served in 2014 with 3.4 million inhabitants and 8 hospitals. Responsible nurses and other nurses working in clinics that use the most blood are included in the training.

In the in-service training program, trainings were given on the definition of blood component, preparation, storage, transportation of blood component, blood groups, pre-transfusion suitability tests, administrative and legal status in blood banking, transfusion applications, transfusion indications and transfusion complications.

Considering the results of the questionnaire conducted after the training, the majority stated that pre-graduate education was not sufficient, that he did not feel sufficient in the first transfusion application in the clinic, he improved the transfusion practice and knowledge with the help of his more experienced colleague and contributed to the individual development of education.

After the second training in March 2015, Transfusion Follow-Up Nurses were determined. In order to ensure patient and blood safety, in the process of blood after the blood center, they started blood request forms, consent form, blood exclusion time, reaction tracking, transfusion follow-up forms, orientation training and other preventive activities.

For example, it has been observed that Transfusion Follow-Up Forms are not fully filled in operating rooms and intensive care units. This situation has shown that there are problems in the traceability process, which is one of the main goals of hemovigilance.

In April 2015, Transfusion Follow NURSING i application, which is initiated sent to the clinic from the blood service units and used erythrocyte suspension to a the push Transfusion Watch Form ratio reached up to 53% and were taken to the evaluation.

Looking at December 2015, it was seen that the rate of Transfusion Follow-Up Form evaluated increased to 93.7% .

Important steps have been taken to maximize patient and blood safety through in - service trainings after graduation and it has been observed that the adaptation process to the 2016 National Hemovijilance Guide has been accelerated.

The Ministry of Health wants the law to be known and implemented by all relevant healthcare professionals, by issuing laws and regulations regarding blood banking practices and ensuring compliance with the legislation.

Directive 2005/61 / EC ;

It is reported that systems that allow blood to be monitored from each donor to the end user should be placed in each unit.

Law

According to clause c of Blood and Blood Products Law Paragraph 1 of 11/04/2007 and numbered 5624, in the section on general principles regarding blood, blood components and products, '' It is essential not to be compromised, to protect against medical risks, to make the transfusion safely and to monitor the donor and recipient after the transfusion. It is obligatory to report the complications that may arise in the receiver and the

transmitter. (9). The outputs of these trainings coincide with the legislation section

2016 in the National Hemovijilance Guide

With the National Hemoviation Guide published in 2016, the Actors of the Hospital Level Hemovilance System are defined as the Transfusion Committee, Hemovilance Clinic Officer, Hemoviation Nurse, Hemoviation Coordinator.

Nurses working as Transfusion Follow-Up Nurses in our hospitals continued to work as the Hemovijilance Nurse after the guide was published. The transition of hospitals with Transfusion Follow-Up Nursing to the National Hemovijilance Guide has been faster and more compatible

Compliance with the guideline took a long time in hospitals that did not provide in-service training to patients and nurses in the field of blood safety, and did not have Transfusion Follow-Up Nursing.

The transfusion process is a multidisciplinary process, and the coordination of the whole team, the level of knowledge and skill ensure maximization of patient and blood safety.

Although the duties and responsibilities of hemoviral nurses are defined in the guide, but not in a basic education program (before and after graduation) and hemoviral nursing, it is also a problem for nurses to experience different practices among hospitals.

The Ministry of Health needs to establish a certified training program for the standardization of the service in this area Consequently, in order to improve patient care quality, it is necessary to support information and behaviors and to give more importance to blood transfusion in education programs.

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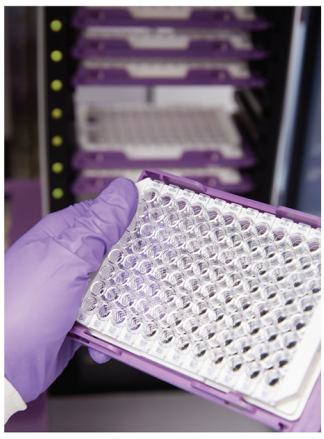

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MICRO RNA'S IN MACRO WORLD

Chairpersons: **Davut Albayrak**
Reha Masatlı

Speaker: **Duran Canatan**

MICRO RNA'S IN THE MACRO WORLD

Duran CANATAN
Antalya Genetik Hastalıklar Tanı Merkezi Müdürü, Antalya

Macro World: We can measure the size of macro world, the other name of the universe in the following numbers, it is defined as 300 synstions: $3x10^{23}$ stars, means after 3, 23 zeros in universe.

Interesting notes from the macro world; We can observe the part that makes up the stars and planets is only five percent of the known universe. The remaining ninety-five percent are dark matter (27 percent) and dark energy (68 percent) means that we do not have general information about ninety-five percent of the universe.

Besides the size of the universe, the speed of light which is 300,000 km per second remains very low. It can take millions or even billions of years for light from far to reach our world. Looking at the sky on a starry night also means looking at the past. The Nasa Hubble Space telescope can see 13 billion years ago.

Our bodies carry the cosmic remains of the big explosion that formed the universe 13.8 billion years ago. We are all star dust. Many of the elements that make us from calcium in our bones to iron in our blood were formed in the nuclei of stars that exploded billions of years ago and spread into space as large dust clouds and reached our solar system.

Out of 99.9999999 percent of the substance is gaps, If we pressed to destroy the gaps between our atoms, 7.7 billion people on our planet will fit into a cube of sugar (**1**)**.**
The total number of cells in humans is known as 3.72×10^{13}, each cell contains 2 meters of DNA and 3.5 billion Adenine, Guanin, Timin and Cytosin (AGTC) nucleotides. If we opened the bend of the DNA double helix in the cells of our body, its length would be 55 billion km, thus, we would travel 6 times from our world to the plato planet **(2).**

Micro RNAS: Micro RNAs (miRNA) are small functional RNA molecules, approximately 18-24 nucleotides in length, provided by transcription from the RNA genes in the genome-encoding intron or exon regions and protein-free regions, but do not perform protein translation.

These protein-noncoding RNA molecules bind to target Messenger RNA (mRNAs), which are complementary to their nucleotide sequences, and regulate post-transcriptional gene expression by translational suppression or mRNA degradation. Using this pathway, MiRNAs play an important role in homeostatic processes such as cell proliferation, cell differentiation or cell death.

Gene regulation in biology has traditionally concentrated mostly on genes encoding DNA / mRNA / protein production. However, in whole genome sequencing studies, approximately 1,5-2% of the total RNA molecule is responsible for protein coding, while a large portion is called non protein coding RNA (npcRNA**) (3,4,5).**

Classification of Noncoding RNAs. NcRNAs are classified into three categories according to their structural or regulatory properties and size. This length, arbitrarily set to the number nucleotides (nt), corresponds to the threshold of sensitivity of RNA extraction methods and can differentiate lncRNAs from short and medium ncRNAs such as microRNAs (miRNAs), small nucleolar RNAs (snoRNAs), and piwi RNAs (piRNAs) (5). **(Table 1)**

Table 1: Type and main function of non-coding RNAs (5).

Type	Size (nt) and Functions
Short ncRNAs	**19-31**
miRNA	Targeting of mRNAs, regulation of proliferation, differentiation, and apoptosis involved in human development.
siRNA	Posttranscriptional gene silencing; defense against pathogenic nucleic acids.
tiRNA	Regulation of transcription by targeting epigenetic silencing complexes.
piRNA	Transposon repression, DNA methylation, development of germ cell, stem self-renewal, and retrotransposon silencing
Tel-sRNA	Epigenetic regulation
Mid-size ncRNAs	**≤ 200**
snoRNA	rRNA modifications
PASR	Regulation of the transcription of protein-coding genes
TSSa-RNA	Maintenance of transcription
PROMPT	Activation of transcription
crasiRNA	Recruitment of heterochromatin and/or centromeric proteins
Long ncRNAs	**≥ 200**
lincRNA	Involvement in biological processes such as dosage compensation and/or imprinting.
Intronik IncRNA	Possible link with posttranscriptional gene silencing
T-UCR	Regulation of miRNA and mRNA levels and antisense inhibitors for protein-coding genes or other ncRNAs
TERRA	Negative regulation of telomere length and activity through inhibition of telomerase
Pseudogene RNA	Regulation of tumor suppressors and oncogenes by acting as microRNA decoys
lncRNAs with dual functions	Modulate gene expression through diverse mechanisms

History of miRNA: Lee et al. published a non protein-coding a small RNA with 22 nucleotide length named Lin-4 in a roundworm Caenorhabditis Elegans in 1993 **(6).** Reingart et al.identified a microRNA called Let-7 with 22 nucleotides in Caenorhabditis elegans in 2000 **(7).**

Formation of miRNAs: Micro RNA formation occurs in three steps. In the first step, primary miRNA (primiRNA) from genomic DNA in nucleus, in second step, precursor miRNA (pre-miRNA) from premium RNA in nucleus, and in the third step, mature miRNAs occur in the cytoplasm.

In the nucleus, pri-miRNA is synthesized from genomic DNA by the RNA polymerase II enzyme, converted to pre-miRNA, which is about 70 nucleotides in length by Drosha and its cofactor Pasha (DGCR8), an endonuclease of the pri-miRNA RNAase III enzyme family.

The pre-miRNA molecule is transported to the cytoplasm by Exportin 5, a nuclear transport receptor and RAN-GTP which a nuclear protein.

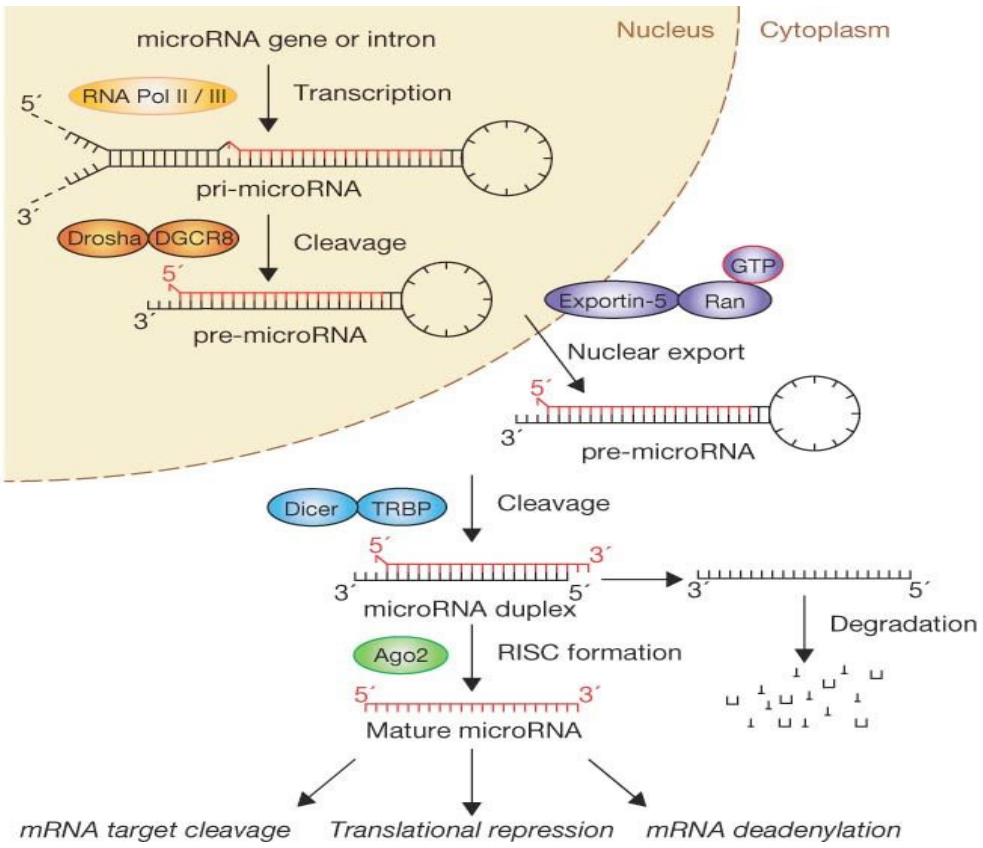
In cytoplasm, Pre-miRNAs are cut into an 18-24 nucleotide-length and converted to double chain miRNA by the endonuclease called Dicer from the RNA az III enzyme family.

Dicer also initiates the formation of RNA-induced silencing complex (RISC). Only one of the miRNA duplex is included in the RISC complex after the Dicer has cut the stem loop of the pre miRNA.

With the effect of argonuate, which is an RNAase in the RISC complex, 5 'ends of these two yarns are selected and included in the complex. This thread guide is called thread, other thread is called anti guide or passenger thread.

It is digested as the substrate of the RISC complex. After micro RNAs are integrated into the active RISC complex, they either cause mRNA degradation or suppression of protein translations with the help of argonute proteins **(8,9) (Figure 1).**

Figure 1: miRNA Biogenesis and pathways (9)



The number MicroRNAs: While the number of human miRNA candidates continuously increases, only a few of them are completely characterized and experimentally validated. A total 28 866 human small RNA sequencing data sets containing 363.7 billion sequencing reads and excluded falsely annotated and low quality data. High-throughput analysis identified 65% of 24 127 mature miRNA candidates as likely false-positives **(10)**.

MicroRNA functions: The functions of miRNAs include post-transcriptional regulation of gene expression, metabolic regulation, memory and synaptic development, development of the organism, embryogenesis, organogenesis, differentiation and control of growth, as well as angiogenesis, tumorigenesis, apoptosis and oncogenes. In studies with model organisms, miRNAs have been shown to play a role in the control of embryonic stem cell differentiation, brain development, neuronal differentiation, hematopoietic lineage differentiation and apoptosis **(11).**

Embriyogenesis: The genetic codes inscribed during two key developmental processes, namely gametogenesis and embryogenesis, are believed to determine subsequent development and survival of adult life. miRNAs are expressed in ovarian tissue, granulosa cells, testis, oocytes, follicular fluid, and embryos and are implicated in diverse biological processes such as cell-to-cell communication. Therefore, understanding miRNAs mediated regulatory mechanisms during gametogenesis and embryogenesis provides further insights about the molecular mechanisms underlying oocyte/sperm formation, early embryo development and implantation **(12).**

Organogenesis: During pregnancy in humans, the physiology of the mother and foetus are finely regulated by many factors. Inappropriate regulation can result in pregnancy disorders, such as complications and foetal abnormalities. The early prediction or accurate diagnosis of related diseases is a concern of researchers. Liquid biopsy can be analysed for circulating cells, cell-free nucleic acids, and exosomes. Because exosomes can be detected in the peripheral blood of women in early pregnancy, these vesicles and their contents have become the focus of early prediction or diagnostic biomarker research on pregnancy complications and foetal developmental disorders **(13).**

Body Growth and Development: Body growth and development are regulated among others by genetic and epigenetic factors. MiRNAs are epigenetic regulators of gene expression that act at the post-transcriptional level, thereby exerting a strong influence on regulatory gene networks. Increasing studies suggest the importance of miRNAs in the regulation of the growth plate and growth hormone (GH)-insulin-like growth factor (IGF) axis during the life course in a broad spectrum of animal species, contributing to longitudinal growth **(14).**

Mesenchymal stem cells: Mesenchymal stem cells (MSCs) are multipotent cells that are excellent candidates for different cellular therapies due to their physiological properties such as immunoregulatory function. Moreover, miRNAs have recently been revealed to have serious functions in MSCs to regulate immunomodulatory properties **(15).**

Bioinformative problems in MiRNA studies: MIRNA-DISTILLER is a system that facilitates miRNA bioinformatics and helps focus experimental validation on the most promising candidates. MIRNA-DISTILLER consists of several databases (TargetScan, microCosm and miRDB), selected data for miRNAs that are predicted to interact with a set of target genes, is a stand-alone program that allows for automatic extraction. The software, a data example file and a tutorial are freely available a thttp://www.ikp-stuttgart.de/content/language1/html/10415.asp **(16).**

Macros in microRNA target identification: A genome wide analysis estimates that at least 60% of all genes are regulated by miRNAs. Several in vitro cellular assays have been developed to investigate the phenomenon of target gene repression by miRNAs. The nature of miRNA gene targeting in animals is particularly complex as: (1) miRNA can bind to partially complementary sequences, leading to a large number of putative targets; (2) the majority of miRNA effects on their target genes show only a modest repression; and (3) distinction of first order effects from second order requires elaborate experimental validation of target genes.

Approaches to miRNA target identification:

1.Computational methods of miRNA target prediction: The miRNA–mRNA interactions based on sequence complementarity have made available a large number of genes as possible targets for single miRNAs, while also presenting opportunities for in silico prediction of target genes.

2. Target site conservation: The conservation of the miRNA binding site in the 3′-UTR of the orthologous genes is a significant feature in predicting miRNA target.

3. Thermodynamic stability: Thermodynamic analysis calculates the energy required for the formation of miR NA–mRNA pairs from a completely dissociated state and is denoted as minimum free energy (MFE) for hybrid formation.

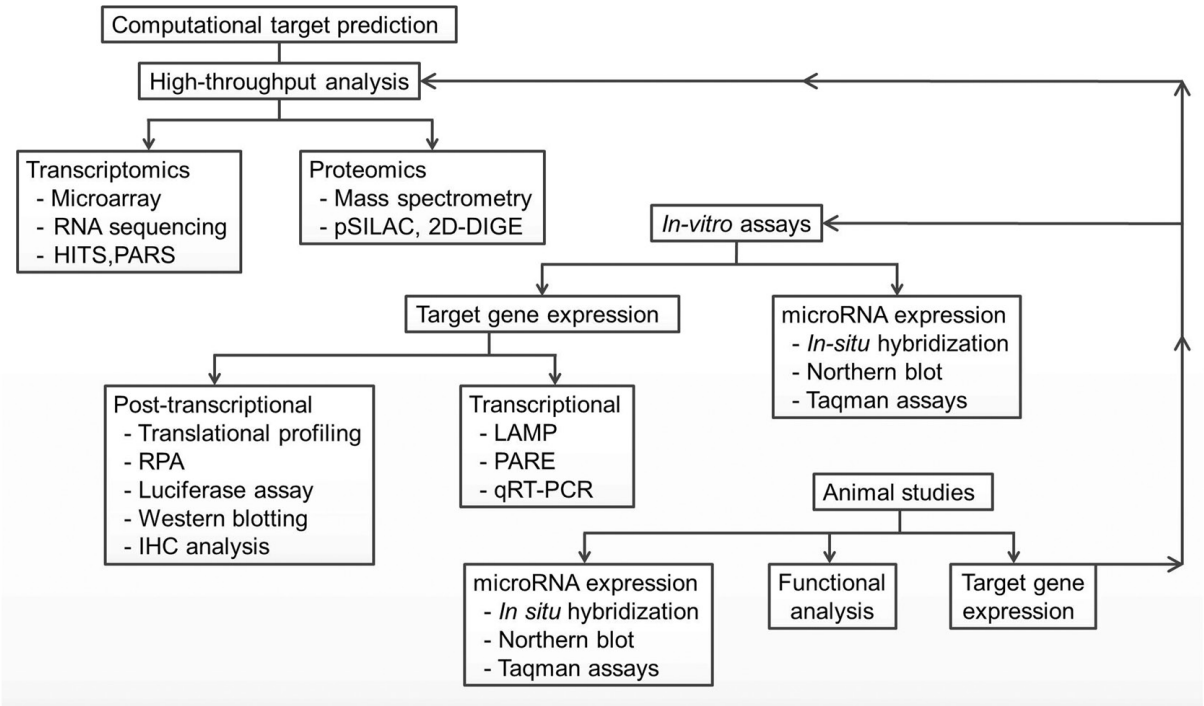
4. Multiple target sites: The algorithms consider that occurrence of multiple target sites will have a dose-dependent effect on target gene expression.

5. Extension of prediction algorithms: Identification of promising miRNA targets is critical in determining the success of future experiments, so concerted efforts have been made to improve the functionality of prediction algorithms.

6.Challenges to computational methods of target prediction: Computer-based prediction methods are valuable in preliminary identification of miRNA target genes.

A schematic representation of the various approaches to identify miRNA target genes and a generalized hierarchical order are shown in **Figure 2 (17).**

Figure 2: Flowchart summarizing the key approaches and major techniques in miRNA target identification (17).



Microarray-based expression analysis is an emerging and powerful strategy for initially identifying candidate miRNAs, which can then be correlated to specific biological process such as carcinogenesis, and eventually developed as a molecular signature for a disease state **(18).**

The two most commonly used methods to analyze data from real-time, quantitative PCR experiments are absolute quantification and relative quantification. The 2n(-Delta Delta C(T)) method is a convenient way to analyze the relative changes in gene expression from real-time quantitative PCR experiments. **(19).**

The gold-standard for miRNA quantification is quantitative reverse transcriptase PCR (RTqPCR) Stem-loop reverse transcription (RT)-based TaqMan microRNA assay is the main PCR technique used in research, with the advantage of having high sensitivity and specificity rates.

This is a two-step method, the first step requiring the binding of miRNA molecules by primers at the 3′ end in order to proceed to stem-loop reverse transcription. For the second step of the technique, real-time PCR is used to quantify the miRNAs targeted. Other available options are direct RTbased and poly (A) tailing-based SYBR miRNA assays.The downside to these techniques is that sensing errors for the samples used can sometimes happen and also, during the amplification steps, there is high risk of contamination **(11).**

If a particular RNA expression is to be analyzed, northern blot or RNase protection assay (RPA) methods are preferred. In situ hybridization method is also used for miRNA detection. However, microarray and quantitative PCR (qPCR) methods are used more frequently because the probe to be used is high and the data obtained are low. In addition, serial analysis of gene expression (SAGE) and deep sequencing techniques are also frequently used in global miRNA profiling studies **(17,18,19).**

The Potential of miRNAs as Biomarkers: In recent years, extraordinary progress has been made in terms of finding the origin and functions of miRNA and their potential use in research and clinical practice, for both healthy and diseased patients. However, probably the most promising role of miRNAs is that of a potential biomarker. Numerous authors have investigated this opportunity in various medical fields. Evidence suggests that they could play an essential role as biomarkers in cancer through exosome-mediated intercellular communication in neurology for the diagnosis and prognosis of Alzheimer's disease, for patients with spinal cord injury, epilepsy or neurodegenerative ailments.

It could also be used in other fields like cardiology, as a faster and more accurate means of diagnosis for acute cardiovascular disease or heart failure and in the case of infectious diseases for the diagnosis of sepsis **(11,20).**

MicroRNA-Based Biomarkers in Patients with Depression: Depression is a debilitating mental illness that affects up to 120 million people worldwide; it is currently determined based on subjective diagnostic schemes that are limited by high uncertainty. Hence, there is an urgent need to identify effective and reliable biomarkers to increase diagnostic accuracy. Dysregulated expression of miRNAs is being investigated as a clinical biomarker for a variety of diseases including depression. Accumulating evidence has shown that miRNAs participate in many aspects of neural plasticity, neurogenesis, and the stress response. miRNAs not only play a key role in the pathogenesis of major depressive disorder, but also present potential for the development of therapeutic targets **(21).**

Infections: miRNAs, play essential roles in regulating multiple biological pathways including innate host defenses against various infections. Recent studies have contributed to understanding the role of miRNAs, the levels of which can be modulated by mycobacterial infection, in tuning host autophagy to control bacterial survival and innate effector function. Despite considerable efforts devoted to miRNA profiling over the past decade, further work is needed to improve the selection of appropriate biomarkers for tuberculosis **(22).**

Viruses are obligatory intracellular parasites that rely on a wide range of cellular factors to successfully accomplish their infectious cycle. Among those, miRNAs have recently emerged as important modulators of viral infections. These small regulatory molecules act as repressors of gene expression. During infection, miRNAs can function by targeting either cellular or viral RNAs. **(23)**

Aberrant expression of miRNAs has the potential to become powerful non-invasive biomarkers in pathological diagnosis and prognosis of different disorders including infectious diseases. Parasite's life cycle may require the ability to respond to environmental and developmental signals through miRNA-mediated gene expressions. Over the last years, thousands of miRNAs have been identified in the helminthic and protozoan parasites and many pieces of evidence have demonstrated the functional role of miRNAs in the parasites' life cycle. Detection of these miRNAs in biofluids of infected hosts as prognostic and diagnostic biomarkers in infectious diseases is growing rapidly **(24).**

Cardiovascular diseases: Heart failure, coronary artery disease and myocardial infarction are the most prominent cardiovascular diseases contributing significantly to death worldwide. Despite several advances that led to the development of biomarkers and therapies based on the renin-angiotensin system, adrenergic pathways, etc, more definitive and consistent biomarkers and specific target based molecular therapies are still being sought.

In the cardiovascular system, miRNAs control functions of various cells, such as cardiomyocytes, endothelial cells, smooth muscle cells and fibroblasts. The pivotal role of miRNAs in the cardiovascular system provides a new perspective on the pathophysiology of disorders like myocardial infarction, hypertrophy, fibrosis, heart failure, arrhythmia, inflammation and atherosclerosis.

MiRNAs are differentially expressed in diseased tissue and can be released into circulation. Manipulation of miRNA activity may influence the course of a disease. Therefore, miRNAs have become an active field of research for developing new diagnostic and therapeutic tools **(25,26,27).**

Metabolic diseases: In a study was determined the associations between miRNA s-target genes, miRNA-long ncRNAs (lncRNA s) and miRNA s-small molecules in human metabolic diseases, including obesity, type 2 diabetes and non-alcoholic fatty liver disease**.**The metabolic disease-related miRNAs were obtained from the Human MicroRNA Disease Database (HMDD) and miR2Disease database. As a result, a total of 20 miRNA s were revealed to be associated with metabolic disorders in the present study **(28).**

Cancer: The first time, Calin et al reported the relationship of cancer and miRNAs, as a decrease and absence of miR-15a and miR-16-1 levels in Chronic Lymphocytic Leukemia (CLL) patients in 2001. **(29)** Michael et al. published that expression levels had changed in solid tumors in humans compared to normal tissues in 2003 **(30).**

In cancer, miRNAs function as regulatory molecules, acting as oncogenes or tumor suppressors. Amplification or overexpression of miRNAs can down-regulate tumor suppressors or other genes involved in cell differentiation, thereby contributing to tumor formation by stimulating proliferation, angiogenesis, and invasion, they act as oncogenes. Similarly, miRNAs can down-regulate different proteins with oncogenic activity, they act as tumor suppressors **(31,32).**

Tumor Suppressor miRNAs: Tumor suppressor miRNA or miRNAs that function as TS-mir inhibit the translation of protoncogenes, their expression decreases, increase oncogen expression and tumor formation. Let-7b, 7c, 7d, 7f and 7g tumor suppressors, which are members of the let-7 family, have been shown in patients with lung cancer **(33).**

Oncogenic miRNAs: on the other hand, miRNAs that function as oncomirs decrease the expression of the tumor suppressor gene and increase cancer development. Unlike tumor suppressor miRNAs, they mostly function in an anti-apoptotic direction to increase uncontrolled growth in cancer types. Mir-155 is a high-level onco-mir with B cell lymphoma, breast, pancreas, lung and Hodgkin lymphoma **(34).**

Dysregulated metabolism is a common feature of cancer cells and is considered a hallmark of cancer. Altered tumor-metabolism confers an adaptive advantage to cancer cells to fulfill the high energetic requirements for the maintenance of high proliferation rates, similarly, reprogramming metabolism confers the ability to grow at low oxygen concentrations and to use alternative carbon sources. These phenomena result from the dysregulated expression of diverse genes, including those encoding miRNAs which are involved in several metabolic and tumorigenic pathways through its post-transcriptional-regulatory activity **(35).**

MiRNAs in the Treatment of Diseases: After many ncRNAs have been demonstrated to show irregular expression in important diseases, current research has focused on their use as therapeutic targets. ncRNAs provide a gene regulation that results in post-transcriptional arrest of mRNA transcription in a sequence-specific sequence. Because of these properties, they are frequently used in drug designs targeting sequence specific gene silencing. The potential for any disease-causing gene can be targeted by cell type or tissue miRNA-RNAi and siRNA-RNAi mechanisms.

Due to this important advantage, 100 companies are currently working on 122 small ncRNA (miRNA, RNAi & siRNA) based drug development projects within the scope of 184 cancer research projects. These drugs for oncological treatment target potential molecules within the basic cellular function such as cell adhesion molecule activity, cofactor binding, cytokine activity, growth factor activity, GTPase activity, kinase activity, ligand-dependent nuclear receptor activity, metallopeptidase activity **(36)**.

Blood Banking Studies with miRNA: Micro RNA studies in blood banking have come to the fore with platelet storage in recent years.

Platelet concentrate (PC) is one of the main products derived from blood. Even under good storage conditions, PC is likely to suffer cell damage. The shape of platelets changes after 5 to 7 days of storage at 22°C. Taking into consideration that some platelet proteins undergo changes in their shape and functionality during PC storage. Sixteen PC bags were collected and each PC bag tube was cut into six equal pieces to perform experiments with platelets from six different days of storage.Thus, on the first day of storage, 1/6 of the tube was used for miRNA extraction, and the remaining 5/6 was stored under the same conditions until extraction of miRNAs on each the following five days.

Samples were sequenced on an Illumina Platform to demonstrate the most highly expressed miRNAs. Three miRNAs, mir127, mir191 and mir320a were validated by real-time quantitative PCR (RQ-PCR) in 100 PC bags tubes. The bags can be tested on the 5th day of storage for the relative expression levels of mir127 and mir320a. These candidate miRNAs as biomarkers of storage damage that can be used as tools to evaluate the quality of stored PC. The use of miRNAs as biomarkers of damage is unprecedented and will contribute to improved quality of blood products for transfusions **(37).**

In another study, they used the next generation sequencing data for examine the profiles of 14 microRNAs in PCs stored for 6 days in a blood bank. In total, nine miRNAs are downregulated (MiR -145-5p, miR-150-5p, miR-183-5p, miR-26a-5p, miR-331-3p, miR-338-5p, miR-451a, miR-501 -3p and miR-99b- 5p) and five miRNAs have been identified as upregulated (miR-1304-3p, miR-411-5p, miR-432-5p, miR-668-3p and miR-939-5p). **(38)** PubMed / Medline, Science Direct and Web of Science scientific citation databases are being investigated for publications containing platelet storage lesions. Studies have identified miRNAs associated with important platelet functions as quality biomarkers of PC such as miR-223, miR-126, miR-10a, miR-150, miR-16, MiR-21, miR-326, miR-495, let-7b, let-7c, let-7e, miR-107, miR-10b, miR-145, miR-155, miR-17, miR-191, miR-197, miR-200b, miR-24, miR-331, miR-376 can be used to identify platelet damage in PC bags. It relates the functions of miRNAs to molecular mechanisms that lead to functional platelet differences such as apoptosis. Therefore, miRNA profiles can be used to measure the quality of PC stored for more than 5 days, to identify bags with platelet injury and to distinguish functional platelets **(39).**

Autologous Blood Transfusion in Sports: Rising Biomarkers: Despite being prohibited by the World Anti-Doping Agency, blood doping through erythropoietin injection or blood transfusion is frequently used by athletes to increase oxygen delivery to muscles and enhance performance. In contrast with allogeneic blood transfusion and erythropoietic stimulants, there is presently no direct method of detection for autologous blood transfusion (ABT) doping. The emergence of "-omics" strategies provides new opportunities to discover biomarkers for the indirect detection of ABT. With the development of direct quantitative methods, transcriptomics based on miRNA or mRNA expression is a promising approach **(40)**.

Micro RNA Studies in our center:

With the support of KOSGEB which the institue is under Republic of Turkey Ministry Industry and Technology, our project named "**MICRO RNA KITs for early diagnosis of cancer**" was carried out between 2016 and 2019.

Background of study: In the twenty-first century, the most important control strategy for cancer is prevention and early diagnosis. It is a fact that cancer can be prevented with screening and early diagnosis, as well as improving the quality of life of the person. Many national and international studies and programs are carried out for the early diagnosis of cancer. Today, in addition to many methods, Tumor Markers are used. However, these markers have a high rate of false positivity and negativity. For this reason, Micro RNAs (miRNAs) have been introduced as biomarkers in recent years. In our country, there is no study on single or multiple miRNAs in early diagnosis of cancer, and there is no kit production produced for this purpose.

The aim of the study: This study was planned to study miRNAs both in cancer patients and healthy individuals, to compare the results of the patients, to compare the serum tumor markers and miRNAs currently in use, to obtain patents, to produce and use kits to make miRNAs ready-made kits**.**

The target of the study was to identify at least one microRNA as a biomarker in breast, lung, colon, prostate, bladder, stomach, pancreas and liver cancer and to use in early diagnosis of cancer.

Samples of the study: Breast, Lung, Colon, Prostate, Bladder, Stomach, Pancreas and Liver cancer patient samples were provided from department of Oncology and Gastroenterology of Akdeniz University Medical Faculty, department of Urology of Antalya Training and Research Hospital and Urology Clinic of Private Anatolian Hospital.

Healthy samples were selected from familiar individuals who are of the same age and gender, have undergone health checks.

Planned cancer samples and studies: In the study, it was planned a total 160 patient samples including 20 samples from each of the eight cancers and 200 healthy volunteer individuals,. However, a total of 133 samples were studied, including 20 in breast cancer, 20 in lung cancer, 20 in bladder cancer, 20 in prostate cancer, 20 in colon cancer, 14 in stomach cancer, 10 in liver hepatocellular cancer, and 9 in pancreatic cancer.

Planned MicroRNAs in the study: Although 50 different microRNAs were planned in the study, firstly 32 microRNAs selected in the literature, two of them were used as endogenous microRNAs (MiR 181, MiR192) for control purposes. In our study, 18 miRNAs were studied in Lung Cancer, 7 in Breast Cancer, 6 in Colon Cancer, 5 in Prostate Cancer, 5 in Bladder Cancer, 3 in Stomach Cancer, 6 in Pancreatic Cancer and 6 in liver cancer.

Methods of miRNA analysis: We used quantitative reverse transcriptase PCR (RTqPCR) . This is Stem-loop reverse transcription (RT)-based TaqMan microRNA assay is the main PCR technique used in research, with the advantage of having high sensitivity and specificity rates.

Statistical analysis of the study, was done in Deparment of Public Health of of Akdeniz University Medical Faculty. The data were evaluated with SPSS (Statistical Package for the Social Sciences) version 23.0 (SPSS Inc., Chicago, IL, USA) program.

As a result of the project; A total of 23 microRNAs were found to be unique and sensitive as biomarkers: 11 in Lung Cancer, 3 in Breast Cancer, 3 in Colon Cancer, 1 in Prostate Cancer, 1 in Bladder Cancer, 1 in Stomach Cancer, 2 in Pancreatic Cancer and 1 in Liver cancer.
The study results are prepared for publications, and patent studies are also ongoing. Kit production will be started by applying to the techno-investment project, which is the second step of the R&D study.

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ROLE OF RED CROSS AND RED CRESCENT IN BLOOD SUPPLY

Chairpersons: **Kerem Kınık**
Mahmut Bayık

Speakers: **Marie-Paule Emonds**
Levent Sağdur

BLOOD TRANSFUSION IN BELGIUM

Marie-Paule EMONDS
Red Cross, Belgium

Belgium, a memberstate of the EU, has a surface area of 30.000 km^2. It is a federal state with 3 regions (Flanders, Wallony and Brussels) and 3 communities (Flemish, French speaking, German speaking). Belgium has 1 Federal and 5 regional Governments. Belgium has 11.5 million inhabitants of which 6.5 million live in Flanders.

The country has 4 blood institutions. They are licensed by the Federal Government and need to be in compliance with the EU Directives that were incorporated in the Belgian law. Compliance with the law is verified by inspections from the Federal Agency for Medicine and Health products (FAMHP).

The Belgian blood supply is fully based on non renumerated voluntary blood donors and donations.

94% or Red cell collections via Belgian Red Cross

Belgium has 4 licensed Blood Institutions being. The Blood Service of the Belgian Red Cross-Flanders (DVB-RKV) accounts for 62% of the red cell supply; the Blood Service of the Belgian Red Cross-frenchspeaking part for 32 % of red cell supply. The remaining 2 institutions are CHU Charleroi with 5% and CHU Mont Godinne with 1% of the national blood supply. The Belgian Red Cross thus collects 94% of the red cell supply in Belgium.

All blood institutes collect red cells as well as plasma and platelets and some, among which DBV-RKV also provide granulocyte concentrates. Based on blood transfusion policies and the requirement to collect increasing amounts of plasma, we expect a further increase in plasma donations and a further decrease in red cell donations (figure 2). This trend was already clear in 2016 for red cells but in the meantime also for plasma as the worldwide use of plasma and plasma derivatives is increasing. This trend is summarized in figure 1 (data are from the hemovigilance report of the FAMPH 2016).

In 2016 over 300.000 donors presented for at least one donation. In total they donated almost 600.000 times: 450.000 were whole blood donations, 111.000 plasma apheresis and 31.000 platelet apheresis donations.

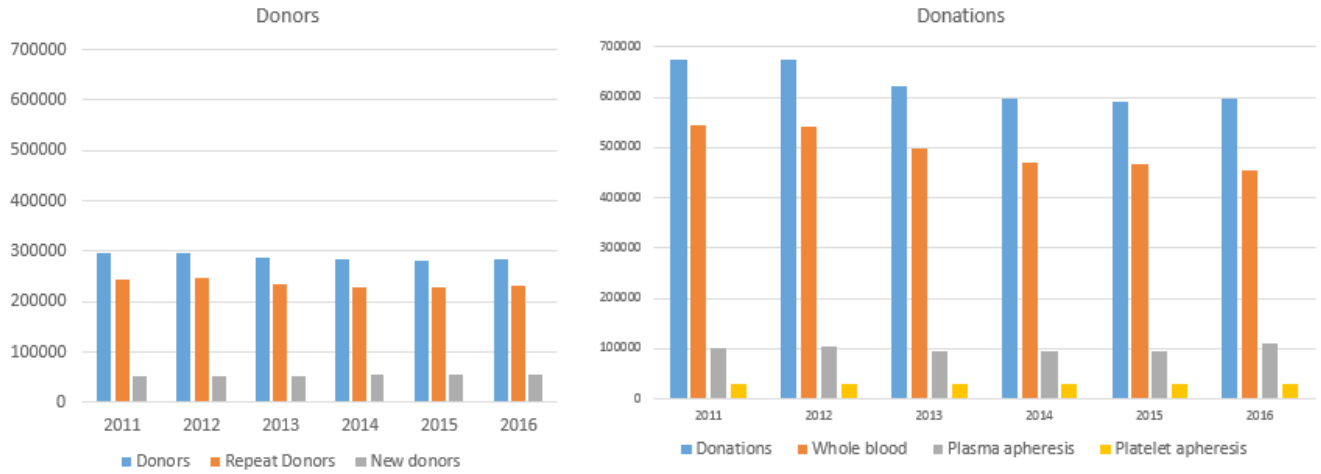


Figure 1: Donors and donations (2011 -2016) in Belgium (data from the hemovigilance 2016 report of the FAMHP) showing a decrease in whole blood donations from 544.000 in 2011 to 454.000 in 2016.

DVB-RKV

As an example, the DVB-RKV (+/- 62% of Belgian red cell collections), provides blood components for Flanders (6.5 million inhabitants) and recorded 381.111 successful donations in 2018 consisting of 250.933 whole blood donations, 15.696 platelet donations and even up to 114.482 plasma donations. The increase in plasma

donation is clear as RKV has collected 3000 more plasma donations in 2019, than collected in the whole of Belgium in 2016.

Interesting to know is that the RKV donor population is young with nearly one in two under the age of 35. On the other hand there is no upper age limit allowing donors older than 71 to donate on condition that they meet all criteria of course. Donor recruitment and donor retention are 2 important targets for the department donor recruitment department.

Donations take place in 13 fixed donor centers (whole blood and apheresis) and 932 mobile drive locations (whole blood only) in Flanders. They are processed in 2 processing centers, one in Ghent and one in Mechelen. Distribution and delivery to more than 40 hospitals in Flanders is automated via ROOS (Red Cross Online Ordering System). DVB-RKV, unlike the French speaking counterpart, is also providing 7/24/365 bloodbanking services in 3 university hospitals as well as 2nd and 3rd line immunohematology lab support.

Future Trends on blood supply

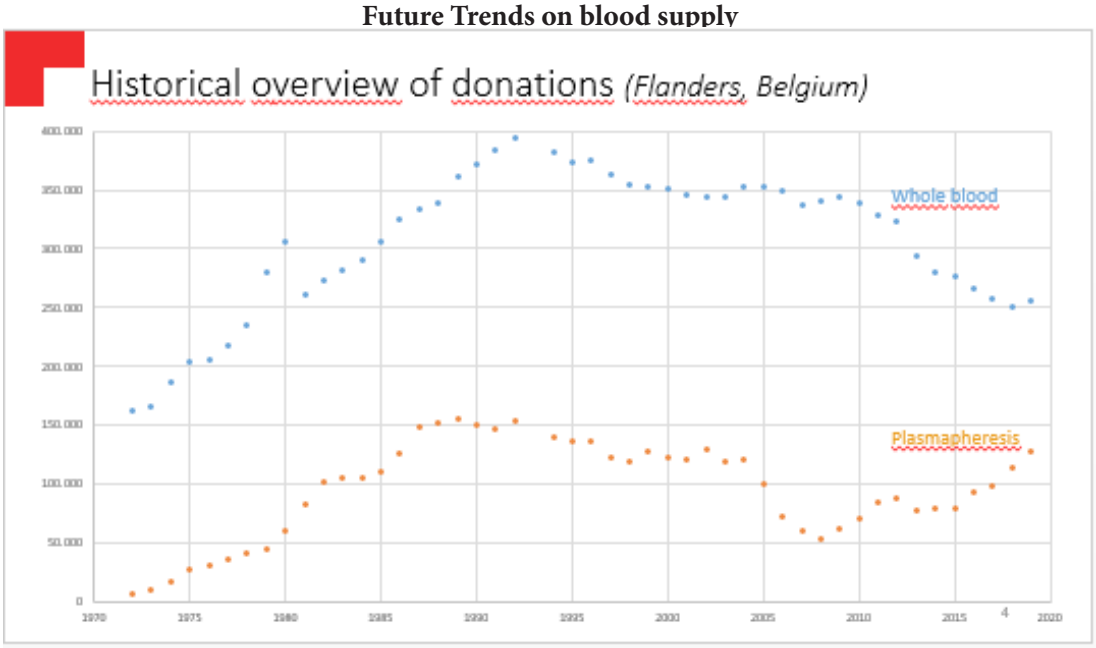


Figure 2: evolution of plasma and whole blood donations

It is expected that red cell usage will stabilize or further decrease but that the demand for human plasma will continue to increase (figure 2 (in blue are the red cell donations; in yellow the plasma donations).

THE ROLE OF KIZILAY AND THE RED CROSS IN THE BLOOD SUPPLY THE TURKISH RED CRESCENT BLOOD BANKING

Levent SAĞDUR
The Turkish Red Crescent

The first blood transfusion in our country was performed in 1921 at the Cerrahpaşa Medical Faculty. In addition to the improvements made following the first blood transfusion; At the Red Crescent Congress in 1953, With the recommendation of President Prof. Dr. Reşat BELGER, it was decided to establish the "Turkish Red Crescent Blood Aid Organization" and in 1954, doctors were sent to England and the USA to receive training on this subject. In 1957, services were provided in the field of blood banking with the first modern Red Crescent Blood Centers established simultaneously in Ankara and Istanbul.

With the establishment of the "Turkish Red Crescent Blood Donor Organization" in 1974, a first was launched again; By giving trainings on blood donation to the public, mobile blood donation organizations started to be organized.

In line with the growing need for blood in our country, in 1983 Turkey Red Crescent Blood Services Department was established and has accelerated studies for the provision of services befitting the said areas of expertise. It continued its services with the "Blood and Blood Products Law" numbered 2857, adopted in 1983, and the Turkish Red Crescent Blood Centers and Blood Stations. In this way, the studies carried out for safe blood supply have gained great momentum. in 1983 at the first blood and blood products law it was emphasized that in the provision of blood the preferred donation way was voluntary blood donation. But since there was no organized blood banking network in the country, a system based on hospital blood banking and therefore replacement blood donation prevailed.

After the 1999 earthquake, when the deficiencies of our country in the field of blood banking have become more noticeable, the Turkish Red Crescent, In parallel with the other Red Crescent / Red Cross societies that has activities in the field of voluntary blood donor recruitment, has entered a restructuring process in this field with its experience from the very beginning in the history of blood banking in our country.

First of all, the need for a structuring related to the regional blood banking was introduced in the Turkish Red Crescent after 1999 and activities were started to increase the competence of the personnel working in this field through in-service trainings. The Turkish Red Crescent has entered a comprehensive preparation phase in this restructuring process; prepared the "National Safe Blood Supply program" that was sustainable between 1999-2005 and focused on solving the country's blood banking problem and proved with great determination that the country aspired to meet its blood need. In 2005, the program was submitted to the Ministry of Health and the objectives in the program were adopted as national policy.

Following the "Law on Blood and Blood Products" dated 2007 and numbered 5624, national guidelines were published by the Ministry of Health and a "National Blood Policy" was created. Pursuant to this policy, the Turkish Red Crescent is empowered to carry out Regional Blood Banking activities in the country, and has been designated by the National Authority to collect blood donations to provide hospitals with a blood component.

Turkish Red Crescent continues its activities in accordance with the new law and regulations issued in accordance with this law, the Blood Banking and Transfusion Medicine guidelines published by our Ministry of Health.

Within the scope of the authority and responsibilities granted by the law, the protocol "Maintaining the Blood Supply System" and "The Production of Plasma Products" were signed with the Ministry of Health. In addition, due to its relationship with volunteer donors, "Practical Assistance Protocol for Voluntary Stem Cell Recruitment" was signed under the TURKOK Project and authorized in the field of stem cell donor recruitment.

In the field of Blood Banking, as a national policy, the Turkish Red Crescent has been pointed out as the only authorized institution in the voluntary blood donation collection activities in the country and it has been requested to be structured in this direction. After this date, the Turkish Red Crescent has accelerated its transformation and structuring in the field of Blood Banking.

First of all, it went to restructuring in blood donor recruitment activities, trained staff to work in this field and accelerated blood donor training and recruitment activities throughout the country.

Firstly, awareness was increased with a national advertising campaign. The main objectives in this area are: Education of the population is to increase the number of blood donations and increase the number of regular blood donors. Advertising and promotional activities, donor communications, training (initial and higher education programs, college students and community training), national / regional projects (hedef25, Turkey Blood Donation League, 1 blood 1 Sapling Project etc.) activities are still being conducted.

2,809,237 units of blood collected in 2019 were taken from 2,300,713 people. 17% of blood donors are female donors and 83% are male donors. In 2019, 33% of those who donated blood were high school, 23% were undergraduate and 17% were primary school graduates. Distribution of blood donors by profession group in 9 years; 27% are self-employed, 20% are students and 13% are workers.

With the "Safe Blood Supply Program" launched in 2005, the number of blood donations collected over the years has increased regularly, and the number of blood donations collected as of the end of 2019 has been 2,809,237 units. In 2020, the blood donation target was determined as 2.932.000 units.

While blood donation activities were carried out in 2005 with 29 service units and 853 personnel in 27 provinces; As of 2019, it is carried out in 63 provinces with 18 Regional Blood Centers (RBC) , 68 Blood Donation Centers (BDC) , 70 Fixed Blood Collection units, 3,693 personnel and a fleet of 744 vehicles. An average of 155 mobile teams are organized daily.

In 2019, there are 1,121 hospitals that use blood and blood components throughout the country, and the number of hospitals under the responsibility of the Turkish Red Crescent is 1,108. Temporary RBC license was given to 13 hospitals by the Ministry. The number of temporary RBC decreased from 84 in 2010 to 13 in 2019. As the Turkish Red Crescent increases the number of blood donations it collects, temporary RBCs are transferred. The target is to meet all of the country's needs by the Turkish Red Crescent Regional Blood Centers.

In 2019, the country's blood donation requirement was realized as 3,120,782 units. 90% of the country's blood need was met by the Turkish Red Crescent.

Regional / National stock management is carried out. The management of extraordinary situations is coordinated by the Operations Directorate of the General Directorate of Blood Services.

In the production units located in 18 Regional Blood Centers, whole blood is separated into its components and offered for use. As the Turkish Red Crescent, 3-Top & Top and 4-Top & Bottom blood bags are used. All components are subjected to leucofiltration. Platelets are put into service as pooled platelet suspensions and a platelet separated from the buffy coat is obtained. When it comes to hospital demand, blood is irradiated. Research is carried out for bacterial contamination in platelet suspensions.

Activities are carried out throughout the country with 4 central laboratories (Serology, NAT and Blood Grouping laboratories). In these laboratories, besides the Standard serological tests, NAT tests for HBV, HCV and HIV are performed in all donors. In addition to the central laboratories, there is a Validation and Control Research Laboratory in the central laboratory located in Ankara, and there are also Quality Control Laboratories in each Regional Blood Center.

Hemovigilance Activities are carried out at regional and national level. Blood donors rejected through the National Red Database are controlled throughout the country. This database also includes hospital blood banks.

STEM CELL BANKING – HEMATOPOIETIC STEM CELL DONOR RECRUITMENT

On 07.11.2013 between Ministry of Health and the Turkish Red Crescent TÜRKÖK (Turkey Stem Cells)

protocol has been signed and the Turkish Red Crescent has been authorized in this area.

Stem Cell Recruitment and Coordination Units and 13 Volunteer Donor Centers (GVMs) have been established within the Turkish Red Crescent General Directorate of Blood Services, and donor recruitment, matching and transplantation processes are being followed.

With the TURKÖK Project, our dependence on finding donors from abroad has decreased, and the transplantation processes, previously completed in 7-8 months, have been reduced to as little as 2-3 months.

Healthy individuals between the ages of 18-50, who have not suffered Hepatitis B, Hepatitis C, Syphilis, HIV (AIDS), have no chronic disease, have not been diagnosed with cancer can donate stem cells. 3 tube samples are taken from donor candidates for serological tests (HbsAg, Anti HCV, Anti HIV and Syphilis), blood grouping test and tissue typing. HLA samples of suitable candidates are delivered to TÜRKÖK Tissue Typing Laboratory (TTL). Tissue typing results are transferred to the TURKÖK Bone Marrow Bank (BMB) database. This stage is the stage that enables inclusion in the system in order to become a stem cell donor candidate.

If a match is detected in the KIB database for a patient by the Ministry of Health, the donor candidate is reached by the Red Crescent. Serological tests are performed by sampling again from the candidate for donor approval. The HLA sample of the candidates whose test results are suitable is delivered to TÜRKÖK TTL for mutual operation with the patient's HLA sample. As a result of this study, if appropriate, a discussion is held with the donor about the transfer date and which method to choose, in coordination with the Ministry of Health.

As a result of the donor recruitment efforts that started on 14.08.2014 within the scope of the TURKÖK Project, 693.478 stem cell donor recruitments have been achieved so far and 6762 (886 of them are for foreign patients) matched requests. From 1844 donors (127 to overseas patients) stem cell collection was performed and transplanted to patients was completed. After compliance with a patient, our 604 donors gave up for various reasons.

PLASMA FRACTIONATION

Within the scope of the "Safe Blood Supply Program" initiated by Turkish Red Crescent in 2005, "Addiction Abroad in Plasma Products" has been one of the problems identified at the beginning of the project and has become one of the strategic goals.

While the Turkish Red Crescent is making progress in the field of Blood Banking, on the other hand, in order to take the place of the Turkish Red Crescent as a productive partner or supplier in the possible production projects to be carried out domestically or abroad, participation in relevant scientific meetings for about ten years, preparations such as facility visits, feasibility studies, follow-up and archiving were made.

As the national blood and blood product supplier, the goal of Turkish Red Crescent in 2020 is to collect approximately 3,000,000 blood donations. Thus, it has been able to provide at least 300,000 liters / year of plasma support to a facility that needs to be established only with plasma obtained from whole blood (recovery plasma).

In the Tenth Development Plan of the Ministry of Development, the Action Plan "Structural Transformation Program in Health Industries" included the action "Domestic production of plasma products and vaccines will be provided within the framework of the cooperation model to be developed". While the organization responsible for the action was pointed out as the Ministry of Health, the Turkish Red Crescent was pointed out as organizations related to the action. Therefore, the establishment of a fractionation facility in our country has been accepted as a national policy and steps have been taken towards this.

Turkish Red Crescent was selected as the authorized institution for the supply of human plasma, which is the raw material to be used in production, during the contracted fractionation period and the establishment of the facility in our country.

In summary: Following the completion of the Turkish Red Crescent preparatory period, it will supply and deliver the plasma in accordance with the supply schedule (500,000 liters / year) of whole blood and plasmapheresis-sourced plasma.

The contractor company will bring relevant know-how, establish a domestic plasma processing plant, and

perform contracted fractionation until the plant becomes operational.

The Ministry of Health will establish the necessary legislation for plasmapheresis centers and plasma for fractionation and will work to prevent unnecessary use of plasma in clinics and to reduce the use of TDP directly in all healthcare providers across the country.

Conformity to plasma fractionation will be certified through domestic / international audits.
For source plasma,The first of the Plasmapheresis Centers to be operated in accordance with the protocol is planned to be opened in 2020. A total of ten Plasmapheresis Centers will be established in Istanbul, Ankara, Izmir and Adana. In total, these ten Plasmapheresis Centers will have an annual capacity of collecting 200,000 liters of plasmapheresis.

An application was made by the European Authorities in 2020 to carry out the first inspection. Following the successful completion of the audit, the Turkish Red Crescent Regional Blood Center will be added to the Plasma Master File (PMF) of the facility in Europe, which will be contracted by the contractor, and the first plasmas will be sent as a result of the approval given by EMA.

When the Plasma Fractionation facility in our country is completed by the contractor company, the plasmas will be processed in the facility in our country instead of in Europe.

Figure 1: Regional Blood Centers and Blood Donation Centers

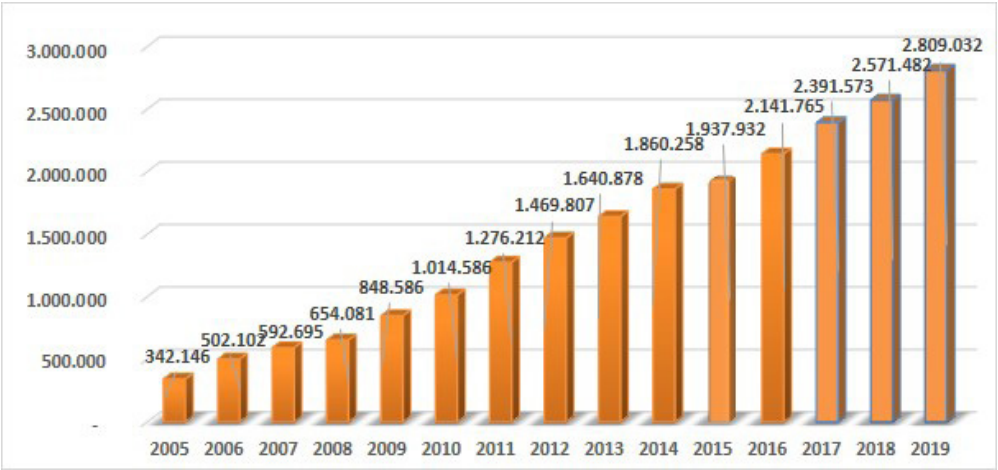


Figure 2: The country's blood donation need was 3,120,782 units in 2019, 90% of this need was met by the Turkish Red Crescent.

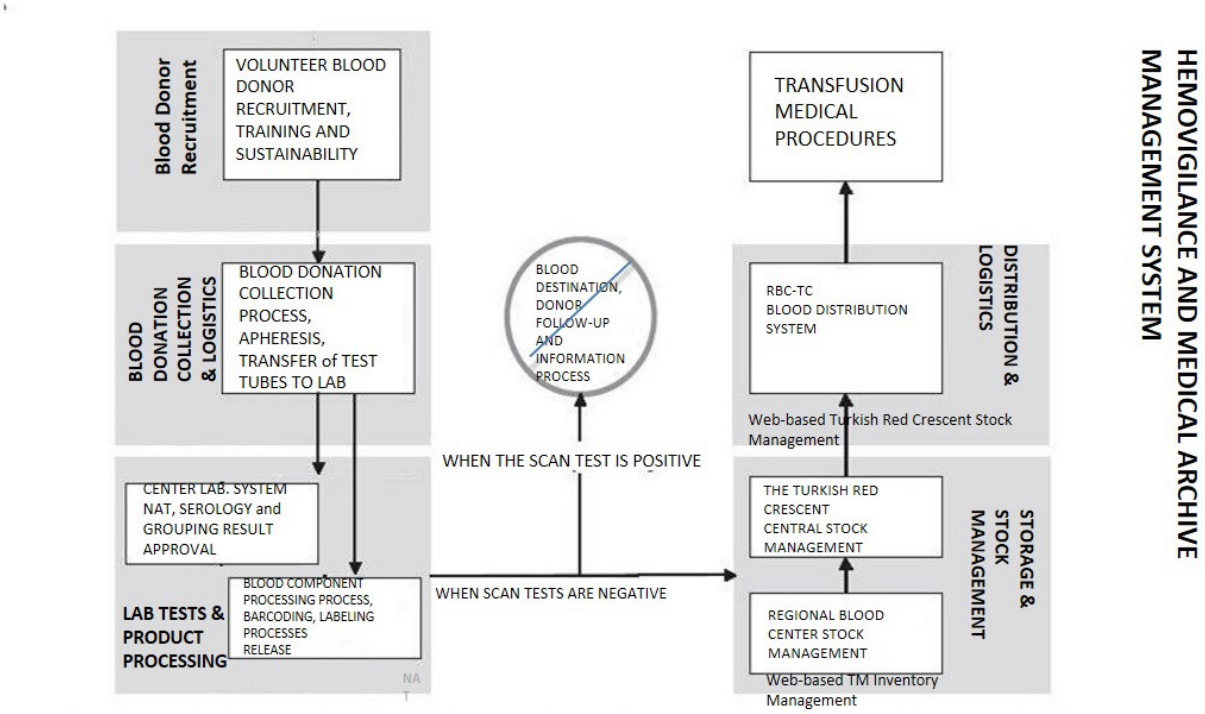


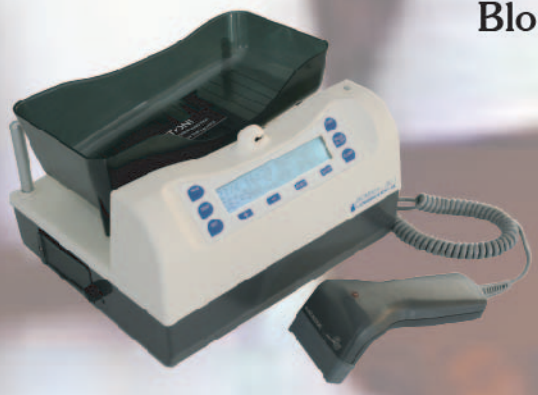
Figure 3: Turkish Red Crescent responsibilities

Blood Bank Devices

26th year in Blood Banking

- Single and Multiple Tube Sealer
- Blood Taking and Shaking Monitor
- Plasma Thawing Device (Dry System)
- Automatic and Manuel Tube Stripper
- Blood Component Separation Device
- Platelet Agitator & Incubator
- Blood Refrigerator
- Plasma Freezer

and Other Blood and Transfusion Center Devices



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Biosafety

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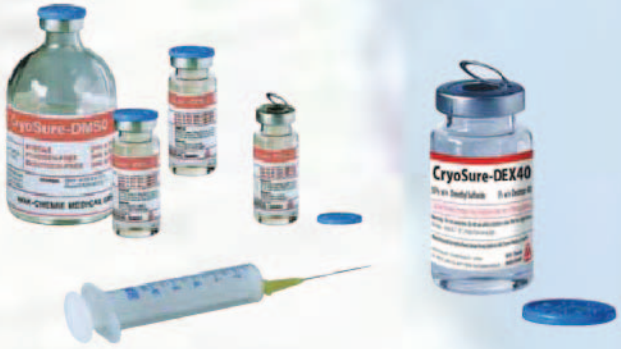


CryoSure-DMSO

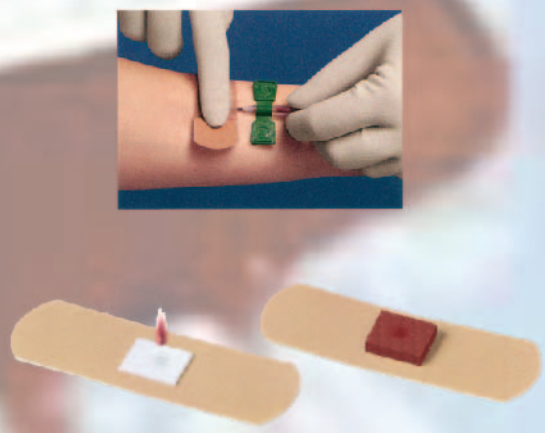
CryoSure-DEX 40

Pressure Bandage

SURESEAL®

Safety Lancet

Baby Heel Lancet



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BLOOD BANKING IN YOUNG'S PERSPECTIVE ; ISBT YOUNG PROFESSIONALS

Chairpersons: **Gamal Gabra**
N. Nuri Solaz

Speakers: **Arwa Al Riyami**
Lucy Asamoah-Akuoko
Bipin Nepal
Oluwakemi Elizabeth Otokiti
Vincent Thonier
Praiseldy Sasongko

ISBT YOUNG PROFESSIONAL COUNCIL

Arwa AL RIYAMI
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ISBT is a global community of professionals sharing knowledge to enhance transfusion practice. We do this by; providing opportunities for advancing knowledge in education and by advocacy for the welfare of blood donors and patients. ISBT's vision is 'A world of safe and sufficient blood.' The ISBT Young Professionals Council was established in 2018 with the mission of engaging and enriching Young Transfusion Medicine Professionals to increase their ISBT membership value and participation in the society's activities. It has its own terms of reference which guide its work. The Council maintain communication with the ISBT board and the ISBT Central Office to ensure that the needs of the Young Professionals' community are met and to hear about ISBT developments particularly in relation to Young Professionals. The Council has representation from all six WHO regions and membership is appointed by the ISBT board. The Council aims to engage Young Professionals, enhance their interactions with the ISBT, improve their experiences during the ISBT Congresses and raise awareness of opportunities and activities within ISBT.

This presentation will provide an overview on the council activities during the ISBT congresses and throughout the year. This includes its contributions in *Transfusion Today* articles and use of social media. In addition, efforts made to increase the participation of Young Professionals in the educational events offered by the ISBT such as live journal clubs, webinars and ISBT Education will be presented. Moreover, an overview of the council's activities during the 39th ISBT regional congress at Basel in 2019 will be highlighted.

BLOOD TRANSFUSION RESEARCH IN THE PERSPECTIVE OF THE YOUNG/EARLY CAREER INVESTIGATOR IN GHANA

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Head, Research and Development National Blood Service, Ghana

Blood Transfusion Research in Ghana

The National Blood Service Ghana (NBSG) is responsible for blood and blood product supply in Ghana. Research capacity building within the NBSG was initiated in 2011 in collaboration with the Transfusion Research in Africa (T-REC) Consortium[1]. The initiative was aimed at building research capacity for blood transfusion research in Africa. The collaboration focused on training a critical mass of early career researchers to conduct research that is relevant to local policy and practice. Prior to 2011, research activities in NBSG were largely uncoordinated, with very few individuals conducting research. In August 2013, a National Research Steering Committee was established to define a Research Strategy and a National Research Agenda for the NBSG. In July 2014, infrastructure establishment for research in NBSG was formally initiated with the establishment of a Research and Development Department to boost research, and to prevent attrition of early career personnel trained to conduct research.

Blood transfusion research is multidisciplinary and cuts across all professional categories. In this regard, in Ghana, the research capacity building project trained about 32 young professionals to design and manage blood transfusion research projects, and supported about 30 undergraduate and postgraduate blood transfusion research projects. Two PhD students were also trained to lead blood transfusion research. The development of young investigators was important for innovation would continue and furnish the momentum and enthusiasm [2] to move blood transfusion research forward. The development of a Young/Early Career Investigator (Y/ECI) has been likened to evolution[2]. To be able to conduct useful research in blood transfusion, young investigators have to be innovative, plan and conduct independent research, and sustain their research activities[2].

Perspectives Young/Early Career Investigator

Opportunities

In Ghana, blood transfusion research is still work in progress. There is therefore abundance of data and untapped areas for research. There is also the opportunity to carry out multidisciplinary research. With the visibility for blood transfusion research that came along with research capacity building activities, came new ideas for research by Y/ECI from all professional categories. A research uptake group was established in 2015 to ensure application or relevant research finding to practice, hence making it possible for young investigators to make an impact with their research knowledge. The grants and support provided by the consortium and the NBSG, specifically aimed at Y/ECI was helpful in whipping up their interest in research. Targeted opportunities in the International Society of Blood Transfusion (ISBT) and the African Society for Blood Transfusion (AfSBT) at Y/ECI help to sustain the enthusiasm for research.

Challenges

Y/ECI face the challenge of conducting independent research and require support/mentorship, which may be difficult to access. Funding opportunities for ECI are scarce and difficult to get, very limited/absent local funding for research. Similar to professional development, opportunities to develop research/scientific skills, gain visibility are few and very competitive.

Way forward

There is a need for increasing and sustaining NBSG's commitment and support for Y/ECI, and for government support for health research in general. Increasing the available targeted opportunities for skills development, collaborations, networking, grants and visibility for Y/ECI to attract young researchers will be key.

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"BLOOD BANKING IN YOUNG'S PERSPECTIVE; ISBT YOUNG PROFESSIONALS"

Bipin NEPAL

People have always been fascinated by blood. Great progress has been made since ancient historical era till date. Transfusion medicine has come a long way due to numerous scientists, bold doctors, daring pioneers, brave donors and patients. Over the last few years, the field that was once known as blood banking has progressed into the discipline of transfusion medicine. Attitudes toward transfusion therapy have changed noticeably.

Current curriculum in medical college and hospital placement lack exposure to transfusion medicine worldwide, training in blood transfusion is not currently presented to medical students in many countries. It requires the redesigning of academic programs. Transfusion medicine is still traditionally practiced by non-specialized medical practitioners, who are unaware of the abundant advances in transfusion medicine. It is a fundamental part of medical treatment.

Young transfusion medicine professionals are drawn into the field by the exciting front-line complication of immunohematology, pathogenesis and clinical manifestations of blood disorders, the ability to combine laboratory and clinical practice, the relationship to public health, the close bedside-to-bench connection, and the practicability of combining practice with research. At present a considerable number of young physicians are unaware of the importance of blood use, and lack the knowledge on the indications and hazards of rational use of the blood products. Transfusion medicine for young clinicians has a unique opportunity in medicine to make contributions that may dramatically affect the outcome of an individual patient through a clinical procedure or consultation and through educational efforts and policy creation. Transfusion Medicine is a very good and upcoming subject which has both diagnostic modalities like immunohematology and therapeutic modalities. Cellular therapies including stem cell and gene therapy are also coming up. Significant progresses in knowledge and skills in transfusion medicine are needed for young professionals who want to work in the field of transfusion medicine. Improvement is needed in both background knowledge and practical application of this knowledge to promote the safe practice of transfusion medicine.

Good prospects are foreseen for young transfusion medicine professionals by upcoming year, at least in the developing countries. Young transfusion medicine professionals will lead big blood centres; traditional blood banking will gradually decline. They will be more clinically oriented and actively associated with transfusion regime in the patients. Advances in the understanding of the pathophysiology as well as new tools for transfusion support have created new roles for the young professionals in transfusion medicine.

The silent days of blood banking are over. The young professionals can play a pivotal role in serving the medical community which can improve transfusion safety as an educator, auditor of blood component usage, and providing direction in therapeutic modalities and contribute positively to cost containment by providing expertise.

BLOOD BANKING IN NIGERIA: A YOUNG PROFESSIONAL'S PERSPECTIVE (THE LAGOS UNIVERSITY TEACHING HOSPIAL (LUTH) AS A CASE STUDY).

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The Lagos University Teaching Hospital (LUTH) is a tertiary and teaching hospital situated in the heart of Lagos, former capital of Nigeria and commercial hub of the country. Lagos is home to over 21million residents (1), making it the most populous city in Nigeria (1). It has two teaching hospitals, LUTH being the reference hospital.

In the Nigerian health care system, three tiers or level of health care exist, primary, secondary and tertiary(2). Presently, Nigeria operates majorly governmental hospital based blood banks. As a tertiary hospital, LUTH provides care to in-patients and patients referred from lower healthcare levels and all over the country. LUTH is an 800-bedded hospital with a centralized blood bank which serves the hospital, its environs and at times from outside the state. The Blood bank in LUTH comprises the blood donor unit which has 9 donor beds, the compatibility unit, the transfusion transmissible infection screening unit (TTI) and the component preparation unit. LUTH is also a cancer treatment and research centre as well as a trauma centre which offers radiotherapy, chemotherapy care to cancer patients and emergency care to trauma patients thus increasing transfusion requirements(3).

For the year 2019, the LUTH blood bank received 19,985 blood and blood component requests whereas, a total of 11,714 units of blood were collected with only 1,931 of the donated units from voluntary blood donors (VBD). Thus voluntary blood donation accounted for only 16% of blood collected in 2019 and Family Replacement Donors (FRP) accounted for most of the remaining 84%. A total of 84 units were discarded within the year due to TTI. The low prevalence of TTI reported is probably as a result of pre-donation rapid screening and exclusion of donors with HBV. The incidence of TTI was 0.8%/year. A total of 20,478units were crossmatched, 12,711 issued and 2,945 returned. This brought the crossmatched to transfusion ratio to 2.1:1 and a 23% return(4) HBV remains the most prevalent TTI in Nigeria(5). This reflects to a large extent what is obtainable in most parts of Nigeria.

As a haematologist (laboratory physician) working in the LUTH blood bank, you work with the medical Lab scientists to provide safe blood and blood components, suggest appropriate blood component, immuno-haematology, triaging, quality control amongst others.

Data from within LUTH has shown that the Obstetrics and Gynaecology department are the highest users of blood and components, followed by haemorrhagic challenges in the accident and emergency (4). Post-partum haemorrhage accounts for 60% of obstetric deaths combined with hypertensive emergences in Nigeria (6).

Challenges faced in the blood banking sector are inadequate or insufficient blood supply. The total number of the Nigerian population is about 202 million as at 2019 (7) and the transfusion requirement of a country by WHO standard is that 1% (8) (2,060,000 in Nigeria) of the population donates blood at least once in a year. However a survey done by the National Blood Transfusion Society (NBTS) in 2006 showed that total blood unit collected in the whole country was 500,000 units (9). World Health Organization (WHO) 2006 ascertained that only 5% of blood donated in Nigeria (10), were from voluntary blood donors. Factors responsible for these include lack of adequate sensitization and education of the public to blood donation, poor funding and insufficient training on donor recruitment activities, myths and cultural beliefs for example "My blood is not enough for me", "blood is sacred and shouldn't be given or taken". It is also worthy to note that some traditions do not allow women to take decisions on accessing care without the approval of their husbands who might not agree or be away. This leads to a three stage delay in accessing healthcare/ transfusion (delay in taking decision to access healthcare, delay to get to the healthcare facility (bad roads, poverty) and delay in the healthcare personnel providing health).

Challenging the menace of blood touts has been quite a herculean task. The predominant category of blood donors that we have in LUTH are the Family Replacement Donor (FRD). But we also know that most FRD are actually blood touts/paid donors who front as FRD. Returning voluntary blood donors (rVBD) account for less than 16% of blood donated in LUTH and might be lower in Nigeria as a whole(4). The high incidence of blood touting is consequent of a failing economy and many Nigerians living on less than a dollar per day.(11) This is a far

cry from what should be obtainable by WHO standards. Most of the rVBD were gotten from blood drives.

Sadly data from LUTH has demonstrated a much higher prevalence of transfusion transmissible infections (TTI) amongst FRD who are actually paid/enumerated/commercial donors compared with rVBD (4). Therefore more needs to be done to encourage more Nigerians to imbibe the culture of voluntary blood donation.

Most facilities within the country are unable to provide blood components for their patients. Whole blood is given in these instances and whole blood transfusion is fraught with its risk: circulatory overload, infection, transfusion reactions etc. Within Lagos, only LUTH provides blood fractionation services, presently we are at 100% fractionation but the pressure is so much and demand greatly outweighs supply as only two 4-buckets cold centrifuges are available and double or triple bags are not readily available. We produce 50units of platelet concentrate and FFP each day to support 21 million Lagosians and environs. As a result of these demands, the centrifuges are over worked and break down repeatedly.

The cost of screening a unit of blood is about 25USD to 35USD per unit. Considering that about 70% of the Nigerian population lives under 1USD/day (11), it is largely expensive and unaffordable to the average Nigerian. Also, the problems of consumables constitute a recurrent issue majorly due to poor healthcare funding. The blood bank suffers from out of stock syndrome (blood bags, anti-sera, etc) and at times poor quality sera are procured. Many of the anti-sera are not potent and are sourced from the general market due to poor funding.

The National Blood Transfusion Service (NBTS) is a government unit established in 2006 under the Federal Ministry of Health. It is not an agency standing on its own therefore it is not well represented and doesn't receive much attention that is needed. The NBTS unit was funded by The PEPFAR grant in 2006 and funding was used to set 6 regional service centres, staffed to be able to collect blood, screen and distribute blood to hospitals in the region with cost recovery plans. However with the withdrawal of the PEPFAR grant, the system collapsed with only one regional facility adequately functioning.

Nigeria has the highest burden of sickle cell anaemia (SCA) in world. (12) As a result of repeated transfusion needs, the prevalence of allo-immunization is high amongst individuals with SCA(13). Blood banks in Nigeria, including LUTH do not have the capability to do an extended cross match and also can only rarely perform antibody identification. This has in a long way being of deleterious effect in the management of SCA and other patients who would have benefited from it.

Haemovigilance- we do not have a standard system of reporting mishaps surrounding blood collection, transfusion, errors in grouping and cross-matching, wrong component transfusion , monitoring complication and transfusion reactions. There is presently no hospital based or national haemovigilance committee to report to, to act on report and prevent future occurrence of mishaps. However we keep registers of occurrences in the blood bank.

Some of the innovations that are in place to mitigate these challenges are sensitization of the Nigerian public through rallies, where haematologists and laboratorians go to the streets to educate the public on the benefits and need to donate blood. We also now recognise returning blood donors during the world blood donor day celebrations giving them awards. With adequate counselling and motivation, we believe some FRP have the potential of becoming rVBD. We can also use the power of media to further educate and sensitize the public on need to donate blood.

We have recently established the voluntary blood donor unit (a 4-man team) to further strengthen voluntary blood donation but these people have no formal training on voluntary blood donation, they are being trained by haematologists and there is no career path for them.

We also advocate for better representation at higher levels of government so as to influence policy making, funding and decisions concerning health care and blood transfusion medicine and financing.

We plan to implement using the current SHOT (Serious Hazards of Transfusion) protocol of reporting various categories of blood transfusion mishaps (14).

We hope that with possible support from bodies such as these we will be able to do aphaeresis and provide adequate and affordable blood components for patients in Nigeria through training, providing consumables and availability. Doing apharesis costs 695USD and a greater proportion of Nigerians live under 1USD/day (11). This

makes it almost impossible for Nigerians to undergo apharesis procedures. We also hope that extended cross-match will be a routine process for all cross-matching done in LUTH and Nigeria as a whole.

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IMMUNOHAEMOTOLOGICAL FEATURES OF PATIENTS WITH SICKLE CELL DISEASE

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Sickle cell disease (SCD) is the most prevalent genetic disorder in France, where it affects mostly people of African descent or individuals from the French West Indies. Many other countries are also affected, and more recently, with increasing migration, SCD has become a worldwide public health issue.

Transfusion is still a key treatment for SCD patients; it is used either as curative or preventive therapy. As a result, they are much more exposed to transfusions than the general population. In 2017, according to the French hemovigilance system, in the general population the transfusion rate was 0.78%. Different cohorts of SCD patients report significantly higher transfusion rates, varying from 18% (in S/C or S/β^+ patients) to 98% (in SS or S/β^0 patients). Another difference, with the general population is how early in life SCD patients are transfused.

Consequently, SCD patients are much more exposed to alloimmunization and delayed hemolytic transfusion reactions (DHTRs), the latter being the most feared complication. In certain situations, defined as hyperhemolysis, autologous RBCs are also targeted and destroyed. This can put the patient in a life-threating situation. Health care professionals should therefore be familiar with the main immunohaematological features of SCD patients and of DHTR.

Alloimmunization happens where there are discrepancies between the recipient's and donor's RBC phenotypes. The typical phenotype of SCD patients is D+C-E-c+e+, K-, Fy(a-b-), Jk(a+b-), S-s+. The distribution of the alleles encoding this phenotype is almost the reverse in Africa and Europe. Some so-called low frequency antigens (LFA) should be considered as polymorphic antigens in the African population and these LFA are not present in most commercial panels. The situation is even more complicated when recipients lack high-frequency antigens, the most common ones being Hr-, Hr^B-, Sec-, U_{neg}, $U+^{var}$, Js(b-), (Hy-), and Jo(a-). Finally, there is a high Rh diversity among people of African descent. Because they harbor variant alleles and/or partial RH antigens, they are at risk of developing alloantibodies. In this setting, screening for partial RH antigens makes sense. The figures illustrating this diversity vary with the approach used. One of them is to take into consideration *RHD* or *RHCE*ce* variant alleles. In several American studies, their prevalence was estimated to be 29-36% and 53-72%, respectively. Other teams take into consideration D, C and e partial antigens. Their prevalence was estimated to be 8.4-14%, 12.5-27.7%, 3.3-3.5%, respectively, and the alloimmunization rates were 17.6%, 14.3-30%, 7.1%, respectively.

As a result of these phenotype discrepancies, SCD patients are more likely to be alloimmunized. An overall immunization rate of 2 to 6% is commonly admitted in the general population. Depending on the unit selection policy and/or the study design, the immunization rate in SCD patients varies from 7% to 76%, the highest figures being established when an ABO/RH1-only matching policy is implemented. In a meta-analysis of 24 publications, the overall alloimmunization rates were around 20%.

Alloimmunization is thought to be enhanced by an inflammatory state, which is often present in SCD patients. They are more prone to develop a new alloantibody. Using a stochastic modeling of alloimmunization, they have a 61% increased risk of producing additional antibodies versus 30% in the general population.

Autoantibodies have been identified as a risk factor of alloimmunization. As a result, SCD patients often have complex mixtures of allo and autoantibodies. RH antibodies and those considered as irregular natural antibodies are present in a significant proportion. Another characteristic of the antibodies in SCD patients is their evanescence; up to 70% of alloantibodies become undetectable within a few years of their initial development. Relatedly, about a third of DHTRs are reported to happen in patients with no previous history of immunization. In addition, a third of patients will not develop an antibody after a DHTR. Identifying patients at risk of developing a DHTR is key to managing them properly.

DEVELOPMENT OF SCENARIOS FOR THE FUTURE DEMAND OF BLOOD PRODUCTS IN THE NETHERLANDS: AN OVERVIEW

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Background: Western blood transfusion practices are currently changing due to various drivers such as blood management policies, ongoing technological developments, and new therapeutic options. In the Netherlands, as in many high-income countries, these have resulted in a diminishing trend of red blood cells. Therefore, it is important for blood bank management to anticipate the future demand of blood products for the sake of medium and long term decision making. To support this decision making, we have employed scenario development, which is used in many other sectors (such as finance and transportation) and can also be applied to blood transfusion.

Aims: To assess for opportunities, threats, and the organizational implications thereof for the medium-term future of Sanquin, the Dutch national blood bank.

Methods: We used a three step methodology. In the first step, we conducted a scoping literature review simultaneous to semi-structured interviews of 44 international experts. In the second step, we gathered 21 experts together for scenario sessions to assess the opportunities and threats for Sanquin's medium-term (15-20 years) strategy using an online platform and face-to-face discussions, which resulted in 11 overarching themes. In the third step, 13 experts came together in focus groups to provide joint recommendations to mitigate threats or stimulate opportunities within each theme.

Results: With regards to opportunities and threats for Sanquin's medium term strategy, 11 themes emerged: blood supply organization, RBC replacements, precision medicine, commercialization, change in Sanquin´s business model, change in perceptions, RBC improvements or alternative applications, digitalization, societal context, disruptive events, and changing legislation. For each of these themes experts provided specific actions for the organizations to mitigate threats or stimulate opportunities accordingly. These actions included increased transparency and improved communication with the (donor) public, lobbying in political spheres, increased activities in educational institutes and large funding organizations, and creating and collaborating on novel blood products on an international level, to name a few.

Summary/Conclusions: These results show that mapping and assessing a blood bank's future using a multi-disciplinary group of experts is conducive as an effective means of collection a diverse range of opportunities and threats. This provides an opportunity for blood bank management to become proactive towards these potential opportunities and threats and possibly evolve future strategies for the organization. This study overall outlines a qualitative approach for blood establishments to consider when thinking about changes in future demand and the organizational implications thereof.

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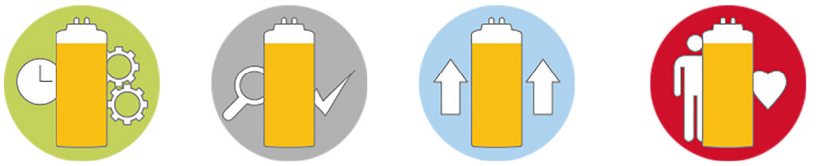

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List of devices covered by this certificate is given in the Annex no. 1

In terms of design documentation, comply with requirements of Annex IV (Section 4) to Directive 98/79/EC (as amended) implemented into Polish law, as evidenced by the audit conducted by the PCBC

Validity of the Certificate: from 27.02.2020 to 27.05.2024

The date of issue of the Certificate: 27.02.2020

CE 1434

Application No: 2072859
Module H

mgr Anna Mirosław
Vice-President

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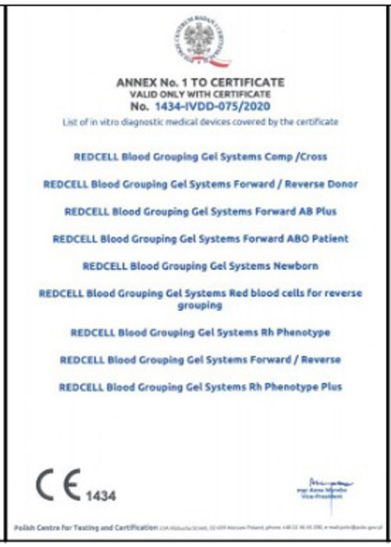

ANNEX No. 1 TO CERTIFICATE
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List of in vitro diagnostic medical devices covered by the certificate

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REDCELL Blood Grouping Gel Systems Red blood cells for reverse grouping

REDCELL Blood Grouping Gel Systems Rh Phenotype

REDCELL Blood Grouping Gel Systems Forward / Reverse

REDCELL Blood Grouping Gel Systems Rh Phenotype Plus

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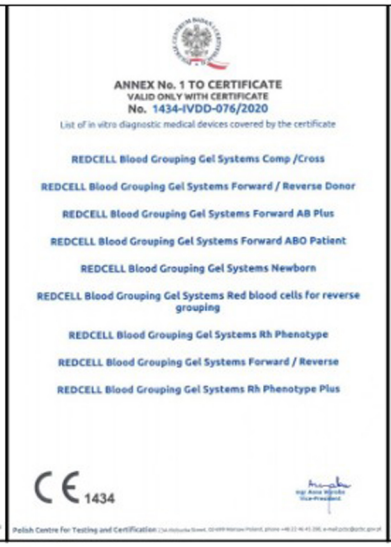

ANNEX No. 1 TO CERTIFICATE
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No. 1434-IVDD-076/2020

List of in vitro diagnostic medical devices covered by the certificate

REDCELL Blood Grouping Gel Systems Comp /Cross

REDCELL Blood Grouping Gel Systems Forward / Reverse Donor

REDCELL Blood Grouping Gel Systems Forward AB Plus

REDCELL Blood Grouping Gel Systems Forward ABO Patient

REDCELL Blood Grouping Gel Systems Newborn

REDCELL Blood Grouping Gel Systems Red blood cells for reverse grouping

REDCELL Blood Grouping Gel Systems Rh Phenotype

REDCELL Blood Grouping Gel Systems Forward / Reverse

REDCELL Blood Grouping Gel Systems Rh Phenotype Plus

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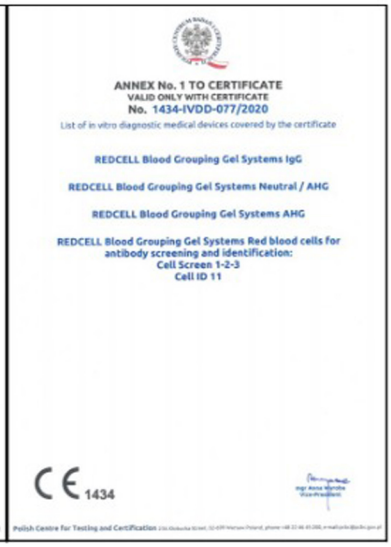

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REDCELL Blood Grouping Gel Systems IgG

REDCELL Blood Grouping Gel Systems Neutral / AHG

REDCELL Blood Grouping Gel Systems AHG

REDCELL Blood Grouping Gel Systems Red blood cells for antibody screening and identification:
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BLOOD CELL ANTIBODIES

Chairpersons: **Cengiz Asadov**
Gülsüm Özet

Speakers: **F. Yüce Ayhan**
Hülya Bilgen
Şeniz Göral

RED BLOOD CELL ANTIBODIES

F. Yüce AYHAN
Dr. Behçet Uz Çocuk Hastalıkları Cerrahisi E.A.H. Kan Merkezi, İzmir

All blood transfusions induce the immune response in all recipients. It is a consequence of interactions between different factors associated with recipients, blood donors and blood components. Pro-inflammatory cytokines, microparticles and damage associated molecular patterns (DAMPs) released during the storage of blood components stimulate the natural immunity in the recipients (1,2). Encountering with alloantigens of blood cells mobilizes immune mechanisms of adapted immunity in blood transfusions and the exposure to a nonself antigen is the first step of alloimmunization. Alloimmunization which is defined as immune response to foreign antigens following exposure to cells or tissues from genetically distinct individuals within a species can occur after pregnancy, transplantation and transfusion (3). The development of red blood cell (RBC) alloantibodies can frequently occur after blood transfusion and pregnancy (4). International Society of Blood Transfusion (ISBT) Working Party on Red Cell Immunogenetics and Blood Group Terminology recognized up to date 360 blood group antigens of which 322 are clustered within 36 blood group systems (5). Although so many non-self RBC antigens transfused to the recipients with every RBC unit, RBC alloantibodies are developed in minority of recipients. Besides exposure to non-self RBC antigens, it is also required the presentation of these antigens by the recipient HLA molecules for formation of RBC alloantibodies (2). The variance in responses to antigen mismatched blood cells might be linked with characteristics of blood donors, recipients and blood components **(Table.1)** (4, 6, 7).

TABLE.1- FACTORS IN TRANSFUSION RELATED RBC ALLOIMMUNIZATION

Donor Characteristics	· Antigen Immunogenicity □ *Density of antigens on RBC membrane* □ *Structural diversity of antigens* · Donor Demographics □ *Age, Gender, Ethnicity*
Recipient Characteristics	· Genetic predisposition □ *Age, Gender, Ethnicity* · Causal disease □ *Myelodysplastic syndromes* □ *Sickle-cell disease* □ *Thalassaemia* □ *Hereditary haemorrhagic telangiectasia* □ *Autoimmune diseases (RA,SLE)* · Transfusion burden · Immunomodulatory / Immunosupressive therapies
Blood Component Characteristics	· Prestorage & Process □ *Timing of processing* □ *Leukoreduction* □ *Irradiation* · Age of blood & Storage lesion

It is stated that the development of RBC alloantibodies is detected in 2-6 percent of recipients (4,7). RBC antigens are mebrane-bound structures such as lipids and glycoproteins anchored to the outer membrane of red cells. With the exception of ABO blood group antigens which are carbohydrates, most of RBC antigens are proteins and the majority of protein RBC antigens differ by a single amino acid polymorphism between donors and recipients. RHD is the exception for this feature with the involvement of whole protein in discrepancy between donors and recipients (3,8). Generally carbohydrate RBC antigens give rise to IgM class antibodies which react strongly at 22°C while the protein RBC antigens give rise to IgG class antibodies that react at 37°C. Formation of the alloantibodies to RBC antigens doesn't always have clinical consequences. Alloantibodies leading acute or delayed transfusion reactions in recipient by destruction of significant proportion of red cells and causing hemolytic disease of the fetus and newborn (HDFN) afterwards crossing the placenta are defined as clinically significant antibodies (7,9).

The effects of the antibodies differ related to antigen density, antibody class and/or subclass, affinity to antigen and the capability of complement activation. As a consequence of complement activation, formation of membrane attack complexes is induced and this may lead red cell clearence via intravascular hemolysis. On the other hand, antibodies without ability of complement binding would give rise to opsonization of red cells and evoke the clearence of red cells by phagocytic cells in the spleen (8).

It was demonstrated that the most potent antigens for invoking the alloimmune response are **K** and **E** and in the following order of immunogenicity **Cw**, **e**, **Jk^a** and **c** antigens were reported (7,10).

Alloimmunization is seen in higher rates in specific diseases and patient groups. Although transfusion burden in certain diseases such as sickle cell disease (SCD), thalassaemia and myelodysplastic syndromes is an important determinant all on its own for alloimmunization, other factors associated with the disease might be in consideration. Even though patients with SCD and thalassemia have among the highest rates of RBC alloimmunization of all transfused patient populations, transfusion to SCD patients in acut illness is more likely to have higher risk for allommunization (2,11). It was also reported increased risk of allommunization in multitransfused patients with older ages (12). Patients with autoimmune disorders such as systemic lupus erythematosus (SLE), rheumatoid arthridis (RA), Crohn's disease and ulceratif colitis present relatively high risk for RBC alloimmunization but lower rates were reported in those patients receiving immunosupressive therapy (7). It was pointed out the higher frequency of autoantibodies to red cells in RBC alloimmunized patients which is unclear whether the alloimmunization induces the autoantibodies or vice versa (7,13). In a single report that investigate the possible role of infections in RBC alloimmunization, it was stated that transfusions made during severe bacterial (tissue-invasive) infections might have been associated with increased risks of development of RBC alloantibodies (14).

Exposing to fetal RBCs during pregnacy and delivery brings about maternal alloimmunization and in relation with the immunogenicity of the RBC antigen HDFN may develop. It is stated that ABO incompatibility between mother and fetus have protective role against RBC alloimmunization likely resulted from the clearence of fetal RBCs from maternal circulation by natural isohemagglutinins. Even though the prevention of RHD alloimmunization in pregnancy might be ensured by administration of RH Immunglobulin in pregnant woman, anti-D is still the foremost reason of HDFN. Along with **D** antigen, RHCE (**C**, **c**, **E**, **e)** Kell, Duffy, Kidd and MNS blood group antigens have significant roles in the development of HDFN (2,7).

Different durations of detection can be seen during the follow up of alloimmunized patients. Once identified antibodies can be detectable in varying time periods up to years. Even though the evanescence of RBC alloantibodies can be occur in time, re-exposure with the same antigen would give rise to alloimmune response. Alloantibodies to the antigens of Kidd (**Jk^a** and **Jk^b**), Lutheran (**Lu^a**), and Kell systems (**Js^a**) are associated with higher evanascence rates. On the other hand, alloantibodies to Rh antigens, particularly anti-D and anti-c are found more durable in alloimmunized patients (7,15). It is recommended to perform the cross matching with antigen negative red cells in the presence of particular alloantibodies such as anti-D, anti-C, anti-c, anti-E, anti-e anti-K, anti-k anti-Jk^a, anti-Jk^b anti-S, anti-s, anti-U anti-Fy^a, anti-Fy^b (9).

Aside from being a common practice in blood banks, identification of RBC alloantibodies may be challenging for carrying out safe transfusions with compatible RBC units in patients that have multiple alloantibodies. Creating of patient registries and development of transfusion strategies for prevention would improve the problem solving solutions in RBC alloimmunization.

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ANTIBODIES TO BLOOD CELLS

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Medipol Mega Hastaneler Kompleksi, İstanbul

In this panel presentation I will talk about the antibodies to leucocytes. Antibodies to leucocytes can develop in different situations and diseases. But here we will discuss their appereance in transfusion medicine . Transfusion related acute lung injury (TRALI), platelet refractoriness and neonatal alloimmune neutropenia (NAIN) will be main topics.

1) TRALI is currently one of the most common causes of transfusion-related major morbidity and death. Among the many TRALI mediators, leucocyte antibodies have been identified as important triggers of severe TRALI.

The major histocompatibility complex (MHC) is a term used to describe a group of genes in animals and humans that encode a variety of cell surface markers, antigen-presenting molecules, and other proteins involved in immune function. The human leukocyte antigen (HLA) complex is synonymous with the human MHC.

Leucocyte antibody screening has to include the detection of human leucocyte antigen (HLA) class I, class II and human neutrophil alloantigen antibodies using established and validated techniques. HLA class I antibody detection should be restricted to antibodies clinically relevant for TRALI. To avoid unnecessary workload, TRALI diagnosis should be assessed by consultation with the reporting clinician and thorough exclusion of transfusion-associated circulatory overload/cardiac insufficiency. In patients diagnosed with TRALI having donors with detectable leucocyte antibodies, evidence of leucocyte incompatibility should be provided by either cross-matching or typing of patient for cognate antigen.

Leucocyte antibody screening for the immunological clarification of TRALI cases as well as for identification of potentially alloimmunized blood donors is feasible and can be performed in a reasonable and quality assured manner. This practice can contribute to the prevention of antibody-mediated TRALI.

2) Although many patients have an appropriate increase in platelet count when transfused with platelets, less than adequate results tend to be common with 28 to 44 percent of platelet transfusions failing to produce a satisfactory response. Immune causes of alloaccount for the remaining minority of cases and include alloimmunization to human leukocyte antigen (HLA) and/or human platelet-specific antigens (HPA), which are due to prior exposure via transfusion, pregnancy, or transplantation. ABO incompatibility may also play a limited role in immune refractoriness . Immunization to HLA antigens is a major risk factor for refractoriness to platelet transfusions. Although platelets express only HLA Class I antigens, HLA Class II antigens present on leukocytes may be essential for the development of alloimmunization to HLA Class I antigens. Exposure to foreign HLA Class II antigens can occur through prior transfusion or from maternal-fetal incompatibility during pregnancy. HLA-A and HLA-B antigens are the predominant HLA antigens expressed on platelets; HLA-C antigens are not expressed well on platelets. While HLA-A and HLA-B antibodies are typically implicated, antibodies to HLA-C locus antigens have also been reported as a cause for platelet refractoriness. For patients who appear to be alloimmunized, the recommended testing a sample of the patient's plasma for the presence of antibodies to the human leukocyte antigen system (ie, anti-HLA antibodies). Methods to detect the presence and specificity of HLA antibodies include lymphocytotoxicity, ELISA, and flow cytometric immunofluorescence testing, depending on the laboratory performing testing.. If the antibody screen is negative, testing for antibodies to the human platelet antigen system (ie, anti-HPA antibodies) should be performed. Not all detectable alloantibodies are clinically significant; HLA antibodies that are capable of activating complement may have a greater likelihood of causing platelet refractoriness. Patients in whom HLA alloimmunization alone is responsible for platelet refractoriness generally respond well to HLA-matched donor platelets.

3) Neonatal alloimmune neutropenia (NAIN, NAIN or NIN) is a neutrophil blood group antagonism, analogous to hemolytic disease of the fetus and newborn (HDFN) and fetal/neonatal alloimmune thrombocytopenia (FNAIT). A limited number of prospective screening studies showed that granulocyte-specific antibodies were detectable in 0.35–1.1% of random postnatal maternal samples and that the incidence of NAIN was below 0.1%. Symptoms vary from none to mild skin infections, omphalitis or more severe infections like pneumonia, sepsis, and meningitis. Treatment of neonatal infection with antibiotics and granulocyte-colony stimulating factor is advised..

NAIN results from maternal sensitization to paternal HNAs present on the fetal neutrophils. The anti-HNA antibodies of the IgG immunoglobulin class are transported across the placenta and bind to the fetal neutrophils. It is unknown whether the antibodies only lead to increased destruction of mature cells or also to inhibition of granulocytopoiesis. In some cases NAIN is caused by isoantibodies, if a mother is lacking a complete HNA system-carrying structure (e.g. anti-FcγRIIIb isoantibodies or HNA-2 antibodies) .Maternal immunization can take place during pregnancy or even before the first pregnancy. The incidence of NAIN is not exactly known. Due to the necessary laborious anti-HNA antibody screening and identification assays the known screening studies are limited in size. Even though NAIN is a relative rare condition, the consequences for the newborn can be serious, and timely diagnosis can prevent severe complications. A good differential diagnosis is important and can point the clinician in the right direction regarding the necessary investigation and treatment, and can predict the clinical course. This can also be reassuring in the counselling of the parents regarding the recovery of their child, and low hazards of severe disease in subsequent pregnancies. Laboratory investigation for detection and specification of the causative maternal granulocyte-specific alloantibodies should be performed by experienced laboratories. In the majority of cases, therapeutic and prophylactic treatment with antibiotics is effective.

The leucocyte antibodies may have great impact in transfusion medicine, and should be carefully evaluated for appropriate diagonosis and treatment.

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PLATELET ANTIBODIES

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Platelets have various functions and participate in primary hemostasis, inflammation, and immune responses (1,2). There are 182 membrane-associated platelet proteins found (3), of which are platelet membrane receptors, known as toll-like receptors, complement receptors, chemokine receptors, adhesion molecules, etc., mediate complex physiological and pathological responses. Moreover, platelets contain granules storing various glycoproteins, growth factors, inhibitors, chemokines, etc., and these proteins have important roles in biological process upon platelet activation (1,2). Haematological diseases demand supportive therapy with allogenic platelet transfusions to prevent and treat bleeding manifestations which may be either a result of chemotherapy or the underlying disease itself. However, multitransfused patients who receive long term platelet transfusion support may develop platelet refractoriness, with progressive poor response to platelet transfusions (4,5). In about 20 percent of such cases, the immune mediated mechanism is the likely reason. This can be attributed to alloantibodies to either class I human leucocyte antigens (HLA) or human platelet antigens (HPA) or a combination of both, which ultimately results in premature removal of transfused platelets (4,6,7).

Antigens on the platelet membrane

Platelet is a major actor in primary haemostasis. Presence of auto and/or alloantibodies against platelet reduces the efficiency of haemostasis in the patient by two main mechanisms: destruction of platelet and thrombocytopenia, functional disturbance due to the fixation of antibodies on the platelet molecules that play a major role in haemostasis. The association of the both mechanisms improves the severity of haemorrhages in the fetal neonatal alloimmune thrombocytopenia (FNAIT). Among molecules on platelet membrane, HLA and, HPA and their alloantibodies represent a concern in platelet transfusion.

1- Human leucocyte antigens

HLA are heterodimer membrane glycoproteins including a polymorphic heavy chain non-covalently associated with amonomorphic molecule, the β2 microglobulin (8). They may also be involved in pathogenesis of certain autosystem autoimmune and infectious diseases. HLA falls into two classes:

- HLA class I antigens (A, B and C) are expressed on the majority of tissues and cells including T and B lymphocytes, granulocytes and platelets.
- HLA class II antigens (DR, DQ, DPA and DPB) are constitutively expressed on B lymphocytes, monocytes and dendritic cells but can also be detected on activated T lymphocytes and activated granulocytes. It is not clear whether they are also present on activated platelets (9).

These multi-polymorphic cell-surface proteins play a major role in antigen presentation. On platelet membrane, only HLA class I antigens were present. Furthermore, platelets are able to produce HLA membrane proteins. Platelets can also acquire HLA antigen specificities by absorbing soluble HLA molecules from plasma. Because of their very high polymorphism and immunogenicity, HLA class I antigens are extremely important in the field of platelet transfusion, particularly for recipients who require chronic transfusion support[8].

2- Human platelet antigens

Numerous glycoproteins are present on the human platelet membrane. On these glycoproteins, several HPA have been found. In 1959, van Loghem et al. described the first platelet-specific antigen named Zwa (today HPA-1a) and established that its incidence in the Dutch population was 97.65% (10). In 1990, a new nomenclature named HPA was adopted by the ISBT platelet working party. The number of new HPA systems improved. Today, up to 35 HPA systems are referenced (11,12-14). Each HPA represent one of six platelet glycoproteins GPIIb, GPIIIa, GPIa, GPIbα, GPIbβ, and CD109, and six biallelic systems (HPA-1, -2, -3, -4,-5, 15) are grouped (13,14). Nevertheless, in practice, in the field of platelet transfusion, only a few are important because they are often implicated in recipient alloimmunization (8).

3- CD36

CD36 is a glycoprotein bind to glycoprotein IV on the platelet membrane and can cause platelet refractoriness. Transfusing platelets to patients with anti-CD36 is challenging because of the rarity of CD36-negative (CD36-)

donors and the possibility of additional HLA antibodies (8,15).

Blood group antigens

The presence of A and B antigens of the ABO blood group system was demonstrated earlier on platelet membrane, but with a lower molecular density than on red blood cell (RBC) membrane. Nevertheless, some individuals express A and B antigens more strongly on their platelet[8].

Platelet refractoriness

Platelet refractoriness is defined as a 1 h corrected count increment (CCI) of $<5 \times 10^9$ /L on two sequential occasions, using ABO identical fresh platelets. This has been attributed to immune causes, such as the presence of platelet alloantibodies and platelet autoantibodies and nonimmune consumption associated with clinical factors such as fever, infection, septicemia, bleeding, disseminated intravascular coagulation (DIC), and splenomegaly (Table 1) (16-19).

CCI = (posttransfusion count – pretransfusion count) × body surface area (m^2)/number of platelets administered.

Nonimmune	**Immune**
Fever	Anti-HLA antibodies
Sepsis	Anti-HPA antibodies
Drug associated	ABO mismatch
Active bleeding	Drug dependent antibodies
Splenomegaly	
DIC	
Veno occlusive disease	

Table 1: Causes of refractoriness to platelet transfusion

Platelets express HLA class I antigens, ABO antigens, and severeal platelet specific antigens. Any of these molecules may potentially serve a an immune stimulus in a transfusion recipient. Whereas antibodies directed against HLA molecules are responsible for most cases of immune-mediated platelet refractoriness, antibodies to the HPA are less frequently implicated (20).

Because fewer than half of platelet refractory patients have demonstrable anti-HLA or antiplatelet antibodies, evaluation of both an immediate response to platelet transfusion and 18- to 24-hour posttransfusion platelet survival is needed to help establish the cause of platelet refractoriness. Platelet counts obtained from 10 minutes to 1 hour after transfusion that repeatedly fail to demonstrate a CCI of more than 5000/µl usually indicate immune-mediated platelet refractoriness. If the 10 minutes to 1 hour posttransfusion platelet count shows a reasonable increment but the platelet count falls back to baseline by 18 to 24 hours, a nonimmune mechanism of refractoriness may be presumed. In cases of suspected immun-mediated refractoriness, HLA antibody screening panel reactive antibody (PRA) provides valuable supporting evidence that allosensitization has occured. A patient with a PRA greater than 70% may be considered to be severly immunized and a good candidate for HLA matched platelets (19,21).

Anti- Human Leukocyte Antigen Antibodies

Three mechanisms are involved in HLA antibody production: transfusion, pregnancy and transplantation. HLA alloimmunization is the major immune factor in the destruction of transfused platelet and platelet transfusion refractoriness. This HLA alloimmunization was the etiology of the platelet transfusion refractoriness in 80% to 90% of all the cases due to immune factor (8,22). However, all platelet multitransfused patients do not develop HLA alloimmunization. In pregnant women, the incidence of HLA antibodies is between 18% and 30% (19,23).

Several assays are available to detect the presence of anti-HLA class I antibodies in the serum of alloimmunized patients. Years ago, the most commonly used test was the lymphocytotoxicity assay (LCA). The results of the LCA correlate well with the response to platelet transfusion. However, this assay does not detect anti-HLA antibodies that do not activate complement. The anti-HLA antibodies can also be detected using an HLA- specific solid -phase enzyme-linked immunosorbent assay, glycoprotein-specific monoclonal antibody-specific immobilization of platelet antigens, or flow cytometric detectlon of antibody binding to beads coated with purified HLA antigens. The flow cytometry-based methodology has significantly improved sensitivity over LCA and, similar to solid-phase assays, it can detect both complement fixing and non complement fixing antibodies (19).

Antiplatelet Antigen Antibodies

Specific platelet antibodies were acquired by pregnancy or transfusion. Anti-HPA antibodies are well known for the association of post-transfusion purpura (PTP) and neonatal alloimmune thrombocytopenia (NAIT) (13,17) and HPA-2 was shown to be associated with febrile non-hemolytic transfusion reaction (FNHTR) (16,17).

The most commonly used methods for detection of anti-HPA antibodies are solid-phase assays using purified platelet antigens for detection of antibody specificity. However, testing for anti-HPA antibodies is not typically performed in the workup of platelet refractory patients, mainly because the importance of these antibodies in causing clinical refractoriness is not well established.

Among multitransfused patients, HPA alloimmunization alone is rare but HPA antibodies were frequently associated with HLA antibodies (19).

Prevention of Alloimmunization

Alloimmunization may be induced via the indirect or direct pathway of allorecognition. For the indirect pathway, donor platelets themselves or WBCs that contaminate blood products first need to be phagocytosed by recipient antigenpresenting cells. These antigen-presenting cells subsequently process and present donor (e.g., HLA Class I and II) peptides to recipient CD4 T cells. In the direct pathway, donor WBCs that contaminate platelet concentrates (PCs) directly stimulate alloreactive recipient CD4 T cells (24,25). Both pathways activate allospecific CD4 T cells, which can provide help to alloreactive B cells to produce alloantibodies. Although the indirect pathway is suggested to be dominant for humoral alloimmunization after platelet transfusions (24,26,27) both pathways can in theory result in production of HLA alloantibodies. These alloantibodies can opsonize donor platelets in subsequent transfusions, causing rapid clearance, and render subsequent platelet transfusions ineffective (24,28-30)

Although they express HLA class I antigens, platelets themselves are fairly weak immunogens. It has been shown that contaminating leukocytes in platelet products are primarily responsible for stimulating HLA antibody formation in platelet transfusion recipients. Thus removing WBCs from blood products (leukoreduction) is an essential means of preventing alloimmunization and subsequent platelet refractoriness. The definitive study showing this was the Trial to Reduce Alloimmunization to Platelets (TRAP study)[19,31], which compared alloimmunization rates in 530 newly diagnosed patients with acute myeloid leukemia randomized to receive unmodified, pooled platelet concentrates (control); filtered, pooled platelet concentrates (F-PC); filtered single-donor apheresis platelets (F-AP); or UV-B-irradiated pooled platelet concentrates (UVB-PC). Anti-HLA antibodies were detected in %45 of control participants compared with %17 to %21 of patients receiving modified platelets. A total of 13% of control group patients became platelet refractory versus only 3% in the F-PC group, 4% in the F-AP group, and 5% in the UVB-PC group (19).

Management of Platelet Refractoriness

When platelet refractoriness has been demonstrated, several strategies may facilitate achieving therapeutic platelet increments in vivo (Figure 1) (19,32). A trial of ABO matched, fresh (1-2 days old) platelets may be helpful. In cases of immune mediated refractoriness, a trial of HLA matched platelets, antigen negative platelets, or crossmatched platelets should be considered. In most cases, alloimmune refractory patients will show some degree of response to HLA matched platelets. Because of high degree of polymorphism of the HLA loci, it is often not possible to find perfect HLA-A and HLA-B locus matches, leading to the use of platelets mismatched at one or more loci

Table 2: Grades of HLA matched platelets.

