



Blood management

Basics of Blood Transfusion
for IV. grade medical students

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National Blood Transfusion Service
Regional Blood Transfusion Centre Pécs
2013



The basic principles of transfusion: HOW to transfuse?

Blood cannot be manufactured – it can only come from generous donors.

The blood availability is limited and there are many risk of blood transfusion.

- 1 **never unnecessarily**
- 2 **if there is an appropriate indication**
- 3 **only the necessary blood components**
- 4 **effective** amount of component

5 with prudent blood management



There are a lot of questions!



ORSZÁGOS VÉRELLÁTÓ SZOLGÁLAT

HOW to transfuse?



Indication and blood ordering is the physician's responsibility



HOW to transfuse?



ORSZAGOS VERELLATO SZOLGALAT

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HOW to transfuse?



1. Restore and maintain the volume of circulating blood
2. Support of cellular components or plasma (clotting factors)
3. Exchange transfusion for adults and babies
4. Stem cell transplantation



HOW to transfuse?



Compatible and sufficient quality and quantity of blood component is needed.

Blood transfusion is not possible without blood.

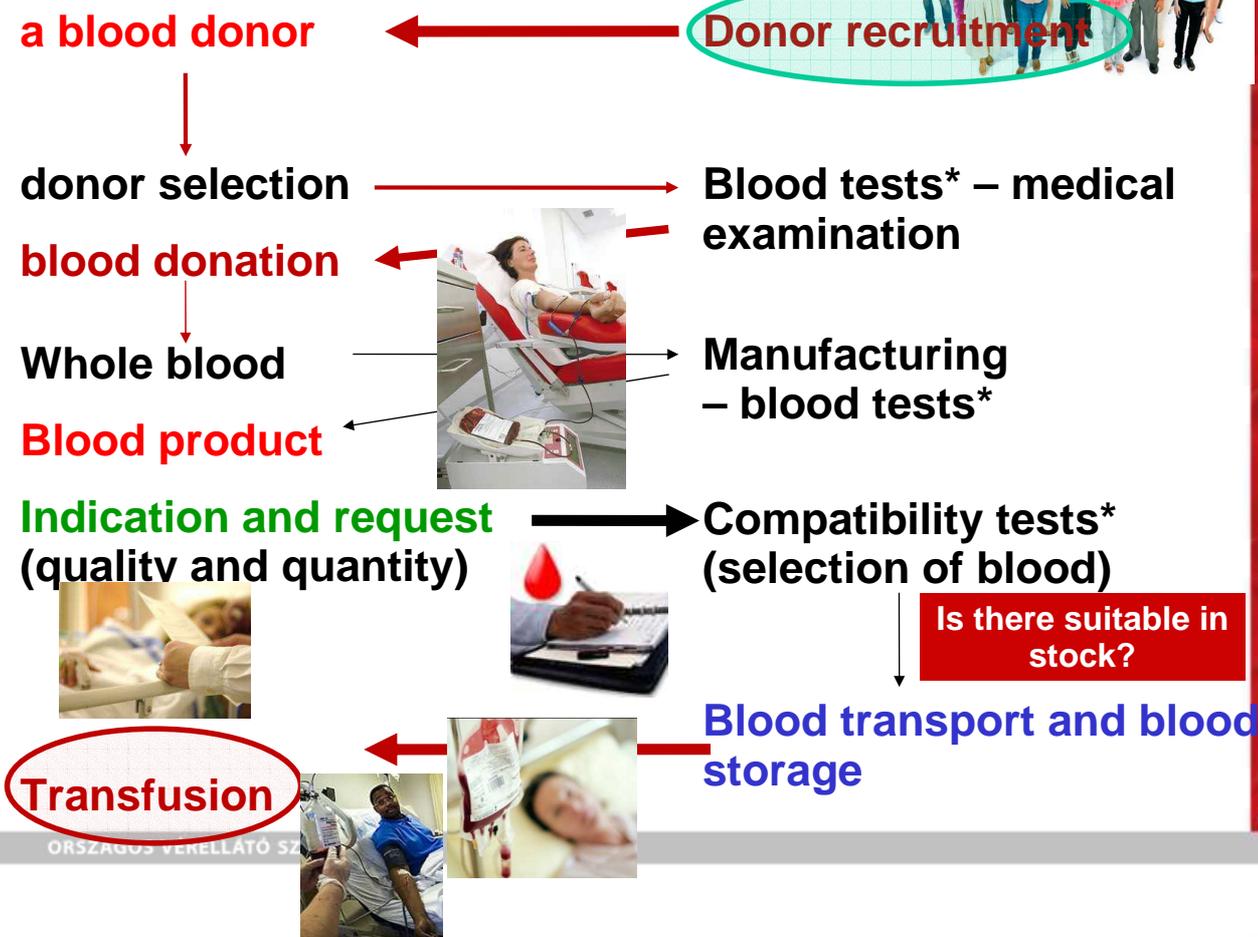
No blood without blood donors.



It is the shared responsibility of the blood banks and all health care workers to maintain responsible blood inventory management



What is needed for a blood transfusion?



Not so simple



Blood donation process in Hungary

Blood product assurance

problems ?

solutions !

