The Point of Intersection between Clinical Transfusiology and Clinical Pharmacology - Patient Blood Management -

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Transfusion in

- **After discovering BGs: ABO in 1900 and RhD in 1940 by K. Landsteiner** - Medicine was changing rapidly
- Blood Transfusion became more safely
- It has changed mortality rate significantly, and
- Nowhere is that change/improvement seen more clearly than in Obstetrics&Gynecology
- Mortality rate in PPH in the era before blod transfusion (BT) was ≈ 50-60%
- After introducing BT mortality rate decline to <5/100 000 live births

BT- Blood Transfusion

Transfusion in Obstetrics and Gynecology

Considering these data,

- **Blod transfusion is life-saving procedure and,**
- **by WHO Blood Transfusion has been identified as one of the 8 essential components for reducing maternal mortality rate**

Transfusion adverse reactions

- Beside positive effects of Blood Transfusion in improving patients' outcome
- Physicians reported Adverse reactions to blood transfusion and
- Based on reported data was created

Haemovigilance reporting system in each country

(SHOT-Serious Hazards of Transfusion in UK)

Transfusion adverse reactions

- **National Haemovigilance Systems are part of International Haemovigilance Network (IHN)**
- **They c**ollect and assess information on unexpected or undesirable effects, with aims
- To target areas for **improvement** in practice by **identifiing steps** which lead to adverse reactions

Transfusion adverse reactions

- Transfusion is a complex multistep process involving nurses, doctors, laboratory scientists as well as the donors and recipients (282 steps)

  72 steps - Blood Donor Service

  210 steps – Hospital Blood Bank

At each of these steps mistakes may be made that can lead to adverse reactions

Berti P Vox Sanguinis 2009;96(Suppl1):20-21.

Transfusion adverse reactions

- There are several types of transfusion reaction:
- Haemolytic ⟺ Non-hemolytic
- Early (Acute) ⟺ Late or Delayed
- Immunologic ⟺ Non-immunologic

The most severe is Acute Haemolytic Reaction (rare – mostly - misindentification of patient)

The most frequently adverse events Whole Blood and Packet RBC

WHOLE BLOOD or Packet RBC

Alergic reaction

TACO, TRALI

WBC

Fever, Tachycardia
Tachypnea, Nausea
Headache
Bradycardia
Hypotension
GVHD

Hemolytic-HTR

Transfusion practice Improvement due to reporting adverse reactions

- Whole blood and Packet RBC contain both plasma and WBC
- Analysing collecting data by IHN
- It was concluded that the majority of reactions has caused by plasma proteins and by content of leukocyte, then
- The proces in transfusion services was **improved**: Blood unit has modified to components without plasma and without leucocytes

IHN – International Haemovigilance network

RBC without both plazma and WBC

Alergic reaction
TACO, TRALI

WBC

Fever, Tachycardia
Tachypnea, Nausea
Headache
Bradycardia
Hypotension
GVHD

Hemolytic-HTR

OAS – Optimal Adidive Solution, WBC – white blood cells

RBC without Plasma and WBC

- Removing Plasma and leukocyte layer from blood unit it has been generated/produced
- Unit of leucodepleted RBCs which are resuspended in Optimal Aditive Solution (OAS)
- This kind of component has rutinly produced - it is always available, and it is more safely to the patient

RBC without Plasma and WBC

The most safely: Leucodepleted **RBC** in OAS

Aller tion

TAC

Fever, Tachycardia

Nau dache

dyca

Hypotension

GVHD

Hemolytic- RARE

RBC without plazma and WBC

- Leucodepleted RBC in OAS does not contain neither Plasma nor Leucyte, and
- Administration of leucodepleted RBC components reduced significantly nonhaemolytic transfusion reaktions
- Improvement of blood procesing is based on reported adverse effects. From this reason →