Match Grade	Description
A	4-antigen match (donor and recipient match at both HLA-A and B loci)
B1U	1 antigen unknown or blank (e.g. donor is: A2, -; B5, 27)
B1X	1 cross-reactive group*
B2UX	1 antigen blank and 1 cross-reactive*
C	1mismatched antigen present
D	≥2 mismatched antigen present
R	Random

*The clusters of HLA that share antigenic epitopes can be classified into cross-reactive antigen groups. Antibodies recognizing one HLA molecule within the group cross-react with other members of the same group.

In general, transfusion of grade A or BU matched platelets can result in an increase in platelet count that is superior to platelet increment obtained using either crossmatched platelets or platelets with different degrees of HLA mismatching (BX, C, or D). An additional step that may help in finding compatible platelets is flow cytometric detection of anti-HLA antibody specifity using single HLA antigen-coated beads. This information can be used to find donors that may be HLA mismatched with the recipient but whose platelets lack the antigens to which the patient has spesific antibodies. Furthermore, family members may be considered as platelet donors in addition to the available pool of HLA-matched volunteer donors. As an alternative to HLA antigen matching, patients may benefit from receiving donor platelets that are crossmatch compatible with the patient's serum. The major benefit of crossmatching is a potentially larger pool of donors that would have been excluded by strict HLA antigen matching. Also, platelet crossmatching may be helpful in cases of refractoriness caused by antibodies directed against platelet spesific antigens (19,33). The most challenging cases are the rare instance involving immune-refractory patients who are actively bleeding and HLA matched platelets or crossmatched platelets are either ineffective or unavailable. In such cases patients are typically transsfused with repeted doses of random HLA incompatible platelets during hemorrhagic episodes (T).

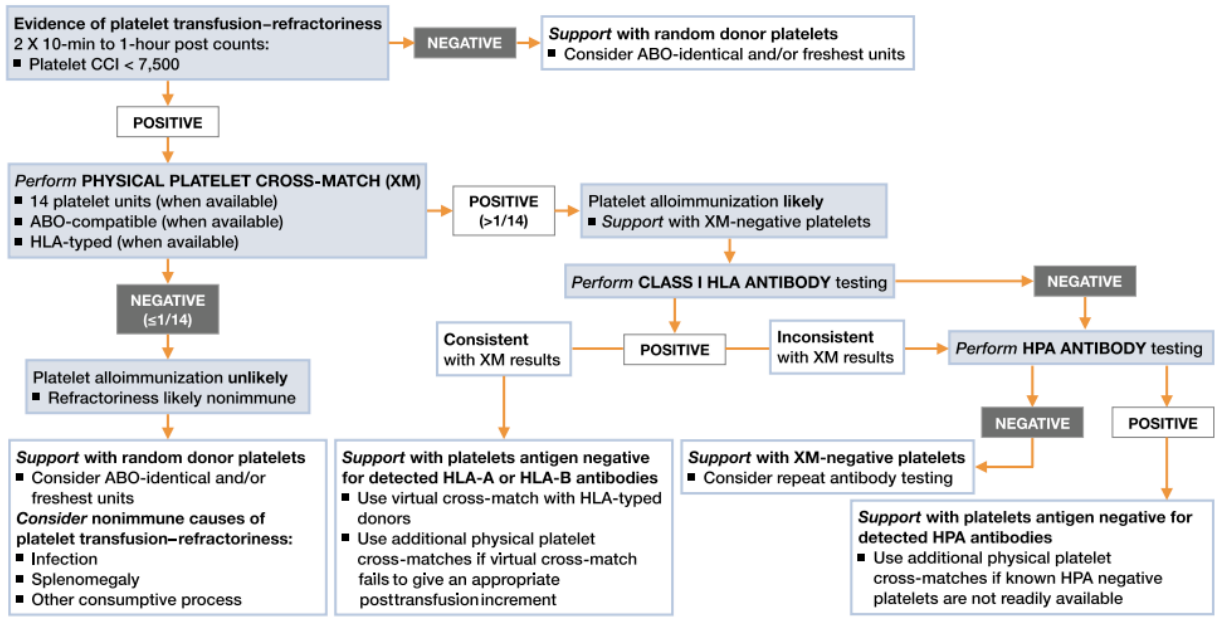

Figure 1: Diagnostic and management algorithm for the platelet transfusion–refractory patient using posttransfusion platelet counts, physical platelet cross-matches, Class I HLA antibody testing, and HPA antibody testing.

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PROBLEMS OF YOUNGSTERS IN BLOOD BANKS IN TURKEY

Chairpersons: **Arwa Al Riyami**
F. Burcu Belen Apak

Speakers: **Özlem Tüfekçi**
Asu Fergün Yılmaz
Yeşim Oymak
Başak Adaklı Aksoy
Berrin Uzun
Tuğba Kula Atik

PLANNING A CLINICAL TRIAL IN THE FIELD OF TRANSFUSION

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Medical research has evolved enormously throughout years; from individual expert described opinions and techniques to "evidence based" scientifically designed methodology based studies. Clinical expertise is important but the clinical outcomes can only be improved if they are complemented by the best external evidence.

Scientific study can be described as "a planned and systematic effort based on evidence for the solution of any health problems using data with high degree of accuracy". A clinical study begins with the development of a clinical research question (PICO-Population, Intervention, Comparison, Outcome) and requires good planning including research protocol, ethical approval, data collection, data analysis, interpretation of results and publication.

Scientific studies can be classified in several ways, depending on data collection techniques (observational/experimental), causality (descriptive/analytical), relationship with time (prospective/retrospective/cross-sectional) and the medium through which they are applied (clinical/labarotory/epidemiological). Figure 1 shows the study designs used in medicine.

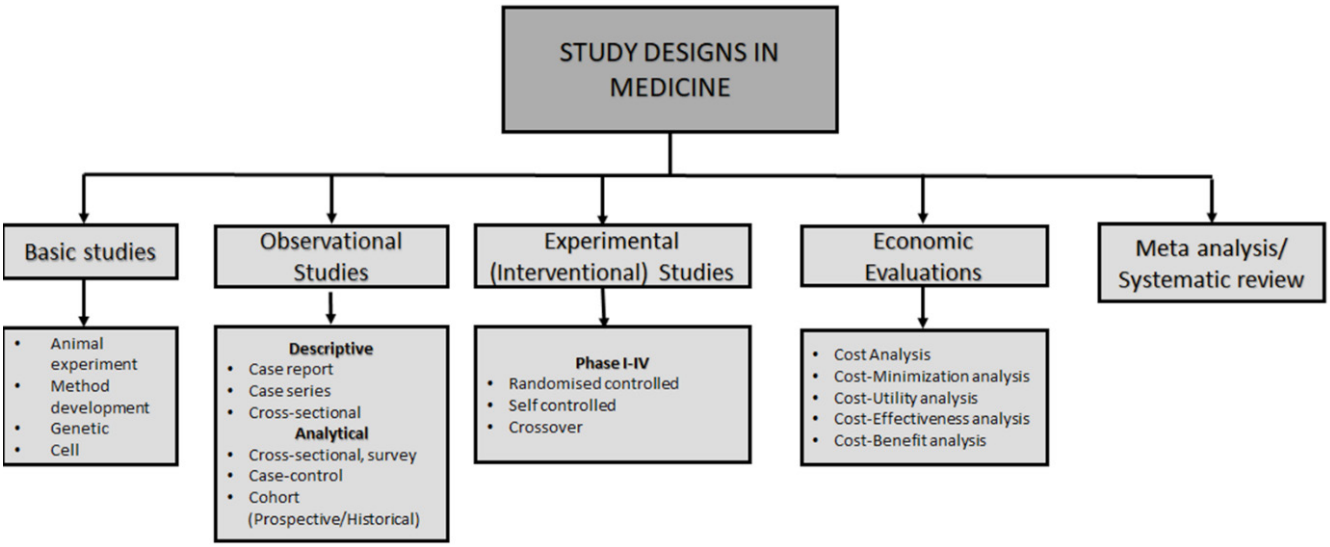

Figure 1: Study designs in medicine

Clinical studies include observational studies and experimental (interventional) studies. There is no intervention or exposure in an observational clinical study; there is a description/analysis of outcomes in participants. Factors aren't controlled, repettition of events aren't generally possible but their results are largely consistent with real life.

An experimental clinical study, on the other hand, compares the effect of treatments/exposures or interventions with control in humans. It is performed in order to establish efficacy, safety or side effect of a treatment or diagnostic approach including drugs, devices, surgical, physical or psychotherapeutic procedures. Randomisation methods can be used in these studies and investigated factors are controlled. Cause-effect relationships are evidence-based and experiment can be repeated as desired. However the results of experimental clinical studies are not always compatible with real life.

Randomised controlled trials (RCTs) are the 'gold standard' of clinical trials as they produce the strongest evidence among clinical trials due to the fact that patients are randomly assigned to treatments or interventions.

Clinical trials in transfusion medicine

Transfusion medicine is relatively an old field of medicine dating back a century. Considerable progress has been made throughout the years including collection, preservation, delivery and safety of blood products. However, many important questions regarding the use of blood products and alternatives have not been the subject of well designed and large RCTs in transfusion medicine. Clinicians frequently make decisions based on suboptimal levels of clinical evidence.

The reasons for relatively low number of large clinical trials in transfusion medicine include the following:
· Transfusion medicine has historically been a labaratory-based speciality
· Blood components are a supportive treatment for patients under the care of other physicians whose research focus is directed at the underlying disease
· The impact of supportive therapy with blood components on important clinical outcomes may be difficult to measure
· Difficulties in obtaining funding for research of a supportive; as opposed to a curative therapy
· Blood components have been part of standard care for years without good evidence
· Few industry partners are willing to invest in clinical trials as products are already in wide use

Clnical trials that are published in transfusion medicine are generally about platelet dose; hemoglobin and platelet threshold for transfusion, the age of blood, type of recussitation package as in massive transfusion and few other topics like benefits of pre- or post- storage reduction. Of note; contrary to other medical disciplines where new drugs are compared to older ones, few such innovations are tested in transfusion medicine.

The American Association of Blood Banks Clinical Transfusion Medicine Committee reported the critical developments of 2018 in transfusion medicine and defined the major topics as big data and omics, emerging infectious diseases, platelet transfusion and pathogen reduction, transfusion therapy and coagulation, transfusion approaches to hemorrhagic shock and mass casualties, therapeutic apheresis and chimeric anrigen receptor T-cell therapy.

Recently the concept of Patient Blood Management (PBM) program has gained a lot importance and popularity in transfusion medicine. PBM is a patient-focused, evidence-based and multidisciplinary approach to optimize both the management of patients and transfusion of blood products for quality and effective patient care. The International Consensus Conference on PBM published 10 clinical and 12 research recommendations in 2020 and stated that systematic, rigorous and transparent evidence-based methodology in a formal consensus format should be the new standard to evaluate (cost-) effectiveness of medical treatments, such as blood transfusion. Key areas in PBM include diagnosing and treating perioperative anaemia, implementing blood-saving measures throughout the course of diagnosis and treatment, and transfusing patients according to accepted and evidence based transfusion thresholds.

Clinical trials in transfusion medicine should be strongly encouraged and be registered to let anyone know what is done where, how and why. Such trials should be independent of industry and be carried out by specialists that have sufficient knowledge in all aspects of transfusion medicine.

Lastly, the key points to remember in planning a clinical trial are:
1) Properly conducted RCTs are the best means to evaluate the risk and benefits of therapeutic interventions.
2) Although 'gold standard'; RCTs often have practical, legal, financial and ethical limitations.
5. Observational studies and self-controlled experimental (quasi experimental) can be useful when RCTs are not feasible. However observational studies are prone to bias and cannot show causation.
3) The design of a RCT depends on whether the investigators wish to evaluate the *efficacy* or *effectiveness* of an intervention

4) A two-group parallel design is the simplest RCT to design and execute but alternative designs can be useful in some circumstances
5) Selecting the appropriate study population and the outcomes is critical to ensure both the feasibility of completing the RCT and the generalisability and clinical relevance of the study results.

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EDUCATION IN TRANSFUSION MEDICINE

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Blood and blood component transfusion is one of the procedures mostly performed in hospitals. Transfusion of blood and blood components is life – saving if the right component is transfused with right indication in right patient in the right place at the right time.

Although transfusion medicine is an essential part of daily practice in most of the clinicians, clinicians' knowledge about transfusion medicine is limited.

In Turkey, National Educational Program (UCEP) is conducted for education of the students in medical school. This program offers a national framework in medical education and aims to determine the standards in medical education. Goals determined in UCEP for medical students in terms of transfusion medicine is 1. The participants should gain the ability to perform transfusion of blood and blood components in emergent situations with the help of guidelines. 2. The participants should make the initial diagnosis of transfusion reactions. But according to a questionnaire study by Kupesiz et al (unpublished data) the education program in most of the universities in Turkey cannot meet this competence. The medical students at 6 th year, did not feel competent and they thought that their knowledge level was insufficient even if in basic transfusion knowledge.

When we look at the National Educational Program related to the post-graduate curriculum, it does not meet the requirements of daily practice especially in anesthesiology, emergency medicine, neurosurgery, general surgery and gynecology and obstetrics.

The curriculum of specialties and subspecialties that are mostly interested in transfusion medicine like hematologist, pediatric hematologists and oncologist and medical microbiology is also defined in National Educational Program. Although practical and theoretical sessions are documented, the duration of rotation in blood banks is not well determined. In Turkey, there is a wide range between universities in terms of transfusion medicine education and rotation programs in blood banks. In a study by Kupesiz et al (unpublished data) although the hematologists felt competent in transfusion practice, they felt insufficient about performing and interpreting laboratory tests in blood bank. This study results drew attention to the need for standardizations and updating the curriculum according to the requirements.

In Turkey, they are also certification programs conducted by government. The duration of rotations and curriculum is well documented. The curriculum and duration of certification program differ according to the specialties of the participants like medical microbiologists, hematologists or infectious diseases and medical microbiology. PPhD programs in some universities and certification programs conducted by societies (e.g Turkish Society of Hematology, Turkish Society of Pediatric Hematology, Turkish Society of Blood Bank and Transfusion) are also available in Turkey.

Similar to our country, there are different education programs in different countries in transfusion medicine. Even in the same country different universities conduct different programs. So standardization is also a problem in Europe and USA. For example, in Canada, transfusion medicine is a 2 year competency based fellowship program. In China, 5 year transfusion medicine diploma program is constituted. In Germany, transfusion medicine is an individual specialty.

In conclusion; transfusion medicine is not a specialty or subspecialty in Turkey, there are Ph D programs, certification programs and training programs of societies. Although there is a huge progress in transfusion medicine education in Turkey, there is a long way to go for standardization and determining a curriculum meeting the all requirements in this field.

PATIENT BLOOD MANAGEMENT: WHERE DO WE STAND IN TURKEY?

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Patient Blood Management (PBM) is an evidence-based multimodal treatment concept that aims to reduce transfusion of allogeneic blood products. Allogeneic blood transfusion should only be a therapy when there are no other reasonable alternatives. The purpose of PBM is minimization or avoidance of unnecessary exposure to blood transfusion.

The patient should be evaluated individually in terms of risk-benefit balance. For instance non hemolytic febril transfusion reaction may advance with high recurrence for each transfusion. On the other hand transfusion related acute lung injury may be fatal. Thus PBM programmes are achieved to provide appropriate blood transfusions constantly.

Patient blood management can be explained with three components. 1. Comprehensive pre-operative optimization of hematopoiesis and anemia treatment 2. Minimization of peri-operative blood loss and restrictive transfusion triggers 3. Use of intravenous iron, erythropoietin, vitamin B12 and folic acid postoperatively.
The World Health Organisation supports establishment of PBM programmes in the countries. In this way clinical outcomes and mortality rates could be improved and save costs. Developed countries have many actual guidelines related with PBM. Restrictive regimens with a hemoglobin treshold of 7-8 g/dl have been adopted in the developed countries guidelines.

We have national guidelines related with blood transfusion which have been uptodated regularly. We don't know that if the clinicians apply blood transfusion appropriatly and how they manage pre –post operative anemia in Turkey. It is obvious that we need a PBM programme. The studies of our national PBM project have been continuing in The Ministry of Health of Turkey and is supported by European Union.

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CONTRIBUTING TRANSFUSION POLICY - ANEMIA MANAGEMENT CLINICS

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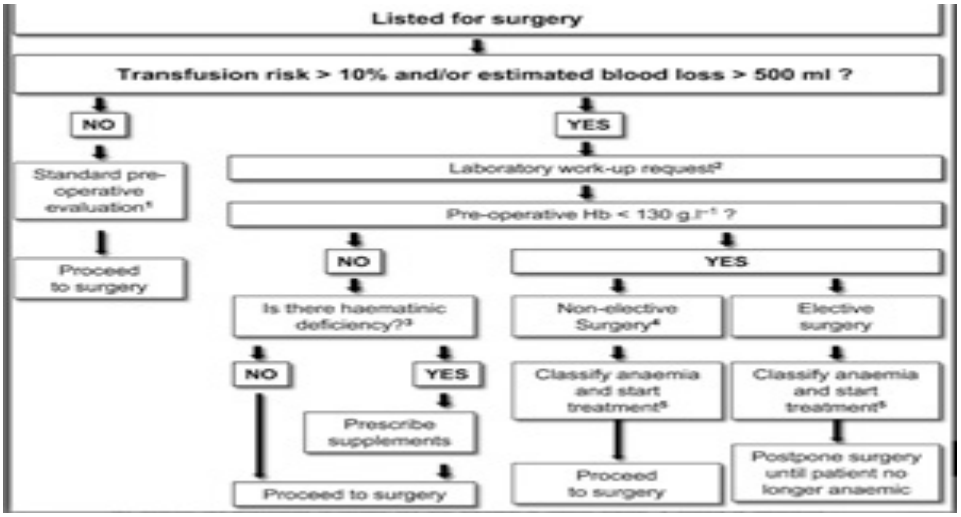
Patient blood management (PBM) is a clinical concept with the goal of avoiding unnecessary blood transfusions to improve patient outcomes and safety. It has three main phases; to detect and correct preoperative anemia properly, to find out the risk of transfusion according to the estimated blood loss of procedures and to improve postoperative care by explaning the possible mechanisms of coping anemia rather than transfusion. Simple but effective algorithms are widely used to prevent unnecessary transfusions(Figure 1).

Figure 1: International consensus statement on the perioperative management of anemia and iron deficiency.



Patient blood management (PBM) is not only a strategy for internal medicine or hematologists; it is also effective in pediatrics, intensive care medicine and the surgeries which are prone to have serious blood loss in the operating rooms. It requires a multidisciplinary involvement and with the help of this collaboration anemia management clinics were put into daily practice in upper-middle income countries and anesthesiologists, intensive care specialists, hematologists are putting effort to make PBM and anemia outpatient clinics actual in lower income countries.

The main purposes of anemia outpatient clinics are to detect the patients with anemia, bb <13 g/dl for adults, before elective surgery with possible high blood loss, detecting the underlying reason -mostly iron deficiency anemia- and treating by hematinics. It is also effective in obstetrical anemia and convenient for the patients refusing blood products. Estimating possible blood loss, suggesting a schedule for treatment and operation will contribute to decrease the transfusion rates.

COLLABORATION OF TRANSFUSION CENTER AND CLINICIANS

Berrin UZUN
İzmir Katip Çelebi Üniversitesi Atatürk E.A.H. Kan Merkezi, İzmir

As in every service sector, service quality and efficiency of blood banking and transfusion medicine is about how informed the person receiving the service is, as much as it is about the quality of people giving this service. The receiver of transfusion service must know how they are served, how the problems that arise during the service are solved and the process of these solutions.

Transfusion center and clinic collaboration starts with the doctor diagnosing a transfusion indication for the patient. During the process, clinics and the transfusion service unit are active in the following steps. Clinics are active in; requesting the blood product in accordance with the rules, taking patient's blood sample (to determine the patient's blood type and for cross matching comparison tests?) simultaneously with the request, delivering the request to the transfusion center correctly and picking the prepared blood product up from the transfusion center, transfusing the product at the clinic and transfusion follow-up steps. Transfusion centers are active in; comparing the request with stock, if the stock is sufficient fulfilling the request, if not, procuring the product from the regional blood center and performing the necessary tests for the procured blood, finding the appropriate blood product for the patient, preparing the product for transfusion steps. These two partners have a common goal in "Transfusion of Safe Blood", however they work unaware of each other's workflow diagrams. Lack of training given during primary healthcare service trainings and in-service trainings in our country causes these steps to be disrupted.

Transfusion centers usually employ laboratory technicians. Despite working in riskier and more difficult conditions than technicians in other laboratories, there are no regulations to protect or reward these employees. Nurses are assigned for all the steps after the product request and so responsibility for the blood products and transfusion services in clinics is mostly assumed by nurses. There are many clinics that are trying to function understaffed (doctors and nurses) in current conditions.

Clinicians' knowledge and skill in transfusion services vary between individuals, both in our country and others. The main reason for this is that our doctors are not provided training in these subjects homogenously during their basic medical education or specialization education which in turn causes doctors to graduate without having basic goals of transfusion knowledge reached. However, doctors working in the field are expected to have and practice this knowledge. Likewise, transfusion center directors are expected to have and practice all the knowledge concerning transfusion medicine and blood banking on top of taking the legal responsibility. Giving laboratory and clinical notion to doctors working in the Blood Banking and Transfusion Medicine (BBTM) field would allow for better working practices. In recent years, BBTM has been included in the Medical Microbiology, Hematology and Pediatric Hematology core curriculums. Despite this, specialists of these fields feel inadequate in BBTM and require additional training, because core training programs of institutions of these fields vary greatly. To correct this, transfusion training must take a larger place in Medical Faculty Graduate and Postgraduate Core Training Program and homogeneity between institutions must be ensured.

It is not realistic to expect the transfusion center directors to fill these gaps in their training just because they work in this field and clinicians to fill these gaps without guidance. To fill these gaps of training, BBTM topics should be regulated to better satisfy the training needs of each clinic, both doctors and nurses should be given separate clinical courses and these courses should be repeated regularly.

The main problem is that the people working in this field do not know that BBTM legislations exist and how these legislations are exercised, and the clinics which use transfusion services are unaware of the inner workings and processes of transfusion centers responsible for said services. Hospital Transfusion Committees and effectively operating these committees, which is also in our legislation, should be utilized to fill the existing gaps in knowledge. Transfusion centers' expectations from clinics and vice versa, and whether these expectations fit the current

legislation and hospital conditions should be discussed in Hospital Transfusion Committee meetings. Afterwards, workflow diagrams for each hospital should be formed in accordance with the topics discussed. Participation of all doctors and nurses assigned to the Hospital Transfusion Committee in these meetings should be ensured via administrative or personal channels, because all the problems are solved, and all said personnel is informed in these meetings.

Another topic that requires efficient clinician-transfusion center communication is "Emergency Transfusions". Knowledge of emergency transfusion's definition, when to employ emergency transfusion processes and how to procure blood products for emergency transfusions should be shared with clinics. For the clinician to know how to procure blood products and in which situations should they request an emergency transfusion would prevent confusion during emergency transfusion cases. Every institution must create their own "Transfusion Workflow Diagrams" and revise it regularly and when necessary.

Another step where communication is indispensable is preparing blood products for elective surgical procedures. In every part of the world, inexperienced surgeons request more blood products than needed, thinking it would be safer. To keep more blood products than needed for longer periods of time than necessary ready for a patient causes unwanted blood product disposals and extra cross-match costs. To prevent this, transfusion centers should inform clinics that critical stock levels are regularly controlled, blood products can only be provided at the necessary amount and when necessary and when the product will be provided. Clinics must be assured that they can contact the transfusion center easily when they need. Having transfusion centers and clinics collaborate will ensure transfusion safety for our patients and make transfusion center work and processes run smoothly.

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DONOR ACTIVATION

Tuğba KULA ATİK
Balıkesir Atatürk Şehir Hastanesi

It is a known fact that the donor population is getting narrower due to the decreasing birth rates and the aging of the population in parallel in most countries. A study in Germany reported that the general blood donor population has started to decline since 2015, and it is estimated that it will decrease by 25-33% by 2060. However, the situation becomes more complicated as innovations in transfusion practice increase the demand for blood products. Since this situation is known to accelerate even more in the next 15-20 years, it is predicted that this will be one of the biggest problems for transfusion medicine in the future. For this reason, intense efforts are made on donor activation to motivate blood donation all over the world. Because the following should never be forgotten: No blood can be collected without donors, or there is no need for blood service units for doing these things.

It will be more appropriate to examine the donor activation issue under the following topics:
· Donor recruitment
· Donor invitation
· Donor selection
· Donation procedures
· Donor retention

Donor recruitment:
The goal of the marketing campaign is to disseminate information on the social value and clinical need for blood donation. Although the critical trigger for donation is known to be self-efficacy, donor's cultural, social, economic, institutional, and personal factors are effective in their decision to become donors. Several motivating factors in blood donors having been identified:

Altruism: 75.2% of voluntary donors were willing to donate because they wanted to help people in need of blood. Another survey among 600 voluntary donors found that 54.8% donated blood because they wanted to help people improve their health. A survey among platelet apheresis donors found that 44.1% of donors were motivated by the feeling of helping other people and social responsibility.

Reciprocity: It was reported that 23.7% of the surveyed platelet apheresis donors engaged in blood donation because their family members or themselves had received blood products in the past. They, therefore, would like to donate to help someone else.

Self-approval and self-respect: A study found that 67.1% of whole blood donors were interested in donation because donating blood made them feel good about themselves. Another study reported that 23.0% of the surveyed platelet apheresis donors felt proud of themselves by blood donation. Pride has been shown to be a much stronger source of blood donation motivation than external motivation factors.

Perceived health benefits: A study found that 72.8% of donors felt that blood donation is beneficial to their health; 30.2% thought donating blood could help get rid of fat. Another survey found that 37.4% of voluntary donors believed that blood donation would produce positive health effects on themselves.

Peer influence: A study reported that friends or family members prompted 7.6% of platelet apheresis donors. A survey among 600 donors at mobile collection vehicles found that friends accompanied 288, and 128 of the friends went on to donated blood at the site.

Curiosity: This is mainly observed in young donors who donate blood out of an impulse to gain a novel experience.

Free Transfusion transmitted viral infections (TTVI) testing: A study found that 16.7% of donors admitted to using blood donation as a method to receive free blood test results on infectious disease. This practice may pose threats to the safety of the blood supply as some of the test seekers are at high risk of TTVI. According to the new blood donation regulations, during the informed consent process before collecting blood from donors, donors should be notified that donation is for altruism only.

Also, there are several deterrents of blood donation identified among blood donors, including:

Fear of the risk of contracting TTVI through a donation: A study found 16.2% of donors were concerned about unsafe collection practice in the blood center, and nearly 40% of voluntary donors did not feel completely safe from contracting TTVI from donating blood. A survey of 279 college students found that 50% of them worried about infection through blood donation.

Traditional beliefs: There is a deeply rooted traditional belief, especially among rural populations, that blood is associated with life vitality, and therefore blood donation will result in irreversible loss of blood and have a long-term negative impact on health and energy. In a study 21.9% of the surveyed donors thought that the loss of any amount of blood would have a detrimental effect on health; 8.6% thought that blood donation would substantially weaken health, vitality or overall immunity, and 3.1% thought the blood loss from a donation is enough to affect the health.

Inconvenience: 24.7% of donors felt that the location and operating hours of the collection sites made it difficult to donate. In particular, mobile devices are becoming more critical in this situation.

Social distrust: The lack of information and transparency has raised the public's concern that the blood they donated may have been misused for profit.

Several incentives ('STAR POWER'- provision of light refreshments, small gifts, recognition of contribution from the blood center and the government, and a blood credit which allows a donor or a donor's direct relative to receive a blood transfusion for free when needed) have been widely used to enhance donor recruitment. However, previous studies in China have shown that the primary channel for the public to obtain knowledge and information on blood donation is through interpersonal communication. For this reason, it has been shown that the best effect is primarily to affect the person who comes to the blood donation center. The real challenge is to convert safe first-time donors into regular, repeat donors.

There are different methods reported in donor recruitment in the literature. In the 'Hub and Spoke' model, blood service units work together with different disciplines (such as psychology, sociology, behavioral sciences, education, marketing, economics, statistics, and public health). The Trans-Theoretical Model (TTM) used for cigarette addiction can also be used to direct people to blood donation behavior. With the 'American Rare Donor Program,' different alternative methods can be created for rare blood groups by identifying rare donors and recording them in the database. It is a known fact that social media and audiovisual media are also a handy tool in developing blood donation practices in today's societies. However, it should never be forgotten that the healthy functioning of the donor cycle and safe blood supply is a situation that can be achieved together through the collaboration of national policies and blood service units. A blood donation habit is a form of behavior, and it is only possible to acquire this habit by individuals through regular pieces of training for every age group.

Donor invitation:

Blood centers usually use telephone, text message, email, and online message systems to invite donors to donate. A study in China showed that after the implementation of donor invitation, repeat donors increased from 27.5% in 2010 to 48.6% in 2011. This suggests that repeat invitation to no-show donors can significantly improve the chance of donation.

Donor selection:

The donor selection is a process that starts with the donor candidate applying to the service unit to donate blood and is the last and most effective weapon remaining after this stage. Different selection criteria (age, donation interval, health history, weight, blood pressure, heart rate, hemoglobin, ALT, ELISA tests) are applied for donor selection by evidence-based national and international standards in all of the world. Nevertheless, the essential point to remember is that success is always directly proportional to the level of sincerity and awareness of the donor.

The current policy should be systematically evaluated and further refined to eliminate those that lead to the unnecessary deferral of large numbers of blood donors. The elimination of false-positive results will help reduce the unnecessary permanent deferral of healthy donors. It should be noted that even a temporary deferral can result in substantial donor attrition because it may dampen the enthusiasm of the donor or arouse their confusion and anger, thereby reducing the chance of returning for a subsequent blood donation. A study among 2220 temporarily deferred donors found that only 559 (25.2%) came back to donate. Therefore, blood centers should pay attention to

the psychological stress of deferred donors. They should explain the rationale for the deferral, explain the difference in sensitivity and specificity of blood center testing versus hospital testing, answer questions from donors, provide support and consultation, and assist the donor in making an appointment to return at a later date for donation. A study reported that by using these strategies, a blood center had 69% of temporarily deferred donors return for blood donation. Interestingly, in a few different studies, the retention rates of deferred donors remained the same as expected, and the retention rates of those who completed successful donation decreased. So, whether it is rejected or successful donation is completed, just as in donor recruitment, the primary importance in this topic is interpersonal communication. For this reason, the motivation of the health worker in the blood service units is also significant.

Donation process:

Mobile blood collection devices are crucial points to increase blood donation visibility and awareness and to improve blood donation access in rural areas. However, the uncomfortable environment created by mobile devices and developing reactions can decrease donor retention. It was reported that 65.9% of donors who donated at a satellite collection cabin came back again for donation; this rate is much higher than the 39.8% return rate of donors who donated at a mobile collection vehicle. A study showed that 3.5% of Chinese donors who donated at a satellite collection cabin had a donation reaction. In contrast, the donation reaction rate among donors donating on a vehicle is much higher (13.8%).

Blood donation experiences must be optimized to ensure complete donor safety and achieve the best donor recruitment rates. Since every blood donor chooses to donate blood and help other people, it should be considered as the most crucial person in the room during donation and motivated by keeping it in focus. The donor deserves to be thanked twice.

Youngblood donors defined as donors under the age of 25 are the most critical potential pools of blood donors (49-61%). By showing that for the first-time donor rates and donor retention rates have decreased in various studies, the focus is on the management of the first donation of young donors who donate blood for the first time and the ability of this group to become a regular donor. It is known that young blood donors are more willing to read and learn the materials offered, but the risk of donor reactions is higher in this group (54%). Recent studies on reactions have focused on body size, phlebotomy duration, lack of sleep, and anxiety. The aim is always to minimize the total donation process and reaction rates, and protect against donor injury.

Donor retention

One of the most critical points in ensuring adequate and safe blood supply is donor retention. A large-scale study among 381185 voluntary donors between 2008 and 2012 found that only 18.9% of donors were repeated donors. There tend to be more repeat donors in platelet apheresis donations. In a province capital city, 44% of platelet apheresis donors were repeated donors, in contrast to only 18.1% in whole blood donors.

Negative donation experiences, such as the unpleasant environment of the collection site, dissatisfaction with the service of blood collection staff, a long wait time, and the lack of interactions with the staff, have been the most frequently cited reason for not returning for repeat donation. A study among platelet apheresis donors found that the primary reasons for not donating again were long wait/collection time (55.7%) and donation reaction (15.2%). In another study among platelet apheresis donors, the reasons for not donating again were donation reaction (37.9%), long collection time (29.8%), long waiting time (19.6%), and dissatisfaction with donation service (5.1%). Therefore, in order to retain blood donors, improving the donation environment and service is critically important. Blood centers have employed different strategies to improve donor retention, including follow-up visits after donation, extending work hours and workdays, shortening waiting time, a club for repeat donors, improving donation environment, and enhancing donor car.

A blood credit that allows a donor or a donor's direct relative to receive a blood transfusion for free when needed is still debated. Although a study found that the use of accumulated points for blood credit helped increase donor retention from 46.4% in 2009 to 60.5% in 2011, another study showed that free blood credit may have negative impact on retention among those whose accumulated donations had met the lifetime free blood credit requirement as some of them may have no motivation to donate any more. Therefore, blood credit should be evaluated in terms of national policies in the light of current and sustainable facts.

It is known that the blood donation hemovigilance, which is getting more and more interested and more focused on, will develop further thanks to the observations and awareness of the employees of the blood service

unit. Moreover, it should not be forgotten that all developments in the hemovigilance system will positively affect and improve donor activation.
Finally, the steps to be taken for donor activation can be summarized as follows:

· Psychological improvement of the donor
· Physiological healing of the donor
· Process improvement

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REVEOS
OTOMATİK KAN İŞLEME SİSTEMİ

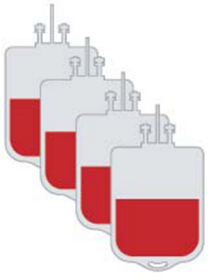
GELİŞMİŞ OTOMASYON
TAM KAN İŞLEMEDE YEPYENİ BİR SEVİYE

- Standart ürünler
- Daha kaliteli ürünler
- Daha fazla üretim
- Daha yüksek verimlilik
- Daha kolay iş akışı
- Daha az yer
- Daha iyi üretim (GMP)
- Lökositi azaltılmış ürünler

3C PROTOKOLÜ İLE 18 DAKİKADA ELDE EDECEĞİNİZ ÜRÜNLER

Plazma ~260 ml

Eritrosit ~52g Hb



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TA-GVHD'nin Önlenmesi

TA-GVHD'nin tedavisi neredeyse her zaman sonuçsuz kaldığı için bu hastalığın yönetiminde, hastalığı kapma riski minimize edilerek önleme yoluna gidilmelidir. Bu yaklaşım, nakledilen donör lenfositlerinin azaltılması veya etkisiz hale getirilmesi üzerinde odaklanmıştır. Günümüzde T lenfositlerini yıkama veya filtrasyon yöntemiyle fiziksel olarak temizlemek için kan bankalarında kullanılan mevcut yöntemler, TA-GVHD'ye karşı etkin koruma sağlayamamaktadırlar. Nakledilen lenfositlerin kan bileşenlerinin gama ışınlaması vasıtasıyla inaktivasyonu, lenfosit blast transformasyonu ve mitotik etkinliğin engellenmesi ve bundan dolayı da TA-GVHD'nin önlenmesi için en etkin metottur.

Özellikleri:

Güvenli Kullanım

- Herhangi bir klasik hastane, klinik veya laboratuar ortamında kullanılabilir

Kalite Güvence

- Gelişmiş görüntüleme ve kontrol sistemi, metal kabın rotasyonunu, ışınlama süresini ve ürün pozisyonunu doğrulayarak ışınlama işlemini takip eder.

Kolay Çalıştırma

- Çok-yönlü, menü sürümlü ve talimatları aşama aşama veren görüntü ekranı ile geçici güç kesintilerinde dahi çoklu devirler için çalışmaya devam edecektir.

Model	Nominal Kaynak Aktivitesi (+/- %15)	Merkezi Doz Hızı (+/- %15)	Merkezde 25Gy için geçen süre	Minimum 25Gy için geçen süre
3000 ELAN	900 Ci (33.3.TBq)	3,10 Gy/ dk	8,06 dk	10,65 dk

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NEW DEVELOPMENTS IN APHERESIS

Chairpersons: **Bülent Eser**
Meral Sönmezoğlu

Speakers: **S. Haldun Bal**
Mehmet Yay
Nil Güler
Ekrem Ünal

MULTICOMPONENT APHERESIS

S. Haldun BAL
Uludağ Üniversitesi Tıp Fakültesi Hastanesi Dr. Raşit Durusoy Kan Merkezi, Bursa

The field of transfusion medicine is impacted by blood supply shortages, regulatory pressure, public pressure, cost pressure, growing & aging population and improved therapeutic modalities like advances in cancer therapy or more aggressive surgical procedures (1,2). While the demand for and production of blood components are increasing, the donor population is decreasing (1–3). Blood supply shortages are worsening due to sociological, demographic and economic reasons[1]. Restrictive donor selection criterion increases the donor deferral rates also (4,5). Therefore transfusion medicine services are also faced with economic pressures. While the costs rise continuously (instruments, disposables, reagents, staff, and additional donor testing), financial resources in the health systems are limited. The increase in costs cannot be passed on to the users or the reimbursement companies(6). For solving these problems, transfusion medicine services have directed their interest in apheresis technology and concurrent blood component collection from one donor during one donation.

Terms that are related to apheresis like pheresis, hemapheresis were derived from the Greek word aphairos, meaning "to take from"(7). Apheresis technology is well established technology and it has evolved from early plasmapheresis to multicomponent procedures (8). Manufacturers have made numerous improvements in donor safety, processing speed or efficiency, and so it was possible to collect of different blood components from the same donor during a single apheresis session (Multicomponent apheresis; MCA) (1,7,9–13). MCA that is a term has various definitions. It is defined as a procedure that leads to collect either at least two different blood components or two or more identical or different blood components in the same session[6].

Multiple doses of platelet (PLT) have been collected since the early 1990s (1). One or double unit of red blood cell (RBCs) collection has been FDA approved since October 1995 and April 1997, respectively (14). Today various combinations of PLT, plasma, and RBC components of consistent volumes and yields can be collect despite variations in donor characteristics (15). For example, these combinations can be collected with MCA:

· Single unit of RBC and PLT
· Single unit of Single RBC and plasma
· Single unit of Single RBC and PLT and plasma
· Double unit of RBC
· Double or triple unit of PLT
· Double unit of (jumbo) plasma etc….

MCA is an effective tool to provides the standardized high quality products tailored to patients' needs with lower costs (16), maximizes the yield from a single donation (17), improves the donor safety, enhances the regulatory compliance (1), reduces the donor exposure for patients (1,18) and improves the logistics of blood collection and banking (9). But the range of products that can be collected is limited by donor blood volume and blood counts. On the other hand, donor safety is a major concern. There are various author's opinions about adverse events (AE) that are seen in both apheresis donations and whole blood (WB) donations. Some of these authors have asserted that AEs rates in apheresis procedures similar or even lower than those seen in WB donations (19,20). But in a review, apheresis procedures were associated with a 150-fold higher incidence of AEs compared to WB donations (21). Therefore various regulatory agencies and accrediting bodies have prepared regulations and guidelines. They have specified predonation laboratory and physical criteria that must be met by donors, limits on the frequency of donations, and maximum number of donations per year, as well as the amount of cumulative plasma and RBC losses allowed per year (22). But specific minimum requirements for multicomponent donations are various between nations or guidelines. In this text, the minimum requirements for apheresis and MCA donations are evaluated according to four guidelines.

Technical Manual of the American Assoc of Blood Banks (18th edn) (**AABB**) (7)
Joint United Kingdom Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee Guidelines for the Blood Transfusion Services, (8th edn) (**JPAC**) (23)
European Directorate for the Quality of Medicines & HealthCare Guide to the Preparation, Use and Quality Assurance of Blood Components (13th edn) (**ECBT**) (24)

Ulusal Kan ve Kan Bileşenlerini Hazırlama, Kullanım ve Kalite Güvencesi Rehberi-2016, Türkiye (**UKBR**) (25).

Donors for apheresis procedures shall meet the usual criteria for ordinary whole blood donations according to AABB (7), JPAC (23), ECBT (24) and UKBR (25). In addition, the following criteria that are summerised in table should be observed for apheresis donors:

Table: Apheresis donor's features

	AABB	JPAC	ECBT	UKBR
Weight	Males: >59 kg Females: >68 kg	For apheresis: >50 kg For duRBC: >70 kg	For apheresis: >50 kg For duRBC: >70 kg g	For apheresis: >50 kg For duRBC: >70 kg
Height	Males: >155 cm Females: >165 cm			
TBV			For double unit RBC > 4.500 mL	For double unit RBC > 5.000 mL
ECV		<15% of TBV	<20% of TBV	
Hemoglobin (Before duRBC)		>140 g/L	>140 g/L	>140 g/L
Hemoglobin (After duRBC)			>110 g/L	>110 g/L
Hematocrit	>40%			>42%
Platelet Count (Before donation)	>150×10^9/L	>150×10^9/L	>150×10^9/L	>150×10^9/L
Platelet Count (After donation)	>100×10^9/L	>100×10^9/L	>100×10^9/L	>100×10^9/L
CPV		<15 L / year <2,4 L / month	<16% of TBV <25 L / year	<16% of TBV
Aspirin **Piroxicam**	Two days	Two or five days (depending on the drug)	Two days	Five days
NSAIs				Two days
Clopidogrel **Ticlopidine**	14 days			

TBV: Total Blood Volume, **ECV**: Extra Corporeal Volume, **duRBC**: Double Unit RBC, **CPV**: Collected Plasma Volume, **NSAIs**: Non-Steroidal Anti-Inflammatories,

Intervals between apheresis donations according to guidelines:

The interval between double unit red cell collections and single or double unit red cell collections should not be less than 16 week s(7) or 6 months (23,25) or 6 months for women and 4 months for men (24).

The interval between a whole blood donation and the donation of a double unit of red cells must be at least 3 months (24,25).

The interval between two single-unit red cell collections must be the same as for collections of whole blood (24,25).

The interval between single-unit red cell collections and the plasma and/or platelets collections must be at least 4 weeks (24,25).

The interval between single-unit red cell collections with platelets, plasma, or both and any other donation must be at least 8 weeks (7).

The interval between the plasma and/or platelets collections and single or double unit red cell collections must be at least 48 hours (24,25).

The maximum volume of red cells collected must not exceed 400 mL (without re-suspension solution) per collection procedure (24).

Triple collections of platelets may not be drawn from first-time donors unless a qualifying platelet count. If the donation interval is less than 4 weeks, many facilities prefer that the donor's platelet count be above 150.000/μL before plateletpheresis occurs to prevent a postdonation count of less than 100.000/μL[7].

There should normally be a minimum of two days (7,25) or two weeks (23,24) between plateletpheresis procedures A donor should not undergo a total of more than twice in a week or 24 plateletpheresis procedures per annum (7,23,25). There should normally be a minimum of two days (7,25) between plasmapheresis procedures A donor should not undergo a total of more than 24 (23) or 33 (24,25) plasmapheresis procedures per annum.

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NEW DEVELOPMENTS IN APHERESIS; PLATELETAPHERESIS

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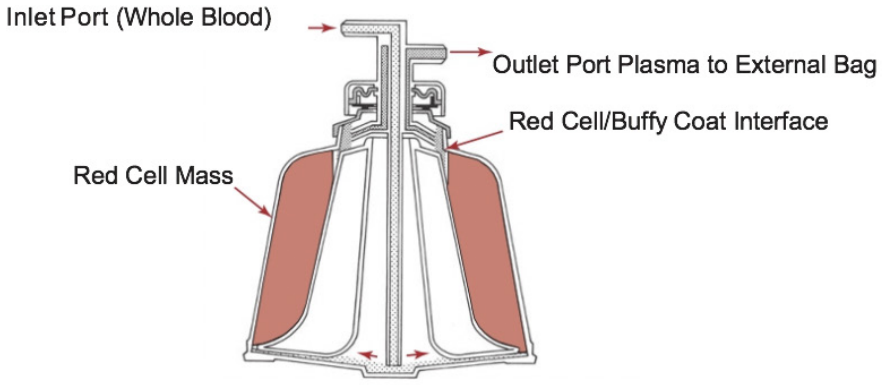
Apheresis, from a Greek word meaning 'to take away', is an alternative to producing blood components from whole blood donations by selectively collecting one or more components directly from donors and returning the rest to the circulation. Automated apheresis can be used to collect platelets, plasma, red cells or granulocytes, and more specialized products, such as stem cells. The main emphasis in the past has been the collection of platelets and plasma components, with red cells being returned to the donor. The size and complexity of the equipment, as well as welfare of the donor, has previously necessitated this activity to take place in static clinics. However, smaller portable machines are now available that can be used on mobile sessions to collect red cells, platelets and plasma. The main advantage of apheresis collections are that more than one dose of platelets or red cells can be collected from one donor per donation, thus reducing patient exposure to multiple donors. In addition, the hematocrit and hemoglobin content of red cells is much more consistent than those produced from whole blood donations, which vary considerably because of the variation in hematocrit of whole blood in different donors.

Early developments in apheresis began some 60 years ago when Harvard biochemist Dr. Edwin J. Cohn devised a large- scale method, based on a simple dairy centrifuge (the Cohn centrifuge), for purifying albumin from pooled human plasma. This procedure, along with pasteurization, provided a safer therapeutic agent for resuscitating wounded soldiers than did using lyophilized pooled plasma, which had an alarming risk of hepatitis transmission. The device Dr. Cohn invented was ultimately not practical for its intended purpose; however, later modifications led to its use in deglycerolizing frozen red blood cells. In the 1960s, A. Solomon and J.L. Fahey used centrifugation technology to separate whole blood into plasma and red blood cells to perform the first reported therapeutic plasmapheresis procedure. In 1965, collaboration between Emil J. Freireich, a physician with the National Cancer Institute, and George Judson, a research engineer with the IBM Corporation, led to the development of the first continuous flow apheresis machine. In the same decade, plasmapheresis was introduced as a means of collecting donor plasma for fractionation. As we entered the 1970s, apheresis was used to extract one cellular component and return the remainder of the blood to the donor. In 1978, the membrane plasma separator was introduced as a method for performing therapeutic plasma exchange. Since these early pioneering processes were developed, many dif- ferent companies have developed apheresis technology based on the same principles.



Cross-section of Haemonetics Centrifuge Bowl (IFC procedure). *(Courtesy of Haemonetics Corporation, Braintree, MA.)*

Picture 1; Earliest continuous flow centrifugation device was hand cranked cream

Picture 2; IBM 2990 apheresis machine

Platelet Products Available**; RDP=** Random donor platelet, **BCPP=** Buffy coat pooled platelet **SDP =** Single donor platelet (Apheresis platelets). Platelets can be prepared as random-donor platelet concentrates from whole blood derived platelets or as apheresis platelets from a single donor. In the whole blood harvest method, 500 mL of blood is collected and stored in a citrate preservative at room temperature within eight hours, the blood is centrifuged with a slow spin and the platelet-rich plasma (PRP) is separated into an attached empty satellite bag. This PRP is centrifuged again with a fast spin and separated into one unit of platelet concentrate and one unit of plasma. Each unit of platelets contains 5.5 x 10^{10} platelets in 50 to 70 mL of plasma (to maintain the pH at >6.2) and 4 to 10 units of platelets are usually pooled together in a single component bag.

Alternatively, platelets can be isolated from whole blood from the buffy coat layer, following centrifugation of whole blood in specific bags that removes RBC and plasma through tubings in the bottom and top of the bag. The platelet-enriched buffy coat is further processed (through centrifugation and/or leuko-reduction filters) to eliminate WBCs and remaining RBCs. This method is currently employed in Europe and Canada and it permits storage of whole blood at room temperature for up to 24 hours prior to platelet harvesting and provides some other potential advantages.

Apheresis platelets or **single donor platelets** are obtained by performing apheresis on volunteer donors. During this procedure, large volumes of whole blood are processed into an extracorporeal circuit and centrifuged to separate the components. The red blood cells and a certain percentage of the plasma are returned to the donor. A single donor on apheresis donates the equivalent of > 3.0 x 10^{11} or six units of whole blood derived platelets suspended in a volume of 200 to 400 mL of plasma. Single donor apheresis-derived platelets minimize the number of donor exposures for the transfusion recipient and have become the primary source of platelets in the USA.

Current apheresis instruments use two differents systems;
1. Continuous flow centrifugation systems like; Trima Accel (Terumo BCT), Amicore (Fresenius Kabi)
2. Intermittent flow centrifugation systems like; Mcs (Haemonetics)

Picture 3; continuous flow centrifugation systems machine

Picture 4; intermittent flow centrifugation systems machine

Apheresis machine companies;

Terumo BCT (Lakewood, Colo.)

Terumo BCT operates in apheresis collections and other components of the blood life cycle, including whole blood processing technologies. Its transportable Trima Accel apheresis system uses continuous flow centrifugation and a patented optical detection technology that helps the automated interface management system uninterruptedly manage the separated layers so the platelet and white blood cell layer accumulates. The AIM system then guides the operation to proficiently remove the required components. The system is designed to monitor and interpret the interface continuously and does not require continuous monitoring by a technician. Through its interface stability, it successfully removes targeted components and achieves accurate results. Trima Accel divices were upgraded to version 7.0 in conjucction with Terumo BTC's accessory T-Cuff. The software upgrade incudes several enhancements, of particular interest being AutoFlow.

Fresenius Kabi (Bad Homburg, Germany)

Engineers at the pharmaceutical company have come up with the efficient COM.TEC and Amicore separation chamber through which a single needle process reduces separation time to less than 60 minutes. The versatile applications for therapeutic plasma or red cell exchange, stem cell and platelet collections and cell depletions using a single device make the COM.TEC a multiprocedural platform. Fresenius Kabi is one of the top players in the U.S. market. It has partnerships with about 350 hospitals and performs about 25,000 apheresis treatments annually.

Haemonetics Corp. (Braintree, Mass.)

MCS+ 9000 mobile platelet collection system is dedicated to blood component collection of platelets. With proven separation technology and state of the art leukocyte reduction with continuous filtration, double unit, and concurrent plasma capabilities. It is lightweight and portable, yet rugged enough to withstand most mobile environments. And its customized transport case doubles as a device stand for increased flexibility. The MCS+ 9000 system is simple to install and easy to operate with its automated cycles.

Primary function platelets are to stop and/or to prevent. Platelet transfusions play an important role in prevention or treatment of bleeding in patients with thrombocytopenia or severely impaired platelet function. Platelet concentrates available for transfusion are prepared either from whole-blood donations or by platelet apheresis procedures. Both products are in widespread clinical use. For example in Germany, about 40% of PC produced in the year 2007 were whole blood derived and 60% were produced by apheresis. When comparing European Countries supposed to provide a similar transfusion service, the respective use of apheresis PCs and pooled PC is very heterogeneous. With platelet apheresis it is possible to collect enough from a single donor to constitute at least one transfusion dose. It is possible to collect up to more than 8 · 10 (11) platelets per apheresis session. Usually these are divided into two therapeutic units of about 3 · 10 (11) platelets. In new, still experimental approaches triple apheresis with production of three therapeutic units is attempted. A recent study demonstrated that high-yield plateletpheresis donation can correlate with reduced transfusion efficacy and that in-vivo studies are necessary to assess the quality of the products.

New technology allows leukocyte reduction in the collection of the component with or without the use of filtration. Matching for refractory patients is possible. Apheresis platelets from some equipment have less white blood cell contamination even in the absence of filtration, which may be an advantage. Febrile non-hemolytic transfusion reaction Febrile non-hemolytic transfusion (FNHTR) reactions are the most common adverse reaction to platelet transfusions. Reactions to platelets are caused by leukocyte-derived cytokines that accumulate in the component during storage.

Several studies addressed whether transfusing only apheresis PCs can prevent alloimmunization as measured by lymphocytotoxic antibodies and refractoriness as defined by poor post transfusion increments. In a metaanalysis combining studies that used non-leukoreduced products, the overall relative risk for allosensitization was not significantly different between apheresis PCs and pooled whole blood-derived PCs.

Preparation of apheresis PCs requires more additional resources in terms of staff, equipment and room which can be attributed to plateletpheresis. This is reflected in higher cost of apheresis PCs. However, it is difficult to provide exact figures on the difference because the accounting system, the attribution of costs and the pricing policy differs substantially between institutions. A clear advantage of apheresis PCs can only be demonstrated in

allosensitized patients with HLA- and or HPA-antibodies who receive antigen-compatible apheresis PCs. On this basis it was recommended to base the product choice mainly on availability and medical indication.

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THERAPEUTIC APHERESIS

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Apheresis word describes removal of something. The target of Therapeutic Apheresis (TA) is removal of plasma and cells which cause the disease. Plasmapheresis is a procedure in which plasma is removed and replaced with replacement fluids. Therapeutic cytapheresis is a procedure in which unwanted increased cells is removed from blood.

TA procedure decision has to be given in light of scientific proven clues based on published randomized or clinical trials or case reports. Sometimes clinician can't find any solid publication about their patient's situation and they can decide to perform TA save the patient, because everything was done except TA. If that kind of situations start to gathering of experience in a disease, this can lead to new indications for TA. However, clinician has to keep balance to follow the scientific clues and to and to prevent unfamiliar decisions.

Description of Categories:
Category I: TA procedure alone or with other treatment is accepted as first line treatment in disorder.
Category II: TA procedure is accepted as second line treatment.
Category III: The exact role of TA is not established in disorder. Decision has to be individualized.
Category IV: TA procedure can be ineffective or harmful.

TA procedure has rationale for mechanism of treatment such as removal of responsible situation. Blood pressure, heart beat, complete blood count, especially the level of hemoglobin and platelet count are checked. During procedure, some part of the patient's blood volume will be circulated out of the body. This part of blood volume is described as Extracorporeal volume (ECV). This volume shouldn't exceed to10-15% of Total Blood Volume. Otherwise it can result in hypotension and hypoxia.

Platelet count is also important for venous catheter placement.

Replacement fluids used during TA are mostly 5% albumin and FFP.

American Society for Apheresis (ASFA) reevaluate the categories for TA in diseases every three years. Before to make conclusion for one disease for TA procedure may be helpful to patient, committee investigate published literature. There has to be at least 10 case report in peer-reviewed journals during last decade and they have to be performed by different study groups.

After this kind of evaluation, Alzheimer's Disease can be a candidate to get indication for TA. There are promising results in preliminary data in phase IIb/III AMBAR (Alzheimer Management by Albumin Replacement) study.

The place of rheopheresis was changed in some diseases. Category for rheopheresis in High-risk dry age-related was changed from Category I to Category II, because of its use in second line therapy in clinical practice.

The recommendation for TA in Catastrophic Antiphospholipid Syndrome (CAPS) was changed from Category II to Category I. According to International Antiphospholipid Syndrome Registry, triple treatment as corticosteroid, TA and/or Intravenous Immunoglobulin are very effective in survey.

Lipoprotein apheresis was changed from Category III to Category II. It has been observed observed that persisntent hyperlipidemia assosiated nefrotoxicity improved with TA.

Lipoprotein (a) Apheresis is a procedure of physically removal of lipoprotein from blood. Generally it is performed lifelong. Lipoprotein apheresis is used in Homozygote Familial Hypercholesterolemia or drug treatment refractory dyslipidemia with cardiac disease. Procedure removes Lipoprotein (a) and LDL cholesterol together. So, it is unknown which one's removal causes the useful effect.

Immunoadsorption in Multiple Sclerosis was changed from Category III to Category II.

The place of TA in Progressive Multifocal Leukoencephalopathy associated with Natalizumab was changed from Category I to Category III.

Red Blood Cell Exchange in Sickle cell Disease with recurrent vaso-occlusive pain crisis or pregnancy was changed from Category III to Category II. Early started exchange has been showed improved outcomes in mother and fetus. It has been observed that regular Erythrocyte Exchange decreased the hospitalization ratio of patients with recurrent vaso-occlusive pain crisis.

The place of TA in Thyroid Storm was changed from Category III to Category II.

ASFA Neurologic Disease Subcommittee performed a study to investigate the efficacy, safety and side-effects of TA procedures as Category II in NMO/NMOSD (Neuromyelitis optica/ neuromyelitis opticaspectrum disorder). TA was found to be safe and have very few side effects.

Pregnancy: Pregnancy is not pregnancy is not contraindicated for TA. Clinician, Apheresis specialist and Obstetrician have to make collaboration. TA has especially a great role in Sickle cell anemia (Category II) and in autoimmune congenital heart block. When TA procedure is performed during second and third trimester, pregnant woman may lie down in slight left lateral decubitus position to relieve compression on the inferior vena cava. TA procedure shouldn't performed if there is less than 24 hours to delivery except very emergent situations, because the procedure can cause depletion of coagulation factors which may result in exceed bleeding during delivery.

Conclusion: TA procedures are life saving and improves the quality of treatment when it is used in proper place and with good practice

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GRANULOCYTE TRANSFUSIONS

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Severe neutropenia renders patients susceptible to life-threatening bacterial and fungal infections. Despite improvements in supportive care and antimicrobial therapy, morbidity and mortality remains significant. Since the 1960s, granulocyte transfusions (GTX) have been used to either treat or prevent serious infections in patients with neutropenia or neutrophil dysfunction. Despite significant optimizations in product collection, the practice of GTX therapy remains controversial. The use of granulocytes varies widely across institutions and countries in terms of indications, procurement, dose, infusion frequency, and duration of therapy. There are limited and conflicting data concerning its clinical effectiveness; current evidence from clinical trials does not support or refute efficacy.

In general it was recommend that the following minimal criteria be met before initiation of GTX), regardless of the cause of the patient's neutropenia:

1. Absolute neutrophil count (ANC) <500 cells/microL, except in the case of fagocyte defect ie: chronic granulomatous disease .
2. Evidence of bacterial or fungal infection (ie, clinical symptoms of infection, positive cultures, pathological diagnosis of infection from biopsies, radiographic evidence of pneumonia).
3. Unresponsiveness to antimicrobial treatment for at least 48 hours (except in extreme circumstances with life-threatening infection).

The rationale for these criteria includes the extreme difficulty in recruitment of donors, the huge burden on the donor, and other costs and risks associated with GTX.

One of the common usages of GTX is chemotherapy or hematopoietic stem cell transplantation (HSCT -induced neutropenia.

Neutropenia from chemotherapy and HSCT is the most common use of GTX, although the use of GTX in this population remains rare. Most retrospective clinical studies and prospective clinical trials of GTX were conducted in this patient population, including adult and pediatric patients. Chemotherapy and HSCT can severely suppress bone marrow production of all cell lines and cause severe pancytopenia.

While anemia and thrombocytopenia can be supported with red blood cell (RBC) and platelet transfusion without significant difficulties, severe neutropenia and associated infection remain the most important complication and limiting factor of these therapies. Granulocyte colony stimulating factor (G-CSF) may be used to stimulate patients' bone marrow production of granulocytes, but response to G-CSF in this patient group is usually poor.

Most bacterial infections and some fungal infections can be controlled with the modern antimicrobials and supportive therapies, but multidrug-resistant bacterial infection and fungal infection in patients with neutropenia remain a major cause of morbidity and mortality. It is for these patients that GTX should be considered.

Determining the efficacy of GTX in patients with neutropenia and resistant bacterial or fungal infections has been extremely challenging, with several lines of evidence showing a trend towards greater efficacy, but no trial establishing an unequivocal benefit.

One of the famous study is the Resolving Infection in Neutropenia with Granulocytes (RING) trial which was a randomized trial to address the efficacy of G-CSF-mobilized granulocytes in patients with neutropenia (ANC <500/microL) due to chemotherapy or HCT who had a proven or probable bacterial or fungal infection. The entry criteria were expanded to include patients with aplastic anemia due to slow accrual; the target accrual of 236 patients was not reached. A total of 114 patients were enrolled, and 97 completed the trial. The primary endpoint was a composite of survival plus microbial response six weeks after randomization. This was reached in 20 of 48 individuals in the GTX arm and 21 of 49 in the control arm (42 versus 43 percent). On subgroup analysis, there was no

effect of baseline patient factors, interval to first GTX, or post-transfusion neutrophil count. A post-hoc analysis of the GTX arm demonstrated improved outcomes in those who received high dose GTX (≥0.6 x 10^9 granulocytes per kilogram) versus low dose (<0.6 x 10^9 granulocytes per kilogram), with efficacy in 59 versus 15 percent, respectively. However, the primary endpoint was reached in 37 percent of the control group who did not receive GTX, suggesting that chance may have explained the difference in outcomes according to dose. Prophylactic GTX remains controversial due to the potential adverse effects of GTX, and we do not use GTX for infection prophylaxis outside of a clinical trial.

GTX has remained in clinical use for over 40 years, despite persistent controversy regarding its efficacy. Severely neutropenic patients with refractory bacterial or fungal infections tend to be very ill with high risk of mortality, therefore clinical response to GTX might be difficult to determine in this setting.

Overall, the quality of the data in the published literature is low, and predominantly limited to individual cases and uncontrolled case series. GTX may have a role in preventing progression of refractory fungal infections during HSCT-induced neutropenia. Modern controlled studies, including the RING trial, have been unable to demonstrate clinical benefit of GTX; however, this study was underpowered due to under-enrollment, and many patients received suboptimal doses.

Transfused granulocytes may cause adverse reactions, including severe pulmonary reactions, HLA alloimmunization, and CMV infection. The risks and benefits must be weighed on a case-by-case basis.

In summary, GTX may be helpful in certain patients if rapidly available at high neutrophil doses, particularly if neutrophil recovery is anticipated.

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LAST 50 YEARS OF TRANSFUSION ; IN MENTOR'S PERSPECTIVE

Chairpersons: **Şadi Yenen**
Gert Matthes

Speakers: **Cees Smit Sibinga**
Gamal Gabra
Şükrü Cin

WHERE DO WE POSITION TRANSFUSION MEDICINE IN THE FAMILY OF SCIENCES?

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INTRODUCTION

Transfusion Medicine has come a long way and has for long been regarded a Cinderella in medicine and medical science. Since the discovery around 1900 by Karl Landsteiner [1] of the ABO blood groups as principle elements for compatibility, the science has been dominated by the laboratory research for immunohematology, microbiology and virology, focused on the test tube and not so much the patient. Over the 20st century several development eras are to be recognized that contributed to the maturation of transfusion medicine as a bridging science. Twenty Nobel laureates contributed to this development.

DEVELOPMENT ERAS

The eras recognized are – blood group serology and immunohematology; preservation of blood and blood products; separation of blood components; transmissible diseases; community, donors and 'soft sciences'; quality management and blood safety; organization, governance and leadership. During each of these eras transfusion medicine bridged with a variety of exact, gamma and ´soft´ sciences.
Today Transfusion Medicine is maturing into a unique multidisciplinary and bridging field in the health sciences. The outbreak of the HIV/AIDS epidemic forced the development of quality awareness and culture, and centred the scientific attention back to the patient expressed by hemovigilance and patient blood management. However, so far in the international world of peer reviewed scientific journals there is only one journal that focuses exclusively on clinical transfusion practice – the International Journal of Clinical Transfusion Medicine,[2] bringing blood transfusion back to where it belongs: the bedside in the hospital with the prime and leading Hippocratic adage – '*primum est non nocere*'.

CRADDLE OF TRANSFUSION MEDICINE

The discipline stems from the mother clinical specialty Internal Medicine with a close relation to Hematology, Immunology, Transplantation Immunology and Genetics. The 20 Nobel laureates, who contributed over the second half of the 19th and the 20th century to its scientific and operational development and maturation, received their price between 1908 (Ilya Ilyich Mechnikov and Paul Ehrlich) and 2011(Ralph Steinman).[3] They clearly illustrate the bridging of disciplines in science with Transfusion Medicine, which would not have developed and matured to its current extend without the research, publication and communication of the scientific work done; and that will certainly not be the end. The evidence is documented, but unfortunately not that easily accessible to many of the scientists in the developing part of the world. However, WHO Headquarters [4] as well as the Offices of the WHO Eastern Mediterranean Region,[5] South-East Asia Region [6] and Western Pacific Region [7] took the initiative to institute a scientific library with an advanced Index Medicus with abstracts of peer reviewed publications that can be consulted on request.

GOVERNANCE AND LEADERSHIP

Since the launch in 2000 of the UN Millennium Development Goals [8] and the continuation of this global initiative in 2016 under the title Sustainable Development Goals,[9] more attention has been created for the basic governance and leadership development as well as the key foundation of an adequate legal framework to position Transfusion Medicine as an integral part of the health care and sciences. All UN Member States have agreed to work towards achieving Universal Health Coverage (UHC) by 2030. This includes financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all. This WHO initiative to introduce the Universal Health Coverage principle has awakened an interest in a scientific approach on how to integrate Transfusion Medicine in public health and the overall health care system. [10] With that the need for research on how to structure the essential steering and supportive processes has also started to become visible. A recent survey among the 22 Member States of the WHO Eastern Mediterranean Region on existence and quality of blood safety legislation unveiled an extreme paucity. Only 9 countries responded having some legislation in place, but none of these laws and regulations comply with the WHO advocated principles and leave wide gaps in the mases of the legislative net.[11] As a consequence mal- and uncontrolled practices continue to flourish opposing and obstructing the efforts to create and achieve nationwide evidence-based safety and avai-

lability of blood and blood products within the scope of universal health coverage. Here a bridge to the science of Law should be developed to create a growing evidence for the need of fundamental protection of communities from poor and maleficent transfusion practices. Another scarcely explored field is in pharmaco-economics to be used to calculate the justification of introducing fashion-tinted interventions and methodologies that do not essentially contribute to an improvement of safety, efficacy and lengthening of quality adjusted life years (QALY) in Transfusion Medicine. Researchers such as Brian Custer [12], Maarten Postma [13] and René van Hulst [14,15] can be marked as pioneers in this still largely unexplored field. WHO included blood and blood products in their growing list of Essential Medicines (EML).[16] Despite the guidance developed by WHO to adequately manage blood and blood products as essential medicines, a scientific response of observable size has not yet been developed. Similarly, Management Science needs exploration to streamline the development of well-organized and governed blood establishments with sufficient economy of scale, away from the fragmented small blood shops on the corners of the health care streets, and operating under the umbrella of a competent and adequate legal framework with a meaningful and protective licensing structure.

BRIDGING SCIENCE

For long the field has been dominated by laboratory sciences and practice with a prime interest in the test tube and not so much the patient. Although the early work was triggered by clinical observations that showed at numerous occasions the power of failure, it deviated into a laboratory defined science, where the connection with the clinical practice was regarded as a 'milk man's shop' business, rather than a truly supportive facilitator of clinical transfusion medicine. Transfusion Medicine has indeed come a long way, largely in the shadow of other fields of science and medical practice. Its comprehensiveness provides a unique scenery and environment to bridge with the many supportive scientific disciplines.[17] Most of these are beta or exact sciences, but over the past decades increasingly 'soft sciences' and the group of applied exact sciences (gamma sciences) have been discovered and bridged.

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Gamal GABRA
Emeritus Professor

LAST 50 YEARS OF BLOOD BANKING & TRANSFUSION IN TURKEY

Şükrü CİN
Ankara

Modern public Blood Banking started at 1957 in Turkey. Turkish Red Crescent opened 2 modern blood banks in Turkey at 1957 in Ankara and Istanbul.

I attended Ankara University Medical School at 1957 which had a training hospital behind the walls of Turkish Red Crescent Ankara Blood Center. I accept this nice coincidence as "term-mate" with this Blood Center because I have dealt in transfusion almost all my medical practice period.

I wish to summarize my personal witness to last 50 years of Blood Banking & Transfusion in Turkey at this text under 3 main topics.

1. Where we were?

1.a. Almost 100 % whole blood transfusion
1.b. Almost 75 % was replacement donation and rest of 25 % supplied by military donations
1.c. No specific pre-graduate curriculum neither for medical doctors nor medical nurses
1.d. No specific training and certification for Blood Bank staffs and clinicians
1.e. No specific post-graduate education such as master degree, PhD and residency neither for medical doctors nor medical nurses
1.f. Very primitive blood group typing almost all done by slide technic very few centers were performing tube technic
1.g. Very few centers besides Turkish Red Crescent were using "Donor Evaluation Form" although it was not enough sufficient.
1.h. Very few centers could produce random platelet concentration. Plateletpheresis started around beginning of 1980 ies. Till 1995 plateletpheresis was performed at very limited centers
1.i. Registration and archiving were performed manually by hard copy documents. This might cause many serious problems.
1.j. Quality Management, Standards, etc. were not existing in blood banking & transfusion medicine (BB & TM)
1.k. There were major variations between blood centers about the contents, quality and effectivity
1.l. Global BB & TM KB community were not familiar about Turkish BB & TM sector
1.m. Mixt type Blood Banking was existing in Turkey which hospital blood banks were widely engaged
1.n. Leucodepletion, irradiation, etc. procedures were available at very few centers which were existing at few major metropoles.
1.o. Screening test of transfusion transmitted infections (TTI) were technically very complicated, open to clerical errors, gradually low specificity/sensitivity
1.p. Although Turkish Red Crescent Plasmafractionation Laboratory was producing FVIII concentrate, albumin solution, fibrinogen concentrate since 1967 those products were not complying actual Plasma Derived Medicinal Products (PDMP) by accuracy, safety and availability. Those productions were banned globally at 1989 after HIV out break
1.r. Since 1981 there were no specific law, bylaw, regulations.
1.s. Scientific literature in Turkish on BB & TM were not existing besides very few limited booklets, etc.
1.t. National Health Authority; Ministry of Health was conducting all activities of BB & TM at Turkey by a small office and with a few staffs. It was not a satisfactory control system.
1.v. Private Blood Banking was legal and made "human blood" as a kind of "commercial commodity". That had very high risks both for the donors and the patients.

2. Where we reached?

2.a. Almost 95 % blood component transfusion
2.b. Almost 85 % is from VNRB donors
2.c. Specific training & certification programs have been existing since 2000 for Blood Bank staffs by Ministry of Health (MoH)
2.d. Specific post-graduate education such as master degree, PhD have been existing since 2000 for medical doctors

2.e. Reliable updated technics are available for blood group typing and immunohematologic tests
2.f. Satisfactory "Donor Evaluation Form" which is issued by MoH usage has been in service since 1996 country wide.
2.g. Plateletpheresis is available almost all country wide
2.h. Registration and archiving are digitally performed. There is different software for BB & TM activities
2.ı. Quality Management, Standards, etc. are existing in BB & TM and under the control of MoH
2.j. Regional type Blood Banking is existing in Turkey since 2005 which Turkish Red Crescent runs.
2.k. There are not major variations between blood centers about the contents, quality and effectivity
2.l. Turkish BB & TM sector has been more evident by Global BB & TM KB community after organizing VIIII. ISBT Regional Congress, Anatolian Blood Days and actively participating different international occasions on BB & TM. already are were not familiar about
2.m. Leucodepletion, irradiation, etc. procedures are available where those are needed country wide. Due to Turkish Red Crescent blood collection bag system 85 % of collected blood are leucodepleted.
2.n. Reliable updated technics are available for transfusion transmitted infections (TTI) screening. Turkish Red Crescent also performs NAT screening for TTI screening at every unit of collected blood since 2014.
2.o. Blood and Blood Components Law was updated at 2007
2.p. There are various scientific literatures on BB & TM in Turkish. Such as Guidelines, Course Books, Symposia Booklets, etc. Those publications cover almost all related topics of BB & TM.

3. Where we were failed?
3.a. Although a lot of dedication and effort have done still there is not standard and obligatory specific pre-graduate curriculum for medical doctors. I graduated from medical school without visiting Blood Center. Unfortunately, it still exists.
3.b. We are still 100 % dependent on importation for PDMPs. Random plasma which is obtained as a byproduct of erythrocyte production can not be valued, send to biologic waste.
My special relation with Red Crescent Ankara Blood Center as a "term-mate" at 1957 was continued as a chief of tender board of Turkish Red Crescent Plasmafractionation Project, an Executive Board Member and Vice -President of Turkish Red Crescent, 1996 – 2003.
I worked with dedicated, reliable and real Red Crescent lovers at this board. Such as Prod. Dr. Şadi Yenen who is chairing our panel, Prof. Dr. Gürol Emekdaş, Dr. Nuri Solaz and Dr. Nilgün Acar a very special person highly qualified doctor and extremely reliable lady. All of us feel her absence very deeply and missed her so much.
We did our best to realize this project till last point, but we couldn't succeed. I resigned from all my posts after I was sure that my suggestion, recommendations were not considered.
But I did not resign from my "Red Crescent volunteer soul" and I again served with pleasure and honor when they asked at 2005 during re-organization of Turkish Red Crescent Blood Services.
Today I am extremely happy and proud to witness the great progress of Turkish Red Crescent Blood Services.
3.c. Although an EU financed project has done in Turkey which advised that MoH should have a better administrative organization with more staffs at country wide MoH actually decreased the previous status and number of staffs. I believe this should be re-evaluated soon.
3.d. Other blood suppliers besides Turkish Red Crescent do not perform NAT screening for TTI. This condition is a real risk both medically and legally. I hope all collected blood for transfusion will be screened by NAT for TTI.

Conclusion:
A group doctors who were involved in BB & TM recognized the educational gap and insufficiency. They decided to establish a society which would work on closing this education and knowledge gap in BB & TM. Blood Banks & Transfusion Society (BBTS) established at 16.11.1996. It is my milestone about BB & TM history of Turkey. Prof. Dr. Mahmut Bayık was the first President and he was followed by Prof. Dr. Gürol Emekdaş. Dr. Ramazan Uluhan is the acting President. Those Presidents and all other members of BBTS dedicated all their efforts and did great job. As a result, BBTS was awarded as **Blood Banks & Transfusion Society of TURKEY (BBTST).**

According to me, the magic of this great success is based on their dedication, honesty, close collaboration, real friendship and scientific thinking between each other, Ministry of Health and Turkish Red Crescent. As a result, a society has converted to a family; **BBTST Family.**

I always feel great honor and pleasure to be one of the founders of this distinguished organization and keep their "Polar Star Award" not only at very special place of my home but also at my heart.
Thanks to all.

Finally, last word for the youngsters who are at the audience,

a. It was not easy to reach this point
b. This point should be moved further
c. It is like a flag footrace, we are going to transfer the flag to you
d. It will be your time and duty to move actual point further
e. Wish to all good luck and power

BLOOD GROUPS AND DISEASES

Chairpersons: **Zöhre Alimirzoyeva**
Okan Töre

Speaker: **L. Tufan Kumaş**

BLOOD GROUPS AND DISEASES

L. Tufan KUMAŞ
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Introduction

Karl Landsteiner's identifying ABO blood group antigens in 1901, is one of the most important steps in safe transfusion. Later studies have shown that many membrane-related structures of erythrocytes have antigenic properties that may produce antibody responses. There are many serologically defined blood group antigens today. Most of these antigens are interrelated and form blood group systems (Table-1).

Table 1 Blood Group Systems

ISBT No	System name	System Symbol	Gene Name(s)	Chromosomal Location
001	ABO	ABO	*ABO*	9q34.2
002	MNS	MNS	*GYPA, GYPB, GYPE*	4q31.21
003	P1PK	P1PK	*A4GALT*	22q13.2
004	Rh	Rh	*RHD, RHCE*	1p36.11
005	Lutheran	LU	*LU*	19q13.32
006	Kell	KEL	*KEL*	7q34
007	Lewis	LE	*FUT3*	19p13.3
008	Duffy	FY	*FY*	1q23.2
009	Kidd	JK	*SLC14A1*	18q12.3
010	Diego	DI	*SLC4A1*	17q21.31
011	Yt	YT	*ACHE*	7q22.1
012	Xg	XG	*XG, MIC2*	Xp22.33, Yp11.3
013	Scianna	SC	*ERMAP*	1p34.2
014	Dombrock	DO	*DO*	12p12.3
015	Colton	CO	*AQP1*	7p14.3
016	Landsteiner-Wiener	LW	*ICAM4*	19p13.2
017	Chido/Rogers	CH/RG	*C4A, C4B*	6p21.3
018	H	H	*FUT1*	19q13.33
019	Kx	XK	*XK*	Xp21.1
020	Gerbich	GE	*GYPC*	2q14.3
021	Cromer	CROM	*DAF*	1q32.2
022	Knops	KN	*CR1*	1q32.2
023	Indian	IN	*CD44*	11p13
024	Ok	OK	*BSG*	19p13.3
025	Raph	RAPH	*CD151*	11p15.5
026	John Milton Hagen	JMH	*SEMA7A*	15q24.1
027	I	I	*GCNT2*	6p24.2
028	Globoside	GLOB	*B3GALT3*	3q26.1
029	Gill	GIL	*AQP3*	9q13.3
030	Rh-associated glycoprotein	RHAG	*RHAG*	6p12.3
031	FORS	FORS	*GBGT1*	9q34.13-q34.3
032	JR	JR	*ABCG2*	4q22.1
033	LAN	LAN	*ABCB6*	2Q36
034	VEL	VEL	*SMIM1*	1p36.32
035	CD59	CD59	*CD59*	11p13
036	Augustine	AUG	*SLC29A1*	6p21.1

Numerous studies have been published in the literature showing the relationship between blood groups and diseases especially with infections, cancers, obstructive vascular diseases and bleeding disorders. Malaria is

the first and most important infection that comes to mind when talking about erythrocytes. However, since some blood group antigens are also expressed in other tissues, they have been associated with various infections.

Malaria and Blood Groups

· Diego Antigen

Diego antigen, also known as Band 3, is one of the most abundant glycoproteins on the erythrocyte membrane. Southeast Asian Ovalocytosis (SAO) is a common hereditary ovalocytosis in the south Pacific region, which has been shown to have a protective effect on children from cerebral malaria. Individuals who have a 27 bp deletion in the Band 3 gene as heterozygous have a variant protein. The expression of band 3 and associated blood group system Diego antigens, which plays an important role in erythrocyte membrane stability, has decreased or disappeared. This leads to erythrocyte deformity and impaired anion exchange functions.

· **Duffy Glycoprotein, DARC (Duffy antigen receptor for chemokines)**

In studies on the high frequency of Fy (a-b-) phenotype in blood donors of African origin, Duffy glycoprotein has been shown to play a role in the attachment and invasion of malaria parasites such as *P. knowlesi* and *P. vivax*. In some West African regions with 100% Fy_{null} variation frequency, absence of *P. vivax* malaria is an evolutionary advantage caused by selection pressure. However, the low neutrophil counts observed in the Fy_{null} population (benign ethnic neutropenia) can be considered as a price paid for this advantage. Some studies have shown that HIV-1 infection rate is higher and renal allograft survival is lower in the Fy_{null} population.

· Ok, Basigin (CD147)

The adherence of *P. falciparum* via PfRh5 protein to basigin as a receptor in erythrocyte invasion suggests a key role in malaria patonegenesis.

· Knops (CD35)

Knops antigen or complement receptor-1 (CR1) is a fairly large glycoprotein containing about 30 complement control protein regions. *Plasmodium falciparum* binds to CR1 via PfEMP1 protein, leading to rosetting and severe clinical complications. In a study in Kenya, it was reported that cerebral malaria is much rarer in children with the Sl1 (-) genotype. Although it is rarely seen in whites, the Sl1 (-) genotype has been reported as 70% in West Africans and 40-50% in African Americans. However, contradictory study results from different regions related to Knops antigenic variations associated with malaria have also been published.

Pathogenic bacteria such as *Mycobacterium tuberculosis*, *M. leprae* and *Legionella pneumophila* use CR1 as a receptor in phagocyte invasion. In studies conducted in Mali and Malawi, the presence of McC^b and *Sl2* alleles was found to be associated with resistance to leprosy and *M. tuberculosis* infection.

· **Gerbich, Glycophorin C and D**

Ge:-2,-3,-4 RBCs were found to be 43% less invaded by *Plasmodium falciparum* than Gerbich-positive cells. In Papua New Guinea where malaria is endemic, the high frequency of Ge:-2,-3 phenotype is thought to be due to selection pressure.

· **MNS, Glycophorin A and B (GPA, GPB)**

Above mentioned many links related to erythrocyte antigens and malaria. It would be useful to give a little information: *P. vivax* uses DARC protein, which carries Duffy system antigens in erythrocyte invasion. But *P. falciparum* uses different membrane structures such as band 3, CR1 and basigin. The attachment to glycophorins carrying Gerbich and MNS system antigens takes place via a sialoglycoprotein-dependent mechanism. Therefore, in regions where malaria is endemic, variations that provide an advantage in infection prevention are common. For example, the frequency of S-s-U- (GPB_{null}) phenotype was determined as 36% in Efe pygmies (Congo).

· ABO Blood Group and Secretor Status

ABO and H antigens are also called tissue-blood group antigens because they are found in many tissues besides erythrocytes. ABO and H antigens can be found not only in tissues, but also in body fluids such as saliva,

tear, milk, genito-urinary and gastrointestinal secretions. Individuals with tissue-blood group antigens in body fluids are defined as secretors (80%), and those who are not defined as non-secretors (20%).

It is observed that the O group is more common in the regions where *Plasmodium falciparum* infection is endemic, compared to the non-O (A, B, AB) phenotype. Especially in children, it has been reported that group O provides advantages in terms of severe malaria when compared with group A. Rosetting and sequestration are less common in individuals of group O. Therefore, it is recommended to give O group RBC to non-O group malaria patients who need transfusion..

The ABO blood group system and secretor status have also been associated with many infections other than malaria:
Infections caused by some *Vibrio cholerae* strains and enterotoxygenic *Escherichia coli* have been reported to be more severe in group O individuals compared to non-O groups. *Helicobacter pylori*, which is responsible for the development of chronic gastritis, gastric and duedonal ulcers, and adenocarcinoma, has been shown to bind to the Le^b antigen with BabA protein. Compared to secretors, ABH non-secretors are more prone to infections caused by *Haemophilus influenzae*, *Neisseria meningitides*, *Streptococcus pneumoniae* and *E. coli* (urinary system).

ABH non-secretors are resistant to symptomatic infections caused by some norovirus (NoV) strains. Non-secretor individuals (se^{428}/se^{428}) have been reported to be more resistant to HIV-1 infection.

ABO antigens have been shown to be associated with various cancers, obstructive vascular diseases and bleeding disorders: Despite their presence in healthy surrounding tissues, the expression of A and B antigens is lost in malignant tumors of the gastrointestinal tract, oral cavity, uterus (cervix), lung, prostate, breast and bladder. H, Le^b, Le^y, sialylated-Le^a (sLe^a) or sialylated-Le^x (sLe^x) increase was observed in tumor cell surfaces with lost A- or B-transferase activity and was associated with distant metastasis and poor prognosis. Pancreatic cancer is observed at higher rates in non-O group individuals compared to group O individuals. The risk ranking is reported as follows: B > A/AB > A_2 > O.

Von Willebrand factor (VWF) plays an important role in the coagulation mechanism. Plasma VWF levels are regulated by a metalloprotease enzyme, ADAMTS13. The presence of A or B carbohydrate structures on VWF, a glycosylated protein, restricts enzymatic activity and reduces VWF breakdown in non-O group individuals. Therefore, when compared with group O individuals, plasma (VWF) levels are 25-30% higher in non-O group individuals [AB > A > B > O > Oh (Bombay)]. Even the ABO genotype has been shown to be effective at VWF levels. *A/A* and *B/B* individuals have higher VWF levels than A/O^1 and B/O^1 individuals. As a clinical outcome of this condition, individuals with group O have a high tendency to bleed, whereas non-O group individuals have higher rates of vascular disorders such as coronary artery disease, peripheral vascular disease, cerebral ischemia and venous thromboembolism.

Conclusion

Although associated with many other diseases, the variety of antigenic molecules on erythrocytes is mainly due to selection pressure caused by infectious agents. As a result of adaptation to the natural environment, different antigenic distributions are observed in different societies in different geographies. As a result, it would be unfair not to give the leading role to malaria parasites when it comes to infections and erythrocytes.

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YATAK BAŞINDA

- Hasta kimliği, hastadan örnek alımı ve hastaya kan ünitesinin bağlanması basamakları doğru, güvenilir ve emniyetli şekilde kayıt altına alınır
- Transfüzyon Servisi ile gerçek-zamanlı iletişim sağlanır
- Herhangi olumsuz bir durum yada transfüzyon reaksiyonu anında fark edilir
- Yapılan transfüzyonun her basamağı ayrıntılı olarak kayıt altına alınır

VE İŞ YERİNİZDE HER YERDEN

- Tüm transfüzyon süreci gerçek-zamanlı olarak izlenebilir
- Beklenmedik olaylara süratle müdahale edilebilir
- İstatistikler, göstergeler ve izlenebilirlik raporları alınabilir
- Arzu edilen herhangi bir hastane bilgi sistemine veri aktarımı yapılabilir
- **Yeni !** : Multi-site özelliği ile aynı veri tabanını kullanan farklı transfüzyon merkezleri, ana merkezden izlenebilir

GRICODE SİSTEMİ, KAN TRANSFÜZYONU İŞLEMİ BOYUNCA
GÜVENLİK, İZLENEBİLİRLİK VE VERİMLİLİĞİ EN ÜST DÜZEYDE
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CAN UMBILICAL CORD BLOOD BE USED AS A SOURCE OF BLOOD COMPONENTS?

Chairpersons: **Saim Kerman**
Fatma Savran Oğuz

Speaker: **N. Banu Pelit**

CAN UMBILICAL CORD BLOOD BE USED AS A SOURCE OF BLOOD COMPONENTS?

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Umbilical cord (UC) is the basic bridge that provides fetal growth and development throughout pregnancy. It consists of 2 arteries and 1 vein with the surrounding connective tissue. Umbilical Cord Blood (UCB) can be collected in-utero following the birth of the baby or ex-utero after the delivery of the placenta. Collection should be done in the first minutes by a competent staff or preferably a obstetrician. Average 70-80 ml venous blood is taken into a standard blood bag. The most important difference from whole blood is that it is a rich source of stem cells. Therefore, the cellular blood components and plasma in its content are excluded, and attention is focused on the stem cell. Erythrocytes and plasma are waste products in UCB for cord blood banks; the main goal is to concentrate the stem cells by sedimentation to store many years. If the erythrocyte volume in the stored product during this process is high, it causes toxic effect due to hemolysis, while degrading the product quality; and also high plasma volume leads to unnecessary volume increase. In recent years, studies have been frequently seen in which these waste products are used for transfusion purposes.

Lymphocyte population of UCB has the capacity to be expansed in different directions and to a wide variety of cells. This makes UCB lymphocytes an important source of allogeneic cellular treatments. UCB plasma has placenta derived peptides (soluble MIC-A, MIC-B, ULG1), which are inhibitory ligands of NKG2d receptors, and in this way, can be used in the expansion of T and NK cells (1). UCB erythrocytes contain fetal Hb; the oxygen carrying capacity of this protein is quite high. It has been reported that allogeneic UCB is very effective especially in meeting the Hb need of premature or low birth weight babies (LBWBs). Demonstration of the development of bronchopulmonary dysplasia, necrotizing enterecholitis and retinopathy due to give the adult erythrocyte to the newborn baby, gave rise to the idea of UCB erythrocytes being preferred for newborn transfusions (2).

The advantages of using UCB for transfusion can be summarized as follows:
1) it is rich in both fetal (mostly) and adult Hb
2) oxygen affinity is high due to fetal Hb
3) Platelet and white blood cell (WBC) number is high
4) Hypo-antigenic form
5) HLA mismatch tolerable
6) GVHD risk is very low since lymphocytes are immature
7) Plasma is rich of cytokine and growth factors. No serious side effects were found in transfusion applications with UCB, especially in premature infants (2-5).

Studies with mouse models suggest that young plasma has a potential therapeutic effect in Alzheimer's Disease. In addition, in the publications about heterocronic parabiosis, the success of young plasma transfusion or plasma exchange is mentioned in reducing or stopping the effects related to aging, especially neurodegenerative diseases (6,7).

The prolongation of human life, improvements in the field of treatment, it causes to need for blood components while increasing the difficulty of reliable donor supply, increased universal blood substitutes studies. One of the important sources for ex vivo red blood cell generation is UCB. UCB is a precursor and multipotent hematopoietic stem progenitor cell source; in culture conditions, can easily show lineage specific differentiation. It presents this opportunity not only for erythroid lineage but also for other cell series. Its important advantages are that it is stored in bank conditions, it is produced with cGMP conditions, the risk of infections is low, the number of cells is modified and sufficient. Studies emphasize the importance of such a product in terms of the supply of rare blood groups in addition to making it universal. It is thought that these product development studies, which have been determined to be cost-effective, can be completed and presented to the current use (8).

The differences of opinion between the group of physicians who decide to collect UCB and the group of physicians who put the indication for use lead to the consideration of the product on a commercial scale. The 2019 recommendations of the American College of Obstetricians and Gynecologists Committee[9] were unfortunately suitable for wrong evaluation. The report focused on the limitations of the use of UCB as a hematopoietic stem cell

source. However, UCB is extremely valuable not only for transplantation but for transfusion as blood components and stem cell source; the parent should be well informed, the product should not be regarded as a biological insurance, but it should be saved from being "waste".

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BLOOD BANKING IN ASIAN COUNTRIES: AATM PRACTICES

Chairpersons: **Aparna Singh Shah**
Emine Güçhan Alanoğlu

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INTRODUCTION OF AATM

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The Asian Association of Transfusion Medicine (AATM) AATM is a trans-national organization operating in Asian region for the development of blood transfusion services (BTS) in this part of the world. It is a twenty years old organization having members from thirty five countries and nineteen countries has functionally autonomous Country Chapters. AATM is a manifestation of the determination of leading specialists in Transfusion Medicine from Asian countries to work together towards finding solutions for their common problems in the spirit of friendship, trust and understanding and to create an order based on mutual respect, equality and shared benefits. The primary objective of the Association is to accelerate the scientific progress and common standard in Blood Transfusion Services (BTS) in member countries in the Asian region.

OBJECTIVES: AATM is committed to establishing inter organizational relationship among various scientific Societies/ Associations related to Transfusion Medicine (technical and motivational field) in Asian countries including SAARC countries. It also intends to work in close co-ordination with various National governments, government organizations like SAARC, BIMTECH, ASEAN etc. for the development of the standards of Blood Transfusion Services in member countries. It may also act as a technical advisory body to member states at various levels, whenever needed. AATM intends to initiate a close liaison with International agencies like World Health Organization (WHO), International Federation of Red Cross and Red Crescent Society etc. to promote the standard of BTS in this part of the world and to transmit the benefits to member countries. AATM has written understanding with various international organizations like American Association of Blood Banks (AABB); National Blood Transfusion Council (NBTC, Govt. of India)-India, Iranian Blood Transfusion Organization (IBTO); Shanghai Blood Center-China; Asian Society of Quality in Healthcare (ASQHC); National Blood Transfusion Center-Sri Lanka etc. for manpower and quality development of BTS in Asian countries.

MEMBERSHIP: AATM membership is open to all nationalities. There are annual individual memberships, institutional and corporate membership of AATM. Annual individual membership is USD50; annual institutional membership is USD 200 and corporate membership is USD 2000. The Associate Membership (annual) for Technologist and Nurses is USD 20. After completion of three consecutive years, members shall have an option to become 'life member' after paying additional fees of INR USD 30 for individual members and INR USD 15 for Associate members technologists. Individual country chapter shall retain membership fees collected by them to take care of their educational programs, office and other petty expenses.

EXISTING MEMBERS: AATM has two tier operational systems i.e. Executive Council and Governing Council. Governing Council takes care of day to day work of AATM which keeps on communicating with members from different countries. The Executive Council has five international members with arbitrator capability to solve international disputes. AATM works on the principle of decentralization. AATM members have formed country chapters for operation in member countries to work independently and they follow procedures as per constitution. AATM has country chapters in Afghanistan, Bangladesh, Bhutan, Cambodia, India, Iran, Laos, Maldives, Mongolia, Nepal, Oman, Pakistan, Kingdom of Saudi Arabia, Sri Lanka, Timor Leste, Turkey, United Arab Emirate.

FUNCTIONING OF AATM:

1. AATM is an registered organization under Registrar of Societies in India
2. AATM works similar to principle of United Nations
3. It was a partner organization with WHO (WBDD-2014) & signed MoU with AABB; IBTO; NBTC-India; NBTC-SL; SBC; III, TTK-RBB etc

ACTIVITIES OF AATM:

1. AATM-Fellowship program under which AATM sponsors its members to receive advance training in knowledge deficient areas in other member countries. This program covers airfare and per diem for the candidate for 4-6 weeks training abroad.

2. AATM-Wet-workshop (hands on training): One to four wet workshops are organized per year in all member countries as per need. Expenses of these activities are supported by AATM and Country chapters. In 2019, AATM organized 19 such 2-3 days duration wet workshops in 9 member countries.
3. AATM-Publications: The Publication Committee of AATM publishes a peer reviewed journal named, Global Journal of Transfusion Medicine (GJTM). It also publishes a Newsletter regularly to keep all members updated about recent development in the field of Transfusion Medicine and voluntary blood donation in AATM member countries.
4. AATM Working Groups (WG): There are four working groups in AATM (immunohematology; VNRBD, mentor-mentee and cellular therapy) and any member could become a member in one or multiple groups. There are continuous exchange of scientific informations and problem solving in these groups.
5. AATM-EQAS program: Ongoing External Quality Assurance Scheme (EQAS) program for blood banks of all members in different countries. EQAS program is complementary to few countries depending upon available funds.
6. AATM HLA and Transplant Immunology: There are short term (4-6 weeks) residential training programs are available for AATM members and also for non-members. The course imparts training in HLA immunology, part of immunohematology and transplantation related serology/ immunology.
7. Rare donor panel: This is a unique web based program where large number of blood donors are phenotyped with rare blood groups and posted in the website. When a patient needs rare blood groups from anywhere of the globe, he/ she can avail this facility.
8. AATM-Website:(www.aatmweb.org) which provides many innovative information about Transfusion Medicine like equipment specifications, list of books, list of journals, IEC sections, conference/ CME updates, slide presentations etc.
9. AATM organizes annual conferences every year in various member countries.
10. To offer advocacy and consultancy to local government/non-governmental organizations in improving the quality and technical standard of BTS in member countries.
11. Joining governmental/ non-governmental agencies in Asian region to increase voluntary non-remunerated repeat blood donation.
12. AATM also joins hands with socio-economic agencies in the region to carry forward the message of peace, amity and prosperity.
13. AATM Consultancy: AATM has a large pool of highly trained manpower in member countries. One Consultancy arm is working for all round development of BTS in any country across the globe.
14. AABB Blood Bank Quality Certificates: AATM is working with AABB to develop one 'Quality Certification' program for member countries. It is in the final stage of implementations from second half of 2020.
15. Advance Certificate Course in Transfusion Medicine: This academic certification program is web-based and could be applied by any one for academic certificate. This program will implemented by second half of 2020.

ACCREDITATION & ASSOCIATIONS:

1. AATM is a registered body under the Registrar of Society of India.
2. AATM has signed a MoU with American Association of Blood Banks (AABB) for joint working to develop blood transfusion in this part of the world.
3. AATM has signed a MoU with Iranian Blood Transfusion Organization for closing working.
4. AATM has signed an MoU with National Blood Transfusion Council, Ministry of Health & FW, Govt. of India for training in a group of Blood Banks.
5. AATM has signed a MoU with National Blood Transfusion Center, Govt. of Sri Lanka for training of AATM-Fellowship candidates.
6. AATM was a member of Global Collaboration for Blood Safety (GCBS), a unit constituted by the United Nation for safe blood supply and Secretariat is operating from WHO-HQ at Geneva (http://www.who.int/blood-safety/links/en/index.html).
7. At present, AATM is a member of the WHO Global Forum for Blood Safety in strengthening the cause of blood transfusion among member countries (http:// ezcollab.who.int/who-gfbs/).
8. AATM is working closely with Asian Society for Quality in Health Care (ASQUA) for working closely in man power development program in BTS from South Asia.

Aysha ALMALKI

BLOOD BANKING IN RUSSIA

Eugene ZHIBURT
National Medical Surgieal Center

HISTORY

For the first time in Russia, the obstetrician Andrey Martynovich Volf successfully transfused blood in St. Petersburg on April 20, 1832. The woman gave birth has been transfused with her husband's blood. April 20 is now National Blood Donor Day.

The first monograph on blood transfusion in Russia, "A treatise on blood transfusion (as the only way to save an extinct life in many cases), compiled in historical, physiological and surgical terms" was prepared by Alexei Matveyevich Filomafitsky (1807 - 1849) - physiology professor of Moscow University and published in 1848 (fig. 1).

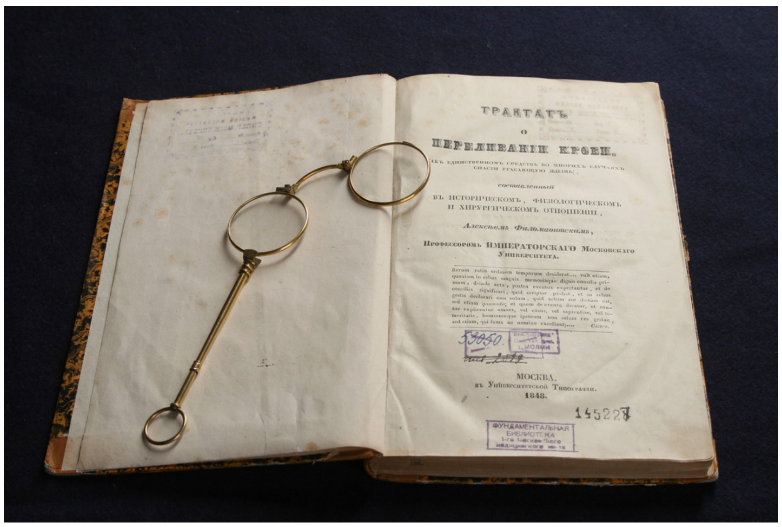

ТРАКТАТЪ
О
ПЕРЕЛИВАНІИ КРОВИ.
МОСКВА,
1848.

Figure 1. First book about blood transfusion in Russia

At the beginning of the 20th century, a number of significant events took place at the Military Medical Academy for the development of our specialty.

Alexander Alexandrovich Maximov (fig. 2) in 1909 published an article "Lymphocyte as a common stem cell of various blood elements in the embryonic development and post-fetal life of mammals". Maximov's theory of stem cells has become the basis of cell therapy.

Doctors Vadim Aleksandrovich Yurevich (1872 - 1963) and Nikolai Konstantinovich Rosenberg (1876 - 1933) on February 2, 1913, using their own centrifuge, the same doctors performed plasmapheresis for the first time in the world and published a priority article.

Figure 2. Professor Alexander Maximov, stem cells pioneer

June 23, 1919 in the clinic of faculty surgery of the Military Medical Academy for the first time in Russia, blood transfusion taking into account blood groups was performed by privat-docent Vladimir Nikolaevich Shamov (1882 - 1962) with the participation of Nikolai Nikolaevich Elansky (1894 - 1964) and Joakim Romanovich Petrov (1893 - 1970). All three are future academics and generals.

The problems of donation served as an incentive for V.N. Shamov was the first in the world to carefully study and substantiate the possibility of transfusion of blood taken from a corpse (cadaveric, fibrinolized blood). At the III All-Ukrainian Congress of Surgeons on September 11, 1928, V.N. Shamov (fig. 3) reported: "Blood tissue, having been in the cadaver up to 11 hours after the death of the animal, again began to continue its life and function in the body of the new organism."

Figure 3. Professor Vladimir Shamov, pioneer of blood transfusion in Russia

He enthralled this with Professor Sergei Sergeyevich Yudin, who, for the first time in world practice, performed a successful transfusion of cadaveric blood at the Moscow Institute of Emergency Medicine (fig. 4).

Figure 4. Professor Sergey Yudin talks about cadaver blood transfusion

The world's first Institute of Blood Transfusion was opened on February 26, 1926 in Moscow at the initiative of Alexander Alexandrovich Bogdanov (1873 - 1928), who became its first director. The first building of the institute is the mansion of the merchant Igumnov and now adorns Ordynka. Now the French ambassador lives there (fig. 5).

Figure 5. First blood transfusion institute in the world was founded here.

Being a doctor by education, A.A. Bogdanov (Malinovsky) became widely known as a revolutionary, philosopher and writer. Back in 1908, in his novel "Red Star", he expressed the opinion that it is possible to supplement political socialism with a mutual exchange of blood, thereby creating a brotherhood from humanity, united not only by a common idea, but also by common blood.

As the main goal of his work Bogdanov determined the restoring, rejuvenating effect of the blood of young people transfused with age-related patients.

After the 12th transfusion on April 7, 1928, A.A. Bogdanov passed away. Cause of death: intoxication, renal failure due to delayed hemolysis of donated blood after incompatible transfusion.Given that the fatal transfusion was already the twelfth for A. A. Bogdanov, a hemolytic reaction with anti-RhD antibodies IgG was most likely to occur. Before the discovery of antigen D, 11 years remained.

A network of regional blood banks was deployed in the USSR in 1930-1932.

During World War II, field hospitals supplied blood collected from the rear by blood transfusion stations and institutes (fig. 6). In total, during the war years about 7 million blood transfusions were made in military hospitals. 20 percent of the blood to the front was delivered from the besieged Leningrad.

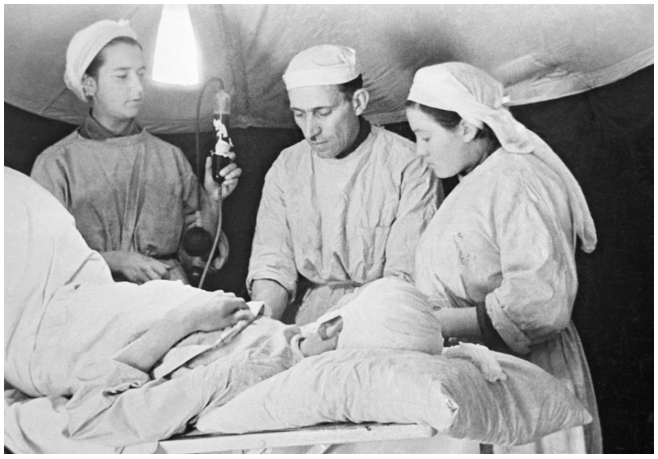


Figure 6. Blood transfusion in field hospital in 1941.

June 24, 1944 was established the award "Honorary Donor of the USSR" (fig. 7)

Figure 7. The breastplate "Honorary Donor of USSR"

CURRENT LAW

Now the blood service works in accordance with the Federal Law of 20.07.2012 N 125-FZ "On the Donation of Blood and Its Components".

Blood donation and (or) its components is based on the following principles:

1) The safety of donated blood and its components;
2) Voluntary donation of blood and (or) its components;
3) Maintaining the health of the donor in the performance of the donor function;
4) Providing social support and respect for the rights of donors;
5) Encouragement and support of free blood donation and (or) its components.

All blood banks are state establishments.

State regulation of relations in the field of blood service is making by:

1) Establishing in the rules for the collection, storage, transportation and clinical use of donated blood and its components, approved by the Government of the Russian Federation, the mandatory safety requirements for donated blood and its components during their collection, storage, transportation and clinical use;
2) Maintaining a unified database of blood donation and its components;
3) State control in the field of blood service.

The powers of the federal Ministry of healthcare, include:

1) Determining the procedure for donors to undergo a medical examination, as well as approving a list of medical contraindications (temporary and permanent) for blood donation and (or) its components and the timing of the withdrawal to which a person is subject, if there are temporary medical contraindications, from blood donation;
2) Determining the procedure for submitting information about transfusion reactions;
3) The establishment of an approximate diet of the donor who donated blood free of charge;
4) Determination of the procedure for the implementation of the annual cash payment to persons awarded the breastplate "Honorary Donor of Russia";
5) Determination of cases in which the blood donation is possible for a fee, as well as the establishment of the size of such a fee;
6) Determination of cases of the possibility of replacing the donor's free nutrition (according to the donor's established diet) with monetary compensation and the procedure for establishing its size equivalent to the cost of the approximate diet of the donor who donated blood or its components for free;
7) Establishing the rules for the clinical use of blood and blood components.

SOME STATISTICS
Table 1
Blood transfusions in Russia

Year	Recipients	Transfusions	Litres
2016	1198773	3229478	1083605,32
2017	1209725	3217068	919591,72
2018	1195801	3249898	923245,26

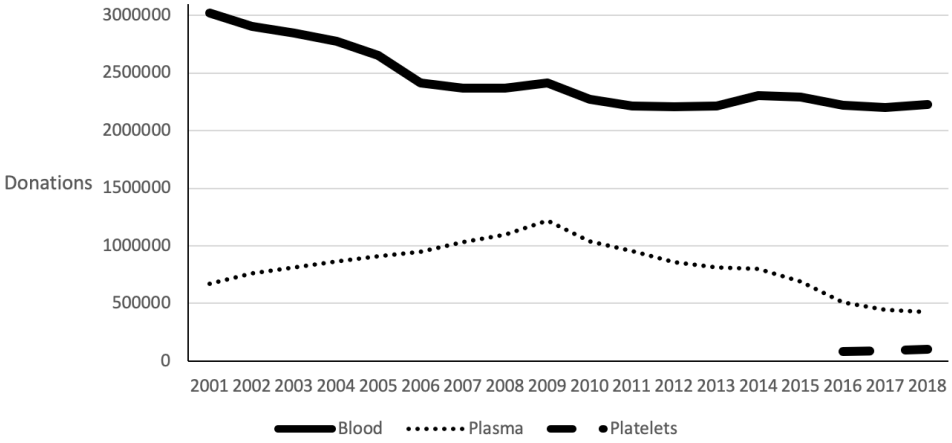


Figure 8. Blood, plasma and platelets donations in Russia

In 2002 I published first textbook about transfusion medicine (fig. 9).

Figure 9. First transfusion medicine textbook in Russian

In my hospital where I work since June, 2006 we try to implement evidence-based transfusion guidelines and patient blood management principles (fig. 10).

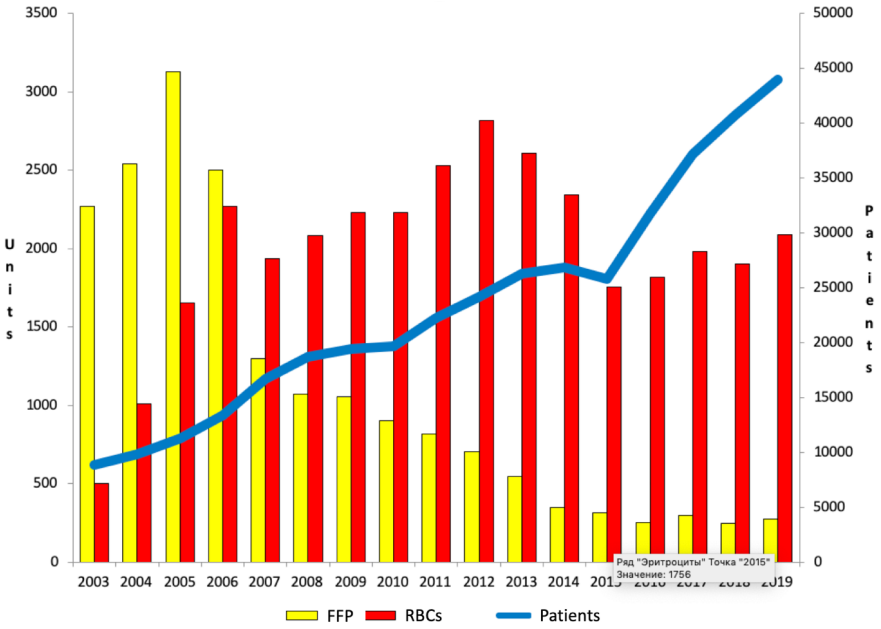


Figure 10. Patients and transfusions in Pirogov center

All colleagues welcome to my National Pirogov Medical Surgical Center for our annual transfusion conference in December (fig. 11)

Figure 11. Transfusion event in Pirogov Center (Moscow)

SRI LANKA COUNTRY PRESENTATION

Ananda GUNASEKERA
Dy Director General Medical Services, Ministry of Health, Sri Lanka, Colombo, Sri Lanka

Blood Transfusion service of Sri Lanka was started in late 1950s as a small laboratory fascility in the National Hospital in Colombo, Sri Lanka.