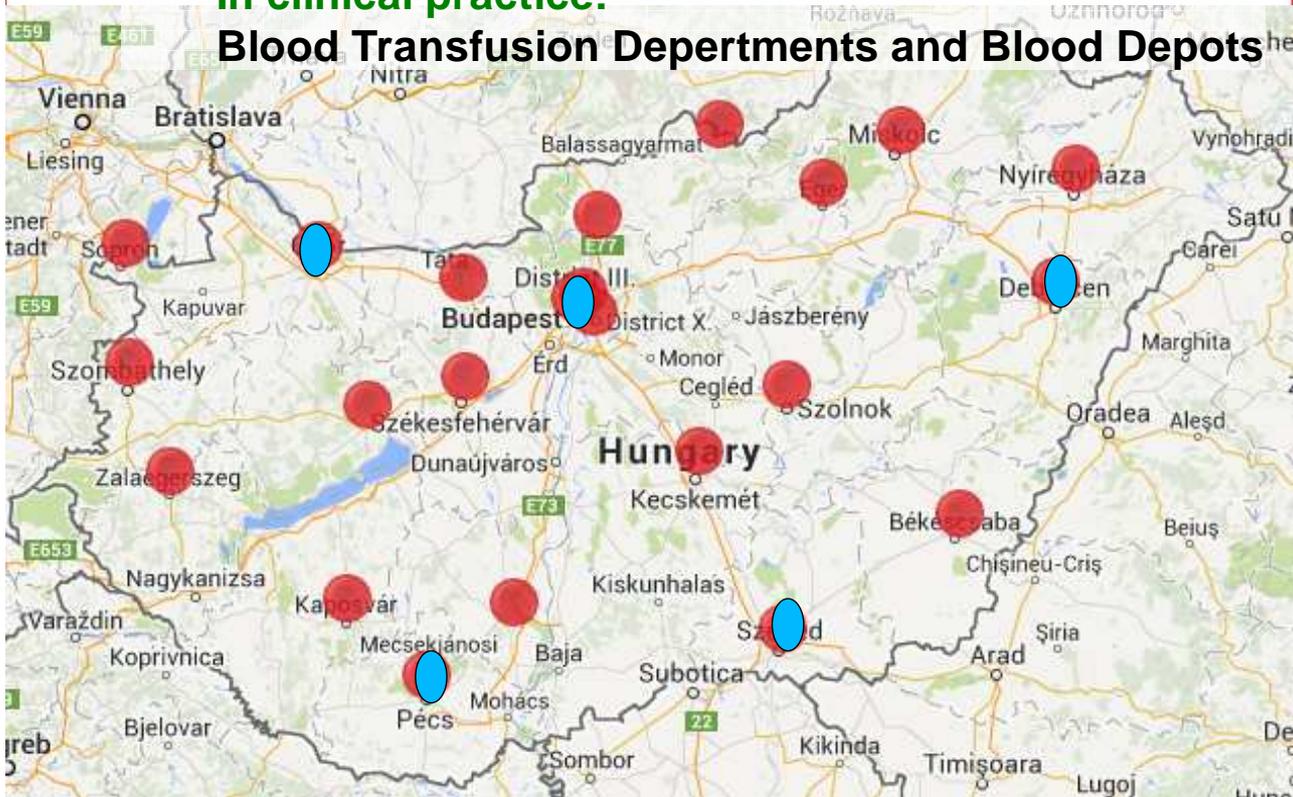


Hungarian National Blood Transfusion Service center in Budapest

Regional Blood Transfusion Centres
Territorial Blood transfusion Centres

In clinical practice:

Blood Transfusion Departments and Blood Depots



Blood provision



*Transfusion activity is regulated
at the level of Ministerial Decree
in Hungary*
Transfusion Guidelines

Blood provision

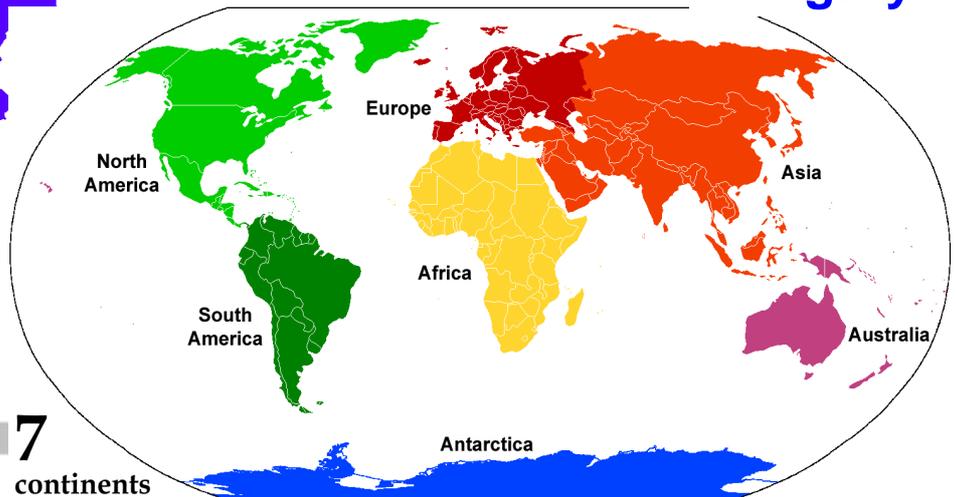


Europe

Hungary

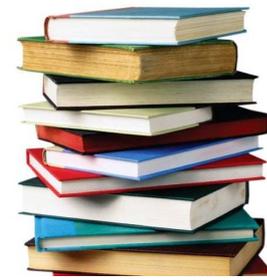


World



**7
continents**

Transfusion Medicine



Preparative transfusiology

donor recruitment (suitability, tests)

blood product manufacturing (preparation, storage, issue, transportation)

Clinical transfusiology

immunohaematology (patient and pregnant serology)

platelet serology

transplantation serology (HLA tests)

transfusion therapy in clinical practice (transportation, storage, blood sampling, administration, dokumentation)



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Blood organisation in Hungary

1. Blood donor recruitment

The blood donor recruitment and retention and organization of blood donation is the responsibility of NBTS together with Hungarian Red Cross.



**ORSZÁGOS
VÉRELLÁTÓ
SZOLGÁLAT**



ORSZÁGOS VÉRELLÁTÓ SZOLGÁLAT

National Blood Transfusion Service

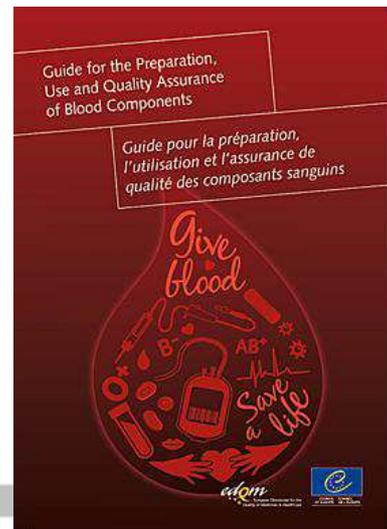
Hungarian Red Cross

Principles



Blood donation is voluntary and unpaid

Process of blood donation and blood preparation is **regulated according to European standards.**



2. Blood donation

Who can give blood?

- Age: 18 60 (65 years)
- Weight: 50 kg
- Being in good health
- Frequency of blood donations / year

5 times man

3 4times woman

Time between donations minimum 56 days



Process of blood donation

○ identification



○ questionnaire



○ haemoglobin test
(ABO test for the first time donors)



○ medical check-up



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Donor selection



Blood donation shouldn't harm the donor and the transfused blood products shouldn't harm the recipient.



Suitability for blood donation

On the basis of

**physical examination
questionnaire**

**Hb test - Hgb level: > 125 g / l (women)
> 135 g / l (men)**

and prior data (deferrals)

the doctor decides whether the person may donate blood.

Blood group check occur due to a control system.



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Blood donation

In Blood Bank



Outside the Blood Bank



ORS.

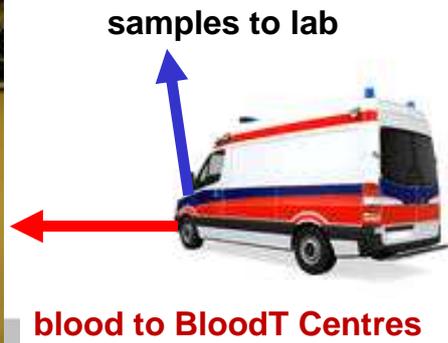
Blood processing



450 ml whole blood donation

2 blood samples for the blood group and virus tests

Blood collection, transportation



Donor blood testing

First, the blood is carefully investigated for transfusion transmitted infections to prevent transmission.



Blood samples are sent to the central laboratory - tests:

Hepatitis B, Hepatitis C, HIV 1/2 and syphilis

Blood grouping (ABO, Rh, Kell)

Manufacturing

The collected blood is processed and stored in the regional blood banks.

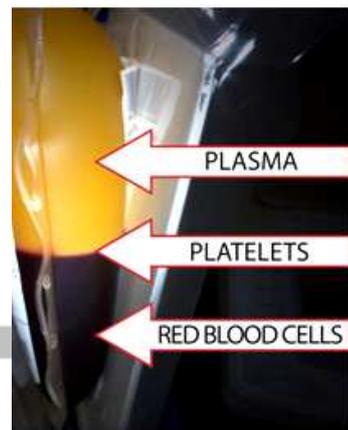
Three blood products are produced from the whole blood.



Plasma

Platelet

Red blood cell





Red blood cell

Platelet

Plasma

Blood products are delivered to the small blood banks or directly to the hospitals from blood centers.



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Red cell storage time:
35 days



Preparation of the **filtered** blood should be done **within 48 hours from donation.**



Platelet storage time:
5 days



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In many cases patients need **fresh blood products.**

The daily **blood donations number** is planned in advance, on the basis of a year plan. Not only the **number** of units of blood is important, but also the **temporal distribution** of the blood donations!