It has evolved gradually from that solidary situation to a Comprehensive National Blood Transfusion Service at present.

Wining the ISBT's Best Transfusion System in the Developing world was one of the highlights in this journey.

The presenter describes the history and the present situation of the NBTS by describing below subjects.

1. General Statistics on Geography & Demography of Sri Lanka
2. Vital statistics on Health & Education on Sri Lanka
3. Vision & Mission of NBTS Sri Lanka
4. History and organisational details of NBTS.
5. Statistical Highlights on, Blood Collection, Voluntary Vs. Non Voluntary donations, Mobile Vs. In House donations, First time Vs Repeat donors, Gender Distribution on Donations, Prevelence of TTI,
6. Recent Achievements of NBTS of Sri Lanka.

BLOOD BANKING SYSTEM IN NEIGHBOUR COUNTRIES : PAST & PRESENT

Chairpersons: **M. Tevfik Yavuz**
Cees Smit Sibinga

Speakers: **Bukurije Zhubi**
Gordana Rasovic
Emilija Velkova
Aida Djozo

BLOOD BANKING SYSTEM IN KOSOVO: PAST & PRESENT

Bukurije ZHUBI
Director of NBTCK, Pristine, Kosovo

The purpose of this presentation is to present past and current situation of transfusion and blood banking system in Kosovo. The development of the blood transfusion establishment and transfusion services in Kosovo during the past twenty years has been developed gradually and now it is organized by National Blood Transfusion Center of Kosovo (NBTCK) in Pristina with its seven Regional Transfusion Centers. National authority for NBTCK is Ministry of Health of Republic of Kosovo.

Kosovo declared independence in February, 17th 2008. In the same year a new law was adopted for blood transfusion which regulated all activities of Blood Banks and Transfusion Medicine Services, related to blood donation, testing, processing, safeguard, transfusion and quality control of the blood and its components.

In 2018, a new law for blood transfusion activities was brought, this time in compliance with EU directives:

2.1. Directive 2002/98/EC, by which are set forth the quality and safety standards during the collection, testing, processing and distribution of blood and blood components regardless of purpose.
2.2. Directive 2004/33/EC, by which applies the Directive 2002/98/EC in relation to the technical requirements for blood, and blood components.
2.3. Directive 2005/61/EC, by which applies the Directive 2002/98/EC in relation to the tracking and reporting of serious adverse events and reactions.
2.4. Directive 2005/62/EC, by which applies the Directive 2002/98/EC in relation to Community standards and specifications relating to the quality system in transfusion institutions.

Also, this law contains provisions that are in accordance with the recommendations of the European Council, the World Health Organization, good practice of manufacturing, clinical and laboratory.

Actually, in Kosovo there is no National Regulation or guideline for Blood Banking and Transfusion Medicine Service. However, European guidelines are used in practice. NBTCK is planning to start preparation of National Regulations and Guidelines for Blood Banking and Transfusion Medicine Service according to new Law of blood and blood products.

Kosovo's population was about 2 million before 2000. During the last registration in Kosovo, the population is about 1.74 million. While in 2007 there were 11.0 Blood Donations per 1000 inhabitants in 2019 there were 16.3 Blood Donations per 1000 inhabitants.

In 2000, there were 10.5% VBD versus 87.1% VBD in 2019. The main challenge for NBTCK is reaching 100% of Voluntary Blood Donations (VBD).

The prevalence of Transfusion Transmitted Infections among blood donors in NBTCK in Pristina are changed during 2000 to 2019 years with the lower prevalence of TTI. In 2000, the prevalence of HBsAg positive was 3.76% comparing with present situation in 2019 which is 0.46%. Also, we have a very low prevalence of anti HCV-Ab for blood donors in present time if we compare with situation in the past (in the past 1.1% respectively in present 0.1%). Only four cases were anti-HIV positive during period of time 2000-2019. And finally, the prevalence of syphilis in the past was 0.03% and in 2019 is 0.02%. We have not started implementing NAT testing yet.

In the past and in the present, NBTCK has a dedicated unit, namely as the Marketing Unit, which is entirely dedicated to the promotion and marketing of blood donation through all aspects.This unit also prepared own recruitment program in the last trimester of the year, for the next year and include schedule for all institutions which are ready to participate in this activity. During period 2000 – 2019, there were increased number of Blood sessions

from 67 to 307 with the larger number of VBDs.

In the past electronic data processing systems are being used in BTC in Kosovo (2006). A Blood establishment's computerised system includes: hardware, software, peripheral devices, personnel, and documentation. The same electronic data systems with some modifications are in use and now.

Processing and use of Blood Components in Kosovo

In the past NBTCK produced less blood products (Red cells, Washed red cells, Platelets from double centrifugations, Plasma and Cryo). At current, Transfusion Blood Centers collects approximately more than 28000 blood units per year and distributed more than 55000 blood components units. Most of the whole blood was separated in Red Cells (washed Red cells), Platelets (Apheresis, Reveos, double centrifugation), plasma (FFP, Cryo, Pediatric FFP and Pediatric Cryo). There is leucodepletion for Red Blood Cells, Platelets and Plasma. No fractionation of plasma products has been done till now.

Mostly, Blood Transfusion Service of Kosovo is able to provide adequate and timely supply of safe blood and blood components through voluntary blood donations. The other small amount of blood and blood components are provided from replacement donations 12.5%.

In Kosovo, there is no National Standards for use of Blood and Blood components. There is no hemovigilance system at National level and National guideline for Transfusion indications or for transfusion complications. There is a standard form for request and follow up transfusion. There is no Hospital Transfusion Committee in Kosovo. With new Law of blood and blood components it will be the sublegal acts for forming of Hospital Transfusion Committee in Kosovo and National Guidelines and protocols.

There is technology progress in blood transfusion in many fields in last two years: Bacterial detection system for blood components, Automatic separation of blood products (Reveos), Measuring of residual leucocytes in filtered blood products (Adams), IH 500 for immunohematology testing. For blood collection out of NBTCK there are two new mini buses which are equipped with 4 new mobile refrigerators. The gamma of blood testing has been widened and quality of blood components is better than before.

According to abovementioned, we can concluded that compared to past and current situation, there was a significant progress in blood transfusion with better quality and safety of blood products. But there is still a lack of guidelines and transfusion policies in national level which require special attention for policy makers of MoH and Blood Banks.

BLOOD BANKING SYSTEM IN NEIGHBOR COUNTRIES: PAST & PRESENT

Gordana RASOVİC
Institute Blood Transfusion of MH

Transfusion medicine as one of the basic branches of medicine, which has united science and practice, enables its operation and functioning of all other branches of medicine, provides safety in work and contributes to the success of therapy. As such, it plays an extremely important role in a country's healthcare system. For this reason, many are rightly called it the "bloodstream of medicine".

Its role is multifaceted, from specific diagnostics and prevention, through treatment with human blood products, making it the most recognizable, to support sophisticated diagnostic and therapeutic procedures in highly specialized areas.

Due to the significance and importance of transfusion services in the health care system as well as the branch of medicine that deals with the most sensitive segment, provision of drug of human origin, Europe is still the middle of the last century (1950), established the basics of the legal framework in this sector. Minimum standards have been set for each country to meet in order to facilitate the further development of the healthcare system in its country. The fulfillment of standards is a prerequisite for engaging in international cooperation and exchange.

But many countries, including Montenegro, in that time did not have possibilities to follow new attitudes in this area.

GENERAL INFORMATION OF THE COUNTRY

Montenegro is a small country belonging to the countries of Southeast Europe.

· Land area 13 812 km2
· Population ..... 620 029 inhabitants (popis 2011)
· Population 18-65 years - 60%
· Gender structure :
Women – 50,2%
Men - 49,8%
· Rural population 38%
· Urban population 62%

By 2006, when Montenegro became an independent State, it was one of 6 republics, now the former state of Yugoslavia.

The beginnings of transfusion service in Montenegro are recorded after World War II, at about the same time as in other republics of the former Yugoslavia.

The first transfusion unit was organized in small town Cetinje in 1947 with the enthusiasm of brave individuals, physicians aware of the importance of this activity.

In 1953 she was transferred to a larger city, to the General Hospital in Titograd.

There it continued its development during 1960, 1964, 1969, 1974, changing its organization until 2002 when it grew into the Blood Transfusion Center Clinical center of Montenegro - the only tertiary-level healthcare facility in Montenegro.

We can say, it started off relatively well and on time. What has been going on since then remains unknown.

The fact is that Montenegro was the only former Yugoslav Republic without Blood Transfusion Institute or National coordinated BTS. Because of that, the development path of transfusion service in Montenegro was significantly different than in other countries in the surrounding areas.

For a long time, Blood Transfusion Service in Montenegro was not recognized as a significant segment of the healthcare system. It was in stagnation, and faced with a lot of problems.

At the time, it was a part of healthcare institutions of secondary and tertiary level, located at inadequate facilities with scarce and out dated equipment, insufficient number of qualified staff and with no dedicated funds. In such conditions, the activities of blood transfusion service, from blood collection through processing of blood to the issuance of blood for patients, were barely meeting professional requirements. The main problems arose when it was no longer able to meet the requirements of the development of other branches of medicine, introduction of new diagnostic and therapeutic methods and particularly when it came to highly specialized branches of medicine, such as cardio surgery and transplantation.

The first important steps in the development of Blood Transfusion Service were made at the beginning of XXI century by the recognition of its role in the public healthcare system and stepping into the arena of international associations and institutions dealing with blood transfusion.

Then there is a very intensive period of development of the transfusion service led by expert staff with the support of the Ministry of Health of Montenegro.

A number of activities are coming down. Also a few strategic documents were prepared.

· 2003. – Republic Commission for blood transfusion had been established as expertly and advisory body within the MoH
· 2004. - Montenegro was acceded to the Safety Blood Project for SEE countries
· 2005. - Analysis of current situation in Transfusion Service in Montenegro with all its disadvantages, had been done and presented to Health Autority
· 2006. - "Strategy of Safe Blood" was adopted by the Government
· 2007. - The Law on Blood Supply was adopted by the Government and the Assembly of Montenegro
· 2008. – The National Program of voluntary blood donation was adopted by the Government and the Assembly of Montenegro

The most important document was "Analysis of current situation in Transfusion Service in Montenegro» **which had been done in 2005. After this reviev** we were faced with numerous and unexpected problems. We set out with fear to make recommendations to overcome existing problems. All that activities were followed by years of hard work, collecting numerous data without computers, Internet and even landline phones, which is unthinkable today.

Despite all the activities undertaken over more than 7 years, the situation until 2011 was as follows:

· Fragmented and disunited Transfusion Service in MN – 9 small hospital based Transfusion Services within healthcare institution (Clinical center of Montenegro, seven General hospitals and one Special hospital)
· Inadequate spaces for work
· Old equipment even up to 40 years old
· No processing of blood – usage of whole blood
· Lack of educated staff
· The total level of blood donation - 2,13%
· The presence of voluntary blood donation- less than 20% (80% replacement donors)
· Lack of legal regulation

When we realized the serious situations, we started with the preparation of new documents and activities carried out that. By that, we formed the basis for application for the EU IPA project in the EU accession process.

Guided by the now widely accepted EU attitude that developed Transfusion Service organized in line with EU requirements is one of the conditions for EU accession, in 2009 the Ministry of Health of Montenegro submitted an application for a project for pre-accession integration named EU IPA 2010 "Blood Transfusion in Montenegro ".

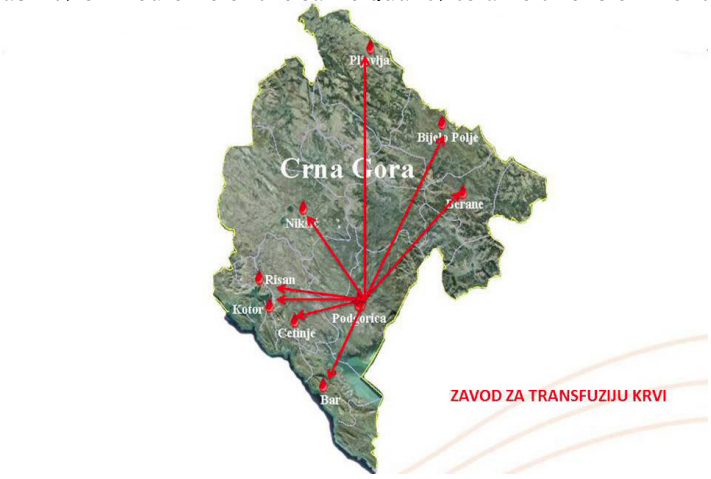
The key activities were undertaken.
· December 2011 - PHI "Institute for Blood Transfusion of Montenegro", has been established as the Institution at the national level

· July 2012 – IBTMN started with independent work after budget revision and commitment of funds for the functioning

The Blood Transfusion Institute of Montenegro is a Public Health Institution under the jurisdiction of the Ministry of Health, which has integrated complete transfusion activity in the territory of Montenegro.

It was founded on December 14, 2011 and started functioning independently from July 1, 2012.

The institution was organized at the national level, by taking over existing transfusion services / centers / units, which operated within CC, general and special hospitals. The new organization, in accordance with the Decision of the Government of Montenegro and EU requirements, includes the Reference Institution of the Institute in Podgorica and 9 organizational parts (OP) throughout the territory of Montenegro localized in: Pljevlja, Bijelo Polje, Berane, Podgorica, Niksic, Cetinje, Kotor, Risan and Bar. Activities of the OP of the Institute are blood collection, storage of blood/blood components and clinical transfusion. Also, imunohematology tests for ambulant patients and pregnant woman have been performed at these facilities. At the Reference Institution - Blood Establishment in Podgorica all collected units are testing (ABO,Rh + K, Screening and TTI), processing into blood components, storage and distributed to OP for storage and issuing. Through this process, we have achieved our goal, which is to ensure equality in the availability of medicine of the same quality to all citizens of Montenegro.



NETWORK – INSTITUTE OF BLOOD TRANSFUSION OF MONTENEGRO
· 2009/2010 – Application for the EU IPA 2010
· December 2011 – The Blood Transfusion Institute was established
· December 2012 – EU IPA 2010 Project "Transfusion medicine in Montenegro" has been started

The Project was presented to EU representatives and it was fully accepted.

The project started at the end of December 2012, the implementation lasted for two years, but despite its exceptional complexity, it was successfully completed on December 25th, 2014.

The project was based on the co-financing of the EU and the Ministry of Health of Montenegro. It contained 3 components.

I Construction of Reference Institution of the Institute for Blood Transfusion of Montenegro – MoH of MN (Government) Fund

II Provision of new laboratory equipment, computer equipment and laboratory furniture for the purposes of new facility – EU Fund

III Implementation of European System of Blood Transfusion in Montenegro – EU Fund – responsibility of WHO
· Harmonization of legal regulation with regulation of EU
· Raising awareness about voluntary non -remunerated Blood Donation
· Design and implementation of quality system
· Education of staff

After the project was approved, we have boldly embarked on the realization of numerous project activities. We knew it was the first and probably the last opportunity for Transfusion Service of Montenegro to get a place in the healthcare system that really belongs to it.
We started in December 2012.

REALIZED
I Component - Construction of Reference Institution of the IBT MN
Construction of the facility of the reference institution of the Institute in Podgorica under the jurisdiction of the Ministry of Health, started on March 27th, 2013. The space was designed in accordance with the standards and requirements of the transfusion profession with a clearly defined path of movement of products, personnel and consumables, without crossing the paths of infectious and non-infectious material, blood donor as a healthy population and patients. The facility was completed in 2 years and started operating on 30.06.2015.

II Provision of new laboratory equipment, computer equipment and laboratory furniture for the purposes of new facility
The second component of the project, which was the responsibility of the EU Delegation in Montenegro, included the procurement of new modern equipment, IT equipment and laboratory furniture for the newly constructed facility. Following the implementation of the tender procedure under the responsibility of the DEU in Montenegro, equipment was purchased and installed in a new facility of the Institute in Podgorica and other Organizational Part of the Institute across the country (8).

III Implementation of European System of Blood Transfusion in Montenegro – EU Fund – responsibility of WHO
· Harmonization of legal regulation with regulation of EU
· Raising awareness about voluntary non -remunerated blood donation
· Design and implementation of quality system
· Education of staff

The third component of the project called "Implementation of the European Blood Transfusion System in Montenegro", which was also the most complex, involved the preparation of numerous strategic documents and the implementation of numerous activities. This component was awarded to WHO for realization and financed by EU funds.

Within this Component, four groups of activities have been implemented that form the basis for establishing a quality organization, functioning and sustainability of the Institution.

· **Harmonization of legal regulation with EU regulation**

The first and fundamental part of this component was related to the harmonization of the legislation with the EU regulation. The first Document prepared was " Technical standards for Transfusion System in Montenegro" and it was the basic document. Drafting and adoption of the Law on blood supply (09.01.2014) in accordance with the parent EU Directive 2002/98 / EC and 6 bylaws - implementing regulations, EU Directives 2001/83 / EC, 2005/62 / EC, 2004/33 / EC, 2005/61 / EC, had been fully reached.

This covers all segments of transfusion work in the field of safe blood supply.

· **Raising awareness of voluntary blood donation**

The second segment, extremely important in the transfusion work of providing sufficient blood supply, was focused on raising awareness of the population about the importance of voluntary, non-remunerated blood donation and its further development by developing strategic documents.
The PR Campaign was conducted within which numerous activities were undertaken and new fields of action were opened with strategic and planning inter - institutional cooperation.

· **Implementation of Quality System**

The third segment involved the development and establishment of a quality system within which in two years, four levels of documentation of the key document, the Quality Manual and the document "Inspection and Accreditation Plan of the Blood Transfusion Institute of Montenegro" were prepared. Within this segment, numerous trainings of employees were conducted in order to carry out quality control, as well as the training of physicians, specialists in transfusion medicine, for the implementation of internal control.

· **Education of staff**

The fourth segment involved strengthening human capacities by conducting training at four levels. All planned trainings for higher education and secondary medical staff were carried out, which included:

· 2 CMEs (continues medical education) for transfusion medicine doctors and clinicians using blood/blood component for treatment,
· 4 CPR (continuous professional development) for technicians with a Certificate for work in the transfusion service,
· Training for medical technicians work in TS without certification for work in the transfusion service - six months,
· The formal education has been established in Montenegro for this profile of staff,
· Training for nurses working in wards where blood is used in treatment. These educations have established an unbroken link between acting in the transfusion service and the hospital blood transfusion chain, which ensures the traceability and safety of the use of blood. This training was completed by 400 nurses from nine (9) healthcare institutions in Montenegro that use blood for treatment during six-month.

In addition to these crucial things, numerous activities have been undertaken to support the overall system, such as the creation of an electronic blood donor database, the creation of an operational blood transfusion information system and linking with healthcare institutions that use blood for treatment.
The facilities of all Organizational parts of the Institute (8) had to be reconstructed to meet minimum standards for transfusion work also.

The Project was completed on December 25th, 2014 and was evaluated by the EC as an extremely high quality and very successfully implemented project.
The involvement of the MoH of MN, the selfless help and support of the EUD in MN, EC and WHO, and the courage and perseverance of the Institute's transfusion staff, who even in the most difficult times found the strength to move on, have led to what we have today and are very proud of.

WHERE WE ARE NOW

After the project was completed, numerous activities in all segments continued intensively and significant results were achieved.

I Blood collection

Significant results have been achieved through conducting numerous campaigns in different population and age groups, establishing cooperation with state institutions (Ministry of Education, University of Montenegro and Ministry of Sport and Youth) and private companies, intensifying the implementation of voluntary blood donation campaigns, cooperation with media, creating a website and establishing communication with all available social networks.

· Blood donation growth trend continues
(2010 – 2,1% 2019 - 3.1%)
· Changing the structure of blood donors
(2010 - 20% 2019 - 48%)

II Qality Management System

Improvement of the quality assurance system continued through the implementation of quality control at all levels followed by documentation of the process, further automation of the work process, procurement of the new equipment, further development of IT system, conducting of staff training and CME, by adoption of changes in EU regulations and regular internal and external audits and controls also.

The most important new activities:
· Certificate ISO 9001:2015 and Certificate ISO 27001:2013 - Decembre 2017. Successfully completed the First Audit by Accreditation Agency DAS in Decembre 2018 and The Second Audit in Decembre 2019,
· Complete automation of the testing process of all collected blood units (ABO, Rh + K, Screening, TTI);
· Introduction the centralization process of testing (ABO, Rh + K, Screening, TTI), processing of all blood units collected on the territory of Montenegro and distribution the final product of the same quality into all organizational parts (9) of the Institute of Montenegro under monitored temperature conditions – July 2019;
· Archiving of samples of blood donors – November 2019
· Electronic record for blood donor implemented
· Forming the Registry of typed blood donors
· Cooperation with the Institute of Public Health of Montenegro on the submission of reports from the Center for Disease Control and Epidemiology on the epidemic situation in the region and wider in close cooperation with ECDC, which are regularly submitted to doctors in charge of blood donors in all organizational parts of the Institute
· Establishing cooperation with reference institutions in Croatia, Serbia and Bristol Reference Laboratory (RhD Bavarian Ag, suspected chimerism and Yt-Cartwright Ab)
· HLA Typing Laboratory has been established

Activities has not been done at all:
· Implementation of apheresis procedures
· Work of Laboratory for Quality Control
· Implementation of the National haemovigilance system

Plans:
· Implementation of apheresis procedures
· Implementation of Laboratory for Quality Control work at all
· Implementation of the National haemovigilance system
· Implementation of telemedicine process in Transfusion Service

Difficulties do we still face:
· Lack of educated staff
· Insufficient financial resources for the functioning of the Institution.
These are major problems, but we hope to overcome them soon.

Conclusion

As it was mentioned before that Montenegro was the only Republic of the former Yugoslavia that did not have a Blood Transfusion Institute, the development path of the transfusion service in Montenegro was different from that in other republics. In the first eight years, the creation of a nationally coordinated transfusion service started with the implementation of all current standards and recommendations.

By provision of basic condition as an adequate space, equipment that enables standardization and safety of

blood, quality control assurance system, information system and planned and continuing education of professional staff, we are fulfilling the conditions for the implementation of the European blood transfusion system in Montenegro. This gives us the opportunity to meet the current and future demands of the health system in our country. Today, we can proudly say that the Institute, as a healthcare institution representing transfusion activity in Montenegro, is a competent representative of transfusion medicine in International, World and European professional associations, ready for international cooperation and exchange.

Abreviation:
· MN - Montenegro
· MoH – Ministry of Health
· EUD MN – Delegation of European Union in Montenegro
· CC – Clinical center
· OP – Organizational part

BLOOD BANKING IN MACEDONIA-ADVANTAGES AND DISADVANTAGES OF ACTUAL BLOOD BANKING

Emilija VELKOVA
Institute of Transfusion Medicine of Macedonia

R. Macedonia is a small country, but with good organized blood donation process that celebrated 72 years of their creation and existence. The blood donation is based on the principles of anonymity, voluntarily and non-reimbursement.

While national healthcare system is in a process of transition almost 20 years, facing with many challenges, starting with privatization of primary healthcare, decentralization and creation of private hospitals, transfusion medicine services succeeded to keep a track in development and quality of their services.

In the last 10 years, the self-sufficiency of blood is provided with 99% of voluntary non-remunerated blood donations. There is national program for organization and realization of blood donations under the Ministry of Health, for which are responsible NITM and Red Cross Society. Blood donations at private hospitals are prohibited.

But, how we reached this level? How was the route of development during the years?

First "direct" transfusions are introduced in the year 1935 from universal "O" type blood donor with "Tzankov" syringe, directly to the patient vain, small portion of 20 ml blood. The brave doctors Panche Karagjozov and Jovan Panovski were the first doctors-surgeons that used direct transfusions to treat patients. The first blood transfusion services in R. Macedonia is established at 1st of July, 1946.

Since then, in the period of 73 years, many changes are in place. The development of blood transfusion in R. Macedonia can be divided in two periods: before the year 2007 and after 2007. In the first period, main characteristics were: decentralized services - hospital blood banks within each general hospital, blood donation TTI testing organized at local level and according the needs of each hospital. Lack of unique national blood donor data base, which resulted donors to give blood more than once in a period of 3 months (men) or 4 months (women). Low level of awareness about transfusion transmissive infections among blood donors, resulted with repeating donations from infected donors at other blood donor sessions at different hospital blood banks, as a "first time" donors due to lack of blood donor traceability.

The decentralized system with many hospital blood banks is expensive to maintain, there were different staff structures and function, mostly old equipment, different tests and techniques in blood donor's testing, only local evidence of blood donor's history and traceability of donors and transfused units, which as a whole resulted with uncertainty in blood safety. The authorities at the Ministry of health recognized that organization of blood transfusion services as incompatible with blood safety standards and European Directives. At the year 2007, Blood safety law was introduced, but its implementation started at 2011, when all hospital blood banks were integrated in one National Institute of Transfusion Medicine (NITM). Both changes were supported with two big projects and financial support from R. France (blood safety legislation) and EU IPA project (training, procurement of equipment, creation of national standard operating procedures).

Since 2011, NITM has in its stucture:

One Institute of Transfusion Medicine in Skopje- ITM-Skopje, which leads in training and education (undergraduate and post-graduate studies, as a part of University), research and creation of national standards in transfusion medicine. Within the ITM-Skopje there are referent laboratories for immunohematology testing, hemostasis, HLA and molecular biology, harvestration of peripheral stem cells, National hemophilia center and out-patient services for patients. ITM-Skopje has departments that are dealing with blood motivation at national level, blood collection (on-site and mobile teams), blood testing and production of blood components, issuing and distribution.

Three Regional Transfusion Centers (RTCs) in Tetovo, Bitola and Shtip- they have responsibilities for: blood collection (on-site and mobile teams), blood testing and production of blood components, issuing and distribution in their region according the needs of local hospitals.

Blood Transfusion Services (BTSs) are acting as local hospital based organizations, 21 in total, are responsible for cross-matching, hospital support and consultations in transfusion medicine, as well as out-patient transfusion services.

The integration resulted with:
- Implementation of the quality standards (ISO 9001:2015)
- Unification of the working process at national level
- Creation of national blood donor data base (Haemasoft -eDelphyn)
- Implementation of telemedicine
- National guidelines for transfusion medicine and equal treatment and services for all patients that need blood or specialist out-patient treatment in the area of transfusion medicine

Disadvantages are mainly present from employees perspective and internal organization: time needed to have back-up information and action from higher hierarchical structures, knowing that general managers are in Skopje, the procurement services, human resource services, technical support and maintenance are also in Skopje. With more than 350 employees and 21 services through the country, NITM is a complex organization for management.

BLOOD BANKING IN SERBIA - PAST & PRESENT

Snežana Jovanović Srzentić
Blood Transfusion Institute of Serbia

Blood transfusion service in Serbia is nationally coordinated, government based, non profit and non commercial organization. There are no independent, private or any other types of blood transfusion establishments in the country.

Beginnings

The first blood transfusion in Serbia is applied by Dr Nikola Krstic, a surgeon in the Serbian army on the Salonika front. Blood donor was Budimir Gajic, the Serbian soldier in the World War I. First Department of blood transfusion in Serbia officially started operating on September 1, 1936, in Central Hygienic Institute of Medical faculty in Belgrade and was led by Dr. Dimitrije Kalic. It registered one hundred blood donors soon. One year after the formation of the Department of Blood Transfusion started the training of personnel.

On October 24, 1944, immediately after the liberation of Belgrade, at the end of the World War II, the Institute for Blood Transfusion was established, at first as military institution. In 1945, this institution took part in the formation of Departments for blood transfusion in several towns in Serbia, and later on in Osijek, Zagreb and Ljubljana. Blood Transfusion Institute of at first federal military institution, became the civilian, and from March 15, 1946, republic institution under the jurisdiction of the Ministry of Health of Federal People Republic of Yugoslavia.

Since 1953, Blood Transfusion Institute of Serbia has been developing cooperation with the organization of the Yugoslav Red Cross in the field of motivating and organizing citizens to donate blood voluntarily, without financial compensation. With the introduction of mobile teams, the blood transfusion service began taking blood in the field. The first mobile team completed their task on April 26, 1953 in the village of Lesnica, near Loznica.

With the mutual help of the Government of the Federal People Republic of Yugoslavia and UNICEF, in 1953 in Blood Transfusion Institute of Serbia was opened the first center for making a dry stable plasma and blood products. The work on the serological and immunohaematological testing of blood for transfusion was extended, as well as the preparation of test sera of all kinds.

In 1948, in Blood Transfusion Institute of Serbia, Dr. Budimir Dinic prepared an anti-D test serum and began immunohaematological testing for sensitization in pregnancy. In 1954, the production of its own antihuman glogulin reagent began with the immunization of laboratory animals.

In 1957, a blood coagulation laboratory was established.

A specialization in transfusiology was introduced at the Faculty of Medicine in Belgrade in 1960 and later on at the Faculty of Medicine in Novi Sad.

The reference laboratory for immunohaematological testing was founded in 1984 in Blood Transfusion Institute of Serbia.

The Section for Transfusiology of the Serbian Medical Society began its independent work in 1996 (1).

Near past

In Republic of Serbia, blood donor recruitment is one of the main activities of Blood Transfusion Service of Serbia and Red Cross of Serbia. Strategic partnership between Blood Transfusion Institute of Serbia and Red Cross of Serbia began in 1953 and was later defined by the Law of Red Cross of Serbia (2), the Law of transfusion medicine activity (3) the Law of public health care (4), the Law of health insurance (5), the Law of personal data protection (6). All activities between Red Cross of Serbia and blood transfusion institutes are defined by the Protocol of mutual cooperation and the Contract between Red Cross of Serbia and Ministry of Health (MoH). Since the adoption of the Law of transfusion medicine activity in 2009 (3), there were three major blood transfusion institutes (Blood Transfusion Institute of Vojvodina, Blood Transfusion Institute of Serbia and Blood Transfusion Institute of Niš),

organized on a regional basis (north, central and south regions), responsible for collection, testing, processing and distribution of blood and 43 hospital based blood transfusion establishments in most cases responsible for collection, testing and distribution of blood and performing transfusion therapy to hospitalized patients. All of the three blood transfusion institutes are under indirect financing through the Republic of Serbia Health Insurance Fund, but the hospital based transfusion services have direct financing by the Republic of Serbia Health Insurance Fund. Institute for transfusiology and hemobiology of Medical Military Academy exists within the Ministry of defence and is independent from civil blood transfusion service, but with mutual cooperation.

Reorganization of the blood transfusion service in Serbia took place within the Project entitled "Support of the European Union to the National Blood Transfusion Service in Serbia", supported by the European Agency for Reconstruction (European Union) and the Ministry of Health of Serbia (Government of the Republic of Serbia) from 2003 until 2005. The main tasks of the project were to improve and to strengthen the capacity of the national blood transfusion service; to ensure the efficient and timely supply of sufficient quantities of safe blood and blood products to all health care establishments in Serbia; to ensure the rational use of blood and blood products; to find the most optimal solution for reorganization of blood transfusion service; to produce a national blood transfusion strategy. However, reorganization of the blood transfusion service in Serbia was a time consuming process which so far has not been finished.

One of the major tasks to be effectuated as soon as possible was to establish unique national information system database. There are no exact data on the total number of blood donors on the annual basis in Serbia. In 2013 there were approximately 142 752 blood donors.

Relation and collaboration between the blood transfusion service of Serbia and other health care delivery institutions were nationally coordinated and government based (7).

National Plasma Fractionation Center located in the Blood Transfusion Institute of Serbia, annually manufactured 4-5 thousand children`s doses of albumin a 10 ml, 20 thousand adult doses of albumin a 50 ml, 4000 doses of anti- tetanus serum and 900 000 to one million I.U. of-anti rabies serum.

The Blood transfusion service in Serbia followed the recommendation from World Health Organization (WHO) and all donations were screened for HIV, hepatitis B virus (HBV), HCV and syphilis (8) by serological testing adopted in all blood transfusion centres in Serbia, dealing with testing of blood donors.

Several national registers were founded in Blood Transfusion Institute of Serbia: Haemophilia Center of Serbia with the National Register of Haemophiliacs has registered patients with inherited coagulation disorders; HLA Tissue Typing Department (accredited in 2013. by European Federation of Immunogenetics),with the Serbian Bone Marrow Donor Register, which became the part of the World Bone Marrow Donor Register;. Rare blood group donor list, as the base for typed donors with rare red cell phenotypes (for Rh, Kell, Duffy, Kidd, MNS, Lewis and P system), financed by the MoH of Serbia; Basis for the voluntary apheresis platelet donors register, with the 70 typed donors for platelet antigens.

HLA Tissue Typing Departmentin Blood Transfusion Institute of Vojvodina in Novi Sad is also accredited by European Federation of Immunogenetics.

Department of three years postgraduate transfusion medicine specialization for medical doctors exists at the University Medical School of Belgrade. University Medical School in Novi Sad has elective course of transfusion medicine within undergraduate education.

Two terms post graduate teaching and training for laboratory technologists and technicians are organized in Blood Transfusion Institute of Serbia and Medical high school in Belgrade.

Present

Number of inhabitants in Serbia is 7 186 862 (2). Distribution according to gender is 3 499 176 (48,7%) of male and 3 687 686 (51,3 %) of female inhabitants (9).

The overall number of blood donations nowadays in Serbia is around 240000 units and the daily issues are around 1000 units.

The first law in Serbia dealing with transfusion medicine was Law of transfusion medicine activity- „Official Gazette of RS", No. 72/09 (3) with Rule books in accordance with that law, which was made in order to improve regulations in the area of transfusion medicine, i.e. respectively area of blood preparation and blood component preparations as well as clinical transfusion. The main purpose was to improve these fields and raise it to the highest standards for supplying right amounts of safe blood for patients in Serbia. These standards were adjusted to European standards. There was a need to improve working conditions in health institutions with the main goal to perform further work according to current achievements in this field.

After several years of its application, the need for better organization of transfusion medicine activity was recognized. Need for different and more precise definition of professional medical terms was noted in order to harmonize domestic regulations with the regulations of European Union in the way that European Union recommends.

The Law of transfusion medicine activity (3) included regulation only about one part of transfusion medicine – preparation of blood and blood components, but did not include further regulations: the field of clinical transfusion that considers blood storage and distribution and blood components for therapeutic purposes, pretransfusion examination, care for optimal use of blood and blood components, autologous transfusion, therapeutic apheresis procedures, hemostasis, perinatal examination, examining effects of blood component therapies (10).

According to WHO recommendations, the number of complications and unwanted events and reactions as a consequence of blood transfusion should be decreased. So far in the practice, transfusion medicine specialist was only in charge to deliver blood orders by other specialist. In that way, adequate use of blood and blood compounds is going to be rationalized. By the new law (10), hospital blood banks are obligated to report their yearly needs of blood and blood compounds until the October 15 of the current year. Blood Transfusion Institute of Serbia is obligated to give a yearly plan of blood needs until November 15 of the current year. Until the December 15 of the current year, institutes should make yearly plan of blood collection actions. Donated blood would be tested for HIV, hepatitis B, hepatitis C and syphilis in concordance with the new law. The law (10) will contribute better rationalization of blood collection, improvement of mobile teams work and production of sufficient blood components in accordance with new requests of clinical and transfusion medicine doctrine.

With the application of the new law (10), blood safety and quality would be raised to the higher level because the law regulates that each blood unite and blood compound should be tested with nucleic acid test (NAT). Implementation of NAT enables fast detection of viruses which allows safer use of blood and blood components. Blood Transfusion Institute of Serbia began with NAT testing at the beginning of August, 2019, for all blood units taken from blood donors in Serbia. This institution is in charge to establish unique Register of all blood donors at latest two years after the start of the law application.

Administration should establish Register of serious unwanted events within the period of two years after implementation of this Law (10).

Until the completing the organization of inspection within Directorate for biomedicine, in accordance with this law, action of inspection surveillance is given to health inspection that has been formed according to the Law of publich health care (4).

The implementation of Law for transfusion medicine (10) started on January 1, 2018 according to instructions given by Directorate for Biomedicine and is applied since January 1, 2019, but is still under adoption.

The law defines two levels of transfusion institutions. First one are authorized transfusion institutions which collect, test, process and distribute blood and components. These are Blood Transfusion Institutes in Novi Sad, Nis, Kragujevac and Belgrade. Second level are general hospitals that are going to become blood banks for patients treatment. Authorized transfusion units collect blood in their centers, as usually in organized actions for blood donation and in cooperation with Red Cross of RS. Services in general hospitals that were in charge for blood collection became blood banks.

All predicted actions are fulfilled by all institutes with the exception of Blood Transfusion Institute of Kragujevac (in development) because of the lack of technical and staff potential. Blood services that were supposed to be taken over by Transfusion Institute of Kragujevac are taken by Blood transfusion Institute of Serbia, Belgrade. Organized blood donations are performed through the actions which are planned and organized in advance. The

citizens are timely informed about the date and places for blood donation. Blood donating is possible only in organized actions in cooperation with Red Cross. Hence, the blood donators will not come anymore to the hospitals to donate, but they will be able to participate in these organized actions.

It is expected that new system will provide the unique way for blood processing in authorized institutions all over the country. At the same time, better management of blood supplies would be possible. Additionally, health institutions would be better supplied with necessary blood blood components. It is mandatory that all authorized institutions have all necessary equipment, human and other needed resources.

Activity of blood bank in hospital includes further monitoring: use of of blood and blood products for patients treatment, management of blood supplies, special analyses for patients and pregnant women, hemostatic analyzes, anticoagulant treatment control, control of anti-aggregation therapy and autologus transfusion, just like intraoperative blood salvage. The law defined higher safety and quality, including testing, preparation of components, storage and distribution of blood units.

Information system has the key role for implementation and application of the Law of transfusion medicine. Relaying on it, it is possible to follow every single blood unit, monitor connection between authorized services and blood banks. Centralysed information system within the Blood Transfusion Services in Serbia is under adoption (11).

Conclusion

Regarding the implementation of the current Law (10), following goals should be highlighted:
Blood collection in Serbia should be done on clinical and institutional requests. The collection is supposed to be planned, according to the statistical data from previous year calculation based on blood and blood components need. Red Cross should continue supporting Blood Transfusion Service in promoting and motivating blood donors. Blood donation and its principles should be identical with existing ones: voluntary, non-remunerated, anonumous and solidary. Blood donors and care for their health should remain priority. Medical records should be kept confidential. Number of mobile teams for blood collection should be rationally defined. Equipment of mobile teams should be in accordance with modern ways for blood collection and with adequate equipment for blood storage and delivery. Cooperation between authorized transfusion services, blood banks, clinics and institutes is not satisfactory. Therefore,there is a need for Rule books to improve cooperation and efficiency of patients treatment. All human resources and potentials need to be saved in transfusion institutes and blood banks. Transfusion medicine as medical specialisation should keep its important role for further competence and medical practice. Transfusion medicine specialisation should be kept on the highest level with the achieved possibility for fellowships in haematology, transplantation and transfusion medicine science and clinical transfusion medicine. Blood transfusion service in Serbia should have major and leading role and great national significance. Actual Law for blood transfusion medicine enables these goals to be achieved (11).

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BLOOD BANKING SYSTEM IN BOSNIA & HERZEGOVINA, PAST & PRESENT

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Bosnia and Herzegovina has experienced important changes in the past thirty years. New social, political and economic challenges appeared with the fall of the former regime and the dissolution of Yugoslavia. The move from centralised to market based economies affected the health system in its entirety, leaving populations increasingly exposed to health threats (1).

Bosnia and Herzegovina is a relatively small economy with a population of approximately 3.5 million, living on a territory of around 51 000 square kilometres. This corresponds to about 0.7% of the EU-28 inhabitants, while the country's gross domestic product (GDP) at current prices of about EUR 17 billion represents only 0.1% of the EU-28 GDP. In the area of research and development, public spending is very low, accounting to only 0.3% of GDP, according to officially provided data, which is far from the 3% EU target for 2020.(2) According to the Agency for Statistics of Bosnia and Herzegovina, the average net salary in February 2018, has increased compared to February last year, and amounts to BAM 849 (around EUR 430).

Before the breakup of the former Yugoslavia, the health system was "centralized" at the level of the Republic of Bosnia and Herzegovina. In 1958, the first Blood Transfusion Service at Sarajevo Clinical Hospital was established. In 1963 first specialist physician became licensed in the transfusiology field in Bosnia and Herzegovina. The first official Rulebook, the "Rulebook on Minimum Requirements for Blood Transfusion Facilities» was adopted by the Federal Transfusion Commission in 1964. In 1965. Institute became the Institute of Transfusion and Hematology, with growing infrastructure. Over time, thanks to the extraordinary results achieved by dr Sreten Boskovic and his team, the Institute became one of the leading institution of this type in the former Yugoslavia. The Republic Institute for Blood Transfusion has also established 15 hospital blood transfusion stations in the Republic of Bosnia and Herzegovina (3).

In the 1970s and 1980s the Institute has seen significant progress and the special effort was made on preparing the first Bone Marrow transplantation. This steady development was brought to halt by catastrophic war (1992 – 1995), that have decimated personnel, destroyed infrastructure and demanded heroic efforts from transfusion services. Between 1992 and 1994, about 80,000 blood units were collected in Institute and tested under impossible conditions, as reviewed and presented by dr Midhat Haracic at the NATO-Civil Military Blood Conference Washington D.C.November 2000 (4).

The Dayton Peace Agreement 1995, have established Bosnia and Herzegovina as a country with particular administrative and political structure. Bosnia and Herzegovina consists of three entities, ethnically different and almost autonomously administered, as follows: Federation of Bosnia and Herzegovina – 10 cantons, each with its own legislative and executive institutions; Republic of Srpska; District of Brcko – an independently administered area of 493 km2, population 85 000, with only one hospital- based blood service.(5). According to most recent data Bosnia and Herzegovina has total population of 3,531,159, significantly lower comparing to 1991(4,377,033), with following distribution: Federation of Bosnia and Herzegovina 2, 219,220, Republic of Srpska 1,228,43 and District of Brcko 83,516 (6)(7).

The Blood donation system in Bosnia and Herzegovina is voluntary based in 100%, with strong component of regular voluntary donation, self-sufficient in one manner. Within the country there is partly a decentralized/fragmented blood transfusion system and the blood donation is mainly hospital based with a small part performed by Red Cross or in association with hospital blood banks.During 2019 cca 90,000 blood units were collected. Based on samples of 100 regular donors, the blood donation rate is around 3,0 donations, what is around 1% increase from 2004. Thus, blood supply is partly based on replacement/family donation (around 70–75%) and cannot meet World

Health Organization (WHO) recommendations. Indeed, WHO recommended regularly that blood supply should be entirely based on voluntary non-remunerated donations(VNRD) because this type of donation is the most sustainable and safest for both donors and patients (8)

According to WHO, the development of national blood policies in one country is considered one of main achievements. Complex and inefficient administrative organization interfere in with creation and implementation of national blood policy. Following are main outlines of transfusion services in three entities:

Entity of Republic Srpska Unlike the organizational structure in the Federation of Bosnia and Herzegovina, the blood system in Republika of Srpska is centralized with key authority held by the Ministry of Health.

Institute of Transfusion Medicine of Republika Srpska is a reference and an independent institution that performs data collection, processing and distribution of blood and blood products based in Banja Luka, formed in 2009.

Centers and hospital transfusion services are based in Banja Luka, Doboj, Bijeljina and Trebinje, Gradiska, Zvornik, Foca, Kasindo, Nevesinje. During 2019 cca 37,000 blod units were collected, comparing to cca 24,000 blood units in 2004.

Legal and regulatory framework:
- The Law on Transfusion Medicine (RS Official Gazette, No: 01/08)
- Blood Safety Strategy in the Republic of Srpska until 2015 (RS Official Gazette, No: 82/08)
- Program for voluntary blood donation in the Republic of Srpska (2010-2015)
- The Laws on transfusion activities ("Official Gazette of RS, No. 44/15").

Reforming of Blood Service started in 2012 and still is in progress (9).

There are 37 board certified specialists in transfusion medicine.

District of Brcko

The Blood service consists of one hospital transfusion department performing complete blood chain activities. 2697 units of whole blood were collected during 2004 (77% at fixed collection), compared to 2400 units in 2019.

Legal and regulatory framework:
-The Law on Health Care of the Brčko District BiH (2008);

There is no rule on transfusion activities and only one board certified specialist in transfusion medicine is engaged.

Federation of Bosnia and Herzegovina

Following the administrative structure of the Federation of Bosnia and Herzegovina, the health care system is decentralized, where the cantons have a significant degree of autonomy in making decisions related to the health care in their territory, while the Federation level has a role of making strategic guidance and a coordination role. The political and economic environment in the Federation is very unfavorable for the process of centralizing of transfusion services and moving to the modern blood banking.Federal government with ten cantonal ministers of health and one federal, has no strength to deliver a national policy.

There is only one independent Institution, Blood Transfusion Institute of Federation of Bosnia and Herzegovina, situated in Sarajevo, being the largest and best equipped transfusion institution. Transfusion centers are based in Tuzla, Mostar-East, Mostar –West and Zenica.

Hospital transfusion departments are based in Bihac, Livno, Gracanica, Tesanj, Orasje, Travnik, Konjic, Gorazde and General Hospital Sarajevo.

Legal and regulatory framework:
-The Law on Blood and Blood Components - 2010. regulates the organization transfusion service, conditions and

standards of quality, security and surveillance in the collection, testing, processing, storage, distribution, issuance and use of human blood and blood components in the Federation.
-Regulation on Quality Assurance and Safety of blood and blood components
-Regulations on specific technical requirements for blood and blood components
-Regulation of the system of monitoring of blood and blood ingredients and serious adverse events and serious adverse reactions

17th edition of Guide to the Preparation, Use and Quality Assurance of Blood components was translated in Bosnian language by the Institute's physicians in 2013.

42 655 units of whole blood were collected during 2004 (69.62% at fixed collection sites), comparing to cca 55,000 blood units in 2019 (10).

There are 34 board certified specialists in transfusion medicine (11).

Summary

Blood collection in Bosnia and Herzegovina is generally made as standard, obtaining whole blood. The institutes and some centres perform aphaeresis procedures for platelets in limited numbers.

Whole blood is further processed into blood components in percentages varying from one center to another; with substantial differences both inter-institutionally and inter- entity. Both entities have governmental requirements regarding mandatory tests for blood borne pathogens and blood grouping, to be performed on all collected blood in compliance with minimal requirements stated in the EU Directive. Additional tests have been kept in use by institutes and some centers. The centers participate in external controls of serology testing carried out by the institute of Federation of Bosnia and Herzegovina .Many centers have purchased automated equipment and subsequently undertaken the computerization of their activities (1).

Plasma fractionation with a full range of products (including coagulation factors concentrates, anti-thrombin and i.v. immunoglobulin) is not available in the country.

There is a lack of national centralized information technology (IT) and weak collaboration between the institutions, the cantons and entities.Traceability of blood components is partially ensured at institutional level, based mostly on local IT system.

According to European Council Directive No. 2002/98/EC the establishment of competent regulatory body which regularly control quality system and issues licenses for transfusion services is required. Quality management system in the country is fragmented, with most of the years delayed further progress.There are examples of functioning quality systems at institutional level in selected cases, namely in some large institutions (institutes).Institutes are certified to ISO 9000: 2015.

There is no haemovigilance as a system.The activities differ depending on type of facility and source of financial support. Hospital transfusion committees (HTCs) exist in a few hospitals only, working with difficulties.

Blood Transfusion Institute of Federation of Bosnia and Herzegovina is the only institution in Bosnia and Herzegovina that performs nucleic acid test- NAT testing for HBV, HCV and HIV of all donations, but only in Canton Sarajevo donations. The Institute is also introducing the molecular HPA (human platelet antigens) testing. Red blood cell antigen genotyping is performing in both Institutes.

Stem cell Transplantation program is organised at entity level with very limited cooperation between them. The country does not have the necessary administrative capacities, including human and material resources, to fulfil the requirements laid down in the EU Rules on human organ, tissue and cell transplantation (2).

The country recognizes a specialization in transfusion medicine. Four years training is finalized by a board examination resulting in a dedicated diploma.Training of nurses and laboratory technicians is present at different levels of specialization.There is no systematic approach to education, nor is this important pillar of the transfusion activities recognized. from the authorities. The same situation is regarding to the purchase of equipment. Transfusion facilities also are faced the difficulties in the application and receiving governmental and non-governmental projects.

Conclusion

It is essential to understand that there is no national mandate for health care financing and provision.Consenquently, there is no blood banking strategy on the national level, as well as no Ministry of Helth on the country level. In fact, Bosnia and Herzegovina is a case study of premature decentralization.First, inter-entity coordination in matters of the health system have been poor because of the lack of formal legislated mechanisms. Second, within the Federation of Bosnia and Herzegovina, the cantons do not officially collaborate with each other.the geographical distribution of hospitals in the entities and cantons has not been optimal for equitable access to health services (12).

Blood services in the country are fragmented and often hospital based. Blood establishments as producers of components are usually combined with blood bank services within one hospital department. This results in substantial differences in levels of development within country and a lack of coordination of activities with an inevitable impact on the adequacy and sustainability of the blood supply.

Financial support of the service comes from different sources and generally is not adequate. This results in inadequate infrastructure (facilities, equipment) of the service and difficulties in performing regular activities (shortages in consumables, staff etc.). Quality and safety of the whole process require increased attention throughout the country, with vast differences reported at cantonal and inter-institutional level.

Considering the current situation and working conditions, it can be said that the present system of transfusion services in Bosnia and Herzegovina is inadequate, unreasonable and unprofitable. It is necessary to access the reorganization of transfusion service, to centralise it in the whoole country, modernize it, to harmonise it throughout the country and to the WHO and EU directives (13).

The government, ministries of health, executive bodies, professional associations and all persons in the blood transfusion chain have their own responsibility to change this unfavourable situation (14).
Facing all described obstacles, and despite numerous significant differences in their organization, the management of majority of blood services in the country is moving in the same direction to ensure safety of their blood supply.

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INTEGRATION OF TRANSFUSION SYSTEM TO EU REGULATIONS ; CHALLENGES AND BENEFITS

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INTEGRATION OF PORTUGUESE TRANSFUSION SYSTEM TO EU REGULATIONS

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In the European Union (EU), millions of blood donations are collected every year by 1,400 blood establishments, enabling the transfusion of millions of blood components. Plasma is also used for the manufacture of plasma derived medicinal products (PDMP). Tissues and cells are handled by over 4,000 tissue establishments and can also be the starting materials for the manufacture of medicinal products and medical devices. Several of these substances are exchanged between Member States.

Blood, tissues and cells (BTC) all come from the same source - donations from human beings - either during life or after death. They are processed, tested and stored in blood and tissue establishments before being supplied to hospitals and clinics. In most cases, no alternative treatments exist to save or enhance human lives. However, these substances can also cause adverse reactions in patients, including the transmission of disease. To ensure high levels of public health protection for all stages of the process, the Blood Directive (2002/98/EC) and the Tissues and Cells Directive (2004/23/EC) were adopted in 2002 and 2004, respectively, laying down common (minimum) quality and safety standards at Union level and aiming to facilitate increased exchange of these substances between Member States.

A brief description of EU legal acts: EU treaties, Regulations, Directives, Decisions, Recommendations and Opinions. A "directive" is a legislative act that sets out a goal that all EU countries must achieve. However, it is up to the individual countries to devise their own laws on how to reach these goals. Once adopted at EU level, it is then transposed by EU countries so it becomes law in their countries.

A brief history of the EU Blood Directives.

DIRECTIVE 2002/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 setting standards of quality and safety for the collection, testing, processing, storage and distribution of human blood and blood component.

DIRECTIVE 2004/33/EC implementing Directive 2002/98/EC as regards certain technical requirements for blood and blood components

COMMISSION DIRECTIVE 2005/61/EC implementing Directive 2002/98/EC as regards traceability requirements and notification of serious adverse reactions and events

COMMISSION DIRECTIVE 2005/62/EC implementing Directive 2002/98/EC as regards Community standards and specifications relating to a quality system for blood establishments

COMMISSION DIRECTIVE (EU) 2016/1214 amending Directive 2005/62/EC as regards quality system standards and specifications for blood establishments - Good Practice Guidelines.

The experience of the transposition of the Blood Directives into the Portuguese regulation and implementation of its requirements in Blood Establishments is explained, regarding the following topics: Traceability (art. 14), Notification of serious adverse events and reactions (art. 15), donors and donations (art. 16-20 Provision of information to prospective donors, Information required from donors, Eligibility and Examination of donors, Voluntary and unpaid blood donation), Testing of donations (art. 21), Storage, transport and distribution conditions (art. 22), quality assurance, as well as the Portuguese Hemovigilance System. Recently, the integration of the GPG, Good Practice Guidelines is the new challenge.

INTEGRATION OF SPANISH TRANSFUSION SYSTEM TO EU REGULATIONS

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Spanish of Blood Transfusion

In the mid-nineties the state members of the EU accorded to transfer their sovereignty in the field of blood transfusion to the EU. The idea was to set standards for blood components foreseeing their free circulation within the EU. By the Treaty of Amsterdam 1997 art. 152 (entering into force in 1999) the EU Authorities received the mandate to regulate the quality of blood intended for transfusion or for source plasma in Europe. In clinical grounds, the EU can regulate the traceability and the haemovigilance processes (both conceived as controls of the safety of the blood transfused) but not the clinical use or the transfusion methods whose control, if any, still falls under each member state authorities. Another critical decision was the consideration of blood and blood components as *biological products*, not *pharmaceutical products*, and matter of a specific legislation. In summary, following its own nomenclature, the EU was competent for the regulation of *Blood Establishments* (blood collection, processing, testing, labelling, storage, distribution) but not for the regulation of *Hospital Blood Banks* (clinical transfusion) except traceability and haemovigilance.

Once the Treaty of Amsterdam approved, it took three years and a long political process before the main Transfusion Directive could be issued in 2003 (into force in 2005) and two more years for the additional Directives developing the "mother directive". In 2016 another transfusion-related Directive introduced mandatory *Good Practice* measures related to further regulate the blood processing and its quality system, making easier the mixture of homologate source plasma from different blood establishments. As explained above, the purpose of the EU legislative measures is to set measures in order to ensure the blood safety and to protect the general population from receiving unsafe blood by means of stringent rules, which on the other hand have to be accorded by members from different background and different countries, and finally approved by politicians, not to speak of the interested parties lobbying. The result is a common set of rules facilitating consistency of blood and blood products all around the member states. The long time elapsed between 1997 and 2005 was an opportunity for EU member states (and also for member candidates) to introduce changes in their own transfusion system in face of what was being seen for the immediate future. For example, by 2002 almost every member state had already organised a haemovigilance system. It is worth to point out that not only member governments were on the track but also transfusion professionals. Transfusion scientific societies were deeply involved. How were these EU moves affecting the Spanish blood transfusion system and how was the outcome? Let's see first the previous situation of blood transfusion in Spain.

During the sixties and seventies, a robust network of public general hospitals was built up in Spain, providing an almost universal hospital care managed by the National Health Service. Each general hospital was equipped with a Blood Bank in charge of blood collection, processing, testing and transfusing blood for their patients. These blood banks were organised as part of the Haematology Unit in the hospital providing a strong clinical input, and a good setting for the education in Transfusion Medicine issues for Haematology Residents. For the promotion of voluntary blood donors, a *Donor Fraternity* (Hermandad) was funded and organised linked to each particular blood bank. The system worked fairly well. Technical issues were properly managed: processing and testing were good, clinical transfusion, indications and adverse effects received appropriate attention. Most blood donations were altruistic, paid donations had disappeared, and family blood donations were minoritarian and decreasing. However there were also significant gaps in the system, transfusion needs in small and private hospitals were a limited but permanent problem, recurrent blood shortages, simple quality systems, and a very short transfusion regulatory legislation. Being blood transfusion hospital-based, the blood donors network was unsatisfactory, in need of coordinated management and competition among blood banks working in the same area.

It should be pointed out that the Spanish Association of Haematology and Haemotherapy (AEHH its acronym in Spanish) had a strong influence in the Spanish blood banking shape. In 1972 a Blood Bank Accreditation Programme was launched providing the by then state-of-the-art standards and peer-review systematic audits. The working scheme followed the AABB Accreditation Program model. The Programme was widely implemented and very effective maintaining a good quality level in Blood Transfusion, and a quite homologous Transfusion Medicine performance all around Spain. At present, the accreditation programme is ISO 17065 certified.

In 1985 a blood transfusion regulatory Law was brought out in Spain. The figure of *Regional Transfusion*

Centre was created bearing the functions later described by the EU as *Blood Establishment*. By then, Spain was undergoing a strong political and administrative decentralization move into 17 Regions, and so was the National Health Service. Public health care was transferred to the regional government. Each region had to determine when and how the Regional Transfusion Centre was going to be established. In the first two years 6 regions out of 17 created their own single Regional Centre. In most instances hospital personnel was transferred to the new centre. Results were excellent, donor base managed much better, improvement of quality systems, efficient resources. This positive experience represented a stimulus for other regions to do the same and finally the whole country was (slowly, it took 15 years) organised on a territorial basis, with 20 blood establishments, all but three out of hospital based. Three remained within their hospital organogram because the region was small in population grounds and it had no sense to split the blood bank. They represent less than 5% of the total blood collected. All the donors are voluntary altruistic and family replacement is non-existent. All the regional centres have their quality system ISO 9001 certified. In every case, the launch of the regional centre was only possible coupling 1) strong political endorsement and 2) the lead of one person, one committed professional of blood transfusion.

The Blood Bank Accreditation Programme has also evolved in time. In 1990 the Spanish Society of Blood Transfusion (SETS) was created. The Accreditation Programme continued supported by both Societies, Haematology and Blood Transfusion. Following the trend in the nineties, standards were considerably enlarged with provisions related to the quality system. These features, organisational and technical carried out early in time, made easy the inclusion of the Spanish Blood Transfusion System into the new EU legislation.

As explained above, the management of the health services is carried out by the regional government, including the management of blood transfusion. The Ministry of Health at the Central Government retains blood transfusion duties related to common legislation for the whole country in accordance to the EU rules. EU Directives have been transposed to the National Legislation in due time. It is worth to note that the transposed laws in Spain include additional provisions regarding the clinical use of blood transfusion. The EU is not competent for this, but the National Government is. The National Annual Report on Haemovigilance is elaborated and sent to the EU Commission by the Ministry, and so is the Annual Report of the activity in blood transfusion. The Ministry of Health has also organised initiatives related to blood transfusion at national level, quality in blood banks, voluntary blood donation, use of clinical plasma, and Good Practice. The Ministry has been involved in the Council of Europe and in EU funded Projects such as the EuBIS, the CATIE, the DOMAINE, and the VISTART. At the Ministry's webpage it is easy to download their manuals' versions in Spanish. There is a Ministry representative at the EBA Board representing Spain.

The main issue still pending is the inspection system. Good inspection is as important as good legislation. In Spain the inspection of health services has been transferred to the regional governments and they are carried out by regional government inspectors. Most inspectors are skilled in administrative issues, health activities and quality system issues. However it is difficult to find inspectors specifically knowledgeable in Transfusion Medicine in every Spanish region, just for the inspection of one single blood establishment every two years. *System Audits* (*System*: quality system, documentation, validation, training, controls of results, etc.) are working well, *Product Audits* (*Product*: selection of donors, collection techniques, processing, testing, etc.) are frequently insufficient. This field can effectively be controlled by the Blood Banks Accreditation Programme (CAT in Spanish acronym) sponsored by the scientific societies linked to blood transfusion. Whereas CAT certification ensures blood transfusion quality it is not government controlled. CAT certification has no official recognition and is not mandatory. However, several regional governments have decide to CAT certify the Blood Establishment and the hospital blood banks in their own regions besides the biennial mandatory inspection bearing mainly an administrative nature.

In conclusion, by the time to implement the EU legislation into the Spanish Transfusion System, extensive efforts had already been carried out, so the transfusion system was already almost completely homologated. The tasks linked to what in the EU legislation is called *Blood Establishment* (promotion of voluntary blood donation, blood collection, processing, testing, labelling, storage and distribution) were reorganised on a territorial basis out of hospitals. This scheme is not necessary and of course not mandatory but makes everything much easier in terms of efficacy and efficiency for the update of new provisions related to the system quality or the product quality. In the Spanish experience, behind the territorial approach of blood establishments you could always identify in every case strong political endorsement and one transfusion professional leading the move. In addition, it is noteworthy to stress how the scientific societies (in Spain, Haematology Society and Transfusion Society) can provide education, clinical guidelines, quality control programmes, and leadership making easy to comply with new mandatory rules. One point in need to take care is the inspection process. To make available a competent body of inspectors verifying that rules are met, is almost as important as the legislative measures themselves. Good and effective inspection should be implemented from the very beginning.

EU DIRECTIVES AND REGULATIONS ON QUALITY AND SAFETY OF BLOOD: GENERAL OVERVIEW

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Early at the beginning of '90s public awareness of the hazards of blood transfusion has led European Commission to recommend the institution of a common strategy in order to promote the supply of safe blood and blood components.

Many Resolutions have been published by the European Parliament in relation to safety and self-sufficiency of Blood in the European Union, aimed at attaining the highest safety level in donor selection, in donor testing and in reinforcing the principle on voluntary non remunerated blood donation (1993, 1995, and 1996). The milestone among these is the Recommendation No R(95)15 of the Committee of Ministers to member states on the preparation, use and quality assurance of blood components: considering that the "Guide to the preparation, use and quality assurance of blood components" published by the Council of Europe has already become the generally accepted European standard, the Recommendation gives a legal basis to this guide; moreover, considering that this guide is regularly updated by the committee of experts of the Council of Europe, recommends that the governments of member states take all necessary measures and steps to ensure that the preparation, use and quality control of blood components are carried out in accordance with the guidelines set out in the Guide.
Other key documents are:

· the Council Recommendation 98/463/EC of 29 June 1998 on the suitability of blood and plasma donors and the screening of donated blood in the European Community, aimed at stressing the importance of ensuring the highest level of safety in the selection of donors and the testing of donations and the principle of voluntary unpaid donations for the objective of Community self-sufficiency;

· the Recommendation Rec(2002)11 of the Committee of Ministers to member states on the hospital's and clinician's role in the optimal use of blood and blood products promoting the setting up of appropriate structures with the purpose of ensuring the implementation of national guidelines on the clinical use of blood and blood products

· the Recommendation Rec(2004)18 of the Committee of Ministers to member states on teaching transfusion medicine to nurses aimed at implementing and evaluating continuous training programs carried out in order to improve the quality and safety of blood transfusion.

However, it was in the early 2000s that the European Union began to undertake regulatory provisions, legally binding for Member States, essentially aimed at establishing homogeneous levels of quality and safety of blood products and transfusion services throughout the European Union.

Looking at the present European regulations, the regulatory scenario of this sector is today very complex and every Member State has been committed to bringing blood transfusion activities into line with the provisions of the European Union, formalizing their transposition into national legislation.

A long history of legally binding provisions characterizes the last 20 years in the field of blood in the European Union, which paved the way to the present implementation of Good Practice Guidelines available to and used by all blood establishments, in their quality system; these good practice guidelines take fully into account, where relevant for blood establishments, the detailed principles and guidelines of good manufacturing practice, as referred to in the first subparagraph of Article 47 of Directive 2001/83/EC, where the relevant topic of prevention of infectious diseases transmissible by blood products is addressed. In doing so, Member States must take into account

the Good Practice Guidelines jointly developed by the Commission and the European Directorate for the Quality of Medicines and Healthcare of the Council of Europe and published by the Council of Europe (appendix to R 95 15).

The first Directive specifically addressing blood and blood products is the **DIRECTIVE 2002/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** of 27 January 2003 setting standards of quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components and amending Directive 2001/83/EC (so called "mother directive"). This Directive is based on the Treaty of Amsterdam (1999) which, at article 4(a), recalls the European Parliament and the Council to adopt measures setting high standards of quality and safety of organs and substances of human origin, blood and blood products. The directive establishes quality and safety standards for human blood and its components to ensure a high level of protection of human health; it applies to the collection and control of human blood and its components for any use intended, as well as to the processing, storage and distribution of the same if they are intended for transfusion.

Relevant provisions of the directive are therefore those related to the Accreditation of blood establishments, to their Quality System, to the control of adverse events and reactions ("haemovigilance"), to the quality and safety requirements for blood and blood components, to technical requirements and their constant improvement in relation to technical and scientific progress.

The first technical directive is the **COMMISSION DIRECTIVE 2004/33/EC** of 22 March 2004 implementing Directive 2002/98/EC of the European Parliament and of the Council as regards certain technical requirements for blood and blood components. In the Annex to the directive are addressed the relevant topics of

· Information to be provided to prospective donors of blood or blood components
· Information to be obtained from donors by blood establishments at every donation
· Eligibility criteria for donors of whole blood and blood components
· Deferral criteria (permanent and temporary) for donors of whole blood and blood components
· Storage, transport and distribution conditions for blood and blood components
· Quality and safety requirements for blood and blood components, as standard monographs for the products (red cell, platelets, plasma)

This important directive gives for the first time a "European" common standard for donor selection, recognizes the existing differences in standards for the protection of the donor and those for the recipient, dictates precise standards for storage, transport and distribution to the hospitals of blood components.

The second "daughter" Directive, **COMMISSION DIRECTIVE 2005/61/EC** of 30 September 2005, implements Directive 2002/98/EC of the European Parliament and of the Council as regards traceability requirements and notification of serious adverse reactions and events. Several articles are worthy of the full attention because they create a real binding network for the notification of adverse events and reactions to the transfusion and for the reciprocal communication and rapid alert among member states.

In Art. 1 definition is given of:
'traceability', as the ability to trace each individual unit of blood or blood component derived thereof from the donor to its final destination, whether this is a recipient, a manufacturer of medicinal products or disposal, and vice versa;

'facilities' means hospitals, clinics, manufacturers, and biomedical research institutions to which blood or blood components may be delivered

'imputability' means the likelihood that a serious adverse reaction in a recipient can be attributed to the blood or blood component transfused or that a serious adverse reaction in a donor can be attributed to the donation process;

In Art. 3 a provision is laid down binding the blood establishment, when it issues units of blood or blood components for transfusion, or the hospital blood bank has in place a procedure to verify that each unit issued has been transfused to the intended recipient or if not transfused to verify its subsequent disposition.

All data ensuring the full traceability must be retained for 30 years (Art. 4) and detailed instructions for the Notification of serious adverse reactions and events are given in articles 5 and 6.

Records for traceability includes:
A. **By Blood Establishments providing blood components:**
1. Blood establishment identification
2. Blood donor identification
3. Blood unit identification
4. Individual blood component identification
5. Date of collection (year/month/day)
6. Facilities to which blood units or blood components are distributed, or subsequent disposition.

B. By facilities using the blood components:
1. Blood component supplier identification
2. Issued blood component identification
3. Transfused recipient identification
4. For blood units not transfused, confirmation of subsequent disposition
5. Date of transfusion or disposition (year/month/day)
6. Lot number of the component, if relevant
ALL those provisions are extended also to blood components imported by Member States from third countries blood establishments.

Annual reports must be submitted by Member States to the European Commission and competent authorities must communicate to each other such information as is appropriate.

The third "daughter" directive, **COMMISSION DIRECTIVE 2005/62/EC** of 30 September 2005, implements Directive 2002/98/EC of the European Parliament and of the Council as regards Community standards and specifications relating to a quality system for blood establishments.

The Directive 2005/62/EC:
· gives definitions, scope and objectives for Quality system standards and specifications
· mandates the need of implementing a quality system for blood establishments which should embrace the principles of quality management, quality assurance, and continuous quality improvement, and should include personnel, premises and equipment, documentation, collection, testing and processing, storage and distribution, contract management, non-conformance and self-inspection, quality control, blood component recall, and external and internal auditing

· specify that a quality system is to be applied for any blood and blood components circulating in the Community and that Member States therefore should ensure that for blood and blood components coming from third countries there is a quality system in place for blood establishments in the stages preceding importation equivalent to the quality system provided under this Directive.

The directive also mandates the development of the "Good practice guidelines", in accordance with Article 28 of Directive 2002/98/EC, for the interpretation of the Community standards and specifications. Due to the pharmaceutical nature of blood components, mainly when used as raw material for further processing into plasma-derived medicinal products, when developing these guidelines, the Commission shall take fully into account the detailed principles and guidelines of good manufacturing practice, as referred to in Article 47 of Directive 2001/83/EC.

This is finally at the origin of the last "daughter" directive, the **COMMISSION DIRECTIVE 2016/1214** of 25 July 2016 amending Directive 2005/62/EC as regards quality; it states that in Article 2 of Directive 2005/62/EC, paragraph 2 is replaced by the following:

"2. Member States shall ensure that, in order to implement the standards and specifications set out in the Annex to this Directive, there are good practice guidelines available to and used by all blood establishments, in their quality system, good practice guidelines which take fully into account, where relevant for blood establishments, the detailed principles and guidelines of good manufacturing practice, as referred to in the first subparagraph of Article 47 of Directive 2001/83/EC. In doing so, Member States shall take into account the **Good Practice Guidelines** jointly developed by the Commission and the European Directorate for the Quality of Medicines and Healthcare of the Council of Europe and published by the Council of Europe"

The Good Practice Guidelines have been elaborated as an ad hoc co-operation between the European Directorate for the Quality of Medicines and HealthCare of the Council of Europe (EDQM/CoE), and the Commission of the European Union. They are published on the EDQM website to make them accessible to a large audience.

The document identifies the quality system elements that must be met by Blood establishments and hospital blood banks that are required to comply with EU Directive 2005/62/EC. It incorporates the "quality system standards and specifications" contained in the Annex of EU Directive 2005/62/EC, the quality system Standards and Principles derived from the Guide to the Preparation, Use and Quality Assurance of Blood Components, as well as quality system elements derived from the detailed principles of GMP (as referred to in Article 47 of EU Directive 2001/83/EC).

The aim of this complex legislation is clearly to guarantee to European citizens to have access to a blood transfusion system fully regulated in all its activities, in close ways to the Good Manufacturing Practices of the pharmaceutical field.

But the irreplaceable fundamental principle in this remains the recruitment and retention of voluntary non-remunerated donors, in order to enhance the quality, the safety and the ethical value of all products originating from blood, which are of strategic relevance for the support of the healthcare systems in the areas of medicine, surgery, emergency and high specialties, as hematology/oncology and transplant.

TURKISH NATIONAL TRANSFUSION SYSTEM AND COMPLIANCE PROCESS WITH THE EUROPEAN UNION REGULATION

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Since its establishment in 1920, the Ministry of Health (MoH) have made its policies according to the national needs and health priorities. Throughout the history of the Turkish Republic, there are important milestones in health policies and Health Transformation Program (2003) is one of these milestones. Health Transformation Program aimed at "accessible, qualified and sustainable health care for all". The World Health Organization policy of 'Health for All in the 21st Century' and the European Union's "Accession Partnership Document" were also taken into consideration to reach these goals (1).

Turkiye has been linked to the EU by an Association Agreement since 1964 and remains a key partner for the European Union[2]. The reforms carried out by Turkiye on the path of full membership to the European Union is an important part of our strategic vision. It also coincides with the ideals of modern civilization set by Ataturk for our nation. All reforms within political, legal, economic or social fields increase the standards of living of the individual and increase the power, respectability and security of our country (3).

During the accession period to EU, there are 33 chapters to be discussed on the harmonization of Turkish National Legislation with the EU acquis. Within the framework of accession negotiations, 16 chapters have been opened so far and one of them is "Chapter 28: Health and Consumer Protection". EU rules protect consumers in relation to product safety, dangerous imitations and liability for defective products. The EU also ensures high common standards for tobacco control, blood, tissues, cells and organs, patients' rights and communicable diseases.

It is possible to divide the Consumer and Health Protection Chapter into two parts: consumer protection and public health. Public health comprises of infectious diseases, blood and blood components, organ, tissue and cell transplantation, cancer, nutrition etc.

Chapter 28 has been opened to negotiation on 19th of December in 2007 and 5 closing criteria have been introduced in order to close the negotiations temporarily. One of these criteria is related to blood safety. The closing benchmark for the blood sector, in the European Union (EU) Common Position on Chapter 28 is as follows: "Turkiye adopts the legislation aiming at transposing the Commission implementing directives in the area of technical requirements for blood and blood components, traceability requirements and notification of serious adverse reactions and events and of a quality system for blood establishments. Turkiye demonstrates that it will have the adequate administrative capacity to properly implement and enforce this legislation by the time of accession." This statement is one of the priorities in National Action Plan for accession to the EU.

The Law on Blood and Blood Products No. 5624 (issued in the Official Gazette dated 02.05.2007) and the Implementing Regulation on Blood and Blood Products (issued in the Official Gazette dated 04.12.2008) have been published with the aim of solving problems in safe provision and use of blood and blood components, and facilitating harmonization with the European Union legislation with the consideration of mother directive No. 2002/98/EC which is setting standards of quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components and Sub-Directives No. 2004/33/EC as regards certain technical requirements for blood and blood components, 2005/61/EC as regards traceability requirements and notification of

serious adverse reactions and events and 2005/62/EC as regards Community standards and specifications relating to a quality system for blood establishments.

MoH's national blood policy is to ensure the sustainability of an effective, strength and safe blood supply and transfusion chain by providing all demand of blood and blood components from regular, voluntary and non-remunerated blood donors through Turkish Red Crescent.

During the pre-accession period, MoH prepared three EU projects under the IPA I and IPA II that will cover all elements in blood supply system in order to ensure implementation integrity in relevant area, where the harmonization with the EU regulation has already been completed.

Our first project "Technical Assistance for Strengthening the Blood Supply System in Turkiye" in which Turkish Red Crescent was a stakeholder too, was carried out between 2012-2014. It was aimed to strengthen the capacity of the blood supply system in terms of quality standards, quality management, human resources and technical infrastructure. The outputs obtained within the project contributed to the establishment of implementation integrity across the country. In the scope of this project;

· National Guideline on the Standards for Blood Service Units
· National Haemovigilance Guideline
· Guideline on the Quality Management System for Blood Service Units
· National Guideline on the Preparation, Use and Quality Control for Blood and Blood Components were prepared and published in 2016. The Guideline on Appropriate Clinical Use of Blood which is another output of the same project will be published in the first quarter of 2020 after updated. The National Haemovigilance Guideline is also being updated and its first revision is about to be published.

One of the most important improvement on the compliance with EU regulation is establishing the National Haemovigilance System. A software program, Blood Service Units Management System, which is able to provide the traceability of blood and blood components and to report serious adverse events and reactions, has been developed within the scope of this project. It's been opened to national use on 01.01.2020 after completed the updating of haemovigilance data sets. IT system will make it easy to evaluate the haemovigilance notices which used to be collected manually before.

Since the National Haemovigilance System is a new implementation for our country, face-to-face training meetings was held for health personnel working in the National Haemovigilance System, and 2.120 health personnels were given training in 18 provinces between December 2016 and May 2018. The sustainability of the trainings is planned to be done by distance education modules.

The Project of "Technical Assistence for Recruitment of Future Blood Donors" was the second EU Project of MoH to strength the national blood supply system. The beneficiaries of the project were MoH, Ministry of National Education (MoNE) and Turkish Red Crescent (TRC). It was developed for the establishment of an effective coordination between MoH, MoNE and TRC and for increasing the capacity of related parties to raise awareness among students and develop attitude their parents on voluntary blood donation nationwide. Within this framework, information and training meetings were held for the relevant personnel of all the three beneficiaries. The main purpose of the project is to contribute to the improvement of community health by preventing problems in supplying safest blood.

During the project, educational materials on the importance of blood donation were prepared such as teacher guide, student guides, brochures for students and adults, animation cartoons, "www.kanvercanver" project web page, 3 different levels of online computer games according to primary-secondary and high school age. In order to ensure the sustainability of awareness on regular, voluntary, non-remunerated blood donation, a curriculum study was conducted with MoNE and Blood Donation Clubs were established in 550 pilot schools which allows an interactive participation of students.

Within the "Blood Donor Education and Recruitment" and "Media and Public Relations" Campaigns in the scope of the project, billboards, brochures, posters and public spots were prepared and a significant part of the society was reached across the country.

Between 2014 and 2016, approximately 250,000 students and 16,000 adults were informed through the campaigns and seminars in 81 provinces, at 550 pilot schools. Before the beginning of each seminars, participants were asked to answer the questions of the pre-test on the topics to be covered during the training. The same questions, as a post-test, were distributed to the participants at the end of the seminar. The difference between the answers on the pre and post-tests was calculated and it is used to evaluate the acceptance of the knowledge by the participants. Analysed results from pre and post tests are showing big improvement in knowledge about blood and regular voluntary and non-remunerated blood donations. The level of knowledge of the students increased by 32.07% and the adults by 35.99%. In addition, 28.000 units of blood donations were collected from parents and teachers during the campaigns.

While the Turkish Red Crescent meets 47% of the country's blood demand in 2009, this ratio became 89.4% in 2019 through the increasing number of blood collection by TRC over the years. Our national goal is to supply all the blood needs of the country from voluntary and non-remunerated blood donors through the Turkish Red Crescent.

A safe and adequate blood supply for transfusion is an essential component of countries national health care policy. According to WHO "Country Profile" report, Turkey is assessed to be a self-sufficient country in blood supply; however, considering the changes in the socio-economic and demographic trends, as well as the needs of the new health strategy, the demand for blood and blood components for Turkey is imminent to be on rise. The number of blood usage which was 2.3 million units in 2012 has increased to 2.9 million units in 2019.

Within this context, putting in place policies related to safe and rational use of blood in Turkey is indispensable. This will reduce unnecessary use and unsafe transfusions and improve patient outcomes and safety which in turn will minimize the risk of adverse events including errors, transfusion reactions and transmission of infections, as recommended by both international and national health authorities.

For Turkiye, the patient-centred blood supply management, which includes storage, transportation, inventory management, inspection of blood establishments but mainly with patient blood management (PBM) is essential. Therefore "Improving the Blood Transfusion Management System in Turkiye" which is the third EU funded project under IPA II has been started on 20 March 2019.

The PBM offers medical and surgical strategies that aim for good practices in the field of blood transfusion. PBM involves the use of multidisciplinary strategies to minimize red blood cell transfusion with the ultimate goal of improving patient outcomes.

The planned outcomes of the project are; National Patient Blood Management Strategy and Action Plan, National Patient Blood Management Guidelines on Critical Bleeding/Massive Transfusion, Intensive Care, Medical (non-surgical), Obstetrics and Maternity, Paediatrics/Neonates, Perioperative, a PBM software, identifying the missing points in transfusion medicine curricula of higher education and resident education in terms of transfusion medicine and recommendations, trainings of clinicians on PBM, strengthening the inspection capacity of MoH with a new inspection guideline adopted from EuBIS Academy and trainings for inspectors.

Consequently, as the competent authority, MoH's blood policy is to ensure safest and efficient blood supply and blood transfusion chain nationwide. Adoptation of EU regulation and implementation of it support our blood policy. However Turkiye is a big country with around 82 million population and 18 regional blood centers, 67 blood donation centers and 1.200 transfusion centers with enormous number of staff. Achieving the integrity on the implementation across the countryside needs effort.

In this regard, MoH's is decisive to achieve its goals with the support of all relevant parties such as scientific associations, academicians and NGOs.

Virus-specific T lymphocytes

Hematopoietic stem cell and solid organ transplantations are promising treatment option for many cancer patients. In mismatched, unrelated and / or haploidentical transplantations, the use of post transplant immunesuppressive drugs increase susceptibility to viral infections.

In hematopoeitic stem cell transplantations, the mortality rate due to viral infections in the first 6 months is 3%. In cases where patients recover from the viral infection; patients with a high viral load of >10,000 copies/ mL have an overall survival 1 year after HSCT of 48% compared with 89% in patients with a low virus burden (1). Therefore, the viral load is known to severely affect long-term survival rates of the patients after hematopoietic stem cell and solid organ transplantations.

Post-transplant lymphoproliferative disease is a serious immunosuppressive-related complication of patients following solid organ or stem cell transplantation with a reported mortality incidence between 30-40% despite all kinds of antiviral therapies[2]. CMV-negative recipients receiving a CMV-positive graft in the absence of an effective preventive strategy develop CMV diseases with an incidence of up to 70%[2]. In pediatric liver transplant patients, ADV-related hepatitis and pneumonia were reported to be associated with a high mortality rate of 43% and 75%, respectively (2).

In the post-transplant period, the treatment of the viral infections with standard antiviral therapies is inadequate due to multiple side effects, drug resistance, insufficient effectiveness and high costs. In contrast, with T lymphocytes that can be produced specifically for latent viruses such as Adenovirus, Cytomegalovirus, Epstein Barr and Polyomavirus can be a better treatment option, due to its effectiveness. Moreover it causes fewer side effects and drug resistance does not occur.

Although the use of Virus-Specific T lymphocytes (VST) in our country is perceived as a new treatment option, according to guidelines, it appears as a secondary treatment, in post-transplant viral infection (3).

In clinical studies administration of T lymphocytes produced specifically for CMV, in the treatment of donor related CMV infection; have shown 57% -100% response rates[3]. It has been reported that treatment with autologous EBV specific cytotoxic T lymphocytes have proved effective enhancing EBV related lymphoproliferative disease (71% response rate); futhermore, no side effects and/or adverse events were observed (4).

A total of 50 patients with 18 Adv, 23 CMV, and 9 EBV who underwent a third-party multi-virus-specific T lymphocyte treatment, the average response time was 7 days and the maximum response time was 6 weeks[5]. When the viral titers of these patients were examined on the 42nd day, the response rate for CMV was 73.9%, EBV was 66.7% and Adv was 77.8% (5).

As a phase II clinical trial; off-the-shelf multi-virus-specific T lymphocytes were administered to 38 patients with 45 infections[6]. The remission rates were presented as 100% for BK virus infection, 94% for CMV infection, 100% for EBV infection, 71% for Adv infection, 67% for HHV-6 infection, and cumulative or partial remission rate was 92% when the entire patient population is examined[6]. In the same clinical study, clinical benefit was achieved in 31 patients treated for one infection and in seven patients treated for multiple coincident infections[6]. The viral titer started to decrease on average of 8th day and reached to a minimmum levet on average of 28th day (6).

As Acibadem Labcell, we are producing Virus Specific T lymphocyte with the patent number PT2019-01625_PY2019-00446. So far, we have conducted two clinical studies involving a total of 17 patients. In the first clinical trial off-the-shelf Multi-virus specific T lymphocyte (M-VST) were administered to total of 13 patients with CMV infection. In this study, the total response rate was 100% (11 complete remissions, 2 partial remissions). Despite its efficacy, grade 1 and grade 2 GVHD were observed in two of the patients, while no other side effects were recorded. The second clinical trial, involved 4 patients with lymphoproliferative disease due to EBV infection. M-VST treatment was administered to patients with viral load of >10,000 copies/mL after anti CD19 treatment, increase in LAP and/or tumour mass (viral burden of patients before treatment; was measured as 20.897 ± 11.124) . Total response rate was rate of 75% (2 complete remission and 1 partial remission). No adverse events and / or side effects were observed after the treatment.

The use of VST; is a feasible and safe approach to rapidly treat severe or intractable viral infections after stem cell and solid organ transplantation (3,7).

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As a result, the worldwide clinical trials and our own clinical experience,have demostrated that donor-derived cytotoxic T cells can restore antiviral immunity and treat viral infections in many patients who fail to respond to conventional therapies after hemapoeitic and solid organ transplantation. However, it should be known that treatment should not be delayed.

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CELLULAR THERAPIES

Chairpersons: **Şükrü Cin**
Tunç Akkoç

Speakers: **Cihan Taştan**
Ercüment Ovalı
Vasıf Hasırcı
Ömer Doğru

ARTIFICIAL INTELLIGENCE AND CRISPR-OF-THINGS: APPLICATIONS OF THE MOST POPULAR GENE EDITING TOOL

Cihan TAŞTAN

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From the self-driving cars to cancer screening; from the algorithm-driven monitoring program to the racial profiling, the computers that make up their own encryption, the new developments about artificial intelligence (AI) technologies show us that the world is changing rapidly and unpredictably[1]. With artificial intelligence systems, researchers can analyze DNA faster, cheaper and more accurately. Thus, they can draw a perspective on the specific genetic plan that regulates all the activities of that organism[2,3].

Behind the interest in usage of AI in genome engineering is because of the development of CRISPR-cas gene editing technology, a newly discovered tool that makes genetic modification cheaper, easier and more accurate[4,5,6]. Genetic repair technologies such as Zinc finger nucleases (ZFN), TALEN and CRISPR-Cas have been developed to repair damaged DNA regions called mutations that cause genetic diseases[7]. These nuclear-based technologies introduce double-strand breaks (DSBs) in the targeted region of the human genome. The worldwide popular CRISPR-Cas gene-editing technology provides the widest potential to solve the underlying causes of genetic diseases. For this purpose, the DNA helix is cut at a certain point, to form a double strand brake (DSB), and naturally existing cellular repair mechanisms repair the DSB. Modes of the repair mechanisms may affect the gene function. When DSB is formed, gene editing techniques can be applied to remove, insert or replace a newly modified sequence using a synthetic donor template DNA. In developed and developing countries, CRISPR-Cas studies in addition to research and development studies are rapidly increasing[8,9,10]. In addition to increasing population, changing weather conditions, declining farmland, increasing biotic and abiotic stresses are other important barriers to agricultural production, food and feed supply.

CRISPR-Cas genetic engineering technology has a deep potential to solve the secrets of basic cell biology and to model the underlying causes of hereditary diseases. Many studies are published on how CRISPR and AI can work together to solve untreatable health problems. In this congress, it is aimed to explain how bio-singularity is formed instead of AI and genetic engineering and technological singularity; It will be talked about as exciting and high added value, as it will be an eerie development[11]. In addition, although CRISPR-Cas technologies have opened the door to a golden age in the treatment of hereditary diseases with gene therapies, the latest CRISPR dolls and the development of super-animals and plants will also be described as a concern for genetic chaos.

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VIRUS-SPECIFIC T LYMPHOCYTES

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Hematopoietic stem cell and solid organ transplantations are promising treatment option for many cancer patients. In mismatched, unrelated and / or haploidentical transplantations, the use of post transplant immunesuppressive drugs increase susceptibility to viral infections.

In hematopoietic stem cell transplantations, the mortality rate due to viral infections in the first 6 months is 3%. In cases where patients recover from the viral infection; patients with a high viral load of >10,000 copies/mL have an overall survival 1 year after HSCT of 48% compared with 89% in patients with a low virus burden[1]. Therefore, the viral load is known to severely affect long-term survival rates of the patients after hematopoietic stem cell and solid organ transplantations.

Post-transplant lymphoproliferative disease is a serious immunosuppressive-related complication of patients following solid organ or stem cell transplantation with a reported mortality incidence between 30-40% despite all kinds of antiviral therapies[2]. CMV-negative recipients receiving a CMV-positive graft in the absence of an effective preventive strategy develop CMV diseases with an incidence of up to 70%[2]. In pediatric liver transplant patients, ADV-related hepatitis and pneumonia were reported to be associated with a high mortality rate of 43% and 75%, respectively[2].

In the post-transplant period, the treatment of the viral infections with standard antiviral therapies is inadequate due to multiple side effects, drug resistance, insufficient effectiveness and high costs. In contrast, with T lymphocytes that can be produced specifically for latent viruses such as Adenovirus, Cytomegalovirus, Epstein Barr and Polyomavirus can be a better treatment option, due to its effectiveness. Moreover, it causes fewer side effects and drug resistance does not occur.

Although the use of Virus-Specific T lymphocytes (VST) in our country is perceived as a new treatment option, according to guidelines, it appears as a secondary treatment, in post-transplant viral infection[3].

In clinical studies administration of T lymphocytes produced specifically for CMV, in the treatment of donor related CMV infection; have shown 57% -100% response rates[3]. It has been reported that treatment with autologous EBV specific cytotoxic T lymphocytes have proved effective enhancing EBV related lymphoproliferative disease (71% response rate); furthermore, no side effects and/or adverse events were observed [4].

A total of 50 patients with 18 Adv, 23 CMV, and 9 EBV who underwent a third-party multi-virus-specific T lymphocyte treatment, the average response time was 7 days and the maximum response time was 6 weeks[5]. When the viral titers of these patients were examined on the 42nd day, the response rate for CMV was 73.9%, EBV was 66.7% and Adv was 77.8%[5].

As a phase II clinical trial, off-the-shelf multi-virus-specific T lymphocytes were administered to 38 patients with 45 infections[6]. The remission rates were presented as 100% for BK virus infection, 94% for CMV infection, 100% for EBV infection, 71% for Adv infection, 67% for HHV-6 infection, and cumulative or partial remission rate was 92% when the entire patient population is examined[6]. In the same clinical study, clinical benefit was achieved in 31 patients treated for one infection and in seven patients treated for multiple coincident infections[6]. The viral titer started to decrease on average of 8th day and reached to a minimum level on average of 28th day[6].

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BIOMATERIALS IN CELLULAR THERAPIES

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Biomaterials and Biocompatibility

The biomaterials are materials that are used to assist or substitute disadvantaged tissues and organs for shot or long periods. These materials do not have to be of natural origin; they can be metals, ceramics, natural and synthetic polymers and also composites. The word biomaterials used to be defined as "a systemically and pharmacologically inert substance designed for implantation within or incorporation with living systems" by the Clemson University Advisory Board for Biomaterials in 1976. In time this definition changed.

Biocompatibility was defined by Williams (1999) at the ESB Consensus Conference I as "the ability of a material to perform with an appropriate host response in a specific application". It was refined in 2005 at the ESB Consensus Conference II as "material intended to interface with biological systems to evaluate, treat, augment or replace any tissue, organ or function of the body". However, they have to be biocompatible. In order to be classified as biocompatible a material has to be nontoxic, non-allergenic, non-immunogenic, non-carcinogenic and they have to have appropriate properties such as mechanical, chemical, electrical, physical and should have appropriate service lives. The earlier examples of these biomaterials and devices were tooth implants, heart valves, contact lenses, wound dressings, catheters. This continued until the 1970s. Then researchers started adding biological components such as proteins, enzymes, and polysaccharides to improve properties.

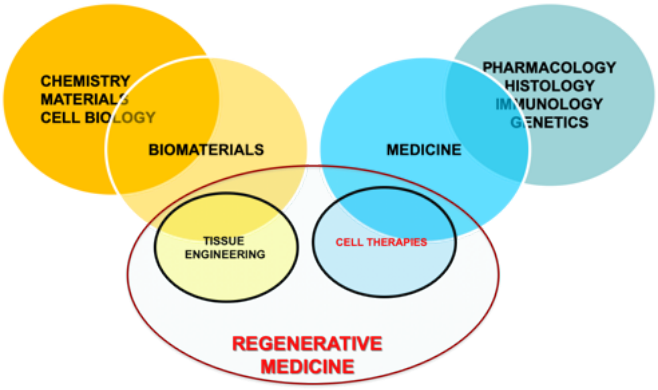

Figure 1. The relation between cellular therapies and tissue engineering

Regenerative Medicine: Tissue Engineering and Cell Therapies

The field of regenerative medicine is considered to be a combination of two fields of which one is cellular therapies and the other is Tissue Engineering. The field of Cell Therapies is supported by the various medical fields such as cytology, pharmacology, histology, Immunology and genetics among others. The other, the tissue engineering field, is supported by chemistry, cell biology and materials science fields to constitute cell carrying biomaterials. The main difference between the two fields is that the cells are carried on a cell carrier or a scaffold in tissue engineering because their function is to substitute for a missing tissue part while cellular therapies do not have the mission to fill a defect site physically.

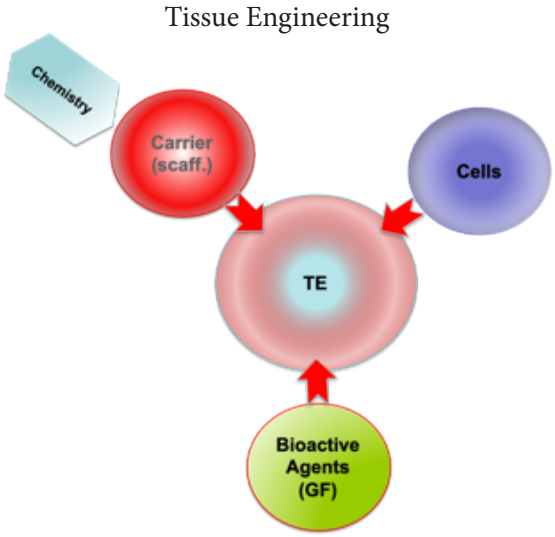

Figure 2. The components of a tissue engineered product

In the early 1990's cells were introduced to the biomaterials field within the concept of tissue engineering. A tissue engineered product is constituted of cells, a biodegradable cell carrier and some bioactive agents to guide the cell differentiation or proliferation. The main difference between a tissue engineered and a classical biomaterial is that the former carries cells on and/or in a biodegradable cell carrier (scaffold) and it is placed at the defect site to be replaced by the regenerating, healing tissue leaving no foreign material behind, while a classical biomaterial such as a tooth implant is designed to stay at the defect site and integrate with the tissue preferably for the whole duration of the patient's life and continue its service.

The Scaffolds Used in Tissue Engineering

The tissue engineering materials are converted into what are called scaffolds the roles of which are to carry the cells of the target tissue or those of the patient to use at the target site. The scaffold should enable the cells to attach, proliferate and if planned so, to differentiate into the cells of the targeted tissue. Their service time is limited and has to match the healing of the tissue. Thus, as the regenerating tissue forms the biomaterial has to degrade and disappear.

The Cells Used in Tissue Engineering

The cells are introduced to the scaffold to make them populate the scaffold, deposit their own extracellular material while eroding the scaffolds with the enzymes they release. What follows next is the replacement of these cells by those of the patient from the healing tissue. The types of cells can be used are primary cells isolated from the damaged tissue or stem cells (generally mesenchymal stem cells) obtained from the bone marrow, from the umbilical cord or the iliac crest.

The advantage of the stem cells over primary cells is their ability to divide faster and more importantly differentiate into a number of cell types depending the biochemical or physical signals they receive. Briefly, stem cells have the ability to self-renew and commit to specific cell lineages in response to appropriate stimuli, providing excellent regenerative potential that will most likely lead to functionality of the engineered tissue.

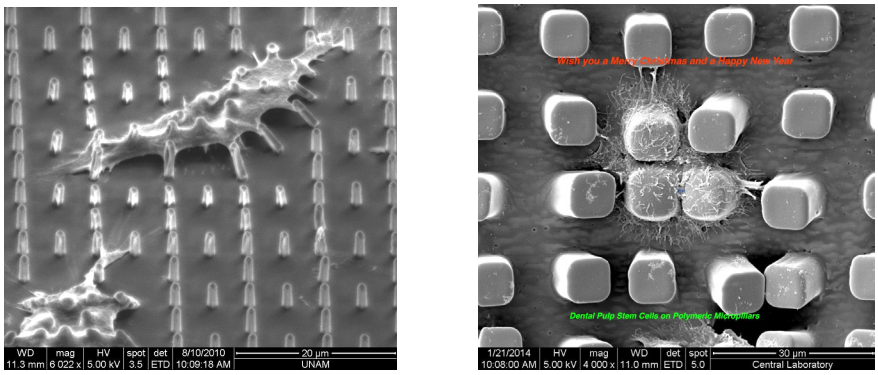

Figure 3. Cells attached onto the surface of biomaterials.

Among the stem cells, Totipotent cells can form all the cell types in a body. Embryonic stem cells (ESCs) are totipotent; they are isolated from the inner cell mass of the blastocyst during embryological development, their use in tissue engineering is controversial. Pluripotent cells, on the other hand, can give rise to all of the cell types that make up the body but not those from the placenta. They also have ethical issues. Multipotent cells can develop into more than one cell type but are more limited in the kind of cells they can develop into. Adult stem cells, mesenchymal stem cells and cord blood stem cells are considered multipotent. Stem cells used in tissue engineering are generally from pluripotent and multipotent stem cell types. One more category is the induced pluripotent stem cells (iPSCs). The discovery in 2006 that human and mouse fibroblasts could be reprogrammed to generate these cells (iPSCs) with qualities similar to embryonic stem cells has created a valuable new source of pluripotent cells especially because they do not carry the issues of the ESC.

Adult stem cells are found in many adult tissue types such as bone marrow, peripheral blood, adipose tissues, nervous tissues, muscles, dermis. The mesenchymal stem cells (MSCs) which reside in the bone marrow can differentiate into osteoblasts for bone myoblasts for muscle, adipocytes for fat and chondrocytes for cartilage. Neural stem cells (NSCs) can give rise to support cells like astrocytes and oligodendrocytes in the nervous system or to neurons.

The Growth Factors Used in Tissue Engineering

Growth factors are a large class of cytokines that stimulate a number of cell functions such as regulation of cell growth, proliferation, migration, wound healing, and angiogenesis. Among the most important are bFGF that promotes cell proliferation and regeneration, VEGF that induces angiogenesis, TGF that regulates cell growth, differentiation, and immune function, NGF for neural development and Bone morphogenetic proteins (BMPs) for induction of bone and cartilage formation. Some growth factors have now been made into preparations that are used clinically with significant effects. However, growth factors have a short half-life and are prone to burst in the body, often making it difficult to reach ideal drug concentrations. Therefore, in order to extend the action time of growth factors in the body and maintain proper drug concentrations drug delivery systems using drug carriers such as nano and microparticles are used.

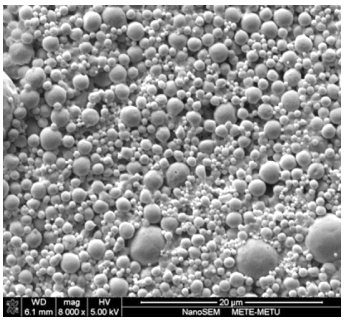

Figure 4 Nano and microparticles for growth factor delivery

The Scaffolds

One of the best-known applications is the tissue engineered bone tissue designed to fill a bone defect site. For this purpose, mechanically strong, biodegradable polymers of synthetic nature are generally preferred. Polylactic acid family of polyesters (PLA, PLGA), polycaprolactone (PCL), and bacterial polyesters such as polyhydroxyalkanoate (PHA) family are the best-known polymers used for this purpose. If, however, the targeted tissue is soft and may be even transparent like in the case of cornea, then hydrogels are made from a variety of hydrophilic polymers from natural and synthetic sources.

The Form and Surface Chemistry,

The form of the product is dictated by the targeted tissue. If tissue is bone, then highly porous polymeric sponges are generally preferred. The material used needs to be cell attractive and pore sizes should be sufficiently large to accommodate cells. The optimum pore diameter is around 200 mm. One more requirement is that the pores should be interconnected so that the cells could penetrate the core of the sponge.

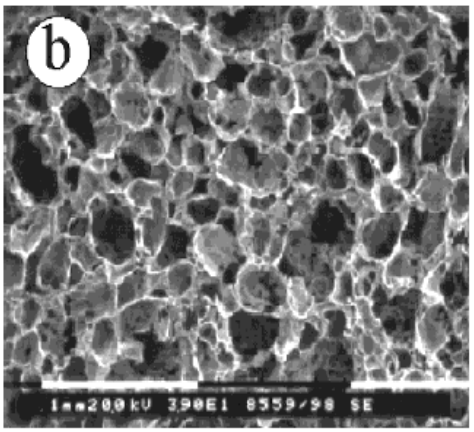

Figure 5. A polymeric sponge scaffolds

In applications where the targeted tissue is uniaxially oriented then nano and micro fibers are produced to attach the cells in a guiding manner. When the tissue is soft, transparent or both then hydrogels are preferred due to their properties.

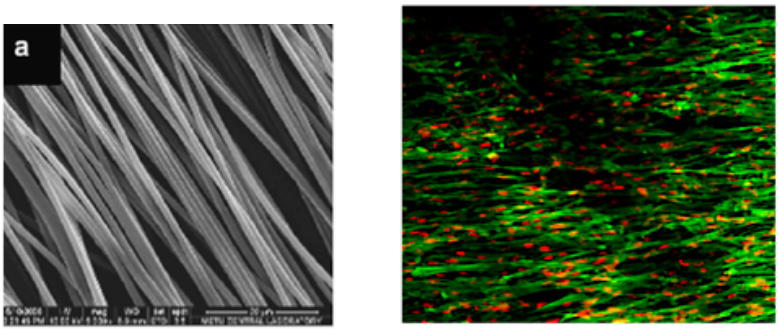

Figure 7. Electro spun fibers for cell guidance.

In addition, the present technology enables the production of 3D printed devices with closely designed interior architecture. This group of devices produce a large variety of products printed in a bottom-up approach. The figure below shows a cell seeded; 3D printed tissue engineered bone which was later successfully used in treating a bone defect in a test animal.

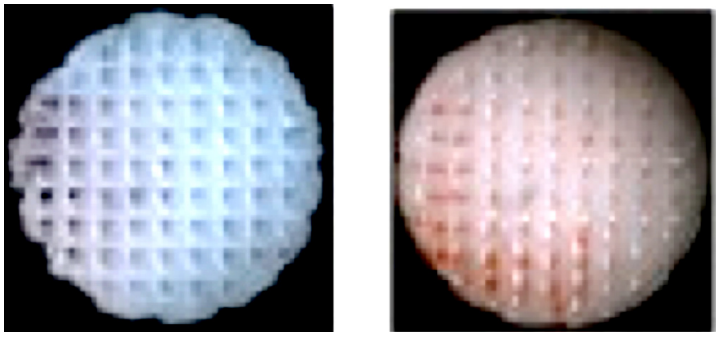

Figure 6. A 3D printed scaffold seeded with bone marrow stem cells from a rabbit femur.

Conclusion

Biomaterials, alone or with joint use of cells from a variety of sources, are bringing new solutions to the quality of life of public. As can be seen from the information provided above developments in different fields lead to significant advances in the therapeutic approaches involving biomaterials.

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TÜRKÇE KONUŞMA ÖZETİ VAR

QUESTIONS ABOUT THE QUALITY

Chairpersons: **Şeyda Keskin**
Saba Jamal

Speakers: **Ayşe Esra Karakoç**
Ertan Özyurt
Sibel Eldemir
Ayla Yavuz

RISK BASED DECISION MAKING IN TRANSFUSION MEDICINE

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Transfusion of blood is an allogeneic transplant and this medical procedure carries intrinsic, unavoidable risks of its nature. These are risks of adverse events, risks of disease transmission, risks of immunologic origin, risks of medical errors arising from wrong decisions and risks of administrative and technical errors arising from lack of procedures or deviations from existing procedures.

Transfusion of blood is nearly the end stage of a complex set of processes, each with a number of stages. This complex operation is mostly referred to as the transfusion chain. This chain starts with the blood donor and ends with the blood recipient. Therefore, risks in transfusion medicine should be addressed for the blood donors, patients and health professionals involved in the process. Also, the environment, the devices, the blood components, the suppliers, the public etc. should be considered.

WHO urges member states to ensure the provision of adequate supply of safe blood and blood products that are accessible to all patients who require transfusion? Managing and minimizing the risks throughout the transfusion chain from donor to recipient is the responsibility of national health authorities and blood establishments that are blood centers and transfusion centers at hospitals.

Transfusion transmission of viruses has long been known as a major risk of transfusion therapy. It has been one of the first topics that risk based approach in transfusion medicine is applied. Residual risk of infection transmission after screening that is calculated with incidence and prevalence data using complex mathematical models is a well-known concept for transfusion specialists. Other areas of risk in transfusion chain are not very well known.

When you run operations, you take decisions. Decisions can be strategic, operational, project investment, recruitment decisions etc. It is important to make good decisions at all levels; especially when things are uncertain and when the outcome matters; that is where there is risk. Uncertainty that matters is a definition of risk and these are risky decisions. Risk based decision making is informed by risk assessment. We need to explore and understand the uncertainties and why they matter and how risks affect the decisions that we are about to take. Robust and reliable risk processes are required for risk-based decision making. What the risks are and why they matter are assessed and are communicated to the decision makers. There are risk specialists to perform this task.

Risk based decision making is based primarily on planning, taking precautions, being proactive. Actual and potential risks need to be identified; risk matrices should be developed. Actual or potential problems or hazards are always risking; the probability of their occurrence and expected damage if the potential problem or hazard occurred are scored for risk analysis. Then the identification, prioritization, communication and management of risks are performed accordingly.

Risk management starts with the assessment of risks which most often includes the identification, analysis and scoring steps. The assessed risks are either accepted or measures are defined to mitigate them. This is the stage of risk reduction. Residual risks are communicated and reassessed as the outputs of the quality management system.

In risk management process it is important to define critical points with greater risks. Risk management in transfusion services starts with the blood donor, ends with the blood recipient. Risk management process needs to make an overall assessment of the safety of the procedures, to verify the effectiveness of already implemented precautions and to point out the processes that still need to be optimized.

Potential problems (hazards) and risks are scored by a number of different matrices or methodologies; mostly in terms of severity from 1, the lowest (residual) to 5, the highest (critical) and in terms of probability or likelihood between 1 (rare) and 5 (almost certain). By means of the probability score and the severity score, other calculations are done and the categorization of risk between low risk (1-4; green) and high risk (20-25; red) is performed.

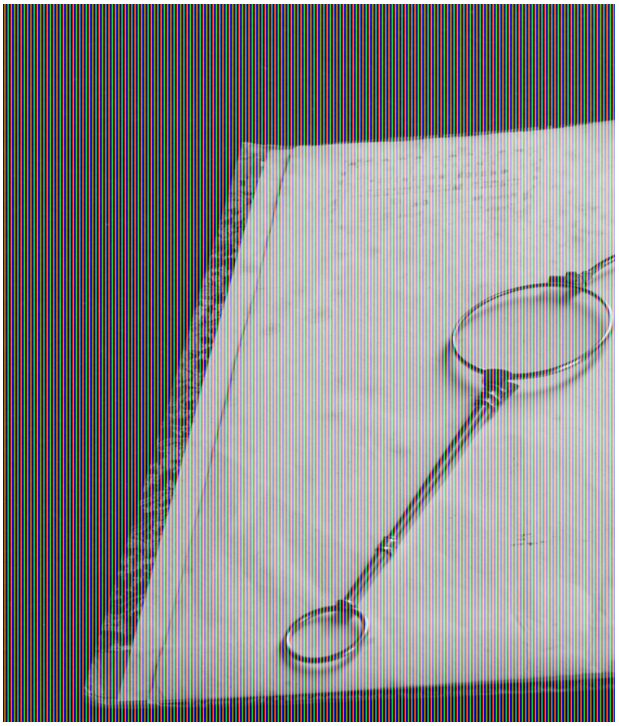

Figure: Categories of risk in terms of risk scores which can be calculated by a number of matrices or methodologies Risk assessment in transfusion medicine is to assess the potential hazards that have any probability to cause harm to the donors of blood components, the patients who receive blood components and to the staff at any stage of the blood transfusion chain.

Transfusion risks need to be addressed with comprehensive and vigorous risk management tools. It is difficult to measure risk in transfusion medicine since it needs to be lowered already because of the biological nature of the procedure. One of the tools to be used is the haemovigilance system where the adverse events and adverse reactions of transfusion are reported and recorded although it has its own limitations.
Haemovigilance data and reports of the near misses etc. mostly focus on the risk or the hazard of the technical and administrative errors in transfusion medicine, not the transfusion risk of disease transmission or the immunological risk. The reports of well-established haemovigilance systems show unfortunately that most of the errors are that of the transfusions of a component that shouldn't have been transfused to that particular patient. These mostly arise from medical and clerical errors. With this perspective risk assessment in transfusion centers at hospitals is expected to address at least the following:

· Ordering of blood by the physician of the patient (electronic and/or written)
· İdentification of the patient request
· Checking and recording the patient's ID and sampling
· Labeling the sample tubes and sampling
· Transport to the laboratory
· Sample check by the laboratory
· Performance of the immunohematology tests
· Selection of blood component(s)
· Issuing of the selected blood component(s) from the transfusion center
· Recording of the blood unit at arrival in the ward
· Administration of the blood unit in the ward
· Bedside patient check
· Follow up of the transfusion and completion of transfusion
· Recording of the transfusion of the unit
· Traceability of blood components
· Diagnosis, management and reporting of suspected transfusion reactions

· Emergency use of O Rh D negative blood

In a study by Bischoff, et al that was conducted to make risk assessment of transfusion medicine processes two risk matrices (one, from blood donor to stock and another from stock to the patient) were produced; the first with 44 and the second with 25 addressed activities. They reported their criteria to be main activities of each department, -potential problems, hazards, -types and groups of risks, -degree of severity and likelihood, -mitigation measures. In the table below two assessed risks from the study by Bischoff, et al are shown as an example of risk assessment at a transfusion center.

Table: Risk assessment of two processes of transfusion services (from a study by Bischoff, et al)

Process	**Area**	**Risk**	**Type of risk**	**Group at risk**	**L**	**S**	**G**	**Mitigation**
Blood group testing	İmmunohematology laboratory	Failure in technical procedure	Incompatible blood transfusion	Blood recipient	1	4	4	- Test automation - Perform test duplicate Electronic transfer of results
Sample collection for pre-tx testing	Hospital ward	Sample collecti-on from wrong patient	Incompatible blood transfusion	Blood recipient	3	4	12	- Hospital transfusion committee - Blood transfusion policy; hospital protocols - Use and check the wrist band with alphanumeric code - intensive nurse information for positive patient identification before sample collection

Risk assessments at the national authority level should address in particular blood safety and availability, also as a part of donor, patient and staff safety. Risk based approach is required for emergency and disaster preparedness in transfusion medicine. Also, future risk assessment of emerging infectious diseases; social, political, ethical, economic and environmental risks that jeopardize blood supply system should be considered in risk based strategic decision making by the national authorities. We conclude that risk-based decision making is essential for any level of operation in transfusion medicine and appropriate risk management is expected to provide improved outcome for blood transfusion services.

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QUALITY MANAGEMENT IN THE LABORATORY OF THE BLOOD BANK: PROCESS CONTROL

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The blood centers have laboratory services including immunohematology and microbiological screening tests for the safety of blood products. Test processes in the laboratory require high quality. Therefore, there should be a quality management system that provides quality assurance in blood centers. To ensure high quality in blood centers, Quality management is provided by performing all of the process in accordance with the predetermined standards. The personnel, organization, building, equipment, materials, documentation, blood collection, processing, storage, distribution, quality control and laboratory tests are some issues in the quality management of blood centers Every action in these issues need process control in itself. Process control in the laboratory tests is our main subject in quality management in the laboratory.

The classic definition of quality is insufficient for immuno-hematological and microbiological screening tests in Blood Centers. Laboratory quality can be defined as accuracy, reliability, and timeliness of the reported test results. The laboratory results must be as accurate as possible, all aspects of the laboratory operations must be reliable, and reporting must be timely in order to be useful in a clinical or public health setting (1). In order to achieve the highest level of accuracy and reliability, it is essential to perform all processes and procedures in the laboratory in the best possible way. The laboratory is a complex system, involving many steps of activity and many people. The complexity of the system requires that many processes and procedures be performed properly. Therefore, the quality management system model, which looks at the entire system, is very important for achieving good laboratory performance. In the laboratory of the blood center, quality assurance guarantees the accurate, repeatable and reliable test results at the right time, using the proper test, in the right sample sent from the right donor. The complexity of the laboratory system requires that many factors must be addressed to assure quality in the laboratory. Some of these factors include:

- Test Guides, Standardization, verification and validation of tests
- Internal and External quality control procedure.
  Monitoring of test performance with Quality Control
- Evaluation and monitoring of the adequacy of the staff, competent and knowledgeable staff, Training
- Keeping and records (QC, Error reporting, CAPA etc.)
- Equipment maintenance and calibration

Quality Management is the process of monitoring the elements of this system and eliminating the problem when a problem is detected. It is planned, continuous and systematic. Statistical process analysis and controls show whether the current process has achieved the target results. It also helps to make regulatory and preventive decisions on a scientific basis. For immunohematological and microbiological screening tests performed in Blood Centers, internal and external quality control must be performed. Random and systematic errors should be detected in the early period and necessary corrective-preventive actions should be initiated to minimize these errors. The strategy to be followed in detecting errors should be based on Statistical Quality Control-SQC methods. Internal quality control sample results should be transferred to the control charts (Shewhart Chart, Levey-Jennings Curve etc.) and the change in test performance should be observed. The change in test performance should be determined by interpreting control charts within the framework of scientific rules (Westgard rules, etc.). Laboratory manager predetermines how to manage when a change, deviation or error occurs. Thus, with daily monitoring, it reduces the number of "invalid" tests by detecting the possible error in the early period and taking the precautions. Internal quality control defines statistical quality control methods applied daily by laboratory staff to laboratory materials and equipment. It demonstrates the repeatability or reproducibility of the laboratory test. The purpose of external quality control in the laboratory is to increase the accuracy of the laboratory tests, the reliability of the laboratory, to be able to compare performance and data between laboratories, to provide an objective assessment of laboratory performance, to ensure that errors overlooked by internal quality control are seen. External quality assessment provides not only test performance, it also controls the laboratory analytical process. In the external quality control programs with many participants, the results of the participants are compared with each other. Each participant can monitor and evaluate their own performance among other participants so each laboratory can get accurate test results.

Laboratories not implementing a good quality management system are guaranteed that there will be many errors and problems occurring that may go undetected. Implementing such a quality management system may not guarantee an error-free laboratory, but it does yield a high-quality laboratory that detects errors and prevents them from recurring. No process, plan, or system is perfect, but a strong and well-organized laboratory quality program provide high levels of confidence in donors, patients, and blood centers staff.

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AUDIT MECHANISM IN BLOOD ESTABLISMENTS

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Having a legal requirement for quality improvement strategies is an important driver of progress, along with the activities of national governments and professional associations and societies. National governments emerged as the key players in developing quality improvement policies, setting quality standards and targets, and providing guidance and support to organizations on implementation. This provided advocacy for the policy, along with health funding and procurement. There is wide variation in the voluntary and mandatory coverage of quality improvement policies and strategies across sectors, potentially leading to varying levels of progress in implementation. Therefore, the implementation of compulsory quality management in blood banking makes a significant difference in terms of the effectiveness of the system compared to other sectors. The Quality System must be designed to assure the quality and safety of prepared blood and blood components, as well as ensure donor and staff safety and customer service. This strategy requires the development of clear policies, objectives and responsibilities. It also requires implementation by means of quality planning, quality control, quality assurance and quality improvement to ensure the quality and safety of blood and blood components, and to provide customer satisfaction.[3]

With the technical and medical focus of the regulations, directives, standards and common requirements are defined in order to ensure the safety of blood throughout the governments. In 2005, the awareness to the importance of appropriate regulation for Türkiye have been boosted by Government and Ministry of Health (MoH) has updated the blood and blood products legislation. Professional associations and scientists gathered under the chairmanship of the Competent Authority have contributed to this study. As a result of this study, the National Blood Legislation, which consists of well-defined principles of evidence-based medicine standards, was updated. In terms of quality, described in the legislation, blood establishments shall provide quality to their customers, like hospitals, clinics, etc. in many forms, including: "Safe and satisfying donation experiences for blood donors, ensured traceability with accurately labelling and tested blood components provided to transfusion services, timely and accurate transfusion services provided to physicians and other health-care personnel, and also safe and efficacious blood transfusions to patients."

In order to further sustain the improvement of blood safety, vein-to-vein chain needs to be taken into consider. All of the blood establishments, regional blood centres, temporary licensed hospital blood banks, and transfusion services are expected to adopt the quality, safety, and effectiveness of the product to all levels of the stakeholders. The quality system model should be established with the major topics.

- Quality system requirements based on the national regulations and common standards in order to establish the audit system and regulatory inspections by competent authority,
- To guarantee the self-sufficiency in blood supply,
- Donor management based on the different and structural variations,
- The optimal use of blood based on right amount of blood and quality criteria for the clinical transfusion process,
- Quality management focused to develop document systems using common standards, criteria and state-of-the art knowledge on blood banking and transfusion medicine.

A number of quality management systems are available which can be applied to from donor recruitment to using of blood. Some of the systems are more product and process oriented and the others deal more with the management and leadership oriented. The pharmaceutical standards, like GMP, PIC/S, HACCP, ICH, etc. are product and process-oriented quality systems. Hazard Analysis and Critical Control Points System (HACCP) is product oriented and is intended to detect and prevent potential hazards. The Pharmaceutical Inspection Co-operation Scheme (PIC/S) is definitely a process-oriented quality system. PIC/S aims at harmonizing inspection procedures worldwide by developing common standards in the field of Good Manufacturing Process (GMP). ICH is a system-based quality system that aims to protect public health by ensuring quality, safety and efficiency in

3 Good Practice Guideline, prepared through co-operation between the European Directorate for the Quality of Medicines & HealthCare of the Council of Europe (EDQM) and the Commission of the European Union (EU).

legal regulations. Management oriented quality systems, such as ISO 9001 and EFQM, aspects securing the sustainability for reliability of the operational process aims fulfil the customer's quality requirements and applicable regulatory Management oriented quality systems, such as ISO 9001 and EFQM, aspects securing the sustainability for reliability of the operational process aims fulfil the customer's quality requirements and applicable regulatory requirements while achieving continual improvement of performance. In case the quality management model is developed by choosing only one of the quality management systems described above, in terms of the effectiveness and effectiveness of the system blood banking and transfusion medicine cannot be met.

To increase uniformity and conformity the quality management system should be used the various of assessment tools; such as regulatory inspections, self-inspection, internal quality audits, external quality assessment schemes and international and regional accreditation, such as AfSBT, AABB and International Organization for Standardization (ISO) certifications. Furthermore, there are national and international organizations addressing issues of quality of healthcare. Among the most influential are European Society for Quality in Healthcare (ESQH), the Council of Europe and the World Health Organization (WHO), the United States-based JCAHO and the IOM, as well as the International Society for Quality in Health Care (ISQua). These have influenced the development of regional, national and international quality of healthcare strategies across the world. These are also objective measures that regulatory authorities may use to assess quality of blood services.

Quality, safety, and effectiveness are built into a product; quality cannot be inspected or tested into a product. Each step in the processes must be controlled to meet quality standards.[4] Therefore quality at the source, the method of process control whereby each worker is responsible for his/her own work and performs needed inspections at each stage of the process, needs to be established based on risk assessments. However, quality at the source is not an objective evidence for detecting gaps in the system. The audit is a system of investigation, evaluation and measurement, and also a means of continuous assessment and therefore improvement. The audit is based on set guidelines, but in fact consists of determining the difference between the directions given and what has actually been done.[5] Quality audit mechanism as a systematic and independent examination to determine whether quality activities and related results comply with planned arrangement and whether these arrangement are implemented effectively and are suitable to achieve objectives should be taken in place[6]. All audits are carried out on the basis of a pre-described method (contained in ISO 19011). The quality management system contains an approach to self-inspection based on risk management to allow analysis of the level of the quality and quality management system. Because of the great differences between established quality systems in terms of specificity of risks, risk approach applications, and handling complex processes. As a result, the effectiveness of quality management approaching focuses on the efficient use of human and protecting public health.

Briefly the importance of audit should be described and highlighted in the quality management systems and audit procedures and tools i.e. required records, development of audit criteria and audit parameters must be developed appropriate to the needs based on multidisciplinary vision. The suggestions are mainly based on Turkish Red Crescent General Directorate of Blood Services' experience.

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HAEMOVIGILANCE RECORDS

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Haemovigilance

Haemovigilance is the set of surveillance procedures covering the entire blood transfusion chain, from the donation and processing of blood and its components, through to their provision and transfusion to patients, and including their follow-up.

It includes the monitoring, reporting, investigation and analysis of adverse events related to the donation, processing and transfusion of blood, and taking action to prevent their occurrence or recurrence. The reporting systems play a fundamental role in enhancing patient safety by learning from failures and then putting in place system changes to prevent them in future.

Blood transfusion is a multi-step process with risk of error in each process from selecting donors, collecting and processing donations, testing of donor and patient samples, issue of compatible blood, to transfusing the patient. An effective quality system provides a framework within which activities are established, performed in a quality-focused way and continuously monitored to improve outcomes. The risk associated with blood transfusion can be significantly reduced by the introduction of quality systems, external quality assessment and education and training for staff.

Quality systems for blood safety

"Quality systems are the key to ensuring the availability of safe blood for all patients needing transfusions" A quality system should cover all aspects of its activities and ensure traceability, from the recruitment and selection of blood donors to the transfusion of blood and blood products to patients. It should also reflect the structure, needs and capabilities of the blood transfusion service, as well as the needs of the hospitals and patients that it serves.
Key elements of quality systems include:

· Organizational management
· Standards
· **Documentation**
· Training
· Assessment

Management commitment and support are essential for the development, implementation and monitoring of a national quality system in order to ensure continuous quality improvement. All staff should understand the importance of quality and the consequences of failure in the quality system.

The most important knowledge in the field of patient safety is how to prevent harm to patients during treatment and care. The fundamental role of patient safety **reporting systems** is to enhance patient safety by learning from failures of the health care system. Health-care errors are often provoked by weak systems and often have common root causes which can be generalized and corrected. Although each event is unique, there are likely to be similarities and patterns in sources of risk which may otherwise go unnoticed if incidents are not reported and analyzed.

Reporting is fundamental to detecting patient safety problems. However, on its own it can never give a complete picture of all sources of risk and patient harm. The guidelines also suggest other sources of patient safety information that can be used both by health services and nationally.

Quality Systems

Within each organization that is responsible for elements of the transfusion chain an effective quality (management) system should be in place. This system should ensure consistent practice through the use of written procedures and regular audit. In blood transfusion services there should be a comprehensive quality system in place and haemovigilance should be embedded within this system. In hospitals, transfusion committees should be in place to ensure appropriate clinical use of blood, effective training of staff, and monitoring and evaluation of clinical practice. The transfusion committee should oversee the implementation of haemovigilance in the hospital, regularly review the results and monitor the effectiveness of improvement measures.(WHO A guide to establishing a national haemovigilance system)

EC

Record keeping

Record keeping Article 13

1. Member States shall take all necessary measures to ensure that blood establishments maintain records of the information required in Annexes II and IV and under Article 29(b), (c) and (d). The records shall be kept for a minimum of 15 years.

Haemovigilance and Traceability (Chapter V Article 14)

1. Member States shall take all necessary measures in order to ensure that blood and blood components collected, tested, processed, stored, released and/or distributed on their territory can be traced from donor to recipient and vice versa. To this end, Member States shall ensure that blood establishments implement a system for identification of each single blood donation and each single blood unit and components thereof enabling full traceability to the donor as well as to the transfusion and the recipient thereof. The system must unmistakably identify each unique donation and type of blood component. This system shall be established in accordance with the requirements referred to in Article 29(a).

2. Member States shall take all necessary measures in order to ensure that the system used for the labelling of blood and blood components collected, tested, processed, stored, released and/or distributed on their territory complies with the identification system referred to in paragraph 1 and the labelling requirements listed in Annex III.

3. Data needed for full traceability in accordance shall be kept for at least 30 years.

Articles 14 (3) of Directive 2002/98/EC and 4 of Directive 2005/61/EC

require that blood establishments, hospital blood banks or facilities keep data to ensure full traceability for a minimum of 30 years in an appropriate and readable storage medium.

Record of data on traceability as provided for in Article 4

By Blood Establishments

- Blood establishment identification
- Blood donor identification
- Blood unit identification
- Individual blood component identification
- Date of collection (year/month/day)
- Facilities to which blood units or blood components are distributed, or subsequent disposition.

By Facilities

- Blood component supplier identification
- Issued blood component identification
- Transfused recipient identification
- For blood units not transfused, confirmation of subsequent disposition
- Date of transfusion or disposition (year/month/day)
- Lot number of the component, if relevant.

Report of The Blood Establishment's Preceding Year's Activity

This annual report will include:

- Total number of donors who give blood and blood components
- Total number of donations
- An updated list of the hospital blood banks which it supplies
- Total number of whole donations not used
- Number of each component produced and distributed
- İncidence and prevalence of transfusion transmissible infectious markers in donors of blood and blood components
- Number of product recalls
- Number of serious adverse events and reactions reported.

Data Protection and Confidentiality (Directive 2002/98/EC Of The European Parliament And Of The Council)

Member States shall take all necessary measures to ensure that all data, including genetic information, collated within the scope of this Directive to which third parties have access have been rendered anonymous so that the donor is no longer identifiable.

For that purpose, they shall ensure:
(a) that data security measures are in place as well as safeguards against unauthorized data additions, deletions or modifications to donor files or deferral records, and transfer of information.
(b) that procedures are in place to resolve data discrepancies.
(c) that no unauthorized disclosure of such information occurs, whilst guaranteeing the traceability of donations.

ISO

The ISO 9001 requires records to be kept on certain activities.
4.2.3 Control of Documents and 4.2.4 Control of Records.

Records: evidence of results achieved, Evidence about a past event.
Document: Information used to support an effective and efficient organizational operation.

Documents and records may sound alike but there is a big difference between the two. Documents are created by planning what needs to be done and records are created when something is done. Documents can change and records don't (must not) change.
Records need to be identifiable (labeled), stored, protected (uncorrupted), retrievable (you need to use the data), retained (backed-up), but disposed of when obsolete

- Who has access to what records and what kind of access do they have?
- Where are records stored and how are they protected?
- How is version control handled?
- How long are records stored and how are they disposed of?

The phrase to look out for in the 2015 version of the quality management standard is **'documented information'** shall be retained. ISO 9001:2015 defines **documented information** as meaningful data that is required to be controlled and maintained by the organization and the medium on which it is contained.

Documented information can be used to communicate a message, provide evidence of what was planned has actually been done, or knowledge sharing.

7.5 Documented Information
7.5.1 General
The organization's quality management system shall include:
a) documented information required by this International Standard.
b) documented information determined by the organization as being necessary for the effectiveness of the quality management system.

7.5.2 Creating and updating
When creating and updating documented information, the organization shall ensure appropriate:
a) identification and description (e.g. a title, date, author, or reference number).
b) format (e.g. language, software version, graphics) and media (e.g. paper, electronic);
c) review and approval for suitability and adequacy.

7.5.3. For the control of documented information,
The organization shall address the following activities, as applicable
7.5.3.1. Requirements of Documented Information
The quality management system and documented information required by this standard should be checked to ensure:
a) It is ready and suitable for use when and where it is needed,
b) It is adequately protected (for example, due to loss of confidentiality, improper use or loss of integrity).

7.5.3.2 is the perfect checklist for your Document/Content control system. I'll paraphrase below.
a) Who is notified of new docs and updates? Who can access it? How do they get it? Is it obvious how to use & file it?
b) Where is it stored? How's it kept safe (physical or IT)? Can it be read (correct language)?
c) Who has authorization to make changes? Who approves those changes? Identification updated?
d) How long are records kept? Who gets access to them (especially once archived)?

Records:
– paper
– magnetic
– electronic or optical computer disc
– photograph
– master sample

TSE
Electronic Records
CIRCULAR 2008/16
Subject: Electronic Records Standards.
Public institutions and organizations will operate in the electronic document management systems TSE 13298 standards.

· TSE 13298 Electronic Records Management.

· TS 13298:2015 ICS 01.140.20; 35.240.20; 01.110 Electronic records and archives management system

Document Properties Among the features of the documents registered in the system, the manufacturer, author, date of production, sender, place of origin, date of production, date of transmission, archiving date, transfer date, recipient name, function name, etc.

These areas may increase in line with the needs of the institution, and the names of the areas may be different.

ERMS (Electronic Records Management System) should prevent any interference to the content of electronic documents that have gained document quality. This is called intellectual integrity.
ERMS should protect the identification elements related to the production, transmission and use of electronic documents as a whole. This is called descriptive integrity.

As stated above, physical integrity is given to the management of integrated documents consisting of multiple files as a whole. In summary,

ERMS should ensure that the integrity of documents intellectually, descriptively and physically will not be impaired.
In other words, a document entered into the system:

• there must be a change in what;
• Neither the defined information about the document (the author, the date of transmission, the date of registration in the system etc.)
• nor the integrity of the attachments associated with the document should be disrupted.

Last of all; Haemovigilance records
· Records are vital.
· It has legal importance
· Standard operating procedures must be followed.
· Records should be kept for 30 years.

https://www.who
https://www.ema.europa.eu
www.iso.org
http://www.tse.org.tr

PULMONARY TRANSFUSION REACTIONS

Chairpersons: **İdil Yenicesu**
İ.Yaşar Avcı

Speaker: **Arzu Akçay**

PULMONARY TRANSFUSION REACTIONS

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It has long been known by physicians that respiratory symptoms develop in some patients after blood product transfusion. Today, two distinct pulmonary transfusion reactions are recognized as the likely etiology. Although both share a similar clinical phenotype of pulmonary edema and hypoxemic respiratory insufficiency, each have different management schemes and preventative strategies. One reaction, called transfusion related acute lung injury **(TRALI)** is a serious blood transfusion complication characterized by the acute onset of non-cardiogenic pulmonary edema following transfusion of blood products.(1) The second, transfusion-associated circulatory overload **(TACO)** results from the compensatory capacity of the cardiovascular system being overwhelmed by an increase in intravascular volume.(2)

Acute lung injury (TRALI)

Epidemiology: The true incidence of TRALI is unknown because of the difficulty in making the diagnosis and because of underreporting. It is estimated to occur in 1:1300 to 1:5000 transfusions of plasma-containing products. The immune mediated form of TRALI occurs approximately once every 5000 transfusions and has a mortality of 6–9%. (3)

Signs and symptoms: The typical presentation of TRALI is the sudden development of dyspnea, severe hypoxemia (O2 saturation <90% in room air), hypotension, and fever that develop within 6 hours after transfusion and usually resolve with supportive care within 48 to 96 hours.

Cause: The cause of TRALI is currently not fully understood. 80-85% of cases are thought to be immune mediated. (4) Antibodies directed toward human leukocyte antigens (HLA) or human neutrophil antigens (HNA) have been implicated. Transfusion of blood components obtained from multiparous women donors is thought to carry a higher risk of immune-mediated TRALI. Previous transfusion or transplantation can also lead to donor sensitization. To be at risk of TRALI via this mechanism, the blood recipient must express the specific HLA or neutrophil receptors to which the implicated donor has formed antibodies.

A non-immune mechanism has been studied, involving the accumulation of bioactive lipids in stored blood components (red cells, platelets, plasma) that possess neutrophil priming capabilities. (5)

TRALI is typically associated with plasma products such as FFP. TRALI can also occur in recipients of packed red blood cells both in adult and pediatric patients. (6)

Pathophysiology: Although the pathogenesis of TRALI remains incompletely understood, antibodies found in donor plasma that are directed at HLAs or human neutrophil antigens (HNA) in the recipient have been implicated in 65–90 % of cases. In this scenario, donor anti-HLA/anti-HNA antibodies are believed to interact with cognate antigens on the recipient leukocytes and/or pulmonary endothelial cells (anti-HLA antibodies only) (7). This process results in leukocyte activation and aggregation within the pulmonary microcirculation. The subsequent neutrophil respiratory burst, along with concomitant compliment activation, activates and injures endothelial cells resulting in capillary leak, alveolar flooding, and the full acute lung injury (ALI) phenotype. (Figure 1).

Diagnosis / Definition: Uniform diagnostic criteria for TRALI were only established following a Consensus Conference in Toronto, Canada in 2004 (8) (BOX 1). TRALI is defined as an acute lung injury that is temporally related to a blood transfusion; specifically, it occurs within the first six hours following a transfusion.

It is typically associated with plasma components such as platelets and fresh frozen plasma, though cases have been reported with packed red blood cells since there is some residual plasma in the packed cells. The blood component transfused is not part of the case definition.

Transfusion-related acute lung injury (TRALI) is an uncommon syndrome that is due to the presence of leukocyte antibodies in transfused plasma. TRALI is believed to occur in approximately one in every 5000

transfusions. Leucoagglutination and pooling of granulocytes in the recipient's lungs may occur, with release of the contents of leukocyte granules, and resulting injury to cellular membranes, endothelial surfaces, and potentially to lung parenchyma. In most cases leucoagglutination results in mild dyspnea and pulmonary infiltrates within about 6 hours of transfusion, and spontaneously resolves.

Occasionally more severe lung injury occurs as a result of this phenomenon and acute respiratory distress syndrome (ARDS) results. Leukocyte filters may prevent TRALI for those patients whose lung injury is due to leukoagglutination of the donor white blood cells, but because most TRALI is due to donor antibodies to leukocytes, filters are not helpful in TRALI prevention. Transfused plasma (from any component source) may also contain antibodies that cross-react with platelets in the recipient, producing usually mild forms of posttransfusion purpura or platelet aggregation after transfusion.

Treatment: Supportive care is the mainstay of therapy in TRALI. Oxygen supplementation is employed in all reported cases of TRALI and aggressive respiratory support is needed in 72 percent of patients. Intravenous administration of fluids, as well as vasopressors, are essential for blood pressure support. Use of diuretics, which are indicated in the management of transfusion associated circulatory overload (TACO), should be avoided in TRALI. Corticosteroids can be beneficial.

Transfusion associated circulatory overload (TACO)

Epidemiology: It is difficult to determine the incidence of TACO, but its incidence is estimated at about one in every 100 transfusions using active surveillance,(9) and in one in every 10000 transfusions using passive surveillance.(9) TACO is the most commonly reported cause of transfusion-related death and major morbidity in the UK,(10) and second most common cause in the USA.(11)

Symptoms: The primary symptoms of TACO are dyspnea, orthopnea, peripheral edema, and rapid increase of blood pressure. TACO must be suspected when there is respiratory distress with other signs, including pulmonary edema, unanticipated cardiovascular system changes, and evidence of fluid overload (including improvement after diuretic, morphine or nitrate treatment), during or up to 24 hours after transfusion. (10)

Diagnosis: To improve the recognition of TACO cases and to address the need for a uniform definition, the Center for Disease Control (CDC), National Healthcare Safety Network Manual on Transfusion Biovigilance has recently outlined their recommendations for adjudicating TACO diagnoses (12) (Box 2). Specifically, the definition requires that at least 3 of these variables are present within 6 h of transfusion. The International Society of Blood Transfusion (ISBT) working party on hemovigilance in collaboration with the International Haemovigilance Network (IHN) and AABB produced new reporting criteria in 2018. (13) Patients classified with TACO should have acute onset or worsening respiratory distress or evidence of pulmonary edema, or both during and up to 12 hours after transfusion. They should have at least 3 of the following characteristics:

- Acute or worsening respiratory distress (tachypnoea, shortness of breath, cyanosis, and decreased oxygen saturations) in the absence of other causes
- Evidence of acute or worsening pulmonary edema (by physical examination, or chest imaging, or other non-invasive assessment of heart function e.g. echocardiogram)
- Evidence of unanticipated cardiovascular system changes (tachycardia, hypertension, widened pulse pressure, jugular venous distension, peripheral edema)
- Evidence of fluid overload (positive fluid balance, response to diuretic therapy with clinical improvement, change in the patient's weight in the peri-transfusion period)
- Changes in a relevant biomarker e.g. elevation in natriuretic peptide (NP) levels (e.g. brain-natriuretic peptide (BNP), N-terminal (NT)-pro BNP) to greater than 1.5 times the pre-transfusion value.

Differential diagnosis: TACO and TRALI are both respiratory complications following a transfusion. (10) TACO and transfusion related acute lung injury (TRALI) are often difficult to distinguish in the acute situation. (13) TACO is usually associated with hypertension and responds well to diuretics, TRALI is often associated with hypotension and diuretics have a minimal effect. A normal natriuretic peptide level post-transfusion is seen with TRALI but not with TACO. (14) (Table 1)

Risk factors for TACO: Low albumin, cardiovascular disease, kidney disease, lung disease, severe anemia, age (less than 3 years old and over 60 years old)

Prevention: TACO is prevented by avoiding unnecessary transfusions, closely monitoring patients receiving transfusions, transfusing smaller volumes of blood at a slower rate, and considering the use of diuretics.

Management: If TACO is suspected stop the transfusion. Treat with oxygen, diuretics, and other treatments for cardiac failure.

Conclusion: The transfusion-related pulmonary complications, TRALI and TACO, remain the leading causes of transfusion-related morbidity and mortality. Importantly, the implementation of conservative, evidence-based transfusion practices may have the greatest effect in mitigating the impact of both TRALI and TACO.

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BOX 1: TRALI consensus criteria (8)

ALI: a) Acute onset
b) Hypoxemia
i. $PaO_2/FiO_2 \leq 300$ or $SpO_2 < 90\,\%$ on room air (or other clinical evidence of hypoxemia)
c) Bilateral infiltrates on frontal chest radiograph
d) No evidence of left atrial hypertension (i.e circulatory overload)

Plus: e) No pre-existing ALI before transfusion
f) During or within 6 hours of transfusion
g) Bearing no temporal relationship to an alternative risk factor for ALI

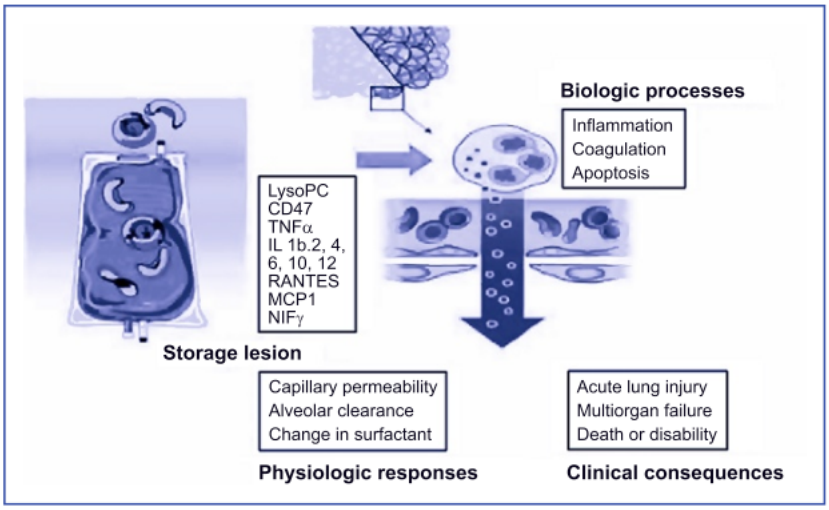


Fig. 1. Putative biologic and physiologic consequences of storage lesion. TNF: tumor necrosis factor; IL: interleukin; RANTES: Regulated upon Activation, Normal T-cell Expressed, and Secreted; MCP: monocyte chemoattractant protein; IFN: interferon;

Box 2. National Healthcare Safety Network Diagnostic Criteria for TACO (12)

New onset or exacerbation of ≥ 3 of the following within 6 hours of transfusion:
Acute respiratory distress
Radiographic evidence of pulmonary edema
Evidence of left heart failure
Evidence of elevated central venous pressure (CVP)
Evidence of positive fluid balance
Elevated B-type naturietic peptide (BNP)

Table 1: Characteristic features of transfusion-related pulmonary complications (13)

Feature	TRALI	TACO
Body temperature	Fever may be present	Unchanged
Blood pressure	Hypotension	Hypertension
Respiratory symptoms	Acute dyspnea	Acute dyspnea
Neck veins	Unchanged	May be distended
Auscultation	Rales	Rales and S3 may be present
Chest radiograph	Diffuse bilateral infiltrates	Diffuse bilateral infiltrates
Ejection fraction	Normal or decreased	Decreased
PAOP	Most often 180 mmHg or less	> 180 mmHg
Pulmonary edema fluid	Exudate	Transudate
Fluid balance	Positive, neutral or negative	Positive
Response to diuretics	No change or deterioration	Significant improvement
White cell count	Transient leukopenia	Unchanged
BNP	< 250 pg/ml	> 1200 pg/ml
Leukocyte antibodies	Present +/- cognate antigens	May or may not be present

PAOP: pulmonary artery occlusion pressure; BNP: B-type natriuretic peptide

IMMUNOMODULATORY EFFECTS OF TRANSFUSION

Chairpersons: **İmdat Dilek**
Nurgül Ceran

Speaker: **Defne Ay Tuncel**

BLOOD TRANSFUSION RELATED IMMUNOMODULATION

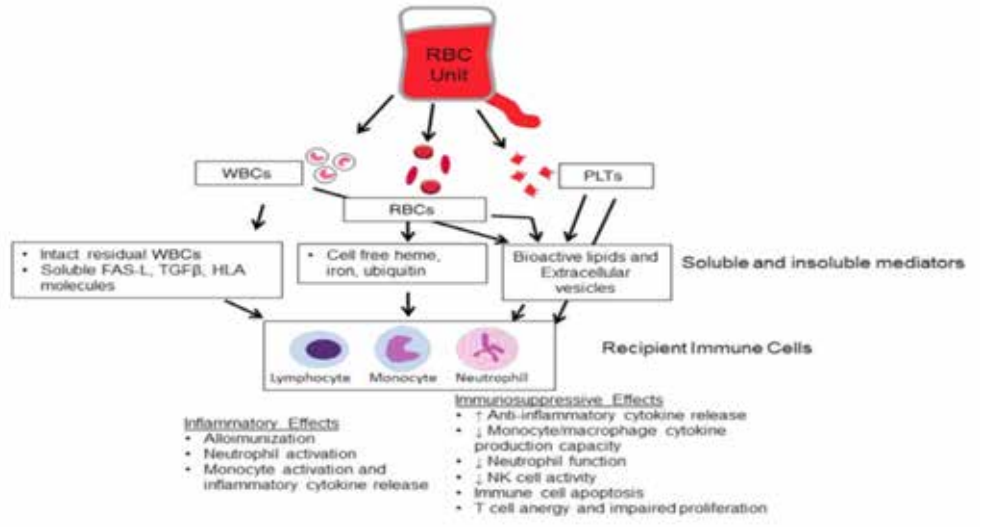
Defne AY TUNCEL
Sağlık Bilimleri Üniversitesi Adana Şehir Eğitim ve Araştırma Hastanesi

While we are administering blood ,we should be think the risks or the benefits of the transfusion for each person. Sometimes the risk can be exceed the benefit of transfusion.

Allogenic blood transfusion(ABT) related clinical findings and laboratory is known as Transfusion Related Immunomodulation= TRIM

Allogenic blood transfusion is meaning of:
1-Immunomodulatory
2-Pro inflammatory mechanisms

ABT causes alloimmunization or induce tolerance
Autologous HLA-DR Ag on donor's WBC plays an important role



INTRODUCTION

By transfusion, the recipient encounters many antigens, including HLA antigens located on the donor's antigen presenting cells (APC).

The presence of the recipient's HLA antigens in donor leukocytes may be determining whether transfusion will lead to alloimmunization or immune tolerance.

Donor sharing at least 1 HLA-DR with recipient will induce tolerance, whereas fully mismatched transfusion leads to Alloimmunization.

TRIM effects may be mediated by :

Soluble HLA class I peptides that circulate in allogeneic plasma

Soluble biologic response modifiers released in time dependent manner from WBC granules/RBC membrane/Platelet concentrates during storage

Allogeneic mononuclear cellsAllogenic

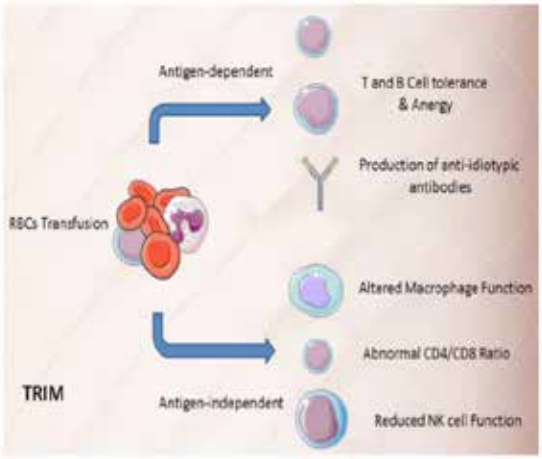
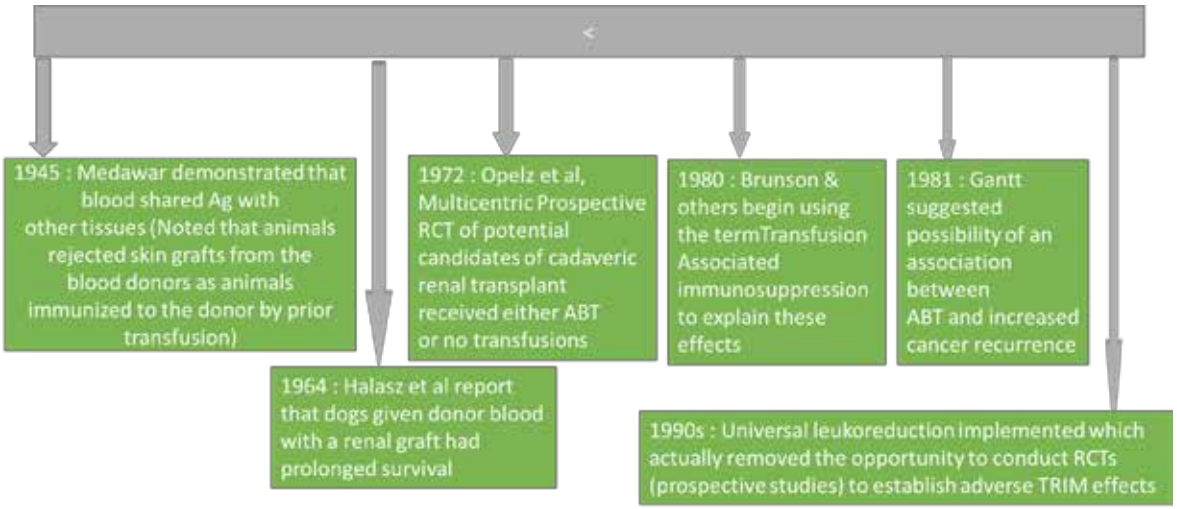


Figure 1. Schematic representation of TRIM. RBC transfusion induces both antigen-dependent T- and B-cell tolerance and enhances the production of anti-idiotypic antibodies, whereas antigen-independent mechanisms involve altered macrophage function, abnormal CD4/CD8 ratios, and reduced NK cell surveillance.

Blood Transfusion has been shown to cause:
· Decreased helper T-cell count
· Decreased helper/suppressor T-lymphocyte ratio
· Decreased lymphocyte response to mitogens
· Decreased natural killer (NK) cell function
· Reduction in delayed-type hypersensitivity
· Defective antigen presentation
· Suppression of lymphocyte blastogenesis
· Decreased cytokine (IL-2, interferon production)
· Decreased monocyte/macrophage phagocytic function

History



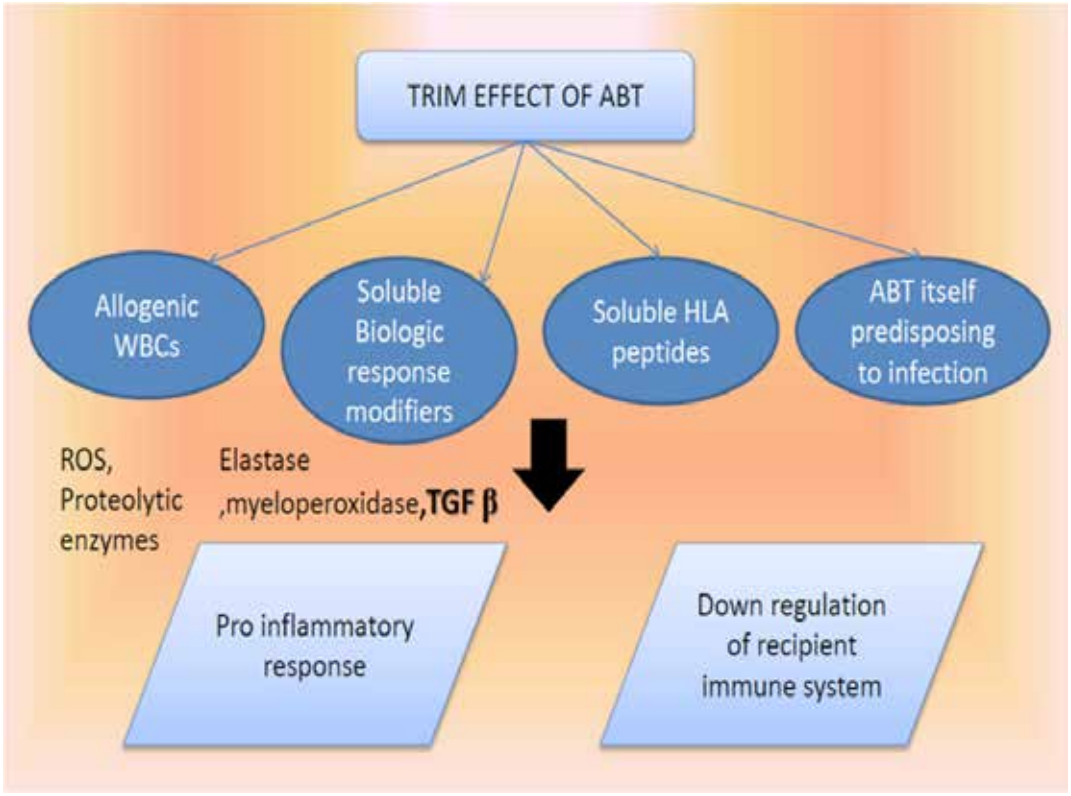
BENEFITS	RISKS
Improved renal allograft survival	Possible increased cancer recurrence
Treatment of recurrent spontaneous abortion(where they share HLA Ag with father)	Possible increase perioperative infection
Reduction of risk of crohn's disease	Increased short term mortality in cardiac surgery setting
	Increase in the risk of reactivation of CMV & HIV

Clinical Aspects

MECHANISM OF TRIM

Three possible mechanisms have been defined as the basis for the apparent association between transfusion related immunomodulation (TRIM) :

1- Immunologically active allogeneic leukocytes
2- Allogeneic leukocyte-derived soluble mediators
3- Human leukocyte antigen (HLA) peptides soluble in allogeneic plasma.



Immunologically Active Allogeneic Leukocytes
Anergic T cell

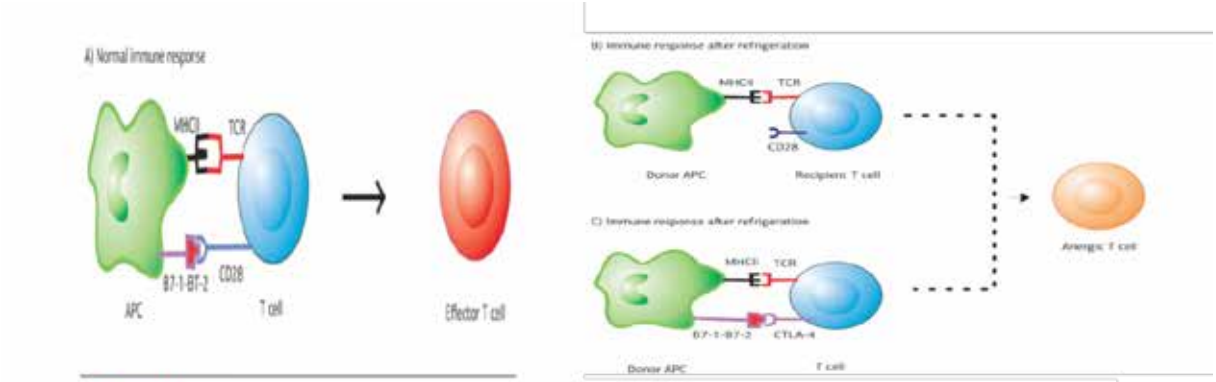


Figure 1. A) Normal immune response showing the binding of major histocompatibility complex class II molecules to the T-cell receptor (MHCII↔TCR) and between the costimulatory molecules B7-1/B7-2 and CD28 (B7-1/B7-2↔CD28), which activates the T cell and turn it into an effector cell. After refrigeration, T cells undergo anergy due to two mechanisms; B) donor antigen presenting cells (APCs) reduce the expression of B7-1/B7-2 molecules or C) the B7-1/B7-2 molecules of APCs bind to recipient cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) molecule[7].

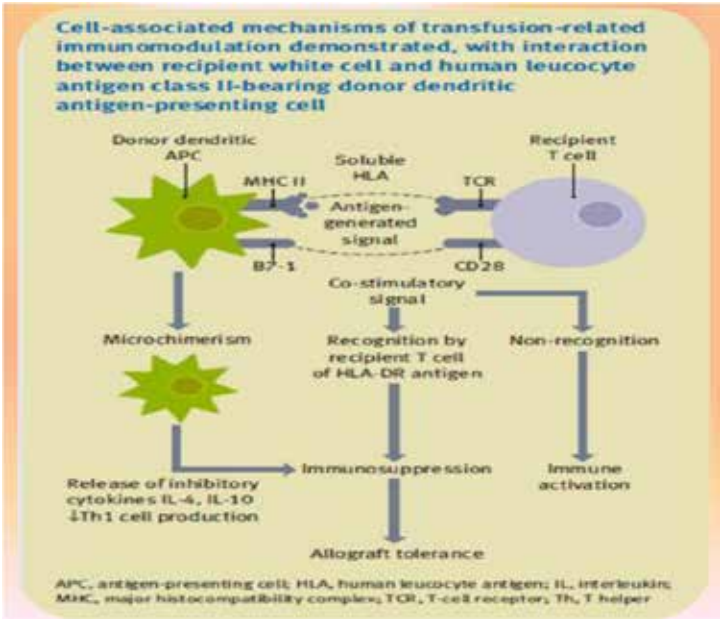
Vamvakas EC, Blajchman MA. Transfusion-related immunomodulation (TRIM): an update. Blood Rev. 2007;21(5):327-48. http://dx.doi.org/10.1016/j.blre.2007.07.003.PMid:17804128

Supression of macrophage function

Microchimerism

High HLA compatibility between donor and recipient that a small number of donor lymphocytes and APCs remain in recipient circulation or organs.

Microchimerism may also induce the development of type 2 T-helper cell (Th2) response and the release of cytokines such as interleukin 4 (IL-4), interleukin 10 (IL-10), TGF-β1. Inhibit type 1 T-helper cell (Th1) response and



macrophages activation, a reaction mediated by host immune response and leads **to reduced secretion of cytokines such as interleukin 2 (IL-2), interleukin 12 (IL-12), and interferon gamma (IFN-γ).**

Therefore, **the presence of donor cells may cause a down-regulation of patient's immune response, resulting in donor tolerance to Alloantigens.**

BIOLOGICAL RESPONSE MODIFIERS

These mediators are contained in intracellular WBC granules, and are released in a time-dependent manner as the WBCs deteriorate.

BRM includes

– Histamine
– Myeloperoxidase
– Eosinophilic cationic protein
– Plasminogen activator inhibitör

Increases 3-25 X over 0 to 35 days of storage.

They have been shown **to decrease neutrophil function** thereby contributing to development of immunosuppression

Allogeneic Leukocyte-Derived Soluble Mediators

The presence of soluble Fas ligand (sFasL) molecules(in the supernatant plasma of donor PRBCs.).

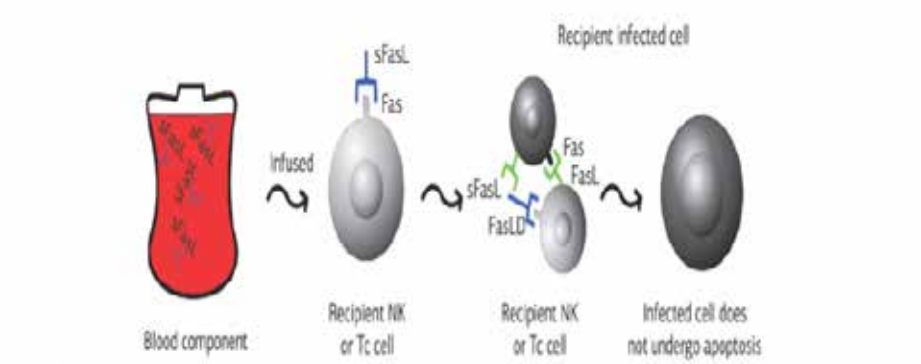


Figure 3: Soluble Fas ligand (sFasL) molecules present in the blood component, when infused into the recipient, may bind to Fas molecules of recipient natural killer (NK) or cytotoxic T (Tc) cells, thus preventing the apoptosis of host infected cells.

When sFasL is infused concurrently with blood components, these molecules may bind to Fas molecules of recipient natural killer (NK) and cytotoxic T (Tc) cells.

It compromise the function of recipient NK and Tc Cells by prevention of the apoptosis of infected cells.

Soluble HLA Molecules

Liver is the main source of HLA molecules in the circulation and they are found in the supernatant fluid of RBCs & Plasma

• Nonpolymorphic peptides derived from HLA class I molecules might induce antigen-nonspecific immunosuppression, whereas polymorphic HLA class I peptides have antigenspecific immunomodulatory effects.

• It also seems possible that allogeneic plasma containing soluble HLA antigens may enter the recipient's thymic circulation, producing clonal deletion of the recipient's T cells that are directed against the allogeneic donor antigens.

CLINICAL TRIM EFFECTS

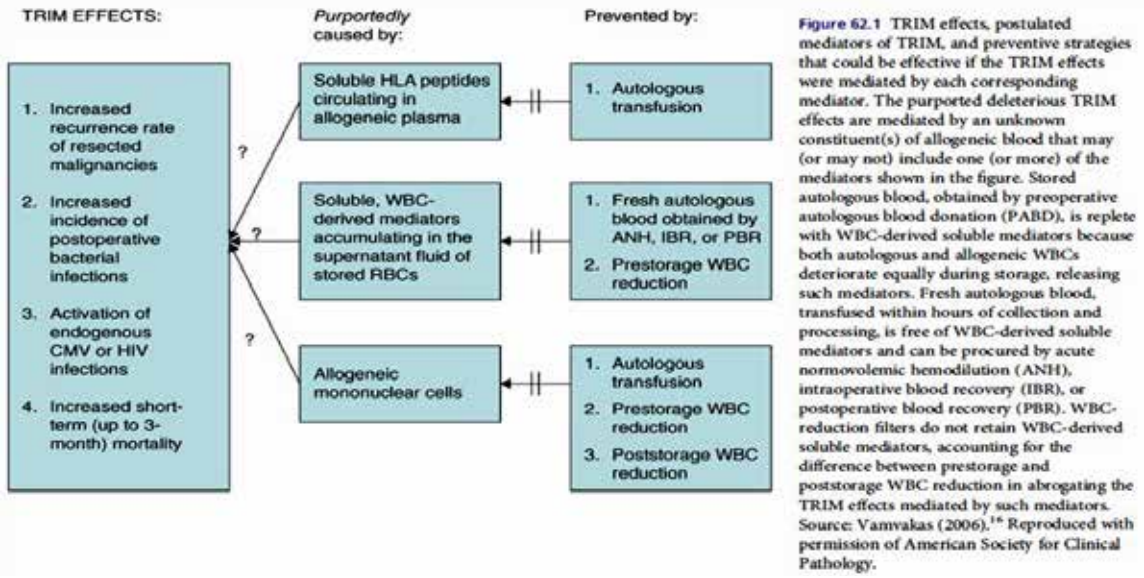


Figure 62.1 TRIM effects, postulated mediators of TRIM, and preventive strategies that could be effective if the TRIM effects were mediated by each corresponding mediator. The purported deleterious TRIM effects are mediated by an unknown constituent(s) of allogeneic blood that may (or may not) include one (or more) of the mediators shown in the figure. Stored autologous blood, obtained by preoperative autologous blood donation (PABD), is replete with WBC-derived soluble mediators because both autologous and allogeneic WBCs deteriorate equally during storage, releasing such mediators. Fresh autologous blood, transfused within hours of collection and processing, is free of WBC-derived soluble mediators and can be procured by acute normovolemic hemodilution (ANH), intraoperative blood recovery (IBR), or postoperative blood recovery (PBR). WBC-reduction filters do not retain WBC-derived soluble mediators, accounting for the difference between prestorage and poststorage WBC reduction in abrogating the TRIM effects mediated by such mediators. Source: Vamvakas (2006).[16] Reproduced with permission of American Society for Clinical Pathology.

Which Populations are in Risk?

Postoperative, Trauma,Sepsis,Cardiopulmonary Bypass, Transplantation, Pediatrics

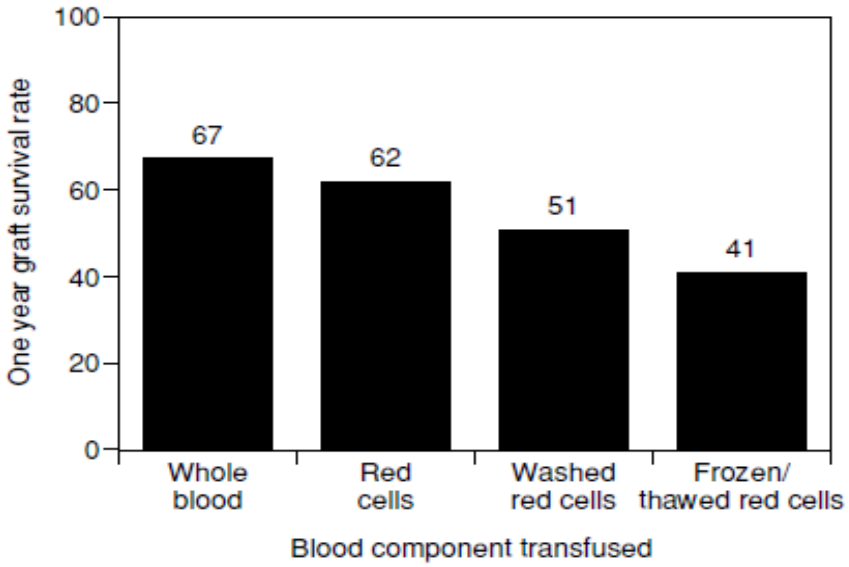


Figure 52–1 One-year kidney allograft survival in recipients of 1–5 units of allogeneic blood of the type listed is shown as a percentage of total patients with transplants. Transfusions with reduced content of allogeneic white cells, platelets, and stored supernatant plasma are associated with inferior 1-year graft-survival rates. (Data from the UCLA registry. Horimi T, Terasaki PI, Chia D, Sasaki N. Factors influencing the paradoxical effect of transfusions on kidney transplants. Transplantation 1983;35:320–323.)

BENEFICIAL EFFECTS

Solid organ transplant

Transfused patients actually experienced overall improved renal allograft survival compared with nontransfused patients. This effect was later shown to be dependent on the transfusion dose and was not observed in those patients receiving leukocyte and plasma reduced blood transfusions.

In renal transplants large randomized trial had studied , but later studies have not supported sufficiently to suggest transfusion before renal transplantation to prevent of the allogreft rejection.

Recurrent Spontaneous Abortions (RSA):

-TRIM was that paternal or other unrelated blood transfusions improve the likelihood that women with repetitive spontaneous abortions will carry a pregnancy to term.

Fetus represents a semi-allogeneic graft to its mother, and maintenance of a pregnancy depends on immunologic equilibrium between the implanted fetus and the maternal immune response to the fetus.

Type 2 immune deviation, with increased expression of cytokines such as interleukin (IL)-4, IL-5, and IL-10 plays role.

Mowbray JF, Liddell H, Underwood JL, et al. Controlled trial of treatment of recurrent spontaneous abortion by immunisation with paternal cells. Lancet 1985;1:941–943.

Reduced risk of Crohn's disease

Transfusion appears to affect favorably some autoimmune diseases thought to be mediated by cellular immunity. These include Crohn's disease (regional enteritis)
Downregulation of the type 1 inflammatory process by allogeneic transfusion.
Williams JG, Hughes LE. Effect of perioperative blood transfusion on recurrence of Crohn's disease. Lancet 1989;2:131–133.

DELETERIOUS EFFECT

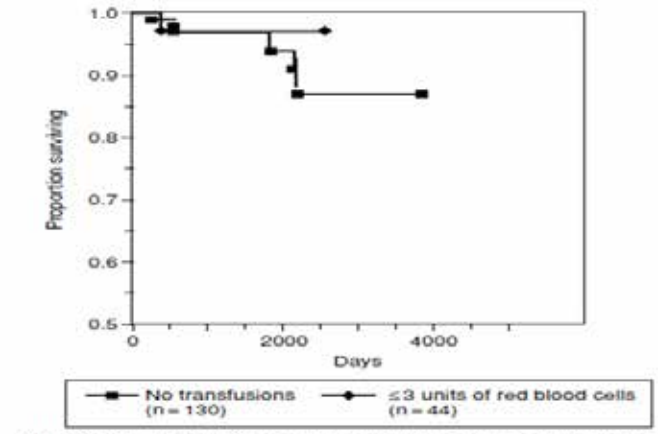


Figure 52–3 Kaplan-Meier plot of the proportion of patients remaining alive after initial surgical treatment for colorectal, cervical, or prostate cancer who received either no transfusions or ≤3 units of red cell concentrates. The two curves are not statistically significantly different.[53,54]

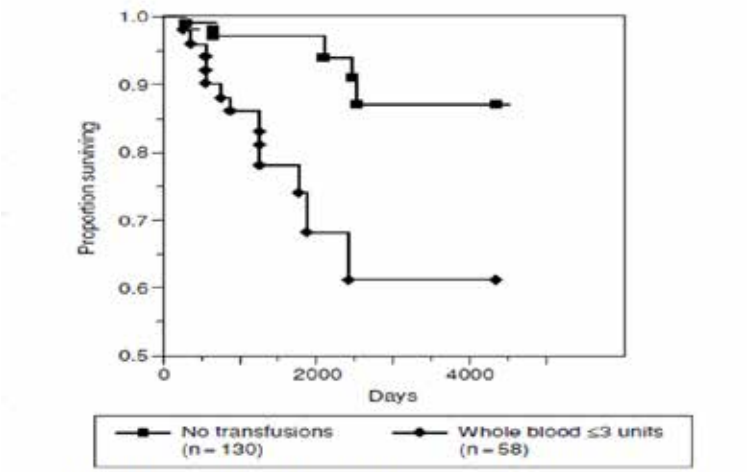


Figure 52–2 Kaplan-Meier plot of the proportion of patients remaining alive after initial surgical treatment for colorectal, cervical, or prostate cancer who received either no transfusions or ≤3 units of blood, at least one of which was whole blood. The two curves are statistically significantly different ($P < 0.001$), with the nontransfused patients having estimated mortality at 5 years of <15%, as compared with almost 40% in those receiving whole blood transfusions.[53,54]

CANCER RECURRENCE

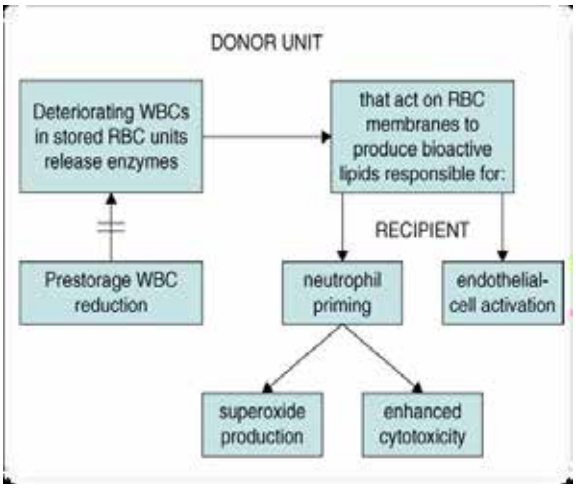
Blumberg N, Heal JM, Murphy P, et al. Association between transfusion of whole blood and recurrence of cancer. BMJ 1986;293:530–533. Blumberg N, Heal JM, Chuang C, et al. Further evidence supporting a cause and effect relationship between blood transfusion and cancer recurrence. Ann Surg 1988;207:410–415.

Leukocyte reduced transfusions may be needed to maximally benefit transfused cancer patients.

POSTOPERATIVE INFECTIONS

Allogeneic transfusion recipients are more likely to develop postoperative infections than are recipients of identical amounts of autologous transfusion.

Recipients of leukocytereduced transfusions are less likely to develop postoperative infections than are recipients of unmodified red cells.



PROPOSED MECHANISM OF NON WBC REDUCED ABT AND MULTI ORGAN FAILURE

IT'S A PROINFLAMMATORY
RATHER THAN
IMMUNOMODULATORY EFFECT

INCREASED RISK OF SHORT TERM MORTALITY (3 MONTHS POST TRANSFUSION)
It doesn not seem mortality between postoperative infection and non-WBCreduce ABT .
Tissue injury is mediated by reactive oxygen species and proteolytic enzymes released from activated neutrophils.

LEUKOREDUCED BLOOD
Leukoreduction reduces CMV,EBV, HLA alloimunization,Bacterial/parasite contamination. A number of implementation trials of universal leukoreduction have been reported. Sparrow et al has demonstrated that prestorage leukoreduction may help in abolishing TRIM.

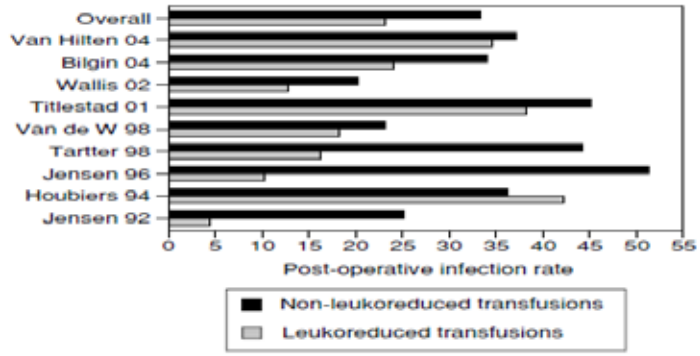
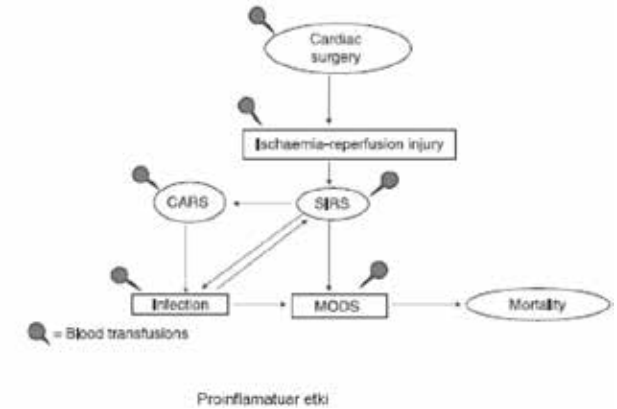


Figure 52–7 The postoperative infection rates observed in nine randomized trials of leukoreduced versus unmodified transfusions in colorectal or cardiac surgery are shown according to randomization arm (intention to treat). Six of the nine studies found statistically significant reductions in postoperative infections with leukoreduced transfusions, and in eight of nine studies, the infection rate was lower in the leukoreduced arm of the study. Nontransfused patients are excluded from these data, but patients with protocol violations (range, 0–11%) remain in the arm to which they were originally randomized. Overall, the infection rate in 1637 patients randomized to receive leukoreduced transfusions was 23%, as compared with 33% in the 1456 patients randomized to receive whole-blood, buffy-coat-poor, or unmodified red cell concentrates (equivalent to a 36% decrease in relative risk with leukoreduced transfusions; $P = .005$ in a random-effects model meta-analysis performed by Drs. Gary Lyman, Hongkun Wang, and Hongwei Zhao of the University of Rochester; unpublished data).

This figure probably understates the benefits of leukoreduced transfusions because protocol violation rates of up to 11% occurred in the leukoreduced arm of these studies.

Proinflamatuar effects



Proinflamatuar etki

Fransen et al. showed an association between allogenic blood transfusion and increased concentrations of post-operative inflammatory mediators in 114 patients undergoing cardiac surgery.

Fransen E, Maessen J, Dentener M, Senden N, Buurman W: Impactof blood transfusions on inflammatory mediator release in patients undergoing cardiac surgery. Chest; 116:1233–1239;1999

CONCLUSION

· Transfusions of allogeneic blood to animals or patients are immunomodulatory.
· Transfusions alter cellular adaptive immunity, innate immunity, and lead to both favorable and unfavorable reduced or increased inflammatory responses, depending on the clinical setting.
· Recipients of leukocytereduced transfusions are less likely to develop postoperative infections.
· Allogeneic transfusions lead to decreased type 1 and increased type 2 cytokine secretion.
· Theory of transfusion immunology
  - alloantibodies (primarily a type 2 response)
  - allergic reactions (also type 2 in origin
  - downregulation of cellular immunity (a type 1 process).

PREGNANCY AND TRANSFUSION

Chairpersons: **Ramazan Uluhan**
Mahmut Bayık

Speakers: **Sevil Sadri**
Ece Gül İbrişim
Ateş Karateke

PHYSIOLOGICAL CHANGES IN HEMATOLOGICAL PARAMETERS DURING PREGNANCY

Sevil SADRİ
Bağcılar Medipol Mega Üniversite Hastanesi Hematoloji Bölümü, İstanbul

During pregnancy many hematological, hormonal and physiological changes occur in body which are necessary for development fetoplacental unit.
Hematologic changes during pregnancy are
-Changes in blood volume
-Changes in White blood cell count
-Changes in thrombocyte count
-Increased procoagulant factors and decreased natural anticoagulants
-Reduced Fibrinolysis

Plasma Volume

At 6 to 12 weeks of gestation plasma volume increases by 10 to 15 % and expands until 30 to 34 weeks, after that decreases though term. It means that increases 1100 to 1600 mL and results 4700 to 5200 mL in total plasma volume which is 30% to 50% above in nonpregnant women.

This volume increase is thought that nutritional opportunity and metabolic demand between uterus and placenta is increasing. The change in plasma volume during pregnancy is attributed to increased plasma renin activity and reduced atrial natriuretic peptide levels. These hormonal changes due to vasodilatation and rise in vascular capac- itance.

Red Blood Cells

Red blood cell (RBC) mass increases 8 to 10 weeks of pregnancy and reaches 20% to 30% higher than nonpregnant women till the end of pregnancy. Erythropoietin production increases with gestational age, peaking at 150% in the third semester, this in turn causes of increasing RBC about 33%.

Hemoglobin

Hemoglobin (Hgb) reference range of World Health Organization (WHO) is 11-12 g/dL. The high levels in the first semester are lowered by hemodilution in second semester while compensatory mechanism (maternal plasma reduction and increased atrial-natriuretic peptides) raise Hgb in the last semester. Maternal anemia leads to preterm birth, abortion so iron supplementation suggests using during pregnancy.

Hematocrit

Hematocrit (Hct) is the percentage of RBCs in whole blood. Pregnancy decreases Hct, particularly in the last trimester due to increase in plasma volume.

Mean Cell Volume

Mean cell volume (MCV) is calculated as Hct/RBC. There is an increase in MCV in pregnancy (an average of 4 fL) which reaches a maximum at 30-35 weeks gestation, it explains with high proportion of young RBCs which are larger in size.

Mean Cell Hemoglobin

Mean cell hemoglobin (MCH) is average mass of Hgb/RBC. There is no changes in MCH during pregnancy.

Mean Cell Hemoglobin Concentration

Mean cell hemoglobin concentration (MCHC) is the average concentration of Hgb in one RBC, it is calculated Hgb/Hct. There are no changes in MCHC during pregnancy.

Platelets

Platelets count does not decrease during pregnancy particularly in the third trimester, this is termed gestational thrombocytopenia. It is due to increased clearance and platelets destruction by their activation. Hemodilu-

tion also contributes to gestational platelet reduction. Gestational thrombocytopenia does not have complications related to thrombocytopenia and babies do not have severe thrombocytopenia. However, the increased platelet aggregation especially in the third trimester makes a hypercoagulable state to thromboembolism. Platelet count returns to prepregnancy baseline level by several weeks postpartum.

White Blood Cells

Normal pregnancy is accompanied by leukocytosis caused by physiological stress, physiological stress is elevating inflammatory response due to immunomodulation, immunosuppression and selective immune tolerance of fetus. Some studies have shown that gestational leukocytosis is as result of release from marginal pools. Leukocytosis begins in the first trimester and remains high through pregnancy, it is between 6-16 x 10^9/L. White blood cell (WBC) count normalizes 4 weeks after delivery.

Normal pregnancy can also result in a small number of myelocytes or metamyelocytes in the peripheral circulation that are normal finding in a pregnant woman.

Neutrophils

Neutrophil count begins to increase in the second month of pregnancy and plateaus in the second or third trimester. Neutrophilia in pregnancy is as result of impaired neutrophilic apoptosis, pregnant woman serum has inhibitory factors which depress chemotaxis and phagocytic activity.

Lymphocytes

In normal pregnancy there is no change in the absolute lymphocyte count. Some studies observed lymphopenia during pregnancy that may be due to monocytosis which helps prevent fetal allograft rejection during the first trimester.

Monocytes

The monocyte count is generally stable. There is monocytosis especially in first trimester but decrease as gestation advances, it helps in preventing fetal allograft rejection by infiltrating the decidual tissue.

Eosinophils and Basophils

The eosinophil count may slightly increase, and the basophil count may slightly decrease. Both do not change significantly during pregnancy

Coagulation and Fibrinolysis (Hemostatic Profile)

Normal pregnancy is a prothrombin state. The shift in balance between the hemostatic and fibrinolytic systems serves to prevent excessive hemorrhage during placental separation.

Compared with nonpregnant women, pregnant women have a marked increase in coagulation factors, reduced fibrinolysis and increased platelet reactivity.

-Increased procoagulant factors: procogulant factors fibrinogen, von Willebrand factor (VWF) factors II, VII, VIII, X, XII increase by 20 to 200 %

In pregnancy activated partial thromboplastin time (aPTT) is usually shortened largely due to the hormonally influenced increase in factor VIII, however no change in prothrombin time (PT) and thrombin time (TT).

-Reduced anticoagulant factors: Protein S decrease, protein C and antithrombin (AT)

level and activity usually are stable

-Reduced fibrinolysis: activity of fibrinolytic inhibitors increases, including thrombin activatable fibrinolytic inhibitor, plasminogen activator inhibitor-1(PAI-1) and PAI-2.

The increase in D-dimers reflects the overall increase in total amount of fibrin during pregnancy consequent to increased thrombin generation, increased fibrinolysis or a combination of both.

Postpartum resolution

Pregnancy related hematologic changes return to baseline by 6 to 8 weeks after delivery.

Plasma volume decreases immediately after delivery, then increases again 2 to 5 days later because of a rise in aldosterone secretion. Finally, plasma volume is normal nonpregnant levels at 6 weeks postpartum. White blood cell (WBC) count falls t to normal range by the sixth day postpartum. Physiological anemia resolves by 6 weeks postpartum since plasma volume has returned to normal by that time. Platelets for women with gestational thrombocytopenia begins to resolve soon after delivery and is no longer present at 3 to4 weeks postpartum. Coagulation

and fibrinolysis generally occur 6 to 8 weeks after delivery.

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BLOOD TRANSFUSION IN PREGNANCY

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Blood transfusion during pregnancy may be indicated in various situations. Transfusion may cause various adverse effects which may be mortal if not managed correctly. Adverse effect of transfusion may be immunologic or infectious which may raise health costs and the possible future problems.

There are several non-emergent and emergent factors that may be indicated for a transfusion during pregnancy, in some situations transfusion saves life.

Problems Specific to The Pregnant Patient:

Physiological changes in pregnancy: Haemodilution, increase in red cell mass (20-30%), plasma volume (50%). Patient stay haemodynamically stable with the normal blood loss during delivery.

Decrease in platelet levels: gestational thrombocytopenia ,hypercoagulable state increase in coagulation factors.

Estimate of Blood Loss:

1. Visual assessment: inaccurate. Clinicians can underestimate blood loss by 50% post partum haemorrhage >500 ml after vaginal delivery and >1000 ml after caesarean sectio, do not adequately reflect the clinical response of the patient.
2. Hematocrit (Hct): Immediate Hct will not reflect actual blood loss. Even blood loss of 1000 ml will reflect a fall in Hct of only 3% in the 1st hour.
3. Urine output sensitive to changes in blood volume can give an early indication of changes in renal perfusion and hence perfusion of other organs.
4. Pulse Oximetry an imperfect tool in the haemodynamically unstable patient.

Transfusion indications in pregnancy

· Anemia of pregnancy and Haemoglobinopathies
· Obstetric hemorrhage
· Surgeries where significant blood loss is expected

Indications for elective blood transfusion:

Anemia anemia: due to iron deficiency is one of the most common reasons for a blood transfusion during pregnancy and is considered a non-emergency situation. For anemic women, even a small amount of bleeding during delivery could cause a complication, a blood transfusion prior to delivery can help avoid those.

Antepartum anaemia : responsible for 15% of maternal mortality. Early correction avoids the need for transfusion and reduces maternal mortality.

Intrapartum anaemia : In addition to major hemorrhage guidelines, obstetric units should have guidelines on criteria for red cell transfusion in anemic women who are not actively bleeding. If the Hb is less than 7 g/dl in labour or in the immediate postpartum period, the decision to transfuse should be made according to the individual's medical history and symptoms

Postpartum anaemia: If the Hb is less than 7 g/dl in the postpartum period, where there is no ongoing or threat of bleeding, the decision to transfuse should be made on an informed individual basis.

Example of Transfusion Guidelines for Chronic Anemia in Pregnancy

Before 36 gestational weeks:

1- Haemoglobin 5.0 g/dl or below, even without clinical signs of cardiac failure or hypoxia
2- Haemoglobin between 5.0 and 7.0 g/dl and in the presence of the following conditions: Established or incipient cardiac failure or clinical evidence of hypoxia, pneumonia or any other serious bacterial infection; Malaria. Pre-

existing heart disease, not causally related to the anaemia

36 or more gestational weeks:
1- Haemoglobin 6.0 g/dl or below
2- Haemoglobin between 6.0 g/dl and 8.0 g/dl and in the presence of the following conditions: Established or incipient cardiac failure or clinical evidence of hypoxia, pneumonia or any other serious bacterial infection: Malaria . Pre-existing heart disease, not causally related to the anaemia.
When elective caesarean sectio is planned and there is a history of: Antepartum haemorrhage (APH), Postpartum haemorrhage (PPH), Previous Caesarean sectio.
1- Haemoglobin between 8.0 and 10.0 g/dl: establish/confirm blood group and save freshly taken serum for crossmatching
2- Haemoglobin less than 8.0 g/dl: two units of blood should be crossmatched and available Note: Specific indications for transfusion for chronic anemia in pregnancy should be developed locally. Transfusion does not treat the cause of anemia or correct the nonhematological effects of iron deficiency
Haemoglobinopathies:

Sickle cell anemia is caused by a genetic mutation that leads to the production of abnormal S hemoglobin known as sickle hemoglobin. Sickle hemoglobin binds less oxygen than normal, lowering the oxygen-carrying capacity of the blood. Pregnant women with sickle cell disease have an increased rate of maternal and fetal morbidity and mortality.

In sickle cell anemia patients, blood transfusion is used to provide normal red blood cells to the patient's body. Red blood cell transfusions help to correct anemia and to lessen the blood's viscosity, allowing it to flow more freely which attenuates disease symptoms and prevent complications.

There are two different kinds of red blood cell transfusions: simple transfusions and exchange transfusions. Simple transfusions are used to deliver additional healthy red blood cells to the patient's body, while exchange transfusions exchange the patient's sickle-shaped blood cells with healthy ones — lowering the concentration of sickle cells without increasing blood viscosity. Simple transfusions are typically given in intervals, possibly once or twice a month, to maintain a healthy proportion of normal to sickle red blood cells

Transfusions can also be divided into acute, long-term, and short-term transfusions. Acute transfusions are given briefly before surgery and delivery and long-term blood transfusion therapy for the prevention or treatment of chronic complications of disease. Short-term transfusions are given to assist a pregnancy. There is insufficient evidence to suggest a definitive Hb level at which a pregnant woman should be transfused, but transfusion has been suggested if the Hb is <7 g/dL or >2 g/dL below baseline. The conservative regimen (aiming for Hb 10 g/dL) was as effective as the aggressive regimen (aiming for Hb of 10 g/dL and HbS <30%) in preventing perioperative complications, although alloimmunization was more common in the aggressive transfusion. (to advised: sickle cells must be at least <%30 before delivery)

It concluded that **prophylactic transfusion** might benefit pregnant women with sickle cell disease. Prophylactic transfusions were started at 8 to 14 weeks gestation in 78% of patients and at 20 to 26 weeks gestation in the remainder. Participants had either simple or partial exchange transfusions to obtain Hb of 10 to 11 g/dL and HbS of <30%.

Fetal complications in particular may be caused by placental sickling which occurs very early in pregnancy and therefore if prophylactic transfusion is going to have an impact on fetal well-being (growth and prematurity), it may need to be commenced early in pregnancy.

Thalassemia is a group of blood diseases caused by decreased production of Hb. Women with thalassemia who require blood transfusions often have a higher rate of infertility. However, some women with the disease are able to become pregnant. The stress of pregnancy can make the symptoms of thalassemia worse. The woman's heart and liver are most vulnerable during pregnancy, as is the endocrine system, which secretes hormones in the body.

Pregnant women must be examined monthly until the 28th gestational week and every 2 weeks thereafter. Women should be screened for gestational diabetes at 16 weeks, and if normal this should be repeated again at 28 weeks. Anemia in women with thalassemia deteriorates during pregnancy; Thalassemia per se in combination with gestational anemia (secondary to increased fluid compartment of the body) account partly for different

complications of the thalassemic pregnancy, such as fetal intrauterine growth restriction (IUGR) and preterm labor. Most centers transfuse pregnant women aiming to maintain hemoglobin at the preconception goal (>10 g/dL) to ensure appropriate fetal growth. Chelation must be stopped as soon as pregnancy is diagnosed. Despite following this approach, IUGR may be present, suggesting the role of other fetoplacental and maternal factors, while transfusion-acquired red-cell

Blood Transfusion In Obstetric Haemorrhage: Major cause of maternal mortality in word. First leading; Postpartum haemorrhage 25% of all pregnancy-related deaths Massive haemorrhage 1000-1500 ml 50% blood volume loss within 3-h or rate of loss of 150 ml/min.
Causes: **Early pregnancy** : Abortions , Ectopic pregnancy

Later pregnancy: Antepartum haemorrhage : Placenta previa, placental abruption , bleeding from vaginal or cervical lesions

Primer Postpartum haemorrhage : Significant bleeding during birth, or immediately after, is called a postpartum hemorrhage and is considered an emergency that may require a blood transfusion and surgery.

Postpartum hemorrhage can be described by the "four Ts":
1- Tone: uterine atony is the inability of the uterus to contract and is the most common cause of a postpartum hemorrhage.
2- Trauma: even in a closely monitored delivery, trauma can occur and cause bleeding.
3- Tissue: retention of tissue from the placenta or fetus, or placental abnormalities, can lead to bleeding.
4- Thrombin: a clotting problem that causes a woman to not be able to stop bleeding during a delivery and uterine inversion

Secondary postpartum haemorrhage : Puerperal sepsis, Retained products of conception, Tissue damage following obstructed labour, Breakdown of uterine wound after Caesarean section

DIC: Intrauterine death, Amniotic fluid embolism, Sepsis, Pre-eclampsia, Abruptio placentae, Retained products of conception, Induced abortion, Excessive bleeding Acute fatty liver

The mainstay of management of haemorrhage is rapid resuscitation with crystalloids to restore and maintain the circulating blood volume to prevent tissue and organ hypo-perfusion. Role of blood transfusion in acute haemorrhage is to maintain tissue oxygenation and reversal or prevention of coagulopathy using appropriate blood components. Simultaneously, the cause of the bleeding should be identified and controlled, by medical means, surgery.

Goals of management of massive blood loss: Role of blood transfusion in acute haemorrhage is to maintain tissue oxygenation and reversal or prevention of coagulopathy using appropriate blood components. Prevention and treatment of hypothermia, acidosis and hypocalcemia will ensure optimal function of transfused coagulation factors. Simultaneously, the cause of the bleeding should be identified and controlled, by medical means, surgery . The common goals for transfusion in the obstetric patient: **Hb ≥8 g/dl Platelet 50x 109/ L PT ≤1.5 times normal APPT ≤1.5 times normal Fibrinogen 2 g/L**

The risk of dilutional coagulopathy needs to be keep in mind when multiple units of PRBCs and crystalloids/ colloids are used. The lowest mortality occurs in the patients where ratio of plasma (TDP), RBC and PLT is 1:1.1

General Principles of Blood Transfusion in Pregnancy:
General principles of transfusion **in pregnancy and the puerperium** ABO-, rhesus D- (RhD-) and K- (Kell-) compatible red cell units should be transfused. If clinically significant red cell antibodies are present: RBCs negative for responsible antigen should be cross-matched before transfusion; close contact with the transfusion laboratory is essential to avoid delay in transfusion in life- threatening case. CMV seronegative red cell and Platelet components, should be provided for elective transfusions during pregnancy but standard, leucodepleted units may be used in an emergency to avoid delay.

In an extreme situation and when the blood group is unknown: group O RhD-negative red cells should be given (although they may be incompatible for patients with irregular antibodies). Staff working in obstetric units should be aware of the location of the satellite blood fridge (where available) and should ensure that access

is possible for blood collection. Alloimmunization of RhD negative women is the most important cause of HDFN. It was a major cause of perinatal mortality before routine postnatal anti-D Ig prophylaxis was introduced. Women may be alloimmunised by feto-maternal haemorrhage during pregnancy or at delivery, or by blood transfusion. Anti-D Ig should be administered within 72 hours of delivery of a RhD positive baby or a potentially sensitizing event in pregnancy in accordance with national guidelines.

Requirements for group and screen samples and cross-matching. All women should have blood group and antibody status checked at booking and at 28 w. Group and screen samples used for pre-transfusion tests in pregnancy should be less than 3 days old. Transfusion or pregnancy may stimulate the production of unexpected antibodies against red cell antigens through either a primary or secondary immune response. To ensure that the specimen used for compatibility testing is representative of a patient's current immune status, serological studies should be performed using blood collected no more than 3 days in advance of the actual transfusion when the patient has been transfused or pregnant within the preceding 3 months.

In a woman at high risk of emergency transfusion: placenta praevia, and with no clinically significant alloantibodies group and screen samples should be sent once a week {exclude or identify any new antibody formation keep blood available if necessary}. Close contact with the hospital transfusion laboratory is essential.
Blood Components used for Obstetric Haemorrhage (hge) .

Red cell transfusion: There are no firm criteria for initiating red cell transfusion. The decision of blood transfusion should be made on clinical and hematological grounds. The decision for blood transfusion: If Hb is <6 g/dl transfusion is indicated irrespective of cause and condition of the patient. If Hb is between 6 and 10 g/ dl, the indication will depend upon whether patients are actively bleeding or having history of previous excessive haemorrhage or having some medical condition where optimal Hb is >7 g/dl is required. If Hb≥10.0 g/dl, transfusion rarely required . If Hb is normal but in the presence of acute haemorrhage, transfusion is required.

FFP: Dose: 12–15 ml/kg should be administered for 6 units of red cells during major obstetric hge. Subsequent FFP transfusion should be guided by the results of clotting tests if they are available in a timely manner, aiming to maintain PT and APTT ratios at less than 1.5 x normal. It is essential that regular full blood counts and coagulation screens (PT, APTT and fibrinogen) are performed during the bleeding episode.

Cryoprecipitate : Dose: two 5-unit pools should be administered early in major obstetric hge. Subsequent transfusion should be guided by fibrinogen results, aiming to keep levels above 1.5 g/l.

The FFP and cryoprecipitate should ideally be of the same group as the recipient. If unavailable, FFP of a different ABO group is acceptable providing that it does not have a high titer of anti-A or anti-B activity. No anti-D prophylaxis is required if a RhD- negative woman receives RhD-positive FFP or cryoprecipitate.

Platelets Aim: maintain the platelet count above 50 x 109/l in the acutely bleeding patient. A platelet transfusion trigger of 75 x 109/l is recommended to provide a margin of safety. The platelets should ideally be group compatible. RhD-negative women should also receive RhD- negative platelets.

Thrombocytopenia in pregnancy has many common causes, including gestational thrombocytopenia, viral and bacterial infections, and preeclampsia complicated by hemolysis, elevated liver enzymes, and low platelet (HELLP) syndrome. Thrombocytopenia (platelets (PLTs) < 150·109/L) in pregnancy may be caused by gestational thrombocytopenia (GT) (59%), immune thrombocytopenic purpura (ITP) (11%), preeclampsia (10%), and the HELLP syndrome (12%). PLTs < 100x109/L are relatively rare in preeclampsia and gestational thrombocytopenia, frequent in ITP and obligatory in the HELLP syndrome.

The HELLP syndrome was named by Dr. Louis Weinstein in 1982. It has been known for a long time that preeclampsia may be associated with hemolysis, elevated liver enzymes and thrombocytopenia .During pregnancy, many may suffer from HELLP syndrome require a transfusion of some form of blood product (red cells, platelets, plasma). A platelet count of <100.000/μL is one of the diagnostic criteria of HELLP syndrome. Platelet transfusions to the women with HELLP syndrome is done if platelet counts are too low. The aim is to maintain platelet count around the safety limit of above 50.000/mL. Platelet counts must be not under 40 000/mL in women with HELLP syndrome.

ITP is a clinical syndrome with thrombocytopenia which may be manifested as a bleeding disorder with purpura and petechiae. Pregnancy does not increase the incidence of ITP, nor does it exacerbate a preexisting disease. Even in many patients with a very low platelet count, neither maternal nor fetal morbidity or mortality is increased. Although rare, spontaneous bleeding is the main maternal risk especially when the platelet count falls below 20.000/mL. Steroids or IVIG are recommended before 36 weeks if platelet count is under 30.000/iL, the patient is symptomatic or an invasive procedure is considered around delivery, the aim is to maintain platelet count above 50.000/mL, the level considered safe for both vaginal and cesarean delivery.

SUMMARY: Indications of Blood Transfusion in Obstetrics

1. If Hb <6 g/dl and there are <4 weeks for delivery
2. If Hb is <7 g/dl in labour or in immediate postpartum period, blood transfusion is only indicated if there is previous history of bleeding or patient is prone for bleeding due to some medical condition.
3. If Hb is 7 g/dl and if bleeding is continuing or the patient is at risk of further significant hge or presenting severe symptoms that need immediate correction (cardiac decompensation).
4. Transfusion in patients with sickle disease and thalassemia should only be reserved for severe situations because prophylactic transfusion is associated with increases in costs, number of hospitalizations, and the risk of alloimmunization.

Key points:

1. Anemia in pregnancy is a hemoglobin concentration of less than 11 g/dl in the first and third trimesters and 10.5 g/dl in the second trimester.
2. The diagnosis and effective treatment of chronic anemia in pregnancy is an important way of reducing the need for future transfusions. The decision to transfuse blood should not be based on haemoglobin levels alone, but also on the patient's clinical need.
3. Blood loss during normal vaginal delivery or Caesarean section does not normally necessitate transfusion provided that the maternal hemoglobin is above 10.0–11.0 g/dl before delivery.
4. Obstetric bleeding may be unpredictable and massive. Every obstetric unit should have a current protocol for major obstetric haemorrhage, and all staff should be trained to follow it.
5. If disseminated intravascular coagulation is suspected, do not delay treatment while waiting for the results of coagulation tests.
6. The administration of anti-Rh D immunoglobulin to all Rh D negative mothers within 72 hours of delivery is the most common approach to the prevention of Rhesus disease of the newborn.

The decision for transfusion should not be made on the basis of Hgb estimation alone . Healthy and clinically stable women do not require blood transfusion even with Hb of <7 g/dl.

Blood Transfusion; How Much to Give And When To Stop?

The decision for blood transfusion ; Hb≤6.0 g/dl almost always required
Hb≥10.0 g/dl rarely required,
Hb is normal but acute hge ; required

Single Hb/Hct ± misleading ± delay initiating red cell transfusion: Serial measurements helpful

The decision to perform a blood transfusion should be made on both clinical and hematological grounds. The majority of protocols recommended that Hct be maintained minimally at 21-24%; however, in actively bleeding patient, target Hct should be 30%. To avoid dilutional coagulopathy, concurrent replacement with coagulation factors and platelets may be necessary. There should be a clear local protocol on how to manage major obstetric **haemorrhage .**

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LAPAROTOMY AND HYSTERECTOMY DECISION IN PPH CASES

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Postpartum hemorrhage (PPH) is an obstetrical emergency that is still one of the main reasons of maternal mortality in industrialized and underdeveloped countries. Prediction, early diagnosis, good usage of resources, early response, and a well-organized team are major determinants which help to reduce mortality rates. PPH is divided into two separate periods depending on its time of occurrence. PPH; which occurs within 24 hours following delivery is defined as primary, or early onset PPH. It is secondary, or late onset PPH when it occurs after 24 hours till first twelve weeks of post-partum period.

Definition criteria for PPH; shows differences in various clinical centers. More than 500 cc hemorrhage during vaginal delivery, and >1000cc hemorrhage during c-section are both accepted as 'abnormal gestational bleedings'. Because of the increased blood volume during pregnancy, the body can tolerate up to 1000-1500 cc of blood loss. Symptoms occur when there is about 1500-2000cc of hemorrhage. PPH sometimes can be missed very easily due to amniotic fluids which prevent detection of actual amount of blood loss. American College of Obstetricians Gynecologists (ACOG) has defined it as postpartum hemorrhage which cause hypovolemia symptoms [1]. Relevant clinical observations also support this definition of ACOG. Time has upmost importance for the management of PPH. Each minute which is lost can be fatal and that may lead to formation of mortality triad, coagulopathy, acidosis, hypothermia.

Causes of PPH; has been discussed in 4 major categories; uterine tonus, tissue damage, trauma and thrombin factor. Lack of effective uterine tonus which is also known as uterine atony is caused by intensive uterus tension (multiparity, polyhydramnios, macrosomia), drugs that decrease the contractile strength of uterus(nifedipine, magnesium, betamimetics, indomethacin, nitric oxide) partum precipitate or prolonged labor (induced labor with oxytocin), chorioamnionitis, halogen anesthetics, myoma uteri etc. [2,3]. Hemorrhage caused by tissue damage may occur if there is present of myoma uteri, placental retention, placental invasion abnormalities, previous history of uterine surgery (myomectomy, c-section), labor dystocia, prolonged tertiary stage of labor, extreme cord traction, etc. PPH secondary to trauma may be due to macrosomic baby, operative delivery, precipitate delivery that eventually cause vaginal injury, cervical lacerations, uterus rupture, extended episiotomies [4]. Forth 'T' states the causative factors of coagulopathy; HELLP (Hemolysis, Elevated Liver Enzymes, Low Platelets) syndrome, disseminated intravascular coagulation coagulation (preeclampsia, septicemia, ablatio placentae, amniotic fluid embolism) hypertension caused by pregnancy, sepsis, Von Willebrand disease, anticoagulant usage. Patients having 'T' situation are prone to bleed more than average. Thus, those patients should be treated in tertiary medical centers where extended surgical interferences can be performed. Early onset PPH is mainly due to uterine atony and late onset PPH mostly occur because of placental retention or infections [5]. Early diagnosis has upmost importance in management of PPH to gain most satisfying results.

When PPH is first diagnosed, patient history should be taken precisely to understand the pathology that is causing the bleeding (from the patient, patient's relatives or the patient's physician). General physical examination, as well as abdominal and vaginal examinations should be done accordingly. Obstetrician, anesthesiologist, critical care nurse and specialist, operation room staff, blood bank technician and manager and unit manager must be notified of the clinical situation. One nurse solely should take the notes. Vulva, vagina, cervix and uterus control should be done meticulously under lithotomic position. Abdominal and vaginal ultrasound is beneficial, and if possible, must be performed in a short time. The decision for method of delivery and defining the causative factor is crucial to ascertain the need of emergency surgery. At least two IV catheters should be placed with large gauge needles (14G, 16G). The patient should be monitored. Blood samples should be driven for complete blood count (CBC), PT, aPTT, fibrinogen, electrolytes, blood group and cross-match tests. Determining the level of acidosis by measuring venous blood gas is critical for cases having shock symptoms. Urinary catheter should be placed. Liquid replacement should be done routinely. It should always be kept in mind that most common causes of preventable deaths are due to delay in fluid replacement and also wrong applications as well. Assessment of blood's ability to carry O2 and functioning of the coagulation system should be aimed. Necessary blood products should be reserved. Transfusion shouldn't be delayed in cases of massive PPH (More than 30% blood loss). It is noteworthy that fast and effective transfusion is life-saving. Underlying cause of bleeding should be investigated simultaneously,

and treatment should be performed accordingly. Transfusion wouldn't be curative while the bleeding continues. Briefly time is of the essence, and every minute that pass by will make it more challenging.

In treatment of PPH; conservative approaches should be tried if possible. Tachycardia and uncontrolled hypotension with anuria or oliguria despite aggressive treatment means that the bleeding continues and at least 30% of the blood volume is lost. In acute hemorrhage, hemoglobin and hematocrit levels may remain within normal levels. Even PT and aPTT measurements may be within limits. Serum fibrinogen is highly valuable in both determining the severity of the hemorrhage and functioning of coagulopathy as well. Less than 100 mg/dl fibrinogen points to severe PPH which necessitates multiple transfusions, surgical treatment that eventually leads to increased maternal mortality [6]. Controlling PPH less than 200mg/dl of fibrinogen is not possible. Clinical experience of the physician and the institute are important elements in deciding laparotomy. There are multiple classifications to define the stages of blood loss. Most known are 'California Maternal Care and Hemorrhage Protocol' and 'The Advanced Trauma Life Support'. Both guidelines have 4 stages. First two stages present compensated blood loss and the other two stages demonstrate decompensated blood loss [7,8]
California Maternal Care and Hemorrhage Protocol
Stage 0: Blood loss < 500ml vaginal or <1000 ml Cesarean. Hemodynamically stable
Stage 1: Blood loss > 500ml vaginal or >1000 ml Cesarean, or Hemodynamic parameters change (by >15% or HR ≥110, BP ≤85/45, O2 sat<%95)
Stage 2: Continued bleeding with total blood loss <1500ml
Stage 3 :Total blood loss >1500ml, or >2 units PRBCs given or Hemodynamically unstable or suspicion of DIC
Advanced Trauma Life Support
Stage 1: Volume loss up to 15% of total blood volume (approximately 750 ml). Heart rate is minimally elevated or normal. No change in blood pressure, pulse pressure, or respiratory rate.
Stage 2: Volume loss from 15% to 30% of total blood volume, from 750 ml to 1500 ml. Heart rate and respiratory rate become elevated (100 BPM to 120 BPM, 20 RR to 24 RR). Pulse pressure begins to narrow, but systolic blood pressure may be unchanged to slightly decreased.
Stage 3: Volume loss from 30% to 40% of total blood volume, from 1500 ml to 2000 ml. A significant drop in blood pressure and changes in mental status occur. Heart rate and respiratory rate are significantly elevated (more than 120 BPM). Urine output declines. Capillary refill is delayed.
Stage 4: Volume loss over 40% of total blood volume. Hypotension with narrow pulse pressure (less than 25 mmHg). Tachycardia becomes more pronounced (more than 120 BPM), and mental status becomes increasingly altered. Urine output is minimal or absent. Capillary refill is delayed.

Indications for laparotomy should be defined according to every clinics' own resources. Texas children hospital algorithm suggested that laparotomy should be performed for patients having uterus atony and 1500 ml or more blood loss. Before main procedure; manual aortic compression, resuscitative endovascular balloon occlusion of the aorta(REBOA) as well as intra aortic balloon catheter can be endeavored. Maternal death can be prevented by immediate evaluation of clinical scenarios following effective treatment of the patient. First hours of PPH is critical therefor early interventions can reduce the amount of blood loss. As the authors of the present study, based upon our clinical experience in this field we claim that delayed surgical intervention up to the decompensate stage may lead to increased morbidity and prolonged intensive care unit duration.

Decision of laparotomy should be considered for patients whose hemodynamic parameters are not stable despite of aggressive fluid resuscitation. Especially if the serum fibrinogen level is less than 100mg/dL, the maternal mortality risk is increased. Under these circumstances, a surgeon should always keep in mind that there can be a conversion to hysterectomy. As the clinical scenario become more critical, coagulation disorders and decompensated shock may occur very rapidly as well. Laparotomies that will be performed because of post-partum bleeding, should be started by middle line incision in lithotomy position. In addition to that, middle line incision should be the first choice if surgeons have suspicion of placental invasion anomaly or retroperitoneal hematoma. In case of postpartum bleeding following C/S, which is performed with Pfannenstiel incision, an additional midline incision should be made also and that should be combined with the Pfannenstiel incision in case of inadequate exposure. Surgical explorations are crucial if there is the need of a vascular ligation or if there is presence of retroperitoneal hematoma due to aberrant placentation. Using a retractor effectively can improve the efficiency of surgical exploration. Multidisciplinary approach under general anesthesia should be preferred to perform these operations. Necessary blood products must be reserved before the operation. At least 2 vascular access should be performed, and if necessary, a CVP (Central venous pressure) catheter should be inserted. Fresh frozen plasma for quick recovery of coagulation profile and erythrocyte suspension for blood replacement should be at hand and be used as well. It is advised to demand thrombocyte suspensions if thrombocytes drop below 100.000 m3, and it

is indicated to transfuse below 75.000 m3. The fibrinogen concentrate infusion should be proceeded rapidly until the serum fibrinogen level reaches 200 mm / dl. Antibiotic prophylaxis should be done. All abdominal cavities, vascular plexus of the uterus and anterior/posterior section of the uterus should be examined. Apart from the genital system, liver rupture, spleen rupture, and aneurysms should be the main concerns in abdominal examination for source of bleeding. All clots and blood should be cleaned. The bleeding focus should not be coagulated instead, the surgeon should ligate the focus if possible. In order to stop the bleeding without performing a hysterectomy, the basic surgical methods should be efficient and rapid. During these procedures, surgeons must check the vital hemodynamic parameters and should be informed of the time periodically. It is crucial for the surgeon to be aware of the time for the success of the operation. During the procedure, the pressure on the aorta from 3-4 cm above from promontorium by a second surgeon's fist can sustain the bleeding and may be significantly beneficial for the sake of exploration. If atony occurs during c-section or when laparotomy is performed due to atony, uterus massage and cavity control should be implemented primarily. Bakri balloon can be administered from the abdomen if atony occurs during a c-section. Uterine compression sutures, such as B-lynch suture, Square sutures, Hayman technique, Makino-Takeda suture, Pereira technique, Hackethal Sandwich method, can be also used for the treatment of atony. Besides various suturing techniques, devascularization methods such as ligation of uterine, hypogastric and ovarian arteries are effective as well. If the placenta is intact; the removal of the placenta should be expected spontaneously with applying mild traction to lend assistance. Spontaneous detachment of the uterus may occur in cases of placenta accrete. There would be no detachment in the placenta percreate and placenta acreate. In case of placental inversion which exceeds the uterus through the lateral wall of the pelvis and main vascular beddings, the placenta may be kept in place but it is not a method we recommend unless surgeons are in a difficult situation [9,10,11]. Also, in placental percreata and placental increate cases, if the invasion is on a small area, the uterus may be preserved [9,10]. But, if the area is large, the uterus should not be preserved since preservation efforts could verge the patients into irreversible stages which can induce massive bleeding with cardiovascular collapse, severe acidosis, and tissue hypoxia despite performing a hysterectomy. Myocardial cells lose their contractility in acidic and hypoxic environment which can create a snowball effect for tissue hypoxia and makes it even worse. If the invasion is in a large area, surgeons should perform hysterectomy without wasting any time[12]. In the presence of retroperitoneal bleeding, bleeding vessels and tissues should be sutured. If vascular lacerations or uterine rupture are present, suturing should be attempted at first sight.

Peripartum Hysterectomy is a life-saving procedure. According to the data from the United States of America, hysterectomy is applied in every 1 out of 100 patients[13]. Advanced maternal age, multipartite, antepartum bleeding, preeclampsia, bleeding disorders, use of assisted reproductive techniques are some of the risk factors [14,15,16]. Hysterectomy should be performed without delay in Abnormal placentation, atony, trauma with lower uterine segment, sepsis, hysterectomy, and difficult-to-repair uterine rupture. Abnormal placentation and atony are 30-50% cause of hysterectomy[17,18]. In cases where preoperative diagnosis is possible such as abnormal placentation, cesarean should be carried out with a prepared hysterectomy . In one study, the rate of hysterectomy in abnormal placentation was given as 60% [19]. In a population-based study, it is mentioned that after the first vaginal delivery possibility of undergoing a peripartum hysterectomy is 1 in 30.000 patients. In the same study, 2 or more previous delivery histories with a c-section is happened to be the riskiest group (1 in 200 patients.) [20]. Blood and fluid preparations should be made in placentation anomalies with preoperative diagnosis. If necessary, a gynecologic oncologist and urologist can be asked for visitation. Supracervical hysterectomy can be performed in procedures due to atony. In cases which cervical area is involved as in lower segmental placental insertion abnormalities or uterine rupture in cervical region, total hysterectomy should be performed. Rating of the invasion should be evaluated carefully considering patients who have not been diagnosed preoperatively with placental invasion anomalies. In case of an undiagnosed placentation anomaly, the degree of invasion during the operation may not be accurately assessed by physical examination. Vascular extensions throughout the obturator fossa, bladder, cardinal ligament and additional palpation of extensions are strong evidences for advanced cases. Using fertility protective procedures in cases with insufficient knowledge of invasion rating will lead to shortening of the intervention period for surgeons. It should be reminded that performing a second laparotomy in these particular cases can increase the mortality risk. As the authors of the present study, we recommend switching to total extra facial hysterectomy quickly. If the operation is performed in a healthcare facility without adequate blood product or physician support, in case of severe symptoms of invasion, the fetus should be removed with fundal incision distal from the placenta. Thereafter cordon should be ligated, and traction should be performed. In order to avoid any complication and blood loss, without any dislocation of placenta, uterus, and abdomen should be closed promptly. The patient should be referred to the appropriate department. If the decision over continuation of operation is taken by the operative team, then anesthesiologists should be warned about the risks of massive blood loss, and afterwards, hysterectomy should be performed with necessary equipment and healthcare personnel. Manipulations in ligation of the internal iliac artery (hypogastric), specifically in cases of when the uterus is located in the base of

pelvis, may cause massive bleeding [21]. Methods such as pressure or strangulation by hand with maximum uterine traction to the cervix, provided by first assistant or operator, can reduce the risk of blood loss and may facilitate the operation. Hysterectomy should be performed extrafasial and total. Release of the cervix due to fear of ureter injuries may cause the continuation of blood loss. Therefore, ureters should be located/explored in the first phase in order to perform precise and rapid surgery. Stabilization and hemostasis of non-severe bleeding should be applied post-hysterectomy. In cases when ureter cannot be located, necessary surgical interventions should be accomplished immediately. After adequate hemostasis has been provided, surgical field and retroperitoneum should be explored. During exploration, we recommend ligation of hypogastric artery. It should not be forgotten that the prevention of mortality due to high PPH is a priority over the protection of ureter. Hemostasis should be redone after the blood pressure is stabilized. If systolic arterial blood pressure drops below60 mm hg during the operation, the operation should be interrupted for control of pelvic and aortic pressure, and the anesthesiologist should provide necessary transfusion to fill the vascular bed properly. Because at low systolic arterial pressure, coronary vessels will not be perfused adequately and consequently myocardium will be severely damaged. Placing one or more abdominal drainage catheters and transfer of these patients to ICU are recommended for postoperative follow–up.

If bleedings in the lower portion of the uterus can't be stopped with a balloon, and also other types of treatments or if placental insertion anomaly covers a large area in the lower segment, total hysterectomy is the first preference in interest of reducing the mortality and morbidity. The amount of bleeding, coagulation diathesis and acidic condition of patients are other types of parameters that should steer the surgeons to choose the treatment option of hysterectomy. Hysterectomy is also the main option for the patients who have serum fibrinogen levels below 10mg/dL and a serum thrombocyte level less than 50.000 m3. Cases with severe acidosis have arterial blood lactate above 10mMol/L. These values should point out to the surgeons that the patient's tissue perfusion is severely impaired and possibly consumes its reserves. After examining about 500 patients with postpartum bleeding, we conclude that total hysterectomy with hypogastric artery ligation seems to be the safest treatment option to stop bleeding and retain the homeostasis. Patients, who pass through these type of operations, having coagulopathy, acidosis or hypothermia may not be improved during operation. Bleeding may continue in the form of infiltration after the pelvic pressure is released. For prevention of this type of bleeding, surgeons should finish the operation then after they should appy a pelvic tamponade. Surgeons should only suture the skin and place drains in both paracolic areas. They should refer the patients to ICU to have close monitoring for possible coagulopathy, hypothermia, and acidosis. Healthcare workers must bring these parameters to the normal range to preserve the coagulation system in good condition. The pressure that is applied to pelvic tamponade by a balloon should be released in 12 hours and after 24 hours the tamponades should be removed and the abdomen should be sutured properly in the operation room. They should leave the drains in place for further removal and place another one in douglas pouch. Additionally, placement of compressed pelvic tamponade is a well-thought and effective choice for reducing the mortality and morbidity risks in patients whose systolic blood pressure cant reach critical 90mmHg level during hysterectomy.

It is necessary for the physician to have adequate knowledge and experience in control of PPH as well as to be a member of an experienced team until he gains the necessary experience. It should be kept in mind that in case of PPH, the survival of the mother's life has upmost importance. Concerns about poor aesthetic appearance due to large incision or loss of fertility due to loss of uterus are not the priority. The severity of the situation should be explained in detail to the relatives of the patients again and again. Understanding the severity of the situation by patients and their relatives will help the doctor to focus more on the intervention.

- **PPH diagnosis may not always been possible**
- **Patients clinical manifestations should be the essence while diagnosing**
- **Through anamnesis, physical examination and ultrasound scanning cause of PPH must detect rapidly**
- **Time is crucial**
- **Pathology that cause PPH should be treated**
- **All units that will involve should be alarmed**
- **Replacement of the lost amount blood and body fluid is a must!**
- **Delayed laparotomy decision can cause maternal death**
- **Serum fibrinogen level assessment is critical to determine coagulopathy**
- Hemostasis control with <200mg/dl fibrinogen levels is insufficient
- For adequate surgical exploration surgical incisions must be effective
- Before hysterectomy compression sutures, blood vessel ligation can be performed
- Hysterectomy decision shouldn't be late
- Hemostasis should be redone after the blood pressure is stabilized

· ICU is recommended for postoperative follow–up

· ICU is recommended for postoperative follow–up

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CHALLENGES IN SCREENING TESTS

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ALGORITHMS IN SCREENING TESTS

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In the Republic of Turkey, all units producing and using Blood and Blood Products act according to the Blood and Blood Products Law numbered 5624. The Ministry of Health is authorized and responsible for the planning, execution and supervision of the services covered by the Law.

In the implementation of the Law, the Blood and Blood Products Regulation published in the official newspaper numbered 27074 on 04.12.2008 is used. In article 21 of this regulation, it is stated that the activities should be carried out according to the guide to be issued by the Ministry. Today, all these practices are carried out according to the "National Blood and Blood Components Preparation, Usage and Quality Assurance Guide" organized in 2015 and available on the website of the Ministry of Health.

There are two main purposes of choosing a blood donor:

To protect the donor from possible damages that may directly affect the donor during or after the blood donation process,

To protect patients from blood from infection or the side effects of the donor's medicines or other medical risks.

Blood to be used for treatment can be obtained only from healthy people.

The evaluation and selection of donors are based on their general appearance, the answers they give to simple questions about their medical history, general health and lifestyle, pre-donation tests and measurements.

Infectious diseases:

All blood and blood components are tested for hepatitis B, hepatitis C, syphilis and HIV infections .The tests, test methods and decision flow charts defined in this section of the guide are applied in conducting hemovigilance processes (tracing from donor to patient, informing the seropositive donor, tracing from patient to donor, etc.) related to screening and verification tests for these infections. The protocols defined by the manufacturers are followed in the preparation, use and storage of equipment or reactive reagents.
Microbiological screening tests are applied to each unit blood and blood component (including apheresis donations) prepared for transfusion, regardless of any period between donations.