It should be taken care of that the number of blood donations should be evenly distributed within a given period for the continuous blood provision.

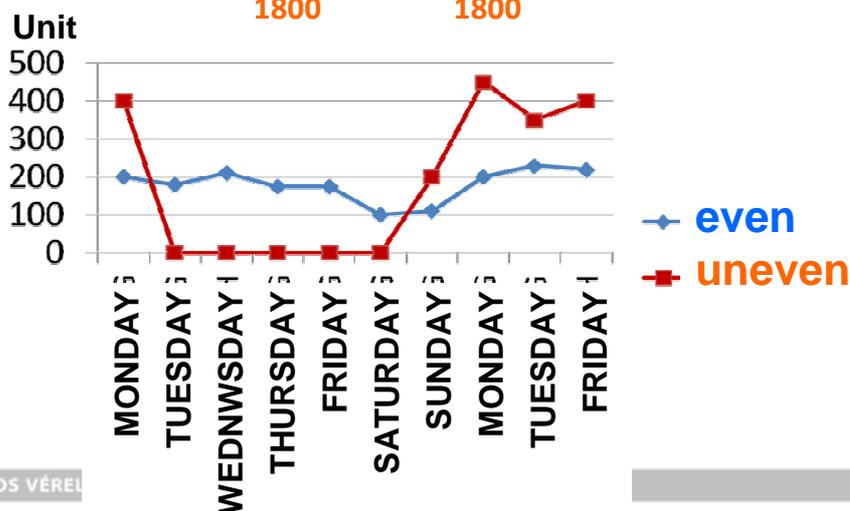
What does it mean?



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Blood donations	<u>1. even</u>	<u>2. uneven</u>
MONDAY	200	400
TUESDAY	180	0
WEDNESDAY	210	0
THURSDAY	175	0
FRIDAY	175	0
SATURDAY	100	0
SUNDAY	110	200
MONDAY	200	450
TUESDAY	230	350
FRIDAY	220	400
	1800	1800

In the **first case** the distribution of donations is near **even**, but **not** in the **second case**.



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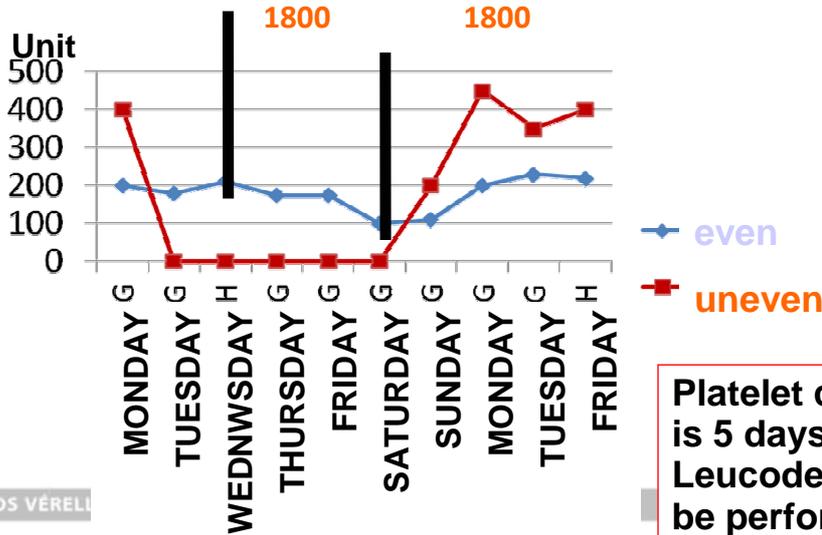
Blood donations

1. even

2. uneven

MONDAY	200	400
TUESDAY	180	0
WEDNESDAY	210	0
THITSDAY	175	0
FRIDAY	175	0
SATURDAY	100	0
SUNDAY	110	200
MONDAY	200	450
TUESDAY	230	350
FRIDAY	220	400

Although in the **first case**, there is some decrease of blood product stock, but there are **enough blood products with a shorter expiry date**.



Platelet concentrate expiry date is 5 days
Leucodepletion of blood should be performed within 48 hours

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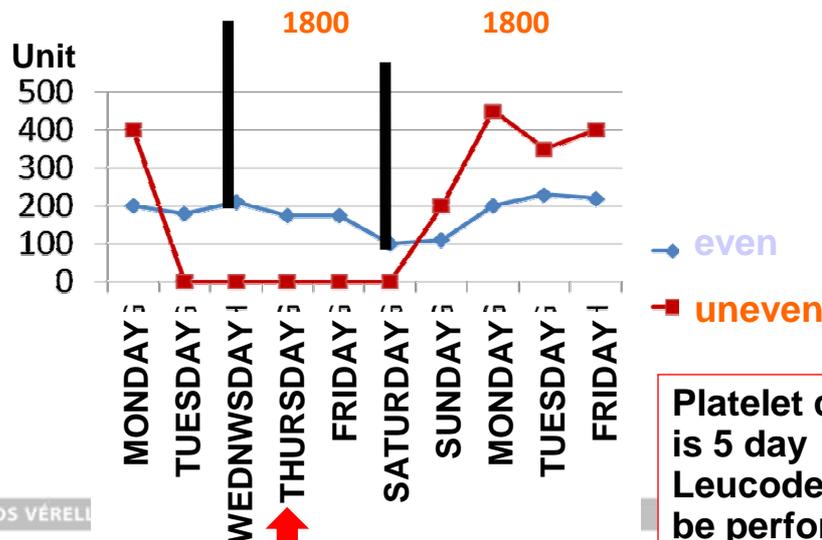
Blood donations

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2. uneven

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SATURDAY	100	0
SUNDAY	110	200
MONDAY	200	450
TUESDAY	230	350
FRIDAY	220	400

While in the **second case** when there are days without blood taking, **on Thursday leucodepleted blood can't be produced and our stock ran out**.



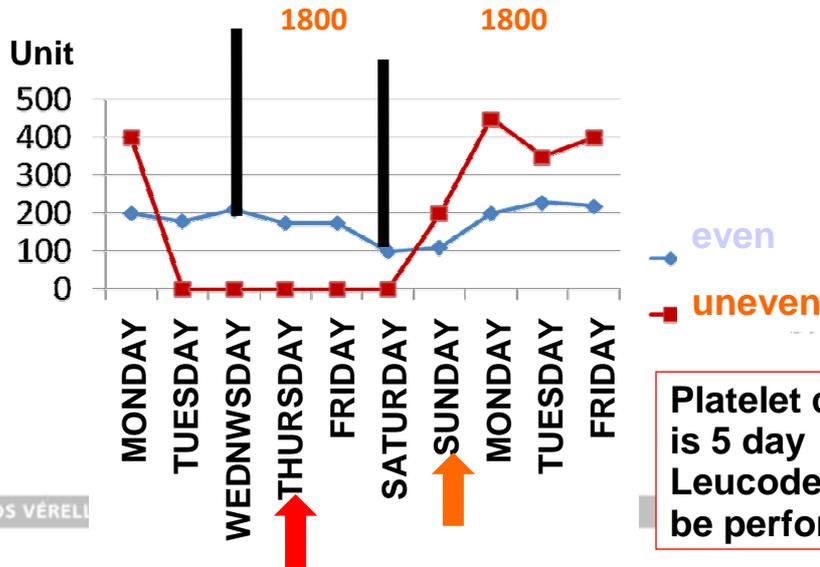
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Blood donations

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SATURDAY	100	0
SUNDAY	110	200
MONDAY	200	450
TUESDAY	230	350
FRIDAY	220	400

On **Sunday** our **platelet stock ran out** because the last blood donation was 6 days ago and the platelet concentrate can't be used after 5 days.



Platelet concentrate expiry date is 5 day
Leucodepletion of blood should be performed within 48 hours

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Planning blood donations is not enough, it also requires a **cooperation** between the blood banks.



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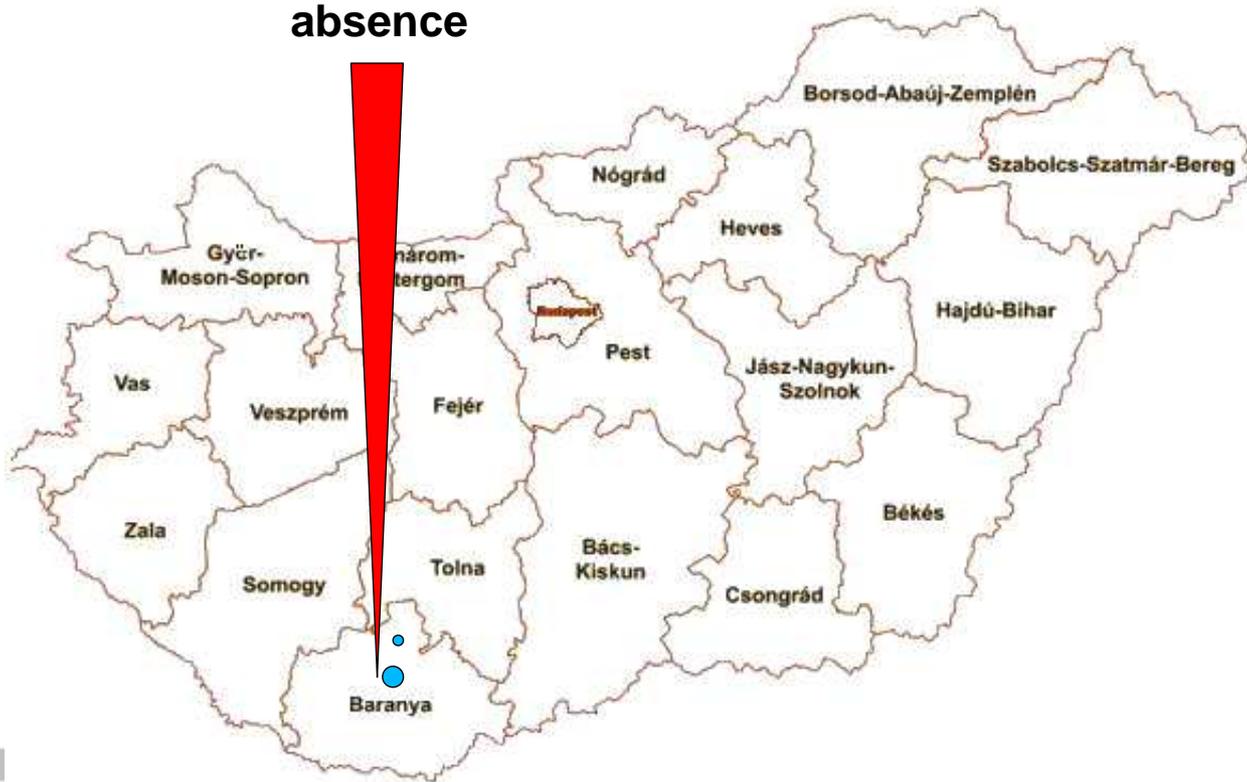