In order to fulfill the requirements within the scope of hemovigilance, appropriate amounts of archive samples (witness samples) are prepared from the samples with screening and verification tests and kept for at least 18 months under suitable conditions.

Unless otherwise stated in the manufacturer's instructions, samples of the donors determined as reactive in the first study are run twice again with the same test. If any of the repeated tests are found to be reactive, this blood is considered a "recurrent reactive", donated blood is not used for transfusion and samples are sent to the validation laboratory.

SCAN TEST METHODS

EIA/CLIA

EIA (*enzyme immunoassay*) and CLIA (*chemiluminescence immunoassay*) are the most commonly used methods for screening blood donors for transfusion-infected infections.

Hemagglutination / Particulate Agglutination

They are often used to detect syphilis antibodies in screening blood donors;

TPHA (*Treponema Pallidum Haemagglutination Assay*): It is a treponemal (specific) syphilis screening test that is studied with hemagglutination **and** microhemagglutination method.

RPR (Rapid Plasma Regain)

It is a non-treponemal (nonspecific) syphilis screening test studied by manual, particle agglutination method.

Immunochromatographic Tests (Cassette tests)

These are single-use tests, also called "cassette tests", designed for detection of antigens or antibodies. Its sensitivity and specificity is lower than EIA / CLIA tests, so it is only used as a quick test in emergency situations.
Kits with the highest sensitivity and specificity (preferably 99.5% and above) capable of detecting known genotypes, subtypes and mutants should be preferred. The specific features that screening tests should have are summarized in the **guide**.

Together with the hospital transfusion committee, the transfusion center makes its in-house arrangements on the requirements defined under the heading "*Approach in Emergency Situations*" and "*Transfusion in Emergency Situations*" and creates SIPs. Each stage in the process is defined in clear terms. It validates the emergency transfusion process, regularly reviews it, and initiates corrective and preventive actions when necessary (incompatibility at any stage, etc.). The path to be followed within the scope of the emergency transfusion process is announced through the hospital transfusion committee.
The following terminology determined by the World Health Organization (WHO) is used to define the degree of emergencies;

Very urgent: the blood component should be obtained within 10-15 minutes.
Urgent: blood component should be obtained within 1 hour.
Priority: The blood component should be provided within 3 hours.

No blood components that have not been screened (Including cases that are in the WHO definition of VERY URGENT) can be used. In "VERY URGENT" cases that do not have enough time to perform rapid tests, O RhD negative erythrocyte concentrate and / or AB group TDP is provided.
In cases that fall under the definition of "URGENT" of WHO, it is essential that the blood components are offered for use according to the **routine test (EIA / CLIA / TPHA) results**. Each transfusion center should record the total duration of routine tests as "minimum" and "maximum" times and define clearly how to follow the specific technical characteristics of the kit / device system.

When rapid tests are applied, routine tests continue to be run from the same sample of the donor, even if nonreactive results are obtained and the blood and blood components are used. When incompatible results are encountered (eg nonreactive in rapid test and reactive in other tests), the physician who is in demand is contacted immediately;
If the positivity of routine tests is confirmed, measures for the protection and follow-up of the patient are taken and notifications are made according to the National Hemovigilance Guide.

In studies carried out with the rapid (immunochromatographic, immunochromatographic test for Syphilis or RPR) test, the technician, the laboratory specialist and the approving TM responsible cannot be held responsible receiver infections that may occur because of transfused components that were found non-reactive as a result of rapid test, if the necessities that were stated in this guide for these tests were met.

VERIFICATION AND SUPPORTING TEST METHODS

HBsAg Neutralization Test
It is a test based on the neutralization of HBsAg (hepatitis B surface antigen) contained in the sample with anti-HBs. It is carried out with the same brand kit, where the HBsAg screening test is applied.
Anti-HBc Test
These are EIA / CLIA tests designed for in vitro detection of antibodies (IgG and IgM) formed against the core antigen of the hepatitis B virus.

If the TPHA method is used as screening test, EIA / CLIA tests, which are more sensitive and specific than the TPHA method, can be applied for verification of syphilis (*see*,
Immunoblot Tests
Western blot
RIBA (*Recombinant immunoblot assay*)
LIA (*Line immunoassay*)

FTA Abs-IgG (Fluorescent Treponemal Antibody Absorption-IgG)
The FTA-Abs test, which is used to detect syphilis antibodies (specific IgG antibodies against *Treponema pallidum*), is based on the indirect fluorescent-antibody technique.

NAT (Nucleic Acid Amplification Tests)
These are tests that detect the presence of viral nucleic acid (DNA or RNA) in the donor sample.

Procedures to be Performed According to the Screening Test Result

In the first study, the screening test result of the sample determined as **screening test nonreactively is recorded as** "nonreactive" and blood components are released.

In the first run, the screening test is applied to the sample determined as reactive (in the same sample, with the same test method, two different devices in the case of having more than one of the same device in which the test is applied in the blood service unit) (double studies);

In case both of the repeated tests are nonreactive; blood components are released; the donor is unblocked. Reactivity of either or both of the repeated tests is defined as "repetitive reactivity". In the screening test, the donor's blood components are detected, with repeated reactivity. The sample is sent to the validation laboratory, and the donor's block remains until the validation tests are concluded.

Procedures to be Made According to the Verification Test Result

Verification test / tests are applied only to the sample with repeated reactivity in the screening test. The result of the verification test of the sample is recorded as "negative", "positive" or "uncertain". If an invalid result is obtained in the verification test, a new sample is taken from the donor and the verification tests are completed.

If the verification test is found to be "negative";
The donor is unblocked. The donor is informed if he / she requests it.

If the verification test is found to be "positive";

The donor is included in the "permanent refusal" and informed. A donor who has a positive HIV or hepatitis C validation test (only if HCV Ag + Ab as screening test and "negative" or "uncertain" results in the immunoblot test and verification tests and "positive" results in the HCV RNA test) will first receive a new sample to verify the donor / test result link, and the donor will be notified if a "positive" result (no later than **one week** from the day the verification test is concluded) is received again in the new sample. In the event of incompatibility between the primary sample (sample taken during donation) and the test results of the new sample taken from the donor, the source of the incompatibility is investigated (incompatibilities such as tube / bag mix etc. are investigated, all records are checked, tests are repeated with existing and new samples when necessary, etc.).

If the verification test is found to be "inconclusive";

The donor's blockage is maintained, and the donor is informed about screening and verification test results. In the validation test, the donor is informed about the causes that led to an "uncertain" result, and it is explained that the validation test will be repeated with a new sample to eliminate this uncertainty but cannot donate blood in this process. The time that the new sample can be taken is defined and the appointment time is set.

In cases where the HIV validation test is "uncertain", a new sample is taken no later than **one week** (7 days) from the day of the validation test.

In cases of hepatitis B or hepatitis C or syphilis validation test is "uncertain", a new sample is taken no earlier than 2 months (eight weeks) from the donor's relevant donation (last donation) date.

In the new sample, the validation test is repeated with the same method;

If the confirmation test result of the new sample is "**negative**", the donor is unblocked, the donor is informed about the test result and explained that he can donate blood in the next period.

If the verification test result of the new sample is "**positive**"; the donor is included in the "**permanent refusal**" and informed.

If the verification test result of the new sample is "**uncertain**"; the donor is included in the "**permanent refusal**" and informed.

The test records of the previous donations of the donor, whose repetitive reactivity was detected in the screening test in his last donation, are examined. If there is a "repetitive reactivity" record in the records of previous

donations for the same screening test type, this condition is defined as "unconfirmed repetitive reactivity between donations". In this case, even if there is an "uncertain" or "negative" result in the verification tests of the last donation, the donor is included and informed within this scope.

For the donor whose verification test is "positive", the process of "look-back" from the donor to the patient is started.

Considering that the problems of the recipient's health are caused by the quality and safety of the transfused blood components, "trace-back" is started from the patient to the donor.

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TURKISH RED CRESCENT DATA (2015-2019)

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In spite of the advanced serological and molecular microbiological screening tests performed, there is a risk of infection transmission by transfusion of blood and blood components (residual risk). This risk may vary depending on the prevalence of infection in the community and blood donors and the sensitivity of the methods and tests used to capture the window period.

The obligation to collect epidemiological data on blood-borne infections aims to obtain information about the risk of infection in a blood donor population and is therefore an important part of the measures taken to ensure the proper selection of blood and plasma donors. The purpose of the epidemiological data collection is to characterize the blood donor population in terms of the risk of infection, to detect epidemiological changes over time and to compare the risks among the blood donor populations.

Routine NAT testing; In HBV, HCV and HIV infections, it detects the window period in which antigen and antibody are negative and immunovariant viruses and reduces the risk of infection by transfusion *(1)*. However, it should be used in conjunction with serological tests due to donors that are seropositive but NAT negative *(2)*. In other words, serological and NAT screening tests are not interchangeable but complementary for each other for blood transfusion safety. In Turkish Red Crescent laboratories, as of November 2014, routine NAT screening tests in the form of 6 pools (Minipool-6; MP6) and serological screening tests have been applied in parallel. Confirmatory testing have been performed by using test algorithms created according to national and international guidelines, to determine if the blood donor with repeatedly reactive can donate blood again in the future *(3-16)*. The data presented here were analyzed in accordance with "*Guideline on epidemiological data on blood transmissible infections (European Medicines Agency)*" *(17)*.

Rates of infection window period risk (residual risk) calculated for one calendar year in "repeat tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period for the same calendar year are shown in Table-1 (HCV), Table-2 (HIV), Table-3 and Table-4 (HBV). In the calculation, HCV, HIV and HBV window periods were taken as 8 days, 15 days and 35 days, respectively *(17)*.

When calculating the HBV adjustment factor, the duration of HBV detection was taken as 77 days according to the worst scenario (Ref 17 and 19). The recommended 70-days HBV DNA detection time for the NAT testing consisting of a 16-sample pool (MP16-NAT) was used to calculate the residual risk according to NAT testing *(18)*.

Estimated infection window period risk (residual risk) ratios calculated for a calendar year for "first time tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period for the same calendar year are shown in Table-5 (HCV), Table-6 (HIV), Table-7 and Table-8 (HBV). The residual risk values were obtained by multiplying the residual risk rates found in "repeat tested donors" by "3". The expected number of donations was calculated with the number of "first time tested donors" *(17,18)*.

YEAR	REPEAT TESTED DONORS (N)	HCV POSITIVE DONORS (N)	WINDOW PERIOD RISK FOR HCV	ESTİMATED DONATİONS İN THE VİREMİC PERİOD
2015	840.897	38	0,99 / MILION DONATIONS	0,83 DONATIONS
2016	948.227	63	1,46 / MILION DONATIONS	1,38 DONATIONS
2017	1.083.731	56	1,13 / MILION DONATIONS	1,23 DONATIONS
2018	1.206.765	66	1,20 / MILION DONATIONS	1,45 DONATIONS
2019	1.335.451	79	1,30 / MILION DONATIONS	1,73 DONATIONS

Table-1: *Rates of HCV infection window period risk (residual risk) in "repeat tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period.*

YEAR	REPEAT TESTED DONORS (N)	HIV POSITIVE DONORS (N)	WINDOW PERIOD RISK FOR HIV	ESTİMATED DONATİONS İN THE VİREMİC PERİOD
2015	840.897	49	2,39 / MILION DONATIONS	2,01 DONATİONS
2016	948.227	81	3,51 / MILION DONATIONS	3,33 DONATİONS
2017	1.083.731	114	4,32 / MILION DONATIONS	4,68 DONATİONS
2018	1.206.765	126	4,29 / MILION DONATIONS	5,18 DONATİONS
2019	1.335.451	152	4,68 / MILION DONATIONS	6,25 DONATİONS

Table-2: *Rates of HIV infection window period risk (residual risk) in "repeat tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period.*

REPEAT TESTED DONORS (N)	HBV POSITIVE DONORS (N)	HBV INCIDENCE ADJUSTMENT FACTOR	WINDOW PERIOD RISK FOR HIV	ESTIMATED DONATIONS IN THE VIREMIC PERIOD
840.897	880	3,71	372,32 / MILION DONATIONS	313,09 DONATIONS
948.227	771	3,70	288,79 / MILION DONATIONS	273,83 DONATIONS
1.083.731	756	3,69	247,12 / MILION DONATIONS	267,81 DONATIONS
1.206.765	630	3,70	185,10 / MILION DONATIONS	223,38 DONATIONS
1.335.451	1.172	3,78	318,15 / MILION DONATIONS	424,87 DONATIONS

YEAR	REPEAT TESTED DONORS (N)	HBV POSITIVE DONORS (N)	HBV INCIDENCE ADJUSTMENT FACTOR	WINDOW PERIOD RISK FOR HIV	ESTİMATED DONATİONS İN THE VİREMİC PERİOD
2015	**840.897**	**880**	**3,12**	**312,77 / MILION DONATIONS**	**263,01 DONATİONS**
2016	**948.227**	**771**	**3,11**	**242,58 / MILION DONATIONS**	**230,02 DONATİONS**
2017	**1.083.731**	**756**	**3,10**	**207,56 / MILION DONATIONS**	**224,94 DONATİONS**
2018	**1.206.765**	**630**	**3,11**	**155,48 / MILION DONATIONS**	**187,62 DONATİONS**
2019	**1.335.451**	**1.172**	**3,18**	**267,45 / MILION DONATIONS**	**357,16 DONATİONS**

Table-4: *According to NAT testing, rates of HBV infection window period risk (residual risk) among "repeat tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period. MP6-NAT was routinely applied in NAT screening tests, but when calculating the incidence of HBV adjustment factor, the HBV DNA detection period was taken as 70 days, that had been defined period for MP-16, according to the worst case scenario (Ref 18).*

YEAR	FIRST TIME TESTED DONOR (N)	ESTIMATED WINDOW PERIOD RISK FOR HCV	ESTİMATED DONATİONS İN THE VİREMİC PERİOD
2015	**680.436**	**2,97 / MILION DONATIONS**	**2,02 DONATİONS**
2016	**729.169**	**4,37 / MILION DONATIONS**	**3,19 DONATİONS**
2017	**768.765**	**3,40 / MILION DONATIONS**	**2,61 DONATİONS**
2018	**770.014**	**3,60 / MILION DONATIONS**	**2,77 DONATİONS**
2019	**869.318**	**3,89 / MILION DONATIONS**	**3,38 DONATİONS**

Table-5: *Rates of HCV infection window period risk (residual risk) in "first tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period.*

YEAR	FIRST TIME TESTED DONOR (N)	ESTIMATED WINDOW PERIOD RISK FOR HIV	ESTİMATED DONATİONS İN THE VİREMİC PERİOD
2015	**680.436**	**7,18 / MILION DONATIONS**	**4,89 DONATİONS**
2016	**729.169**	**10,53 / MILION DONATIONS**	**7,68 DONATİONS**
2017	**768.765**	**12,97 / MILION DONATIONS**	**9,97 DONATİONS**
2018	**770.014**	**12,87 / MILION DONATIONS**	**9,91 DONATİONS**
2019	**869.318**	**14,03 / MILION DONATIONS**	**12,20 DONATİONS**

Table-6: *Rates of HIV infection window period risk (residual risk) in "first tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period.*

YEAR	FIRST TIME TESTED DONOR (N)	ESTIMATED WINDOW PERIOD RISK FOR HBV	ESTİMATED DONATİONS İN THE VİREMİC PERİOD
2015	680.436	1116, 97 / MILION DONATIONS	760,03 DONATİONS
2016	729.169	866,36 / MILION DONATIONS	631,72 DONATİONS
2017	768.765	741,36 / MILION DONATIONS	569,93 DONATİONS
2018	770.014	555,31 / MILION DONATIONS	427,60 DONATİONS
2019	869.318	954,44 / MILION DONATIONS	829,72 DONATİONS

Table-7: *Rates of HBV infection window period risk (residual risk) in "first tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period.*

YEAR	FIRST TIME TESTED DONOR (N)	ESTIMATED WINDOW PERIOD RISK FOR HCV	ESTİMATED DONATİONS İN THE VİREMİC PERİOD
2015	680.436	938,32 / MILION DONATIONS	638,46 DONATİONS
2016	729.169	727,74 / MILION DONATIONS	530,65 DONATİONS
2017	768.765	622,69 / MILION DONATIONS	478,70 DONATİONS
2018	770.014	466,43 / MILION DONATIONS	359,16 DONATİONS
2019	869.318	802,34 / MILION DONATIONS	697,49 DONATİONS

Table-8: *According to NAT testing, rates of HBV infection window period risk (residual risk) in "first tested donors" and the number of donations expected from these donors during the viremic phase of the diagnostic window period.*

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ETHICAL AND LEGAL DIMENSIONS IN TEST RESULTS

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Ethics is basically a series of moral values or a code of conduct. Ethics is a dynamic process regarding the state of scientific knowledge, public awareness and local laws at any time and place. Ethics' role in developing clinical practice guidelines and recommendations for healthcare providers is to ensure that reasonable value is given to values that are not sufficiently incorporated into the law. Users of guides and guidelines should be aware of possible ethical conflicts inherent in many medical decisions. Guides should reflect thought and balance of problems.

Transfusion medicine practice involves a number of ethical issues because blood comes from humans and is a valuable resource with a limited shelf life. It includes a moral responsibility to both donors and patients. Ethical decisions should be based on four principles: respect for individuals and their values, protection of individuals' rights and well-being, avoidance of exploitation, and the principle of Primum non nocere i.e. "do not harm first". In 1980, the International Blood Transfusion Association (ISBT) approved the first official code of ethics. It was later approved and accepted by the World Health Organization and Union of Red Crescent Societies.

ISBT's Code of Ethics
Code of Ethics for Blood Donation and Transfusion
Aim is to define the ethical principles and rules which must be followed in the field of transfusion medicine.

1. Blood donation, including haematopoietic tissues for transplantation shall, in all circumstances, be voluntary and non-remunerated; no coercion should be brought to bear upon the donor. The donor should provide informed consent to the donation of blood or blood components and to the subsequent (legitimate) use of the blood by the transfusion service.
2. Patients should be informed of the known risks and benefits of blood transfusion and/or alternative therapies and have the right to accept or refuse the procedure. Any valid advance directive should be respected.
3. In the event that the patient is unable to give prior informed consent, the basis for treatment by transfusion must be in the best interests of the patient.
4. A profit motive should not be the basis for the establishment and running of a blood service.
5. The donor should be advised of the risks connected with the procedure; the donor's health and safety must be protected. Any procedures relating to the administration to a donor of any substance for increasing the concentration of specific blood components should follow internationally accepted standards.
6. Anonymity between donor and recipient must be ensured except in special situations and the confidentiality of donor information assured.
7. The donor should understand the risks to others of donating infected blood and his or her ethical responsibility to the recipient.
8. Blood donation must be based on regularly reviewed medical selection criteria and not entail discrimination of any kind, including gender, race, nationality or religion. Neither donor nor potential recipient has the right to require that any such discrimination be practised.
9. Blood must be collected under the overall responsibility of a suitably qualified, registered medical practitioner.
10. All matters related to whole blood donation and haemapheresis should be in compliance with appropriately defined and internationally accepted standards.
11. Donors and recipients should be informed if they have been harmed.
12. Transfusion therapy must be given under the overall responsibility of a registered medical practitioner.
13. Genuine clinical need should be the only basis for transfusion therapy.
14. There should be no financial incentive to prescribe a blood transfusion.
15. Blood is a public resource and access should not be restricted.
16. As far as possible the patient should receive only those particular components (cells, plasma, or plasma derivatives) that are clinically appropriate and afford optimal safety.
17. Wastage should be avoided in order to safeguard the interests of all potential recipients and the donor.
18. Blood transfusion practices established by national or international health bodies and other agencies competent and authorized to do so should be in compliance with this code of ethics.

Ethical issues related to donors

Blood donation as a gift: WHO recommends that national blood services be based on voluntary, free blood donation. No one should be forced to donate for family or economic or other reasons. The trade of human blood and body parts is unethical. "Human dignity and value should be respected."

Free blood donation is considered a gift and the blood center has the right to accept or postpone it if it is not acceptable. Donor deferral may appear as discrimination and a violation of a human right, but since blood centers are made to help patients, not donors, the patient's right to receive safer blood is more important than the donor's right of non-discrimination.

Donor privacy, donor notification and donor approval: Donor privacy is an important issue. The personal information disclosed by the blood donor during the pre-donation interview and the information obtained from various tests on the donated component are expected to be kept confidential by the donor center.

Donor screening and testing was previously simple. Today's donors are asked candid questions about their lifestyle and a series of laboratory tests are conducted. This has had important implications for relationships between blood centers, blood donors, doctors and patients. The blood donor, an apparently healthy individual, until an abnormal result is reported by the blood center, may seek the advice of a physician and doubt the credibility of the testing procedure and deferral policies. A more specific test may be negative, and the donor may be labeled as healthy. This donor can never donate again and may return to the blood center, demanding compensation for the expenses incurred and unnecessary mental suffering.

There may be misunderstandings about donor room staff and donor's confidentiality. In donor centers, there is often a tension between the need to keep donor information confidential and the need to disclose relevant information to third parties such as family members, employers, public health officials and police officers.
Blood safety depends in part on the information provided by the donor, and it is also the ethical duty of the donor to provide accurate information. It is unethical to intentionally hide information about high-risk behavior or medical history.

Ethical issues about patients

Ethical issues for patients include free safe blood, informed consent for transfusion, the right to refuse transfusion, and the right to inform if damaged.

Approval for transfusion: Approval for transfusion should be informed. The patient should be informed about the known risks and benefits of transfusion and alternative treatments such as autologous transfusion or erythropoietin. Only then should approval be documented. If the patient cannot give informed consent, the basis of transfusion therapy should be in the patient's best interest.

Right of refusal: The patient's right to refuse blood transfusion must be respected. Some religious sects, such as Jehovah's Witnesses, do not accept blood transfusions.

Right to be informed in case of damage: If the patient is given blood and non-directed components, he / she has the right to be informed. Similarly, a patient who accidentally receives positive blood for a transfusion-transmitted infection has the right to be informed and to receive the necessary compensation.

Ethical principles for blood institutions

Profit should not be the basis for the establishment and execution of blood transfusion services. Waste should be avoided to protect the interests of potential donors and recipients.

Blood donation and Transfusion Medicine is now an important component of integrated care processes typical of the current, modern health vision for disease management logic. Operational coordination and management, including the administrative area of many activities that are part of the transfusion process, play a key role

in the clinical governance of all procedures related to the field of transfusion. Blood and blood components are actually "the final result of various interconnected and intertwined processes (clinical, laboratory, social) involving different professional skills and responsibilities".

The transfusion process can be defined as a "supply chain", the supply chain in the field of transfusion begins with donor and donor procedures and processing, qualification and biological validation, receiving transfusion requests, evaluating the suitability of requests, determining immunological compatibility, delivering blood components from individual patients to the clinical unit that requests, recording and reporting of transfusion and any transfusion-related side effects and adverse events to the recipient patient.

The correct management and monitoring of the processes that make up the transfusion supply chain affects the safety of the entire process, which is a special purpose of hemovigilance systems. A good hemovigilance system includes proper management of patients' transfusion needs and safe fulfillment of these needs.

goes beyond the safety of transfused therapeutic products due to a series of closely related processes that begin with the donor and end with the recipient. Systematic recording of transfusion results and transfusion therapy-related adverse events constitutes the afferent branch of each hemovigilance system and plays a key role in researching and identifying possible strategies for recovery. In contrast, the purpose of the efficient branch of these systems is to achieve a continuous and global improvement in the transfusion process through an analysis of the data collected and its possible changes over time, to identify possible corrective or preventive strategies based on objective evidence.

The need to harmonize the actions that implement the European Directives for all countries with existing national laws is very complex in terms of relations between Europe and national legislation.

The European regulatory provisions on laws and related activities are strongly inspired by the basic principle of protecting public health in terms of justice, transparency and the right to access, as well as periodic repetition of social and ethical solidarity, volunteering and donations. Blood services should be safe and systematically controlled services. In addition, great attention is paid to the principles of management and control of certain care processes aimed at ensuring high organizational and professional standards, as well as ensuring the suitability of the clinical use of blood products.

Ethical issues in Transfusion Medicine:

1. Clinical suitability;
2. *Information and consent / rejection on donation and transfusion*;
3. Development of institutional blood management programs;
4. Conflict between the individual's rights and public safety;
5. The problem of payment for blood donation;
6. Security of minors;
7. Collection and storage of blood products.

Information and consent / rejection on donation and transfusion; Once the indication for transfusion therapy is confirmed, the main requirement before any medical procedure is to provide information that the patient can consent Therefore, ***informed consent*** is a symbolic expression of the relationship between the healthcare provider and the person receiving this care, in which the patient rationally agrees or refuses to undergo a diagnosis or treatment procedure.

The four main common components of an effective informed consent for blood donation, provided that it is clearly understood by the individual, are:

ι. the causes, nature and objectives, risks and related consequences, benefits, and viable alternatives of the procedure under examination
ιι. privacy protection level, limits and mechanisms
ιιι. who to contact for related questions
ιϖ. the voluntary nature of the participation and the possibility of suspending the procedure without penalty.

Specific features of the informed consent for full blood donation by adults and minors are:
a. description of the procedures before and after donation
b. tests to detect infectious diseases (especially human immunodeficiency virus [HIV], hepatitis B virus [HBV] and hepatitis C virus [HCV])
c. contact information to report any damage
d. information about donor deferral in the transfusion center
e. information on costs and / or additional medical treatments

Legal Aspects

Providing safe and adequate blood should be an integral part of each country's national health policy and infrastructure. WHO recommends that all activities related to blood collection, testing, processing, storage and distribution should be coordinated at national level through effective organization and integrated blood supply networks. The national blood system should be governed by the **national blood policy** and **legal framework** to promote the same implementation of standards and consistency in the quality and safety of blood and blood products.

WHO recommends that all blood donations be screened for infections before use. HIV, hepatitis B, hepatitis C and syphilis screening should be mandatory. Blood screening should be done according to the quality system requirements. Adequate and reliable, safe blood supply can be provided with regular, voluntary, free blood donors. These donors are also the safest donor group because transfusion-induced infections are the lowest in this group. Unnecessary transfusions and unsafe transfusion practices expose patients to the risk of serious adverse transfusion reactions and transfusable infections. WHO recommends developing systems such as hospital transfusion committees and hemovigilance to monitor and improve the safety of transfusion processes.

In the field of transfusion medicine, most of the legal cases brought against blood centers, hospitals, and doctors include problems with donor screening and infectious disease testing practices. For transfusion-transmitted infections, including HIV, hepatitis B, hepatitis C, and syphilis, screening of all donated blood and verification of reactive results is mandatory. However, risky behaviors based on donor interrogation and the transfusion-transmitted infection of the donor during the window period and the infection agent, which cannot be detected by current screening strategies, constitute the main problems. Lawsuits filed on this issue may be directed to organizations that set standards, blood centers and hospitals, managers working there, transfusion medicine specialists working in blood centers and hospitals, and clinicians who participate in the care of patients. Courts can draw different conclusions about their responsibilities due to deficiencies in donor screening and blood donation testing to prevent transmission of diseases by transfusion. There may be different results between countries, even between states in the same country.

Today, it seems likely that cases related to screening, donation and transfusion of blood and blood components will continue. Especially as new pathogens e.g. the West Nile virus appear and are shown to be transmitted through blood, negligence claims seem likely to continue and multiply. In many cases, blood donation, blood banking and transfusion-related institutions, practitioners and associations will be protected from the responsibility as ongoing scientific discussions and tests evolve. However, the risk remains if the scientific and legal debates become the basis of the expert's statement that the entire industry may be responsible for adopting reasonable standards of care (as in some early AIDS cases. Also, whether the blood centers' medical enforcement error laws are preserved depends on how the courts interpret the current case-law and legislation. Blood centers may wish to investigate this issue with their legal counsel to determine their overall potential responsibilities and the way to mitigate potential risks in this area. By applying difficult lessons learned from HIV-related transfusion cases to the recent cases, it is possible to avoid or at least minimize the impact. An important lesson for medical associations is to immediately implement government recommendations and standards adopted by private institutions. Another lesson is to follow best practices, especially those related to new techniques, technologies and medical challenges, to constantly evaluate all available scientific evidence and foresee the adoption of an application as a standard. It indicates that a facility is knowledgeable about risks and takes into account the available options in situations where there is a lack of consensus on how to manage particular, equally important risks. Finally, efforts such as reconciliation conferences and workshops trying to make a compromise or practice within the professional community are extremely

important. Even simple efforts, such as the development and adoption of a proper donor-history survey, can ensure the recognition of open care standards. It is not difficult to minimize the risk of legal responsibility in the transfusion environment, but it is not possible to eliminate this risk completely in today's society. It is crucial to stay up to date with the practice standards and to train the staff effectively about these standards in order to eliminate legal demands. By following these proactive steps, it will be possible to prove that the physician or facility meets the currently accepted standard of care in transfusion and cellular therapy communities. This will allow the professional to spend much less time defending past activities and more valuable time to serve donors and patients.

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HEMOVIGILANCE PRACTICES IN DIFFERENT COUNTRIES

Chairpersons: **Yasemin Heper**
Jose Manuel Cardenas

Speakers: **C. Shivaram**
Cees Smit Sibinga
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HAEMOVIGILANCE PROGRAM OF INDIA

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Background

Haemovigilance is a continuous process of data collection and analysis of transfusion- related adverse reactions in order to investigate their causes and outcomes and prevent their occurrence or recurrence**.** Haemovigilance Programme of India was set up as an offshoot of the Pharmacovigilance program and the responsibility for deployment, monitoring and execution was entrusted with the National institute of Biologicals under the ministry for Health and Family Welfare, Govt of India. During its inception the aim of this National Haemovigilance Program was to improve transfusion safety and quality by collecting, collating, analyzing and disseminating information pertaining to adverse transfusion reactions resulting from transfusion of blood and blood components. Information obtained would be used to build better and safer systems, for efficient use of valuable health resources and ultimately deliver better patient healthcare. The ultimate goal of the Haemovigilance programme of India was to be a part of the International Haemovigilance Network (IHN) which presently has 28 countries as its member and provides a global forum for sharing best practices and benchmarking of Haemovigilance data.

Methods

The program was rolled out by the National institute of Biologicals(NIB) as the co-ordinating centre with 60 medical colleges included in the network of haemovigilance on 10th December, 2012 and was initially restricted to recipient haemovigilance. The same was supervised by the Haemovigilance Advisory Committee so that it achieves its goals and objectives. A software called Haemovigil for updating the results was developed in-house by NIB and made available to participants online via the Haemovigilance Program website: http://nib.gov.in/haemovigilance.html Many centres were finding it difficult to understand and interpret the recipient reactions which was handled in 2 ways. CME programs were conducted in different regions of the country and Hands on Workshop were held for all participants from the reporting centres. To keep it simple for the reporting centres, initially there was only a simple one page transfusion reaction reporting form(TRRF). The TRRF sought the following information in 5 sections A. Patient Information. B. Transfusion product details C. Nature of Adverse Reaction D. Outcome of Adverse Reaction E. Reporter F. Causality assessment. ISBT standard definitions for various reactions was taught to participants and also a guidance document provided.

Results

A total of 3807 reports & 3903 reactions specific to Recipient haemovigilance were received via this one page Transfusion Reaction Reporting Form(TRRF) from across the country during the period of Jan2013 to April 2016. FNHTR accounted for 40.84% , anaphylaxis/allergy accounted for 12.68% . A total of 164/3903 HTRs resulting from ABO incompatibility 0.56%(n=22), HTR due to allo-antibody 1.49%(n=58), non-immune hemolysis accounted for 2.15%(n=84). ABO mismatch was due to various reasons like sampling error, Wrong Blood In Tube, Blood Grouping errors, blood administration errors. HTR due to all-antibody was attributed to Anti-Jka, Anti-E and Anti-Jkb in 3 separate cases. Antibody identification was not done in 55/58 patients with allo-antibodies. Serious reactions like TRALI were noted in 0.26%(n=10) , PTP 0.64%(n=25) and TACO 0.67%(n=26). Malaria accounted for 0.03%(n=1) infection and bacterial infections accounted for 0.46%(n=18 cases). The blood components implicated in the various reactions consisted of RBC(n=1534),FFP(n=324), Plateletpheresis (n=47), RDP/pooled platelets(n=106), Whole blood(n=289) and Cryo(n=1).

No. of Reports received under Haemo-Vigil Software (Recipient haemovigilance) were 14,212. No. of Reports received under Donor-Vigil Software(Donor vigilance) were15,463 . Of these 79.7% of the reactions were vasovagal reactions. The Donor haemovigilance software is relatively new and is yet to be analyzed in details.

Discussion-Haemovigilance program was designed to be Non-punitive in nature, independent of regulatory body, with confidentiality maintained. The results were analyzed by expert groups and the National Executive committee. Credibility of results was ensured by ensuring traceability, defining responsibilities to all the key departments and also by defining systematic documentation process. Recommendations made focus on changes in systems and process rather than individual performances. Participating organizations are being encouraged to implement as much of the recommendations as possible.

Recommendations made to Ministry of Health

These related to the need for improving and implementing standard technology for blood grouping and introducing technologies for alloantibody screening and identification, for the proper investigation and diagnosis of immune HTRs and also to issue compatible blood in complicated cases especially in those blood centers supporting transfusion therapy in thalassemic patients. Greater awareness in investigating reactions and improving the accuracy of diagnosis and imputability of the reaction to transfusion was recommended. The need to create awareness about the different types of blood components, their appropriate clinical use , good bedside transfusion practices and detection and reporting of adverse events is a very basic necessity. In this connection it was recommended that training modules need to be prepared and CMEs organized for awareness of clinicians. It was also recommended that at the hospital level –haemovigilance nurses, transfusion safety officers should be identified and Hospital transfusion committees be set up. The CDSCO was requested to facilitate blood centre enrolment by means of a circular to enroll for the Haemovigilance Program. Out of 3000 blood centers 928 (31%) have enrolled for the program. During analysis the 1 page TRRF form was found to be inadequate , it was therefore expanded to include more information on classification of reactions and causality assessment. It was felt that training of reporting centres- both new enrollment and problem sorting for already enrolled centres should be an ongoing process**.**

Conclusion-Haemovigilance both recipient and donor are important for patient and donor safety. Every country needs a National program in line with ISBT guidelines using standard definitions and a systematic investigation and documentation process. Blood centers and clinicians need an ongoing training program for better understanding of haemovigilance**.**

HAEMOVIGILANCE IN THE NETHERLANDS

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INTRODUCTION

The first ever report of vigorous preventive actions taken because of a transfusion-related lethality in France was published in 1667 in England in the Philosophical Transactions of the Royal Society, authored by the French physicians Jean Denis and Paul Emmerez [1,2], both affiliated to the court of Louis XIV in Paris. In 1668 both physicians were accused of murder and brought to court. The judges concluded in their verdict that these eminent doctors were not guilty because there was no evidence of negligence. However, the same verdict proclaimed that continuation of experiments with blood transfusion would require prior authorization from the then famous Faculty of Medicine of the celebrate University of Paris 'Sorbonne'. Times were not yet enlightened and in 1670 the French Parliament, recommended by the Council of the Sorbonne, announced a ban of all blood transfusion practices in France. A similar proclamation from the Roman Catholic Pope in Avignon rapidly followed, condemning blood transfusion as '*a form of satanic cannibalism*'.

The outcome of the Paris lawsuit and the proclamations was followed by various European countries, in particular Britain. These unfortunate events were not based on reason or science, judges and legislators applied precautionary principles in such strong way that development and progress in blood transfusion was blocked for almost a century and a half. It was the Scottish obstetrician James Blundell who - in 1818 - not only laid the foundations for clinical immunology recognizing the prime principle species specificity, but also started to treat bleeding women in labour transfusing human blood.[3]

The most important breakthrough came with the scientific research of the Viennese physician Karl Landsteiner around the turn of the 20st century discovering the unique antigenic characteristics of human beings – the ABO blood group system. [4] Quite rightly so, he was awarded a Nobel Prize in 1930.

BIRTH OF HAEMOVIGILANCE

It took decades till the mid-1980s, the outbreak of HIV infections transmissible through blood, before the emphasis of science and research shifted from the test tube to the bedside. The awful and dramatic scenery that rolled out in France with over a dozen Haemophilia patients infected through contaminated transfusions caused by emotion driven patriotism among French transfusion scientists, triggered the French authorities to not only initiate another court case but designed a very strict system for control of transfusion-related adverse events to be reported – the term 'haemovigilance' was born and introduced in 1994 [5] with a governmental decree '*règles d'hémovigilance*', a mandatory surveillance system. The EU decided to legislate and regulate blood transfusion through a series of regulatory Directives attached to a framework Directive 2002/98, which became in force January 2003 and would include a chapter and operational Directive 2005/61/EC on Haemovigilance.[6,7]

The same year 1994 the English and Scottish Transfusion Services started EU reason-based negotiations to come to a similar system in Britain, the Serious Hazards of Transfusion (SHOT) system which became in force in 1996 on a voluntary reporting principle.[8]

As the adverse events reporting ball started to role, various countries having more advanced health care systems started to design legislative and regulatory frameworks and a surveillance mechanism to control quality of care including blood transfusion – haemo- and later broadened into bio-vigilance, founded on proper documentation and traceability. The principle is in an effective and operational implementation of a Quality System Management shaped along five elements – Organization and (infra-)structure; Standards (Quality and Technical); Documentation; Education (teaching and training); Assessment (M&E, SPC and Haemovigilance).[9] Since the Haemovigilance Directive became in force September 2005 all EU member states were obliged to submit an Annual Report to Commission before June 30.

HAEMOVIGILANCE IN THE NETHERLANDS

The Federation of 21 Dutch Red Cross Blood Banks has been one of the first European mainland countries to create and implement in the 1980s national standards and a Quality System Management structure with regular audits and a peer certification, besides the formal inspections of the health inspectorate Quality System Manage-

ment programme, which started its functional operations in 1998 on a voluntary principle. In the wake of the EU Directive 2002/98 it was decided to create a formal and independent haemovigilance institute 'Transfusion Reactions in Patients' (TRIP); financially supported by the government and legally operating as a foundation in its own right with a Board, an Advisory Council, a broad forum of affiliated professional organizations and associations, and an operational office in Leiden.[10] The first year of data collection was 2003, with a formal TRIP Report published in 2004.[11] In 2006 the reporting system became digitalized and was extended into biovigilance reporting on adverse events in tissue transplantation of which the first year of data collection was 2008, with a formal TRIP report presented in 2009. Further developments are ongoing as is progress in clinical awareness, confidence of the public and politicians, and the introduction of the Hollnagel Safety-II management philosophy focusing on how routine processes work and why they do well.[12]

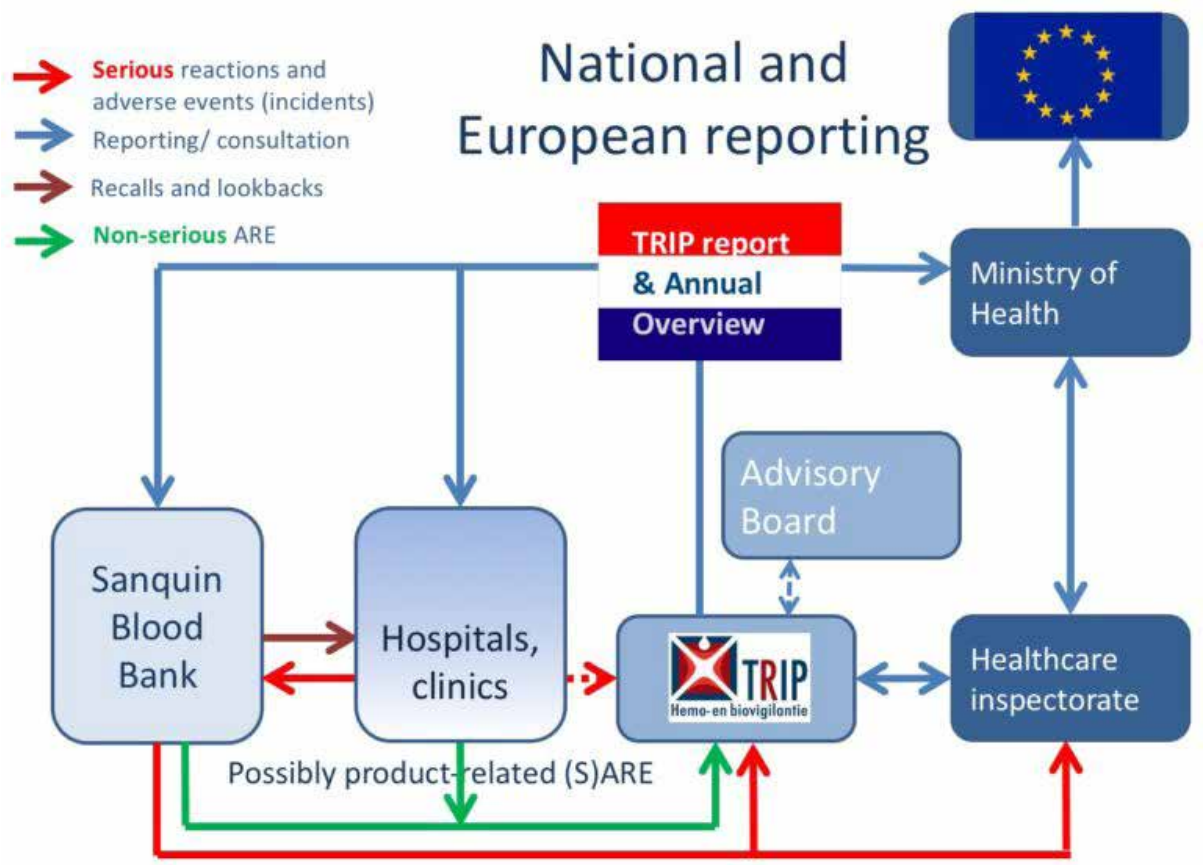

Figure 1 – National and European reporting of adverse transfusion reactions and events in The Netherlands. On the right are the governance organizations.

In the next sections the results of haemovigilance reporting of the hospitals from 2003 and 2018 will be presented and discussed for comparison reasons and indicating the creation of a solid science based data base on clinical transfusion practices in the country.

Baseline data – haemovigilance in 2003 [11]

Participation – A total of 82 (80%) of the 102 Dutch hospitals participated in the TRIP data collection in 2003, 73 hospitals (72%) submitted reports of transfusion reactions and nine hospitals (9%) explicitly informed TRIP that no transfusion reactions in the TRIP categories had been reported. Seven hospitals (7%) indicated that they were not (yet) able to participate in 2003.

Reports of transfusion reactions in 2003 – TRIP received a total of 1092 reports of transfusion reactions in 2003 by the closing date of 15 May 2004. Reporting of a number of types of non-serious transfusion reactions was made optional.

Participating hospitals could determine for themselves whether they wished to take on this extra commitment and workload; 303 of the 1,092 reports (from 57 hospitals) were in these optional categories.

Seriousness of the transfusion reactions – In accordance with international guidelines transfusion reactions were graded as to their seriousness. 773 of the reports (71%) were rated by the hemovigilance officers. Of these, 344 reports (49.7%) were rated as grade 0, defined as 'no morbidity', but in practice often used by reporters to denote no significant morbidity, e.g. a mild febrile reaction. 339 (43.9%) were rated as grade 1 (minor morbidity, not life-threatening), 37 (4.8%) grade 2 (moderate to serious morbidity), 9 (1.2%) grade 3 (serious morbidity, immediately life-threatening) and 4 (0.5%) grade 4 (death following a transfusion reaction).

Likelihood of a relation to the blood transfusion ('imputability') – The reported transfusion reactions were also rated according to the likelihood that they occurred as a result of the blood transfusion. It is recognized that a patient may have symptoms or signs during or after a blood transfusion for many reasons other than the actual transfusion. This concept is internationally referred to as 'imputability'. 793 (72.6%) of the transfusion reactions were rated as to imputability. Of these, a relationship to the transfusion was rated as 'certain' in 193 (24.2%), as 'probable' in 278 (35.1%), as 'possible' in 245 (30.9%), as 'unlikely' in 70 (8.8%) and 'certainly not' in 8 (1.0%).

Types of reaction – The numbers of reports in the different categories are as follows: non-haemolytic febrile transfusion reaction 268, acute haemolytic transfusion reaction 10, delayed haemolytic transfusion reaction 20, transfusion-related acute lung injury (TRALI) 6, transfusion-associated circulatory overload 7, anaphylactic reaction 7, other allergic reactions 125, viral infection 5 (of which only 2 judged 'possibly' related to the transfusion), bacterial contamination 8 (of which only 2 rated 'certainly' related to transfusion) and other reactions 61. 245 reports of development of new red cell antibodies were received. 31 cases of transfusion of the wrong blood component were reported, with clinical consequences in 9 cases, and 5 other incidents in the transfusion chain, all without consequences for the patient. In the optional reporting categories: 212 mild febrile reaction, 31 near miss and 60 reports concerning blood components which after transfusion were found to have a positive bacterial screening result – in two of these the patient had clinical signs.

Number of reports in relation to number of blood components In 2003 - Sanquin, the national blood supply organisation, delivered a total of 778,199 blood components. The total number of reports received nationally for that year is 1092, giving a overall average of 1.4 reports per 1000 blood components issued. 0.064 reports per 1000 blood components issued, approximately 1 per 16,000 blood components, were of grade 2 or higher.

Discussion and conclusions of the 2003 base-line data:

Participation in the national reporting system – The 80% participation by hospitals in the first year of the TRIP hemovigilance reporting system is already very good in comparison to other countries. There is however a considerable variation in the number of reports submitted by hospitals, even when the blood component use per hospital is taken into account. The reasons for this variation are not yet known.

Quality of information received – In the TRIP system the reporting form is meant to solicit all the data required, either on the form itself or by added hand-written comments or copies of hospital reports. The supporting information sent in to TRIP was not always sufficient to enable the expert committee to verify the type, seriousness and imputability of the reaction.

Types of transfusion reactions and perspectives for future improvement in transfusion safety – Most reports are of mild transfusion reactions. Only 50 out of the 1,092 (11.9%) reports, or 6.4 per 100,000 issued blood components were rated as grade 2 or higher, and only 13 (2.4%; 1.6 per 100,000 blood components) were grade 3 or higher. The majority of reports are febrile and allergic reactions.

Only a small number of reports relate to (possibly) infected blood components. These were the 8 reports concerning bacterial contamination, of which only two were deemed 'certain', and the 5 reports of viral infection, of which only two were in the category 'possible'. This means that TRIP's findings concur with those from abroad: virus transmission by a blood transfusion is rare and if there is an infectious complication of transfusion it is rela-

tively often caused by bacteria. Although the risk of an infected blood transfusion can never be totally eliminated, the blood components prepared from donations by Dutch voluntary unpaid and regular donors are very safe.
The 5 reports concerning autologous blood components show that transfusion of autologous blood components is not without risk. In proportion to the small number of autologous donations annually (501 in 2003) there is a relatively high risk associated with their use (9.98 per 1000).

It is striking that relatively few errors were reported in comparison to the findings of SHOT in the UK and the Irish system, where over half of the reports concern transfusion of the wrong blood component. It is probable that reporting is incomplete.

What happened since 2003-haemovigilance in 2018 [13]

Participation-Over the decade and a half a number of hospitals had merged and some were closed. Of the remaining 89 hospitals 87 (97.8%) participated and 84/89 (94.4%) provided information on the blood products involved.

Reports of transfusion reactions in 2018-Since the introduction in 2016 reporting was fully electronic and covered all types of adverse reactions and events. In total 2,195 reports were received; of these 2,055 classified as adverse transfusion reaction of any type - 2,001 (4.1 per 1,000 blood products) were adverse reactions, 54 were a combined reactions and events; 121/2,001 (6.0%; 1 per 5,000 blood products) were serious transfusion reactions. Additionally 140 reports were just events; This year 2018 total transfusions per blood product in paediatrics (<21 years old) were collected; 31 (34.8%) of the hospitals of which 5 neonatal intensive care units and the national paediatric oncology centre reported on adverse reactions and events (110), the use of 13,948 blood products compared to the use of 207,401 blood products in >21 year old patients; in both age categories (<21 and >21 years) respectively 59% and 76% red cells; 33% and 12% platelets; 16% and 17% fresh plasma were transfused. Data on adverse reactions and events in paediatric patients (84) showed an incidence of 50 per 100,000 transfusions, 77 in the adverse reaction category (31 allergic of which 1 anaphylactic), and 7 (of which 3 wrong products transfused) in the category of events.

Seriousness of the transfusion reactions-Of the 2,195 reports, 121 (5.5%) were classified as serious, grade 2 of higher; 40 TACO, 18 non-haemolytic and 13 anaphylactic reactions. There were 72 bacterial infection related reports from 37 hospitals of which only one could be confirmed by a matching positive culture of the unit involved; no viral transmissions. Most serious adverse reactions occurred with transfusion of red cells (84/382,844 transfusions; 0.02%), and platelets (21/53,900 transfusions; 0.04%). It was observed that of all serious transfusion reactions 71 (65%) patients showed considerable clinical dyspnea, which is 3.5% of all reported reactions.

Over the past decade there is a slight upward trend in the TACO reports with the largest number of serious adverse reaction (134 reported by 42 hospitals).

Also the non-categorizable group of adverse events has increased from 164 to 289 (61 hospitals) reports. Of these 289 reports 26 (8.9%) classified as serious grade 2 or more.

Over the last decade, however, the delayed haemolytic adverse reactions steadily declined from over 10 to 4, probably caused by preventive matching of selected blood products in combination with stringent quality management discipline.

Likelihood of a relation to the blood transfusion ('imputability')-In the category seriousness grade 2 and 3 there were 105 reports of which the imputability distribution was classified as certain 8, probable 37 and possible 60, and for seriousness grade 4 (mortality) 5 reports with an imputability score possible (TRALI 1; TACO 2; other 2). The remaining 11 seriousness grade 2 or 3 did not seem to be related to the transfusions – imputability: unlikely.

Types of reaction – The numbers of reports in the different grades 2-4 and imputability categories are – haemolysis (ABO) 1; haemolysis (immune, other blood groups) 3; allergies 10; fever 25; other reactions 25; transfu-

sion-associated dyspnea 2; transfusion-transmitted bacterial infection 1; TRALI 4; TACO 39.

Number of reports in relation to number of blood components In 2018 – The number of reports on use of blood products and serious transfusion reactions grade 2-4 provided the following picture - Red cell transfusions 1806/84; Platelet transfusions 259/21; fresh plasma 0/0; Solvent Detergent (SD)-plasma 22/5; combinations 62/11 and blood sparing methods 2/0.

DISCUSSION

Over the first 3 years of implementation and reporting the system has been voluntary with a remarkably high participation (80%) of the hospitals. Following the implementation of the EU operations Directive 2005/61/EC in 2006 [7]the system changed to mandatory with a 100% participation. In the course of the decade and a half of reporting, clinical awareness and alertness have improved resulting in an noticeable improvement of public, professional and political confidence in the quality of the blood supply and an open mindedness of the reporting and communication with the national organization TRIP. The introduction in 2018 of the Hollnagel Safety-II principle [12] looking at and learning from what went well and how, instead of what went wrong and why seems to stimulate professional curiosity and the overall intension and willingness to improve. Additionally, the clinical consumption of blood products has shown a dramatic decrease od red cell concentrate transfusions from 617,015 red cell concentrates in 2003 to 382,844 in 2018 (38% reduction). However, the use of platelet concentrates increased from 49,063 platelet concentrates to 53,900 in 2018 (25% increase) and from 111,620 units of fresh plasma to 1,248 in 2018 with a consumption of 56,714 units of SD-plasma (48% reduction)! The incidence of transfusion-transmitted infections is extremely low, with one proven bacterial infection in over 500,000 blood products transfused and evidence of transfusion-transmitted viral or other infections.

The results reflect the importance of an existing well-functioning documentation system – the core of a quality management system – to allow accurate traceability.

At the end of the reporting year 2018 TRIP [13] concluded with three major recommendations to haemovigilance officers and blood prescribing clinicians –

1. Transfusion adverse events with dyspnoea: stimulate proper diagnosis of this type of adverse event;
2. Near miss reports regarding blood group discrepancies: proper registration and investigation to allow better understanding of the conditions that may play a role in the causation of these errors as well as a mapping of possible risky situations;
3. In case of a positive bacterial screening of a blood product considered relevant, always contact the manufacturer of the product. This equally applies to suspicion of a serious transfusion-related septicaemia with yet unknown screening results.

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HAEMOVIGILANCE IN CROATIA

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A voluntary system of transfusion reaction monitoring has been present in Croatia since 1999. As the Croatian legislative related to blood and blood components was harmonized with European Union Directives in 2006, blood component traceability system and the national system of reporting serious adverse events and reactions has become mandatory. Since then, a healthcare institutions in Croatia providing transfusion treatment are obliged to establish systematic reporting of serious adverse events (SAE) and serious adverse reactions (SAR) associated with the quality and safety of blood components as well as reactions and complications in blood donors. According to the law, the Ministry of Health (MoH) is responsible to establish a national haemovigilance system and register of SAR and SAE. In case of a SAE or SAR, healthcare institution reports it in writing to MoH as soon as possible and to the blood establishment that has produced blood component of suspected quality/safety.

Croatian Institute of Transfusion Medicine (CITM) as the national institute and Reference Center for Transfusion Medicine of the Ministry of Health performs voluntary systematic surveillance of transfusion treatment at the national level, i.e. data collection from all Croatian institutions performing transfusion treatment, assessment and categorization of reactions/events, data processing and reporting at national and international level.

Blood establishments report all reactions/complications related to blood donation in form of annual report to the CITM. Healthcare institutions using blood components in transfusion treatment systematically record, manage and assess reactions, and report all reactions/events in the form of annual report directly to the CITM or through their transfusion departments.

Reactions/complications in blood donors are classified according to the Standards for Collecting and Reporting Data on Reactions Related to Blood Donation (International Haemovigilance Network - IHN, International Society of Blood Transfusion - ISBT). Reactions to transfusion treatment are classified according to the Proposed Standard Definitions for Surveillance of Non Infectious Adverse Transfusion Reactions (IHN, ISBT) and to the Serious Hazards of Transfusion (SHOT) classification.

Since 2010, the haemovigilance annual report is published every year in Transfusion Medicine Newsletter. For the time being, surveillance of transfusion treatment depends on personal efforts invested by transfusion medicine specialists in hospitals to stimulate respective education of physicians and nurses at clinical departments with whom they analyze and treat the reactions/events and perform corrective/preventive actions. These activities have been upgraded from year to year.

In the future, we hope it will be possible to improve reaction/event collecting and reporting *via* e-Delphyn, unique national transfusion software, whereas the haemovigilance system will be upgraded with additional analysis and recommendations. With further computerization, better implementation of the legislative and continuous education, the already established reporting of adverse reactions/events may hopefully grow into a uniform and more efficient system.

HAEMOVIGILANCE IN SRI LANKA

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Haemovigilance as a nationally coordinated discipline is practiced, in the Blood Transfusion systems around the globe for last decade or so. This was practiced at hospital level in Sri Lanka from 1980s, as individual fault fin- ding inquiries . However, Sri Lanka declared open it's National Haemovigilance Center in 2009, which coordinates entire countries blood transfusion incidents. Now this is practiced as a fact finding mission.

The presenter describes the system in Sri Lanka by going through the below headings.
Health system in SL
BTS in SL
Statistics for BTS 2018
Glimpse on HV in world
Method of practice
Details of HV in SL
Clinical work load
Donor & Process HV
Methods of reporting & Guidelines book
Incident management register
Incident management forms
Recipient HV
Transfusion related adverse events form Composition of the HV team
Analysis of events in 2018 National HV reports

TRANSFUSION PRACTICES IN HAEMATHOPOIETIC STEM CELL TRANSPLANTATIONS

Chairpersons: **G. Hayri Özsan**
Gumral Alakbarova

Speakers: **Nurhilal Büyükkurt**
Melda Özdamar
Adalet Meral Güneş

TRANSFUSION POLICY IN HEMATOPOIETIC STEM CELL TRANSPLANTATION

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1. Introduction,

The patients who underwent hematopoietic stem cell transplantation (HSCT) need the support of intensive blood components as well as before and after transplantation. The compatibility of human leukocyte antigen between the recipient and the donor in allo-HSCT setting is important but the incompatibility of ABO-blood group does not constitute a barrier to transplantation [1]. The genes encoding carbohydrate glycosyl transferase in the formation of ABO-blood group are located on chromosome 9q34 [2]. These genes do not have an association with genes encoding human leukocyte antigens on chromosome 6p21 [3]. At present, 40–50% of allo-HSCTs are ABO incompatible. This incompatibility consist of 20–25% is major, 20–25% minor and 5% bi-directional (major plus minor) [4]. Although the transfusion requirement of blood components is generally comparable according to the source of stem cells used in transplantation, this requirement may be increased by the fact that the engraftment period is late in bone marrow and cord blood transplantations [5]. Each transfusion carries risks such as transfusion-related infection transmission, graft versus host disease (GvHD), hemolytic/ febrile non-hemolytic transfusion reaction and transfusion-related acute lung injury. The transfusion policy due to all those reasons should be cover all of the process which begins from the time the patients' diagnosed with malignity who was a candidate for HSCT to time after the transplantation period.

2. Transfusion Requirements and Product Feature,

While erythrocyte and thrombocyte suspensions are the most commonly used blood products, the requirement of plasma suspensions is relatively low. Granulocyte transfusions may be performed rarely. However, transfusion is usually performed if hemoglobin is 7–8 g/dL or hematocrit is below 24–30%. In addition, the threshold value for transfusion may be higher due to the clinical condition of the patient, for example, advanced age, heart disease, anemia-related symptoms [6, 7]. For platelet transfusion, a platelet count of 10,000–20000/uL is usually given for a stable patient with no fever and/or no bleeding symptoms or findings. This threshold is higher in patients with bleeding, fever, or sepsis. In the case of resistance to platelet transfusion, platelet from the antigen-negative donor can generally be transfused according to the human leukocyte antigens-class I and human platelet antibody profile. In this case, the choice of Luminex-based antigen-negative donor can be used [8]. Leukocyte reduction is generally recommended in erythrocyte and thrombocyte suspensions [6, 7]. The main goal of leukofiltration is to provide removing leukocytes 99, 9 percent, especially before the blood product is stored, prevents the febrile nonhemolytic transfusion reaction. It also reduces the risk of cytomegalovirus (CMV) transmission and alloimmunization. All cellular blood products (erythrocytes, platelets, and granulocytes) should be irradiated with 2500 cGy. Irradiation is important to prevent transfusion associated GvHD which can occur via passenger lymphocytes in the blood product. Plasma reduction in blood products is usually performed to prevent circulation overload for newborns and other pediatric patients [7].

3. Transfusion Policy in ABO Incompatible Transplantation,

The accreditation committees recommend that all donors shall be tested before the HSC collection for the ABO group and type D [8]. If there is no donor blood sample, it is absolutely necessary to determine the blood group before cryopreservation of the stem cell product. However, since the cord blood products are frozen, the blood group cannot be retested from the product.

In the condition of ABO incompatibility, transfusion policy is evaluated in three distinct periods:
a) Before transplantation period (phase I);
b) At transplantation period (phase II);
c) After engraftment period (phase III).

ABO incompatibility between the recipient and the donor is divided into three subtypes based on erythrocyte antigens and isohemaglutinins in both the recipient and the donor .Especially ABO isohemoglutinins may

cause various complications during stem cell infusion and post-transplantation period (Table 1).

Table 1. ABO incompatibility, clinical outcomes, etiology and management strategies

Type	ABO Blood Group		Potential Clinical Outcome	Etiology	Prevention/Management
	Recipient	Donor			
Major	O	A, B, AB	• Acute hemolytic reaction	• Transfusion with incompatible erythrocyte cells	• Erythrocytes depletion in the stem cell product
Major	A	AB	• Delayed erythrocyte engratment	• Loss of immature stem cells producing ABO antigens expressed in granulocytes and platelets	• Therapeutic plasma exchange to reduce isohemagglutinins before transplantation
Major	B	AB	• Pure red cell aplasia • Delayed granulovcyte and thrombocyte engraftment		• To provide erythropoiesis with erythropoietin administration
Minor	A	O	• Acute hemolytic reaction	• High isohemagglutinin titers in donor plasma	• Plasma reduction
Minor	B	O	• Delayed type hemolysis due to PLS in the stem cell graft	• Isohemoglutinin-producing passenger lyphocytes	• Close follow-up for hemolysis symptoms / findings between + 5 and +15 days of transplantation for hemolysis
Minor	AB	O,A,B			
Bidirectional	A	B	• Combination of those seen in major and minor incompatibility	• Combination of those seen in major and minor incompatibility	• The intervention as major and minor incompatible
Bidirectional	B	A			

3a. ***Non-ABO-type antibodies/Rh antibodies,***

Antibodies to non-ABO type erythrocyte antigens do not show a clinically significant impact in most of the cases. But rarely, they may also cause severe hemolysis [8]. The ratio of antibodies to minor erythrocyte antigens ranges from 1 to 8.6% and their clinical significance can be variable. Antibodies such as anti-JK**b**, anti-M, anti-Le**b**, anti-Di**b**, anti-E, anti-JK**a** and anti-K have been defined and may develop in about 1 month or more. These allo-antigens can be seen in transplantation period despite the immunosuppressive treatments. Particularly antibodies to the Kidd (Jk) antigen may lead to severe hemolysis. If the donor is sensitive to the Kidd antigen but has no antibodies detected before the transplantation, or if the patient has antibodies against the Kidd blood group system, the patient may become anamnestic when exposed to this antigen again and this may result in severe hemolysis. Another situation is Rh incompatibility [7, 8]. In the case of the transplantation from Rh D + donor to Rh D- recipient (D major incompatible), depletion of erythrocytes from the stem cell product should be considered. If there is Rh-incompatibility (Rh D- donor → Rh D+ recipient), the recipient should receive Rh D− erythrocytes. If the donor has anti-D at the time of transplantation, hemolysis in the recipient may be observed in an earlier period.

3b. ***Transfusion support and monitoring in ABO incompatibility,***

The anti-A and anti-B titers of both the recipients and their donors should be measured before the transplantation at the work-up [7, 8, 9]. If the titers of antibodies are 1: 128, they should be monitored twice weekly until they are lower than 1:16 after the transplantation, and then should be continued to follow them weekly until the titers disappear. If hemagglutinins titers are negative two times at the weekly monitoring without need for blood transfusion, the follow up of the titers can be ceased.

Another important issue is deciding the blood groups that have to be used before and after the transplantation in ABO incompatibility which have been showed in Table 2 [8, 9]. Phase I is the period in which the recipient has been prepared for the transplantation. If blood transfusion support is needed in this period, the recipient should receive blood products from own blood group. Phase II is defined as the conditioning regimen and post-transplantation period. This period ends when the direct Coombs test is found negative and the anti-donor type isohemagglutinins are not detected in the recipient plasma with the negativity of the recipient's erythrocyte antigens. The third phase is the period when recipient's blood group has completely changed to donor type ABO blood group.

Table 2. Recommendation of transfusion support according to the HSCT process phase.

Recipient	Donor	Phase I	Phase II					Phase III				
		All Products	Erythrocytes	Platelets		Plasma		Erythrocytes	Platelets		Plasma	
				1.choise	2.choise	1.choise	2.choise		1.choise	2.choise	1.choise	2.choise
Major ABO incompatibility												
O	A	Recipient	O	A	AB,B,O	A	AB	Donor	A	AB,B,O	A	AB
O	B	Recipient	O	B	AB,A,O	B	AB	Donor	B	AB,A,O	B	AB
O	AB	Recipient	O	AB	A,B,O	AB	–	Donor	AB	A,B,O	AB	–
A	AB	Recipient	A	AB	A,B,O	AB	–	Donor	AB	A,B,O	AB	–
B	AB	Recipient	B	AB	B,A,O	AB	–	Donor	AB	B,A,O	AB	–
Minor ABO incompatibility												
A	O	Recipient	O	A	AB,B,O	A	AB	Donor	A	AB,B,O	A	AB
B	O	Recipient	O	B	AB,A, O	B	AB	Donor	B	AB,B,O	B	AB
AB	O	Recipient	O	AB	A,B,O	AB	–	Donor	AB	A,B,O	AB	–
AB	A	Recipient	A	AB	A,B,O	AB	–	Donor	AB	A,B,O	AB	–
AB	B	Recipient	B	AB	B,A,O	AB	–	Donor	AB	B,A,O	AB	–
Bidirectional ABO incompatibility												
A	B	Recipient	O	AB	B,A,O	AB	–	Donor	AB	B,A,O	AB	–
B	A	Recipient	O	AB	O,A,B	AB	–	Donor	AB	A,B,O	AB	–

4. Conclusion,

ABO incompatibility may lead to several complications during and after stem cell transplantation in the early or late period. The blood groups of the recipient and donor should be typed by the method of forward and reverse blood grouping before HSCT. Depending on the subtype of ABO blood group-incompatibility and the graft source to be used for the HSCT, it should be decided whether the titers of hemagglutinins in the patients and / or their donors will reduce or whether erythrocyte depletion of stem cell products, especially bone marrow derived products, will be done. In addition, both the transplantation unit and transfusion center must work together to choose the most suitable blood product for transfusion to the patient according to the level of incompatibility at the peri-transplant period. Avoiding unnecessary and inappropriate transfusions may prevent the complications that may be observed after transplantation. Special guidelines, in which blood transfusion principles are specified, should be prepared by each transfusion center for transplant patients.

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TRANSFUSION PRACTICES IN HEMATOPOIETIC STEM CELL TRANSPLANTATION (HSCT): THE ROLE OF TRANSFUSION CENTER

Melda ÖZDAMAR
Özel Anadolu Sağlık Merkezi, Kocaeli

With the increasing "Hematopoietic Stem Cell Transplantation Centers (HSCT)" in our country as well as in the world in recent years, the rates of blood and blood products usage continue to increase. While these products are provided by the Red Crescent or authorized Regional Blood Centers (BKM) in Turkey, there may be situations when hospitals that use high numbers of specialized- processed blood products need to produce local solutions in transfusion centers.

Transfusion center of the HSCT units are able to provide a fast and safe transfusion service in a sufficient amount, without increasing the wastage rates of the blood products and multiple low-cost interventions and it needs to be studied or managed while treating domestic and international patients. "Patient blood management (PBM)" studies are provided by the Ministry of Health and associations related to this subject, interactive trainings for physicians and healthcare professionals are given in the hospitals but for the HSCT patients it might be different and difficult. In this regard clinicians, transfusion center manager and technicians, hemovigilance coordinator, hemovigilance nurse and quality performance employees should work as a multidisciplinary team. What we already know about this topic is blood transfusion is the most common procedure performed in this kind of hospitals and is often overutilized. Encouraging evidence-based transfusion practice can improve blood utilization[1].

In HSCT patient's pre and post transplantation transfusion protocols are similarly different from other patients. Major differences, nearly mandatory are mentioned below:

· Irradiated blood products usage: To reduce the graft-versus-host disease (GvHD) there are some guidelines published[2].
· FFP-associated GvHD haven't been reported so irradiation of the plasma is not necessary. But for the last 30 years it has been common practice to irradiate blood components transfused to allogeneic haemopoietic stem cell transplant (HSCT) recipients. Irradiation is recommended that it should be continued at least until immunosuppressive therapy is withdrawn (at least 6 months in most cases) (Grade 1 recommendation; level B evidence).

· Autologous bone marrow or peripheral blood haemopoietic stem cell transplantation Virtually all UK and European country centers currently irradiate blood components for autologous HSCT recipients and most use irradiated components before and during 'harvesting' of marrow or peripheral blood stem cells. As a minimum, irradiated blood components should be used until there is evidence of haematopoietic engraftment and lymphoid reconstitution (at least 3 months with chemotherapy conditioning alone and 6 months if total body irradiation is given). (Grade 2 recommendation; level C evidence).

· Leukocyte-reduced blood products are preferred to prevent alloimmunization against HLA antigens. Also for preventing and reducing febrile reactions in HSCT recipients ensuring that there is no Cytomegalovirus (CMV) and EBV (Epstein-Barr virus) infection, when the immunomodulatory effect of transfusion is undesirable or when immune suppression is undesirable, a leukocyte-reduced product is used.

· Anti-CMV IgG negative blood product is needed in HSCT recipients who are not immunized with cytomegalovirus (CMV). In this context, there is a need for registered volunteer CMV seronegative blood donors, which cannot be found easily in transfusion centers. In a study from Antalya, CMV seropositivity in the age group of blood donors in Turkey was found to be % 98 so an action must be taken to find the seronegative volunteer donors[3].

· HLA alloimmunization develops 7% to 34% in hemato-oncology patients. This increases the need for platelet transfusion. Red Crescent's preparation planning is aimed at meeting those patients for antigen-negative, cross-matched or HLA-compliance platelet needs. The main solution here is to reduce HLA alloimmunization, but it may be necessary to reduce the use of excessive platelets in the HSCT centers, which is necessary for this percentage to escape. So dedicated advancement and education in molecular and serologic immunohematology should be developed in blood banking.

We found it appropriate to carry out a patient blood management project in the HSCT department with scientific data's. The chief executive officer and the financial director of the hospital (Anadolu Medical Center-AMC) focused on the blood and blood products usage and wastage costs for HSCT units' patients because we analyzed that 90% items used for this unit. The aim is to increase efficiency by reducing inappropriate transfusions, possible side effects and transfusion reactions, and the transfusion costs. So a PBM Project were done for two years of period (2017-2018).

Methods are described for implementing a patient blood management program across a multi-institutional healthcare system as a quality improvement and patient safety effort in the highlight of the guidelines[4-5-6]. We performed the ASM blood management team (transfusion center manager-led, quality-improvement team, hemato-oncology department director) promoting best practices for the patients can reduce unnecessary transfusions, overall blood utilization, and costs, some amount return on financial investment across the wards of HSCT. Changes in blood utilization with implementing the new transfusion guidelines for packed red blood cells (pRBCs) and platelets (apheresis or pooled) and blood acquisition costs were compared for the pre– and post–patient blood management time periods. The impact on reducing pRBCs and platelet (PLT) wastage in the 24 months after intervention implementation was compared with the wastage rates in the 16 months before these interventions had been implemented.

An algorithm was prepared for the indications of usage pRBCs, apheresis thrombocyte and/or pooled thrombocyte suspensions as can be found in figure 1 and figure 2. To monitor compliance of the "Transfusion Protocol" that was published in January 2018, we wanted to measure whether the blood products were delivered according to this protocol annually. We sampled for the patients using pRBCs and thrombocyte suspensions in 2017 and 2018, and the release dates list. (Sampling method, time interval, patient and product numbers were determined). We evaluated the determined patients (laboratory findings, vital signs, daily follow-up records, surgery notes) according to the AMC Transfusion Protocol.

The results for 2017 were; pRBCs transfusion protocol compliance rate 89% and thrombocyte suspension transfusion protocol compliance rate 100%. Transfusion guideline compliance audits with feedback (reports) to providers were done. The positive effects were monitored by tracking the two-year transfusion costs and reported to team and the managers of the hospital. The establishment of a well-organized transfusion center with a high quality system in multidisciplinary all areas is necessary for transfusion applications to be made on need and for the health and well-being of the patient.

Figure-1: Packed red blood cells (pRBCs) transfusion protocol

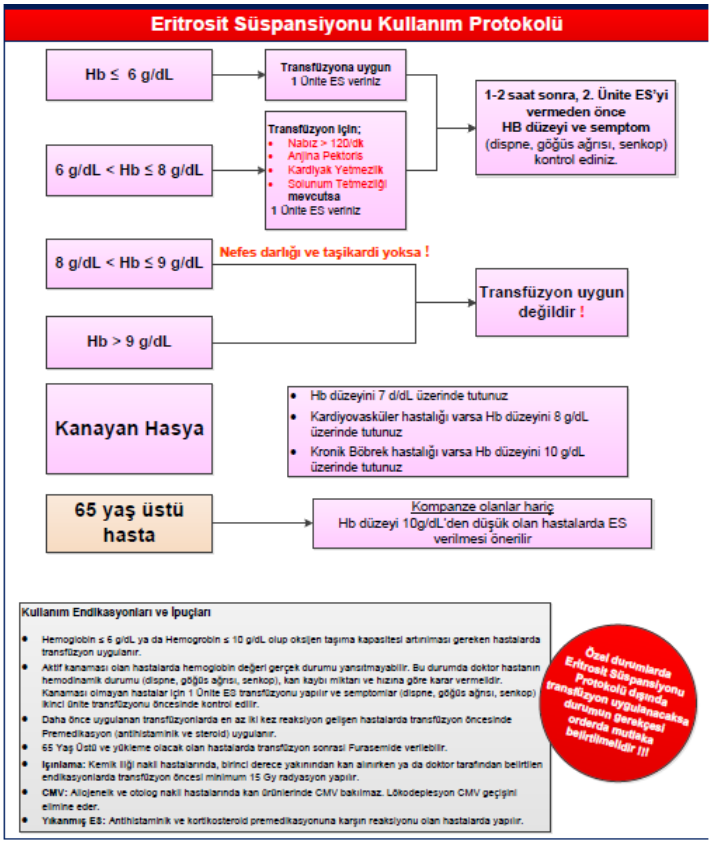
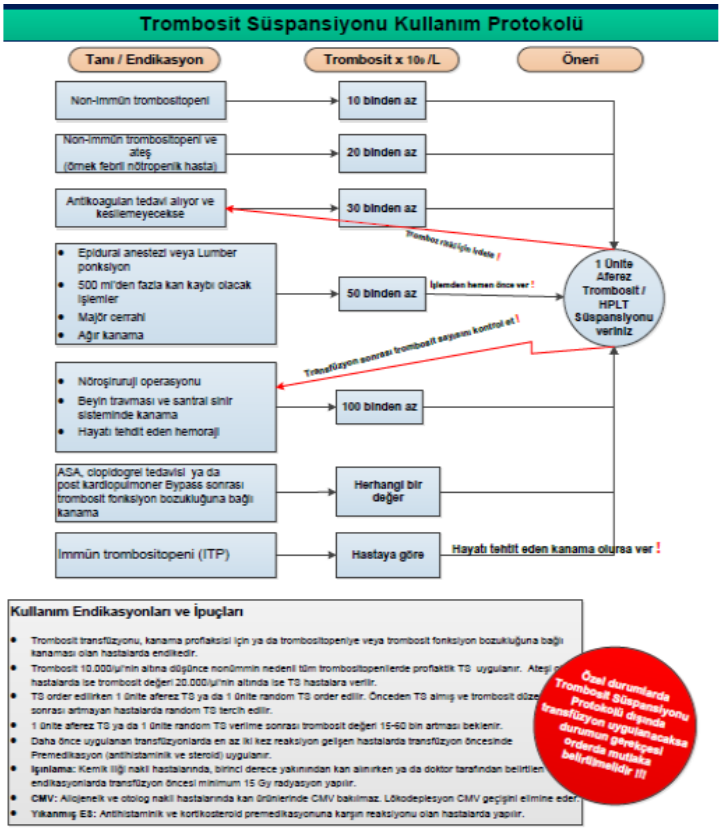


Figure-2: Platelets (apheresis or pooled) transfusion protocol



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Acknowledgements:
I appreciate the support of Elif Terzioğu, clinical quality and performance specialist, in implementing the transfusion protocols and training the related personnel. I would also thank for the valuable efforts of Prof Dr. Zafer Gülbaş for improving the procedures in terms of scientific quality and flow with the PBM team.

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Oral Presentations

OP-01

DEMOGRAPHIC, SOCIAL ASPECTS AND MOTIVATION OF BLOOD DONATION IN AZERBAIJAN

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AIM: The effectiveness of blood donation in the country is determined by a number of moral, ethical, socio-psychological and medical characteristics. In the context of the increasing demand for blood and its preparations every year, the study of the social portrait of the donor and the motives for donating blood is of particular importance, which allows us to identify trends in the recruitment of blood donors and improve the development of donation in the country.

MATERIALS & METHODS: For the purpose of definition of a sociological portrait of donors, anonymous questioning of 5000 blood donors was organized. Sociological interrogation was done with use of specially developed questionnaire of the blood donors. During the questionnaire, we found out the gender, age, profession, motives for participating in the donation, the reasons that prevent participation in the donation, the subjective opinion about the effect of donations on well-being and we were able to assess the effectiveness of the promotion of donation.

RESULTS: The number of male donors (77.1%) exceeded the number of female donors (22.9%). The largest number of donors was noted in the age group of 30-39 years old. By level of education, donors were divided as follows: 60% of donors had an average, 22.0% of donors had a higher education, and 18% - had incomplete higher education (students of various universities). In analyzing the distribution of blood donors according to social position showed that the social status of the respondents was dominated by employees (59%), whereas the workers accounted for 21%, pensioners - 2% of the students - 18%. Setting priorities in motivating donation showed that 34% do it for altruistic reasons, 24% because of a desire to help a sick family member, 15% because of religious beliefs, 13% under the influence of the team at the place of work or study, 12% of the-striving for social affirmation, 3% because of the free testing of health. 1% of respondents could not answer the question about the motives of blood donation. 22% of those who came to the blood bank did not know anything at all about blood donation, 19% were not sure of its safety, 40% were not aware of contraindications to donation.

CONCLUSION : The identification of medical, social, personal and motivational characteristics of donors made it possible to develop basic measures to increase the efficiency of work with the population on issues of voluntary blood donation.

KEYWORDS: Blood Donation, Demographic Aspekts, Motivation, Social Aspects

OP-02

A RING WE IGNORE IN THE HEMOVIGILANCE CHAIN: STAFF WORKING FOR THE TRANSPORT OF BLOOD PRODUCTS IN THE HOSPITAL

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AIM: Transport of blood and blood products is one of the most important rings in the hemovigilance chain. However, there is no study in the literature investigating the transportation of blood and blood products within the hospital. Our aim was evaluating this subject, revealing the wrong practices, if any, proposing solutions and raising awareness on this ring of hemovigilance chain.

MATERIALS & METHODS: The hospital staff at Afyonkarahisar Health Sciences University Hospital, carrying blood and blood products included in the study. They have surveyed with multiple choice 20 questions about safe blood sample and blood product transport to and from the blood centre, blood transport bag features, documents to be brought to the blood centre, things to be done after delivering the blood product to the department. SPSS 23.0 was used to analyze the data.

RESULTS: The average age of 100 hospital staff, who met the inclusion criteria and surveyed was 39.5 ± 6.5 years. The duration of their blood carrying duty was between 1 and 18 years. The median number of correct answers was 9 (minimum 0, maximum 17). There was no significant difference in the median number of correct answers according to the gender, education and training status. No significant correlation was found between the age of the staff, blood carrying duty duration and the number of correct answers. Shortly after a training by hemovigilance personel, the median number of correct answers to same survey increased from 9 to 17 (minimum 6, maximum 20) and was statistically significant.

CONCLUSION: The fact that there was no significant difference between hospital staff who were previously trained or not, suggests that the trainings should be repeated periodically. The fact that there was no significant correlation between the total professional working year of staff and the number of correct responses suggests that, as the duration of the occupation of staff increases, the errors continue, while this is expected to decrease with the duration of the occupation. As a result, our findings show that the hospital staff in charge of the transportation of blood products in the hospital, do not consciously, effectively and accurately perform their duties, although they constitute a very important link in the chain of hemovigilance. Hospital hemovigilance units must focus more on this issue is of great importance in order not to break the hemovigilance chain, which must be successfully processed as a whole.

KEYWORDS: Blood, Hemovigilance, Staff, Transport

OP-03

RETROSPECTIVE EVALUATION OF ACUTE TRANSFUSION REACTIONS IN A TERTIARY HOSPITAL, ERZURUM, TÜRKIYE

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AIM: Transfusion of blood and blood components is a special type of tissue transplant and a life-saving treatment. However, besides the benefits of blood product transfusions, there are also some undesirable side effects (1). Transfusion-related undesirable side effects can only be prevented by identifying the factors that contribute to the formation of transfusion-related side effects and by taking corrective measures (2). This study was undertaken to determine the incidence and type of acute transfusion reactions (ATR) in our hospital.

MATERIALS & METHODS: In the study, acute transfusion reaction types, time of occurrence, types of blood and blood components in Erzurum Regional Training and Research Hospital between January 2018-January 2020 were evaluated retrospectively.

RESULTS: In the two-year period, 61636 blood and blood components were used in 9334 patients. Out of the blood and blood components were 18015 bags of erythrocyte suspension, 4099 bags of platelet suspension, 39153 bags of fresh frozen plasma (TDP), 156 bags of whole blood, 213 bags of cryoprecipitate. ATR developed in 53 of the transfused patients. An ATR was observed in 51 patients, it was seen two times in two patients. Of the patients who developed an ATR, 18 were female and 35 were male, and their ages ranged from 1 month to 85 years (Figure 1). The frequency of ATR was 0.09%, allergic was 47.3%, febrile nonhemolytic transfusion reaction (FNHTR) 41.8%, hypotensive transfusion reaction 7.3%, Transfusion-associated lung injury (TRALI) 1.81% (Table 1). 61.8% of all ATR were related to erythrocyte suspension, 30.9% TDP, 5.5% platelet suspension, 1,8% whole blood. Table 2 shows the time for the formation of acute transfusion reactions.

CONCLUSION: A limited number of studies have been reported examining transfusion reactions from our country. In our study, it was observed that only ATR were reported to our hemovigilance unit and no late transfusion reactions were reported. We think that the reason for this is that late transfusion reactions have not been diagnosed or late transfusion reactions that don't require acute medical treatment are under-reported. The incidence of ATR in the literature has been reported between 0.032-21.3% (3-9). The results of our study are compatible with the literature. In our study, allergic reactions and FNHTR were detected as the most common ATR in accordance with the literature. It is important to monitor the transfusion patients for undesired reaction during and after the transfusion to determine the frequency and type of transfusion reactions, risk factors and to provide safety measures.

KEYWORDS: Adverse Events, Hemovigilance, Transfusion Reaction

Figure 1:

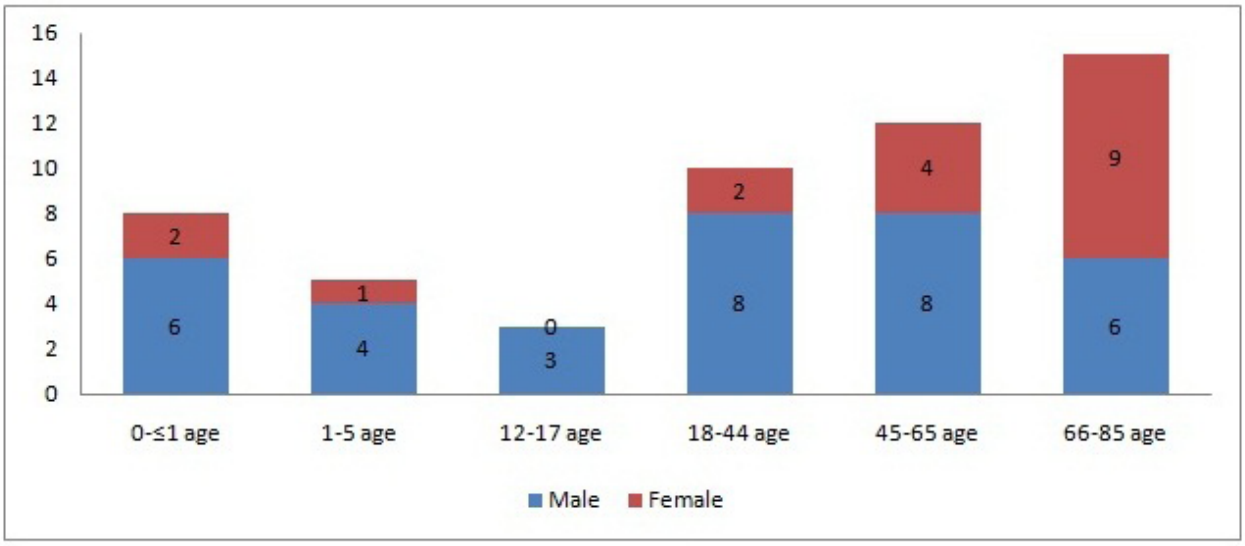

Figure 1: Distribution of patients with acute transfusion reaction by age and gender

Distribution of patients with acute transfusion reaction by age and gender

Table 1

Table 1: Frequency of acute transfusion reactions

	Erythrocyte suspension (n,%)	Whole blood (n,%)	FFP (n,%)	Platelet suspension (n,%)	Total (n,%)
Total Transfusions	18015 (100)	156	39153	4099	61636
Number of Transfusion Related Side Effects	34(0,19)	1(0,64)	17(0,04)	3(0,07)	55(0,09)
Allergic Reaction	11(42,3)	0	14(53,9)	1(3,8)	26 (47,3)
FNHTR	21(91,3)	0	2(8,7)	0	23(41,8)
Anaphylactoid	1(100)	0	0	0	1(1,81)
Hypotensive Transfusion Reaction	1(25)	0	1(25)	2(50)	4(7,3)
TRALI	0	1(100)	0	0	1(1,81)

FNHTR; febrile non hemolytic transfusion reaction, TRALI; Transfusion-Related Acute Lung Injured, FFP; fresh frozen plasma

Frequency of acute transfusion reactions

Table 2

Table 2: The time of occurrence of acute transfusion reactions

Acute transfusion reaction types	Number of cases	Reaction development time(minute) mean + standard deviations (min-max)
Anaphylactoid reaction	1	20
Allergic Reactions	23	57,9±45,2(3-180)
FNHTR	26	43±37,485-180)
TRALI	1	15
Hypotensive transfusion reaction	4	31,2±22,1(10-55)

The time of occurrence of acute transfusion reactions

OP-04

KNOWLEDGE LEVEL AND AWARENESS OF HEALTH WORKERS IN HEMOVIGILANCE SYSTEM ABOUT TRANSFUSION REACTIONS

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AIM: Blood transfusion is a miraculous treatment method, a tissue and even an organ transplantation that saves lives. The mistakes in transfusion may become irreversible. For this reason, it is important to know the transfusion reactions and their complications properly and recognize them immediately for the right treatment. The aim of this study is to determine the knowledge and awareness of the health workers in our hospital about transfusion reactions.

MATERIALS & METHODS: Universe of this study consisted of all nurses, midwives and anesthesia technicians working in Zeynep Kamil Women and Children's Diseases Education and Research Hospital, and the sample of this study consisted of 200 people who volunteered to participate in the survey in January 2020. A 15 item questionnaire including demographic characteristics of the participants and created by the researchers based on literature was used as a data collection. Data was analyzed by using SPSS Software 22.

RESULTS: 29.5% of the participants were midwives, 63% were nurses and 7.5% were anesthesia technicians. 78.5% of the participants had bachelor degree. 55.5% had been working for 0-5 years. 96.5% had been trained in blood and blood components transfusion reactions. 86% of them had received in-service training. 93.5% of the participants had performed a blood transfusion and 44.5% had encountered a transfusion reaction. 78% of the participants stated that they had sufficient information about the transfusion of blood and blood components and follow-up. The average correct response rate of the participants to ten questions about transfusion reactions was 77.6% and the false answer rate was 18.15%. 4.25% of the questions were not answered. The questionnaire questions and correct response rates directed to the participants are as shown in Table 1.

CONCLUSION: Blood transfusion can save lives, on the other hand, it may cause death. Therefore, health professionals play a major role in every step of blood transfusion. In this study, the knowledge level and awareness about transfusion reactions of the health personnel in our hospital were studied. In consideration of these data, it was planned to carry on in-service trainings and also unit-based trainings periodically.

KEYWORDS: Awareness Level, Hemovigilance, Transfusion Reactions

Transfusion reactions survey questions and correct response rates

When is the riskiest period in transfusion reactions?	80%
Which is the riskiest group in transfusion reaction?	70,5%
In which blood component is the transfusion reaction the most common?	85%
How long should the patient be monitored for transfusion reactions after transfusion?	70,5%
The body temperature of the patient is measured at 36.7 ° C before transfusion. If the temperature is increased 2°C and the patient has the symptoms of tremor and headache after the transfusion start. What is the first step to follow?	96,5%
If the patient has severe hypotension, respiratory distress, syncope, sore throat during or after transfusion, what is the diagnosis that comes to your mind?	39,5
Which infectious agent is not transmitted by transfusion?	97,5%
Do you think transfusion reactions require immediate medical attention and can result in death?	99,5%
What is the transfusion reaction in wrong ABO blood type of transfusion?	79%
What are the main causes of AHTR?	70%

OP-05

INVESTIGATION OF REASON AND DESTRUCTION RATE OF BLOOD AND BLOOD COMPONENTS IN SELCUK UNIVERSITY MEDICAL FACULTY HOSPITAL BETWEEN 2010-2019

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AIM: Blood transfusion is one of the most important component of health therapies. Transfusion centers are responsible for stocking a sufficient number of blood and blood components according to hospital needs. In addition, these centers are responsible for the efficient use of blood and blood components. In this study, we aimed to investigate the rates and causes of destruction of blood and blood components obtained in our institution for 10 years period and the effectiveness of the studies aimed to prevent causes of destruction.

MATERIALS & METHODS: Between January 2010 and December 2019, complete blood (CB), erythrocyte suspension (ES) and fresh frozen plasma (FFP) destruction rates and causes of destruction (recorded by Selcuk University Medical Faculty Transfusion Center) were evaluated retrospectively. Our center has been serving as a Transfusion Center since January 2013.

RESULTS: The rate of blood and blood components destructed during 10-year period are shown in Table 1. The highest rate of destruction was detected 19.8% (730) in 2010. Blood usage rates have increased year by year. The lowest destruction rate was detected with 1.2% in 2019. The highest reason of destruction rate (49.8%) were evaluated as expiration date of blood and blood components.

CONCLUSION: Our blood products destruction rate has decreased compared to previous years. In our hospital, Solution-oriented decisions were taken by the Transfusion Control Committee and Hemovigilance Unit. After the decisions, our blood destruction rate decreased by 18.5% and reached 1.2% in a decade. This result showed us that the trainings given about the conditions under which the blood products will be kept and the safe transfusion, the correct use of blood, the right blood component selection with the right indication effected positively our destruction rate. Therefore, the training and precautions should be continued.

KEYWORDS: Blood Components, Blood Destruction, Reason of Destructions

Table 1. The rate of blood and blood components destructed during 10-year period

Table 1. The rate of blood and blood components destructed during 10-year period

Year		Complete blood	Erythrocyte suspension	Fresh frozen plasma	Total
2010	Number of used products	40	2041	870	2951
	Number of destructed products	50	366	314	730
	Destruction rate (%)	55,5	15,2	26,52	19,83
2011	Number of used products	49	4309	2189	6547
	Number of destructed products	69	468	236	773
	Destruction rate (%)	58,47	9,76	9,73	10,56
2012	Number of used products	90	6970	2973	10033
	Number of destructed products	64	527	417	1008
	Destruction rate(%)	41,55	7,03	12,3	9,12
2013	Number of used products	117	7471	2614	10202
	Number of destructed products	53	682	453	1188
	Destruction rate (%)	31,17	8,36	14,77	10,43
2014	Number of used products	64	7593	2821	10478
	Number of destructed products	30	369	528	927
	Destruction rate (%)	31,91	4,63	15,76	8,12
2015	Number of used products	111	7996	2821	10928
	Number of destructed products	15	234	621	870
	Destruction rate (%)	11,9	2,84	18,04	7,37
2016	Number of used products	117	10200	4431	14748
	Number of destructed products	7	180	633	820
	Destruction rate (%)	5,64	1,73	12,5	5,26
2017	Number of used products	182	12331	6928	19441
	Number of destructed products	10	147	469	626
	Destruction rate (%)	5,2	1,17	6,34	3,11
2018	Number of used products	691	12765	7356	20812
	Number of destructed products	115	1137	986	2238
	Destruction rate (%)	14,26	8,17	11,81	9,7
2019	Number of used products	793	13301	7385	21479
	Number of destructed products	43	133	99	275
	Destruction rate (%)	5,14	0,99	1,32	1,26

OP-06

ANALYSIS OF ADVERSE EVENT AND REACTION DATA IN A TRAINING AND RESEARCH HOSPITAL IN A YEAR

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AIM: Adverse reactions that occur due to transfusions of blood and blood components are described as transfusion reactions. The slightest signs and symptoms encountered during transfusion should be considered a life-threatening transfusion reaction and diagnosis and treatment should be initiated at the same time. Haemovigilance describes the entire blood transfusion chain, from the donation and processing of blood and its components, through to their provision and transfusion to patients, and including their follow-up. In this study, the records of transfusion-related adverse events and reactions seen in blood recipients in the haemovigilance tracking system between January 2019 and January 2020 were retrospectively analyzed.

MATERIALS & METHODS: In our hospital, Hemovigilance Nurse follows all transfusion practices with related records and forms. All transfusion-related adverse events and reactions were forwarded to Haemovigilance Nurse by the related forms and records by Hemovigilance Unit Officers. Adverse events and reactions were described. Along with other data of the Transfusion Center, they were discussed at the Hospital Transfusion Committee meetings. Transfusions, adverse events and adverse reactions recorded between 2019-2020 were analyzed.

RESULTS: A total of 10864 blood and blood component transfusions were performed in our hospital between January 2019 and January 2020. Transfusion-related adverse reactions were seen in 12 patients and three adverse events were recorded. Seven of the adverse reactions were evaluated as febrile non-hemolytic transfusion reaction (FNHTR), three mild allergic reactions, one transfusion-related circulatory loading, and one patient was identified as an undefined mild transfusion reaction. All of the mild allergic reactions detected in three patients and the unidentified mild transfusion reaction occurred during TDP transfusion. Six of the FNHTR seen in seven cases seen during ES transfusion and one during TDP transfusion. TACO reaction occurred during TDP transfusion. The imputability levels were reported as "3" in four reactions and "2" in three reactions. The distribution of adverse reactions according to blood products, severity, and imputability levels are summarized in table 1. Two of the three adverse events seen in our hospital in 2019 occurred due to the delivery of different blood samples with the patient who was requested. In one case, the wrong blood product was output by the transfusion center. Adverse event detection and preventive action are shown in table 2.

CONCLUSION: In our hospital, within a year 12 transfusion reactions (incidence of 0.12%) and three adverse events were detected. Seven of the adverse reactions were FNHTR, 3 of them were a mild allergic reaction. The low incidence of transfusion-related adverse reactions may be due to all the blood components used are filtered. The three adverse events were noticed at the time and were corrected without causing death or life-threat.

KEYWORDS: Adverse Event, Adverse Reaction, Haemovigilance, Transfusion Reactions

Transfusion-related adverse reactions in 2019

Reaction	Blood Component	Severity Level	Imputability Level	Service
A2 FNHTR	RBC	1	2	Emergency Room
A2 FNHTR	FFP	1	3	Gastroenterology
A2 FNHTR	RBC	1	0	Neurosurgery Intensive Care Unit
A3 mild allergic reaction	FFP	1	3	Nephrology
A2 FNHTR	RBC	1	2	Neurosurgery Intensive Care Unit
A2 FNHTR	RBC	1	0	Aesthetic, Plastic and Reconstructive Surger
A6 TACO	FFP	3	2	Gynecology and Obstetrics
A2 FNHTR	RBC	1	1	Emergency Room
A3 mild allergic reaction	FFP	1	3	Gynecology and Obstetrics
(X) Unidentified reaction	RBC	1	0	Internal Medicine
A2 FNHTR	RBC	1	3	Nephrology
A3 mild allergic reaction	FFP	1	3	General Surgery

Table.1

Transfusion-related adverse events in 2019

Event	Event description	Prevention
Request for wrong patient	It was determined that the blood sample and the request form belonged to different patients. Due to the automation update and patient intervention, the blood request was discarded to a different patient.	The blood group was confirmed by requesting the blood sample again. Automation was discussed; necessary corrections were made in the patient records.
Error in barcoding and no barcode control	Blood samples from different patients were sent to the blood center. An error was detected when the patient had a different group from the previous blood group.	The blood group was confirmed by requesting the blood sample again. The clinic was warned to check the barcode at the bedside.
Incorrect delivery	Blood delivery was performed on behalf of the different patient to the patient requested by the clinic. An error was noticed in the service check; transfusion was not performed.	Personnel causing adverse event were warned about outputs. Information was given about the risks of false transfusion.

Table.2

OP-07

ASSOCIATION BETWEEN PLATELET COUNT AND BLOOD GROUPS IN APHERESIS PLATELET DONORS WITH DEMOGRAPHIC FEATURES: NEW FINDINGS

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AIM: Platelet transfusion is used to prevent bleeding in the patients with thrombocytopenia or platelet dysfunction. Aim of the study, to investigate demographic characteristics of eligible volunteers as platelet donor and to demostrate the association of platelet counts with blood groups as well as other factors.

MATERIALS & METHODS: Data of 2,198 individuals who referred to Blood Centre of Pendik Training and Research Hospital within Marmara University and were accepted as donors between 2017 and 2018 were analyzed retrospectively. Age, body weight, body mass index (BMI) and gender were determined and than hemogram values such as leukocyte, haemoglobin, hematocrit and platelet and ABO blood types of those individuals were determined.

RESULTS: No significant difference was for age in both male and female, but a statistically significant difference were determined for height, body weight and BMI in both genders. Although, BMI was lower in group of platelet count ykrk30250, was higher in group of platelet count > 250. Furthermore, platelet count was lower in blood group O Rh positive but, no significant difference was group O Rh negative. Platelet count was higher in other Rh positive blood groups than Rh negatives. Platelet counts were associated with BMI. Platelet counts were lower in groups of normal BMI and grade 1 obese, were higher in groups of grade 2 and morbid obese.

CONCLUSION: BMI is important in apheresis donors, and individuals with higher BMI may be preferred in case of need for double dose or more apheresis. Rh Factor is another important factor in apheresis donors. In our study, platelet counts were higher in Rh positive individuals than Rh negative ones. When double-dose or greater apheresis is required, the primary orientation of Rh positive donors in blood group compliance will facilitate access to this difficult-to-supply product.

KEYWORDS: Apheresis, Blood Group, Donor, Platelet

table 1.

Table 1. Distribution of anthropometric characteristics according to the gender

	Female (Mean ± SD)	Male (Mean ± SD)	P
Age	35.7±9.265	35.5±8.90	>0.05
Height	**165.4±6.162**	**175.9±7.216**	**<0.05**
Body weight	**67.7±11.216**	**82.6±12.359**	**<0.05**
BMI	**24.8±4.112**	**26.7±4.001**	**<0.05**

Table 2.

Table 2. Distribution of demographic characteristics and blood group according to the gender

		Female n (%)	Male n (%)	p
	EDUCATIONAL STATUS			
	Elementary School	**19 (16.4)**	**336 (15.8)**	**<0.05**
	Middle School	**13 (11.2)**	**404 (19.0)**	
	High School	**31 (26.7)**	**721 (33.9)**	
	University	**53 (45.7)**	**664 (31.2)**	
	MARITAL STATUS			
	Married	76 (65.5)	1450 (67.9)	>0.05
	Single	40 (34.5)	685 (32.1)	
	BLOOD DONATION HISTORY			
	First	**68 (58.6)**	**538 (25.0)**	**<0.05**
	Previously donated	**48 (41.4)**	**1610 (75.0)**	
	BLOOD GROUP			
	A Rh (+)	**35 (33.7)**	**763 (37.4)**	**<0.05**
	A RH (-)	**9 (8.7)**	**103 (5.0)**	
	B Rh (+)	**19 (18.3)**	**233 (11.4)**	
	B RH (-)	**3 (2.9)**	**22 (1.1)**	
	AB Rh (+)	**9 (8.7)**	**101 (4.9)**	
	AB Rh (-)	**-**	**22 (1.1)**	
	ORh (+)	**23 (22.1)**	**691 (33.9)**	
	O Rh (-)	**6 (5.8)**	**106 (5.2)**	
Blood group		**Total n (%)**		
A Rh (+)		798 (37.2)		
A Rh (-)		112 (5.2)		
B Rh (+)		252 (11.7)		
B Rh (-)		25 (1.2)		
AB Rh (+)		110 (5.1)		
AB Rh (-)		22 (1.0)		
O Rh (+)		714 (33.3)		
O Rh (-)		112 (5.2)		

Table 3.

Table 3. Change of the platelet group by body weight and BMI

PLT Group		n	Mean	Std. Deviation	p
Body weight	≤250	1.093	81.49	12.397	>0.05
	>250	1.106	82.13	12.990	
BMI	**≤250**	**1.093**	**26.41**	**3.674**	**<0.05**
	>250	**1.105**	**26.85**	**4.335**	

Table 4.

Table 4. Distribution of the platelet group by blood groups

			PLT Group		Total	P
			≤250	>250		
Blood group	O Positive	n	**362**	**341**	**703**	**<0.05**
		According to the blood group %	**51.5%**	**48.5%**	**100.0%**	
	O Negative	n	**55**	**55**	**110**	
		According to the blood group %	**50.0%**	**50.0%**	**100.0%**	
	A Positive	n	**378**	**410**	**788**	
		According to the blood group %	**48.0%**	**52.0%**	**100.0%**	
	A Negative		**67**	**42**	**109**	
		According to the blood group %	**61.5%**	**38.5%**	**100.0%**	
	B Positive	n	**120**	**128**	**248**	
		According to the blood group %	**48.4%**	**51.6%**	**100.0%**	
	B Negative	n	**13**	**12**	**25**	
		According to the blood group %	**52.0%**	**48.0%**	**100.0%**	
	AB Positive	n	**47**	**59**	**106**	
		According to the blood group %	**44.3%**	**55.7%**	**100.0%**	
	AB Negative	n	**17**	**5**	**22**	
		According to the blood group %	**77.3%**	**22.7%**	**100.0%**	
Total		n	1.059	1.052	2.111	
		According to the blood group %	50.2%	49.8%	100.0%	

Table 5.

Table 5. The association of the platelet group with BMI

			PLT Group		Total	P
			≤250	>250		
BMI Group	Normal	n	**416**	**372**	**788**	**<0.05**
		According to BMI %	**52.8%**	**47.2%**	**100.0%**	
	Overweight	n	**483**	**532**	**1.015**	
		According to BMI %	**47.6%**	**52.4%**	**100.0%**	
	Grade 1 Obesity	n	**177**	**168**	**345**	
		According to BMI %	**51.3%**	**48.7%**	**100.0%**	
	Grade 2 Obesity	n	**12**	**27**	**39**	
		According to BMI %	**30.8%**	**69.2%**	**100.0%**	
	Morbid Obesity	n	**5**	**6**	**11**	
		According to BMI %	**45.5%**	**54.5%**	**100.0%**	
Total		n	1.093	1.105	2.198	
		According to BMI %	49.7%	50.3%	100.0%	

OP-08

SEVERE ACUTE HEMOLYTIC TRANSFUSION REACTION AFTER 2 PACKAGES OF ABO INCOMPATIBLE ERYTROCYTE SUSPENSION TRANSFUSION SUCCESSFULLY TREATED WITH RUXOLITINIB AND PLASMA EXCHANGE

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AIM: Acute immune hemolytic transfusion reaction (AHR) due to ABO incompatible red blood cell (RBC) transfusion is rare but mortality risk is very high. Even little amounts of ABO incompatible erythrocytes, such as 50 milliliters can be mortal. Since there is no successfully standard therapy, preventive measures are very important. After ABO incompatible transfusions generation of massive antigen-antibody complexes are very important in pathogenesis. These complexes stimulate huge cytokine release which is responsible for multi organ failure that increases the risk of death. In here, we present an immunocompetent patient who had given 2 units of ABO incompatible erythrocytes and survived with massive plasma exchange (PEX) and ruxolutinib therapy. As far as we know, this is the first patient in literature whom ruxolutinib was used as a part of therapy.

MATERIALS & METHODS:

RESULTS: A 29 year old female patient with O positive blood group who has been transfused with 2 packages of AB positive RBC has been referred to our hospital 22hours after transfusion. In admission it was learned that patient had cesarean with one living birth and postop transfusion. She had hemolysis, respiratory insufficiency, acute renal failure and DIC. Pulse steroid, PEX (2volumes per procedure twice a day) and hemodialysis was started. Due to respiratory insufficiency, low oxygen saturation and hypoxia induced conscious changes and combined acidosis patient has been intubated. She had rapidly worsening clinical status and refractory to first day therapies. Because of urgent clinical condition ruxolitinib 2x10 mg po has been started with informed consent. Three days after ruxolitinib patient was extubated and on the 7th day patient has been taken from intensive care unit. Hemodialysis and PEX was stopped on day 10. Ruxolitinib has been withdrawn on day 15. Patient was discharged with normal blood levels and renal function tests without any sequela or complications on day 26.

CONCLUSION: ABO incompatible RBC transfusions are one of the main causes of mortalities in clinical practice. Generally, the AHR initiates very rapidly and give clinical findings at the first few minutes of transfusion. Despite the early termination of transfusion due to realizing of clinical reaction mortality risk is still high. Most of the survivors are those who are transfused with little amounts of RBC, old and/or immunosuppressed patients. There is no standard successful therapy for ABO incompatible RBC transfusion. Most of the therapy depends on supportive measures such as stabilization of hemodynamic changes, hemodialysis and transfusion of blood components for DIC. Huge cytokine release is one of the main pathogenetic events that lead to multi organ failure in patients. Steroids and PEX can eliminate cytokine release but generally insufficient in most patients. Ruxolitinib is a potent and immediate inhibitor of many cytokines, so we decided to use ruxolutinib for our patient as a part of therapy. Our patient is young and immunocompetent patient and transfused 2 units of incompatible RBCs. Although, the chance of living was minimal, she was survived with massive PEX and ruxolitinib therapy. In conclusion, ruxolitinib can be an option for treatment of this life threatening situation.

KEYWORDS: ABO İncompatible Transfusion, Acute Hemolytic Transfusion Reaction, Ruxolitinib

OP-09

IS BLOOD TRANSFUSION NECESSARY IN ALL PATIENTS WITH DISSEMINATED INTRAVASCULAR COAGULATION ASSOCIATED POSTPARTUM HEMORRHAGE

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AIM: The diagnosis of disseminated intravascular coagulation (DIC) in obstetrics is complicated. Therefore, a pregnancy-modified DIC score that includes only three components of the International Society on Thrombosis and Hemostasis (ISTH) DIC score has been constructed. Our aim was to determine how many blood-transfused postpartum women actually had the diagnosis of overt DIC according to the modified ISTH score and had the correct indications for blood transfusion.

MATERIALS & METHODS: We retrospectively analyzed 279 women who had received transfusion of at least two units of blood for postpartum hemorrhage. We used the modified ISTH score for DIC, which is based on platelet count, fibrinogen concentration, and prothrombin time (PT) differences. A total score of 26 points or higher indicated overt DIC, whereas a score lower than 26 points represented nonovert DIC.

RESULTS: According to the modified ISTH score, 100 of the 279 patients (35.8%) had overt DIC, with a median DIC score of 37.0. Thirty-five percent of patients in the overt DIC group and 25.7% in the nonovert DIC group had received more than four units of blood. The levels of PT and activated partial thromboplastin time were higher, and the fibrinogen level was lower in patients with overt DIC.

CONCLUSION: Diagnosis In obstetrics, is much more complicated because coagulation is enhanced and fibrinolysis is during late pregnancy. A pregnancy modified DIC score was constructed that includes only three components of DIC score. This score facilitates prompt diagnosis and early management of obstetrical DIC. Based on this scoring system, we found that blood transfusion was unnecessary in 179 of the 279 postpartum women. If the modified ISTH score had been used, these women would have been protected from transfusion- related risks and complications. The condition of the patient due to mild postpartum hemorrhage could be corrected with intravenous hydration rather than blood transfusion. If this condition could not be achieved, the patients should be compensated with blood especially in severe cases to prevent However, according to our results, 25.7% of the patients in the nonovert DIC group received more than four units of blood; it was not clear why so much blood was given to these patients. The guidelines emphasize that blood transfusion is a type of tissue transplantation and may be associated with many future complications. In conclusion; Further studies are needed to establish new diagnostic criteria with greater sensitivity and specificity for the early diagnosis and proper management of DIC to avoid unnecessary blood transfusions.