Number of blood donations Blood donation distribution

Blood donation: 120 units Pécs

Patients need: 180 units

absence

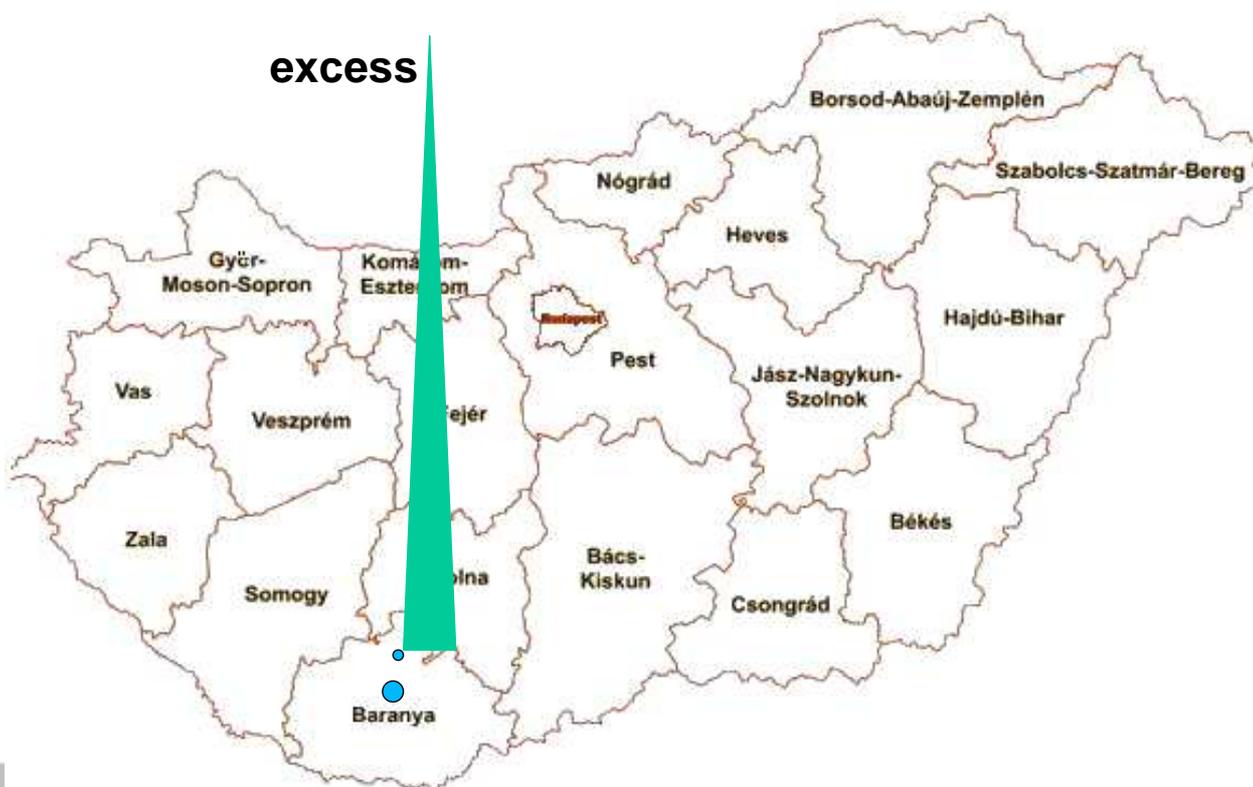


Number of blood donations Blood donation distribution

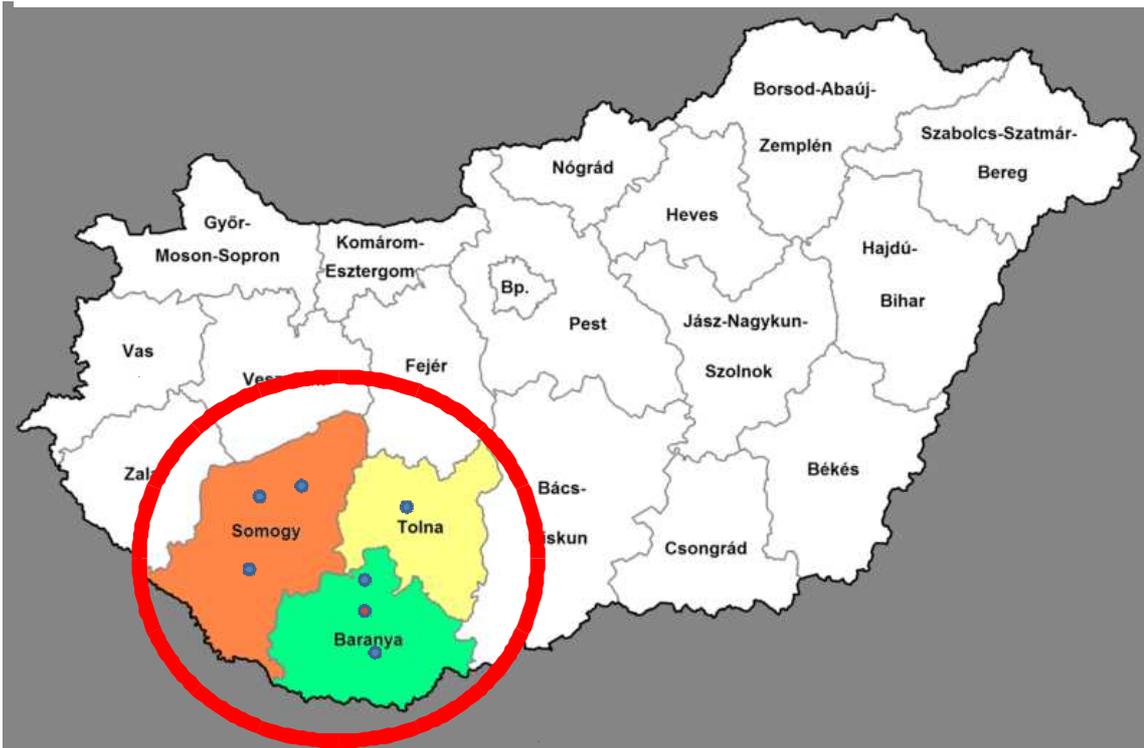
Blood donation: 70 units Komló

Patients need: 20 units

excess



The blood banks in the region are to meet the demand of hospitals for blood in cooperation.



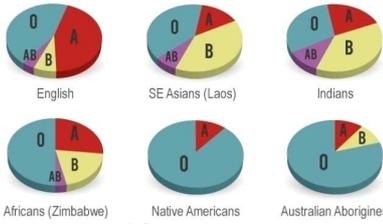
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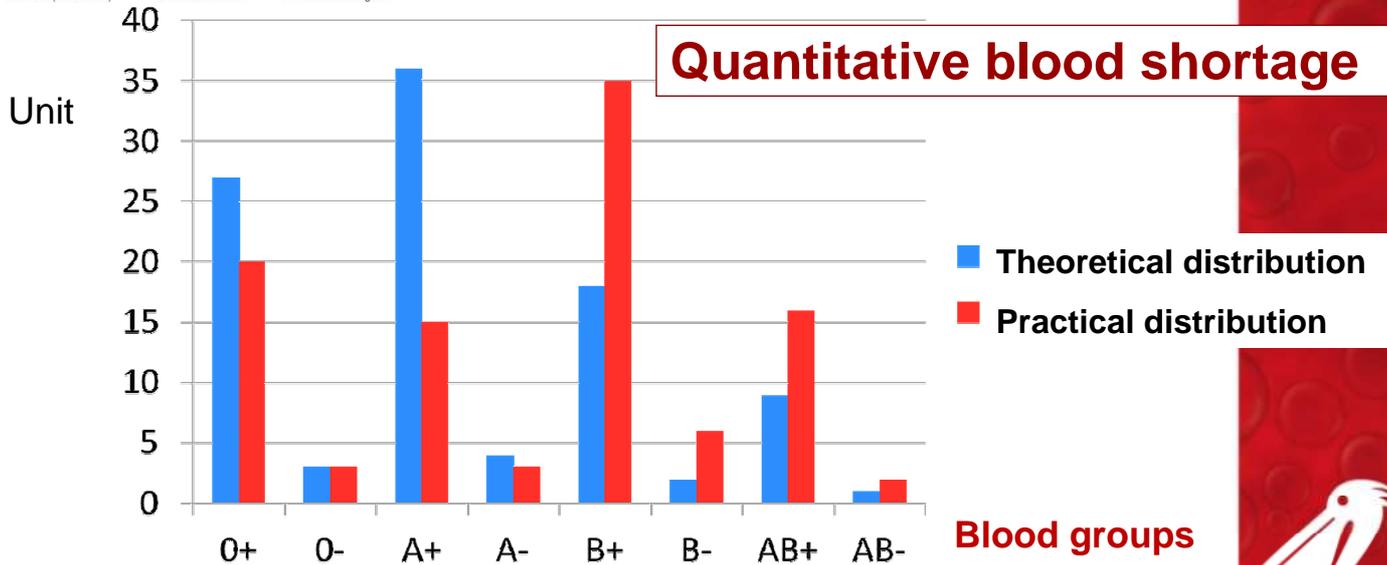
The blood products can also be redistributed within the country, if there is a sever shortage of blood somewhere.



Theoretical distribution of blood groups and



distribution in practice for example



Available blood inventory in theory distributed by blood group in a given day compared to actual blood supply available. Quantity of A+ is less, the B+ is more than theoretically expected.

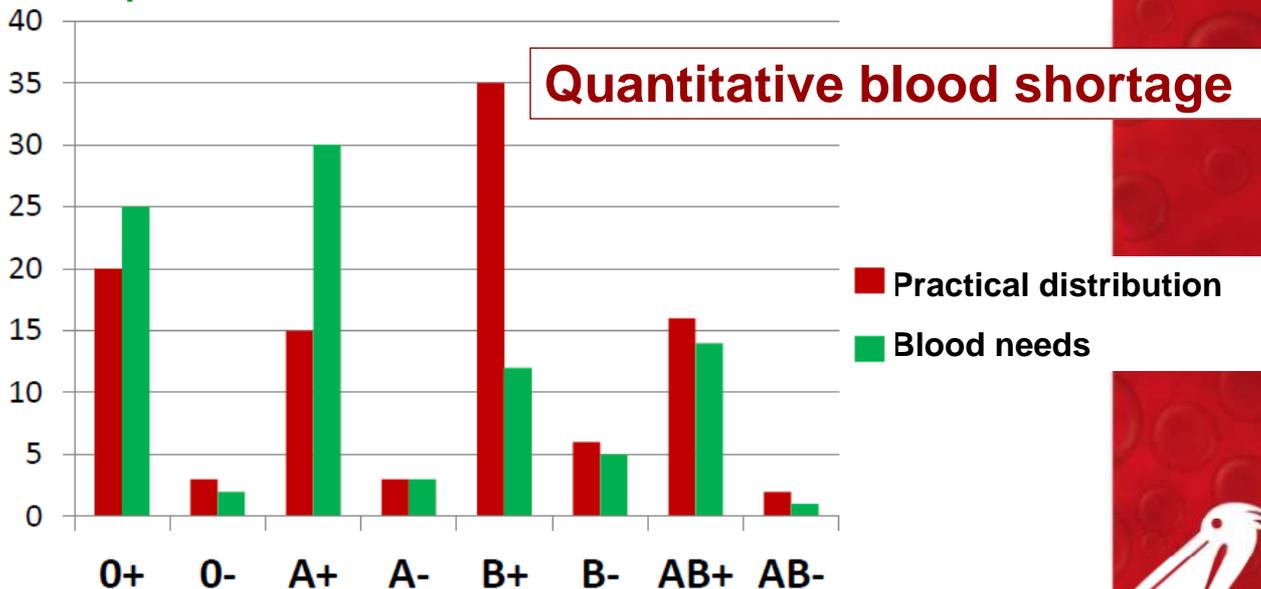


Daily blood demand

distribution in practice on one day



Number of requested units of blood



Blood needs are met by available inventory excluding the A+ and O+ blood group. Here the demand exceeds the stock.



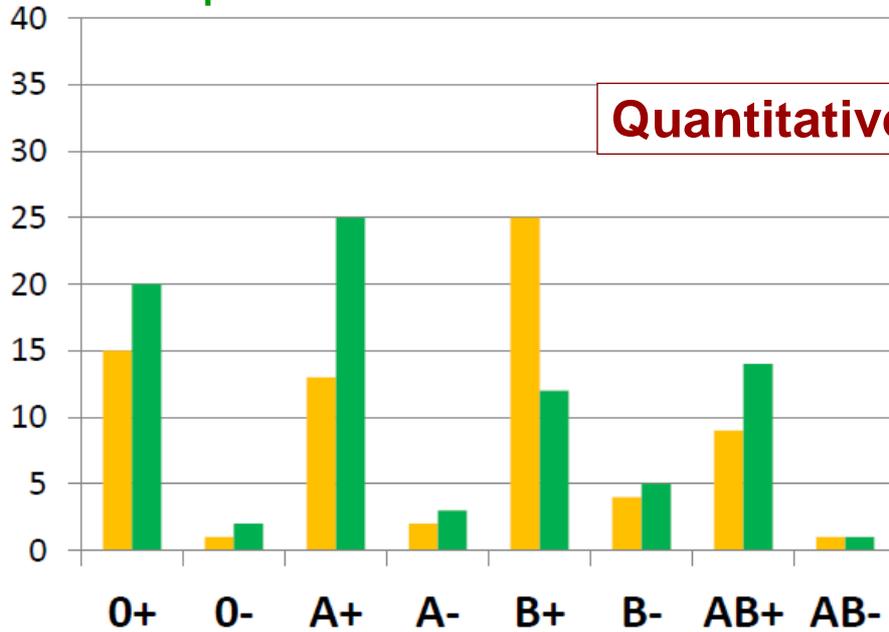


Daily blood demand



distribution in practice on one day

Number of requested units of blood IN SUMMER



Quantitative blood shortage

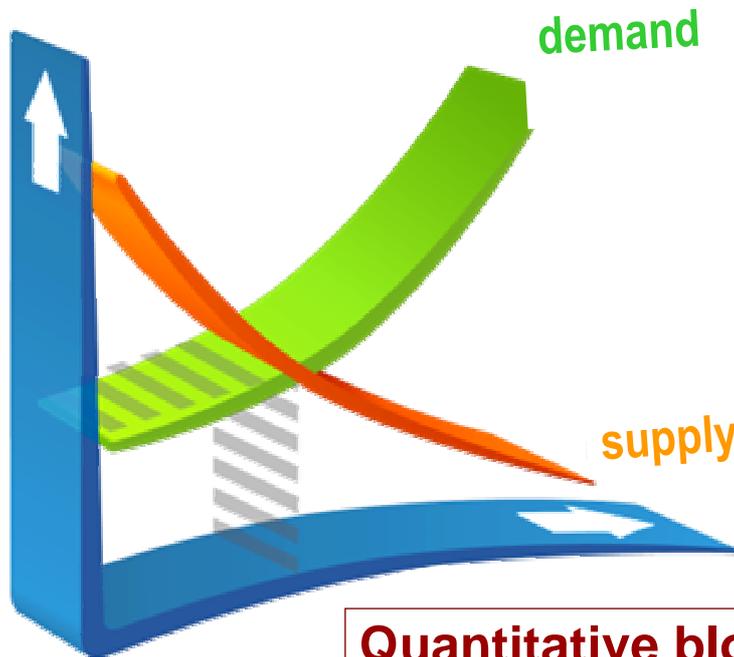
Practical distribution
Blood needs

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The demand exceed the supply for more blood groups



We can see, therefore, that the **demand** for blood and the **available amount** of blood are not in balance relative to each other.



Quantitative blood shortage

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Qualitative blood shortage

Despite the good plan and well organized blood donation and donor recruitment it could be possible that the requested blood



- HERE
- NOW
- FROM THE GIVEN BLOOD GROUP
- IN SUFFICIENT QUANTITY

is not available for disposal.

e.g.



O RhD positive C negative e negative Kell negative

or

A RhD positive E negative Fya negative, Jka negative



What could be the reasons for it?

Who can do something about it?

What are the solutions to this problem?



Cooperation of Hospitals and the blood banks is necessary for the solution of the problem.

Why?

Causes of blood shortage:



Number of blood donors decreases

People's attitude to blood donation **has changed**. (Young people!) They are less willing to selflessly help others.

- Others would like to help, but are hampered by external circumstances in mind. (**changes in working conditions**)
- **The aging** of society is an enormous problem.
- **Health status** of the people is generally worse.
- The average **age of the blood donors** is getting higher.
- The number of blood donors is **seasonally different**.
- There are local differences between **town and country**.



Less blood could be used than the number of applying donors.

- Some of the blood donors will not be able to give blood due to **current health or other problems.**

- 1-2% of expected donors turn out even based on **questionary** answers that they are not suitable for blood donation.

- Based of medical examination 12-14% of expected donors are **deferred** from blood donation.



Less blood could be used than the number of applying donors.

- A portion of the collected blood can not be used because of their **virus reactive test or any technical reason.**



Donor deferrals

Reasons of donor deferral are regulated

Blood donation shouldn't harm the donor and the transfused blood products shouldn't harm the recipient.

The most common cause of donor deferral is
♦ **anaemia**

in ♦ **some diseases and conditions** blood donation can be dangerous (eg. heart disease) In other cases,

♦ **a risk of pathogen transmission** exists through blood products. (e.g. Tick bite, staying abroad)

➔ **Questionnaire!**

For immunosuppressed patients it may be harmful

♦ **other pathogens** such as sore throat, runny nose

Only a healthy person could donate blood!

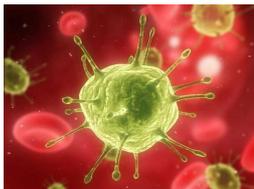
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Donor deferrals

The greatest risk are the pathogens that are **transmitted through blood and sexual contact.**

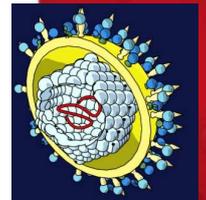
HIV



Hepatitis B



Hepatitis C



The risk of transmitting the virus is always in the blood preparations, because the sensitivity of the virus tests is never 100 %. **Window period!**

Risk factors: Tattoos , IV drug usage

It is important that from people with such a risk blood shouldn't be collected.