KEYWORDS: Blood Transfusion; Disseminated İntravascular Coagulation; Postpartum Hemorrhage

tablo1

Table 1. Parameters on modified ISTH score.

Parameters	Score
Platelet count, 10^9/L	<50 = 1
	50–100 = 2
	100–185 = 2
	>185 = 0
Prothrombin time (value of patient/normal value)	<0.5 = 0
	0.5–1.0 = 5
	1.0–1.5 = 12
	>1.5 = 25
Fibrinogen level, g/L	3.0 = 25
	3.0–4.0 = 6
	4.0–4.5 = 1
	>4.5 = 0

Calculated score >26 = high probability for DIC.

tablo2

Table 2. Indications for blood transfusion and management procedures.

Indications	No (%)
Uterine atony	122 (43.7)
Placenta previa	81 (29)
Placenta adhesive disorders	28 (10)
Preeclampsia, eclampsia, HELLP syndrome	25 (8.9)
Ablatio placenta	19 (6.8)
Uterine rupture	4 (1.4)
Arterial ligation (uterine or hypogastric)	27 (9.7)
B-Lynch suture	7 (2.5)
Bakri balloon	29 (10.4)
Segmental resection	8 (2.9)
Peripartum hysterectomy	60 (21.5)

tablo3

Table 3. Comparison of the patients with overt DIC and nonovert DIC.

Characteristics	Nonovert DIC mean or no (%)	Overt DIC mean or no (%)	*p*
Age (years)	32.7 ± 6.1	32.1 ± 6.9	NS
Gravida	3.3 ± 1.9	2.8 ± 2.0	**.036**
Parity	1.8 ± 1.4	1.4 ± 0.6	**.020**
Hospital stay (days)	5.3 ± 3.2	5.6 ± 3.4	NS
Prepartum hemoglobin (g/dL)	9.9 ± 2.2	10.4 ± 2.1	**.028**
Prepartum hematocrit (%)	31.5 ± 6.1	33.3 ± 5.9	**.012**
Prepartum platelet count (10^3 cells/μL)	225.2 ± 78.2	218.2 ± 67.3	NS
Postpartum hemoglobin (g/dL)	7.1 ± 1.7	7.1 ± 1.5	NS
Postpartum hematocrit (%)	22.2 ± 4.9	22.2 ± 4.4	NS
Postpartum platelet count (10^3 cells/μL)	168.6 ± 77.3	156.2 ± 73.3	NS
Hemoglobin decline (g/dL)	2.6 ± 2.3	3.3 ± 2.3	**.032**
Hematocrit decline (%)	9.2 ± 7.0	11.1 ± 7.7	**.042**
Fibrinogen level (g/L)	17.5 ± 11.1	2.6 ± 2.3	**<.001**
Postpartum PT	14.6 ± 2.9	16.9 ± 6.5	**.001**
Postpartum aPTT	32.6 ± 11.0	39.3 ± 22.5	**.025**
Postpartum INR	2.5 ± 1.3	3.4 ± 1.6	NS

Statistical siginificance was identified as $p < .05$ marked in bold.

OP-10

ASSOCIATION BETWEEN BLOOD TYPES AND SOME HEMATOLOGIC MALIGNANCIES

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AIM: Notably, the ABO antigens are expressed not only on the surface of red blood cells but also on a variety of human cells and tissues, including epithelia, platelets, vascular endothelia and neurons. Therefore, it is reasonable to hypothesize that such carbohydrate moieties are of importance not only for transfusion and transplantation medicine, but also for the pathogenesis of various systemic diseases. Among these pathologies, the best clinical evidence emerged from the association between ABO antigens and cardiovascular disorders. Data on hematologic malignancies are not satisfactory. In this study, we assessed whether the ABO blood group correlates with the risk of developing Chronic Myeloid Leukemia (CML) and Multiple Myeloma (MM).

MATERIALS & METHODS: 766 CML and 262 MM patients were analyzed. As a control group 7086 primary blood donors aged between 35 and 60 years were enrolled to the study. P values calculated from chi square using the software IBM SPSS.

RESULTS: As a result of our study we determined that the percentage distribution of ABO and Rhesus blood groups in control group is as follows: 0 - 38,4%, A – 35,4%, B - 20,2%, AB - 6,1%, Rh+ - 90,2%, Rh - 9,8%. ABO and Rhesus blood type distribution among CML patients is such: 0 - 37,6%, A – 40,3%, B - 14,6%, AB - 7,5%, Rh(+) - 92%, Rh(-) - 8%. A comparison of these data with the control allowed us to conclude that group A is determined more often in patients with CML ($p = 0.0002$), and group B is much less common ($p = 0.0006$) than in the control group. Distribution of ABO and Rhesus blood type among MM patients is: 0 - 29,7%, A – 40,4%, B - 22,8%, AB - 7,1%, Rh(+) - 90%, Rh(-) 10%. A comparison of these data with the control allowed us to conclude that group ? and B is determined more often in patients with ?? (respectively $p = 0.0033$ and $p = 0.0036$), and group 0 is much less common ($p = 0.0001$) than in the control group. Thus, people with group A have a greater risk of getting CML, and people with group A and B get MM, while people with group B have a lower risk of getting CML, and group 0 MM.

CONCLUSION: The results of this study underline the both certain role of ABO blood group for the risk of developing CML and MM.

KEYWORDS: Blood Types, Chronic Myeloid Leukemia, Multiple Myeloma

OP-11

THE IMPACT OF GAMMA IRRADIATION ON EXOSOME PROFILES AND ELECTROLYTE LEVELS IN APHERESIS THROMBOCYTE SUSPENSIONS

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PURPOSE: To investigate and to compare the exosome profiles and electrolyte levels between non-ırradiated (NI-aTS) and irradiated aTS (IR-aTS).

MATERIALS & METHODS: Our study was carried out with the approval of Uludag University Faculty of Medicine ethical committee (No: 2019-19/15), and financed by our 2018-2019 Nilgün Acar Abstract Awards. aTS donations were made by 2 voluntary donors admitted to our blood center, selected by national blood donor eligibility criteria. Trima Accel Apheresis System (triple dose) was used for donation. The third aTS units from each donor were used for the study. Each aTSs were divided into four epual units, those four little units were used as 0th and 5th storage day samples of NI-aTS and IR-aTS. The aTSs were stored in our blood banks like all TS's, throughout the study period. Electrolyte level measurements were made in each sample at day 0 and day 5. Exosome isolation from related samples was done on the same days via a special kit (Norgen, Canada). Before flow-cytometric analysis, carboxyl latex beads were coated with exosome specific antibodies (anti-CD9). The exosome level in each sample was determined by BCA Assay. After those, exosomes were conjugated with the coated beads according to the formula (one µgr exosome + one µl bead). Exosome-coated bead conjugates were analyzed by flow cytometer after staining with fluorescence-labeled monoclonal antibodies. Our study is designed for 10 aTS. Exosome isolations are going on in the rest aTS's. The remaining test will be performed after completing the isolation. These are the results of our pioneering work.

RESULTS: Electrolyte levels was significantly increased in the 5th day according to 0th days, both in non-ırradiated and irradiated aTS's, while there were no differences between both groups on 5th day. (Table-1). BCA Assay and exosome results were summarized in table-2 and table-3. Exosome levels in all samples ranged from 97,1% to 99,7%. Thrombocyte derived exosomes had the highest level. Granulocyte derived exosomes were found at high-levels also. Our results have not shown significant differences between both NI-IR groups and the 0th-5th storage days groups.

CONCLUSION: We didn't see significant changes in exosome levels at the moment, but our study is going on. The best logical comment might be made after obtaining all data and statistical analysis. On the other hand, the increase in electrolyte levels in he 5th day could be an important issue for same special patient groups.

KEYWORDS: Electrolyte Level, Exosome, Gamma Irradiation, Thrombocyte Suspension

Table-1: Electrolyte level results

		Day 0		Day 5	
		Non-Irradiated	Irradiated	Non-Irradiated	Irradiated
Ca	1	7,78	7,73	10,80	9,40
(mg/dL)	2	8,42	8,02	9,37	9,92
Mg	1	1,54	1,64	2,81	2,42
(mg/dL)	2	1,35	1,40	1,92	2,09
Na	1	154	155	>200	195
(mmol/L)	2	152	152	183	194
K	1	3,16	3,49	6,64	5,73
(mmol/L)	2	3,35	3,38	5,13	5,44
Cl	1	81,50	81,70	118,90	104,50
(mmol/L)	2	83,20	83,40	101,60	106,80

Table-2: BCA Assay results

(µg/µL)	Day 0		Day 5	
Sample	Non-Irradiated	Irradiated	Non-Irradiated	Irradiated
1	4,95	5,23	4,58	3,72
2	5,26	4,97	5,07	4,45

Table-3: Exosomal analysis results

	Sample	Day 0		Day 5	
		NI	IR	NI	IR
Exosomes	1	99,7%	97,1%	98,6%	97,8%
CD9+	2	98,3%	99,0%	98,5%	95,6%
Thrombocyte Derived Exosomes	1	82,8%	71,9%	85,7%	81,9%
CD9+ CD41+	2	82,7%	84,9%	80,1%	82,5%
Erythrocyte Derived Exosomes	1	2,1%	2,0%	1,7%	2,1%
CD9+ CD235a+	2	2,2%	2,1%	1,9%	1,1%
T Lymphocyte Derived Exosomes	1	1,0%	1,1%	0,9%	1,5%
CD9+ CD3+	2	2,3%	1,0%	1,5%	1,2%
Th Lymphocyte Derived Exosomes	1	0,0%	0,0%	0,0%	0,1%
CD9+ CD3+ CD4+	2	0,1%	0,2%	0,1%	0,2%
Tc Lymphocyte Derived Exosomes	1	0,6%	0,6%	0,5%	0,7%
CD9+ CD3+ CD8+	2	0,7%	0,3%	0,3%	0,3%
B Lymphocyte Derived Exosomes	1	0,9%	1,2%	0,8%	1,5%
CD9+ CD19+	2	1,0%	1,1%	0,4%	2,2%
Monocyte Derived Exosomes	1	1,0%	0,3%	0,7%	0,8%
CD9+ CD14+	2	1,0%	0,6%	1,6%	0,9%
Granulocyte Derived Exosomes	1	14,0%	18,1%	4,5%	11,0%
CD9+ CD15+	2	13,7%	12,0%	11,5%	12,8%
MDSC Derived Exosomes	1	6,8%	1,9%	3,0%	6,2%
CD9+ CD11b+	2	2,8%	5,4%	6,3%	2,4%
G-MDSC Derived Exosomes	1	1,1%	0,5%	0,2%	1,0%
CD9+ CD11b+ HLA-DR- CD14- CD15+	2	0,7%	1,0%	0,9%	0,5%

NI-Non-Irradiated IR-Irradiated

Th-T helper lymphocyte Tc-T cytotoxic lymphocyte

MDSC-Myeloid derived suppressor cell G-MDSC-Granulocyte derived MDSC

OP-12

ESTABLISHING NURSING CARE STANDARDS IN PATIENTS UNDERGOING BLOOD TRANSFUSION

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AIM: The use of an international nursing diagnostic system, such as The North American Nursing Diagnosis Association (NANDA), is recommended to improve the quality of nursing care, to make comparisons between local, national and international organizations, to improve nurse-nurse and nurse-physician communication and interaction, and to use computerized forms. According to Lopes et al. NANDA nursing diagnostic systems are useful, valid and important (1). Staub Müler M.et al stated that nursing diagnoses are important in maintaining language unity in nursing and will provide quality in nursing records, nursing interventions and patient outcomes(2). Transfusion applications have an important role in the clinical application processes of nurses. Ensuring the safe transfusion of blood and blood products, preventing medical errors, improves the quality of nursing service delivery. Our aim is to build nursing diagnostic system to improve patient care and optimize nursing practice and to our knowledge, this is the first study that offers a nursing diagnostic system.

MATERIALS & METHODS: This study was conducted retrospectively and descriptively and 165 blood product transfusions of 100 patients in Pediatric Hematology / Oncology Unit in 2019 were examined,165 nursing care plan samples were reviewed. Collaborative nursing diagnoses used in our hospital's data system and NANDA nursing diagnostic lists were used. A new nursing diagnostic system was designed and will be proposed.

RESULTS: When the nursing care plans of the patients who underwent blood transfusion in our hospital were examined, lack of information (28.48%), bleeding risk (13.33%), infection risk (63.03%), anxiety (7.27%), self-care inefficacy (1, 21%) were diagnosed. It was determined that these diagnoses did not meet the need for nursing care of a patient who had blood transfusion and that the nursing diagnosis was made for the primary diagnosis of the patient. The lack of care plan samples in patients undergoing blood transfusion leads to inappropriate care plan practices in patients. It was decided to create a care plan sample for the patients who underwent blood transfusion in the Evaluation and Care and Transfusion Committee of our hospital.

CONCLUSION: Blood transfusion requires a multidisciplinary approach. In order to improve the quality of patient care, more attention should be paid to the support of knowledge and behavior and blood transfusion in education programs. We believe that the standard of care will be established as a result of using and evaluating the prepared care plan sample and program is planned to be passed in May 2020 in the information systems in our hospital.

KEYWORDS: Blood Transfusion, Nursing Care Plan Sample, Nursing Diagnosis

OP-13

EVALUATION OF THE ACHIEVEMENT OF HEMATOLOGISTS TO TRANSFUSION MEDICINE EDUCATION WITH SELF-ASSESSMENT QUESTIONNAIRE

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AIM: We aimed to determine the access of hematologists to the learning objectives defined by curriculum for the transfusion medicine and the factors affecting it.

MATERIALS & METHODS: Questionnaires were administered to hematologists using the SurveyMonkey® from June to September 2018. The survey questions were prepared based on the curriculum for transfusion medicine by

the expert lecturers. The questionnaire consisted of a competence self-assessment and theoretical multiple-choice knowledge questions. IBM SPSS v.23 was used for statistical analyses.

RESULTS: Of the 213 hematologists, 54 (25%) were included in the study. Hematologists rated their competences in the clinical competence areas as 3,65 ± 0,73 (median 3,60) as "I know but not t a sufficient level". The participants 'perception of competence was "I know, but not at a sufficient level"' with an average of 3.31 ± 0.84 (median3.5) in the blood banking field, while the average in hemapheresis and transfusion medicine was 4.04 ± 0.63 (median 4) as "enough". In interventional procedures, hematologists stated that their vocational competences were 2,79± 0,92 (median 2,93) on average as "I have an idea- I know, but not enough". The correct answer to 13 theoretical questions was an average of 6,96 ± 1,89 (median 7). Hematologists performing blood rotation felt significantly more competent than the physicians who could not do the rotation in the blood bank, blood banking (p = 0,000), transfusion medicine (p = 0.034) and interventional competence (p = 0.04). Physicians who believed that they are sufficient in the blood banking area, were more confident in transfusion medicine (p = 0.000) and managing interventional procedures (p=0,000).

CONCLUSION: The hematologists generally felt more competent in subjects such as transfusion and therapeutic apheresis, which they often think of as not having enough knowledge in the area of blood banking. Hematologists have been more confident in the field of transfusion medicine as their years of expertise increased, but they did not feel better equipped in the fields of blood banking and interventional competence. The current results suggested that hematologists who are expected to be the blood bank supervisors do not internalize the area of blood banking, are not strong in their competence, and do not want to work in this area unless they are required. The hematology education curriculum, positive revisions in education can be achieved by revising blood banking curriculum and learning objectives, standardizing blood center rotations with content and duration, and support from online distance education programs.

KEYWORDS: Hematology, Medical Education, Self-Assessment Questionnaire, Transfusion Medicine, Turkey

Table 1. Information regarding the hematologists' education and current employment

		Number	(%)
Gender	**Female**	30	**55**
	Male	24	45
Principal Branch Specialization	Pediatrics	25	46
	Internal medicine	29	**54**
Specialty training	Training & Research Hospital (TRH)	17	31
	University Hospital	33	**61**
	University of Health Sciences TRH	4	8
Subspecialty training	Training & Research Hospital	7	13
	University Hospital	41	**77**
	University of Health Sciences TRH	5	10
End of subspecialty training (years)	2013	5	10
	2014	17	**32**
	2015	9	17
	2016	7	13
	2017	12	22
	2018	3	6
Who responsible for blood center during subspecialty training	**Hematologist**	37	**69**
	Other	17	31
Who responsible for blood center in current place of employment	Hematologist	26	48
	Other	28	**52**
Current place of employment	**Training & Research Hospital**	20	**40**
	University Hospital	16	32
	University of Health Sciences TRH	7	14
	Public Hospital	5	10
	Private	2	4
Duty in transfusion committee	Yes	22	41
	No	32	**59**
Blood banking training	Yes	17	32
	No	37	**68**

Table 2. Results of self-assessment transfusion medicine clinical competency and interventional competency areas

Area	Question	1-2 1(n) / 2(n) (%)	3 3(n) (%)	4-5 4(n) / 5(n) (%)	Mean±SD
Blood Banking clinical competency	Blood donor and safety	2 / 7 (17%)	14 (26%)	23 / 8 (55%)	3.52± 1.02
	Blood type and cross match	4 / 4 (15%)	19 (35%)	20 / 7 (50%)	3.41± 1.06
	Antibody screening and identification	5 / 9 (26%)	24 (44%)	10 / 6(30%)	3.06± 1.09
	Blood center organization	10 / 11 (80%)	21 (39%)	11 / 1 (21%)	2.67± 1.06
Hemapheresis clinical competency	Plasma exchange	1 / 3 (8%)	13 (24%)	31 / 6 (68%)	3.70± 0.82
	Stem cell apheresis	6 / 2 (15%)	13 (24%)	22 / 11 (61%)	3.56± 1.19
	Erythrocytapheresis	5 / 6 (20%)	16 (30%)	20 / 7 (50%)	3.33± 1.13
Transfusion Medicine clinical competency	Blood products and indications	1 / 0 (2%)	6 (12%)	29 / 18 (86%)	4.17± 0.77
	Identification of transfusion complications	1 / 0 (2%)	5 (11%)	32 / 15 (87%)	4.11± 0.74
	Treatment of transfusion complications	2 / 0 (4%)	5 (9%)	31 / 16 (87%)	4.09± 0.85
	Properties of specially processed (filtered, washed, irradiated) products and indications for their use	2 / 0 (4%)	13 (24%)	26 / 13 (72%)	3.89± 0.90
	Massive transfusion method	1 / 8 (7%)	11 (20%)	22 / 12 (63%)	3.67± 1.05
	Procedure to be followed in even of contamination of blood product	4 / 8 (22%)	20 (37%)	15 / 7 (41%)	3.24± 1.10
Bblood Banking interventional competency	Blood type and cross match	7 / 16 (43%)	15 (28%)	13 / 3 (33%)	**2.80**± 1.12
	Donor apheresis operation	7 / 11 (33%)	21 (39%)	12 / 3 (28%)	**2.87**± 1.08
	Whole blood collection and component preparation	8 / 14 (41%)	21 (39%)	8 / 3 (20%)	**2.70**± 1.08
	Antibody screening and identification	10 / 15 (46%)	23 (43%)	3 / 3 (11%)	**2.52**± 1.04
Hemapheresis interventional competency	Plasma change	4 / 8 (22%)	24 (44%)	10 / 5 (34%)	**3.19**± 1.10
	Leukocyte Apheresis	8 / 10 (33%)	22 (41%)	9 / 5 (26%)	**2.87**± 1.15
	Erythrocytapheresis	10 / 18 (51%)	16 (30%)	6 / 4 (19%)	**2.56**± 1.14

Table 3. Information measurement results in the field of Blood Banking, Hemapheresis and Transfusion Medicine

Area	Question	Correct answer n (%)
Organization	Blood Service Units	38 (70%)
	Undesired effect and case notification guide	38 (70%)
Blood Banking	Reasons for temporary donor rejection	29 (54%)
	Indirect antiglobulin test usage areas	29 (54%)
	Leukofiltration efficacy	28 (52%)
Hemapheresis	Therapeutic plasma exchange	35 (65%)
	Erythrocytapheresis indication	15 (28%)
	Hematopoietic stem cell storage	39 (72%)
Transfusion Medicine	Clinical importance of alloantibodies	37 (68%)
	Blood product with which febrile non-hemolytic reaction is most commonly seen	29 (54%)
	Risk of transfusion-associated acute lung injury	30 (56%)
	Massive transfusion complications	22 (41%)
	Fresh frozen plasma/cryoprecipitate usage	11 (20%)

OP-14

EVALUATION OF THE KNOWLEDGE OF INTERN DOCTORS ON TRANSFUSION MEDICINE IN TURKEY

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AIM: Proper clinical use of blood and blood products requires competent theoretical and practical knowledge of transfusion medicine. Medical education in Turkey is defined by the National Core Education Program on the Curriculum of Medical Faculties (NCEP). The purpose of this study was to evaluate levels of transfusion medicine knowledge and attainment of educational targets among final-year Turkish medical students, and identify factors affecting the education of transfusion medicine.

MATERIALS & METHODS: This multicenter survey study was conducted among intern doctors in their last internship before graduation from medical school. The survey questions were prepared based on basic information and NCEP learning objectives for transfusion medicine. The questionnaire consisted of a competence self-assessment with Likert scale, and theoretical questions. The study group was formed by stratified sampling. The survey was conducted via one-on-one interviews. IBM SPSS v.25 was used for statistical analyses. Chi-square and Mann–Whitney U tests were used for parametric and nonparametric data, respectively. $P < 0.05$ was accepted as statistically significant.

RESULTS: The survey included 727 (24%) of 3009 final-year students enrolled in 13 medical schools. In the competence self-assessment, 65% of the students reported that transfusion medicine education was insufficient. Only 14% felt competent in recognizing transfusion complications and applying first-line treatment. For initiating and monitoring transfusions, 41% stated they could manage under supervision and 7% stated they had sufficient practice, while the remaining 52% considered themselves completely insufficient in this area. The 10 questions assessing basic knowledge and attainment of educational targets had 53 choices (26 right and 27 wrong answers). The mean number of correct answers selected was 13 ± 3.5 of 26, while the mean number of incorrect answers selected as correct was 8 ± 3.1 of 27. This indicates that intern doctors were not able to recognize 50% of the correct and 30% of the incorrect information concerning very basic and practical transfusion issues.

CONCLUSION: Our results demonstrate that a large proportion of medical students nearing graduation did not have adequate theoretical knowledge or self-assessed practical competency in transfusion medicine. We believe that expanding and standardizing the transfusion curricula in medical schools will help improve knowledge of transfusion among junior physicians.

KEYWORDS: Medical Education, Medical Students, Self-Assessment Questionnaire, Transfusion Medicine, Turkey

Table 1

Question	Response	n (%)	Net Points in test	
			mean ± (SD)	Med.
Do you think the education on Transfusion Medicine is sufficient in the medical school?	Strongly disagree	161 (22)	4.60± (3.42)	5.00
	Disagree	311 (43)	4.94± (3.58)	5.00
	Partially agree	205 (28)	4.96± (3.87)	5.00
	Agree	35 (5)	4.49± (3.27)	4.00
	Strongly agree	15 (2)	5.2± (5.1)	4.00
How competent do you feel regarding complications related to blood and blood product transfusion?	I can't determine the pre-diagnosis	223 (31)	4.11± (3.40)	4.00
	I can determine the pre-diagnosis but I can't apply any treatment	403 (55)	5.00± (3.64)	5.00
	I can determine the pre-diagnosis, and I can apply first-line treatment	101 (14)	5.92± (3.89)	6.00
How competent do you feel in initiating and monitoring the transfusion of blood and blood products?	I don't find myself competent	374 (51)	4.43± (3.38)	5.00
	I can apply it by receiving support in an emergency	302 (42)	5.21± (3.85)	5.00
	I have competence in this application	51 (7)	5.90± (3.91)	6.00

Distribution of scores in the students' self-evaluation of competence

Table 2

Percent missed (%)	Question
	Which actions would you take if a patient developed fever of 38.5°C with chills during the transfusion of red cell suspension?
76%	Perform direct antiglobulin test
70%	Give antipyretics to the patient
66%	Perform blood culture
	Which actions can be performed to prevent febrile nonhemolytic transfusion reaction?
84%	Give antipyretics to the patient before transfusion
42%	Perform leukocyte filtration on the blood unit
	Which of the following products do not require cross-match?
51%	Platelet suspension
45%	Cryoprecipitate
42%	Fresh frozen plasma
	Which of the following statements are correct about platelet suspensions?
81%	The possibility of bacterial contamination is higher with platelet suspension than red cell suspension
55%	The storage period of platelet suspension is 5 days
54%	ABO-Rh(D) compliance should be investigated for platelets.
	Which of the following statements are correct about transfusion of red cell suspension?
59%	Transfusion of red cell suspension should be completed within 4 hours at the latest
88%	In emergencies with patients of unknown blood group, the group of fresh frozen plasma (FFP) that may be administered is group AB

Correct answers not recognized as correct by the students

Table 3 Incorrect answers not recognized as incorrect by the students

Percent selected (%)	
81%	In emergencies with patients of unknown blood group, the fresh frozen plasma (FFP) that may be administered is group O
43%	Febrile nonhemolytic transfusion reaction can be prevented by irradiation of blood product
35%	FFP is used as an albumin source
34%	FFP is used as an immunoglobulin source
14%	There is no need for cross-match of red cell suspension and fresh whole blood
7%	The universal donor for red cell suspension is the AB Rh(D)-negative.

Incorrect answers not recognized as incorrect by the students

OP-15

HOSPITAL TRANSFUSION REPORT APPLICATION FOR PATIENT BLOOD MANAGEMENT

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AIM: The proven effect of transfusion applications to increase mortality and morbidity in the recipients, the decrease in the number of safe donors worldwide, and the transfusion being accepted as an economic loss for both patients and hospitals have increased the patient blood management (PBM) studies. One of the PBM applications in developed countries is the creation of "transfusion reports" to raise awareness about the clinical use of blood. Studies have shown that the number of transfusions reduced by a minimum of 20% with such applications. In this study, the transfusion data in our hospitals (16 hospitals) were examined monthly, and the data was shared with the Chief Physicians under the name of "Hospital Transfusion Report" by the Medical Directorate to raise awareness.

MATERIALS & METHODS: A module that transfers the automatic data of the relevant laboratory test of the patient for each product that is output for transfusion from transfusion center (TC) is added to the software (Tenay software). In the study, related laboratory test results that 24 hours before transfusion (hemoglobin -Hb- value for erythrocyte concentrate –EC- transfusion, platelet–PLT- value for platelet concentrate –PC- transfusion, INR value for Fresh Frozen Plasma -FFP- transfusion) are taken into consideration. Also in the report cards; the number of inpatients for that month, the number of transfused patients, the total number of transfusions, the number of transfusions per patient (the lowest/highest unit), the number of waste components, the invoice amount that was paid to the Regional Blood Center and Transfusion Center were included (Figure 1). Evidence-based indication is highlighted in the report cards; if transfusion was performed without requesting any laboratory test in the last 24 hours, EC transfusion when Hb> 10 g/dL, PC transfusion when PLT> 100 K/mm3, and FFP transfusion when INR<1.5 were considered "out of indication". In October 2019, the report card for 8 months between February and September was forwarded to chief physicians (Figure 2). In addition, out of indication rates of blood product usage are shown in red in the graph compared to other hospitals (Graph 1). In the graph, 16 hospital averages are marked with a line and it is intended that the hospital can easily follow where the average is.

RESULTS:

CONCLUSION: Results and Conclusion: In the study, it is planned to reveal the differences between before and after October 2019. However, shortness of the second period was not sufficient to show significant differences in comparisons. In order to increase the effectiveness of this practice, it was decided to organize informative meetings in all hospitals, to present data in hospital transfusion committees, to create physician-based report cards and to monitor out of indication uses with cases. The presentation of this study was deemed appropriate in order to contribute to PBM applications and to form a model for the other TC.

KEYWORDS: Hospital Transfusion Report, Patient Blood Management, Transfusion Policy

Investigating Parameters

Number of Inpatients
Number of Transfused Patients
Total No of Transfusions (units)
No of Transfusion Per Patient
The lowest number of transfusion (units)
The highest number of transfusion (units)
Number of Transfused Packed Red Blood Cell Concentrate (PRBC) (units)
Number of Transfused PRBC, while Hb> 10 gr/dL
Out of indication Packed Red Blood transfusion rate (%)
Number of Transfused Platelet Concentrates (PC) (units)
Number of Transfused PC, while PLT> 100 K/mm3 (units)
Out of indication Platelet Suspension transfusion rate (%)
Number of Transfused Fresh Frozen Plasma (FFP) (units)
Number of Transfused FFP, while INR <1.5 (units)
Out of indication Fresh Frozen Plasma transfusion rate (%)
Number of transfusion without evidence of laboratory test result (units)
Transfusion decision making rate without laboratory evidence (%)
Number of Waste Blood Components
Expiration rate of Blood Components
Invoice Amount of Regional Blood Center
Invoice Amount for laboratory tests

Figure 1. Investigating Parameters

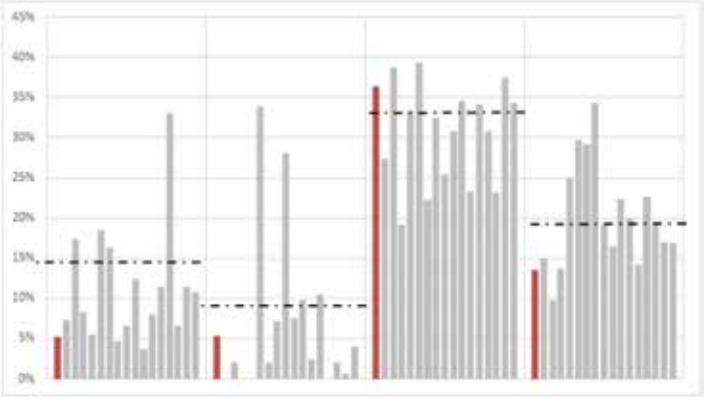
Information report to chief of hospital (a sample)

* Number of Inpatients : 5239
* Number of Transfused Patients : 1486
* Total No of Transfusions (units) : 9634
* No of Transfusion Per Patient : 4,5 (The lowest number of transfusion (units) 1 - The highest number of transfusion (units) 192)
* Number of Waste Blood Components : 296

A HOSPITAL	Number of Transfused PRBC, while Hb> 10 gr/dL	Number of Transfused Packed Red Blood Cell Concentrate (PRBC) (units)	%	Number of Transfused PC, while PLT> 100 K/mm3 (units)	Number of Transfused Platelet Concentrates (PC) (units)	%	Number of Transfused FFP, while INR <1.5 (units)	Number of Transfused Fresh Frozen Plasma (FFP) (units)	%	Number of transfusion without evidence of laboratory test result (units)	Total No of Transfusions (units)	%
	833	4779	17,4	51	2531	2	901	2324	38,8	959	9634	10

Figure 2. Information report to chief of hospitals (a sample)

Information report to chief of hospital (a sample)



Graphic 1. Information report to chief of hospitals (a sample)

OP-16

CAMPAIGN AT MY SCHOOL

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[1]Turkish Red Crescent Society Blood Services, Konya Blood Bank, Konya

AIM: By evaluating the results of blood donation campaigns for parents of students in schools; which will meet the annual need of blood of Konya and Karaman provinces that 5% of the population between the ages of 18-65, and ensuring sustainability.

MATERIALS & METHODS: By analyzing the data of school blood donation campaigns in Konya and Karaman provinces between 2017-2018-2019, national blood donation of blood drive productivity, female donor rate, first time blood donor rate, blood donation susceptibility rates are comparatively evaluated.

RESULTS: In 2017-2018-2019 years company at my school blood donation campaigns, a total of 285 campaigns and 19.553 units of blood donations were collected. Compared with country-wide blood drives; Productivity: Increased from 48 units to 68 units and 70% more blood donations were collected. Female Donor Rate: From 16% to 32%, twice as many female donors were reached. First Time Blood Donation Rate: Rate: 53.6% more donors were obtained by increasing from 28 units to 43 units.

CONCLUSION: In 2017-2018-2019, a total of 285 school blood donation campaigns and 363.772 parents were invited to donate blood, 10,0% (36.377) said they wanted to donate blood, 64,8% (23.588) came to donate blood and 53,8% (19.553) donated blood. The target community was parents between the ages of 18 and 65 in blood donation campaigns in schools. 5% of these people were expected to donate blood. 5,4% of parents donated blood and made a successful activity. If the blood donations campaigns continue in this way, it has been determined that the annual blood needs of Konya and Karaman provinces can be met with these activities.

KEYWORDS: Blood Donor, Campaign, Giving Blood, Lifesaver, School, Turkish Red Crescent Society

Creating Positive Thoughts In Students

Preparing before a blood donation campaign in schools to ensure that students positively influence their parents. Giving Homework on Blood Donation.

Students do homework with parents to be exhibited at school ahead of the Blood donation campaign.
Use of Concept Slogan

Parents are informed with impressive visuals.
The Arts By Students

A blood donation memory that students will remember for many years to come is created.
Visiting The Work Done By The Students While Exhibiting

The fact that students see their own works on display in the field of blood donation area has left unforgettable memories about blood donation event.

Productivity

41,7%	2017	2018	2019	All Time Avg.
*C.W.	47	47	51	48
**C.A.S.	63	75	69	68

In 2017-2018-2019, the number of blood donations collected per event country-wide is 48 units. With 68 units of blood donations, 41.7% more blood donations were collected. *Country-wide **Company at my school

Female Donor Rate

100,0%	2017	2018	2019	All Time Avg.
*C.W.	15	16	17	16
**C.A.S.	37	27	33	32

In 2017-2018-2019, the country-wide proportion of female donors was 16%. With 32% female donor sourcing, 100% to twice as many female donors were provided. *Country-wide **Company at my school

First Time Blood Donor

53,6%	2017	2018	2019	All Time Avg.
*C.W.	29	27	28	28
**C.A.S.	44	37	48	43

In 2017-2018-2019, the first donor rate country-wide was 28%. With a 43% initial donor rate, 53.6% more first donor gains were achieved. *Country-wide **Company at my school

Blood Donation Susceptibility

Company at My School	2017	2018	2019	All Time Avg.
Invited Parents	127592	81868	154312	363772
Parents Who Accept to Donate Blood	12759	8187	15431	36377
Parents Who Came to Donate Blood	7445	6046	10097	23588
Parents Can Donate Blood	6249	5054	8080	19553

In 2017-2018-2019, a total of 285 campaigns and 363772 parents were invited to donate blood, 10,0% (36377) said they wanted to donate blood, 64,8% (23588) came to donate blood and 53,8% (19553) donated blood.

OP-17

REASONS FOR DISCARD OF BLOOD AND BLOOD PRODUCTS IN OUR TRANSFUSION CENTER AND REDUCING DISCARD RATES WITH ROOT CAUSE ANALYSIS

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AIM: We aimed to examine the numbers of usage and discard for the blood products which were delivered to wards. We aim to reduce blood discard levels with amendments.

MATERIALS & METHODS: We examined the discard rates belonging to 2018 and to the first 11 months of 2019 registered by I.M.U. Göztepe E.R.H. Transfusion Center. It was provided that blood products were used in the most efficient way by planning inventory management accurately, specifying the critical inventory level and directing inventory management by preparing Maximum Surgery Blood Component Request Schedule. The reservation time was reduced to 24 hours for pooled platelets and to 48 hours for apheresis platelets with the objective of enabling rapid circulation of platelets inside the hospital. The critical stock was specified for platelets. In addition, our priority was education, and we aimed to educate especially our residents who requested blood components in our transfusion center for 3 days (face to face theoretical and practical training in groups of seven).

RESULTS: In the dates belonging to the time period between January 2018 and December 2018, the total number of products used was found to be 20877 and the number of discarded products was found to be 4444 (21%). When we examined the discarded products, we found that mostly erythrocyte suspensions (1217, 27%), pooled platelets (1073, 24%) and fresh frozen plasma (1523, 34%) were discarded. In the data belonging to the time period between January 2019 and October 2019, the total number of products used was found to be 22014 and the number of discarded products was found to be 1706 (7,7%). Our rates of discard were reduced up to 2,6% especially in the second half of 2019. The highest number of products discarded were found to be ES (686, 40%) and pooled platelet suspension (532, 31%). The reasons for discard belonging to the products are shown in Table 1.

CONCLUSION: One of the productivity targets of transfusion centers is reducing discard rates. Our discard rates belonging to the year of 2018 showed a trend of reduction in line with reformatory and preventive activities performed across the hospital. We aim to reduce 2020 discard rates below 1%, to continue close monitoring of product expiration dates and reserve times which is currently being conducted meticulously by our transfusion center and to conduct education activities in our hospital.

KEYWORDS: Blood Products and Reasons for Discard, Haemovigilance

Table 1

Reasons for Discard	01/01/2018 –31/12/2018 Number of Discard%	01/01/2019 –31/11/2019 Number of Discard%
Expired	61,7	82,5
Hemolysis	0,06	0,1
Discarded in ward	0,27	0,05
Contamination	0,13	0,35
Damage in bag	1,8	3,8
Coagulum in bag	0,67	1,17
Returned to TC	1,87	3,5
Thawed and not used	3,1	7,3
Other reasons	29	0,17

Reasons for Discard of Blood Products by Years

OP-18

EXAMINING LOOK BACK PROCESSES AS A HEMOVIGILANCE PRACTICE: A FOUR YEARS ANALYSIS

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AIM: In our study, we aimed to analyze the reports to our transfusion center that were made within the scope of "from donor to patient look back" program, which was carried out by the Aagean Region Transfusion Center Hemovigilance Unit.

MATERIALS & METHODS: Undesirable event report, undesirable event confirmation and blood product withdrawal forms that were sent to our transfusion center from 2016 to 2019 were examined. Following the reports, directions from the hemovigilance guide were followed. Patients were not informed of the undesirable events before they were confirmed in 2018 and 2019.

RESULTS: The number of undesirable event reports sent from the regional blood center to our hospital were 22 in 2019, 13 in 2018, 10 in 2017 and 2 in 2016, while the number of blood products withdrawn were 12 in 2019, 2 in 2018 and 5 in 2017. Of the 2019 reports; 65% were infections (11 HBV, 3 HIV, 2 HBV-HCV, 1 syphilis, 1 propionibacter acnes and 4 risky sexual intercourse), 35% were of unknown reasons. Of the 2018 reports; 87% were infections (8 HBV, 1 HIV, 1 leptospira, 2 syphilis and 1 malaria), 13% were of unknown reasons. Of the 2017 reports; 66% were infections (9 HBV and 1 syphilis), 33% were of unknown reasons. Both of the 2 reports from 2016 were of HBV infections. 50% of 2019 reports were confirmed; 5 positive and 12 negative. 73% of 2018 reports were confirmed; 5 positive and 6 negative.40% of 2017 reports were confirmed; all6 of them negative. No confirmations were made to our hospital in 2016. See Table 1 for detailed information.

CONCLUSION: Confirmation rates of undesirable events gradually increased each year. The reason that 2019 confirmations were as low as 50% was thought to be that some of the undesirable events have not been reported yet. Patients must be informed according to their confirmation report; therefore, it is important for patient and public healthcare, that hospitals receive precise confirmations. That there are 4 cases of risky sexual intercourse reports shows there is a significant amount of incorrect donor statements and thus there is need for more careful donor questioning. It is stressed that patients must be informed after undesirable event confirmation, even though it is not stated as so in the hemovigilance guide. Along with data gathering, hemovigilance practices also include analysis of said data and application of necessary organization and prevention methods.

KEYWORDS: Blood Product Withdrawal, Hemovigilance, Look Back, Undesirable Event Confirmation, Undesirable Event Report

Product Withdrawal
Infection Confirmations and Reports by Years and Products

Infection	Confirmation	Suspension	Reports	Year
HBV	Positive	Erythrocyte	+	**2019**
HBV	Negative	Erythrocyte	not reported	
HBV	Unknown	Erythrocyte	not reported	
HBV	Negative	Erythrocyte	not reported	
HBV	Unknown	Erythrocyte	not reported	
HBV	Unknown	Erythrocyte	not reported	
HBV	Positive	Pooled platelet	+	
HBV	Unknown	Pooled platelet	not reported	
HBV	Positive	Pooled platelet	+	
HBV	Positive	Apheresis platelet	+	
HBV	Unknown	Fresh frozen plasma	not reported	
HIV	Negative	Pooled platelet	not reported	
HIV	Negative	Pooled platelet	not reported	
HIV	Negative	Fresh frozen plasma	not reported	
HBV,HCV,HIV,Syphilis*	Negative	Erythrocyte	not reported	
HBV,HCV,HIV,Syphilis*	Negative	Pooled platelet	not reported	
HBV,HCV,HIV,Syphilis*	Negative	Fresh frozen plasma	not reported	
HBV,HCV,HIV,Syphilis*	Negative	Kriopresipitat	not reported	
HBV,HCV	Negative	Erythrocyte	not reported	
HBV,HCV	Negative	Pooled platelet	not reported	
Propionibacter acnes	Positive	Pooled platelet	+	
Syphilis	Negative	Fresh frozen plasma	not reported	
Unknown 12 cases	Unknown	6 Erythrocyte 2 Pooled platelet 4 Fresh frozen plasma	not reported	
HBV	Positive	Erythrocyte	+	**2018**
HBV	Positive	Erythrocyte	+	
HBV	Negative	Erythrocyte	not reported	
HBV	Positive	Aferez trombosit	+	
HBV	Negative	Aferez trombosit	not reported	
HBV	Negative	Pooled platelet	not reported	
HBV	Positive	Pooled platelet	+	
HBV	Positive	Fresh frozen plasma	+	
HIV	Negative	Erythrocyte	not reported	
Leptospira	Unknown	Fresh frozen plasma	not reported	
Syphilis	Negative	Pooled platelet	not reported	
Syphilis	Negative	Fresh frozen plasma	not reported	
Malarya	Unknown	Erythrocyte	not reported	
Unknown 2 cases	Unknown	1 Pooled platelet 1 Fresh frozen plasma	not reported	
HBV	Negative	Erythrocyte	+	**2017**
HBV	Unknown	Erythrocyte	+	
HBV	Unknown	Erythrocyte	+	
HBV	Unknown	Erythrocyte	+	
HBV	Negative	Erythrocyte	+	
HBV	Negative	Aferez trombosit	+	
HBV	Unknown	Aferez trombosit	+	
HBV	Negative	Fresh frozen plasma	+	
HBV	Negative	Cryoprecipitate	+	
Syphilis	Negative	Erythrocyte	+	
Unknown 5 cases	Unknown	3 Pooled platelet 1 Fresh frozen plasma 1 Erythrocyte	+	
HBV	Unknown	Fresh frozen plasma	+	**2016**
HBV	Unknown	Fresh frozen plasma	+	
*All of HBV, HCV, HIV, Syphilis infections were reported because of risky sexual intercourse notice				

OP-19

RETROSPECTIVE ANALYSIS OF SEVEN YEARS OF TRANSFUSION RELATED REACTIONS: SINGLE CENTER EXPERIENCE

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AIM: Hemovigilance is a series of monitoring procedures that cover the entire transfusion chain, from the collection and processing of blood and blood components to transfusion and follow-up to the recipient, and aim to collect, evaluate and prevent repetition of adverse events and reactions. In this study, we aimed to evaluate the adverse reactions associated with transfusion that developed in our hospital within 7 years.

MATERIALS & METHODS: In Sıtkı Koçman University Faculty of Medicine Education and Research Hospital, the reports of adverse reactions related to transfusions of blood components, which were made to the hospital hemovigilance unit between 01.01.2013-31.12.2019, were analyzed retrospectively.

RESULTS: A total of 106,355 blood / blood component transfusions were performed in our hospital in 7 years. Blood / blood components used 68866 (64.7%) erythrocyte suspension, 28083 (26.4%) fresh frozen plasma, 3465 (3.2%) apheresis platelet suspension, 5664 (5.3%) pooled platelet suspension, 114 (0.1%) whole blood was distributed as 163 (0.1%) cryoprecipitate. A total of 82 transfusion-related adverse reactions have been reported, with an incidence of 0.77 / 1000 blood components. All unwanted reactions were acute and there were no delayed reaction reports. Among the blood / blood component types, the most common transfusion reaction was detected in apheresis platelets (n: 4, 0.11%). Undesirable reaction was detected in 0.1% (n: 71) of erythrocyte transfusions. No reaction was observed in pooled platelets, cryoprecipitate and whole blood transfusions. Among the transfusion-related types of adverse reactions, mild allergic reaction was the most common (n: 60, 73.2%). This includes febrile non-hemolytic transfusion reaction (n: 12, 14.6%), anaphylactic reaction (n: 4, 4.9%) and unspecified transfusion reaction (n: 4, 4.9%), TRALI (n: 1, 1.2%) and transfusion-related sepsis (n: 1, 1.2%). No reaction causing death was observed.

CONCLUSION: Allergic transfusion reactions range from urticaria to life-threatening anaphylaxis. Most of them are mild allergic reactions and are seen with a frequency of 1-3% (1-2). In our study, the most frequent mild allergic reaction was observed and its incidence (0.57 / 1000 blood component) is below global data. The incidence of anaphylaxis is 1: 20000-1: 50000 transfusions worldwide and our results support this data. The incidence of FNHTR is reported to be 0.1% to 1% worldwide. However, in our study, the incidence of FNHTR was found to be 0.11 / 1000 transfusions. In addition, it should be aimed to increase transfusion safety by providing continuous hemovilance training to all healthcare professionals.

KEYWORDS: Allergic Reaction, Hemovijilans, Transfusion

OP-20

THE EFFICACY OF AUTHORIZED STAFF IN BLOOD TRANSFER TO PRIORITIZED DEPARTMENTS

Havva Kaya[1], Adile Akkuzu[1], Ayşen Güleryüz[1]

[1]Denizli State Hospital

AIM: The aim is to demonstrate the efficacy of authorized staff for the blood product transfers to be safe and in line with quality standards in our hospital.

MATERIALS & METHODS: Two staff members from Transfusion Center were trained regarding the convenient and safe transfer of blood products and afterward, they were authorized by the chief physician. The prioritized services were determined according to the presence of 5 different blocks of inpatient services, high numbers of blood transfusion, an insufficient number of department health staff. The most frequent periods of blood orders and transfusions were determined. Accordingly, blood transfer was commenced by authorized staff members to Operation Rooms, Intensive Care, Thalassemia Departments between the busiest hours of blood orders, 08.00-18.00. Separate blood bags with heat trackers and separators were assigned to each staff member for the transfer. Blood Product Log Book was allocated to each staff member with blood bags and the staff was signed (Figure 1,2)

RESULTS: Table 1 shows the first-month results of blood transfer to the above-mentioned departments by authorized staff. A total of 1.471 blood product transfer was performed between 14 November and 14 December 2019. 891 (60%) of these blood products were transferred between 08.00-18.00 (daytime) while 580 (40%) were done at nighttime. It was found that 526 (59%) of daytime transfusions were performed with the authorized staff while 365 (41%) of them were performed by service health staff (nurse, health officer)(Table 2).It was indicated that blood components transferred by authorized staff were delivered at an average of 5-10 minutes.

CONCLUSION: Our hospital is a quite busy institution with separate blocks, blood product transfusion number reaching 16.452 annually, and a high workload of health staff. By transferring blood, authorized staff contributed highly by time-saving, providing uninterrupted functioning of service, meticulous control of blood product and transportation under convenient conditions. 60% of blood product transfusion is at its busiest between 08.00-18.00. Taking this into consideration, authorized staff will reduce the workload on service staff by performing the transfer during busy hours.

KEYWORDS: Authorized Staff, Blood Transfer, Prioritized Departments

Figure 1. Blood Bag 1

Figure 2 Blood Product Log Book (Used by Authorized Staff)

Table 1. Blood Transfer Rates Between 14 November-14 December, 2019

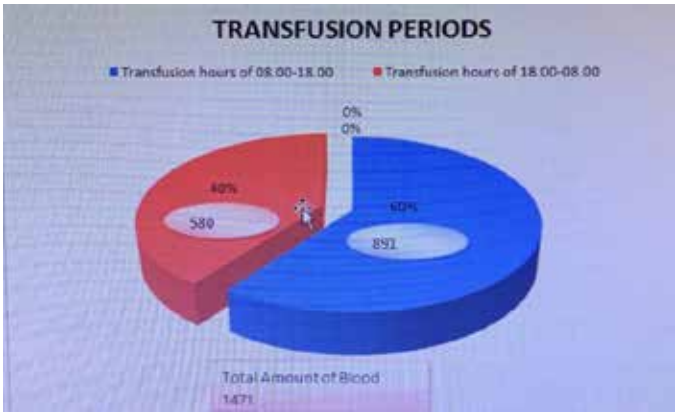
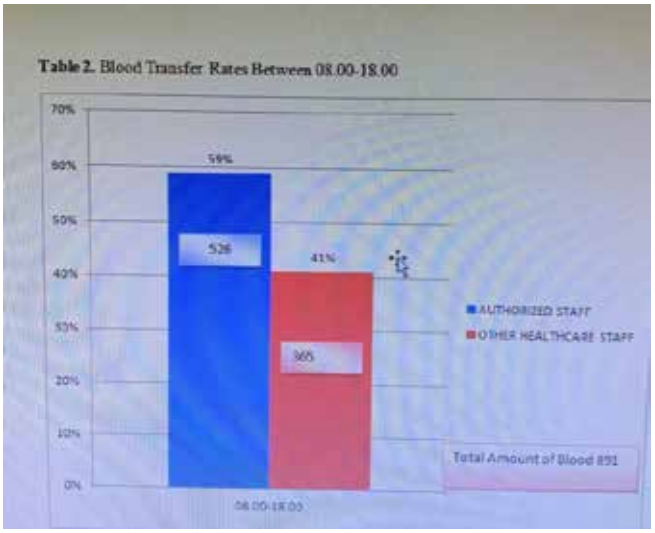


Table 2. Blood Transfer Numbers Between 08.00-18.00



OP-21

IN-PROVINCE TRANSFER METHOD FOR THE EFFECTIVENESS OF BLOOD PRODUCTS, CASE OF DENIZLI

Havva Kaya[1], Reyhan Yavuz[1]

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AIM: The aim is to provide an in-province transfer of erythrocyte suspensions from District State Hospitals that have Transfusion Center to Denizli State Hospital before expiry to promote the effective use of blood products in the province.

MATERIALS & METHODS: ES has been sent to Denizli State Hospital (DSH) from the District State Hospitals named Buldan, Tavas, Acıpayam, Çivril before 15 days of expiry since 2014. In September 2019, new policies were introduced. As of the last quarter of the year, blood transfer will be done according to the availability of the transfusion center stocks. A communication group of practitioners and technicians was formed. Districts shared the blood type and expiry date of ES and daily stock levels of the center were checked. The transfer was approved ensuring that maximum stock levels were not exceeded. ES was transferred in blood bags with a cold chain indicator. For each approval from a district, orders from Red Crescent were decreased.

RESULTS: In one year, 203 ES from different blood groups were admitted to our hospital. The district of Tavas ranked first by 91 (44.8%), while Acıpayam ranked second by 52 (25.6%). The distribution from the districts indicated that A Rh (+) was the most common by 71 (35%), while 0 Rh (+) ranked second by 69 (34%) (Table 1). 195 ES were transfused (96%), while 8 were destroyed (4%). 75% of destroyed blood was AB Rh (-). In the first three months, there was no destruction. In the third three-month period, 6 destructions were noted. With the precautions taken, destruction was reduced to 1 in the fourth three-month period. Investigating average transfusion and destruction days of ES, it was shown that A Rh (-) was the quickest by 1.6 days in average while it's 3 days for A Rh (+), 3,8 for 0 Rh (+), 4 for B Rh (+), and AB Rh (-) ES were destructed after 24,5 days due to expiry (Table 3).

CONCLUSION: Rh (+) ES ordered from districts was utilized by 99%. It was found that a more cautious approach's required while admitting RH (-) to stocks. In DSH, 16.500 blood components are transfused annually. The admittance and utilization of blood, if done according to the stock availability, will contribute less discard in Denizli.

KEYWORDS: Erythrocyte Suspension, In-Province, Transfer

Table 3. Average stocking times of transfusions and advanced blood cells by blood groups

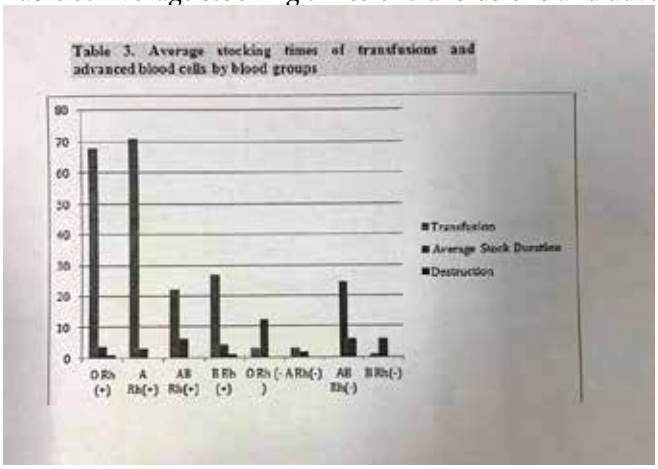

Table 1. Blood Group Distribution from Districts to DSH in 2019

DISTRICT	O Rh (+)	A Rh (+)	AB Rh (+)	B Rh (+)	O Rh(-)	A Rh(-)	AB Rh(-)	B Rh(-)	TOTAL
BULDAN	25	17	0	0	0	0	0	0	42
TAVAS	22	34	13	18	0	1	3	0	91
ACIPAYAM	18	17	7	6	2	0	2	0	52
ÇİVRİL	4	3	2	4	1	2	1	1	18
TOTAL	69	71	22	28	3	3	6	1	203

Table 2. Destruction numbers of three-month period

Blood Group	January-March	April- June	July- September	October- December
0 Rh(+)		1		
B Rh(-)			1	
AB Rh(-)			5	
B Rh (+)				1

OP-22

INVESTIGATION OF THE EFFECT OF ABO MISMATCH ON BLOOD GROUP TRANSFORMATIONS AND TRANSPLANT OUTCOMES IN PATIENTS WHO UNDERWENT ALLOGENEIC TRANSPLANTATION IN OUR CENTER; FIVE-YEARS EXPERIENCE

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AIM: ABO blood antigen mismatch can be seen in HLA-compatible relatives and non-relative hematopoietic stem cell transplantation (HSCT) donors because of the genes encoding ABO blood groups and HLA systems are on different chromosomes (1). There is an ABO blood group mismatch between recipient and donor on average of 40-50% of HSCT transplantation (2). This may result in events such as prolonged reticulocytopenia and immune-mediated hemolysis, which may be severe enough to cause death, so it requires careful assessment and follow up. Although the ABO mismatch causes difficulties in HSCT, it does not hamper successful engraftment and does not affect the incidence of Graft versus host disease (GvHD). Here we present the effects of ABO mismatched transplants on changes in blood group and transplant results in our center in the last 5 years.

MATERIALS & METHODS: We extracted data from the hospital patient information management system, nucleus v9.26.79, and we analyzed it.

RESULTS: We detected 101 patients who underwent ABO blood group mismatch allogeneic transplantation (Tx). Seventy-four (73,2%)patients underwent transplantation due to hematological malignancies and 27 (26,7 %) patients due to sickle cell disease (SCD). Of the 101 patients, ABO mismatch transplantation forms were 10 patients bidirectional, 36 major mismatch, 34 minor mismatch, and 21 Rh mismatch. We reviewed Tx complication in this cohort as an acute GVHD, chronic GVHD, and pure red cell aplasia in 13 (12,8 %), 16 (15,8 %) and 4(11,1 %) patients respectively. As expected, the pure red cell aplasia patients were in major mismatched Tx group. The engraftment delay was revealed in only one patient with SCD. We have shown the ABO blood group transformation after transplantation in mismatch groups in table 1. One patient in the bidirectional ABO mismatch group was dead in the first month so the ABO blood group control couldn't be done.

CONCLUSION: That is known the transplantation immunology has been a very complicated and multivariate process. The ABO mismatch Tx has an extra complication as pure red cell aplasia in major ABO mismatch Tx, and immediate and delayed hemolysis in major and minor ABO mismatch Tx. In our cohort, the results of pure red cell aplasia, acute and chronic GVHD rate were under the expected rates of literature. We aimed to do multivariate analysis after controls of all patients whose blood group not yet viewed. And we want to do analysis in terms of GVHD, risk factors for pure red cell aplasia and look for an effect on survival and blood group transformation times.

KEYWORDS: ABO Mismatch Transplantation, Blood Group Transformation

Table 1.ABO blood group transformation of mismatch tranplantation groups.

ABO mismatch goups	Not yet viewed (no patients)	Fully transformed (no patients)	Still forward- revers incompetible (no patients)	Not transformed (no patients)
Major ABO mismatch	10	13	10	3
Minör ABO mismatch	6	2	24	2
Bidirectional ABO mismatch	3	-	6	-
Rh mismatch	5	16	-	-

OP-23

THE USAGE OF HIMS FOR TRANSFUSION REACTIONS

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AIM: The blood is an intravascular fluid which provides organ perfusion and the only source for it is human. The blood transfusion is potentially a life-saving treatment and can help replace blood lost due to surgery or injury. The reactions can develop in blood transfusion which can reduce the quality of a person's life and could even cause more serious consequences like death. Therefore it is paramount that the precaution needs to be taken. In this study, it is planned to inform the employees by creating a coded warning system (Hospital Information Management System - HIMS). The patients who have reactions after a transfusion will be alerted by this system for planned re-transfusion treatments. This also will allow monitoring the process and it will raise awareness of the issue at Yedikule Chest Diseases and Thoracic Surgery E.R. Hospital.

MATERIALS & METHODS: In accordance with the decision taken after the transfusion committee meetings held in our hospital in 3-month periods, necessary planning and studies were made with the data processing unit and HIMS was establish. The transfusion forms and encoded reactions were controlled via system. The missing or inaccurate information was corrected by discussing the issue with information data processing unit.

RESULTS: The blood transfusion follow up forms have been filled out by using the system since December 2018. In 2019, the units performing transfusion in our hospital, except for the chemotherapy department, operating theatre and emergency department, gradually switched to the system. Since August 2019, most units successfully continue to complete of these form thoroughly. According to the decision taken at the last 3-month transfusion committee meeting in 2019, it was planned to code the reactions by using HIMS and unit nurses were trained by hemovigilance nurse. After the reaction coding entered to the system of the patient who developed a reaction in transfusion, "transfusion reaction occurred " warning is given actively by HIMS. This reminds our employees once again the safety of transfusion as well as increases the awareness of the physician in other transfusions planned for the patient.

CONCLUSION: As of December 2019, after HIMS was activated, 4 physicians (1 intensive care unit, 2 chest diseases clinic and 1 thoracic surgery unit) did not complete planned re-transfusions to the patients because of the system warning for the patients. Therefore we think that HIMS will be very useful for hemovigilance. Our close observations will continue throughout in 2020.

KEYWORDS: Hemovigiance, Transfusion Reaction

OP-24

HEMOVIGILANCE EXPERIENCE OF BURSA ULUDAG UNIVERSITY FACULTY OF MEDICINE

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AIM: Evaluate the association between hemovigilance training policies of our hospital and reported adverse reactions-events (AR-AE) and the filling of transfusion monitoring forms (TMF) in 2018 and 2019 (with 6 months periods). Training actions of our hospital have started as seminars in early 2018 due to incorrect blood transfusion which had seen 4 times in the last few months of 2017. Hemovigilance system and its requirements were described by the hemovigilance coordinator to almost every staff via seminars and meetings during 2018 and 2019. Hospital software was changed in January 2019 and so the hemovigilance system stopped for 3-4 months. Therefore face to face training activities were planned to induce the system. It was started in June 2019. Our hemovigilance nurses gave education for 15 minutes to every clinical nurse about transfusion chain, TMF, AR-AE and report system.

MATERIALS & METHODS: We decided to check the TMF filling rates in May 2017. According to this decision, the filling ratio of our TMFs was checked every 6 months (November and May). We analyzed also the ARs-AEs reporting numbers and training activities during this 6 month period. Data for this analysis were obtained from hemovigilance system records.

RESULTS: 48 AE and 66 AR were seen in all periods and 1.141 staff were educated with 33 different training activities. 492 clinical nurses (91% of our target) were educated by face to face programs (Table-1). ARs-AEs and filling of TMF increased in every period in comparison with its previous period and parallel with the hospital training activities. Only in the 3rd period where the hospital software changed, our AR reporting and TMF filling rates decreased (Table-1, 2). Imputabilities of transfusion reactions which were seen in these four periods were summarized in table-3.

CONCLUSION: We have seen that education is important, but follow up is as important as education. The new software system blocked the monitorisation of the transfusion chain for a while and thereby AR reportings and the filling of TMFs decreased in the 3rd period. Also, it was understood that face to face trainings are very effective and decided that a face to face education program must go on with different topics. Our new target is to provide the entire control of the transfusion chain with our new software. So we hope that both transfusion safety will be increased and the filling of TMFs will be completely achieved.

KEYWORDS: Adverse Event, Adverse Reaction, Training/Education Activity, Transfusion, Transfusion Monitoring Forms

Table-1: Relation between ARs-AEs and training program

		1st Period 01.11.2017 01.05.2018	2nd Period 01.05.2018 01.11.2018	3rd Period 01.11.2018 01.05.2019	4th Period 01.05.2019 01.11.2019	Total
Advers Events	SAE	3	7	9	11	**30**
	UTE		1		1	**2**
	ICBT	5	3	2	2	**12**
	NM			1	3	**4**
	Total	**8**	**11**	**12**	**17**	**48**
Advers Reactions	Mild Allergic	7	12	6	9	**34**
	FNHTR	3	3	2	9	**17**
	Anaphylactic			2	1	**3**
	Septic	1				**1**
	Hemolytic	1				**1**
	Dispnea				3	**3**
	TACO				1	**1**
	Unidentified			1	5	**6**
	Total	**12**	**15**	**11**	**28**	**66**
Seminar Number		**11**	**17**	**4**	**1**	**33**
Nurses and etc		397	295	104	-	**796**
Anesthesia technicians		33	-	8	-	**41**
Medical Doctor		36	204	-	6	**246**
Associate		4	52	-	2	**58**
Trained Staffs Number		**470**	**551**	**112**	**8**	**1.141**
Face to face training of Nurses and etc (Number) (%)					**492**	**(91%)**

(SAE) Severe adverse event, (UTE) Unserious transfusion error,
(ICBT) Incorrect blood transfusion, (NM) Near miss

Table-2: Relation between the filling of TMF and training program

	1st Period 01.11.2017 01.05.2018	2nd Period 01.05.2018 01.11.2018	3rd Period 01.11.2018 01.05.2019	4th Period 01.05.2019 01.11.2019	Total
Seminar Number	**11**	**17**	**4**	**1**	**33**
Nurses and etc	397	295	104	-	**796**
Anesthesia technicians	33	-	8	-	**41**
Medical Doctor	36	204	-	6	**246**
Associate	4	52	-	2	**58**
Trained Staffs Number	**470**	**551**	**112**	**8**	**1.141**
Face to face training of Nurses and etc (Number) (%)				**(492)**	**(91%)**

	Before 1st Period	End of 1st Period	End of 2nd Period	End of 3rd Period	End of 4th Period
Months	Nov. 17	May. 18	Nov. 18	May. 19	Nov. 19
Filling Ratio of TMF	21,6%	66,4%	83,0%	61,1%	89,0%

(TMF) Transfusion monitoring form

Table-3: Imputabilities of ARs

Imputability		Transfusion Reactions							
		MAR	FNHTR	AR	SR	HTR	TAD	TACO	UIR
For 4 Periods	Imp-0	1	5		1	1			3
	Imp-1	20	8	1			3	1	2
	Imp-2	10	2	2					1
	Imp-3	1	1						
	Imp-X	1	1						1

(Imp) Imputability, (X) could not be assessed, (MAR) Mild allergic reaction, (FNHTR) Febrile nonhemolytic transfusion reaction, (AR) Anaphylactic reaction, (SR) Septic reaction, (HTR) Hemolytic transfusion reaction, (TAD) Transfusion associated dispnea, (TACO) Transfusion associated cardiopulmunary overload, (UIR) Unidentified reaction.

OP-25

SEROLOGICAL WEAK D PHENOTYPES AND {RHD} GENOTYPE FREQUENCY AMONG TURKISH BLOOD DONORS

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AIM: The Rh blood group system is one of the most polymorphic and immunogenic systems. RHD gene polymorphisms causes differences in D antigen expression, namely, molecularly defined weak D phenotypes, partial D phenotypes and DEL phenotypes which play important role in transfusion practice. Variant D genotypes distribution aimed to be evaluated.

MATERIALS & METHODS: RhD blood group phenotyping were performed by gel centrifugation / column agglutination method with polyclonal anti-D blood group reagents. Donors' samples giving no or weak (<+4) reactivity in initial testing were tested by indirect globulin tests (IAT) with potent anti-D reagents. All IAT positive samples were tested also by direct antiglobulin (DAT) test. All DAT positive samples were excluded from the study. The remaining donors' with IAT-positive and DAT-negative samples have been accepted as weak D and were called back for PCR-genotyping. RHD genotyping was performed by using ready-to-use PCR-SSP commercial kits.

RESULTS: Between January 2011 and February 2017, 177.554 donors were assessed. By routine analyses RhD negative phenotype frequency was found to be 15.11% (n=26.822) whereas 228 (0.12%) of them had been defined as having weak D phenotype. 67 of donors turned back to recall. Among genotyping, 68.7% had weak D and 22.4% partial D. Six cases (8.9%) were not identifiable. Among weak D genotype, type15 (26.9%), type 11 (14.9%) and type 1 (13.4%) were the most frequent genotypes (Table 1).

CONCLUSION: The prevalence of serological weak D phenotypes varies by race and ethnicity. An estimated 0.2–1.0% of Caucasians inherit an RHD genotype that codes for a serological weak D phenotype. Our serologic weak D phenotyping showed a few lesser frequencies. Most serological weak D phenotypes in Caucasians express molecularly defined weak D types 1, 2 or 3 whereas our finding indicates the most frequent genotypes as in order type15, 11 and 1. For transfusion practice a weak D test is required if a blood donor's typed as D negative. Blood donors with a serological weak D phenotype should be managed as RhD-positive, in contrast to transfusion reci-

pients and pregnant women, who should be managed as RhD-negative. We think that clinical laboratories should implement policies to increase detection of serological weak D phenotypes and resolve their interpretation by RHD genotyping, not avoid their detection or make detection optional. In standard practice weak D typing may document types with increasing risk of alloanti-D forming types. {The present work was supported by the Research Fund of Istanbul University. Project No.40636}

KEYWORDS: Molecular Rhd Typing, Partial D, Rhd, Variant D, Weak D

Table 1: Distrubution of RHD genotypes in our study.

	Variant type	n.(%)
Partial D	DFR	10 (14.9)
	DVa associated	3 (4.5)
	DAU-0,1,2,3	1 (1.5)
	DVI Type 3	1(1.5)
Weak D	Type 1	9 (13.4)
	Type 2	6 (9)
	Type 3	2 (3)
	Type 5	1 (1.5)
	Type 11	10 (14.9)
	Type 15	18 (26.9)
	Unidentified	6 (8.9)
Variant	Weak D	46 (68.7)
	Partial D	15 (22.4)
	Unidentified	6 (8.9)

OP-26

PREPARATION OF ERYTHROCYTE CELL PANEL FOR ALLOADSORPTION TEST IN THE PRESENCE OF AUTOANTIBODY

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AIM: Erythrocyte autoantibodies in patients, like in autoimmune hemolytic anemias, prevents safe transfusion and it is difficult to find appropriate blood. Pre-transfusion compatibility tests like cross-match or antibody screening / identification give mostly positive results with all cells due to autoantibodies. Technically difficult tests such as autoadsorption or alloadsorption are used to detect possible underlying alloantibodies in patients with a history of transfusion or pregnancy. In our center, we frequently encounter such patients especially from departments such as hematology, oncology and rheumatology. In this study, we aimed to prepare an erythrocyte cell panel with appropriate antigenic properties in order to remove autoantibodies by alloadsorption method and to identify possible underlying alloantibodies.

MATERIALS & METHODS: Minor blood group antigens of our Blood Center staff were typed by gel microcolumn method (Bio-Rad Laboratories 1785Cressier FR Switzerland). Minor group antigens was analyzed and a panel was created with blood samples taken from two individuals whose antigenic properties complement each other (Figure-1). If clinically important antigens such as Rh (C, E), Kell (K), Kidd (Jka, Jkb) and MNS (M, N, S, s) were found positive in one cell, care was taken for them to be negative in the second cell in order not to adsorb possible underlying alloantibodies. Five patient blood samples that had positive direct antiglobulin (DAT) and indirect antiglobulin tests (IAT) results were used. All these samples showed a pan-reactive activity in IAT. By using the panel prepared with two different cells of our staff, the autoantibodies in the patient samples were tried to be removed by the alloadsorption method (Judd WJ, Johnson S, Storry J. Judd's methods in immunohematology. 3rd ed. Bethesda, MD: AABB Press, 2008). Antibody identification was performed in the patient serum after three adsorption processes with 30-minute incubations.

RESULTS: Auto-antibodies were successfully removed in three of five cases after alloadsorption and no alloantibodies were detected afterwards (Figure-2). But autoantibody reactivity continued in the enzyme phase in two cases (Figure-3,-4).

CONCLUSION: Alloadsorption is an effective way to remove autoantibodies with an appropriate cell panel. As seen in two cases, additional adsorption procedures may be required in patients with high antibody titer. However, in these cases, it can be accepted that the process is partly successful considering the ongoing "enzyme-only" reactivity. In this study, the cell panel required for this test method was in-house prepared and it is showed to be effective. However, the best solution would be to provide cells with appropriate antigenic properties from institutions such as Regional Blood Centers.

KEYWORDS: Alloadsorption, Antibody İdentification, Pre-Transfusion Test

Figure-1

Dr. Raşit DURUSOY Kan Merkezi Personeli Minör Kan Grupları Antijen Tablosu

Rh					Kell				Duffy		Kidd		Lewis		P	MNS				Lutheran	
D	C	E	c	e	K	k	Kp^a	Kp^b	Fy^a	Fy^b	Jk^a	Jk^b	Le^a	Le^b	P_1	M	N	S	s	Lu^a	Lu^b
+	-	+	+	+	-	+	-	+	+	+	-	+	-	+	+	+	-	+	-	-	+
+	-	+	+	+	-	+	-	+	-	+	+	+	-	+	+	+	+	-	+	-	+
+	+	-	+	+	-	+	-	+	-	+	-	+	-	+	+	+	+	+	+	-	+
+	+	-	+	+	-	+	-	+	+	+	+	+	-	+	-	+	-	-	+	-	+
+	+	+	+	+	-	+	-	+	+	+	+	+	-	+	+	+	-	-	+	-	+
+	+	-	+	+	-	+	-	+	+	-	+	+	-	+	+	+	-	+	+	-	+
+	-	+	+	+	-	+	-	+	+	-	+	+	-	-	+	+	+	-	+	-	+
-	-	-	+	+	-	+	-	+	+	+	+	+	-	+	+	+	-	+	-	-	+
+	+	-	+	+	-	+	-	+	-	+	+	-	-	-	+	-	+	-	+	+	+
-	+	-	+	+	-	+	-	+	+	+	+	+	-	+	+	+	-	+	-	-	+
-	+	-	+	+	+	+	-	+	+	+	-	+	-	+	+	+	-	+	+	-	+
+	+	-	+	+	-	+	-	+	-	+	-	+	+	-	-	-	+	-	+	-	+
+	+	-	+	+	-	+	-	+	+	+	+	-	-	+	+	+	-	+	+	-	+
+	+	-	+	+	+	+	-	+	+	+	+	+	+	-	+	-	+	-	+	-	+
+	+	-	+	+	-	+	-	+	-	+	+	+	-	+	+	-	+	+	+	-	+
+	+	-	+	+	+	+	-	+	+	+	+	+	-	+	+	+	-	-	+	-	+
+	+	-	+	+	+	+	-	+	+	+	-	+	-	+	-	+	+	+	+	+	+
+	+	-	-	+	-	+	-	+	+	+	+	+	-	+	+	+	+	+	+	-	+
-	-	-	+	+	-	+	-	+	+	+	+	+	-	+	-	+	-	+	+	-	+
+	+	+	+	+	-	+	-	+	+	+	+	+	-	+	+	+	+	+	+	-	+

Minor blood group antigen table of Blood Center staff and selection of cells with appropriate antigenic properties

Figure-2

Antibody identifications of three cases after alloadsorption

Figure-3

Antibody identification after alloadsorption (enyme reaction)

Figure-4

Antibody identification after alloadsorption (enyme reaction)

OP-27

EFFECT OF TURKEY'S NATIONAL DIRECTORY APPLICATION ON BLOOD DONOR SERO-POSITIVITY, ERCIYES UNIVERSITY EXPERIENCE

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AIM: In our Country, National Blood and Blood Products guidelines were published firstly in 2009, 2011 and 2016. These guidelines provide a wide range of criteria for selection of blood donors. In these guidelines, it is emphasized that the safe blood supply and use of blood donors will be managed by national and international standards.

MATERIALS & METHODS: In this study; We reviewed the sero-positive comparison of blood donors between the previous 5-year period (2006-2010)and the 5-year period (2015-2019)when 3 guidelines were published and implemented, and the effects of the guidelines on donor selection and sero-positivity.

RESULTS: Between 1.1.2006-31.12.2010, the period before the national guides, 143,523 people came to the Blood Center of Erciyes University for blood donation. 15,345 people(10.7%)could not donate blood for various reasons and were rejected. In this period, the rate of volunteer blood donors among the donors was 45% and the relative donor rate was 55%. In this period; 1,592 Hbs Ag,61 HCV,34 syphilis and 2 HIV tests were found positive among 128,178 people who donated blood. In this period, the total number of sero-positive donors was 1,689(1.32%). The period following the implementation of national guidelines; Between 1.1.2015-31.12.2019, 156.840 people who came to our blood center for blood donation; 129,123(82.3%)people were accepted as blood donors and 27,717(17.7%)people were rejected according to national guidelines. In this period, the rate of volunteer blood donors was 57% and the rate of patient donors was 43%. In this period, Of the 129,123 people who donated blood to our center between 1.1.2015-31.12.2019, 224 Hbs Ag,15 HCV,49 Syphilis,3 HIV tests were found positve including validation. In this period, 291(0.22%)of our blood donors were sero-positive.

CONCLUSION: As a result; Our total sero-positive ratio was 1,689(1.3%)in 128,178 donors before the guidelines and 291(0.22%)in 129,123 donors after the guides. These rates were found to be significant in the statistical analysis(chi square test $p<0.0001$). Although the strict implementation of national guidelines, which were renewed 3 times and added new rejection criteria according to national and international criteria, caused a significant increase in the number of rejections from 10.5% to 17.6%; blood. In addition to the effective use of national guidelines, the increase in the number of volunteer blood donors, the prevention of permanent or temporary rejection of blood donors from permanent or temporary rejection by using an information system at a national level has led to a significant decrease in the rates of blood donors in sero-positivity and safe blood supply in our center.

KEYWORDS: Application, Blood Donation, National Directory, Sero-Positivity, Turkey

Statistical data

	01.01.2005 – 31.12.2010	01.01.2015-31.12.2019
Number of Donors Applied for Blood	143.523	156.840
Blood Donation Count	128.178 (89.3%)	129.123 (82.3%)
Number of Temporary or Permanent Rejections	15.345 (10.7%)	27.717 (17.7%)
Sero-positive donors	1.689 (1.3%)	291 (0.22%)
Volunteer Rate	45%	57%
Replacement Ratio	55%	43%
First Blood donor rate	57%	51%
Regular / Irregular Blood Donor Rate	43%	49%

OP-28

STUDIES FOR THE REDUCTION OF RESERVE CANCELLATION IN SURGICAL BRANCHES AND THEIR EFFECTS ON BLOOD DESTINATION RATES

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AIM: It is aimed to prevent excessive blood demand and blood wasting for routine surgical procedures by reducing reserve cancellations in surgical branches.

MATERIALS & METHODS: Blood request forms for surgical branches canceled by Denizli State Hospital Transfusion Center between April 2019 and December 2019 were evaluated and archived in three-month periods. At the meetings held by the Transfusion Committee and the Hemovijilance Unit, new decisions were made based on these data. The following decisions were taken at the June 2019 Transfusion Committee meeting. - The duration of

the blood reserved for the patients was decided to be reduced from three days (72 hours) to two days (48 hours), to contact the services and to extend the reserve times by two more days for the blood components whose indication for use does not disappear. - It was decided to give training to the nurses responsible for the service on "blood request". - In orthopedic service knee prosthesis cases, it was decided to reduce the 3-unit erythrocyte suspension reserves requested for the patient to 2 units. - A color warning system was added to the Hospital Information Management system of patients whose erythrocyte suspension reserve duration exceeded 48 hours. - A sufficient amount of blood reserves were requested just before the planned operation in the surgical branches. - Transfusion committees were convened in 3-month periods, and the decisions regarding the reduction of reserve cancellations were made by contacting the physicians and nurses responsible for the surgical branch, where reserve cancellations were excessive.

RESULTS: In the three-month period of April-May-June 2019, the total number of blood products canceled in surgical branches was 1565, and the reserve cancellation rate was 64.9% (Table 1). - In the three-month period of July-August-September 2019, the total number of blood products canceled in surgical branches is 1299, and the reserve cancellation rate is 59.8% (Table 2). - In the three-month period of October-November December 2019, it was determined that the total number of blood products canceled in surgical branches was 1457 and the reserve cancellation rate was 58.8%. There were significant reductions in reserve cancellations especially in some units such as General Surgery, Urology, Orthopedics and Cardiovascular Surgery (Table 3).

CONCLUSION: Reserve cancellations are frequently experienced in the requests made in terms of blood supply during the preoperative preparation phase, since the surgical branches do not reduce their blood preparations In addition, the lack of feedback to the transfusion center from services related to reserve cancellations of the blood whose indication does not continue causes the blood component to remain in the reserve without being used for a long time. With the reduction of the reservation period from 72 hours to 48 hours, there was a decrease in reservation cancellations from 64.9% to 58.8%. Thus, time was saved and reserve cancellations decreased.

KEYWORDS: Blood Transfusion, Reserve Cancellation, Surgical Branch

Table 1. Reserve Cancellation / Total Blood Demand Rates in Surgical Branches for April-May-June 2019

Services	Number of Products with Canceled Reserves	Number of Total Blood Product Transfusions	Total Number of requested Blood Products	Reserve Cancellation Rate (%)
General Surgery	90	116	206	43,6
Orthopaedics	592	200	792	74,7
Urology	67	21	88	76
Brain surgery	340	100	440	77
Plastic surgery	10	5	15	66,6
Gastroentrology surgery	14	11	25	56
Cardiovascular surgery	136	220	356	38,2
Pediatric Surgery				
Obstetrics and Gynecology	245	155	400	61,2
Gynecologic Oncology surgery	9	0	9	100
Surgical Oncology	46	10	56	82
Burn	1	0	1	100
Breast Surgery	15	0	15	100
TOTAL	1565	838	2411	64,9

Table 2. Reserve Cancellation / Total Blood Demand Rates in Surgical Branches for July-August-September 2019

Services	Number of Products with Canceled Reserves	Number of Total Blood Product Transfusions	Total Number of requested Blood Products	Reserve Cancellation Rate (%)
General Surgery	71	170	241	41,7
Orthopaedics	565	192	757	74
Urology	34	28	62	54,8
Brain surgery	292	67	359	81
Plastic surgery	2	0	2	100
Gastroentrology surgery	4	4	8	50
Cardiovascular surgery	105	203	308	34
Pediatric Surgery		1	1	0
Obstetrics and Gynecology	187	173	360	51,9
Gynecologic Oncology surgery	26	7	33	78,7
Surgical Oncology	11	22	33	33
Burn		1	1	0
Breast Surgery	2	2	4	50
TOTAL	1299	870	2169	59,8

Table 3. Reserve Cancellation / Total Blood Demand Rates in Surgical Branches for October- November December

2019

Services	Number of Products with Canceled Reserves	Number of Total Blood Product Transfusions	Total Number of requested Blood Products	Reserve Cancellation Rate (%)
General Surgery	41	98	139	29
Orthopaedics	657	294	951	69
Urology	43	80	123	34,9
Brain surgery	355	97	452	78,5
Plastic surgery	1	0	1	100
Gastroentrology surgery	19	3	22	
Cardiovascular surgery	94	276	350	26,8
Pediatric Surgery				
Obstetrics and Gynecology	199	155	354	56,2
Gynecologic Oncology surgery	29	5	34	85,2
Surgical Oncology	17	4	21	80,9
Burn				
Breast Surgery	2	2	4	50
TOTAL	1457	1014	2477	58,8

OP-29

'RIGHT BLOOD' TO THE 'RIGHT PATIENT': 'SANDESH POSITIVE NEGATIVE (SPON) PROTOCOL': A NOVEL APPROACH TO BEDSIDE PRETRANSFUSION IDENTITY CHECK OF BLOOD AND ITS COMPONENTS:

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AIM: Background: 'Right blood' to the 'Right patient' is presently the stringently accepted norm worldwide. Blood component mistransfusion causing serious complications is generally due to preventable clerical errors, especially misidentification of patient/blood unit at patient's bedside just before transfusion. To prevent the same, use of electronic devices such as barcode scanners are recommended as the standard practice to check the patient's identity. However, several healthcare facilities especially in underdeveloped countries cannot afford these equipment. These centres hence, usually perform the identity check by subjective visual assessment. But, this type of assessment is prone to clerical errors which may lead to serious morbidity and medico-legal consequences, thus precipitating significant level of anxiety in the healthcare personnel transfusing the blood unit. Hence, a novel objective method in performing pretransfusion identity check, the 'Sandesh Positive-Negative (SPON) protocol', was developed and evaluated.

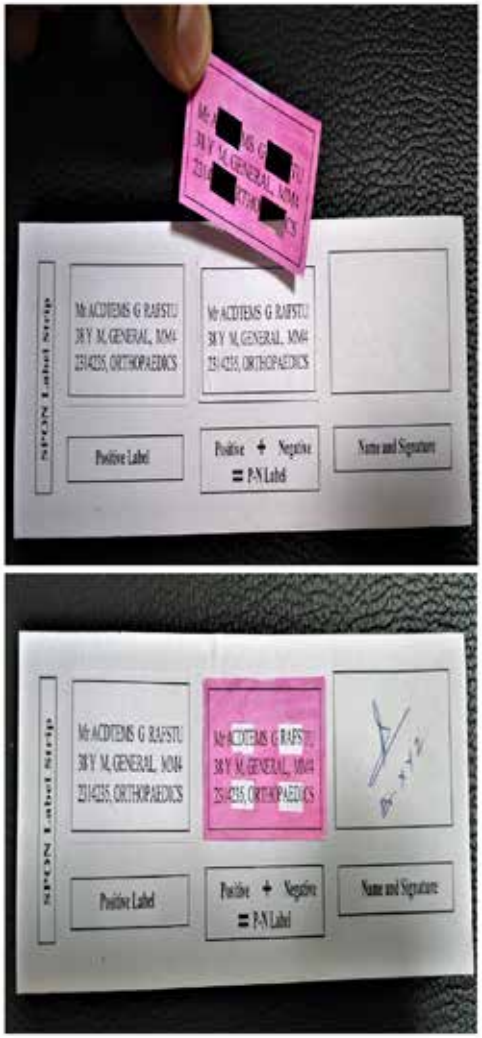
MATERIALS & METHODS: Methods: A nonrandomized study on bedside pretransfusion identity check of blood component was conducted wherein, 75 health care personnel performed transfusion. The intervention was carried out by matching a custom-made 'negative label' available alongside the blood component with a 'positive label' of the same patient that was available at bedside who was about to receive transfusion. The new intervention was evaluated in terms of anxiety, satisfaction levels and preventable clerical errors among the transfusionists.

RESULTS: Results: In total, as many as 85.3% of the subjects were anxious while performing pretransfusion identity check based on the existing standard practice. After the implementation of the SPON protocol, only 38.7% experienced either mild, moderate or severe anxiety. The overall level of satisfaction also increased from 8.0% to 38.7% and none were dissatisfied. Although only 9.3% were dissatisfied about the existing practice, approximately 70.7% felt the need for a better/additional protocol. Clerical error was not observed.

CONCLUSION: Conclusions: The SPON protocol is a cost-effective, subjective-objective method that reduces anxiety and increases satisfaction levels among the transfusionists while performing final bedside identity check of blood components especially in third world countries.

KEYWORDS: Blood Component Transfusion, Blood Safety Errors, Hemovigilance, Mistransfusion, Novel Intervention, Organization And Administration, Prevention And Control, Standards

SPON Protocol



Comonents (negative label, positive label, label strip) and procedure of the SPON protocol

OP-30

PROPOSAL OF A NEW TRIGGER FOR PLATELET TRANSFUSIONS IN PEDIATRIC PATIENTS: CAN PLATELET MASS AS A TRANSFUSION TRIGGER PREVENT LIBERAL TRANSFUSION?

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AIM: Recent studies about platelet transfusion had shown that the multiplication of platelet number with mean platelet volume (MPV), so called plalelet mass (PM) can be used safely and succesfully as platelet transfusion trigger in newborn patients. By the use of PM as a trigger, the rate of transfusion can be decreased without increase in bleeding events. As a result, morbidity and mortaility augmented by platelet transfusion can be avoided. In this study, we hypothesized that PM can be used as platelet transfusion trigger in children at all ages, and analyzed platelet transfusions retrospectively in pediatric and newborn patients according to this new trigger to investigate whether there would be a decrease in transfusions when it is used.

MATERIALS & METHODS: Platelet transfusions in 0-18 ages pediatric patients between January 2017-January 2019 were analyzed for platelet transfusion triggers, types of transfusion, the efficacy and costs. We evaluated the transfusion rates when transfused according to conventional (platelet count) or new (PM) triggers and we calculated the decrease in costs if we hypothetically used the PM trigger for transfusions.

RESULTS: 183 platelet transfusions among 82 pediatric patients were made in 68.5% male, 31.5% female patients. 24% of the patients were newborns. 94% of the transfusions were prophylactic. 55.2% of the patients did not have underlying coagulopathy, 32.2% had sepsis, 12% had operation and 0.5% had DİC. The mean age was 56.1 months (1-486 ±79,13 months); mean platelet count was 38,04 x109/L (7-156± 20,53 x109/L); mean PM was 352,04 (69-1307 ± 188, 05) fl/nl. The transfusions were retrospectively classifed as 'relevant' and 'unrelevant' when evaluated for relevance to platelet mass as assumed trigger. The unrelevant transfusions were found to be 17.7% (n=32). When relevance to platelet mass trigger and costs and efficacy of transfusion were compared, no difference was found ($p>0.05$). The results made us think that transfusions could be made with the same efficacy and lower cost at the same time, ensuring decreased exposure to transfusions in children.

CONCLUSION: As platelet transfusion triggers are always higher in newborns compared to older children, we can easily assume that similar neonatal triggers for PM can be used in children as well. With this policy, it would be possible to decrease platelet transfusion rates and costs and exposure to transfusions in children. In order to show whether this protocol could prevent bleeding to the same extent needs to be investigated in further prospective randomized controlled trials.

KEYWORDS: Platelet Mass, Platelet Transfusion, Transfusion Trigger

OP-31

PRIVATE MEDSTAR ANTALYA HOSPITAL – 5 YEARS OF TRANSFUSION AND HEMOVIGILANCE EXPERIENCE

Burak Deveci[1]

[1]Özel Medstar Antalya Hastanesi

AIM: Since a live tissue is being transferred to a live recipient, blood and blood products transfusion are among the most risky medical procedures in terms of complications. In addition to this, when the mortality and morbidity rates of the transfusion related complications, it is imperative to keep the records of the transfusion procedures, unwanted and unexpected situations, meaning hemovigilance data, regularly and often both for the patient and to prevent a possible legal problem. For this reason, the present study aimes to study the 5-years of transfusion and hemovigilance data and to discuss the complication preventive measures.

MATERIALS & METHODS: In this study, transfusion and hemovigilance data between 2014-2018 from Medstar Antalya Hospital were scanned. Transfusion and hemovigilance data were recorded separately according to reaction type and type of blood products. In the scope of the study, reactions that occurred between the start of the transfusion and within the first 24 hours after transfusion onset were examined. Late stage complications were not included in the study.

RESULTS: When transfusion numbers are examined, it is seen that more apheresis thrombosis are used than fresh frozen plasma. As the patients undergoing transfusion in the center are mainly hematology-oncology patients and bone marrow transplantation is performed in the center, apheresis thrombosis requirement increases. On the other hand, allergic reactions were the most common transfusion reactions. However, the absence of high mortality risk reactions, such as transfusion-related acute lung injury, may be due to the fact that donors are predominantly male and that ethnic differences that can make up HLA diversity in our country are less than in other countries.

CONCLUSION: Generally, early stage transfusion reactions are observed less than the literature norm in our center. This could be due to the fact that majority of the patients are immunosuppressed hematology and oncology patients and also the immunosuppressive therapies used in the treatment of the diseases and bone marrow transplantation. In conclusion, transfusion of blood and blood products is one of the treatments that can lead to fatal complications if not performed with great care. In order to reduce the risk of complications; unnecessary transfusions should be avoided, protective procedures such as irradiation and / or Leucocyte filters should be used in patients who need frequent transfusions, transfusion follow-ups and records should be kept completely and appropriate measures should be taken according to the hemovigilance data.

KEYWORDS: Blood and Blood Product Transfusion, Hemovigilance, Transfusion Complication

Data for 87,434 blood and blood product transfusions over 5 years are summarized in Table 1.

Product Type	Used Product Number	Total Reaction Number	Reaction per product (%)
Erythrocyte Suspension	41.571	96	0,23
Fresh Frozen Plasma	19.422	20	0,10
Apheresis Thrombosis Suspension	26.441	95	0,36
Total	87.434	211	0,24

Table 1. Blood products used and reaction numbers.

Table 2.

Reaction Type	Erythrocyte Suspension	Apheresis Thrombosis	Fresh Frozen Plasma	Total	%
Allergic	18	72	16	106	50,24
Febrile Non Hemolytic Transfusion Reaction	36	18	3	57	27,01
Dyspnea	9	4	1	14	6,64
Transfusion related Circulation increase	29	0	0	29	13,74
Hypotension	1	1	0	2	0,95
Hypothermia	3	0	0	3	1,42
Transfusion related Acute Lung Injury	0	0	0	0	0,00
Acute Hemolytic Transfusion Reaction	0	0	0	0	0,00

Table 2. Subgroups of transfusion reactions and distribution according the blood product types.

OP-32

COMMUNICATION OF HEMOVIGILANCE NURSES THROUGH WHATSAPP APPLICATION

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[2]Maltepe State Hospital

AIM: The aim of this study to examination of communication of 255 hemovigilance nurses who are included in the common platform through a whatsapp app and who work in public and private hospitals in Turkey, and to determine the most common issues that are on their agenda. In this way, the most common issues in hemovigilance nursing and the need for information and support are put forward and support studies such as training planning, expanding the content of used guides and establishing an online information center will be able to carried out

MATERIALS & METHODS: 7453 whatsapp correspondences between 22/03/2018 and 03/01/2020, of 255 hemovigilance nurses who are included in a whatsapp app which is established to share knowledge and experiences and who work in public and private hospitals in Turkey, were reviewed. All correspondences were grouped by two different researchers and divided into main and sub-titles. The percentage of correspondences divided into main and subheadings were calculated and the significance levels of them were determined.

RESULTS: The correspondence was divided into eight main topics. These; order and transport of blood and blood products, hemovigilance nursing, Health Quality Standards (HQS), transfusion process, blood/blood product characteristics, conditions and periods of storage and retention of blood and blood products, destruction, Blood Transfusion Centers and other subjects. Among these main topics, the highest content of correspondence was related to HQS with 21.28%, followed by transfusion proces with 14.26% and hemovigilance nursing with 13.83%. Blood Transfusion Centers and blood/blood product characteristics had the lowest share with 0.59% and 1.65% respectively. In the sub-headings; most of the correspondence was related to subjects on social issues (15.31%) and transactions for additing people to the group and left the group (6.88%).

CONCLUSION: When the messages of Whatsapp group were analyzed, it was seen that information, documents and experiences were shared on many subjects. It is clear that especially those newly appointed and less experienced in hemovigilance nursing gain support from those who have been in this position for many years. It is suggested that these issues should be addressed in the planning of education for hemovigilance nurses or in the regulation studies. In addition, it is recommended to establish a more reliable and national wide online network by considering discomfort from off-time messaging and security concerns of internet communication.

KEYWORDS: Communication, Hemovigilance Nurses, Whatsapp Applicatıon

OP-33

LOOK BACK INVESTIGATION BETWEEN 2015-2019 IN A PRIVATE HOSPITAL

Hulya Bilgen[1], Asuman Mersin Kokrek[1], Sefa Can[1], Mensure Gundogdu[1], Selvet Gacaloglu[1], Ferhat Aslan[1], Semra Yılmaz[1], Canan Yakar[1]

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AIM: To evaluate the effectiveness and results of look back activity in our hospital between 2015-2019 and recommend more effective approach to our patients.A Look back is defined as an investigation on the fate of recipients of previously donated blood or blood components resulting from recognition that the donation may have presented a risk of transmission of infection. Look back will generally be required when a donor has undergone seroconversion, to exclude a previous window period donation, unless there is clear evidence that the previous donation could not have presented a risk to any recipient, and in other situations such as a newly recognised chronic, occult infection not previously detected through donation screening. The look back investigation would usually include retesting of any relevant archive samples held by the blood establishment

MATERIALS & METHODS: All the look back notifications recieved from Turkish Red Cresent European Regional Blood Center were evaluated and our approach is investigated. The patient invitations were made by the primary doctor of the pateints via telephone calls.The tests were studied and reported.

RESULTS: In our hospital in a period between 2015-2019 we had recieved 84 take back notifiifications out of 92421 blood components that we had from Turkish Red Crescent European Regional Blood center. We had recieved 40 look back possible transmitted infection disease notificiations out 0f 84. 26 out of 40 notifications were confirmed as possible infectious transmissions and 14 out of 40 were reported as non confirmatory. All the results is presented in Table 1. In these 26 confirmed infectious donors we traced the patients who had recieved components from them. Out of 26 patients 11 had died from their primary disease, 4 were international patient that we could not contuct, 4 patient did not respond to our invitations to our center, we could reached to 7 patients and did their serologic tests. All the 7 patients were negative serologically.

CONCLUSION: It is a challenge to reach to the patients for look back investigations especially in private hospitals. It has a burden of liability of Transfusion Transmitted Infection and also it is expensive to do this investigations in patients and follow them periodically, especially in private hospitals.We should find a way to follow up the patients more properly and less costly. Collaboration with Regional Blood Bank and Ministry of Health Haemovigilance system will make our transfusins more safer.

KEYWORDS: Haemovigilance, Look Back, TTI

Regional blood center call backs

Total call backs	2015	2016	2017	2018	2019	Total
Without reason	0	1	11	10	22	44
Non confirmed	0	1	4	1	8	14
HBV	6	8	1	3	6	24
HIV	0	1	0	0	0	1
Bacteria	0	0	0	0	1	1
						84

Table 1

OP-34

EVALUATION OF DIRECT COOMBS TEST RESULTS IN NEWBORNS

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AIM: Direct coombs test is an hemaglutination-based test which is performed using Anti Human Globulin (AHG). DAT investigates if the erythrocytes tested are coated by antibody or complement (IgG and/or C3). In the neonatal period, the most common reason for immune hemolytic disease is erythrocyte antigen incompatibilities. More than fifty erythrocyte antigens associated with hemolytic disease of the newborn have been identified up to the present time. Previously, the most common reason for hemolytic disease of the newborn was Rh D alloimmunization. Currently, the frequency of Rh-D alloimmunization is gradually decreasing with widespread application of anti-D globulin prophylaxis during pregnancy and in the postnatal period, and alloimmunization developing against the other erythrocyte antigens is gaining importance. This study was conducted to evaluate the results of DAT tests studied in newborns in the blood transfusion center in our hospital.

MATERIALS & METHODS: One tousand eighty three newborns whose blood samples were sent to the blood transfusion center in our hospital between December 2018 and November 2019 for DAT test, were included in the study. The hospital automation information of all babies were examined retrospectively.

RESULTS: In the study period, DAT was found to be positive in 80 (4,4%) of a total of 1783 newborns and 1793 (95,5%) newborns were found to have a negative DAT result.

CONCLUSION: In hemolytic disease, the positive predictive value of DAT has been reported to be 23-59% and its sensitivity is 86%. DAT positivity may occur in absence of hemolysis and a positive result alone does not indicate immune hemolytic anemia. The prevalence of DAT positivity in newborns has been reported to be 1-9%. In our study, DAT positivity was found with a rate of 4,4%. The DAT positive results in our hospital arised from ABO-RH incompatibility, subgroup antigens and other blood group antigen incompatibilities. Therefore, screening of antibodies against other erythrocyte antigens during pregnancy is gaining importance more and more. We think that it would be appropriate to perform indirect coombs test not only in pregnant women with Rh incompatibility, but in all pregnant women, because ABO incompatibilities are in the first order among the reasons of hemolytic disease of the newborn, and it is known that immunization may develop against erythrocyte antigens other than major blood group antigens.

KEYWORDS: Coombs Test, Hemolitic Disease, Neonate

OP-35

INVESTIGATION OF BLOOD USAGE RATES AND CROSS-MATCH /TRANSFUSION RATES AND ASSESSMENT OF RATIONAL BLOOD USAGE IN OUR HOSPITAL

Aysel Aydın[1], Ayse Bozkurt Turhan[1]

[1]Istanbul Medeniyet University (İMÜ) Göztepe Education and Research Hospital Transfusion Center

AIM: Appropriate blood usage and selection of accurate blood component with accurate indication constitute the most important issue in patient blood management. As preparation of unneccessary blood while preparing blood for elective operations causes misuse of sources and discard of blood, cross-match/transfusion rates should be monitored as an indicator of quality and should be kept below 2. Quality Indicators for Transfusion Centers were revised in April 2018 and Assessment of Cross match/Transfusion Rates entered in force. With initiation of application of these indicators, this study was presented with the objective of performing necessary enhancements by examining our data, reaching reliable data related to blood usage in our center and keeping cross-match/transfusion rates below 2.

MATERIALS & METHODS: The numbers of blood products required from and used in TC including whole blood (WB), erythrocyte suspension (ES), fresh frozen plasma (FFP), platelet suspension (PS), apheresis platelet suspension (APS), pooled platelet suspension (PPS) and Cryoprecipitate (CP) between January 1, 2019 and December 24, 2019 and Cross match/Transfusion rates were specified. Gynecology and Obstetrics, Orthopaedics, Brain and Nerve Surgery, Cardiovascular Surgery (CVS) and General Surgery were selected as the clinics which used blood products most frequently, and number of blood usage and crossmatch/transfusion rates were examined.

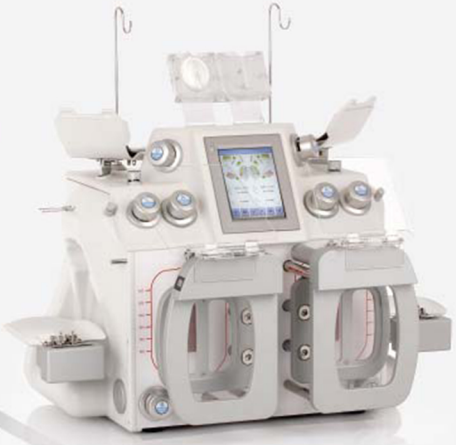
RESULTS: It was found that 23.375 units blood products were used in all clinics during the study period and the blood product distribution was as follows: 46% ES, 26% FFP, 14% APS, 12% (PPS), 1% CP and 1% whole blood. The cross-match/transfusion rates were as follows: 2,4 (2387/988) in orthopaedics clinic, 7,4 (2187/292) in brain surgery clinic, 1,9% (1776/923) in CVS clinic, 4,9% (6080/1226) in obstetric and gynecology clinic and 2.3% (3117/1337) in general surgery clinic. The cross-match/transfusion rate in all clinics in our hospital was found to be 1,4.

CONCLUSION: The primary rule in patient blood management is accurate usage of blood which is a very valuable national wealth and the single resource of which is humans. When the cross match number/Transfusion rates were evaluated, the rate was found to be below 2 only in CVS clinic among surgery divisions. In the other surgery clinics, this rate was much more higher. It is pleasing that this rate was below 2 throughout our hospital. Performing so many unnecessary crossmatch tests is disadvantageous in terms of cost and personnel functionality and seriously harmful for the country's economy. Therefore, educating physicians in surgical branches is one of the primary issues of TCs.

KEYWORDS: Blood Usage, Cross-Match/Transfusion Rate, Patient Blood Management

Blood Technology

DONATION



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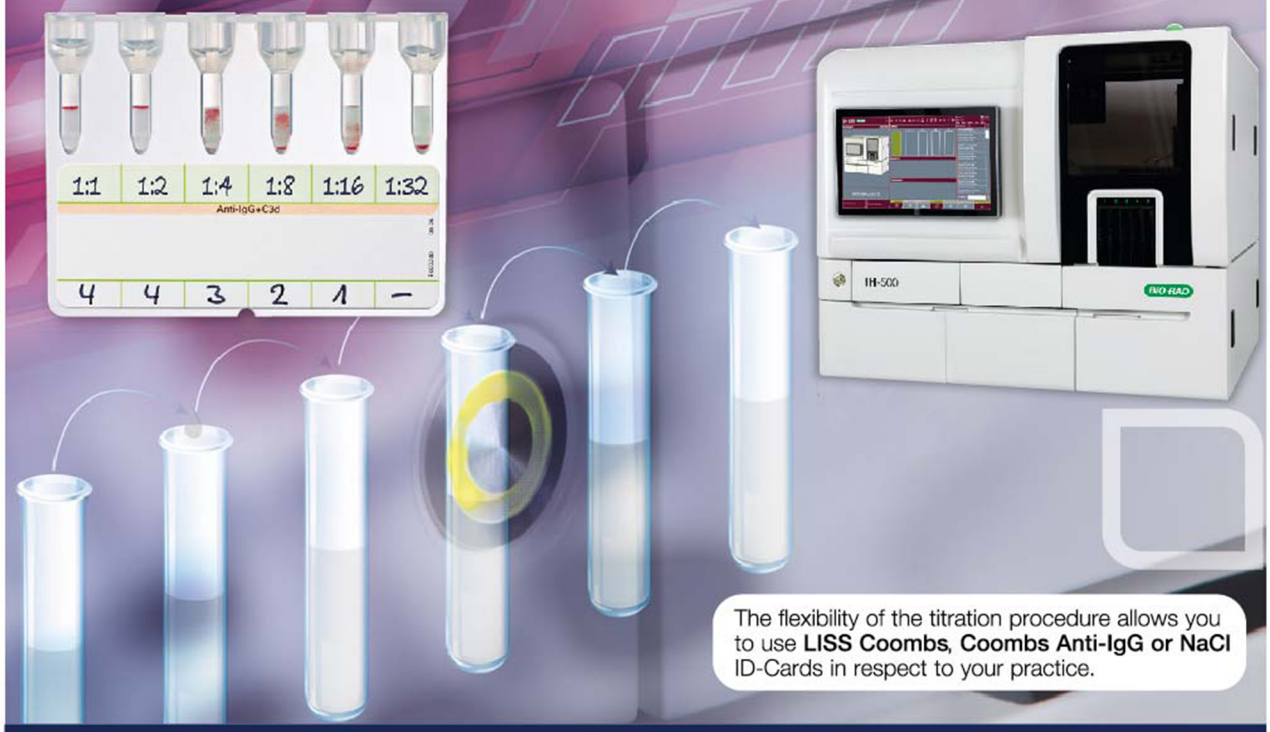

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IH-QC 2	B [ABO:-1,2,3]	DCcEe (R_1R_2), C^w- [RH:1,2,3,4,5,-8]	K- [KEL:-1]	Fy(a-) [FY:-1]	Anti-A [Anti-ABO1]	Anti-Fy^a [Anti-FY1]	Neg
IH-QC 3	AB [ABO:1,2,3]	DCCee (R_1R_1), C^w- [RH:1,2,-3,-4,5,-8]	K- [KEL:-1]	N/A	Anti-c [Anti-RH4]		Neg
IH-QC 4	0 [ABO:-1,-2,-3]	DccEE (R_2R_2), C^w- [RH:1,-2,3,4,-5,-8]	K- [KEL:-1]	N/A	Anti-A and Anti-B [Anti-ABO1 and Anti-ABO2]	Anti-K [Anti-KEL1]	Neg
IH-QC 5	A_2 [ABO:1,-2,3,-4]	DCcee (R_1r), C^w- [RH:1,2,-3,4,5,-8]	K- [KEL:-1]	N/A	Anti-B [Anti-ABO2]		Neg
IH-QC 6	N/A	Weak D [RH:W1]	N/A	N/A	N/A		Neg
IH-QC 7	N/A	N/A	N/A	N/A	N/A		Pos [IgG]
IH-QC 8	N/A	N/A	N/A	N/A	N/A		Pos [C3b (c/d)]

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Poster Presentations

PP-01

GRANULOCYTE TRANSFUSIONS IN FEBRILE NEUTROPENIC PEDIATRIC HEMATOLOGY / ONCOLOGY PATIENTS: A SINGLE CENTER EXPERIENCE

Başak Adaklı Aksoy[1], Seda Karanlı[1], Ayşegül Bayram[1], Emine Göçmen[1], Elif Türkmen[1], Sevil Özhan[1], İbrahim Aşkın[1]

[1]Altınbaş University, Medical Park Bahçelievler Hospital, Transfusion Center, İstanbul

AIM: Although new broad-spectrum antibiotics and antifungal therapies have been introduced, infections remain the most common cause of death in neutropenic patients. Granulocyte transfusions has been used for many years as an adjunct to infection therapy to prevent and treat severe infections in neutropenic patients, but its role in treatment has not yet been clearly established. In this study, we aimed to evaluate the safety and efficacy of granulocyte transfusion in pediatric hematology / oncology patients with febrile neutropenia.

MATERIALS & METHODS: To describe the clinical course of febrile neutropenic pediatric hematology / oncology patients undergoing granulocyte transfusion (GTF), we retrospectively reviewed the data of all pediatric hematology / oncology patients receiving granulocyte transfusion in our hospital between 2016-2019. 29 patients age between 1-18 were included.

RESULTS: Out of 29 patients, 18 of the patients were male, 11 were female and the median age was 9 years (1-18). A total of 538 Granulocyte transfusions were applied to 29 patients. Infections were classified as microbiologically documented infection (47%), clinically suspected infection (53%). Eighteen of 29 patients who received sequential granulocyte infusions died due to the inability to control their infections. The most frequent reaction was observed as fever in patients receiving granulocyte transfusion. No patient, including acute hemolytic reaction, was lost due to a transfusion-related reaction.

CONCLUSION: Granulocyte transfusions can be considered as an effective and safe adjunctive treatment method in patients with neutropenia who has antimicrobial agent resistant infections. Although granulocyte transfusions have been observed to improve short-term outcomes in neutropenic pediatric hematology / oncology patients, randomized controlled trials are needed to determine their true role in survival.

KEYWORDS: Granulocyte Apheresis, Granulocyte Transfusion

PP-02

MULTICOMPONENT APHERESIS EXPERIENCE OF BURSA ULUDAG UNIVERSITY FACULTY OF MEDICINE

Salih Haldun Bal[1], Metin Öncü[1], Levent Tufan Kumaş[1], Yasemin Heper[1]

[1]Bursa Uludag University Faculty of Medicine

AIM: Apheresis systems are mostly used to obtain thrombocyte suspension (aTS) in our blood bank. For this purpose, the Trima Accel Apheresis System has been used since 2013. We had obtained our aTSs requirement through triple doses apheresis process until 2017. But, some legal preventions have changed this implementation (the third dose couldn't be charged anymore) and our TSs requirement could be provided by double doses process since that date. Our purpose is to make a financial comparative analysis between double doses versus triple doses donor thrombocyte apheresis.