Highly important is that the blood donor **answers honestly to the questionnaire and knows the consequences of the questions.**

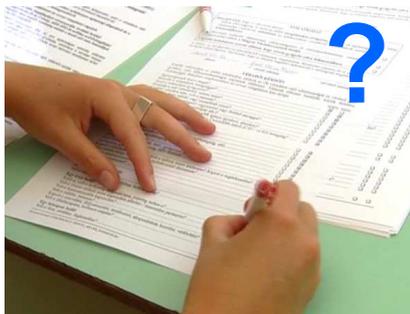
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An important cornerstone of **blood safety** is the **VOLUNTARY AND UNPAID NATURE OF BLOOD DONATION**

because of the donor is **financially interested** in the donation he/she would not fill the questionnaire truthfully.

He/she would **not confess the truth** about its risk factors not to be deferred from blood donation.



Summary of the donor and blood wastage

Reasons

- **1-2%** of expected donors turn out even based on **questionnaire answers** that they are not suitable for blood donation.
- Based on **medical examination 12-14%** of expected donors are deferred from blood donation.
- Due to the **non-negative results of virus test 1-2%** of the collected blood is retired.
- **For technical reasons 0.5%** of the blood is lost.

14,5 – 18,5% !



NATIONAL BLOOD DONOR MONTH
01-30 June 2013

Donate your Blood and make a difference

Designed by **SEAWI Corp**
Tos W. J. Manupras

Only 1% are blood donors.
We need your type to make the difference...

For more information on our Mobile Blood Donation Drives, please call Tel: 62200-183 or log on to www.donorweb.org

Save a Life Give Blood

The red cells from your donation are being used in the following ways:

- 4% Cancer and blood diseases
- 10% Surgical patients including open heart surgery and burns
- 1% Organized patients including haemophiles and liver transplant
- 10% Other causes of anemia
- 10% Other medical problems including heart, asthma and kidney disease
- 2% Trauma, including patient safety
- 2% Transfusing to other patients

1 PINT CAN SAVE 3 LIVES

Save a Life Today

If any one saved a life, it would be as if he saved the whole humanity - Quran [5:32]

IV. Országos Vasutas Vértadónap

Úton a segítség!
December 10-én véradás reggel 9 órától délután 4 óráig az alábbi pályaudvarokon, állomásokon:

Kérjük, személyi igazolványát, TAJ- és lakcímkártyáját hozza magával!

They are all life-savers. Are you?

A representative from NHS Blood & Transplant will be on site in the Coffee Lounge on **Tuesday 27th March** 12.00 – 14.00

To enrol potential new blood donors and answer your questions

Save a life – give blood
Visit blood.co.uk or call 0300 123 23 23

Every drop counts

In partnership with the Nursing Students Executive Council

August 24, 2012, 1:00 pm to 6:00 pm at the Thibault Grounds

Come and donate!

BENEFITS OF DONATING BLOOD

- Blood donation burns the extra calories and cholesterol level.
- It stimulates the production of new blood cells and refreshes the system.
- It will help your body regulate the level of iron and can reduce the risk of heart diseases especially among young people.
- It is a noble cause to save lives. The blood you are donating will not only save others life, but maybe your own or your family.

It is important to inform whole society in detail about the blood donation. (**Flyers, web pages, presentations, media**)

MAGYAR VÉRADÁS

www.aabb.org/resources/donation/pages/bblocator.aspx

www.blood.co.uk/giving-blood/where-can-i-go/

www.scotblood.co.uk/become-a-donor.aspx

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GIVE BLOOD

0845 90 90 999 NHS National Services Scotland

Become a donor

Donating blood is safe, simple and takes only an hour

Every minute of every day someone in Scotland is receiving blood as part of a life-saving or life-enhancing treatment. Yet, only 5% of the population are active blood donors.

The Scottish National Blood Transfusion Service (SNBTS) must welcome 5000 blood donors every week to meet the needs of patients in Scotland.

Register today and help us show patients in Scotland they are not fighting alone.

Where to donate

Find your nearest session

Enter Full Postcode

Find

Become a donor

Becoming a blood donor is quick and simple.

Register now

Can I donate?

Ensure you don't have a wasted journey.

Check here

Title

First name

Surname

Date of birth

DDMMYYYY

Increase the supply



In an emergency we **call blood donors** to donate blood



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It takes!
all types!

GIVING = LIVING

Decrease the demand

Cooperation is most important

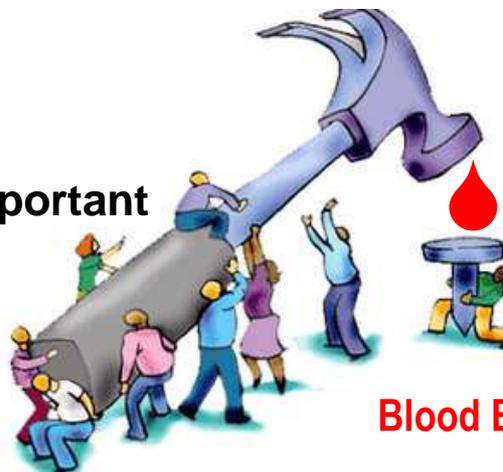
Hospitals

Doctors

Nurses

Patients

Transporters



Blood Bank

Basically they should understand that the **available amount of blood** must be **divided responsibly TOGETHER** with the blood bank.

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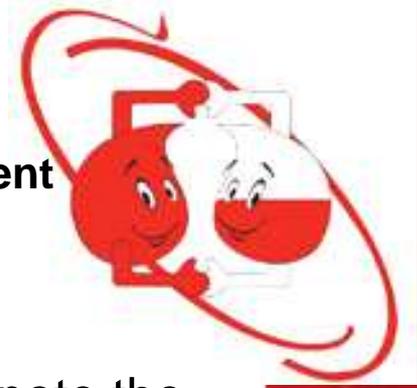


Decrease the demand

Blood requirement limiting, strict assessment

Planning transfusion, planning operations

Decreasing blood wastage



After **reasonable indication** one should note the following:

laboratory findings,
condition and
underlying disease state of the patient.

Appropriate amount of blood should be administered, but **not wastefully!**

You should preorder the blood if the patient needs a **large quantity** of blood, especially in case of **rare blood groups** and **cooperate in solving transportation issues.**



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Decrease the demand

Reduction of wastage

Appropriate treatment of blood products
transport, storage

During **transport, storage and in use of** blood products they should be treated very carefully to **prevent their damage.**



Transport in **isothermal** box
Storage under **controlled conditions**
Warming up just before use



SZOLGÁLAT



Decrease the demand

Organization of donated blood at the bedside

This is especially helpful in case of patients with a **rare blood group**, because it is more likely that this blood type occurs in the family.

A good opportunity for the clinician to contribute to the **increase of blood supply**



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The relatives of patients requiring blood are usually more helpful with blood donation.

Decrease the demand

Autotransfusion

An operation must not be necessarily use of a large amount of allogenic blood.

In case of certain groups of patients, there is the possibility of **removal of own blood** (for example hip implant)



In this cases in one week intervals prior to surgery maximum 3 U of blood is taken from the patient, which is then returned during surgery.



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Decrease the demand

Decrease the blood loss
In surgery

Cornerstone of a surgery with little blood loss is the prudent surgical operation technique.



There are methods that are used during or after surgery, that collect the patient's own blood and after specific treatment the patient's own blood is given back.