MATERIALS & METHODS: This analysis has been made between our triple doses of data from 2016 and double dose data from 2019.

RESULTS: We have obtained aTS, with different performances between 2016 and 2019. While 3.740 aTSs have been provided by 1.458 apheresis procedures in 2016, only 3.229 aTSs have been provided by 1.674 apheresis procedures in 2019. TS/set ratio was 2,38 in 2016 and 1,93 in 2019. Our mean aTS requirement for a year was calculated as 3.686 (Table-1). The comparison between 2016 and 2019 has shown that a double dose process caused a financial loss in comparison with the triple dose process. The double dose process has increased the requirement of apheresis sets (18,9%) (Table-1). The increased set requirement also leads to more payment from the Republic of Turkey Social Security Institution (SSI) to hospitals (23,7%) (Table-2).

CONCLUSION: SSI payment of triple doses apheresis should be established again to prevent the unnecessary expense of national sources. Increased apheresis set requirement will cause not only increased set costs, but also increased requirement for donors and tests (microbiological and immunohematology), and SSI will continue to pay more payment with this regulation also.

KEYWORDS: Apheresis, Financial Loss, Multycomponent Apheresis

Table-1: Economic Damage of Blood Bank

Years	Transfused aTS number	Required sets number with 3 doses TS/set ratio=2,38	Required sets number with 2 doses TS/set ratio=1,93	Undesirable set usage	%
2017	3.815	1.603	1.977	374	**18,9%**
2018	4.015	1.687	2.080	393	**18,9%**
2019	3.229	1.357	1.673	316	**18,9%**
Average	**3.686**	**1.549**	**1.910**	**361**	**18,9%**

Table-2: Economic Damage of SSI

Required aTS	Unit Price (TL) for Triple Doses	SSI Payment (TL) for Triple Doses	Unit Price (TL) for Double Doses	SSI Payment (TL) for Double Doses	%
3.686	169	622.990	209	770.444	23,7%

PP-03

PERFORMED CROSS-MATCH AND ACTUALIZED TRANSFUSION RATES ACCORDING TO THE REQUEST OF OPERATING ROOM

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AIM: In preoperative arrangement period, many redundant blood and blood products could be requested by surgeons to feel safe and /or in peroperative period under abnormal bleeding conditions. It caused to increase cross-match numbers. In this study we aimed to evaluate cross – match and actualised transfusion rates to maintain rationale blood utilisation.

MATERIALS & METHODS: Between 01.08.2019-01.01.2020 in Kosuyolu High Specialization Training and Research Hospital Transfusion Center, preoperative and peroperative demanded blood and blood products numbers, those which were used during surgery and returned to transfusion center after surgery were evaluated retrospectively. Records were obtained from Hospital Information Management System and transfusion monitoring forms.

RESULTS: All of the blood and blood products usage preoperative and peroperative demanded (n: 4765) and returned to transfusion center after surgery (n: 1711) were %35. %68 of fresh frozen plasma (FFP), %67 of pooled platelet (PP), %62 of concentrate red blood cell(CRBC), %60 of whole blood (WB) and %41 of cryoprecipitate were returned to transfusion center without usage. In table 1, cross-match/transfusion rates for WB and CRBC were calculated as 2,6.

CONCLUSION: Sufficient and rationale blood utilization is the first rule of Patient Blood Management. We found that our cross-match to transfusion rates were 2,6 because of the overmuch demands of blood and blood products. As a quality indicator, this rate should be monitoring and preferred to maintain under 2. To provide optimal rate, we have attempted " Maximum Surgery Blood Demand Chart" constitution.

KEYWORDS: Blood Utilization, Cross-Match, Maximum Surgery Blood Demand Chart

Table 1.

	1 st Month		2nd Month		3rd Month		4th Month		5th Month		Cross-match/ Transfusion
	Demanded	Utilized	Demanded	Utilized	Demanded	Utilized	Demanded	Utilized	Demanded	Utilized	
CRBC	529	230	467	158	562	301	668	385	498	208	2,61
WB	34	16	19	7	25	13	26	9	13	2	
TOTAL	563	246	486	165	587	314	692	394	511	208	

Table 2: Cross-match and transfusion rates

PP-04

EFFECTIVENESS OF MEASURES FOR REDUCING THE DISPOSAL OF ERYTHROCYTE SUSPENSIONS DUE TO THE EXCESS OF EXPIRATION DATE

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AIM: Transfusion centres are responsible for keeping blood and blood components in sufficient number according to hospital needs. An analysis was made in Denizli State Hospital in 2018 according to the causes of disposals; In the study, it was observed that the most common cause of disposals of erythrocyte suspensions was the excess of expiration date. In this study, we aimed to ensure the efficient use of erythrocyte suspensions in 2019 and reduce the rate of disposals.

MATERIALS & METHODS: The number of blood components, the number of blood component disposals and causes of blood component disposals, held by Denizli State Hospital Transfusion Center in 2018 and 2019, were examined. It was determined that the rate of disposal of erythrocyte suspensions was high due to excess of expiration date. The decisions taken at the previous meetings by the Transfusion Committee and the Hemovigilance Unit were evaluated. Solution-oriented decisions were made by making improvements. The duration of the blood reserved for the patients has been reduced from three days (72 hours) to two days (48 hours). The blood components reserve duration, whose indication of use didn't die out, was extended for two more days by contacting the services. -Color warning system was installed on the screens of the Hospital Information Management system of the patients whose erythrocyte suspension reserve period exceeded 48 hours. - Except for specificial cases, it was acted in accordance with the principle of "first entering first, exit" in the reserve cabinet in the blood center. In addition to critical stock levels, minimum and maximum stock levels were determined. Care was taken not to exceed the maximum stock level determined for each blood group. - The blood components in the sub-districts with more than 15 days of expiry date was accepted according to the stock status of the Transfusion Center. Those which were less than 15 days were not accepted.

RESULTS: In 2018, the number of erythrocyte suspension disposal was 111. When the distribution according to the reasons was examined, it was seen that the most disposals due to excess of expiration date were in 97 pieces of erythrocyte suspension. The number of disposal of erythrocyte suspension was 95 in 2019 and its distribution according to the causes of disposal was examined, it was again determined as 84 pieces of erythrocyte suspension due to the excess of expiration date. The most transfused blood component in 2018 is 12213 pieces of Erythrocyte Suspension (ES) and 0.9% of them were destroyed. In 2019, the most transfused blood component was 13061 pieces of Erythrocyte Suspension (ES) and 0.8% of them were destroyed.

CONCLUSION: In order to reduce the rates of disposal of blood and blood products, it is necessary to focus on the causes of disposal and offer solutions. It was determined that the most disposals were in erythrocyte suspension due to the excess of expiration date and measures have been taken against this. The precautions taken were effective in the reduction of the Erythrocyte Suspensions rate of 2019.

KEYWORDS: Erythrocyte Suspension, Excess of Expiration Date, Transfusion Center

2018-2019 ERYTHROCYTE SUSPENSIONS DATA

	NUMBER OF COMPONENT DISPOSAL	TRANSFUSION NUMBER	DISPOSAL RATE %	REASON FOR DISPOSAL (EXCESS OF EXPIRATION DATE	TRANSFUSION NUMBER	DISPOSAL RATE%
2018	111	12213	0,90	97	12213	0,78
2019	95	13061	0,72	84	13061	0,63

PP-05

PREGNANCY AND THROMBOPHILIA – CASE REPORT

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AIM: Thrombophilia is a complex situations, with multiple mutations gone mutations of coagulation. This condition in pregnant women display physiologic hypercoagulation condition with an increased risk of thromboembolism during pregnancy and after delivery.

MATERIALS & METHODS: Case report: There is a case display of a pregnant woman and long life complications due to thrombophilia.

RESULTS: A case of 45 years old woman, with unexpected pulmonary emboli (PE), after diagnosis of as Thrombophlebitis superphicialis, of v. Saphena magna, 5 days ago. In her past history, she had v. Femoralis thrombosis, after 10 days of normal delivery 23 years ago. Test for thrombophilia revealed ATIII deficieny She was treated with Sintrom 4mg (Vit-K antagonist) for a long period till developing colleterals without any recurrens of thrombosis. Thereafter she was continued therapy with aspirin 100mg/day. The PE was treated with high doses of LMWH and Vit -K antagonist. She was completely rehabilitated after 6 months. Further on ordinated by a long term therapy of Xarelto (Riviroxaban) 20 mg tablets/daily.

CONCLUSION: Thromboembolism risk is increased with pregnancy in hereditary thrombophilia patients, Increased suspectibility to thrombosis during pregnancy in thrombophilic patients causes placenta malfunctions, recurrent abortions, fetus mortus and women's veins thromboembolism. There is no need of primary long life-long therapy in patients with asymptomatic individual with one or dual mutations (Martinelli 2000), but anticoagulation prophylaxis patients is recommended for patients with recurrent thromboembolic attacks, in hereditary thrombophilia.

KEYWORDS: Anticoagulation, LMWH, Pregnancy, Rivirixaban, Thrombiphilia, Thromboembolism

PP-06

EVALUATION OF TRANSFUSION REACTIONS AT KOCAELI STATE HOSPITAL

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AIM: Undesirable response in a patient related to the administration of blood or blood products is considered as a transfusion reaction. The faster these reactions are identified in clinics, the more likely the patient will survive. The main objective of this study is to investigate the transfusion reactions reported in our hospital within the last two years and contribute to the training of the health personnel by the Hemovigilance Unit about safe transfusion and possible reactions.

MATERIALS & METHODS: Records that were submitted to the Hemovigilance Unit of Kocaeli State Hospital Blood Transfusion Center were analyzed retrospectively and reactions reported in 2018 and 2019 were evaluated. When a reaction occurs in any clinic, our blood center is immediately informed and the transfused component along with the set, patient blood samples, transfer reaction and treatment forms are sent to Transfusion Center.

RESULTS: In 2018 and 2019, a total of 17332 transfusions were applied in Kocaeli State Hospital. Transfusion reactions were reported for 22 (0.13%) cases. Reactions are shown in Table 1 according to coding given in "2016 National Hemovigilance Guideline". Five of the reactions have been reported from internal medicine, three from general surgery, four from orthopedics, two each from chest diseases, oncology and intensive care units, one each from cardiology, palliative, urology and infection services. Allergic reaction (A3) is the most commonly seen reaction followed by febrile non-hemolytic transfusion reaction (A2). On the other hand, acute hemolytic transfusion reaction (A1) is reported to be the most serious reaction reported by internal medicine. The reaction was due to absence of ID confirmation by the service nurses. Fortunately, the reaction was promptly identified and thus did not cause mortality.

CONCLUSION: The number of reactions reported in our hospital, which approximately performs 9000 units of transfusion per year, is found to be very low. Early identification and follow-up are very important in reducing mortality rates related to transfusion reactions. Therefore, training was provided to all clinical nurses on authentication, second nurse control and safe transfusion. Transfusion Committee decided not to perform transfusions outside working hours except very urgent cases. Employees were told not to abstain from reporting transfusion reactions. Every simple mistake has a potential to cause greater mistakes. With this philosophy, necessary training is planned to prevent or minimize wrong practices.

KEYWORDS: Hemovigilance, Reaction, Transfusion

Table 1 - Types of transfusion reaction

	# of units transfused	A3	A2	A1	A6	X	Total
Erythrocyte suspension (ES)	11542	4	4	1	1	2	12
Fresh frozen plasma (FFP)	4719	9	-	-	-	1	10
Platelet suspension (PS)	1057	-	-	-	-	-	-
Total	17332	13	4	1	1	3	22

A1: Acute hemolytic transfusion reaction, A2: Febrile non-hemolytic transfusion reaction A3: Allergic reaction, A6: Transfusion associated circulatory overload, X: Unidentified transfusion reaction

PP-07

BLOOD TRANSFUSION REACTIONS KNOWLEDGE LEVELS AND EFFECT OF EDUCATION IN PHYSICIANS AND NURSES WORKING IN OUR HOSPITAL

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AIM: This study was planned to determine Knowledge Levels of Blood Transfusion Reactions and the effect of education on knowledge levels of physicians and nurses working in Sureyyapaşa Chest Diseases and Chest Surgery Training and Research Hospital of Health Sciences University

MATERIALS & METHODS: All physicians and nurses working in Sureyyapasa Chest Diseases and Chest Surgery Training and Research Hospital participated in the study. The sample of the study consisted of 512 people who actively participated in the study and agreed to participate voluntarily in 2019. After obtaining the permission of the institution, a questionnaire form consisting of 15 questions was applied to the participants by researchers.. After the pre-test applied to the participants, a 1-hour in-service training program prepared by the hemovigilance nurse on blood transfusion reactions was conducted at the appropriate hour in the employees in their own clinics. One week after the training, the participants were given post-test. Data were evaluated by appropriate statistical methods.

RESULTS: 38.9% of the participants were between the ages of 25-30, 67.2% were women and 53.5% were graduates. Health workers participating in the study who know more than half of the 13 problem were divided into two groups as true and false. 30.4% of the nurses gave the correct answer to the first test, 46% gave the correct answer to the last test. While 38% of the physicians gave the correct answer to the first test, this ratio increased to 90.4% and 30.4% of the surgical physicians gave the correct answer in the first test, all 20 surgical physicians participating in the final test gave the correct answer. The percentage of correct answers to all questions in the study increased significantly after training.

CONCLUSION: One hour training on blood transfusion reactions given by hemovigilance nurse increased the knowledge level of physicians and nurses about blood transfusion reactions. Blood transfusion reactions should be included in the mandatory in-service training plans of health personnel and the information should be kept up to date.

KEYWORDS: Blood Transfusion Reactions, Effect Of Education, Nurse, Physician

PP-08

REVISION SUGGESTIONS IN THE PROCESS OF RECALLING BLOOD COMPONENTS

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AIM: According to National Hemovigilance Guide (2016)in article 2.4"Recall: If there is a hazard situation which threatens the safety of transfusion, then, blood components which are potential hazards and not used yet are recalled by the supplier". Turkish Red Crescent recall the blood components with the "Blood Component Recall Form". In the same date if the blood component is transfused, it is requested to reach the patient to be transfused and to perform the tests and follow-up of these patients. All the positive or negative findings are recorded and the conditions that should be followed-up with suspicion of window period was recorded with "Adverse Event Notification Form". "Adverse Event Confirmation Form" is sent the latest. At this study,it was aimed to research how much of the recalled blood components that were recalled from Turkish Red Crescent according to article 2.4,and the rate of undesired events related to the recalled blood components were confirmed.

MATERIALS & METHODS: Between 1 January 2017 and 31 December 2019,forms that were"Blood Component Recall Form","Adverse Event Notification Form","Adverse Event Confirmation Form"were retrospectively evaluated.

RESULTS: In this study period,75925 units of blood components that were supplied from Turkish Red Crescent and 42(0.05%) units blood components were recalled.It was found that 33(76.7%) of the recalled blood components had shelf life before the recall date,27(62.7%) units of them were reported as adverse event and 8(19%) units were confirmed as adverse event (Table 1). All 8 blood components which were recalled with the suspicion of HBV infection's window period.One of them was destroyed,other 7 were transfused to patients.Three of patients who were transfused had positive Anti-HBs test result before the transfusion,two of transfused patients could not be reached because of they were being ex,2 of transfused patients could be reached and applied some tests, there was any infection due to transfusion was observed.

CONCLUSION: These forms, which are used in the process of tracing the donor to the patient have reached our hand on irregular dates, and sometimes do not reach, so that the correspondence can be made in electronic environment can provide a more healthy follow-up. When recall process begins, in the same date, recalling only blood components that have still shelf life, may prevent unnecessary correspondence and time waste. If adverse events are confirmed, then these blood components' patients should be studied if there are any transfusion originated infection. By doing this, it would prevent patients and their relatives.

KEYWORDS: Adverse Event, Adverse Event Confirmation, Recalling, Shelf Life

Shelf life of the recalled blood components and adverse event confirmation result information

Blood component shelf life information	Adverse event notification and confirmation result notification		2017	2018	2019	Total
Recalled blood components whom shelf life is expired (33 units)	Events that are sent as a result of confirmation (25 units)	unconfirmed	11	4	2	17
		confirmed	2	3	3	8
	Events that are not sent as a result of confirmation*		-	4	4	8
Recalled blood components whom shelf life is not expired yet (9 units)	Events that are sent as a result of confirmation (4 units)	unconfirmed	3	-	1	4
		confirmed	-	-	-	-
	Events that are not sent as a result of confirmation*		2	-	3	5

*Just arranged the Blood Component Recall Form

PP-09

EVALUATION OF ADVERSE REACTIONS FOR FOUR YEARS

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AIM: According to National Hemovigilance Guide(2016) states that the number of adverse reactions and incidents occurring within a given time period and the critical problems in the relevant process should be calculated and the incidence of the adverse events to be established and operated in order to ensure traceability of the blood components (article4.1). Adverse reactions are classified that as common reactions (minor allergic reactions:1-3% and febrile non-hemolytic transfusion reaction: 0.1-1%), relatively common reactions (transfusion-associated circulatory overload: <1% and transfusion-related acute lung injury:<0.01%), relatively rare reactions (anaphylaxis:1/20000-1/50000, acute hemolytic transfusion reaction:1/76000 and sepsis:1/50000 for platelets, 1/5000000 for red blood cells), frequency too rare(hypotensive transfusion reaction, air embolism, non-immune hemolysis). At this study we aimed to determine the incidence of transfusion-related adverse reactions in our hospital on the basis of components and reactions.

MATERIALS & METHODS: Between 1 January 2016 and 31 December 2019 forms that were "Annual Notification Form of Transfusion Associated Adverse Reaction" were retrospectively evaluated. The data were evaluated separately for the periods before (2016-2017) and after (2018-2019) hemovigilance nurses started to work.

RESULTS: Minor allergic reactions that caused by plasma proteins in the blood components and febrile non-hemolytic transfusion reactions most commonly have been reported. Turkish Red Crescent since the end of 2016, the transition to an in-line leukocyte filter bag system has been less frequent in the last two years than in the first two years. After hemovigilance nurses started to work, the recognition and reporting of reactions were doubled and the recognition and reporting of the most common minor allergic reactions increased threefold compared to the previous period (Table 1).

CONCLUSION: In our hospital, the most frequent minor allergic reaction was reported before and after hemovigilance nurses started to work. It is thought that the recognition of adverse reaction will increased by the effective hemovigilance system.

KEYWORDS: Adverse Reactions, Blood Components, Incidence

Adverse reactions (2016-2017/2018-2019)

Adverse reactions	Blood component	2016-2017		2018-2019	
		Number	%	Number	%
Minor allergic reaction	Fresh frozen plasma (FFP)	7	0.04	18	0.13
	Red blood cell (RBCs)	7	0.02	6	0.01
	Aphaeresis platelets	1	0.05	7	0.41
	Random donor pooled platelets	-	-	1	0.07
Febrile non-hemolytic transfusion reaction (FNHTR)	Red blood cell (RBCs)	10	0.03	6	0.01
	Aphaeresis platelets	-	-	2	0.11
Transfusion-associated circulatory overload (TACO)	Red blood cell (RBCs)	-	-	1	-
Transfusion-associated dyspnea (TAD)	Red blood cell (RBCs)	-	-	2	-
Total		25	0.04	43	0.08

PP-10

EVALUATION OF THE EFFECTS OF HEMOVIGILANCE SYSTEM ON ADVERSE EVENTS

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AIM: Adverse events occur after erroneous or incomplete applications in the collection, testing, preparation, storage, distribution and transfusion of blood components. It may or may not result in an adverse reaction in a transfusion recipient. Hemovigilance system was established in our hospital in 2018.Hemovigilance nurses work for organization of training about "transfusion safety" in all clinics. At this study, it was aimed to compare the number of adverse events in 2018 and 2019 in our hospital and to investigate whether the hemovigilance system contributed to the reduction of adverse events.

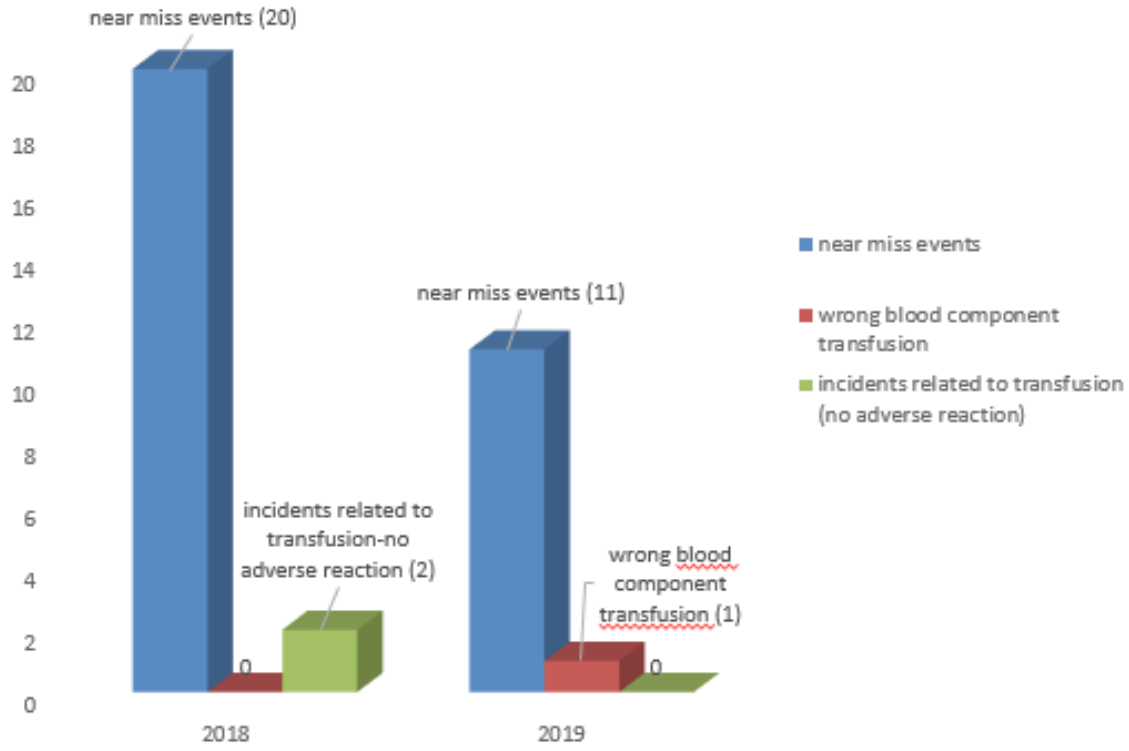
MATERIALS & METHODS: Between 1 January 2018 and 31 December 2019 the adverse events records and training practice records on transfusion safety were retrospectively evaluated.

RESULTS: In 2018, practices have been provided to 284 nurses and technicians in 33 clinics. Also in 2019, 89 nurses and technicians in 15 clinics were included to the practices. The numbers of transfused blood components were 24719 and 24886 units in 2018 and 2019 respectively. In 2019, the number of adverse events decreased by 50% compared to 2018. In both years, all adverse events were" near miss events". Patient blood sample labeling and patient identification errors were most common types of near miss events (Graph 1).

CONCLUSION: The number of adverse events may be further reduced by continuing the training practices and by analyzing the causes of near miss events by necessary revising the system.

KEYWORDS: Blood Sample Labeling, Erroneous Applications, Near Miss, Transfusion Safety

Adverse events (2018-2019)



PP-11

THE EFFECTS OF HEMOVIGILANCE SYSTEM ON AWARENESS OF HEALTH WORKERS AND SAFE TRANSFUSION; ONE CENTER EXPERIENCE

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AIM: We aimed to investigate the contribution of hemovigilance system to awareness and safe transfusion by comparing data such as notifications of transfusion reactions, reaction times and actual sections between the years of 2018-2019 when hemovigilance system was applicable and 2016-2017 when it was not applicable.

MATERIALS & METHODS: Before and after hemovigilance applications, transfusion follow-up forms and adverse reaction notification forms were evaluated retrospectively. Number and percentage calculation method have been used on the evaluation of the data.

RESULTS: A total of 68,250 units of blood and blood products were used in our center in 2016-2017 and 31 reactions were reported. 18(58%) of these reactions occurred during working hours and 13(42%) of them occurred outside working hours. 80.6% of the reported reactions in 2016 and 2017 were from internal medicine departments and 19.4% were from surgical departments. No reaction has been notified from Pediatrics Department. In 2018 and 2019, a total of 63,982 units of blood and blood products were used and 89 reactions has been reported. 65(73%) of these reactions occurred during working hours and 24(27%) of them occurred outside working hours. 79.8% of the reported reactions in 2018 and 2019 were from internal medicine departments and 13.5% were from surgical departments. 6.7% of the reports came from Pediatrics Department.

CONCLUSION: When the data is been compared; It has been detemined that there is a significant increase in the number of reaction notifications and reporting units and the variety of reaction types although the number of transfusions decreased. It has been thought that 128 hemovigilance trainings were given to 1369 health personnel in our center contributed to this situation positively. All healthcare personnel have been informed through these trainings about the importance of usage of blood safely, mortality and morbidity might be reduced in case of the rapid identification and treatment of reactions and no criminal action would be taken in case of a reaction notification. Awareness of hemovigilance has been increased by the continuous field trainings which has been done by hemovigilance nurses.

KEYWORDS: Hemovigilance, Safe Transfusion, Transfusion Reactions

PP-12

REPORT NUMBER OF ADVERSE REACTIONS AND ADVERSE EVENTS IN BURSA AND BURSA ULUDAG UNIVERSITY FACULTY OF MEDICINE

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AIM: Evaluate the reported numbers of adverse reactions (AR) and adverse events (AE) which occurred in 2018 and 2019 in our city (Bursa) and the hospital of Bursa Uludag University Faculty of Medicine (BUUFM).

MATERIALS & METHODS: Data were obtained from the hemovigilance system records of both Bursa Provincial Health Directorate (BPHD) and BUUFM

RESULTS: Twelve percent of transfusions which were performed in one year in Bursa (~400.000) have been made in BUUFM (~48.000) (Table-1). Report rates in 2018 was 0,096% for our hospital and 0,034% for all Bursa region including ours. These reports were 146/100.000 and 29/100.000 in 2019, respectively. Other hospitals did not report any AE in 2019. Al reports was from our hospital (Table-2). Also, the reports of AR and AE increased in 2019 compared with 2018 in our hospital (Table-2). But in Bursa, AR reports did not change, but AE's decreased. "The regional hemovigilance workshop" (RHWS) was organized by BPHD in October 2019 in Bursa. All hemovigilance coordinators and nurses of the Southern Marmara Region were invited and educated about the hemovigilance system (approximately 160 people). The "before & after" evaluation has shown that the report numbers increased from 23 to 50 for 100.000 transfusions after this workshop (Table-3).

CONCLUSION: Report/transfusion ratios are an important indicator of the hemovigilance system. Increased numbers and ratios of our reports might be associated with our training/education programs and corrective-preventive actions. These results have also shown that awareness about ARs, AEs and the hemovigilance system increased in our hospital. Training/education programs of other hospitals in Bursa are not well known. Increased reports and ratios after RHWS have shown that training is an important tool to establish and develop the hemovigilance system. For that reason, every hospital should prepare their educational activity and corrective-preventive actions to achieve the best transfusion safety.

KEYWORDS: Adverse Event, Adverse Reaction, Reports, Transfusion

Table-1: Transfused blood component numbers and percentages

		ES	FFP	TS	WB	GS	Cryo.	Total
2018	TBC (Bursa)	254.209	105.876	37.070	525	18	1.383	399.081
	TBC (Hospital)	23.053	14.948	9.299	243	6	402	47.951
	%	9,1%	14,1%	25,1%	46,3%	33,3%	29,1%	12,0%
2019	TBC (Bursa)	252.908	107.113	35.720	271	137	1.139	397.288
	TBC (Hospital)	21.826	16.747	8.239	215	33	267	47.327
	%	8,6%	15,6%	23,1%	79,3%	24,1%	23,4%	11,9%

(n) Number, (TBC) Transfused Blood Components, (ES) Erythrocyte Suspension, (TS) Thrombocyte Suspension, (FFP) Fresh Frozen Plasma, (WB) Whole Blood, (GS) Granulocyte suspension, (Cryo) Cryoprecipitate, (GS) Granulocyte suspension, (Cryo) Cryoprecipitate.

Table-2: Report numbers and percentages

Years	Reports	Hospital	Bursa
2018	TBC (n)	47.951	399.081
	AR (n)	26	94
	AR (%)	0,054%	0,024%
	AE (n)	20	41
	AE (%)	0,042%	0,010%
	Total (n)	46	135
	Total (%)	0,096%	0,034%
2019	TBC (n)	47.327	397.288
	AR (n)	40	87
	AR (%)	0,085%	0,022%
	AE (n)	29	29
	AE (%)	0,061%	0,007%
	Total (n)	69	116
	Total (%)	0,146%	0,029%

(n) Number, (TBC) Transfused Blood Component
(AR) Adverse Reaction, (AE) Advers event

Table-3: "Before & after" evaluation after RHWS

(n)	Total	Before	After
AR & AE	114	74	40
Transfusion	397.288	317.830	79.458
Report	0,029%	0,023%	0,050%

(AR) Adverse Reaction, (AE) Advers event

PP-13

ANALYSIS OF ALLERGIC TRANSFUSION REACTIONS IN BURSA ULUDAĞ UNIVERSITY SCHOOL OF MEDICINE IN 2018-2019

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AIM: The aim of this study was to evaluate the allergic reactions seen in our hospital and to investigate the relationship between these reactions and patient blood group, age, gender, and donors.

MATERIALS & METHODS: All data were analyzed retrospectively from the hospital information system, hemovigilance system, blood center records and blood center archive.

RESULTS: A total of 35 allergic reactions were seen in our hospital in 2018-2019. 32 mild allergic reactions (MAR) associated with 29 patients and 35 components; 3 anaphylactic reactions (AR) associated with 3 patients and 3 components (Table-1). In 2018, two patients had two MARs, while in 2019 one patient had both MAR and AR. One of the patients who experienced MAR twice in 2018 experienced MAR once more in 2019. MAR was most commonly associated with apheresis thrombocyte suspensions (aTS) (Table-2). MARs were found to be most common in patients with blood group O Rh (+) (48,3%), women (65,5%), especially O Rh (+) women (34,5%). When these rates were compared with the blood group distribution in Turkey, the ratio of those with blood group O Rh (+) among MAR patients was found to be 1,7 times higher than the population (Table-3). It was found that the blood groups of three reported AR patients were A Rh (+) and two of them were male and one was female. The mean age of patients with allergic reactions, the mean storage day of transfused erythrocyte suspensions (ES), fresh frozen plasma (FFP), aTSs and pooled TSs (pTS) are summarised in Table-4. The donor questionnaire forms (DQF) of 56 blood donors who donated 38 blood components causing an allergic reaction and the other blood components donated by the same donor were examined (Table-5). The donor information of a pPS causing MAR and an ES causing AR from Regional Blood Center (RBC) could not be reached. No findings were seen in DQFs about allergies. In addition, no allergic reactions have been reported in any patient due to the transfusion of 115 other components from the same donors.

CONCLUSION: High rates of O Rh (+) in patients with MAR and A Rh (+) in AR patients may be significant. There was no correlation between those reactions and patient age, sex, and donors. Since our data is scarce, analysis with a bigger series for more years will valuable.

KEYWORDS: Allergic Reactions, Blood Groups, Transfusion

Table-1: Allergic reactions

	Years	Reaction Number	Components Number	Patients Number
Mild Allergic Reactions	**2018**	19	22*	17**
	2019	13	13	12**
	TOTAL	**32**	**35***	**29****
Anaphylactic Reactions	**2018**	0	0	0
	2019	3	3	3***
	TOTAL	**3**	**3**	**3*****
Total Allergic Reactions	**2018**	**19**	**22***	**17****
	2019	**16**	**16**	**14**/*****
	TOTAL	**35**	**38***	**31**/*****

* Reactions were related more than one component

** In the same patient, more than one MARs were seen at different times

*** In the same patient, both MAR and AR were seen in 2019

Table-2: Blood components, patients and allergic reantions

		Reaction Number	Allergic Reaction Rate Per Blood Component (1/100.000)	Allergic Reaction Rate Per Patient (1/100.000)
Mild Allergic Reactions	Erythrocyte Suspension (ES)	11	24,5	92,9
	Fresh Frozen Plasma (FFP)	11	34,7	269,3
	Apher. Thromb. Susp. (aTS)	5	68,8	333,6
	Pooled Thromb. Susp. (pTS)	5	51,6	273,7
	TOTAL	**32**	**36,2**	**173,9**
Anaphylactic Reactions	Erythrocyte Suspension (ES)	1	2,2	8,4
	Fresh Frozen Plasma (FFP)	1	3,2	24,5
	Apher. Thromb. Susp. (aTS)			
	Pooled Thromb. Susp. (pTS)	1	10,3	54,7
	TOTAL	**3**	**3,4**	**16,3**
Total Allergic Reactions	Erythrocyte Suspension (ES)	12	26,7	101,3
	Fresh Frozen Plasma (FFP)	12	37,9	293,8
	Apher. Thromb. Susp. (aTS)	5	68,8	333,6
	Pooled Thromb. Susp. (pTS)	6	61,9	328,4
	TOTAL	**35**	**39,6**	**190,3**

Table-3: Relationship between MARs and patient gender and blood groups

Blood Groups	Group O		Group A		Gr0up B		Group AB		Total (%)
	Rh (+)	Rh (-)	Rh (+)	Rh (-)	Rh (+)	Rh (-)	Rh (+)	Rh (-)	
Female	10 **34,5%**	1 3,4%	2 6,9%	1 3,4%	3 10,3%	1 3,4%	1 3,4%	-	**19** **(65,5%)**
Male	4 13,8%	-	2 6,9%	1 3,4%	2 6,9%	-	1 3,4%	-	**10** **(34,5%)**
Total	**14** **48,3%**	**1** **3,4%**	**4** **13,8%**	**2** **6,9%**	**5** **17,2%**	**1** **3,4%**	**2** **6,9%**	-	**29** **(100%)**
General Population (GP)	5.352 **28,5%**	946 **5,0%**	7.275 **38,8%**	1.041 **5,6%**	2.413 **12,9%**	372 **2,0%**	1.174 **6,3%**	175 **0,9%**	18.748 **100,0%**
Total/GP	**1,69**	**0,68**	**0,36**	**1,24**	**1,34**	**1,74**	**1,10**	-	

Table-4: Age of patients with allergic reactions and storage days of transfused blood components

		Mean Age (Year)	Mean ES Age (Day)	Mean FFP Age (Day)	Mean aTS Age (Day)	Mean pTS Age (Day)
Female		33,3	4,3	44,8	2,0	0,8
Male		28,4	2,0	32,5	2,0	0,3
Total		30,9	3,8	38,7	2,0	0,8
Mild Allergic Reactions	O Rh (+)		2,8	37,0	2,0	0,5
	A Rh (+)			16,0	2,0	
	B Rh (+)		2,0	19,0	2,0	0,0
	AB Rh (+)			11,0		
	0 Rh (-)			141,0		
	A Rh (-)		9,0	94,0		
	B Rh (-)		9,0			
Anaphylactic Reactions	A Rh (+)		3,0	25,0		3,0

Table-5: Blood components

Causing MAR and AR	Blood Components Number	Blood Donors Number	Other Components of Donors
ES*	10	10	37
Paediatric ES	2	2	7
FFP	14	14	34
aTS	5	5	10
pTS*/**	6	24	27
Total	**38**	**56**	**115**

* ES and pPS information could not be obtained from Regional Blood Center.
** pPSs consist of four random PS.

PP-14

EVALUATION OF COMPLIANCE WITH BLOOD TRANSFUSION PROCESSES

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AIM: Blood transfusion which is a life saving application should be performed in a safe way. All processes must be properly performed for safe blood transfusion. In this study, follow-up forms of transfusions in the internal diseases unit, where the transfusions were applied frequently, were examined by the haemovigilance unit and it was checked whether or not the transfusion starting times after exiting the blood transfusion center and transfusion durations were proper. It is aimed to detect and correct errors in the transfusion process.

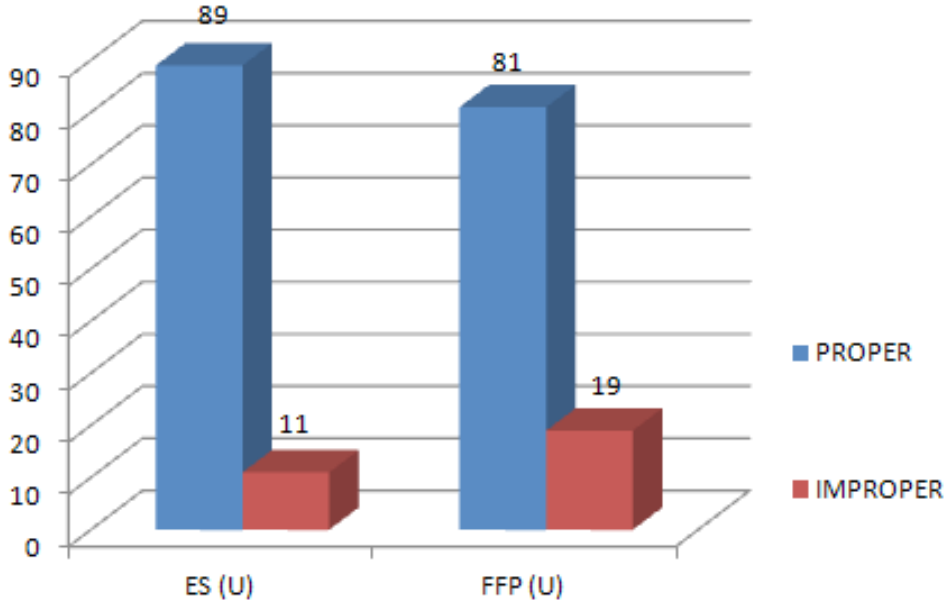
MATERIALS & METHODS: The transfusion follow-up forms of the haemovigilance system blood modüle (HSK) for the year 2019 were examined by the haemovigilance unit of Haseki Training and Research Hospital. Randomly selected follow-up forms and processes of 100 units of erythrocyte and Fresh Frozen Plasma transfusions from the Internal Diseases department of our hospital, where transfusion rates are high, were included in the study.

RESULTS: It was found that 11 out of 100 transfusions were not performed according to the planned time. In 13 of erythrocyte transfusions, transfusion starting times were found to be over 30 minutes after leaving the blood transfusion center. It was seen that 36 units of Fresh Frozen Plasma (FFP) transfusions started more than 30 minutes after the plasma being thawed and 19 of the transfusion times were over 30 minutes. Five of the inproper FFP transfusions were completed in 90 minutes and the rest were completed in 60 minutes (Pictures 1 and 2). The absence of a healthcare professional's countersign who is double-checking the transfusion process was detected in 0.5% of the transfusion follow-up forms. All of the observed transfusions were completed without any problems.

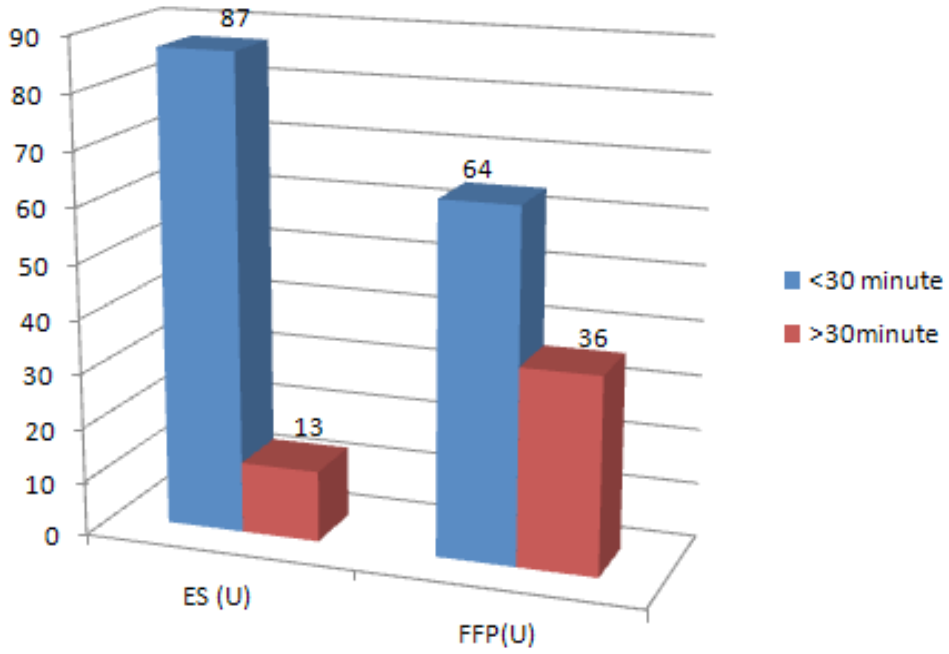
CONCLUSION: For the safety of transfusion, every stage of the blood product should be controlled and in compliance with the rules. Transfusion should begin within at most half an hour after the blood product exits the blood transfusion center. If transfusion is delayed for various reasons, blood product should be returned to the blood transfusion center to be kept in proper storage conditions. The knowledge level of proper transfusion timing and duration, especially of the physician of the patient and other healthcare professionals who are taking places in transfusion processes should be increased. Pre-transfusion trainings of the staff were planned by the haemovigilance unit about transfusion process and the double checking in transfusion applications to eliminate the deficiencies. at most half an hour

KEYWORDS: Compliance, Haemovigilance, Procesess, Transfusion

1. Proper of transfusion durations



2.Transfusion starting times



PP-15

INVESTIGATION OF BLOOD AND BLOOD PRODUCT USAGE AND DESTRUCTION RATES IN UNIVERSITY OF HEALTH SCIENCES ISTANBUL MEHMET AKIF ERSOY THORACIC AND CARDIOVASCULAR SURGERY TRAINING AND RESEARCH HOSPITAL

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AIM: Blood transfusion is a life-saving attempt, but it should be noted that transfusion of blood and blood products is a process of tissue / organ transplantation. Proper clinical use of blood and blood products should be ensured and unnecessary transfusion should be avoided. Whether the patient needs real transfusion, how much to use from which product, what is the expected benefit and harm from transfusion, should be well evaluated before transfusion. Parallel to the high number of blood and blood products used in cardiac surgery, the number of destruction is also high. It is aimed to examine the usage and destruction numbers of blood and blood products, which are performed by the Transfusion Center in Istanbul Mehmet Akif Ersoy Chest and Cardiovascular Surgery Hospital, and to examine whether the improvements have decreased blood destruction levels.

MATERIALS & METHODS: In this study, the blood and blood products prepared, used and destroyed in 2016 and 2019 using the hospital database and the number of A group operations performed in our hospital were analyzed retrospectively. In 2016, the reasons for the destruction of blood and blood products have been determined in our hospital, and studies have been started to prevent destruction.

RESULTS: Table: Number of products used per surgery, usage and disposal rates of blood and blood products.

CONCLUSION: Following the determination of the causes, the measures were planned and implemented. As a result, the rate of blood destruction and the number of blood and blood products used per surgery were reduced from 2016 to 2019 through trainings, planning and close follow-up.

KEYWORDS: Blood and Blood Products, Destruction Rate, Rate of Use

Tablo örnek

YEARS	GROUP A SURGERY NUMBER	NUMBER OF OUTPUTS OF BLOOD AND BLOOD PRODUCTS	NUMBER AND RATIO OF BLOOD AND BLOOD PRODUCTS	NUMBER OF DISPOSAL AND RATE	AVERAGE PER SURGERY NUMBER OF BLOOD AND BLOOD PRODUCTS
2016	3422	19941	19497 (99,77 %)	444 (2,23 %)	5,70
2017	3945	16238	16038 (98,77 %)	200 (1,23 %)	4,07
2018	4116	17098	16881 (98,73 %)	217 (1,27 %)	4,10
2019	4368	17254	17078 (98, 98%)	176 (1,02 %)	3,90

Table: Number of products used per surgery, usage and disposal rates of blood and blood products.

PP-16

ANALYSIS ON DISCARD OF BLOOD AND ITS PRODUCTS WITH SUGGESTED POSSIBLE STRATEGIES TO REDUCE ITS OCCURRENCE

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AIM: Introduction and Aim: Pre-condition of Hemovigilance is "tracebility". Transfusion of every component taken from the donor, discard of unused components and to send back or inform the regional blood bank when unsafe situations found is essential in haemovigilance system

MATERIALS & METHODS: Method: Descriptive and retrospective study composition is made by used and discarded blood components period between 01 January 2015 to 31 December 2019. Datas picked up from hospital automation system retrospectively. Record of Transfusion Center's blood and blood components , discarded component details were obtained and calculated.

RESULTS: RESULTS: When the search blood and blood components from which were used in our hospital between years 2015 to 2019; in 2015 was 4859, in 2016 was 3676, in 2017 was 3097, in 2018 was 3197 and in 2019 was 4179 units as totally 19008 units of blood and blood components were used (Table 1). Before hemovigilance system implanted in our hospital in year 2015 totally 156 blood and in 2016, 147 blood products were discarded. After being more functional for hemovigilance system in the year of 2017 , 81 units , in 2018, 53 units and in the year of 2019 totaly 29 units of blood components were discarded (Table 2).

CONCLUSION: Conclusion: Hemovigiliance System is a team working as a well organized, more communicative and more collaborative Works leads to success. When we analyzed the discard of blood and blood component rates in our center repeatedly we see that the rates did noticeably diminished.. Decreasing of discard rates is reflecting the quality of a transfusion center and it is in our main quality indicators. Our target in 2020 is to reduce the discard rates of the blood components more. Fort hat we do continue the trainings about this topic in our hospital . Our transfusion centre's aim is to transfer the blood components immeadetly when needed and for to prevent the discard the storage stock levels will be evaluated more strictly and our transfer strategy will be alwasys as "first come in- first come out" for he following applications and we will evaluate the status more freqently in order to have agile transfusion policies.

KEYWORDS: Discard Rates of The Blood Components, Hemovigilance System, Tracebility, Transfusion Center

Table I. Use of blood components between 2015-2019

Years	Erythrocyte Suspension	Platelet Suspension (Pool)	Apheresis Platelet Suspension	Fresh Frozen Plasma	Cryoprecipitate	Whole Blood	Total
2015	2346	864	19	1597	1	32	4859
2016	2047	341	15	1239	28	6	3676
2017	2057	210	55	734	30	11	3097
2018	2047	203	25	861	57	4	3197
2019	2516	254	57	1232	119	1	4179
Total	11013	1872	171	5663	235	54	19008

Table II. Discarded blood components and reasons between 2015-2019

Years	Erythrocyte Suspension	Platelet Suspension (Pool)	Apheresis Platelet Suspension	Fresh Frozen Plasma	Cryo precipitate	Whole Blood	Total	Percentage
2015	Date of expiry: 62 Improper storage: 5 Bag Integrity Breakdown: 2	Date of expiry: 79	Date of expiry: 2	Improper storage: 1 Bag Integrity Breakdown: 2		Date of expiry: 2 Bag Integrity Breakdown: 1	156	3,2%
2016	Date of expiry: 82 Improper storage: 5	Date of expiry: 37		Bag Integrity Breakdown: 15 Improper storage: 6	Bag Integrity Breakdown: 1Bag Integrity Breakdown: 1	Date of expiry: 1	147	3,99%
2017	Date of expiry: 52 Improper storage: 2 Bag Integrity Breakdown: 2	Date of expiry: 12	Date of expiry: 3	Bag Integrity Breakdown: 3	Bag Integrity Breakdown: 1	Date of expiry: 1	81	2,6%
2018	Date of expiry: 31 Improper storage: 4 Bag Integrity Breakdown: 1	Date of expiry: 13	Date of expiry: 2	Bag Integrity Breakdown: 1		Date of expiry: 1	53	1,65%
2019	Date of expiry: 13 Bag Integrity Breakdown: 3	Date of expiry: 7 Improper storage: 1	Date of expiry: 2	Date of expiry: 1 Bag Integrity Breakdown:2			29	0,69%
Total	264	149	9	31	2	11	466	2,45%

PP-17

CONTRIBUTION OF HEALTH INFORMATION MANAGEMENT SYSTEMS (HIMS) TO DIGITAL TRANSFUSION MONITORING FORM

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AIM: With Health Information Management System (HIMS), it was aimed to prevent labor loss by saving time and to increase the effectiveness of the hemovigilance unit in filling and evaluation of blood components transfusion and follow-up forms.

MATERIALS & METHODS: When the patient's transfusion follow-up form was opened in the digital media, the patient information, the component number of the given blood, ABO Rh group were automatically opened on the screen and these informations were entered manually by the service nurses and it was aimed to prevent possible errors and save time. In addition, the conversion of the blood components released from the transfusion center to the transfusion was prevented before the transfusion start and end times were entered. Filling out the transfusion follow-up forms through the system made it easier for service nurses more attentive and careful, while the control and follow-up of the transfusion follow-up forms by the hemovigilance unit were carried out faster and included all patients. The importance of transfusion follow-up form and hemovigilance has been further emphasized by increasing awareness of hemovigilance and transfusion follow-up form by adding training slides, pre-test and final test questions to the hospital education system by the training unit of our hospital.

RESULTS: According to the National Guidelines for Hemovigilance, published in 2016, "transfusions should be monitored by filling out relevant forms for blood and blood products transfusion." In 2018, 15.799 blood products were transfused at the hospital. The Hemovigilance Unit established in May 2018 identified deficiencies in 23.8% of the 9.403 transfusion follow-up forms after the training was provided to the medical staff. Our hospital, which consists of 40 services and 8 intensive care units, was worked in coordination with the information processing unit in order to make the follow-up faster and more regular in 2019. After the changes were made in the digital form, all services were trained and the digital hemovigilance system was introduced to 40 services and 2 intensive care units. In 2019, a total of 16.452 blood products were transfused in our hospital. Although there was a 4% increase in the number of transfusions compared to the previous year, the deficiency rate in transfusion follow-up forms fell to 2% (Table 1).

CONCLUSION: The hemovigilance unit closely monitors all processes from the donor stage of the blood components to the transfusion of the patient. In places such as Denizli State Hospital where the number of transfusions are high, the fact that the data of all processes related to transfusion can be entered and tracked in digital media has not only facilitated the completion of follow-up forms, but also saved time and workload.

KEYWORDS: Computing, Education, Hemovigilance

Table 1. Deficiencies identified in transfusion follow-up forms

Number Of Blood Transfusions In 2018 15.799	Blood Transfusion Count For 2019 16.452
Deficiencies In Transfusion Follow-Up Form %23.89	Deficiencies In Transfusion Follow-Up Form %2- %1
Most Missing Episodes	Most Missing Episodes
Blood Type	Physician Signatures
Product Component Number	
Component Type	
Physician Signatures	
Start Time	
Termination Time	
Amount of Transfused Component	

PP-18

RETROSPECTIVE ANALYSIS OF SEVEN YEARS OF TRANSFUSION RELATED REACTIONS: SINGLE CENTER EXPERIENCE

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AIM: Hemovigilance is a series of monitoring procedures that cover the entire transfusion chain, from the collection and processing of blood and blood components to transfusion and follow-up to the recipient, and aim to collect, evaluate and prevent repetition of adverse events and reactions. In this study, we aimed to evaluate the adverse reactions associated with transfusion that developed in our hospital within 7 years.

MATERIALS & METHODS: In Sıtkı Koçman University Faculty of Medicine Education and Research Hospital, the reports of adverse reactions related to transfusions of blood components, which were made to the hospital hemovigilance unit between 01.01.2013-31.12.2019, were analyzed retrospectively.

RESULTS: A total of 106,355 blood / blood component transfusions were performed in our hospital in 7 years. Blood / blood components used 68866 (64.7%) erythrocyte suspension, 28083 (26.4%) fresh frozen plasma, 3465 (3.2%) apheresis platelet suspension, 5664 (5.3%) pooled platelet suspension, 114 (0.1%) whole blood was distributed as 163 (0.1%) cryoprecipitate. A total of 82 transfusion-related adverse reactions have been reported, with an incidence of 0.77 / 1000 blood components. All unwanted reactions were acute and there were no delayed reaction reports. Among the blood / blood component types, the most common transfusion reaction was detected in apheresis platelets (n: 4, 0.11%). Undesirable reaction was detected in 0.1% (n: 71) of erythrocyte transfusions. No reaction was observed in pooled platelets, cryoprecipitate and whole blood transfusions. Among the transfusion-related types of adverse reactions, mild allergic reaction was the most common (n: 60, 73.2%). This includes febrile non-hemolytic transfusion reaction (n: 12, 14.6%), anaphylactic reaction (n: 4, 4.9%) and unspecified transfusion reaction (n: 4, 4.9%), TRALI (n: 1, 1.2%) and transfusion-related sepsis (n: 1, 1.2%). No reaction causing death was observed.

CONCLUSION: Allergic transfusion reactions range from urticaria to life-threatening anaphylaxis. Most of them are mild allergic reactions and are seen with a frequency of 1-3% (1-2). In our study, the most frequent mild allergic reaction was observed and its incidence (0.57 / 1000 blood component) is below global data. The incidence of anaphylaxis is 1: 20000-1: 50000 transfusions worldwide and our results support this data. The incidence of FNHTR is reported to be 0.1% to 1% worldwide. However, in our study, the incidence of FNHTR was found to be 0.11 / 1000 transfusions. In addition, it should be aimed to increase transfusion safety by providing continuous hemovilance training to all healthcare professionals. References 1. Delaney M, Wendel S, Bercovitz RS, et al. Transfusion reactions: prevention, diagnosis, and treatment. Lancet 2016; 388(10061):2825-36. 2. Mazzei CA, Popovsky MA, Kopko PM. Noninfectious complications of blood transfusion. Fung MK, Grossman BJ, Hillyer CD, Westhoff CM, editors. Technical Manual 18th ed. AABB; 2014.p.667,678-679.

KEYWORDS: Allergic Reaction, Hemovijilans, Transfusion

Table 1

		ES		FFP		AP		PP		WB		Cryo		Total	
		Rx	N	Rx	N	Rx	N	Rx	N	Rx	N	Rx	N	Rx	N
2013	A2	1	7303	0	2598	0	98	0	613	0	12	0	0	6	10624
	A3	2		0		0		0		0		0			
	A4	3		0		0		0		0		0			
	A5	0		0		0		0		0		0			
	A9	0		0		0		0		0		0			
	X	0		0		0		0		0		0			
2014	A2	3	7532	0	2135	0	124	0	404	0	15	0	0	13	10210
	A3	6		0		0		0		0		0			
	A4	0		0		0		0		0		0			
	A5	0		0		0		0		0		0			
	A9	0		0		0		0		0		0			
	X	4		0		0		0		0		0			
2015	A2	3	9053	0	3463	0	348	0	607	0	1	0	0	17	13472
	A3	13		0		1		0		0		0			
	A4	0		0		0		0		0		0			
	A5	0		0		0		0		0		0			
	A9	0		0		0		0		0		0			
	X	0		0		0		0		0		0			
2016	A2	3	9987	0	4507	0	770	0	1100	0	4	0	0	16	16368
	A3	12		0		0		0		0		0			
	A4	0		0		0		0		0		0			
	A5	0		0		0		0		0		0			
	A9	1		0		0		0		0		0			
	X	0		0		0		0		0		0			
2017	A2	0	9454	0	3685	0	547	0	407	0	5	0	1	7	14099
	A3	3		2		1		0		0		0			
	A4	0		0		0		0		0		0			
	A5	0		1		0		0		0		0			
	A9	0		0		0		0		0		0			
	X	0		0		0		0		0		0			
2018	A2	1	12130	0	5564	0	743	0	1135	0	5	0	56	10	19633
	A3	7		0		2		0		0		0			
	A4	0		0		0		0		0		0			
	A5	0		0		0		0		0		0			
	A9	0		0		0		0		0		0			
	X	0		0		0		0		0		0			
2019	A2	1	13407	0	6131	0	835	0	1398	0	72	0	106	13	21949
	A3	7		4		0		0		0		0			
	A4	1		0		0		0		0		0			
	A5	0		0		0		0		0		0			
	A9	0		0		0		0		0		0			
	X	0		0		0		0		0		0			
Total		71	68866	7	28083	4	3465	0	5664	0	114	0	163	**82**	**106355**

ES: Erythrocyte suspension, FFP: fresh frozen plasma, AP: Apheresis platelet, PP: Pooled platelet, WB: Whole blood, Cryo: Cryoprecipitate, Rx: Number of adverse reactions associated with transfusion

Number of Transfusions and Transfusion Reactions on the Basis of Blood and Blood Products by Years

Table 2

Reaction Type	Number of patients (%)	incidence (every 1000 blood components)
Early Reactions	82 (100%)	0,77
A2 Febril Non-Hemolytic Transfusion Reaction (FNHTR)	12 (14,6%)	0,11
A3 Mild Allergic Reaction	60 (73,2%)	0,56
A4 Anaphylactic Reaction	4 (4,9%)	0,04
A5 TRALI	1 (1,2%)	0,01
A9 Transfusion Related Sepsis	1 (1,2%)	0,01
Undefined Transfusion Reaction (X)	4 (4,9%)	0,04
Late Reactions	0	0

Distribution of Transfusion Related Reactions in Patients by Reaction Type

PP-19

ANALYSIS OF BLOOD AND BLOOD PRODUCTS DISPOSAL CAUSES IN LAST ONE YEAR IN ANKARA EDUCATION AND RESEARCH HOSPITAL

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AIM: The duties of the transfusion centers include performing blood and blood components transfusion procedures by standard procedures and preventing blood wastage by ensuring the efficient use of blood components. In this study, the rates and causes of disposal in our hospital in the last year were analyzed retrospectively.

MATERIALS & METHODS: In our hospital, the disposal rates for 2019 were retrospectively analyzed. The number and causes of disposal in the first six months and the second six months are compared.

RESULTS: When the distribution of disposal reasons for blood and blood components was examined in 6 months periods of 2019, it was found that the total number of disposal in the first 6-month period was 161. It was observed that the highest number of disposal was 59 (37%) which was due to expiration. In the second row, there were 57 (36%) abandonment of transfusions. In the second 6-month period, a total of 96 disposals were detected. Of these, 23 (30%) were expired and 49 (51%) were abandoned. The total number of disposal in 2019 was 257; 62.7% of these were in the first 6 months and 37.3% in the second. The number of blood components which were disposed of due to abandonment was 107 and expiration was 82. It was determined that 54 (51%) of the abandoned blood components were TDP and 37 (35%) were pooled platelets. All the expired blood components were red blood cells.

CONCLUSION: To reduce the blood and blood component disposal rates, the reasons for destruction should be determined and solutions should be offered. Good planning of stock management, accurate determination of the critical stock level and reporting to the regional blood center will ensure the effective use of blood components. Requesting platelets just before the usage, canceling the reserves by contacting the clinic if indication has disappeared, and providing courses on blood component requests, usage and storage, safe transfusion rules, will be effective in the reduction of destruction rates.

KEYWORDS: Adverse Event, Adverse Reaction, Haemovigilance, Transfusion Reaction

PP-20

WHAT CAN IMPLEMENTATION OF HAEMOVIGILANCE SYSTEM CHANGE IN A HEALTHCARE FACILITY?

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AIM: Haemovigilance system is a preventive approach for patients and transfusion safety that requires to set up according to legal regulation in healthcare facilities. In this system nurses have many responsibilities about knowing all steps and implementing correctly. In this study we aimed to evaluate with regard to "2016 National Haemovigilance Guide " to determinate the circumstance of clinical transfusion practices and importance of safe blood implementation.

MATERIALS & METHODS: In 2018 IV. period (three months each) Kartal Koşuyolu High Specialization Training and Research Hospital Haemovigilance Team was established. According to the team's observation and audit based on active surveillance, an inservice training about "Haemovigilance and Safe Blood Transfusion " was given to all clinical staff implementing transfusion. Before and after training 10 open-end and 8 multiple-choice tests were performed to all participants.

RESULTS: Among 337 participants %16 (n:54) were male and %84 (n:283) were female. Mean age was 34 ± 7,5. Table 1 shows storage conditions, identity authentication/labelling, transfusion practices/steps and reactions rates of pre and posttests' correct answers. Both in pre and posttest the highest correct answers' rates obtained from identity authentication / labelling by %89 (n:299) and %95 (n:323) respectively. In pretest the lowest correct answers'rate obtained from storage conditions by %53 (n: 178) but after training it increased to %89 (n:299). During 2019, bedside and inservice trainings were maintained periodically. Team also monitored all transfusion practices and checklist forms to evaluate both efficacy of trainings and process running. Data improvements were considered significant after setting up the team.

CONCLUSION: Haemovigilance contains all undesired events and reactions occured in any steps of transfusion chain and recipient. Besides this, the main goal is to enhance safety of transfusion by preventing the repetition of undesired events and reactions. In our center,after establishing the haemovigilance team accordance to procedures and increment of awareness and knowledge were provided in a short time.

KEYWORDS: Education, Haemovigilance, Knowledge and Attitude

Table 1.

Questions	Pretest correct answers (n)	Posttest correct answers (n)
Storage conditions	%53 (178)	%89 (299)
Identity authentication/labelling	%89 (299)	%95 (323)
Transfusion practices/steps	%69 (232)	%80 (269)
Reactions	%59 (198)	%75 (189)

Questions and correct answers in pre-posttests

PP-21

ABO BLOOD TYPE AND PEDIATRIC ACUTE RESPIRATORY DISTRESS SYNDROME

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AIM: Pediatric Acute Respiratory Distress Syndrome (PARDS) is an acute-onset and progressive hypoxic condition caused by direct injury to the lung (e.g., pneumonia and gastric aspiration) or indirect injury (e.g., sepsis, trauma and pancreatitis). Blood type A has been associated with increased risk of endothelial in?ammation. In the present study, we wanted to determine the relationship of ABO blood types with ARDS in children.

MATERIALS & METHODS: Total of 22 children (aged 1 month to 18 years old) diagnosed with PARDS and 11 of non-ARDS cases were included in this study in between April 2016 and April 2017. Patients were fulfilled the PALICC definition for PARDS and intubated. The PARDS definition included: 1) hypoxemia with oxygenation index (OI) ykrk314 or oxygenation saturation index (OSI) ykrk315; 2) new radiological lung infiltrates; 3) occurred within 7 days of a known clinical insult; and 4) not explained by cardiac failure or fluid overload. ABO blood type was determined by standard RBC typing performed for clinical purposes before the receipt of transfused blood products. The ABO blood type was collected from blood bank records, allowing patients to be classi?ed as blood type A, B, AB, and O.

RESULTS: Twenty two patients with PARDS (9 girls, 13 boys) and 11 non-ARDS, control group (5 girls, 6 boys) were included in the study. The mean age in PARDS and control group were 88,8±76,8 and 102,5±76,3 months, respectively. While pneumonia (13 of 22 patients, 59,0%) was the most common pulmonary reason of PARDS, aspiration was seen in that of 3 (13,6%) cases. Trauma and sepsis were recorded in that of one (4,6%), and 5 (22,8%) patients, respectively as extrapulmonary causes. Blood type A, B, AB, and O were detected in 12, 5, 1 and 4 patients with ARDS, respectively. The degree of hypoxemia was noted as 2 mild, 5 moderate and 5 severe hypoxemia in PARDS children with blood type A.

CONCLUSION: Blood type A was associated with increased risk of ARDS in critically ill patients. It should be investigated the association between pathogenesis of ARDS and ABO blood type.

KEYWORDS: ARDS, Blood Type, Children, Pulmonary

PP-22

THE IMPORTANCE OF DAT POSITIVITY IN ERYTHROCYTE SUSPENSIONS SENT BY THE RED CRESCENT IN CROSSMATCH INCOMPATIBILITY

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AIM: The test which is performed to show coating of the antigens found on erythrocyte surfaces with specific antibodies in the body (sensitization) is called direct coombs test (DAT). It has a single stage. It is used to investigate alloimmunization reactions related to autoimmune hemolytic anemia (AIHA), drug-related hemolysis, hemolytic disease of the newborn (HDN) and recent blood transfusion. This study was conducted to evaluate the DAT results of erythrocyte suspensions sent from the Red Crescent to Istanbul Medeniyet University Göztepe Education and Research Hospital, and to specify its importance in crossmatch incompatibility.

MATERIALS & METHODS: Samples were obtained from erythrocyte suspensions which were sent from the Red Crescent to Istanbul Medeniyet University Göztepe Education and Research Hospital in a one-month period between November 15, 2019 and December 15, 2019, placed in tubes with purple caps containing EDTA, were studied using gel centrifugation method (OrthoClinicalDiagnostics), and the results obtained were reported.

RESULTS: DAT was found to be positive in 3 (1%) of 300 erythrocyte suspensions sent to our hospital from the red crescent and included in our study (Table 1). In this one-month period, a total of 2437 crossmatch tests were performed in our hospital and the result was found to be incompatible in 25 of these tests (1,02%). The reason for 3 of these 25 incompatible results was the fact that bag erythrocyte was DAT positive. In other words, the reason for crossmatch incompatibility in our hospital was presence of antibodies in bag erythrocyte in 12% of the cases.

CONCLUSION: DAT gives positive result with a rate of 10% in patients and with a rate of 1/1000-1/10000 in blood donors. When we evaluated our results, we found a high positivity rate of 1%. We thought that this could have been arised from the low number of samples. The Crossmatch test is only one of the compatibility tests performed before transfusion. The crossmatch test is a preliminary test performed in tube for antigen-antibody reaction that could occur during transfusion and it is the final step of compatibility tests. This study was presented to emphasize that DAT positivity in bag erythrocytes should also be tested while investigating the reasons, if the test is not found compatible.

KEYWORDS: Crossmatch, DAT, Red Crescent Erythrocyte Suspension

PP-23

THE RELATIONSHIP BETWEEN ABO BLOOD GROUP ANTIGENS EXPRESSION AND DISEASE PROGRESSION IN AN ACUTE MYELOID LEUKEMIA PATIENT

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AIM: ABO blood group antigens are clinically important because they are highly immunogenic, and because they are inherited, they usually do not change throughout life. In some malignant diseases, especially hematologic malignancies, It is reported that decrease or loss of ABO blood group antigens can be seen. This antigen exchange situation may cause problems in blood group detection or transfusion planning. The aim of this study was to investigate ABO antigen changes during the course of the disease in a patient with AML and to evaluate the relationship between these changes and disease progression.

MATERIALS & METHODS: ABO typing was studied by gel centrifugation method with automated devices by using gel cards with "AcrossGel Forward&Reverse ABO with DVI-/DVI+" configuration.

RESULTS: A 69-year-old male patient admitted to the our hospital due to dyspnea was diagnosed with AML with standard risk in terms of cytogenetic and with showing dysplasia characteristics. At the time of diagnosis, the bone marrow blast counts was 20% and in the first detection of blood group, double populations in A antigen were observed. After 7 cycles of decitabine treatment, it has been identified that the expression of A antigen was lost in the blood group test. Because of the progression of the disease and the blast counts in the bone marrow was 48%, 5-azacytidine treatment was initiated and after 4 cycles of treatment, a double population was detected in the A antigen in the blood group. After 8 cycles of 5-azacytidine treatment, all cells in the peripheral smear were seen as blasts and it was determined that expression of A antigen was lost in the repeated blood group. Venetoclax was added to 5-azacytidine treatment because of resistant disease. At the fourth month of venetoclax treatment, it was detected that A antigen showed +4 agglutination in the patient's blood group. But the patient died due to disease progression. During this period, 40 units of A Rh(+) and 6 units of O Rh(+) erythrocyte suspension were transfused to the patient.

CONCLUSION: Changes in A antigen expression were observed throughout treatment process in our patient with AML. During the course of the disease, changes in expression of ABO antigen could not be correlated with disease activity since the patient had no remission. In this study, we wanted to draw attention to the blood group changes in patients with hematological malignancy such as AML, in order to ensure the transfusion of the correct product.

KEYWORDS: AML, Antigen, Antibody, Blood Group

PP-24

EXAMINATION OF HEMOGRAM VALUES ACCORDING TO ABO AND RH BLOOD GROUP SYSTEMS IN HEALTHY INDIVIDUALS: THE SAMPLE OF ANTALYA TRAINING AND RESEARCH HOSPITAL

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AIM: The relationship between blood groups and diseases continuous to be investigated with increasing interest and expanding scope. The relationship between blood groups and infectious diseases, cardiovascular diseases and cancers are most frequently investigated. In our study, we aimed to investigate whether there is a difference between the blood groups in terms of hemogram values in healthy individuals.

MATERIALS & METHODS: Blood group data and hemogram values of the donors who were admitted to the transfusion center of our hospital between 01.01.2013 and 01.09.2019 were analyzed retrospectively. The donor list registered in the system was rebuilt according to the ID numbers and the data of the repeated donations were excluded from the analysis. Hemogram values of the donors white blood cell (WBC), hemoglobine (HGB), hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), platelet (PLT) and mean platelet volume (MPV) were compared in terms of blood groups of Rh and ABO. Comparisons were made separately in the male and the female groups. SPSS 25 statistical package program was used in the comparison. $p< 0.05$ was considered as significant.

RESULTS: The data of 10335 (95.10 %) males and 532 (4.90 %) females were used in the study. The age range of the subjects was 37.38 ± 9.52. RBC, HGB, HCT and MCHC values in males and RBC values in females were significantly higher in B blood group than A, AB and O blood groups (p=0.000). MCV and MCH values in males were significantly lower in the B blood group than the A, AB and O blood groups (p=0.000). While MCV and MCH values in men and PLT values in women were significantly higher in O blood group than non-O blood groups (p=0.000, p=0.000, p=0.007 respectively), RBC and MPV values were significantly lower in men (p=0.000, p=0.046 respectively). PLT value in men was significantly higher in Rh+ blood group than Rh– blood group (p=0.000). No difference terms of hemogram values were found between Rh blood groups in womens (p>0.05).

CONCLUSION: The comparison of the obtained data were made in their physiological limits. Extensive studies are needed to determine whether detected differences are considered physiological differences or whether they are important for predispozition for some diseases.

KEYWORDS: ABO Blood Groups, Hemogram Values, Rh Blood Group

PP-25

OUR ABO/RH BLOOD TYPE PROFILE: A TERTIARY HEALTHCARE DATA

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AIM: It is one of transfusion centers' chief duties to perform immunohematologic tests of patients for whom transfusion is planned. Success of transfusion is dependent on these pre-transfusion compatibility tests. One of these compatibility tests determines the antigens D (in Rh system), A and B on the surface of erythrocytes of donors and recipients. In our study, we aimed to determine our hospitals blood type data by investigating the distribution of blood types among patients we chose from the samples our transfusion center recieved for blood type testing.

MATERIALS & METHODS: Through our hospital database, we examined the distribution of blood types of patients that applied to out hospital between january and december 2019. Blood types were tested by gel centrifugation method (Across gel, DiaPro Medical Prodaucts, Turkey) both manually and by automated systems.

RESULTS: In our studies time frame, 30.645 patients blood types have been assessed. Total percentage of Rh(+) bloods was 89% and percentage of Rh(-) bloods was 11%. All blood type percentages were; A Rh(+) 38%, 0 Rh(+) 29%, B Rh(+) 15%, AB Rh(+) 7%, A Rh(-) 5%, B Rh(-) 2%, 0 Rh(-) 3%, AB Rh(-) 1% (see Table 1).

CONCLUSION: Our blood type profile is consistent with literature and other studies conducted in our country. Our hospital provides healthcare to all Eagean Area, so we want to emphasize that our data would be a considerable contribution to the national database and would be valuable for stock tracing.

KEYWORDS: ABO Blood Types, Immunohaematologic Tests, Rhd Blood Types

Patients' Blood Type Distribution

Table 1: Patients' Blood Type Distribution

		Amount	%
A	Rh(+)	11.580	38
	Rh(-)	1.533	5
B	Rh(+)	4.753	15
	Rh(-)	537	2
O	Rh(+)	8.884	29
	Rh(-)	1.107	3
AB	Rh(+)	2.201	7
	Rh(-)	230	1
Total Rh	Rh(+)	27.238	89
	Rh(-)	3.407	11
Total		30.645	100

Patients' Blood Type Distribution

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Total Rh	Rh(+)	27.238	89
	Rh(-)	3.407	11
Total		30.645	100

PP-26

DETERMINATION OF KELL SUBGROUPS IN THALASSEMIA MAJOR PATIENTS

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AIM: Thalassemias are hereditary blood disorders characterized by the reduced or suppressed synthesis of the globin chains of hemoglobin. They are classified according to the impaired globin chains resulting in variable phenotypes ranging from severe anemia to clinically asymptomatic individuals. Patients with severe anemia are required frequent blood transfusions. It is difficult to find appropriate Rh subgroups in these transfusions. In this study, we aimed to determine the blood subgroups to be applied in the absence of appropriate subgroups for thalassemia patients followed up in our hospital.

MATERIALS & METHODS: Rh subgroups of beta-thalassemia major patients who were followed up in the pediatric hematology out-patient clinic of Diyarbakır Children's Hospital in the last 5 years were evaluated retrospectively. Subgroup analysis was studied by the gel system withAcrossautosystemocto-m (Turkey).

RESULTS: Of the patients included in the study, 71 (44.09%) were female and 90 (55.9%) were male. Subgroups are performed at first admission to our clinic. The study revealed that all 161 patients were Kell 1 negative.

CONCLUSION: Red cell alloimmunization is a serious problem in chronically transfused patients. K (Kell 1) was reported as the most immunogenic antigen in previous studies. Kell 1 subgroup was found to be 9% and Kell 2 was found to be > 99% in the white race. Subgroup detection was performed in 161 thalassemia patients who were registered in our transfusion center and Kell 1 was detected in none of them. For our patients, our primary aim is to provide an appropriate Rh subgroup erythrocyte transfusion. However, subgroup appropriate blood may not be

accessible all the time. Transfusion of the red cell which is Kell 1 negative at the first admission to the hospital may be a guide for the development of a new algorithm. In the absence of an appropriate subgroup, it is important to select at least Kell 1 negative blood products for the prognosis of our patients.

KEYWORDS: Blood Transfusion, Kell, Thalassemia Major

PP-27

FOREIGN PATIENTS AND ABO/RH BLOOD TYPES

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AIM: The definiton of ABO blood types by Karl Landsteiner is a hallmark in transfusion practice. ABO and Rh system is the most clinically prominent blood type system. Blood type distribution may differ among various races and ethnic groups. Every year the number of refugees in our country increases and so does the share of healthcare services they recieve. These refugees are experiencing serious problems in basic healthcare, preventive measures and diagnosis and treatment services, thus knowledge of different blood type distributions originating from ethnic differences of these people is valuable for increasing the healhcare services they recieve. In our study, we assessed the distribution of blood types among foreign patients that applied to our hospital for treatment.

MATERIALS & METHODS: Through our hospital database, we examined the distribution of blood types of foreign patients that applied to out hospital between january and december 2019. Syrian patients were categorized seperately because they make up the vast majority of our foreign patients. Blood types were tested by gel centrifugation method (Across gel, DiaPro Medical Prodaucts, Turkey) both manually and by automated systems

RESULTS: In the time frame of our study, blood types of 30.645 patients were assessed. 3,4% of these (1038 patients) were foreigners. Among these foreigners 88% (918 patients) were Syrian. There were 125 non-Syrian foreign patients, who were from, in order; Azerbaijan, Turkmenistan, Morocco, Uzbekistan, Russia, Kyrgyzstan, Ukraine, İran, Georgia, Germany, Afghanistan, Bulgaria, Kazakhstan, Moldova, Greece, Lebanon, Netherlands, South African Republic, Algeria, Austria. The blood type distribution of Syrian patients, which make up the majority, is presented in Table 1.

CONCLUSION: Compared to our data from previous years, both Rh (+) and Rh (-) of A and B type values were increased by one point each, while O type was decreased. Total Rh (+) and Rh (-) values were unchanged.Data from studies conducted in southern provinces and our study showed Rh (+) blood type percentage to be just a few points higher than the national values. Considering that the blood type distribution of Syrian population is similar to our national values, we foresee that there won't be a lack of rare blood types for Syrian patients. However the overall increased demand for blood will cause a problem of insufficient donors and is an issue that needs to be addressed.

KEYWORDS: ABO/Rh Blood Type, Foreign, Immunohaematology, Syrian Patient

Syrian Patients' Blood Type Distribution

		Amount	%
A	**Rh(+)**	**310**	**34**
	Rh(-)	18	2
B	**Rh(+)**	**174**	**19**
	Rh(-)	23	3
O	**Rh(+)**	**286**	**31**
	Rh(-)	38	4
AB	**Rh(+)**	**54**	**6**
	Rh(-)	10	1
Total	**Rh(+)**	**824**	**90**
	Rh(-)	89	10
		913	**100**

PP-28

THE EFFECT OF IMMUNOGLOBULIN VALUES ON CROSS-MATCHING TEST IN MULTIPLE MYELOMA DISEASE

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AIM: Multiple myeloma (MM) is a disease characterized by the uncontrolled growth of monoclonal plasma cells in the bone marrow. Since the most common peripheral blood finding in multiple myeloma is anemia, blood transfusion plays an important role in the treatment of MM patients. Therefore, immunohematological tests before transfusion are of great importance in these patients. It is known that in patients with high levels of immunoglobulin and protein in their sera, such as MM patients, have problems with false-positive results in serological tests. The aim of this study was to investigate the effect of immunoglobulin values on cross-matching test in patients with multiple myeloma.

MATERIALS & METHODS: Cross-matching test, direct antiglobulin test and antibody screening were performed with automated devices by gel centrifugation method. The cross-matching test was performed by using gel cards with "Across Gel Cross Match" configuration and autocontrol, direct antiglobulin test "Across Gel Monospecific Direct Coombs (DAT)" configuration and antibody screening "Across Gel Neutral/Coombs" configuration.

RESULTS: A 64-year-old female patient and a 68-year-old male patient were followed-up for 1 year. The results of cross-matching tests performed when the patients needed erythrocyte transfusion were examined and this results evaluated by comparing with the immunoglobulin and total protein values simultaneously. In the first case, no compatibleness was detected in the cross-matching test during the examined period, but +1 and +2 agglutination was observed in direct proportion to the immunoglobulin and total protein values. In the second case, both compatibleness and +1 and +2 agglutination in direct proportion to the immunoglobulin and total protein values was detected in the cross-matching test.

CONCLUSION: In our study, it was found that as serum immunoglobulin and protein level increased, agglutination rate in cross-matching test increased. On the other hand, Daratumumab, the approved monoclonal antibody for the treatment of multiple myeloma, causes panagglutination in compatibility tests. This situation may lead to unnecessary additional tests and ultimately delay the delivery of blood products from the transfusion center. It is obvious that positive results of cross-matching and other immunohematological tests in MM patients should be evaluated correctly. In this study, it is predicted that highly important to immunohematology laboratory staff and clinical physicians are in constant communication and sharing some information about the patient with laboratory staff is essential in order to ensure the transfusion of the correct product to the patient.

KEYWORDS: Cross-Matching, False Positivity, İmmunoglobulin, Multiple Myeloma

PP-29

C, C, E, E, KELL SUBTYPES OF PATIENTS WITH WHOM NO SUITABLE BLOOD TYPES WERE FOUND

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AIM: Blood types have great clinical importance in transfusion and transplantation medicine. Most blood type's antibodies cause the destruction of transfused erythrocytes with surface antigens, which in turn cause haemolytic transfusion reactions, immediately or within days. At worst presence of these anhtibodies can lead to disseminated intravascular coagulation, kidney failure or death and at best they would decrease the efficiency of the transfusion. Compatibility tests are an important step towards identifying these antibodies. For cross-match incompatibilities, donor and recipient antigens must be identified. In our study, we investigated the results of C,c,E,e, Kell, Cw antigen tests performed to solve incompatibilities, and the clinical benefits of identifying these antigens.

MATERIALS & METHODS: ABO, cross-match, Rh subtype and Kell subtype tests performed in our transfusion center's immunohaemotology laboratory between January 2017 – December 2019 were examined. Test results of cases with no suitable blood types found were assessed. Patient samples are tested for ABO and RhD types, followed by complete cross match test against ABO, RhD compatible units. If the cross-match test is incompatible, Coombs and antibody identification tests are performed, determining the patient's Rh (DCcEe) and Kell (K) subtypes. Afterwards suitable blood product is procured from Kızılay Regional Blood Center, which is then complete cross-matched against Rh and Kell subtype compatible units and then given to the patient. Immunohaemotologic test were performed by gel centrifugation method (Across gel, DiaPro Medical Prodaucts, Turkey) both manually and by automated systems.

RESULTS: In the past 3 years, because of problems experienced in cross-matching, Rh and Kell subtypes could only be performed for 22 patients. Patients' blood type numbers are as follows; 8 A Rh(+), 2 A Rh(-), 1 A Rh Variant, 3 B Rh(+) ve 8 O Rh(+). Patients' antigen negativities are given in Table 1. See Table 2 for the number of requested antigen negative erythrocytes

CONCLUSION: In case of incompatibilities encountered in cross-matching of ABO and RhD compatible bloods, Rh and Kell subtype negative erythrocyte concentrate should be procured from Kızılay Regional Blood Center. If the regional center is unable to test for Rh and Kell subtypes, it is important to be in contact with another center that can perform the needed tests.

KEYWORDS: C, c, E, e subtypes, Rh subtype, Kell subtype, cross-match incompatibility

Patients' Antigen Negativities and Requested Antigen Negative Erythrocytes

Table.1 Patients' Antigen Negativities

Year	D	C	c	E	e	Cw	Kell
2017	-	-	1	3	-	6	5
2018	-	-	2	3	-	5	5
2019	2	5	1	7	2	12	12

Table.2 Requested Antigen Negative Erythrocytes

	Ce, Kell	E, Kell	cE, Kell	C, Kell	CE, Kell	Kell	CE	E
Number of Patients	2	6	4	1	1	7	1	1

PP-30

DEFINING THE VARIANTS OF ABO AND D BLOOD TYPES

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AIM: Blood type polymorphisms sometimes cause a drastic change ,making an entire macromolecule appear or disappear, while at other times they make a minor difference, changing only a single aminoacid or monosaccharide. This study aims to investigate detected ABO and Rh D variants.

MATERIALS & METHODS: This study was conducted between January 2017– December 2019. Blood types were tested by gel centrifugation method (Across gel, DiaPro Medical Products, Turkey), both manually and by automated systems and according to the manufacturer's instructions. We further assessed out of ordinary test results. For further assessment of ABO variants, patient erythrocytes were tested with anti-H and Anti-A1 antiserums (ALBAclone, Alba Biosicence, United Kingdom and Lorne Laboratories, United Kingdom) in neutral gel cards. For reverse assessment, an erythrocyte panel (Across gel, DiaPro Medical Products, Turkey) with four antigens (A1, A2, B, 0) was used. Wetested further for weak D confirmation when weak agglutinations were spotted inDVI+ and DVI- wells of blood type cards. For this, patient erythrocytes were incubated with anti-D antiserums (ALBAclone, Alba Biosicence, United Kingdom and Lorne Laboratories, United Kingdom) in AHG gel cards in 37°C for 15 minutes, followed by a serological assessment performed with blood type gel cards. In these assessments, if the agglutinations in DVI+ and DVI- wells differed from each other, the result is determined to be Rh D variant. Weak D test, as described above, was performed for samples with no agglutination in both anti-D wells (DVI+ and DVI-).

RESULTS: We have examined 101.485 patients' blood types in three years. In total 88% of these blood types were Rh (+) and %12 was Rh (-). ABO percentages were; 43% A, 17% B, %8 AB and 32% O. A total of 61 patients had variant blood types; 18 of these were ABO variant, while 43 were Rh variant. 14 patients were found to have A3 phenotypes, one had A3 phenotype and 3 patients phenotypes could not be identified because of insufficient sample amounts. Of the 43 RhD variants; 14 patients were found to be Variant D (DVIphenotype), 27 patients were Weak D phenotype and 2 patients' phenotypes could not be identified because of technical difficulties or insufficient sample amounts.

CONCLUSION: Identifying these phenotypes is crucial to prevent haemolytic transfusion reactions involving transfusions of these people. It is important to designate referencing centers in each province or have the hospitals make necessary arrangements, to detect ABO and RhD variants.

KEYWORDS: A3 Phenotype, ABO Variants, Dvıphenotype, D Variants, Variant D Phenotype, Weak D Phenotype

PP-31

ANNUAL BLOOD PRODUCT USAGE: 2019

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AIM: Determining the amount of blood products requested and used in our hospital has an important role in procuring blood products from Kızılay for our transfusion center, determining critical stock levels and keeping the amount of disposed of products to a minimum. In our study, we aimed to update our critical stock levels by determining the types of blood products transfused to our patients and the distribution of the blood types.

MATERIALS & METHODS: Our transfusion center's used blood product data between january – december 2019 was examined retrospectively through hospital automation system. At the end of 2019, our hospital newborn intensive care unit was opened. The blood used by this unit was ignored in our studies' calculations because the amount was too miniscule.

RESULTS: 36.204 blood products were used in a one year period. Of the products used; 62,2% was erythocyte suspension, 24,7% was fresh frozen plasma, 8,2% was pooled platelet suspension, 1,3% was apheresis platelet suspension and %3,6% was cryoprecipitate. Used blood products by their blood types were; 38,7% ARh(+), 4,2% A Rh(-), 16% B Rh(+), 4,4% B Rh(-), 5,9% AB Rh(+), 1% AB Rh(-), 26,5% O Rh(+), 3,3% O Rh(-). Apart from these, 11 irradiated infant erythrocyte suspensions and 3 infant apharesis suspensions were used. See Table 1 for used blood product percentages by blood types.

CONCLUSION: Diversity of blood products and distribution of these products by blood type in our hospital is enough to meet the hospital's blood product demand sufficiently and timely. During daily routine, it might seem like patients of certain blood types require blood products more frequently than others but our data suggests there is no change on a yearly basis. However required blood products might change. To keep track of changes in hospital blood product needs and to update critical stock levels are crucial to to make sure that blood and blood products are used effectively. We came to the conclusion that keeping these datas up to date is a must.

KEYWORDS: Blood Product, Erythrocyte Suspension, Fresh Frozen Plasma, Platelet Suspension

Used blood product percentages by blood types

	A +	A -	AB +	AB -	B +	B -	0 +	0 -
İRRADİATED POOLED	91	5	14		40	20	38	22
POOLED	1201	83	234	3	454	50	624	109
IRRADIATED APHERESIS	52		1		10	15	14	4
APHERESIS	149	20	20	4	58	4	87	12
IRRADIATED ERYTHROCYTES	123	2	9	3	44	22	69	15
LEUKOCYTE FILTERED ERYTHTOCYTE	8464	1048	1440	162	3473	354	6494	793
FRESH FROZEN PLASMA	3528	327	366	185	1289	1115	1956	185
CRYOPRECİPİTATE	401	28	53		448	12	302	42
DIVIDED IRRADIATED ERYTHROCYTE	4	6						1
INFANT APHERESIS	1	2						
TOTAL	14014	1521	2137	357	5816	1592	9584	1183

PP-32

EVALUATION OF SUBGROUP COMPATIBLE BLOOD PRODUCT TRANSFUSIONS IN A STATE OF CROSSMATCH INCOMPATIBILITY

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AIM: In blood transfusions alongside with the ABO major blood group mismatches, Rh subgroup mismatches also can cause crossmatch incompatibilities and transfusion reactions. In such cases transfusions can be performed by determining the patient's Rh subgroup and selecting the blood product which is compatible with the patient's Rh subgroup. In this study we investigated on the patients who underwent transfusions in a condition of patient-donor Rh subgroup compatibility when the crossmatch tests were incompatible and determined the prevalent Rh subgroup phenotypes.

MATERIALS & METHODS: Patients who underwent transfusions of blood products which were compatible with the patients' Rh subgroups when the crossmatch tests were incompatible were investigated by using the data from the test instrument and the Haemovigilance System Blood (HSK) module that has been developed by Haseki Training and Research Hospital Blood Transfusion Center.

RESULTS: 115 patients which 21 of them from neonatal intensive care unit, 3 of them from pediatric services and 91 of them were adults from several services were investigated and the range of their blood groups were shown in the Table 1. It was seen that the most common Rh Subgroup phenotypes by the percentage were Ccee(30%), CCee (24%), CcEe (21%), ccee (15%), ccEe (10%) and ccEE (1%) ; and the most common Rh subgroup antigens were e (97,4%) and c (74,8%). It was determined that the Kell antigen positiveness percentage of the patients were 4,3%. Prevalent Rh subgroup antigen positivenesses and negativenesses were summarized in the Table 2 and the Table 3. Distribution by the services of the patients who were given Rh subgroup compatible blood products were shown in Figure 1 and the most common Rh subgroup phenotypes were shown in Figure 2. There weren't any reaction reports of the patient-donor Rh subgroup compatible blood product transfusions and any problems about the

transfusion follow-up forms of those.

CONCLUSION: Finding a suitable blood product in crossmatch incompatibilities of patients from haematology and neonatal services is one of the major problems of the blood transfusion centers. Antibody screening and identification tests are time consuming tests that cannot be performed in all blood transfusion centers. It is concluded that in the need of transfusions to neonatal patients and patients with crossmatch incompatibilities, patient-donor Rh subgroup compatible blood products can be transfused by consulting with the Haematology unit.

KEYWORDS: Crossmatch, Subgroup, Transfusion

Figure 1: Most common Rh subgroup phenotypes

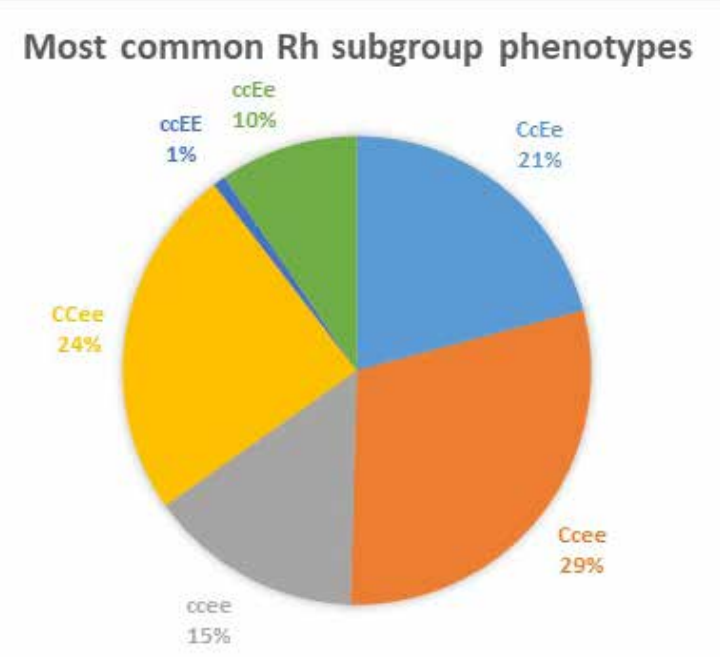

Figure 2: Distribution by the services of the patients who were given Rh subgroup compatible blood products

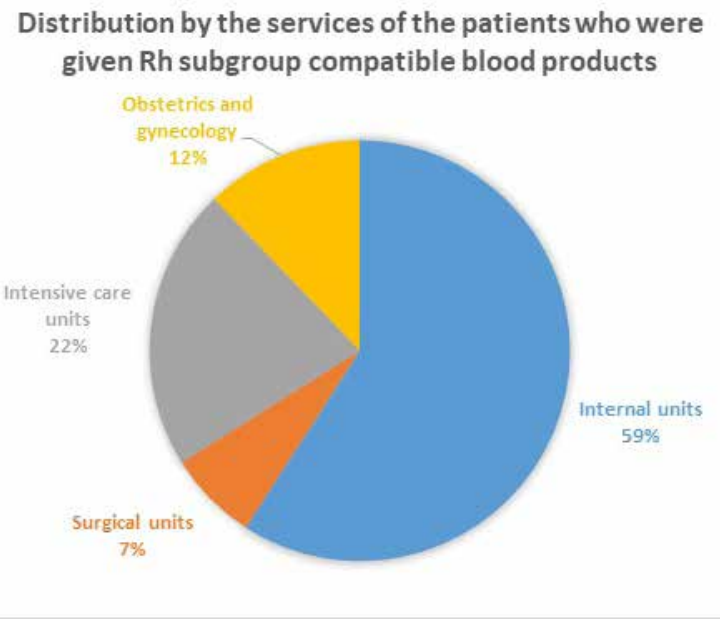

Table 1: ABO major blood group range of patients

	A	B	O	AB	TOTAL
Number of patients	60	17	32	6	115
%	52,2	14,8	27,8	5,2	100

Table 2: Prevalent antigen negativenesses seen together

	C,Kell	E,Kell	c,Kell	e,Kell	E,C,Kell	E,c,Kell	C,e,Kell	E	C	Kell	TOTAL
Number of patient	28	77	27	3	15	27	3	82	37	110	115
%	24,3	67,0	23,5	2,6	13,0	23,5	2,6	71,3	32,2	95,7	100

Table 3: Rh Subgroup antigen positivenesses range of patients

	D	C	E	c	e	Kell	TOTAL
Number of patients	97	78	33	86	112	5	115
%	84,3	67,8	28,7	74,8	97,4	4,3	100

PP-33

ANALYSIS OF BLOOD PRODUCT DISPOSALS

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AIM: Blood and blood products are, because of their cost and difficult production methods, very valuable and irreplacable medical products. It is among a transfusion center's duties to ensure safe and efficient transfusion of blood products as well as procuring and storing them. Blood products are prepared by "first in, first out" principle and proper workflow plans are extablished to reduce blood product disposals. In our study, we examined disposals that happened despite these precautions.

MATERIALS & METHODS: Used and disposed of blood product data of our transfusion center was studied retrospectively over both the hospital automation system and transfusion center records. Our hospital's newborn intensive care unit inaugarated at the end of 2019. Erythrocytes requested for newborns are procured as two products with the same product number, one of which is used and the other disposed of.

RESULTS: 36.204 blood products were used in a one year period. 903 blood products were disposed of in total. Our disposal percentage is 2,49%. Disposal percentages by product are; 52,7% platelet suspension, 26,4% fresh frozen plasma, 19,4% erythrocyte suspension, 1,3 infant (divided) erythrocyte suspension, 0,2% cryoprecipitate. All of cryoprecipitates, all of platelet suspensions and 15% of erythrocyte suspensions were disposed of in our center because they expired. 11% of fresh frozen plasma was disposed of in our center because of damaged pacakage. Rest of the disposals took place in clinics. Erythrocyte clinic disposals were done 2,7% because of patient exitu and 1,7% because transfusion was cancelled due to patient developing a fever. 11% of fresh frozen plasma clinic disposals were done because plasmapheresis is cancelled.

CONCLUSION: Our disposal rates were reduced by 0,3% compared to the year before. Half of our disposals were platelet suspensions, same as the year before. Because of our hospitals high amount of high risk patients, more careful product planning and more frequent communication with Aegean Regional Blood Center, where we procure our products, is necessary. Hospital's transfusion courses should be constantly repeated and cooperation with clinics should be increased to better diagnose transfusion indications.

KEYWORDS: Disposal Rates, Erythrocyte Suspension, Fresh Frozen Plasma, Platelet Suspension

PP-34

A STUDY OF DEPARTMENTS THAT USE BLOOD OFTEN AND THE PRODUCTS THEY USE

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AIM: Our hospital is an education and research hospital with 1150 beds evenly distributed between surgical and medical departments. It is significant to document the total amount and distribution of transfused components to plan the activities and goals of the center. For this purpose we analyzed departments that use blood products often and which products they used.

MATERIALS & METHODS: Data of blood products used in our transfusion center between January – December 2019 was studied retrospectively over the hospital automation system. Departments that used more than 1000 units of blood products were included in our study. Dperatments with less blood product consumption were not analyzed.

RESULTS: 36.204 blood products were used in a one year period. Of the products used; 62,2% were erythocyte suspension, 24,7% were fresh frozen plasma, 8,2% were pooled platelet suspension, 1,3% were apheresis platelet suspension and %3,6% were cryoprecipitate. See Table 1 for departments with more than 1000 units of blood product consumption and the products they used. All products were used most frequently by internal medicine, followed by cardiovascular surgery departments. Most used blood products by department were; platelet suspensions for hematology department, fresh frozen plasma for neurology department, and erythrocyte suspension fort he rest of the departments.

CONCLUSION: Our hospital has a high blood product consumption rate. We are constantly maintaining communication with frequent product using departments to be able to provide the products they need, This way, product needs can be met timely and thoroughly

KEYWORDS: Cryoprecipitate, Department of Cardiovascular Surgery, Department of Internal Medicine, Erythocyte Suspension, Fresh Frozen Plasma, Platelet Suspension

Departments With More Than 1000 Units Of Blood Product Consumption And The Products They Used

Departments	Erythocyte Suspension	Fresh Frozen Plasma	Platelet Suspension	Cryoprecipitate
Internal Medicine	3654	1535	815	454
Cardiovascular Surgery	2667	1214	518	251
Neurosurgery	1467	493	213	8
Medical Oncology	1453	2	222	-
Anesthesiology	1488	558	435	68
General Surgery	1599	769	78	75
Emergency Medicine	2413	266	98	1
Orthopedic Surgery	2281	193	6	-
Obstetrics and Gynecology	775	324	22	10
Hematology	466	469	547	57
Neurology	591	937	100	16

PP-35

CROSS-MATCH TRANSFUSION RATE AS AN INDICATOR OF TRANFUSION CENTER QUALITY

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AIM: Using blood products effectively and in correct amounts is important patient treatment. Not using the product after its cross-math test is done increases the cross-match cost, while not using blood products signed off for a patient increases the number of product disposals. And since 2018, number of cross-match tests per product transfused is beeing used as a measure of quality. In out study, we aim to demonstrate our cross-match test and transfusion numbers.

MATERIALS & METHODS: This data for this study was taken from records between January – December 2019. Our transfusion center's records were manually scanned for data because hospital database date was not reliable. Cross-math number/transfused product number*100 formula was used to calculate the results. Blood type and cross-match test were performed by gel centrifugation method (Across gel, DiaPro Medical Prodaucts, Turkey) both manually and by automated systems.

RESULTS: In the time frame of our study, 31.355 cross-match tests and 22.526 transfusions were performed. Cross-match/transfusion rate were calculated to be 1,39. See Table 1 for cross-match/transfusion rates by months.

CONCLUSION: Our annual cross-match/transfusion rates were higher than most hospitals. Using cross-match/transfusion rate as a quality indicator would reduce unnecessary cross-match tests thus benefit greatly to decrease transfusion costs. Clinics and transfusion centers must coordinate together to ensure this system works.

KEYWORDS: Cross-Match, Cross-Match/Transfusion Rate, Transfusion, Quality Indicators

Cross-Match/Transfusion Rates by Months.

Months	Cross-matches	Transfusions	Cross-match/transfusion rates
January	2.789	1.910	1,46
February	2.613	1.841	1,42
March	3.135	2.254	1,39
April	2.746	1.984	1,38
May	2.629	1.980	1,32
June	2.186	1.622	1,34
July	2.516	1.868	1,34
August	2.190	1.592	1,37
September	2.527	1.776	1,42
October	2.605	1.833	1,42
November	2.850	1.970	1,45
December	2.569	1.896	1,35
Total	**31.355**	**22.526**	**1,39**

PP-36

THE ISOHEMAGGLUTININ TITERS OF BLOOD BANK DONORS: THE EXPERIENCE OF ISTANBUL FACULTY OF MEDICINE

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AIM: In this study, we investigated both the isohemagglutinin titer values of the individuals with A,B and O blood groups and the distribution of these titers between decades and gender. In addition to this, we examined the probability of the ability to define an accurate isohemagglutinin cut off level for Turkish society

MATERIALS & METHODS: One thousand five randomly chosen volunteer 1005 blood donors(48 female,957 male),fulfilled the criteria to be a standard blood donor in Blood Center Department of İstanbul Faculty of Medicine were accepted to the study.The study was approved by the Ethics Committee of Istanbul Faculty of Medicine. Blood donors with 335 A, 335 B and 335 O blood groups were included in the study. Forward and reverse blood group determination were performed to the donors in order to identify the Anti-B IgM and IgG isohemagglutinin titer values for blood group A, Anti-A IgM and IgG titer values for blood group B and also Anti-A IgM/IgG and Ani-B IgM/IgG titer values for blood group O subsequently by using column agglutination methods. Statistical analyses were enforced with NCSS.

RESULTS: While the titer value of Anti-A IgM isohemagglutinin was 1:128 for female individuals with blood group B; the titer values of both Anti-B IgM (1:128 and 1:256) , Anti-B IgG (1:1024) and Anti-A IgM (1:256) isohemagglutinins were statistically significiance in female individuals. There was no statistical difference in anti-B IgG and IgM titers in blood group A, anti-A IgG and IgM titers in blood group B and anti-A IgG and IgM titers in blood group O between males and females($p>0.05$). However Anti-B IgG and IgM antibody titers were higher in females than males in donors with blood group O respectively $p=0,017$ ($p<0,05$) and $p= 0.001$ ($p<0,01$) (Figure 1 A,B).

CONCLUSION: Female individuals of blood bank donors participated in our study demonstrated increased isohemagglutinin titer values rather than male ones. As a result; gender appears to play a key role in the elevated isohemagglutinin titer values of individuals. At the same time nutrition, vaccination and past history of recurrent blood transfusion among blood bank donors may have an effect on these titer values. Consequently; owing to the observation of the utility of patients-undergoing HSCT and having been administered multiple ABO incompatible transfusions-in the recent literatures, we foresee that population spesific isohemagglutinin titers would be of a great interest in further years and isohemagglutinin titer cut off value should be the issue of furter researchers.

KEYWORDS: Isohemagglutinin

Image Description

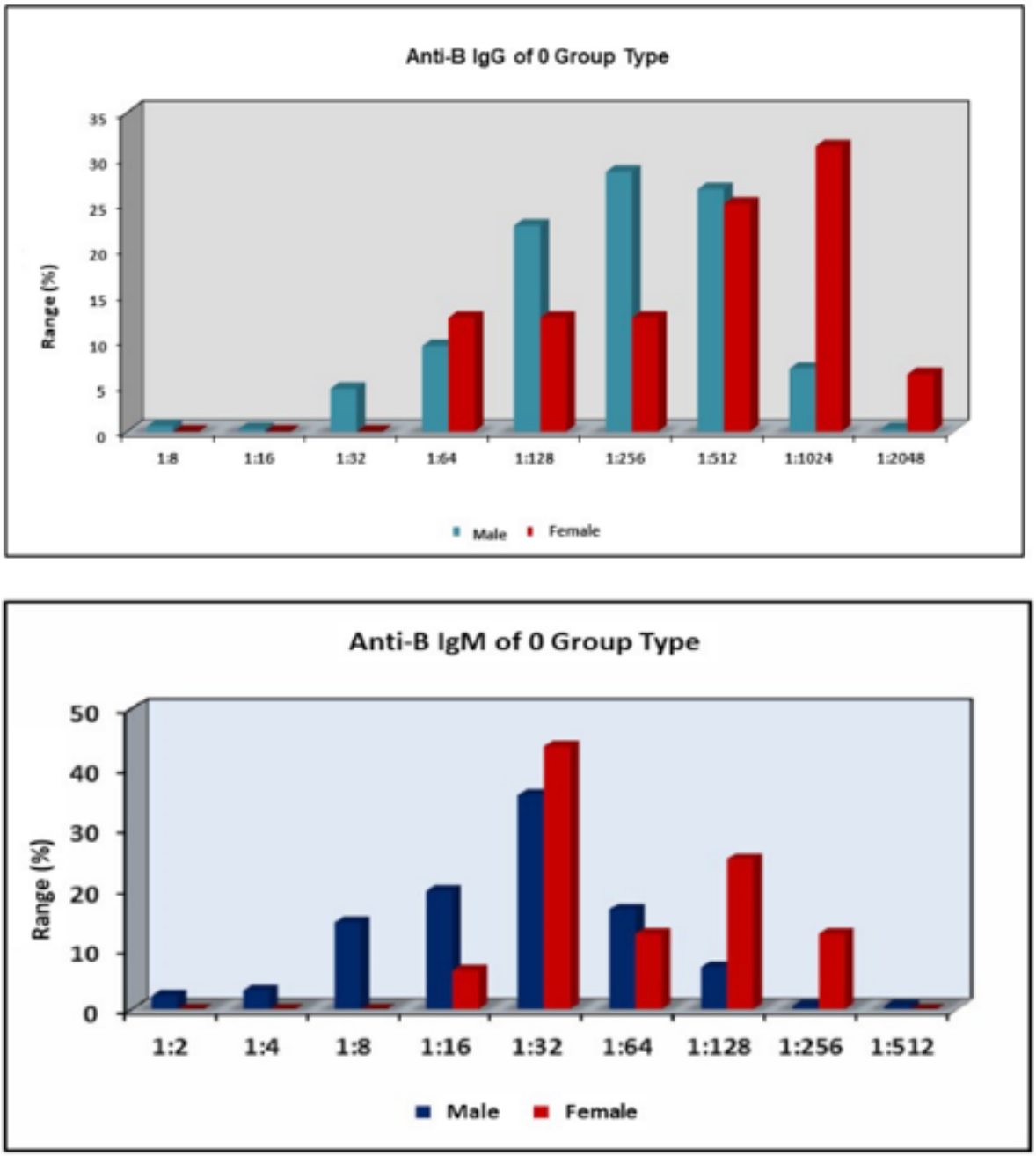

Figure 1A,B:Distribution rates of Anti-B IgG and IgM titers.

PP-37

WHAT CAN BE DONE TO DETECT AND REDUCE "EMERGENCY" REQUESTS THAT ARE NOT URGENT?

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AIM: The laboratory turnaround time of the immunohematological tests are among our quality indicators and are targeted to be below the predetermined values. These parameters are important not only compliance with the quality standards of the work performed but also for patient safety. In our procedure, the normal turnaround time of these tests is 2 hours, while for urgents' 1 hour. The aim of this study is to eliminate and/or reduce non-urgent but "come with urgent barcode" requests.

MATERIALS & METHODS: Urgent test requests rates were targeted to be below 5% in our procedures. In this study, the rates of emergency barcoded blood group and cross match tests requested from Transfusion Centers (TC) between 01.06.2019 - 31.12.2019 were examined. The report (from LIS: Tenay software) as an e-mail were weekly shared with responsible physicians of the TC by coordinator of TCs. In these e-mails, TC physicians were asked to perform the following tasks: • Determination of the reasons for non-urgent test requests, • Determining the clinics with high request rate with urgent barcode and making face-to-face interviews with relevant clinical physician, • Sharing the data at the hospital transfusion committee (HTC) meetings, • Ensuring that the decisions of the HTC meetings are announced to the entire hospital.

RESULTS: In order to follow the change, the working period is divided into two as the first four months and the second three months. The sum of normal and urgent test requests, the rates of urgent test requests are shown in Table 1. Decrease in hospitals numbered 1,2,5,8,11 and 12 were found statistically significant (Chi square, $p<0,0001$). In addition; due to the workload of the TC (no.4) physician could not have sufficient interviews (10.73%) with clinicians, the urgent test requests were continued due to the social indications in no.1 and no.8 (5.48% and 16.03%, respectively). It was learned from the feedbacks that there was an increase (5.26%) due to a real urgent event in the no.10.

CONCLUSION: Physicians make urgent requests even in non-urgent situations with social indications and in some cases, their habits determine the way they want. However, this situation creates unnecessary workload and delays the turnarond time of real urgent tests in the TC. In addition to training, keeping the TC-clinical relationship active, determining the cause-effect relationships, and providing positive feedback by monitoring the data regularly are extremely important in improving and devoloping the quality of services.