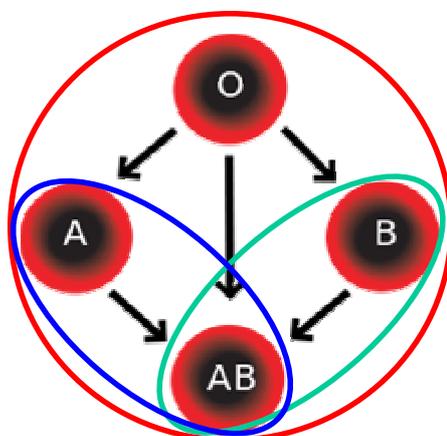


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Decrease the demand

Transfusion with ABO compatible blood products
in case of tight blood supply

In the acute case, two units of O blood could be given to any patient if RBCs are resuspended in nutritive solution without washing.



Cooperating in the classification of patients according to urgency

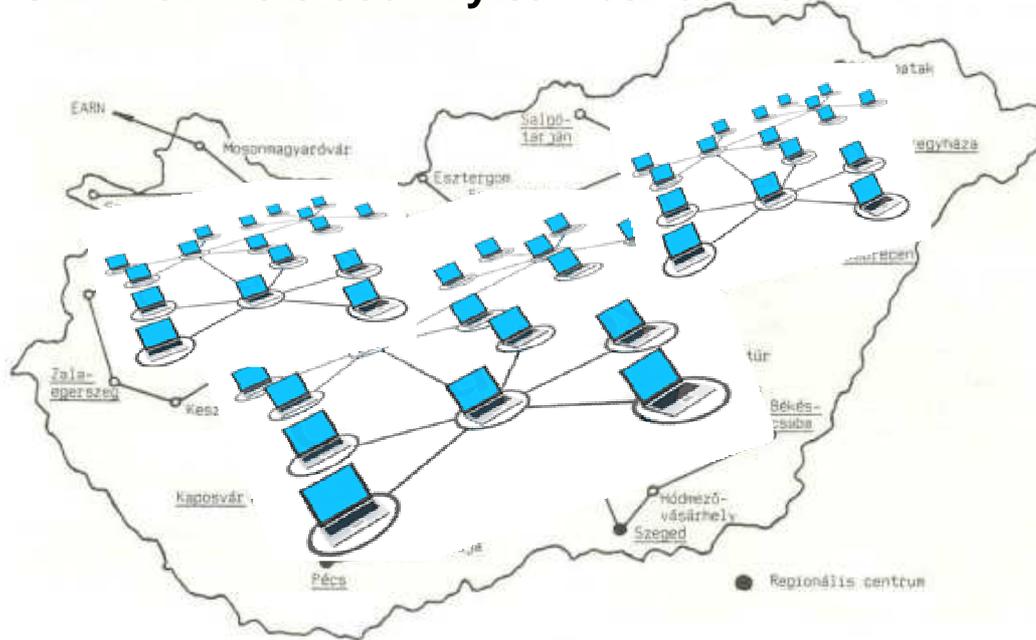
Acceptance of compatible blood

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Donor and patient safety

Blood banks in Hungary are interconnected by a **computer system**, the database of the donors and the patients in the whole country can be reached.



The connection of the hospitals and the blood banks computer network is under way, which greatly facilitates the joint management of blood products.



HOW to transfuse?



1. RBC min. 70g/l Hb
2. PLT minimum $5 \times 10^{11}/l$
3. FFP is generally indicated for prophylactic use only when the PT or PTT is 1.5 times the midpoint of normal or higher.



Clinical signes of hypoxia or bleeding !

Acute or chronic ?



HOW to transfuse?



In the **appropriate rate** corresponding to clinical conditions

Heated blood to 37°C if necessary

What can be planned should be **preordered**

Use **blood-saving** methods and techniques

Consider **indication and risks** of blood transfusion



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Never use blood unnecessarily!

Thank you for your attention!

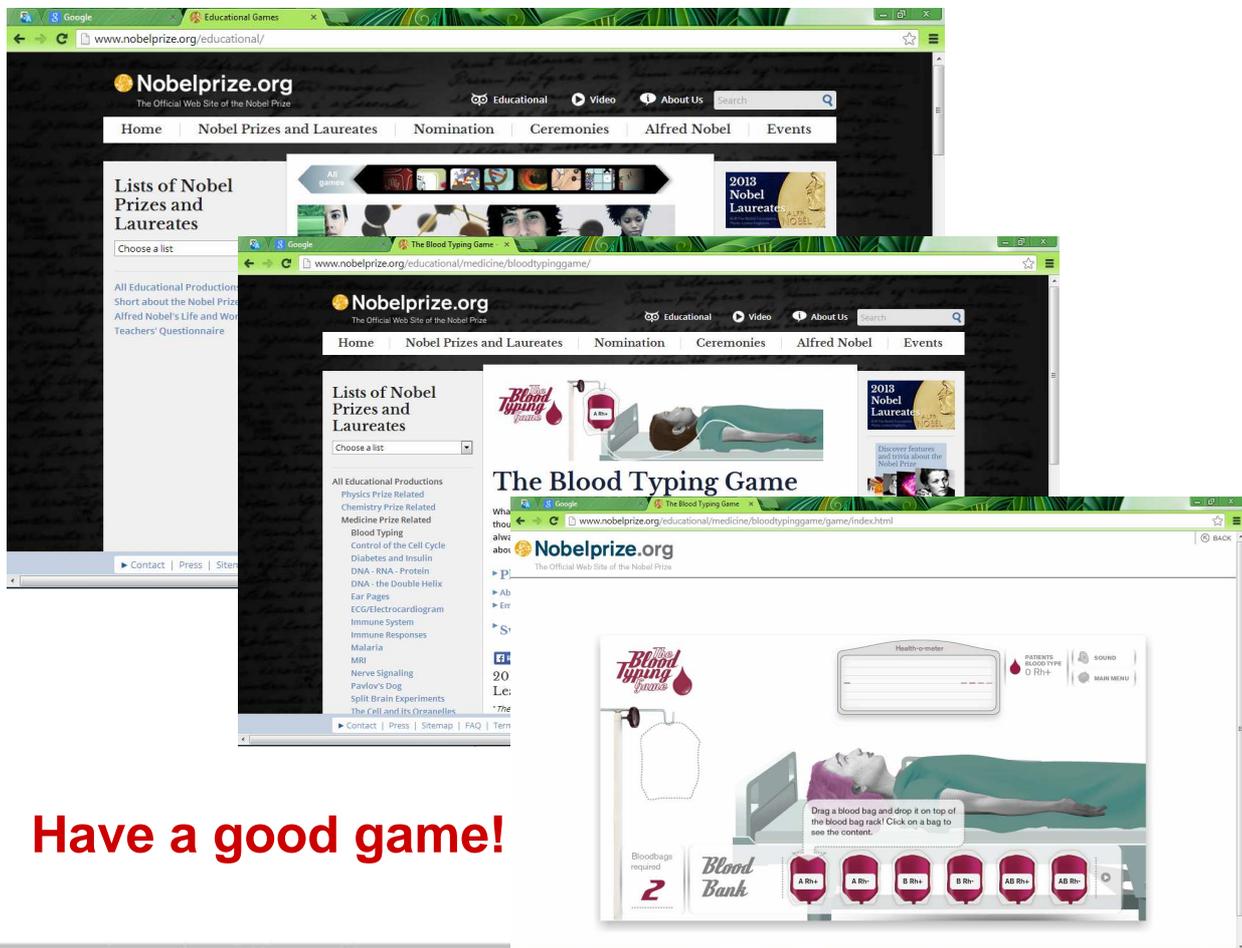


If you are healthy give blood!



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csernus.zita@ovsz.hu



Have a good game!



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<http://www.nobelprize.org/educational/>