KEYWORDS: Laboratory Turnaround Time, Transfusion Center-Clinics Relationship, Quality Improvement

Changes in rate of emergency requests

Table 1: Changes in rate of emergency requests

	I. PERIOD			II. PERIOD			
HOSPITAL	TOTAL TESTS NO	URGENT TESTS NO	%	TOTAL TESTS NO	URGENT TESTS NO	%	p value
1	5619	483	8,49	4148	239	5,48	p<0,0001
2	8115	611	7,10	7536	317	4,01	p<0,0001
3	1581	12	0,62	1160	8	0,53	p=0,76
4	8891	1041	11,33	7062	767	10,73	p=0,23
5	2784	215	7,73	2448	54	1,85	p<0,0001
6	3291	65	1,77	2071	20	1,08	p=0,043
7	3840	135	3,23	2946	135	3,94	p=0,11
8	3413	1033	25,54	2641	477	16,03	p<0,0001
9	3191	53	1,49	2858	52	1,74	p=0,44
10	1981	102	4,33	1627	102	5,26	p=0,193
11	2295	84	3,18	2010	25	1,10	p<0,0001
12	3908	356	8,02	2668	26	0,87	p<0,0001
13	1432	31	1,84	1178	14	1,19	p=0,186
14	2091	83	3,32	1803	40	1,93	p=0.83
15	5802	168	2,72	5284	141	2,73	p=0,0074
16	2286	26	1,13	2210	26	1,14	p=0,98

PP-38

INVESTIGATION OF BLOOD GROUP-DISEASE RELATIONSHIP IN PATIENTS TREATED WITH SEPSIS DIAGNOSIS IN BURSA ULUDAG UNIVERSITY FACULTY OF MEDICINE BETWEEN 2015-2019

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AIM: To investigate the relationship between blood groups and sepsis in patients who are followed-up and treated in our hospital.

MATERIALS & METHODS: The files of patients who were diagnosed with sepsis between 2015-2019 (five years period) in our hospital were analyzed retrospectively. Hospital information system, blood center records and blood center archive were used.

RESULTS: A total of 401 patients treated in our Department of Anesthesiology and Reanimation-Reanimation Unit with the diagnosis of sepsis between 2015-2019 were evaluated. Within the scope of the study, age, gender, blood group distribution, hospital stay lengths of the patients were evaluated. Distribution of patients according to blood groups and comparison with blood group distribution in Turkish society can be seen in table-1. Duration of hospitalization according to blood groups can be seen in table-2. The blood group distribution according to the average age of the patients is summarized in table-3. The distribution of patients according to gender is shown in table-4

CONCLUSION: Numerous studies have been published in the literature showing the relationship between blood groups and diseases especially with infections, cancers, obstructive vascular diseases and bleeding disorders. In our study, the relationship between sepsis and blood group was investigated. As seen in Table-1, when compared to the general population, the O group frequency was low in the study population while the A, B and the AB group (non-O group) were high. RhD (+) frequency was high while RhD (-) was low also. However, the differences in neither ABO nor RhD blood group distrubitions were found statistically significant. The average length of hospital stay was 33.9 days, while this was shorter in the O and RhD (-) group and longer in the non-O and RhD (+) group (not statistically significant). When the average age of the patients is examined, it is seen that the AB group patients ages are above the study group average. This situation can be considered as an additional risk factor for patients with blood group AB whose hospitalization period is longer, because they are older. In conclusion, according to our findings, no significant relationship was found between patients diagnosed with sepsis and blood groups.

KEYWORDS: ABO, Blood Group, Rhd, Sepsis

Table-1

Blood Group	A	O	B	AB	RhD (+)	RhD (-)
General Population	%42,5	%33,8	%15,9	%7,8	%87,3	%12,7
Patient Group	%42,9	%33,1	%16	%8	%89,5	%10,5

Comparison of sepsis patient group and general population blood group

Table-2

	Patient Group Average	A	O	B	AB	RhD (+)	RhD (-)
Length of hospital stay (Days)	33,9	34,6	31,2	36,3	36,3	34,9	25,1

Lengths of hospital stay according to blood groups

Table-3

	Patient Group Average	A	O	B	AB	RhD (+)	RhD (-)
Average Age	56	56,2	56,1	52,8	60,8	56,3	53,5

Blood group distribution according to the average age of the patients

Table-4

	Female	Male
Number of Patients	166 (41.4%)	235 (58.6%)
Patient Age	56.5	55.4
Length of hospital stay (Days)	29.9	33.2

Patient distribution by gender

PP-39

ABO BLOOD GROUP DISCREPANCIES: A MULTICENTER STUDY

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AIM: ABO grouping is the most frequently performed test in the blood bank. It is important that ABO blood grouping should be performed, recorded, and interpreted correctly for patient safety and good transfusion practices. In the present study, we aimed to investigate both the insidence of ABO discrepancies and relationship between underlying diseases and discrepancies.

MATERIALS & METHODS: An annual data of 84 000 patients aged between 0-65 years old were retrospectively investigated in between January 2019 and December 2019 in Marmara University Medical Faculty and Kartal Lutfi Kirdar Education and Research Hospital Blood Centers. Blood was collected in EDTA tubes after the collection of blood unit from each patient for ABO red-cell and serum testing. Anti-A/Anti-B and A1/B cells were used for forward and reverse grouping, respectively. SPSS 15.0 was used for analyzing. Descriptive statistics was done for distribution of ABO forward and reverse discrepancies. Non-parametric variations were analyzed by Mann Whitney U test.

RESULTS: Forty-nine patients who had ABO group discrepancies, 24 (48,97%) female and 25 male (51,03%), were recorded. The mean age was 35.87±20.90. ABO cell and serum grouping tests, forward and reverse discrepancies, were seen in 5 (10,21%) and 44 (89,79%) patients, respectively. Most of patients whose reverse discrepancies were female and infection was mostly seen. The presence of additional anti A1 antibodies were recorded in 14 (66,67%) of A and in 9 (100%) of B positive patients (Table 1).

CONCLUSION: ABO group forward and reverse discrepancies should be resolved for correct blood typing and labeling in terms of preventing ABO incompatibility. In addition, the relationship between underlying disease and discrepant results could be identified in large case series as well.

KEYWORDS: Blood Group, Discrepancy, Forward, Reverse

Table 1.

ABO group	Gender F/M	Age Mean±	Forward				Reverse		TOTAL
			Anti-a	Anti-b	Anti-A1 lectin	Anti-H lectin	A1 cell	B cell	
A positive	11/10	37.80±19.07	1 missing				14 extra	6 missing	21
B positive	6/3	48.44±17.6					9 extra		9
0 positive	0/2	10.00±11.31					1 missing	1 missing	2
AB positive	0/1							1 extra	1
A subgroup	4/1	28.00±23.62	2 missing				3 extra		5
AB subgroup	2/4	35.5±21.95	2 missing				3 extra	1 extra	6
Rh negative A negative B negative	 0/3 1/1	23.4±24.93					3 extra	 2 extra	5
TOTAL	24/25		5				33	11	49

ABO blood group discrepancies

PP-41

PERFORMANCE ANALYSIS OF BLOOD TRANSPORTATION STAFF IN FACULTY OF MEDICINE, BURSA ULUDAG UNIVERSITY

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[1]Bursa Uludag University Faculty of Medicine

AIM: Our purpose was to rearrange our Blood Transportation Staff (BTS) working conditions through data obtained from their performance analysis.

MATERIALS & METHODS: First, a detailed analysis form was created. Forms were filled for every round of blood transportation by BTSs, for 2 months. The parameters such as step counts, transported blood component counts, and weight, was evaluated. Evaluation of the delivery rate of blood components to our clinics was made via three parameters. These parameters were analyzed for weekday-weekend and shift variables. Those parameters were: • Delivery to BTS: It starts with the component request from clinicians and ends with the delivery of the components to BTS. It's supposed to be <30 min. • Transportation time: It starts with the delivery of the component to BTS and ends with the delivery to the clinic nurse. It's supposed to be <45 min. • Delivery to nurse: It contains all the transport process from request to delivery. It's supposed to be <60 min.

RESULTS: Evaluations were made for 08:00-16:00 and 16:00-24:00 shifts on both weekdays and weekends. Two or three BTSs were working on weekdays 08:00-16:00 shift, while two were working on the 16:00-24:00 shift. One or two BTSs were working on both shifts at weekends (Table-1). The average step count of BTSs was 9.012 steps. They rounded to clinics 6,8 times and climbed 23,4 stairs on every workday. An average of 11,9 erythrocyte suspensions (ES), 4,6 thrombocyte suspensions (TS) and 9,7 fresh frozen plasma (FFP) were transported (Table-1). When three BTSs on the 08:00-16:00 shift of the weekday and two BTSs on the 08:00-16:00 shift of the weekend were assigned; a) Their step count didn't decrease (Table-1). b) Delivery time to nurse didn't decrease (Table-2) Because we don't have sufficient BTS, we can rarely assign the BTSs on the 24:00-08:00 shifts. At those shifts mostly the clinical staff have to transport the blood components from our blood bank to the clinics. When we evaluate the perfomnances of our BTSs on the days which we could assigned them on the 24:00-8:00 shift, we have seen that their performance was efficient than them (Table-2).

CONCLUSION: Two BTSs on weekdays 08:00-16:00 / 16:00-24:00 shifts and one BTS on weekends 08:00-16:00 / 16:00-24:00 shifts are sufficient for our hospital. Also one BTS at 24:00-08:00 shift should be placed for every day. According to these results, we decided to request a new BTS to achieve the most efficient blood transportation.

KEYWORDS: Blood Component Delivery Time, Blood Transportation Staffs Performance, Transfusion

Table-1: Working Summary of BTSs

	Shift	Working Days Count	BTS Count	Avg. Steps Count	Avg. Round Count	Avg. Climb up Stairs	Avg. ES Count	Avg. TS Count	Avg. FFP Count	Avg. (gr) Cargo Weight
Weekday	08:00-16:00	66	2	9.857	6,5	21,9	14,6	4,9	13,3	17.643
		15	3	9.421	5,5	16,6	10,9	2,3	10,5	13.623
Weekday	16:00-24:00	77	2	8.191	6,7	23,4	9,5	4,4	5,5	13.985
		-	-	-	-	-	-	-	-	
Weekend	08:00-16:00	16	1	9.947	8,1	27,2	11,9	5,6	15,2	19.239
		2	2	9.076	5,5	17,5	7,5	2,0	17,0	13.950
Weekend	16:00-24:00	14	1	8.971	10,1	35,6	15,9	6,5	8,1	21.539
		4	2	6.101	5,0	18,5	5,5	3,8	8,8	11.127
Overall Evaluation		**194**	**1,92**	**9.012**	**6,8**	**23,4**	**11,9**	**4,6**	**9,7**	**16.077**
		For Every Round		**1.316**	**1,0**	**3,4**	**1,7**	**0,7**	**1,4**	**2.348**

Table-2: Delivery rates of the blood components to clinics

Shift	BTS Count	Weekday (%)			Weekend (%)		
		Delivery to BTS >30 min	Transportation time >45 min	Delivery to Nurse >60 min	Delivery to BTS >30 min	Transportation time >45 min	Delivery to Nurse >60 min
08:00-16:00	1	32,0%	20,0%	40,0%	11,3%	22,5%	27,5%
	2	5,0%	39,4%	33,9%	20,0%	40,0%	60,0%
	3	13,3%	20,0%	40,0%			
16:00-24:00	1	8,0%	12,0%	20,0%	5,0%	27,5%	30,0%
	2	5,6%	19,0%	21,5%	0,0%	0,0%	0,0%
24:00-08:00	0*	46,5%	1,6%	26,7%	42,4%	2,4%	25,9%
	1	3,7%	1,1%	2,7%			

* There were no BTS in this shift. Blood transportation issues were made by clinical staffs.

PP-42

COMPARISON OF PACKED RED BLOOD CELL USAGE/CROSSMATCH RATIO OF HASEKI TRAINING AND RESEARCH HOSPITAL IN 2018-2019

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AIM: Transfusion, which is a life-saving procedure; has become a practice to be avoided due to undesirable effects and some complications that have just started to be understood. The difficulties in blood supply and increasing costs in recent years have made it necessary to establish Patient Blood Management (PBM) and transfusion policies in hospitals. In this study, the number of Packed Red Blood Cells (PRBC) units, which were requested in 2018-2019 in Haseki Training and Research Hospital, was compared with the units which were used, and it was intended to determine the usage/crossmatch ratio according to the services and help to establish our hospital's future blood transfusion policy by evaluating the effects of the trainings which were given to the services.

MATERIALS & METHODS: The data in the HSK (Hemovigilance System Blood) module which was developed by the Blood Transfusion Center were examined, the numbers of used PRBC units and crossmatches requested from the services were compared.

RESULTS: The number of crossmatch requests in 2018 is 16136, the number of used PRBC is 9275, the number of crossmatch requests in 2019 is 18178, the number of used PRBC units is 10197, and the rate of PRBC usage/crossmatches was 0,57 in 2018 and 0,56 in 2019. The ideal ratio is accepted as 1. Usage/crossmatches ratio by services are shown in Table 1 and Table 2.

CONCLUSION: As in many hospitals, the PRBC units that the surgeon requests to feel safe before the surgical procedures aren't used because they aren't needed during the operation. It's believed that the reason for PRBC usage/crossmatches rate in the surgical units of our hospital is far from 1, that the surgical units request more PRBC units than necessary to feel free with the concern of protection of patient's life and professional success, regardless of patients' Haemoglobin and Haemotocrit levels. In this regard, the hospital blood transfusion committees should shape the transfusion policies and plan trainings for all clinics on Patient Blood Management. By planning the minimum stock levels by the blood transfusion center managers, surgeons should be assured that the amount in the stocks will provide the daily need. It's planned to watch the daily stocks, to re-calculate the minimum stock levels and to switch to a system that doesn't allow blood product requests and usage above the determined Haemaglobin and Haematocrit values according to the patient's age and gender. Approaches that restrict transfusion should be accepted as "imperative" rather than "possible".

KEYWORDS: Crossmatch, Packed Red Blood Cells, Ratio

Table 1: Usage/crossmatches ratio by services in 2018

Services	Crossmatches	Number of used PRBC units	Percentage
Neurology	52	48	0,92
Emergency Intensive Care Unit	1198	1016	0,85
Internal Diseases	5189	4170	0,8
Neonatal and Pediatric Intensive Care Units	252	192	0,76
Nephrology	443	341	0,76
Intensive Care Unit	640	479	0,72
Cardiovascular Surgery Service	847	436	0,51
General Surgery Service	2730	1300	0,48
Pediatry	204	91	0,45
Cardiology	255	112	0,44
Obstetrics and Gynecology	1326	556	0,42
Neurosurgery	713	259	0,36
Orthopedics	2490	768	0,31
Urology	2091	621	0,3
TOTAL	18430	10389	0,56

Table 2: Usage/crossmatches ratio by services in 2019

Services	Crossmatches	Number of used PRBC units	Percentage
Neurology	51	47	0,92
Emergency Intensive Care Unit	653	553	0,85
Internal Diseases	4656	3633	0,78
Neonatal and Pediatric Intensive Care Units	225	174	0,77
Nephrology	331	255	0,77
Intensive Care Unit	1508	1086	0,72
Cardiovascular Surgery Service	585	384	0,66
General Surgery Service	2003	1063	0,53
Pediatry	121	76	0,63
Cardiology	147	92	0,63
Obstetrics and Gynecology	1553	548	0,35
Neurosurgery	805	252	0,31
Orthopedics	1772	555	0,31
Urology	1726	557	0,32
TOTAL	16136	9275	0,57

PP-43

AN EFFICIENCY INDICATOR: THE RATIO OF THE FULL BLOOD AND ERYTHROCYTE CONCENTRATE TO THE NUMBER OF CROSS-MATCH NUMBER OF TRANSFUSIONS

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PURPOSE: The purpose of this study is to evaluate the indicator criteria, cross-match / transfusion number ratio according to the clinical services in 2019.

MATERIALS & METHODS: In the study, the data of Istanbul Health Sciences University Zeynep Kamil Gynecology and Pediatrics Training and Research Hospital we re-evaluated between January-December 2019. As data collection tools, transfusion center monthly productivity indicator cards, cross-match numbers, transfusion numbers and annual averages we re-examined by using the institution's Hospital Information Management System (HBYS). Cross-match numbers / transfusion number ratios (C / Tx: 1) we recalculated and evaluated (ideal cross comparison / transfusion rate is 1).

RESULTS: In 2019, cross match numbers, transfusion numbers, annual crossmatch numbers / transfusion numbers according to clinics we re-evaluated. The ratios of crossmatch numbers to transfusion numbers (C / Tx: 1) we recalculated. The values obtained are indicated in Table 1. When the ratio of the number of cross-match / transfusions in 2019 is compared with obstetrics and gynecology clinics, this ratio was 1.21 in pediatric clinics, 2.7 in obstetrics and gynecology clinics. The ratio of the overall crossmatches in 2019 to the number of transfusions has been calculated as 2.36.

CONCLUSION: In hospitals, the ratio of the number of whole blood and erythrocyte concentrate crossmatches to the number of transfusions is followed as an indicator of efficiency. When the transfusion number ratio of 2019 crossmatch numbers was evaluated, it is observed that the ideal rate has not been reached in our hospital. The main reasons of not reaching the ideal rate are the fact that we are a branch hospital, the fact that the referral of complicated cases to our hospital, and the doctors want to feel safe for malpractice. The ratio of the number of crossmatches to the number of transfusions will continue to be evaluated on physician and clinical basis. In order to reach the ideal rate, it is aimed to increase awareness through in-service trainings and in-unit trainings.

KEYWORDS: Cross-Match, Indicator, Transfusion

JANUARY - DECEMBER 2019						Table 1
	ERYTHROCYTE SUSPENSION			WHOLE BLOOD		
CLINICAL	Number of Cross - match	Number of Transfusion	Number of Cross - match / Number of Transfusion	Number of Cross - match	Number of Transfusion	Number of Cross - match / Number of Transfusion
Department of Pediatrics / Pediatric Emergency Service / Pediatric Intensive Care Unit	66	52	1,26	0	0	0
Pediatric Surgery	48	22	2,18	0	0	0
Pediatric Surgery Intensive Care	142	102	1,39	0	0	0
Neonatal Intensive Care	444	402	1,1	0	0	0
Total number / Average	700	578	1,21	0	0	0
Perinatology	268	78	3,43	0	0	0
Delivery Room / Adult Intensive Care / Emergency Service	282	169	1,66	1	1	1
Department of Obstetrics and Gynaecology / Oncology	4701	1691	2,78	0	0	0
Total number / Average	700	578	1,21	0	0	0
2019 General Total / Average	5952	2517	2,36			

PP-44

ANALYSIS OF TYPES AND NUMBER OF BLOOD COMPONENTS SUPPLIED FROM KIZILAY AND RATE OF DESTRUCTION BETWEEN 2018-2019 IN KONYA KARAPINAR STATE HOSPITAL TRANSFUSION CENTER

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AIM: Efficient use of blood components in transfusion centers has great importance. Although blood supply and storage conditions are respected, for various reasons blood components may need to be disposed of without being used to the patient. All of our blood needs are supplied from Kızılay in our hospital. In this study, the type and number of blood components supplied from Kızılay and blood component destruction rates of Transfusion Center of Karapınar Public Hospital between 2018 and 2019 were investigated retrospectively screened.

MATERIALS & METHODS: The type and number of blood components supplied from Kızılay and blood component destruction rates records of 2018 and 2019 years were examined in our Transfusion Center's archive. Destroyed and used the number of blood components were compared between 2018 and 2019.

RESULTS: Erythrocyte suspensions are the main components that is destroyed between in 2018 and 2019 in our Hospital Transfusion Center. The number of blood components destroyed in the period 2019 is significantly higher than 2018. Number of blood components destroyed / used: 49/282 (0,17%) in 2018 and 66/189 (0,34%) in 2019 . In our study covering the years 2018-2019, the most common cause of destruction was the expiration of date. (97,31%) The second cause is ruptured blood component bag. (2,69%)

CONCLUSION: Reducing the rate of destruction of blood components is of critical importance for the efficient functioning of our transfusion center. We have found an increasing number of desruction rates in 2019 which Show that we have to take. We believe to keep critical stock level, the blood components reserved(cross matched) for elective surgical cases should be transfered to main stock within 24 hours if they are not transfused. Precautions to reduce the number of destruction. Training to clinics undergoing transfusion and good dialogue with services will reduce blood component destruction rates.

KEYWORDS: Blood Need, Blood Supply, Destruction Rates, Kızılay

Figure 1. Distribution of Destruction 2018-2019 years

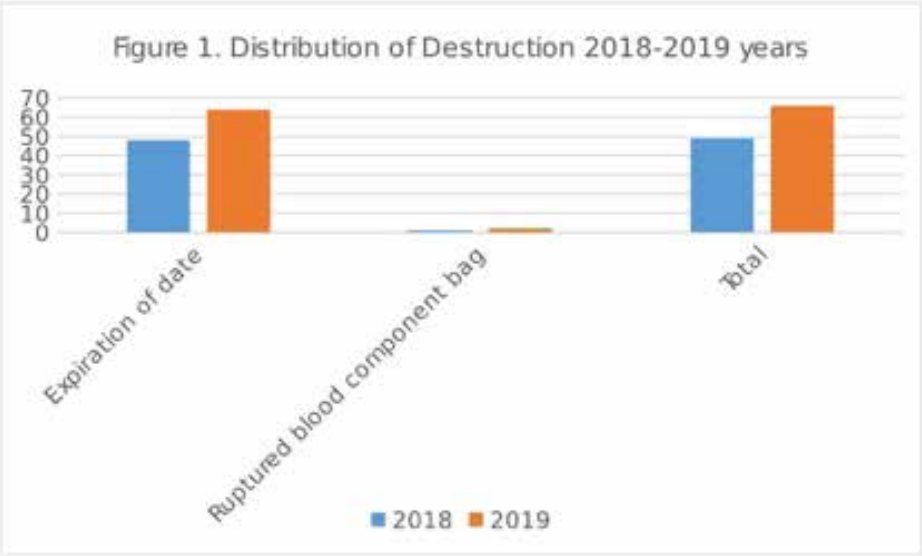

Table 2. Reasons for Destruction of Blood Components (n /%)

	2018	2019
expiration of date	48	64
ruptured blood component bag	1	2
Total	49	66

2018 2019 Miad Dolması Nedeniyle 48 64 Torbanın yırtılması 1 2 Toplam 49 66

Table 1. Blood Components, Types and Numbers Destroyed by Years

	2018	2019
Whole Blood	0	0
Erythrocyte Suspension	49	66
Fresh Frozen Plasma	0	0

2018 2019 Tam Kan 0 0 Eritrosit Süspansiyonu 49 66 Taze Donmuş Plazma 0 0 Toplam 49 66

PP-45

DISTRIBUTION OF BLOOD GROUP OF PATIENTS APPLYING TO KARAPINAR STATE HOSPITAL BETWEEN 2018-2019 YEARS

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AIM: In this study, Blood groups of transfused blood components are determinated to follow up the stocks and to meet the demand in emergency situations. This study is done to determine the blood group distribution of patients transfused in Karapınar State Hospital between 2018-2019.

MATERIALS & METHODS: The distribution of the blood groups of the patients who applied to Karapınar State Hospital between 01.01.2018-31.12.2019 was examined retrospectively through the hospital database. Blood groups were studied manually and automated systems by gel centrifugation method (DiaMed).

RESULTS: The blood group of 4093 patients was studied. 41.2% (1687 people) were male and 58.2% (2406 people) were female. Rh (+) (3957) ratio was found to be 96.7% and Rh (-)(136 people) ratio was found to be 3.3%. Blood groups were respectively A Rh (+)(1550 people)37.9%, 0 Rh (+)(1232 people) 30.2%, B Rh (+)(677 people) 16.5%, AB Rh (+)(244 people) 5.9%, A Rh (-)(168 people) 4.1%, B Rh (-) (62 people)1.5% 0 Rh (-)(136 people) 3.3%, AB Rh (-) (24 people) 0.6 %.

CONCLUSION: It is thought that our results on blood group distribution will make a large contribution to our country's database. ABO-Rh blood group distribution in our country and the results obtained in our study were similar.

KEYWORDS: Blood Group, Gel Centrifugation, Karapınar

PP-46

KONYA AND KARAMAN BLOOD DONATION STATISTICS

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AIM: Number of blood donations in Konya and Karaman provinces. Female blood donation count and male blood donation count. Percent slices. Rejection rates and distributions. Blood donation list of men and women. Blood group ratios. percentage of first blood donors.

MATERIALS & METHODS: Entering the information of blood donors and finding the rates.

RESULTS: In which environments do people prefer to donate blood? Where female donors donate more blood. Blood donation rates for women and men in Konya and Karaman provinces. Reasons for rejection of blood donors. Blood group statistics were found in these regions.

CONCLUSION: As a result of the study, donors in Konya and Karaman provinces gave blood according to which teams. Which places should be focused on to increase blood donation rates. The increase in the number of women donors giving blood in Konya and Karaman provinces will increase in order to increase the number of teams to be organized there. this will allow increased blood donation awareness.

KEYWORDS: Keywords

Total Blood Donation and Abandonment

	Blood Donation	% Blood	Cancel	%Cancel
Scholl	7.666	8,70	63	0,82
General	45.068	51,14	225	0,50
University	8.273	9,39	81	0,98
The Military	1.446	1,64	7	0,48
Blood Collection Unit	25.680	29,14	91	0,35
Total	88.133		467	

Blood Donation Rate for Men and Women

	Total	Famale	Male	% Famale	% Male
School	7.666	2.575	5.091	33,59	66,41
General	45.068	7.498	37.570	16,64	83,36
University	8.273	2.816	5.457	34,04	65,96
The Military	1.446	0	1.446	0	100
Blood Collection Unit	25.680	3.859	21.821	15,03	84,97
Total	88.133	16.748	71.385	19,00	81,00

Blood donation rejection rates

	Total	% Total	Famele	% Famale	Male	% Male
Disease Other	3.990	25,49	2.874	72,03	1.116	27,97
Surgical Operations	5.732	36,62	1.248	21,77	4.484	78,23
Life Style- Surpicious Relation	1.556	9,94	4	0,26	1.552	99,74
Hemoglobin Level-High	4.375	27,95	3.894	89,01	481	10,99
Total	15.653					

Ratio of Blood Donation to Population

Konya - Karaman	Population	Blood Donation	%	% Population
Famale	1.237.089	16.748	1,35	0,68
Male	1.220,433	71.385	5,85	2,90
Total	2.457.522	88.133	3,59	

Blood Group Rates

Blood Group	Number of Donations	%
A Rh (+)	33.839	38,40
A Rh (-)	4.421	5,02
B Rh (+)	11.777	13,36
B Rh (-)	1.549	1,76
AB Rh (+)	5.857	6,65
AB Rh (-)	820	0,93
O Rh (+)	26.355	29,90
O Rh (-)	3.349	3,80
Uncertain	166	0,19
Total	88.133	

PP-47

GROUP, GENDER AND AGE DISTRIBUTION OF WHOLE BLOOD DONORS OF UŞAK TRAINING AND RESEARCH HOSPITAL TRANSFUSION CENTER

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AIM: The ABO blood group system is the most valuable blood group system in transfusion medicine. ABO has been defined according to the amounts of A, B and O (H) antigens in the erythrocyte membrane. The Rh system is one of the most complex antigen systems. In our study, it was aimed to examine the ABO groups, age group and gender distribution of our whole blood donors detected during blood grouping.

MATERIALS & METHODS: The distribution of the blood groups of patients who applied to Uşak Training and Research Hospital between January 2018 and December 2019 to be a complete blood donor were analyzed based on the statistics kept by our transfusion center. Blood samples were taken for examination, the gel centrifugation method (Across, DiaPro Medical Products, Turkey) was studied by an automated system. During the test, those with weak agglutination in DVI + and DVI- wells encountered in blood group cards were not considered as donors.

RESULTS: In our study date range, 342 men and 5 women donors in 2018; In 2019, blood types were studied for 215 male and 6 female donors. Blood group distribution of donors in 2018 0 positive 59-negative 10; A positive 124-negative 53; B positive 76-negative 10; AB positive 14-negative 1 was found. In 2019, the blood group distribution of donors was 0 positive 52-negative 4; A positive 69- negative 8; B positive 67-negative 2; AB positive 18-negative 1 was determined. As of the age group distribution, in 2018 male donors had 70 donors in the 18-24 age group, 222 in the 25-44 age group and 45 donors in the 45-65 age group; The distribution of female donors was 1 in the 18-24 age group, 2 in the 25-44 age group and 2 in the 45-65 age group. In 2019, male donors had 32 donors in the 18-24 age

group, 149 donors in the 25-44 age group and 34 donors in the 45-65 age group; The distribution of female donors was 2 in the 18-24 age group, 3 in the 25-44 age group and 1 in the 45-65 age group. (Table 1 and 2)

CONCLUSION: The distribution of blood groups of our patients was found to be compatible with the data of our country. These data are important in determining the need for blood products and following the critical stock level. It is thought that these hospital-based data will be useful while stock control and stock planning of the regional blood centers.

KEYWORDS: ABO Gruping, Sex and Gender Distribution, Whole Blood Donors

DONOR BLOOD GROUP, AGE AND GENDER DISTRIBUTION FOR 2018

DONOR BLOOD GROUP, AGE AND GENDER DISTRIBUTION FOR 2018

		OCAK	ŞUBAT	MART	NİSAN	MAYIS	HAZİRAN	TEMMUZ	AĞUSTOS	EYLÜL	EKİM	KASIM	ARALIK
DONÖR YAŞ VE CİNSİYET DAĞILIMI	ERKEK	46	40	22	60	36	41	20	20	4	12	20	21
	18-24 Yaş Grubu	7	11	1	12	9	9	5	1	4	2	4	5
	25-44 Yaş Grubu	33	22	16	41	19	28	13	13		9	15	13
	45-65 Yaş Grubu	1	7	5	7	8	4	2	6		1	1	3
	KADIN	0	0	0	0	2	3	0	0	0	0	0	0
	18-24 Yaş Grubu					1							
	25-44 Yaş Grubu						2						
	45-65 Yaş Grubu					1	1						
DONÖR KAN GRUPLARI	0 -KAN GRUBU	16	12	0	6	2	1	6	5	0	5	12	4
	Rh (D) Pozitif	11	12		6		1	4	4		5	12	4
	Rh (D) Negatif	5				2		2	1				
	A -KAN GRUBU	26	21	17	34	20	19	6	12	3	0	7	12
	Rh (D) Pozitif	20	21	11	16	15	8	6	8	3		4	12
	Rh (D) Negatif	6		6	18	5	11		4			3	
	B -KAN GRUBU	4	7	5	17	14	21	8	0	1	4	0	5
	Rh (D) Pozitif	4	6	5	11	13	21	6		1	4	0	5
	Rh (D) Negatif		1		6	1		2					
	AB -KAN GRUBU	0	0	0	3	2	3	0	3	0	3	1	0
	Rh (D) Pozitif				3	1	3		3		3	1	
	Rh (D) Negatif					1							

DONOR BLOOD GROUP, AGE AND GENDER DISTRIBUTION FOR 2019

DONOR BLOOD GROUP, AGE AND GENDER DISTRIBUTION FOR 2019

		OCAK	ŞUBAT	MART	NİSAN	MAYIS	HAZİRAN	TEMMUZ	AĞUSTOS	EYLÜL	EKİM	KASIM	ARALIK
DONÖR YAŞ VE CİNSİYET DAĞILIMI	ERKEK	21	21	36	19	28	6	13	17	12	13	6	23
	18-24 Yaş Grubu	1	3	4	1	5	1	4	2	1	7	1	2
	25-44 Yaş Grubu	18	16	28	14	19	3	8	12	8	5	4	14
	45-65 Yaş Grubu	2	2	4	4	4	2	1	3	3	1	1	7
	KADIN	0	1	0	0	0	0	1	2	0	2	0	0
	18-24 Yaş Grubu							1			1		
	25-44 Yaş Grubu		1						1		1		
	45-65 Yaş Grubu								1				
DONÖR KAN GRUPLARI	0 -KAN GRUBU	11	8	5	0	3	3	0	12	0	0	3	11
	Rh (D) Pozitif	7	8	5		3	3		12			3	11
	Rh (D) Negatif	4											
	A -KAN GRUBU	4	3	15	9	9	0	0	4	11	10	3	9
	Rh (D) Pozitif	4	3	14	9	9			2	9	10	3	6
	Rh (D) Negatif			1					2	2			3
	B -KAN GRUBU	0	11	16	10	13	2	7	3	1	3	0	3
	Rh (D) Pozitif		11	16	10	13	2	5	3	1	3		3
	Rh (D) Negatif							2					
	AB -KAN GRUBU	6	0	0	0	3	1	7	0	0	2	0	0
	Rh (D) Pozitif	6				3	1	6			2		
	Rh (D) Negatif							1					

PP-48

ACUTE HEMOLYTIC TRANSFUSION REACTION DUE TO ANTI-C

Utku Uçar[1], Ayla Yavuz[2], Nazime Çebi[2]

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AIM: Rhesus (Rh) mediated hemolytic transfusion reactions (HTR) are usually immunoglobulin G mediated and delayed type. Rh antibodies that cause acute HTR and intravascular hemolysis are still being discussed. The aim of this case is to highlight the importance of including pre-transfusion antibody screening in routine testing.

MATERIALS & METHODS: A 59-years-old female patient was admitted to the CVC outpatient clinic of Ahi Evren Hospital on 03.04.2019 date, with respiratory distress, chest pain and dyspnea. The patient was hospitalized with the diagnosis of mitral valve disease and coronary artery disease and the mitral valve replacement surgery was performed on 10.04.2019. On the fifth postoperative day, the control hemogram was decreased from 13.1g / dL to Hb: 8.3 g / dL and 1U ARh [+] ES was inserted. After 110 minutes , receiving approximately 200mL transfusion the restlessness, weakness, tremor, pallor, headache and dyspnea occured and transfusion was stopped. Necessary interventions and reports were made. Blood group, cross-match, direct anti-globulin test, indirect anti-globulin test, hemogram, biochemistry and full urine test were re-requested and given in Table-1.

RESULTS: This case is an unusual case of AHTR due to anti-C Rh antibody. Rh antibodies appeared after 110 minutes in the form of acute transfusion reaction, while IgG structure was expected to activate the complement and give extravascular hemolysis. IAT positivity in the results increases the presence of antibody in erythrocytes and increases suspicion of HTR.

CONCLUSION: In conclusion,we want to emphasize the critical role of the blood bank for early diagnosis and treatment of AHTR, especially due to antibodies in individuals receiving multiple transfusions and additionally thıs should be performed as rutin pre- transfusion tests to screening of antibodies, recognition of antibodies which will ensure safe blood transfusion. Paying particular attention and thus minimizing morbidity and preventing potential mortality. Transfusion Medical professionals should be consulted immediately by the treating physician when they encounter patients with an acute decrease in hemoglobin level following the last transfusion.

KEYWORDS: Antibody, Hemolytic Reaction, Rh, Transfusion Reaction

Perfomed patient tests and results

	Hb (11.7-16.1 gr/dL)	Hct (34-47)	WBC (4.5-10.4 x10³/µL)	PLT (150-400 x10³/µL)	T.BİL (0.3-1.2 mg/dL)	LDH (<248 IU/L)	AST (<35 IU/L)	Blood Group	Cross Match	DAT	IAT	Anticor typing	Urine
Pre-transfusion	8.3	24	6.0	258	1.06	256	22	A Rh D (+)	Complete	Negative	-	-	-
Post-transfusion /1st hour	9.5	26	6.3	268	2.44	391	55	A Rh D (+)	Complete	Positive	Positive	-	Negative
Post-transfusion /1st day	9.2	26	12.9	262	1.86	477	46	-	-	Positive	Positive	Anti-C positive (Across identi cell anticor typing)	-
Post-transfusion /2nd day	8.8	25	9.9	217	1.03	518	35	-	-	-	-	-	-
Post-transfusion /3rd day	8.8	25	8.4	214	-	-	27	-	-	Positive	Positive	-	-
Post-transfusion /4th day	8.3	24	6.9	246	1.2	507	24	-	-	-	-	-	-
Post-transfusion /11th day	9.8	29	6.9	370	0.44	390	19	-	-	Negative	Positive	-	-

Table-1: Pre-transfusion and post-transfusion CBC,Biochemistry and Immunohematology test results.

PP-49

WHY ARE STUDENTS IMPORTANT IN RECRUITING WOMEN AND FIRST BLOOD DONORS?

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AIM: Introduction: Voluntary blood donation rate in the World and Turkey is lagging behind the needs. For this reason, it is important to conduct acquisition studies for new donors and groups that are lacking in blood donation behavior in increasing voluntary blood donation [1,2]. Referring to Turkey statistics, 29% of the rate of new blood donors, and donors ratio of women is seen to be 16% [3,4]. In European countries, the rate of women donors (such as Australia (49.9%), France (46.6%)) and the first donor rates (35-81%) are higher than our country [1,5]. For this reason, the "Lifeguard Schools Project" between the Turkish Red Crescent Mersin Blood Donation Center and Mersin Provincial Directorate of National Education is important as a sustainable program and an example of cross-sectoral collaboration efforts for women and the first donor recruitment. Objective: The aim of the project is to raise awareness among school administrators, teachers, students and parents on the importance of voluntary and permanent blood donation and to increase the rate of new and female donors.

MATERIALS & METHODS: The study was conducted in the form of 124 blood donation campaigns with 104 schools in total during the 2018-2020 academic year. A week before the blood donation campaign in the schools where the study was carried out, the Red Crescent Mersin Blood Center, the blood donor recruitment specialists, provided 30-minute "The Importance of Voluntary Blood Donation" training to the school teachers. Afterwards,

the teachers were asked to inform their students about their blood donation, to explain this information to their parents and to fill out the "Blood Donation Parent Information and Participation Form for Blood Donation Campaign" with their parents. In this way, parents were given preliminary information about voluntary blood donation and campaign through students. A week later, the Red Crescent blood collection team came to the school and donated blood from volunteer teachers and parents.

RESULTS: As a result of the study, 110,217 students were informed. Following the informations, 9569 people applied to donate to blood donation campaigns in schools, and blood donations were obtained from 7,404 people who met the conditions suitable for blood donation. 32% of the people who donate blood are women and 43% are the first donors.

CONCLUSION: While the blood donation informations in schools create awareness among students and parents, the first and female blood donors have a positive effect on recruıtment.

KEYWORDS: Blood Donations, First Time Donors, Students, Woman Donors

PP-50

THE ANALYSIS OF BLOOD DONORS REJECTION IN 2017-2018 AT BURSA ULUDAG UNIVERSITY FACULTY OF MEDICINE

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AIM: To evaluate the blood donor rejections and the reasons in our hospital blood bank between 2017-2018. We also evaluate whether the rejection is mostly before or after the donation.

MATERIALS & METHODS: All data were analyzed retrospectively from the hospital information system, blood center records and blood center archive.

RESULTS: The main results of blood donors and donations are summarised at table-1. Thirty-two per cent of all donor candidates (before and after blood donation) were rejected. The rejections before donation were significantly higher than the rejections after donation. The temporary rejection was higher than the permanent rejection (Table-2). While hemogram results were the main cause of rejections before blood donation, it was microbiological screening tests (MST) after donation (Table-3). While 11,3% of candidates were rejected due to hemogram results, 19,9 % were rejected through donor questionary (diseases, travel, drug, vaccination, age and other) (Table-3).

CONCLUSION: We eliminate approximately 1/3 of candidates during donor selection. Hemogram and the donor questionary play the biggest part in this elimination. Although we can not entirely trust the information that has been gotten through donor questionary, it is still the most valuable way in donor selection. In our blood center, 19,9% of candidates are rejected by this questionary. That means the donors who came for donation do not entirely have the knowledge of the process. Public education about blood donation would be important. (* They are 6th-year medical students. They all participated equally in this study)

KEYWORDS: Blood Donation, Blood Donor, Rejection

Table-1: Summary of blood donors and donations

	Number	%
Blood Donor Candidates	68947	100,00%
Rejected Blood Donors	22165	32,15%
Blood Donation*	47448	68,82%

*Includes "Rejection After Donation"

Table-2: Rejections Before and After Donations

	Number	%	Temporarily		Permanently	
			Number	%	Number	%
Rejection Before Donation	21499	97,00%	20738	93,56%	761	3,43%
Rejection After Donation	666	3,00%	200	0,90%	466	2,10%
Total	22165	100,00%	20938	94,46%	1227	5,54%

Table-2: Rejection Details

	REJECTION BEFORE BLOOD DONATION				
	TOTAL	TEMPORARYLY		PERMANENTLY	
	Number	Number	%	Number	%
TOTAL	21499	20738	96,46%	761	3,54%
HEMOGRAM	7791	7791	36,24%	0	0,00%
DISEASES	2501	1889	8,79%	612	2,85%
TRAVEL	862	846	3,94%	16	0,07%
DRUG	2535	2495	11,61%	40	0,19%
VACCINATION	197	197	0,92%	0	0,00%
AGE	98	18	0,08%	80	0,37%
OTHER	7515	7502	34,89%	13	0,06%

	REJECTION AFTER BLOOD DONATION				
	TOTAL	TEMPORARYLY		PERMANENTLY	
	Number	Number	%	Number	%
TOTAL	666	200	30,03%	466	69,97%
MST	463	0	0,00%	463	69,52%
DAT	59	56	8,41%	3	0,45%
iAT	57	57	8,56%	0	0,00%
Syncope	87	87	13,06%	0	0,00%

MST-Microbological Screening Tests

PP-51

ANALYSIS OF DONOR REACTIONS IN BURSA ULUDAG UNIVERSITY FACULTY OF MEDICINE BLOOD CENTER

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AIM: To analyze adverse reactions of allogeneic blood donors in our blood center.

MATERIALS & METHODS: The donor reactions observed between 01.07.2019-31.12.2019 (six month) were analyzed retrospectively by examining the Hospital Information System and Blood Center records.

RESULTS: Both apheresis and whole blood donation procedures are performed in our center. In the maintened six-month, 15415 donors applied to our center and 12787 of them were accepted for blood donation according to National Donor Eligibility Criteria. The deferral rate for this period was determined as 17.05%. During this period, 21 donor reactions were observed and the reaction rate was 0.16%. All of the donor reactions detected in this period occurred during whole blood donation. 91.06% of blood donors were male (average age: 36) and 8.94% were female (average age: 36). Information about donor reactions are summarized in table-1.

CONCLUSION: It is observed that the rate of female donors (8.9%) in our general donor profile is low. But the rate of female donors (19%) was higher in donors with reactions. The average age of the donors with reaction was 36 in females and 27 in males. 16 of the total 21 reactions were identified as vasovagal and four of them as hypovolemic reaction, and one reaction could not be identified from the records. As a result, the most common reaction was vasovagal reaction. Our female donor rate is low in the general donor profile. Compared to the international literature, the rate of donor reactions detected in our center appears to be quite low. This may be due to careful donor assessment and phlebotomy procedures under safe conditions. But also may be caused by the lack of questioning and lack of recording of mild reactions like weakness, dizziness, pain in the phlebotomy area, etc. According to our findings in this study, female gender and low age in males was determined as risk factors in terms of donor reactions and was found to be compatible with international literature.

KEYWORDS: Blood Donation, Blood Donor Adverse Reactions, Vasovagal Reaction

Table-1

Gender	Age	Weight (kg)	TA (mmHg)	Pulse rate	Reaction
Female	52	70	90/60	56	Vasovagal
Female	21	60	90/60	95	Hypovolemic
Female	24	65	80/45	55	Vasovagal
Female	48	57	92/61	75	Vasovagal
Male	39	65	130/80	70	Vasovagal
Male	37	80	119/79	80	Vasovagal
Male	19	65	127/81	89	Vasovagal
Male	24	70	100/70	81	Hypovolemic
Male	34	98	95/65	72	Vasovagal
Male	18	63	80/50	65	Vasovagal
Male	28	80	80/50	67	Vasovagal
Male	30	98	110/70	89	Hypovolemic
Male	20	106	70/45	56	Vasovagal
Male	27	75	90/60	71	Vasovagal
Male	24	80	106/70	68	Vasovagal
Male	24	73	96/57	64	Vasovagal
Male	33	83	100/50	70	Vasovagal
Male	42	82	80/50	58	Vasovagal
Male	20	110	100/65	-	Vasovagal
Male	29	89	100/60	-	Unidentified
Male	22	89	106/66	83	Hypovolemic

Donor Reactions

PP-52

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF GADOPENTETATE USE ON CROSS MATCH TEST

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AIM: The radiopaque agents used in radiological imaging have chelation property. It is known that especially agents containing gadolinium affects some biochemical tests. Because of this potential of radiopaque agents, the cross match test can be affected by these molecules in the blood matrix. The aim of this study is to investigate the effect of radiopaque agents on cross match test.

MATERIALS & METHODS: Whole blood samples were randomly selected from A Rh +, A Rh-, B Rh +, B Rh-, AB Rh +, AB Rh-, O Rh +, and O Rh- blood groups. 100 uL gadopentetate was added to 3 ml of patient blood in the sample tube with EDTA and homogenous mixing with rotator was performed. Cross match tests were measured by column agglutination method on Ortho AutoVue analyzer (Johnson & Johnson Ltd.) and repeated 3 times for each blood group.

RESULTS: A Rh +, A Rh-, B Rh +, B Rh-, AB Rh +, AB Rh-, O Rh + and O Rh- blood groups were tested only after the addition of gadopentetate with donor blood. +1 positive incompatibility was detected in the A Rh + blood group. Other blood groups were determined compatible.

CONCLUSION: Radiopaque agents are known to cause interference in many tests. In this study, gadopentetate affected the cross match test in the A Rh + blood group and led to as +1 positive incompatibility. A false positive cross match test may cause unnecessary cross match repetition and late transfusion. Only the incompatibility detected in the A Rh + blood group may be due to the chelation of gadolinium by A group antigen. For repeated cross match tests, it should be questioned that the patient has received radiopaque agent. The repetition of the cross match test should be performed by new blood sample after the radiopaque is eliminated from the patient's blood.

KEYWORDS: Blood Group, Column Agglutination, Gadopentetate, Interference

PP-53

INVESTIGATION OF THE EFFECT OF IOVERSOL AND IOHEXOL ON COOMBS TESTS

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AIM: The ioversol and iohexol compounds used in radiological imaging can absorb X-ray rays. These compounds have variable side effects ranging from urticaria to anaphylaxis. At the same time, it is also known that these substances affect biochemical test results after parenteral infusion. However, it is not known the effects of radiodiagnostic substances on the direct and indirect coombs. The aim of this experimental study was to investigate the effect of two different iodine containing radiodiagnostic agents on indirect and direct coombs results.

MATERIALS & METHODS: Whole blood samples were randomly selected from A Rh +, A Rh-, B Rh +, B Rh-, AB Rh +, AB Rh-, O Rh +, and O Rh- blood groups. 100 uL ioversol and iohexol was added to 3 ml of patient blood in the sample tube with EDTA and homogenous mixing with rotator was performed. Direct and indirect coombs tests were performed by column agglutination method on Ortho AutoVue analyzer (Johnson & Johnson Ltd.) and repeated 3 times for each blood group.

RESULTS: A Rh +, A Rh-, B Rh +, B Rh-, AB Rh +, AB Rh-, O Rh + and O Rh- blood groups were tested after the addition of ioversol and iohexol. +1 positive incompatibility was detected in the direct coombs test in the B Rh + blood group concerning addition of ioversol and +1 positive incompatibility was determined in the indirect coombs test in the A Rh + blood group concerning addition of iohexol. Other blood groups were determined compatible.

CONCLUSION: Radiopaque agents are known to cause interference in many tests. In this study, ioversol and iohexol affected the direct and the indirect coombs test in the A Rh + and B Rh + blood group. A false positive coombs test may cause false diagnosis and unnecessary treatment. it should be questioned that the patient has received radiopaque agent in a suspicious result of coombs tests.

KEYWORDS: Coombs Test, Column Agglutination, Ioversol, Iohexol, Interference

PP-54

SEROPREVALENCE OF HEPATITIS B, HEPATITIS C AND HUMAN IMMUNODEFICIENCY VIRUS INFECTIONS AND SYPHILIS IN BLOOD DONORS

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AIM: Blood transfusion is one of the most important therapeutic options of life-saving intervention for many diseases or conditions with severe blood loss. However, it is associated with certain risks which can lead to adverse consequences that may cause acute or delayed complications and bring the risk of transfusion-transmissible infections including HIV, Hepatitis B ,C and Syphilis. World Health Organisation (WHO) has endorsed regular blood donation and volunteer donors for safe blood procurement. With strict selection criterias, improvements in screening test and usage of advanced methods transfusion transmitted infection risks decreased gradually. In our country, it was started to screen HbsAg from 1983, anti-HIV from 1985 and anti-HCV from 1996. We aimed to obtain the seroprevalence of HBsAg, anti-HCV, anti-HIV, RPR and to assess their rates according to time in blood donors.

MATERIALS & METHODS: HBsAg, anti-HCV, anti-HIV and VDRL-RPR results of 5529 blood donors from January 1, 2018 to December 31, 2019 admitted to Koşuyolu High Specialization Training and Research Hospital were evaluated retrospectively. Data obtained from Hospital Information Processing Module in Transfusion Center System. HBsAg, anti-HCV, anti-HIV screening were done by macro ELISA method (Cobas E601, Roche Diagnostic, Germany) and anti syphilis antibodies were done by RPR (Syphilis Rapid Test Device, Eco- test, China) methods in eligible donor blood samples .Prevalence of HBsAg, anti-HCV, anti-HIV, and VDRL-RPR were investigated by years.

RESULTS: 5119 (93%) of the 5529 donors were male and 410 (7%) were female. The age range of the donors was between 18 and 64 years, and the mean age was 31.55±8.94. HBsAg was positive in 16 (0.2%), anti-HCV in 16 (0.2%), anti-HIV in 6 (0.1%) and RPR in 16 (0.2%) donors. Among anti HIV positives 2 were performed Western Blot and resulted non reactive. Remaining 4 were not reached to obtain specimen for confirmation.

CONCLUSION: In conclusion, there is a decline in anti HCV results by years and it is presumably result of new therapeuetic modalities that could provide whole cure of the disease. HbsAg levels persisted at same rates. We suggest that more attention should be given paid providing health education concerning risk factors and prevention of HBV, HCV and HIV infections to the general public.

KEYWORDS: Blood Donors, Hepatitis B, Hepatitis C, Human Immunodeficiency Virus

Table 1.

Years	Donor numbers	HbsAg (%)	Anti HCV(%)	Anti HIV (%)	VDRL-RPR (%)
2018	2965	8 (0,2)	13 (0,4)	1 (0,03)	6 (0,2)
2019	2564	8 (0,3)	3 (0,1)	5 (0,1)	10 (0,3)
TOTAL	5529	16 (0,2)	16 (0,2)	6 (0,1)	16 (0,2)

Donor numbers and HBsAg, anti-HCV, anti-HIV, and VDRL-RPR rates by years.

PP-55

OUR SCREENING TEST RESULTS IN CARDIOTHORACIC SURGERY HOSPITAL

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AIM: Donor screening tests for infectious diseases are obligatory for safe transfusion.In this study, we aimed to investigate the results of four-year microbiological screening tests in blood donors in a cardio –thoracic surgery hospital.

MATERIALS & METHODS: The screening test results of donors who atended to the Transfusion Center of Istanbul Dr.Siyami Ersek Thoracic and Cardiovascular Surgery Training and Research Hospital between January 2015 and December 2018 were analyzed retrospectively. HBsAg, Anti-HCV, Anti-HIV and Total Syphilis AB (TSA) tests were assayed by chemiluminescent microparticle enzyme immunoassay method in Architect i1000 System (Abbott Diagnostic, USA).

RESULTS: Total 10776 blood donations were done during the four-year period. Sex distribution of blood donors are shown in Table 1. 3782 men, 257 women in 2015, 2974 men, 58 women in 2016; 1901 men and 5 women in 2017, in 2018 all of 1799 blood donors were men. 4039 samples are studied in 2015; the number of reactive samples were as follows; 21 for HBsAg test, 13 for Anti-HCV test, 6 for Anti-HIV test, and 15 for TSA test. The number of reactive results among the 3032 tests studied the year 2016 was 10, 8, 2 and 9, respectively. In 2017, the number of reactive samples in screening tests from 1906 blood donors were 8 for HBsAg, 9 for Anti-HCV, 2 for Anti-HIV and 3 for TSA. The number of samples detected as reactive in the screened donors in 2018 were; 5, 5, 1 and 8 respectively (Table 2). The number of women donors in the past two years is not enough to compare the reactive test rates between sexes. However, for 2015 and 2016 no significant difference was found in the reactive test rates between the female donors and male donors.

CONCLUSION: The microbiological screening test positivity rate found in donors of our Transfusion Center was lower than the rates from previous studies of our country. This showed us that donors have become more conscious over the years and that the questions in the inquiry form used before donation are examined more effectively. Thus, a more cost-effective study was obtained. In addition, loss of labor was minimized. Although our reactive screening test rates have decreased, we think that studies should be continued without interruption in order to monitorig these numbers.

KEYWORDS: Anti-HCV, Anti-HIV, Donation, Hbsag, Syphilis

Table 1: Sex distribution of donors by years

	Women (%)	Men (%)	Total (%)
2015	257 (6,36)	3782 (93,64)	4039 (37,48)
2016	58 (1,91)	2974 (98,09)	3032 (28,14)
2017	5 (0,26)	1901 (99,74)	1906 (17,69)
2018	0	1799 (100)	1799 (16,69)
Total	320 (2,97)	10456 (97,03)	10776 (100)

Table 2: Distribution of reactive test results by years

	Reactive Tests	Reactive Tests	Reactive Tests	Reactive Tests	Total Tests
	HBsAg (%)	Anti-HCV (%)	Anti-HIV (%)	TSA (%)	
2015	21 (0,52)	13 (0,32)	6 (0,15)	15 (0,37)	4039 (37,48)
2016	10 (0,33)	8 (0,26)	2 (0,07)	9 (0,30)	3032 (28,14)
2017	8 (0,42)	9 (0,47)	2 (0,10)	3 (0,16)	1906 (17,69)
2018	5 (0,28)	5 (0,28)	1 (0,06)	8 (0,44)	1799 (16,69)
Total	44 (0,41)	35 (0,32)	11 (0,10)	35 (0,32)	10776 (100)

PP-56

ADVENTURE OF THE BLOOD

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[1]Denizli State Hospital

AIM: The aim is to demonstrate the process from the admission of Red Crescent's Erythrocyte Suspensions (ES) to Denizli State Hospital Transfusion Center or the period until destruction, screenings, a distribution based on blood groups; and how the data is affected by stock levels.

MATERIALS & METHODS: The cross-match/transfusion rates of ES that are accepted in stocks, average stock days of ES, destruction numbers, average stock days of destructions and cross-match/destruction rates have been evaluated based on blood groups between January 2019-2020. Maximum Stock Levels (MSL) were determined by the ES consumption rates for the first six months. In the second six-month period, while placing an order from Regional Blood Center to Transfusion Center stocks, it was decided not to exceed MSL.

RESULTS: 12.954 ES in number were transfused while 83 of ES was destructed in one year. The cross/transfusion rate of transfused ES was 2 and turned into transfusion after 6 days. The destruction number was 83 (0.6%), the cross-transfusion rate of destructions was 2; however, the average stock days were 23. The most commonly transfused group was A Rh (+) by 4.927 (38%), while the highest destruction rate belonged to AB Rh (-) by 29 (35%) (Table 1). The average stock period was 30 days in the destroyed blood of AB Rh (-), however, the cross-match test performed at an average of 1 (Table 2). 1. When transfusion and destruction rates of the first six-month and second six-month were evaluated, the results below were obtained: 6. 327 transfusions were performed and 62 (0,92%) ES were destructed in the first six months while there were 6.627 ES transfusions and 21 (0,31%) destructions in the second six-months period (Table 3).

CONCLUSION: For each blood group, the Maximum Stock Level should be set. If the stocks are in line with the needs, the number of tests and destructions will be reduced so the costs will be quite low. However, while placing an ES order for the rarest types such as AB Rh (-) and B Rh (-), clinicians should be cautious and opt for reserving to prevent the blood from destruction. In conclusion, the adventure of the blood depends on multiple parameters such as the accurate amount of demand from TC, the time in RBC, and the avoidance of unnecessary blood orders.

KEYWORDS: Adventure, Cross/Transfusion, Erythrocyte Suspension

Table 1: Group Distribution of Transfused Erythrocyte Suspensions

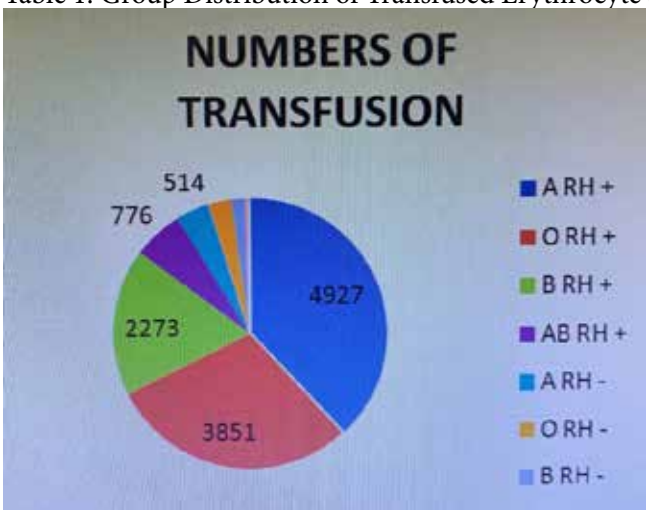

Table 2: Group Distribution of Data of Transfused and Destroyed Erythrocyte Suspensions

Blood Group	Transfusion Number	Cross/ Transfusion	ADS* Transfusion	Destruction number	Cross/ Destruction	ADS* Destruction	Destruction Total %
A RH+	4927	2	5	4	2,5	13	0,08
O RH+	3851	2	5	25	3	14	0,64
B RH+	2273	2	6	4	3,5	25	0,17
AB RH+	776	2	9	8	2	24	1
A RH-	514	2	6	6	3	26	1,1
O RH-	347	2	8	1	1	8	0,28
B RH-	215	2	7	6	2	33	2,7
AB RH-	51	2	11	29	1	30	36

ADS* Transfusion:*Average Days of Stock

Table3:The Comparison of ES Transfusion and Destruction Rates Between the First and Second Six-Months Period

TIME	TRANSFUSION	DESTRUCTION	DESTRUCTION %
JANUARY-JUNE 2019	6327	62	0,92
JULY-DECEMBER 2019	6627	21	0,31

PP-57

THE CAUSES OF BLOOD AND BLOOD PRODUCTS DESTRUCTION: EXPERIENCE FROM A CITY HOSPITAL

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[1]City Hospital Transfusion Centre/ Bursa

AIM: Transfusion centers are units that are not authorized to collect blood from the blood donor except for emergency situations. In order to prepare for use in patients, these centers procure the blood and its components from the connected regional blood centers (RBC) and perform cross-matches and necessary tests for transfusion. These centers are obliged to store the blood and blood products under proper storage conditions and in accordance with critical stock levels and needs. This study aims to evaluate the blood products usage and destruction rates of Bursa City Hospital transfusion center within the first 5 months.

MATERIALS & METHODS: Data from the city hospital data processing module, department registers and monthly invoices issued from Kızılay were examined in this study; no statistical analysis was employed.

RESULTS: Between July 2019 and December 2019, 5823 erythrocyte suspension (ES), 2204 fresh frozen plasma (FFP) and 449 pooled platelet (PP) suspensions were supplied from RBC. During this period, 14519 cross-match tests were performed in our center and 5749 ES transfusions were performed. Sixty-six ESs were destroyed. Destruction rate was 1.33%, while the cross-match / transfusion rate was 2.55. The underlying reasons for ES destruction showed that 75% of product destructions (50 out of 66) were due to date expiration. 7.5% of destructed products (n=5) were left out of the cold chain for more than 30 minutes. 7.5% (n=5) of the set product was opt out even though ordered for a certain patient and 4.54% of destructions (n=3) were a result of bag perforation. In this time frame, 26 (1.8%) out of 2204 FFPs and 16 (3.6%) out of 449 PPs were destroyed. Sixteen (61.5%) of 26 FFP were destroyed due to deterioration of bag integrity and 10 (38.5%) of them were disposed of non-usage within 24 hours of meltdown. All destroyed pooled platelet suspensions were due to the expiration date.

CONCLUSION: In our transfusion center, which was opened within a new city hospital only 26 weeks ago, ES and FFP stocks are adjusted by documentation of previous usage and PPs are processed by supplying from RBC upon request. Our ES destruction rates and cross comparison / transfusion rates are relatively high. This may due to large number of reservations of ES up to 4 days for upcoming surgeries. Moreover, it is apparent that a more careful and individual approach is needed to reduce the destruction of PPs. Attempts have been made to take the necessary measures and further results are expected to be examined for long-term solutions

KEYWORDS: Blood, Destruction, Expiration, Stock, Storage, Transfusion

PP-58

DETERMINATION AND MINIMIZATION OF WASTAGE RATES OF BLOOD AND BLOOD PRODUCTS IN KOCAELI STATE HOSPITAL

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AIM: Human being the only source, blood and blood components are invaluable products that cannot be wasted. The blood and blood products (packed red cells, plasma and platelets) used in our hospital are supplied by the Turkish Red Crescent, Western Black Sea Region Blood Center. This study investigates the wastage rates of the blood and blood products used in our hospital within the last two years. After determining the wastage rates of the blood and blood products in our hospital, we aimed to minimize the wastage rates.

MATERIALS & METHODS: The records kept by the Transfusion Center of Kocaeli State Hospital in years 2018 and 2019 were scanned, blood and blood products wastage rates were evaluated in three month periods. The causes of blood wastages were determined.

RESULTS: Table 1 depicts the blood wastage rates for years 2018 and 2019. The wastage rates in 2018 were 3.1% (110/3551) for the January-March period, 1.7% (54/3173) for the April-June period, 1.0% (28/2738) for the July-September period and 0.8% (25/3037) for the October-December period. The average wastage rate for 2018 is 1.7% (217/12499). The wastage rates in 2019 on the other hand were 0.5% (17/3061) for the January-March period, 0.4% (13/3067) for the April-June period, 0.5% (16/2866) for the July-September period and 0.5% (14/2809) for the October-December period. The results reveal a dramatic decrease in blood wastage rate from 1.7% in 2018 to an average 0.5% (60/11803) in 2019. The main causes for the blood wastage were determined to be the time expiry, blood medically or surgically ordered but not used, torn bag, lack of transport personnel and cabinet failure.

CONCLUSION: The results reveal a noticeable reduction in our blood wastage rates. A number of measures were taken to reduce the wastage rates. Blood reservations requests were asked to be made 24 hours in advance. Reservations were allowed to drop from the system after 3 days excluding Orthopedic Clinic reservations. Expiry date and stock control were performed daily. To monitor cabinet failures, audible and e-mail warning systems were adapted. Only authorized personnel were allowed to transport blood/blood product within the hospital. Training was provided to clinical staff on safe transport and storage of blood products. We have achieved significant gains by establishing a communication channel between all private and public hospitals in our province for inter-changing blood products upon need to reduce wastages.

KEYWORDS: Blood and Blood Products, Blood Wastage Rate, Kocaeli State Hospital

Table 1 - Blood wastage rates for years 2018 and 2019

	2018	2019
January – March	3.1% (110/3551)	0.5% (17/3061)
April – June	1.7% (54/3173)	0.4% (13/3067)
July – September	1.0% (28/2738)	0.5% (16/2866)
October - December	0.8% (25/3037)	0.5% (14/2809)
Total	1.7% (217/12499)	0.5% (60/11803)

Table 1 - Blood wastage rates for years 2018 and 2019

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CLINICAL BASED EVALUATION OF THE CROSS MATCH/TRANSFUSION RATIO BEFORE ELECTIVE SURGERY

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AIM: Part of the blood prepared by cross-match prior to elective surgery is possibly not used because it may not be needed during surgery. This results in a certain test cost. In addition, the reserved blood cannot be used for other patients for a certain period of time. This study aims to evaluate the cross match/transfusion ratios of surgical clinics at Kocaeli State Hospital and reduce the cross match/transfusion ratios to acceptable levels.

MATERIALS & METHODS: One year records of Kocaeli State Hospital Transfusion Center were analyzed retrospectively and cross match/transfusion ratios were calculated for various clinics. Being the busiest surgical clinics, orthopedics, general surgery, brain surgery, chest surgery and urology were selected for the analysis of the cross match/transfusion ratios.

RESULTS: The individual cross match/transfusion ratios were calculated as 2.8% for the orthopedics, 2.1% for the general surgery, 4.6% for the brain surgery, 3.4% for the chest surgery and 12.4% for the urology. Before surgical procedures, acceptable cross-match/transfusion ratio is typically below 2%. The cross match/transfusion ratios were determined to be higher than accepted levels in all clinics. It was determined that blood was cross-matched and then not used.

CONCLUSION: It was decided to reduce unnecessary blood preparation by asking all surgical clinics to submit maximum surgical schedules to the Transfusion Committee. Considering unnecessary costs and labor, training was scheduled for surgical clinics about the indications for transfusion and clinical use of blood.

KEYWORDS: Blood, Cross Match, Transfusion

Table 1 - Cross-match / transfusion ratios for various clinics

	Cross-match count	Transfusion count	Cross match / transfusion ratio
Orthopedics	2126	768	2.8%
General surgery	359	170	2.1%
Brain surgery	534	115	4.6%
Chest surgery	68	29	3.4%
Urology	311	25	12.4%

PP-60

EVALUATION OF BLOOD AND BLOOD PRODUCTS USED IN I.M.U GÖZTEPE E.R.H PEDIATRIC AND ADULT HEMATOLOGY CLINIC

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AIM: Blood transfusion is a life saving method which has no alternative. On the other hand, it may lead to complications with important risks. All over the world, blood usage is being attempted to be reduced in a controlled manner because of transfusion risks and difficulties which we meet each day with a gradually increasing rate in terms of obtaining blood. Blood transfusion is one of the most important complementary methods in medical treatment. In addition, it is a valuable product, because its source is only humans. Our aim was to investigate if blood and blood products used in the pediatric and adult hematology clinics in our hospital were being used rationally.

MATERIALS & METHODS: The data were examined retrospectively by using our hospital's information management system in computer environment. The rates of blood products used in the pediatric and adult hematology departments between the dates of 01/12/2018 and 30/11/2019 were calculated.

RESULTS: A total of 2364 blood and blood products were used in the pediatric hematology clinics. The following blood and blood products were used: 52% (1247) erythrocyte suspension (ES), 7,7% (184) fresh frozen plasma (FFP), 2,1% (51) cryoprecipitate, 8,8% (210) pooled platelet suspension (PPS), 28,3% (670) apheresis platelets (APLT) and 0,08% (2) apheresis granulocyte (AG) suspension. In the adult hematology clinic, 4419 blood and blood products (1,86-fold higher compared to the pediatric hematology clinic) were used: 51% (2254) ES, 24% (1081) FFP, 1,1% (50) cryoprecipitate, 8,5% (376) PPS, 14,7% (650) APLT and 0,18% (8) AG suspension (Table 1).

CONCLUSION: In this study, it was analysed if blood was being used rationally in the hematology clinics in our hospital. It was observed that ES and FFP were used most frequently. Considering that ES is used with a rate of 72% and FFP is used with a rate of 12% in countries with advanced transfusion medicine, we found that FFP was used excessively in the adult hematlogy clinic in our hospital. While pooled platelet usage was similar in both clinics, the rates of apheresis platalet usage and cryoprecipitate usage were found to be 2-fold higher in the pediatric hematology clinic.

KEYWORDS: Blood Usage, Blood Products, Hematology

Table 1

Blood Products Used	Pediatric Hematology Clinic %	Adult Hematology Clinic %
Erythrocyte Suspension	52	51
Fresh Frozen Plasma	7,7	24
Apheresis Platelet	28,3	14,7
Pooled Platelet	8,8	8,5
Cryoprecipitate	2,1	1,1
Apheresis Granulocyte	0,08	0,18

Blood Products Used in our Hematology Clinics

PP-61

EVALUATION OF BLOOD AND BLOOD PRODUCTS USED IN THE LAST TWO YEARS IN I.M.U GÖZTEPE E.R.H

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AIM: Blood is a live, unique, life-saving tissue composed of specific structures each having different functions. Its source is humans. Currently, the principle in modern blood banking is to give patients the blood products they need. The objective is to provide safe and efficient blood components which will be beneficial for the recipient. Blood transfusion is transplantation of tissue and even organ. Accurate clinical usage should be enabled and unnecessary transfusions should be avoided. In recent years, an increase has been observed in blood usage rates. However, it is not clear if these transfusions have been performed with accurate indications. This study aimed to specify usage of blood and blood products that were delivered by our transfusion center (TC) to wards in Istanbul Medeniyet University Göztepe Education and Research Hospital in the last two years by years.

MATERIALS & METHODS: The numbers and ratios of erythrocyte suspensions (ES), fresh frozen plama (FFP), apheresis platelets (ATS), apheresis granulocyte suspensions (AGS), pooled platelets (PPS), cryoprecipitates (CY), random platelets (RPS) and whole blood (WB) products used during all transfusions performed between December 01, 2017 and December 01, 2019 in our hospital, were examined retrospectively

RESULTS: It was found that use of all blood and blood products increased by 22% by years. When examined by products used, it was found that the highest increment occured in use of CY (1827%), AGS (400%), PTS (61,2%), APS (47,8%), FFP (41,5%) and ES (9,3%). While a reduction of 100% was observed in use of RPS, no change was found in use of whole blood. Table 1 shows the numbers of blood and blood products.

CONCLUSION: When we examined the blood and blood products used in our hospital between 2017 and 2019, we found that the rates increased in the second year, whereas a reduction was found only in use of RPS. This was related the fact that our hospital became a transfusion center and RPS was no longer produced. Stableness in use of whole blood was favorable. Emphasis on the importance of reducing use of whole blood in the trainings in our hospital had a great role. Is the annual increase of 22% in use of blood an actual need or inefficient use? As use of blood is gradually reducing in developed countries, the increase in our country is worrisome.

KEYWORDS: Blood Management, Bood Usage Rate, Hemovigilance

Tablo 1.

	2017 -2018 December	2018 -2019 December	INCREASE REDUCTION %
Erythrocyte Suspension	14278	15608	9,3
Fresh Frozen Plasma	4604	6518	41,5
Apheresis Platelet Suspension	1463	2163	47,8
Pooled Platelet Suspension	1014	1635	61,2
Cryoprecipitate	18	347	1827
Apheresis Granulocyte Suspension	3	15	400
Random Platelet Suspension	150	0	100
Complete Blood	7	7	-
The total incremen between December 2017 and December 2019.			22

Rates of Usage of Blood and Blood Products in the Last Two Years

PP-62

THE NUMBER OF UNNECESSARY CROSS MATCH TESTS

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AIM: Blood cross-matching (CM) is defined as a procedure to test recipient's blood against a donor's blood to make sure they are fully compatible. Excessive blood requests are a common problem. Complete compatibility tests between donors and recipients (cross-matching) are still conducted before blood transfusions are performed. The cross match to transfusion ratio (CM/TR) is an indicator that is used to gauge the appropriate use of services offered by the transfusion laboratory service. The aim of this study was to measure the cross match/transfusion ratio in Balıkesir.

MATERIALS & METHODS: Data was collected retrospectively during 11 months period (01.01.2019-31.11.2019) in Balıkesir State Hospital and Balıkesir Atatürk City Hospital. Patients who has erythroside suspension (ES) transfusion were identified through the transfusion services electronic database. This data was used to calculate the cross match/transfusion ratio. CM tests were performed by gel centrifugation (Across Gel Cross Match, Diapro).

RESULTS: İn Balıkesir State Hospital 6190 units of ES cross-matched, 4818 units were transfused; in Balıkesir Atatürk City Hospital 18285 units of ES cross-matched, 12974 units were transfused. Guidelines from the British Society of Haematology are based on a crossmatch to transfusion ratio of 2:1. The overall CM/TR was 1.3 in BSH and 1.4 in BACH. The CM/TR was less than 2 in all departments except Neurosurgery department both two hospital. (Table 1 and 2).

CONCLUSION: Using cross match/transfusion ratio for evaluation of efficiency of blood utilization, the practice in Balıkesir shows effective blood utilization in all departments except neurosurgery department. Reporting these results to the requesting physician is important.

KEYWORDS: Cross Match /Transfusion Ratio, Cross Match Test, Erythroside Suspension

CM/TR in Balıkesir State Hospital

Department	CM test	ES Transfusion	CM/TR
Orthopedia	1553	784	2
Adult ICU	1525	1441	1.1
Internal Medicine	1110	1076	1
Hematology	938	834	1.1
Neurosurgery	366	176	2.1
General Surgery	280	212	1.3
Urology	153	92	1.7
Other Departments	265	203	1.3
TOTAL	6190	4818	1.3

CM/TR in Balıkesir Atatürk City Hospital

Deparments	CM test	ES transfusion	CM/TR
Adult ICU	3124	2516	1.2
Orthopedia	2195	1312	1.7
Cardiovascular Surgery+ICU	2112	1207	1.7
İnternal Medicine	1754	1466	1.2
Gatroenterology+Nefrology	1523	1373	1.1
Neurosurgery	1293	359	3.6
Oncology	1256	1076	1.2
Hematology	776	744	1
Cardiology+ANJIO	751	697	1.1
Gynecology and Obstetrics	734	485	1.5
Urology	689	367	1.9
General Surgery	544	307	1.8
Chest Diseases+ ICU	227	203	1.1
Other Departments	1307	862	1.5
TOTAL	18285	12974	1.4

PP-63

TRANSFUSED BLOOD COMPONENT AGES IN BURSA ULUDAG UNIVERSITY FACULTY OF MEDICINE

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AIM: Our purpose is to analyze the age of blood components that are transfused in our hospital.

MATERIALS & METHODS: Data were obtained from records and information management system (IMS) of Bursa Uludağ University Faculty of Medicine, retrospectively.

RESULTS: All blood components which had been transfused in 2019 (n=47.327) were evaluated. Transfused blood components were whole blood (WB), erythrocyte suspension (ES), pediatric ES (pES), random thrombocyte suspension (rTS), pooled TS (pTS), apheresis TS (aTS), random granulocyte suspension (rGS), apheresis GS (aGS), fresh frozen plasma (FFP) and cryoprecipitate (Cryo). The ratio of transfused blood component types of all transfusions were respectively 45,3%, 0,9%, 0,4%, 0,9%, 9,6%, 6,8%, 0,4%, 0,1%, 35,0% and 0,5% (Table 1-3). Our results have shown that all blood components were used at an early age. For example, 54,7 % of ESs were transfused in their first week (Table-1), FFPs were transfused in first month (60,1%) (Table-2) and pTSs were transfused in first 2 day (69,1%) (Table-3).

CONCLUSION: We found that transfused blood component ages in our hospital are very close to the blood donation date. The reason for this is insufficient blood stocks. In our hospital, most of the blood donations are made by replacement donors, provided by the patient's relatives. Additionally, blood components are frequently produced according to the patient's requirements and are transfused immediately after donation. Systematic and steady blood donation country-wide through volunteer non-remunerated blood donors would provide better blood stock management.

KEYWORDS: Blood Component Ages, Transfusion, Blood Group

Table-1: Ages of transfused ESs and pESs.

Blood Component	ES	pES
In All Transfusions (%)	45,3%	0,9%
Transfused Components Age	**%**	**%**
0 day - 7 day	54,7%	45,1%
7 day - 14 day	22,6%	21,6%
14 day - 21 day	11,4%	25,5%
21 day - 28 day	6,5%	7,8%
28 day - 35 day	3,6%	0,0%
35 day - 42 day	1,2%	0,0%
Transfused Components Age	**Day**	**Day**
Mean	8,90	10,14
Minimum	0,14	0,61
Maximum	41,91	27,97

Table-2: Ages of transfused FFPs and Cryo.

Blood Component	FFP	Cryo.
In All Transfusions (%)	35,0%	0,5%
Transfused Components Age	**%**	**%**
0 month - 1 month	60,1%	18,6%
1 month - 6 month	36,4%	45,2%
6 month - 1 yıl	2,5%	25,3%
1 yıl - 2 yıl	0,8%	10,9%
2 yıl - 3 yıl	0,1%	0,0%
Transfused Components Age	**Day**	**Day**
Mean	45,03	160,1
Minimum	0,26	5,3
Maximum	886,23	558,3

Table-3: Age of transfused WBs, rTS, pTS, aTS, rGS and aGS

Blood Component	WB	rTS	pTS	aTS	rGS	aGS
In All Transfusions (%)	0,4%	0,9%	9,6%	6,8%	0,4%	0,1%
Transfused Components Age	**%**	**%**	**%**	**%**	**%**	**%**
0 day - 1 day	90,3%	14,1%	35,0%	38,7%	100%	100%
1 day - 2 day	5,9%	45,8%	34,1%	29,7%		
2 day - 3 day	2,2%	18,5%	18,9%	19,6%		
3 day - 4 day	1,1%	15,6%	9,5%	8,2%		
4 day - 5 day	0,5%	6,0%	2,5%	3,8%		
Transfused Components Age	**Day**	**Day**	**Day**	**Day**	**Day**	**Day**
Mean	0,49	2,03	1,56	1,55	0,52	0,24
Minimum	0,04	0,30	0,00	0,00	0,16	0,96
Maximum	4,09	5,00	4,62	4,99	0,99	0,96

PP-64

DOES CROSS-MATCH FROM MOTHER'S BLOOD PREVENT HEMOLYSIS IN NEWBORN TRANSFUSIONS?

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AIM: Neonatal ABO grouping differs from adult ABO grouping. Neonatal ABO red cell antigens may be poorly expressed, neonatal immune system is naive and the corresponding ABO red cell antibodies are not usually well-developed. This practice must be maintained until the antibody disappears from the neonate's circulation. The cross-match is mandatory in the case of transfusions following a first one, even when the direct antiglobulin test and/or search for irregular antibodies was initially negative. The packed red cells must be the same ABO/Rh group or a group compatible with the neonate and the mother's serum/plasma.

MATERIALS & METHODS: All infants (ykrk303months old) at Ümraniye Education and Research Hospital who received a RBC transfusion from January 2018 to December 2019 were included and RBC transfusion data were recorded. Children and mother blood group types were analyzed. The crossmatch test made from mother's blood in all transfusions. If cross match is inappropriate, indirect coombs and subgroup analysis was done.

RESULTS: A total of 396 neonates received 1400 RBC transfusions. Most transfusions were performed in the neonatal intensive care unit (n:772), pediatric intensive care unit (n:352) and pediatric cardiovascular surgery unit (n: 272). In 36 mothers, indirect coombs positivity was detected. Anti-D in 29 babies and C, c, E, Lewis A incompatibilities in other 7 babies.

CONCLUSION: Antibodies of the mother are important in newborn transfusions. These antibodies pass to the baby can cause hemolysis. Maternal IgG ABO antibodies may be detectable in the neonatal plasma and it is recommended that maternal serum/plasma is used for the search for irregular erythrocyte antibodies and/or cross-matching at the first transfusion; when maternal serum/plasma is not available, the pre-transfusion tests can be performed only on the neonate's serum/plasma although, if the direct antiglobulin test is positive, it is preferable to use the eluate obtained from the RBC rather than the neonate's serum/plasma. In cases in which the direct antiglobulin test and/or search for irregular antibodies are positive, cross-matching must always be performed, through the indirect antiglobulin test, using the mother's serum/plasma (at the first transfusion) and/or eluate of the neonate's RBC and/or the neonate's serum/plasma. Cross-match and indirect coombs analysis should be performed

KEYWORDS: Crossmatch, Hemolysis, Neonatal, Transfusion

PP-65

ANNIHILATION RATES AND CAUSES OF BLOOD AND BLOOD PRODUCTS IN KOŞUYOLU HIGH SPECIALIZATION TRAINING AND RESEARCH HOSPITAL

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AIM: Obtaining blood and blood products are hard and costly procedures. Furthermore, because depending of the volunteering basis we could not predict the maintainability. It's crucial to keep under favourable conditions these products for supporting to patients in timely manner. We aimed to present annihilation rates and causes of blood and blood products and evaluate initiative of improvements on annihilation rates.

MATERIALS & METHODS: From January 1, 2018 to December 31, 2019 we analysed annihilation numbers of whole blood (WB), concentrate red blood cell (CRBC), fresh frozen plasma (FFP), pooled platelet concentrates (PPC), apheresis platelet concentrate (APC) and cryoprecipitate in Koşuyolu High Specialization Training and Research Hospital Transfusion Center retrospectively. Data obtained from Hospital Information Processing Transfusion Center Module.

RESULTS: Table 1. shows utilisation and annihilation numbers and rates of blood and blood products by years. The highest rate was seen in 2019 by %4 (n: 1024). In 2018 annihilation rate was accounted for %0,8 (n: 262). In table 2. causes of annihilation shows the highest rates by %71 (n: 183) in inappropriate storage medium in 2018 and by %56 (n: 575) product out of date in 2019. In 2018 utilization rate is much more than 2019 on the other hand annihilation rate is higher in 2019.

CONCLUSION: It's obvious that our annihilation rates increased according to 2018. This can be explained by a newly established "Haemovigilance Team" efforts about education, monitoring, follow-up, audit and feedback of all transfusion steps. Also product out of date, usage defects and inappropriate storage medium constituded first three causes of annihilation in 2019 (%56, %19 and %16 respectively). In conclusion rational blood utilization, incorporating with clinicans to support on the date and persistence of transfusion practice educations are crucial to decrease annihilation of blood and blood products.

KEYWORDS: Annihilation Causes, Blood And Blood Products, Storage Medium

Table 1.

	WB	CRBC	FFP	PPC	APC	Cryoprecipitate	Annihilation number	Utilization number	%
2018	127	43	53	36	2	1	262	32670	0,8
2019	30	281	302	346	20	41	1024	25137	4

Annihilation rates of blood blood products by years

Table 2.

	Splitting	Usage defect	Contain lipit	Product out of date	Contain clot	Inappropriate storage medium	Rupture of bag	Reaction occured	TOTAL
2018 (%)	1 (0,3)	1 (0,3)	-	70 (27)	1 (0,3)	183 (70)	5 (2)	1 (0,3)	262
2019 (%)	7 (0,7)	201 (19)	8 (0,7)	575 (56)	7 (0,7)	170 (17)	56 (5)	-	1024

Causes of annihilation

PP-66

UTILIZATION OF FRESH WHOLE BLOOD RATES IN KOŞUYOLU HIGH SPECIALIZATION TRAINING AND RESEARCH HOSPITAL

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AIM: Fresh whole blood defines "a pending whole blood less than 24 hour". To enhance oxygen carrying capacity, compansate volume deficit and maintain the haemostasis, whole blood can utilize during 6-8 hours after obtaining from donor. Because of many disadvantages of whole blood ,there is no usage indication in modern transfusion medicine except open heart surgery, exchange transfusion and massive bleeding. Besides this, whole blood utilization is still going on as our center is a cardiovascular surgery hospital. Here, we aimed to present whole blood usage rates.

MATERIALS & METHODS: From January 1, 2018 to December 31, 2019 we analysed whole blood numbers and rates in Koşuyolu High Specialization Training and Research Hospital Transfusion Center retrospectively. Data obtained from Hospital Information Processing Transfusion Center Module.

RESULTS: Table 1. shows all blood / blood products and whole blood utilization rates. In 2019 whole blood rates decreased to %1,7 (n:449) whereas it has remained at %2,5 (n: 842). While all blood / blood products utilization number was 32670 in 2018, it decreased to 25137 in 2019 despite operation numbers increased .

CONCLUSION: Mainly volume loading, alloimmunisation to leukocyte and platelet antigens, depending on plasma contents increasing the allergic reaction probability are disadvantages of whole blood transfusions. Apart from this, there is a huge effort to decrease all blood and blood products in globally because of procurement difficulties, high costs and both contrabuting to mortality and morbidity. In some special circumstances as cardiovascular surgery patients, we could take a patient-based action and could keep on minimum levels of blood utilisation as we can. In this respect, we conclude that our utilization rates promising by years.

KEYWORDS: Cardiac Surgery, Massive Transfusion, Whole Blood

Table 1.

Years	Whole blood (%)	All blood /blood product
2018	842 (%2,5)	32670
2019	449 (%1,7)	25137

Table 1. All blood /blood products and whole blood utilization rates

PP-67

PROSPECTIVE STUDY OF THE PATIENTS WITH EXCESSIVE ACENOCOUMAROL AND WARFARIN ANTICOAGULATION

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AIM: The aim of this prospective study was to analyze the patients treated with oral anticoagulant (OAT) therapy who had one or more INR values greater than 5.

MATERIALS & METHODS: The treatment was carried out on 215 patients with an average age of 64.4 years, women were 102, or 47.4%, and male, 113 or 52.6% who were monitored at 12-month period in National Blood Transfusion Centre of Kosovo (NBTCK) in Pristine, for the incidence of INR> 5 in 109 patients treated with Acenocoumarol and 106 with Warfarin.

RESULTS: From the study group treated with OAT with different morbidity, only 45 (20.9%) cases had one or more values of INR> 5. Out of 3347 tests of INR values, 67 INR values or 2% were higher than 5. The incidence of tests with INR values of 5-6 was 1.3%, and the tests with INR values from 6 to 13 were 0.7 %. The mean value of 67 tests of INR>5 tests was 6.2 with minimum and maximum INR values of 5 to 13. Females used to have more INR>5 than males (64.4% respectively 35.6%). There was no significant difference between patients treated with Acenocoumarol and Warfarin who had INR> 5 (48.9% and 51.1% respectively). From 45 patients with INR> 5, 71.1% of them had INR level from 5 to 6 and 13 or 28.9% of patients had INR level above 6. There were 26.7% of patients with mitral and aortic valve surgeries 42.2% with rhythm disorders (arrhythmia and MI, arrhythmia and CMP, arrhythmia and HTA and AF), and 17.8% with cerebrovascular ischemia (ICV) which had INR> 5. Patients with INR> 5 were present in the age group 50-69 years and in the age group over 70 years (62.2% respectively 28.9%), while in the age group below 50 years it was present in only 8.9%. There was no significant difference between patients with INR> 5 treated with Acenocoumarol and Warfarin. But was the significant difference (p>0.5) between females and males age patients with INR> 5. Females were younger than males (average 61.97 respectively 65.81 years).

CONCLUSION: We may conclude that the management of oral anticoagulant therapy with Acenocoumarol and Warfarin in our country is in accordance with relevant recommendations, reaching satisfactory control of anticoagulation, taking into account the association with other diseases and overdosing level.

KEYWORDS: Acenocoumarol, Inr, Warfarın

Table 1. Incidence of INR>5 in patients treated with OAT

Variables	INR 5-6	INR 6-13	INR>5
No of patients	32	13	45
Frequency % of patients	71.1	28.9	100
No of values (3347) with INR>5	42	25	67
Incidence % INR>5	1.3	0.7	2.0

Variables INR 5-6 INR 6-13 INR>5 No of patients 32 13 45 Frequency % of patients 71.1 28.9 100 No of values (3347) with INR>5 42 25 67 Incidence % INR>5 1.3 0.7 2.0

Table 2. Treated patients with Acenocoumarol and Warfarin with INR>5 according to gender divided in two groups (group with 1 value of INR>5 and group with 2-5 values with INR>5)

	Acenocoumarol	Acenocoumarol	Female	Female	Male	Male
1-5 value with INR > 5	No	%	No	%	No	%
group with 1 value of INR>5	14	63.6	8	53.3	6	85.7
group with 2-5 values	8	36.4	7	46.7	1	14.3
Total	22	100	15	100	7	100
p<0.05	Patients treated with Acenocoumarol	48.9	Female	68.2	Male	31.8
	Warfarin	Warfarin	Female	Female	Male	Male
1-5 value with INR > 5	No	%	No	%	No	%
group with 1 value of INR>5	15	65.2	9	64.3	6	66.7
group with 2-5 values	8	34.8	5	35.7	3	33.3
Total	23	100	14	100	9	100
p<0.05	Patients treated with Warfarin	51.1	Female	60.9	Male	39.1
	Total patients with OAT	Total patients with OAT	Female	Female	Male	Male
1-5 value with INR > 5	No	%	No	%	No	%
group with 1 value of INR>5	29	64.4	17	58.6	12	75
group with 2-5 values	16	35.6	12	41.4	4	25
Total	45	100	29	100	16	100
p<0.05			Tot Female Treated with OAT	64.4	Tot Male Treated with OAT	35.6

1-5 value with INR > 5 Acenocoumarol F M No % No % No % group with 1 value of INR>5 14 63.6 8 53.3 6 85.7 group with 2-5 values with INR>5 8 36.4 7 46.7 1 14.3 Total 22 100.0 15 100.0 7 100.0 p<0.05 48.9 F 68.2 M 31.8 1-5 value with INR > 5 Warfarin F M Nr % Nr % Nr % group with 1 value of INR>5 15 65.2 9 64.3 6 66.7 group with 2-5 values with INR>5 8 34.8 5 35.7 3 33.3 Total 23 100.0 14 100.0 9 100.0 p<0.05 51.1 F 60.9 M 39.1 1-5 value with INR > 5 Total with OAT F M Nr % Nr % Nr % group with 1 value of INR>5 29 64.4 17 58.6 12 75.0 group with 2-5 values with INR>5 16 35.6 12 41.4 4 25.0 Total 45 100.0 29 100.0 16 100.0 p<0.05 64.4 35.6

Table 3. Treated patients with Acenocoumarol and Warfarin with INR>5 according to diagnosis

	Total	Total	Acenocoumarol	Acenocoumarol	Warfarin	Warfarin
Diagnosis	No	%	No	%	No	%
ICV	8	17.8	7	31.8	1	4.3
Arrhuthmia and HTA	6	13.3	3	13.6	3	13.0
Arrhuthmia and CMP	4	8.9	0	0	4	17.4
Insufficiency Valve mitralis-aortalis and Arrhythmia	6	13.3	2	9.1	4	17.4
Atrial Fibrillation (AF)	6	13.3	2	9.1	4	17.4
Operations valve mitralis-aortalis	12	26.7	7	31.8	5	21.7
Myocardial infarction and Arrhythmia	3	67	1	4.5	2	8.7
Total	45	100	22	100	23	100

Total A V Diagnosis Nr % NIr % Nr % ICV 8 17.8 7 31.8 1 4.3 Arrhythmia and HTA 6 13.3 3 13.6 3 13.0 Arrhythmia and CMP 4 8.9 0 0.0 4 17.4 nsufficiency Valve mitralis-aortalis and Arrhythmia 6 13.3 2 9.1 4 17.4 Atrial Fibrillation (AF) 6 13.3 2 9.1 4 17.4 Operations valve mitralis-aortalis 12 26.7 7 31.8 5 21.7 Myocardial infarction and Arrhythmia 3 6.7 1 4.5 2 8.7 Total 45 100 22 100 23 100.0

Tabele 4. Age statistical parameters in patients treated with Oral Antocoagulant Therapy which have had INR>5 according to gender

Age	Female	Male	Total
Mean Value	61.97	65.81	63.33
No of points	29	16	45
Std deviation: (Std)	12.6	6.3	10.9
Std Error: (SE)	2.3	1.6	1.6
Minimum	25.0	54.0	25.0
Maximum	83.0	81.0	83.0
Median	65.0	64.5	65.0
Lower 95% CI:	57.1	62.4	60.0
Upper 95% CI:	66.7	69.8	66.6
F test	p=0.0035	Differences between two SD is significant	

Age F M Total Mean Value 61.97 65.81 63.33 No of points 29 16 45 Std deviation: (Std) 12.63 6.33 10.89 Std error: (SE) 2.346 1.582 1.624 Minimum 25.00 54.00 25.00 Maximum 83.00 81.00 83.00 Median: 65.00 64.50 65.00 Lower 95% CI: 57.16 62.44 60.06 Upper 95% CI: 66.77 69.18 66.61 F test p=0.0035 Differences between two SD is significant

Table 5. Frequency of INR>5 in treated patients with Acenocoumarol and Warfarin according to age group

	OAT	OAT	OAT	OAT	Aceno-coumarol	Aceno-coumarol	Aceno-coumarol	Aceno-coumarol	Warfarin	Warfarin	Warfarin	Warfarin
Patients/ No of tests with INR>5	Total Patients	Total Patients	Total INR>5	Total INR>5	Total Patients	Total Patients	Total INR>5	Total INR>5	Total Patients	Total Patients	Total INR>5	Total INR>5
Age group	No	%	No	%	No	%	No	%	No	%	No	%
<50 years	4	8.9	5	7.5	2	9.1	2	5.9	2	8.7	3	9.1
50-69 years	28	62.2	43	64.2	14	63.6	20	58.8	14	60.9	23	69.7
>70 years	13	28.9	19	28.4	6	27.3	12	35.3	7	30.4	7	21.2
Total	45	100.0	67	100.0	22	100.0	34	100.0	23	100.0	33	100.0
Average INR>5/ patients				1.5				1.5				1.4

OAT ACENOCUMAROL VARFARIN Patients/ No of tests with INR>5 Total Patients Total INR>5 Total Patients Total INR>5 Total Patients Total INR>5 Age group No % No % No % No % No % No % <50 years 4 8.9 5 7.5 2 9.1 2 5.9 2 8.7 3 9.1 50-69 years 28 62.2 43 64.2 14 63.6 20 58.8 14 60.9 23 69.7 >70 years 13 28.9 19 28.4 6 27.3 12 35.3 7 30.4 7 21.2 Total 45 100.0 67 100.0 22 100.0 34 100.0 23 100.0 33 100.0 Average INR>5/patients 1.5 1.5 1.4

PP-68

RETROSPECTIVE EVALUATION OF THE ABO INAPPROPRIATE BLOOD COMPONENTS USE: FOUR CENTER EXPERIENCES

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AIM: In this study we aimed to evaluate the ABO inappropriate blood components use in four hospitals.

MATERIALS & METHODS: ABO inappropriate 0 group red blood cell (RBC) suspensions, AB group fresh frozen plasma (FFP) and different group platelet concentrate (PC) output from transfusion centers (TCs) of four hospitals (two public hospitals, one university hospital, one private hospital) between 2017 and 2019 were analyzed retrospectively using the hospital databases. PC data of a center due to the practice of using PC which is different from others and hematology-oncology patients data of all centers were excluded from the study in order to evaluate common practices among hospitals.

RESULTS: All centers used totaly 119738 RBCsuspensions, 40168 FFP and 12277 PCs between 2017 and 2019. ABO inappropriate 391 RBCsuspension (0.32%), 45 FFP (0.11%) and 35 PC (0.28%) transfusions were performed. The reasons for using ABO inappropriate products and the user clinics are shown as Table 1; the age distribution of patients as Table 2. The allergic reactions developed in two of 173 patients (1.1%) using ABO inappropriate RBC-suspensions. For emergency transfusion 56 (57.7%) of 97 patients using ABO inappropriate RBCsuspensions, four (66.6%) of six patients using FFP and two (14.2%) of 14 patients using PCs were exitus due to underlying diseases.

CONCLUSION: The most common reason and service for using ABO inappropriate RBC suspension were emergency transfusion and emergency departments while inability to determine the blood group and intensive care units (ICUs) respectively for the FFP. The ratio of ABO inappropriate products use due to the emergency transfusion to the all transfusions were 0.17% for RBC suspensions and 0.03% for FFP. These data suggest that clinicians stil prioritize the use of RBC suspensions in emergency transfusion. The ratio of ABO inappropriate product use due to the emergency transfusion to all use was higher (0.21%) for PCs than others. ABO inappropriate PCs were most used by ICUs. We think that the reason for this situation may be related to PCs supply from different cities for two centers and clinicians prefer to use the existing product instead of waiting for the group compatible product. The low ratio of exitus (14.2%) in patients used ABO inappropriate PCs emphasize the importance of approaching 1:1:1 ratio for RBCs:FFP:PCs usage in massive transfusion. Continuous updating of critical stock levels by TCs, development of actively used emergency transfusion workflow schemes and regular coordination of TCs with clinics are very important in the management of emergency transfusion applications.

KEYWORDS: ABO Blood Groups, Blood Components, Blood Groups Inappropriate Transfusion

Table 1: The reasons for using ABO inappropriate products and the user clinics

	ABO Inappropriate Blood Products		
	O Group Red Blood Cell Suspension (n: 391)	**AB Group Fresh Frozen Plasma (n: 45)**	**Different Group Platelet Concentrate (n: 35)**
The reasons for using			
Emergency Transfusion	**205 (52,4%)**	15 (33,3%)	**26 (74,2%)**
Subgroups of ABO Blood Groups	106 (27,1%)	3 (6,6%)	4 (11,4%)
Blood Group Not Determined	67 (17,1%)	**19 (42,2%)**	3 (8.5%)
Newborn Patients	13 (3,3%)	8 (17,7%)	2 (5.7%)
Clinics			
Emergency Department	**114 (29.1%)**	4 (8.8%)	3 (8.5%)
Intensive Care Units	106 (27.1%)	**20 (44.4%)**	**23 (65.7%)**
Surgery Departments	91 (23.2%)	13 (28.8%)	1 (2.8%)
The Other Departments	67 (17.1%)	-	6 (17.1%)
Newborn Intensive Care Unit	13 (3.3%)	8 (17.7%)	2 (5.7%)

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Table 2: The age distribution of patients transfused ABO inappropriate products

Age distribution	O Group Red Blood Cell Suspension (n: 175 patient)	AB Group Fresh Frozen Plasma (n: 21 patient)	Different Group Platelet Concentrate (n: 22 patient)
Newborn	5 (2.8%)	5 (23.8%)	2 (9%)
1-17	11 (6.3%)	1 (4.7%)	2 (9%)
18-60	86 (48.7%)	9 (42.8%)	10 (45.4%)
60<	71 (41%)	6 (28.5%)	8 (36.3%)

PP-69

THE USAGE AND DISCARD OF RHD(-) BLOOD COMPONENTS AT A BRANCH HOSPITAL

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AIM: In modern medicine blood is considered a vital drug whose only source is human. Blood groups play a big clinical role in transfusion and transplantation. The discovery of ABO blood group system is one of the main factors that make blood transfusion possible. “D”, the most important erythrocyte surface antigen after A and B, is also the most important antigen of the Rh blood group system. The D(-) phenotype is associated with the lack or absence of RhD protein. D antigen, which is routinely considered in blood grouping with ABO system antigens, plays a huge role in transfusion applications. In this study it was aimed to evaluate all the RhD(-) blood components used and discarded in our hospital in 2019 (in cases of emergency and in necessary occasions on patients whose RhD blood type couldn’t be identified or on those with the blood type RhD(+)) .

MATERIALS & METHODS: Our retrospective study consisted of RhD(-) blood and blood components, which were used and discarded between the dates 01 January 2019 and 31 December 2019. The retrospective data is collected from our hospital’s automation system and analyzed. Transfusion reaction notification forms were reviewed .

RESULTS: In our hospital total of 4194 blood and blood components, 3604 of them were RhD(+), and 590 of them were RhD(-). The distribution of the blood components used is shown in Table 1.The distribution of 590 RhD (-) blood components used throughout the year is shown in Table 2. Seven transfusion reaction reports were made in our hospital throughout 2019.Only one of these occurred with the use of RhD (-) ES given to the blood group 0 RhD (-) patient. There were no transfusion reaction reports regarding 44 RhD (-) blood components used throughout the year. 29 blood and blood components were discarded in our transfusion center in 2019. 15 of them were RhD(-) and 14 of them were RhD(+) blood components.Table 3 shows the numbers and reasons of blood components discard in detail.

CONCLUSION: Blood is a miraculous remedy that has no alternative, is limited in resources but has one and only source, which is human. Since the number of safe blood donations in our country is not so sufficient, rational use of blood and blood components is important. In our study, it was determined that RhD (-) blood components were discarded more. It is important to cooperate with clinicians in order to meet the demands made at the appropriate time, to provide sufficient blood components. Education in transfusion medicine , determining the critical stock

levels of our transfusion center, and to work on reducing the discard of RhD (-) blood components, which are more difficult to provide. Blood management means less discard and we should work together.

KEYWORDS: Discard Of Blood, Rhd(-), Transfusion Reaction

Table 1: RhD(+) and RhD(-) blood components used in 2019

Blood Components	Erythrocyte Suspension	Fresh Frozen Plasma	Platelet Suspension (Pool)	Apheresis Platelet Suspension	Cryoprecipitate	Whole Blood	Total	Percentage
RhD(+)	2179	1038	212	55	104	1	3589	85,90%
RhD(-)	337	194	42	2	15	0	590	14,10%
Total	2516	1232	254	57	119	1	4179	100%

Table 2: The use of 590 RhD(-) blood components used in 2019

Blood Components	RhD(-) components used ın RhD(-) patıent	RhD(+) components used ın RhD(-) patıent	RhD (-) components used for patıents wıthout blood group determıned	RhD (-) components used for patıents wıth weak posıtıve RhD
Erythrocyte Suspension	297	40	14	4
Platelet Suspension (Pool)	38	4	2	0
Apheresis Platelet Suspension	2	0	0	0
Fresh Frozen Plasma	194	0	0	0
Cryoprecipitate	15	0	0	0
Total	546	44	16	4

Table 3. the numbers and causes of destructıon of blood components between the dates 01.01.2019-31.12.2019

Blood Components	Erythrocyte Suspension	Platelet Suspension (Pool)	Apheresis Platelet Suspension	Fresh Frozen Plasma	Percentage
RhD(+)	Stuffed miad: 2 AB RhD(+) Bag Integrity Breakdown: 2 A RhD(+)	Stuffed miad: 4 0 RhD(+) 1 A RhD(+)	Stuffed miad: 2 0 RhD(+)	Stuffed miad: 2 A RhD(+) Bag Integrity Breakdown: 1 A RhD(+)	%48,2
RhD(-)	Stuffed miad: 7 AB RhD(-) 1 A RhD(-) Bag Integrity Breakdown: 1 A RhD(-)	Stuffed miad: 3 A RhD(-)			%51,8
Total	16	8	2	3	

PP-70

LOOK-BACK FEEDBACK FROM DONOR TO PATIENT AND TERMINATION PROCESS

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AIM: In this study, it was aimed to evaluate the notifications made to the Hemovigilance unit of our hospital within the scope of tracking the patient from the blood donor sent by the Hemovigilance unit of the South Aegean Regional Blood Center.

MATERIALS & METHODS: In 2019, unwanted event notification, unwanted event verification and blood component recall forms sent to our hospital "transfusion center" (TC) by the South Aegean Regional Blood Center were examined. It was investigated whether the blood components of the relevant donations were used. If the blood component was not used, it was destroyed at TC; if it was used, the patients had been contacted by the Hemovilance unit, and the suspicious situation related to the blood transfusion had been explained to the patients and necessary examinations had been made by asking them to come to the hospital. According to the results of the examination, the relevant clinician was contacted and the necessary referrals were made.

RESULTS: In 2019, a process of tracking donor to patient in a total of 15 blood components was initiated in our hospital. Of these blood components, 11 were erythrocyte suspensions, 3 were freshly frozen plasma, and 1 was pooled platelets. A total of 15 blood components including the recall procedure and the unwanted event notification form were organized in the components, unintended event verification results and termination times of the recall were shown in Table 1. According to the National Hemovilance guide, the purpose of tracing from the donor to the patient was to determine the donors of the donor during the window period of infection, and to dispose of the blood and blood components of the donor if they were not used for transfusion purposes. If transfused, it was necessary to take protective measures against patients and to determine whether or not there was a transfusion-induced infection in patients. According to this, the hospital's hemovigilance unit initiated a recall procedure for 11 notifications. In the other 4 reports, the recall procedure could not be initiated because there was no verification of witness sample results. The recall form for 11 blood components was answered within the same day, patients were contacted within 3 days and patients were informed and called to the hospital. All 11 patients were reached and it was learned that 2 patients were dead. 1 patient did not come to the hospital. The examination result of 7 patients was negative and the result of 1 patient was positive. The process was completed with a minimum of 3 days, a maximum of 16 days, an average of 7 days, and the procedure was terminated within the scope of the process of tracing from donor to patient.

CONCLUSION: The donor-to-patient tracking process is performed if a situation is detected in the donor that threatens transfusion safety. In this context, it is very important to reach the patient as soon as possible and carry out the examinations that will lead to the recall and to carry out the necessary regulatory and preventive activities.

KEYWORDS: Hemovigilance Unit, Tracking, Unintended Incident

Table 1. Feedback on donor-to-patient tracking and termination period of 2019

Blood Component	Blood Component Count	Reason For Recall	Unintended Incident	Patient Access Status	Unintended Incident	Examination result	The Feedback Terminating Time
Erythrocyte Suspension	9	HBV	1	Patient reached	Confirmed	Negative	6 days
			1	Patient reached	Not verified	The patient didn't come	3 days
			1	Dead	Not verified	Dead	Same day
		HBV-HCV	1	Dead	Not verified	Dead	Same day
			1	Patient reached	Not verified	Negative	7 days
		HBV-HCV-HIV-SYPHILIS	1	Patient reached	Not verified	Negative	8 days
			1	Patient reached	Not verified	Negative	8 days
			1	Patient reached	Not verified	Negative	5 days
		HBV-HCV-HIV	1	Patient reached	Not verified	Negative	11 days
Fresh Frozen Plasma	2	HBV	1	Patient reached	Confirmed	Negative	10 days
			1	Patient reached	Confirmed	Positive	16days

PP-71

EVALUATING THE TRANSFUSION STEPS OF BLOOD/BLOOD PRODUCTS IN A CARDIOVASCULAR SURGERY HOSPITAL

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AIM: Transfusion of blood and blood products are performed mainly in intensive care units (ICU) and clinics. Here, we performed a point prevelance study for one day to determine transfusion steps deficients, to take precaution if necassary and to provide persistance of trainings.

MATERIALS & METHODS: In Koşuyolu High Specialization Training and Research Hospital, we implemented one day point prevelance study in ICUs (coronary, adult and pediatric) to evaluate transfusion steps. Parameters on transfusion control bundles were used.

CONCLUSION: The TC data as a hematology-oncology center situated well outside the city center but between two big cities and giving care also to international patients differ at some point from other transfusion centers. A multicenter study from Turkey using the CMIA method by Abbott found HBsAg and Treponema pallidum positivity higher than our center in all voluntary/replacement donors3. A stringently followed algorithm, a very firm selection of donors with highly dedicated and trained staff might be an important factor in decreasing the positivity in the results obtained which show even a slightly low positivity compared to National data2. In the highlights of these results, our center wishes to start platelet apheresis process immediately to increase blood donor satisfaction.

KEYWORDS: Donor Seroprevalence, Platelet Apheresis, Transfusion Center, Transfusion Transmitted Infections

Tables

Table 1. Anadolu Medical Center TC test results (using CMIA)

	Number of tests	HBV +	HCV +	HIV +	Syphilis +
2014	1257	7 (0.6%)	1 (0.08%)	1 (0.08%)	1 (0.08%)
2015	1410	14 (1.0%)	0	0	3 (0.2%)
2016	1192	8 (0.7%)	0	0	2 (0.2%)
2017	523	3 (0.6%)	0	1 (0.2%)	0
2018	763	2 (0.3%)	0	0	0

Tablo 2. Turkish donor seroprevalence from Red Cross (using real time PCR)

	HBV	HCV	HIV	Syphilis
2015	0.50%	0.019%	0.008%	0.033%
2016	0.40%	0.018%	0.009%	0.020%
2017	0.35%	0.017%	0.012%	0.062%
2018	0.30%	0.016%	0.012%	0.076%

Table 1. Anadolu Medical Center TC test results (using CMIA) Tablo 2. Turkish donor seroprevalence from Red Cross (using real-time PCR)

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In 2019, Abbott announced the discovery of a new strain of HIV: HIV-1 Group M, subtype L.

This marks the first time a new subtype of HIV-1 has been identified since 2000. The Abbott Global Viral Surveillance team is making this new strain accessible to the research community to evaluate its impact to the diagnostics testing, treatments and potential vaccines, keeping the global health community a step ahead of the virus.

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