OAS- Optimal Aditive Solution

Reporting of transfusion adverse reactions is useful

- **Reporting** of all serious adverse reactions of therapeutic use of blood is **mandatory**
- **By the law** (the EU legislation), and
- All IHN member states are required to report serious adverse reactions and events annually via their 'competent authority'

European Union (EU) legislation, EU Blood Safety Directives 2003, 2005

C/T index and MSBOS

- Despite described adverse reactions
- For elective surgeries **over ordering** of blood is a common practice
- Evaluation of excessive ordering of blood has been assessed by

  C/T ratio (Crossmatch/Transfusion)

MSBOS – Maximal Surgical Blood ordering Shedule

C/T index and MSBOS

- The C/T ratio has been used to:
- assesse Blood ordering efficiency
- evaluate the appropriateness of erythrocyte orders, and
- improve ordering policy – in an attempt to reach
- Optimal ratio described as < 2.0

(Ordered 100 - Transfused at least 51 blood units)

C/T = 100/50 = 2

MSBOS

- Considering high C/T ratio it was obviously that should find a mechanism to maximize usage of blood and minimize wastage in elective surgery
- in 1976 - Friedman and coworkers published the first maximal blood order schedule
- The goal of the MSBOS is to promote efficient use of blood.

MSBOS – Maximal Surgical Blood Ordering Shedule

MSBOS

- The MSBOS helps anesthesiologists, surgeons, transfusion medicine physicians and staff - to identify which surgical cases might require blood and which do not
- MSBOS requires samples being in the Transfusion Laboratory at least twenty four hours prior to surgery

MSBOS – Maximal Surgical Blood ordering Shedule

MSBOS

- The majority of surgical procedures do not require crosmatch (xm), only to perform blod group and antibody screening - T&S (G&S)
- According to the MSBOS some of the procedures that require crossmatch are shown in the following table

T&S – Type and Screen or G&S – Group and Screen

MSBOS

Procedures	No antibody detected	If antibodies detected
Abdominal aortic aneurysm	6 xm BU	6 xm BU
Total / subtotal colectomy	2 xm BU	2 xm BU
Thyroidectomy	T&S*	2 xm BU
Total knee replacement	T&S	2 xm BU
Embolectomy	2 xm BU	2 xm BU
Trans-urethral resection prostate	T&S	2 xm BU
Ovarian Cyst	T&S	T&S
Mastectomy simple	T&S	T&S

*Tape&screen, BU-Blood Unit, xm-crossmatch

MSBOS

- The MSBOS guidelines are widely accepted and have been repeatedly shown to decrease unnecessary cross-matching and wastage of blood

MSBOS

- Operative environment such as operative methods, haemostatic drugs and preoperative conditions of patients can change, therefofe
- MSBOS should be re-evaluated regularly, according to the changes
- It must include recently developed surgical procedures, according to

  institution-specific blood utilization

MSBOS

- MSBOS decrease delays in starting surgical cases, decrease excess ordering of laboratory tests and helps in the decision of ordering and transfusing blood which reduces blood wastage

In one word:

MSBOS promotes the goals of

Patient Blood Management programs-PBM

PBM

- The term Patient Blood Management (PBM) was first used in 2005 by Professor James Isbister, an Australian haematologist, who realised that the focus of transfusion medicine should be changed from blood products

  to the patients

Isbister J. Updates in Blood Conservation and Transfusion Alternatives. 2005

PBM

- Patient Blood Management (PBM) is a multimodal, multidisciplinary **patient-centered** approach adopted to minimise the use of allogeneic blood components with the aim of improving clinical outcomes of patients

PBM

- The first attempt to minimise the use of allogeneic blood is

  Autologous Blood Donation

  in elective surgery

Autologous transfusion

There are a few strategies of autologous blod donation:

1. **Preoperative collection -** up to 6 units during 6 weeks, nown as “leap frog”. The last donation 3 days before surgery
2. **Normovolaemic Haemodilution** – on surgery day

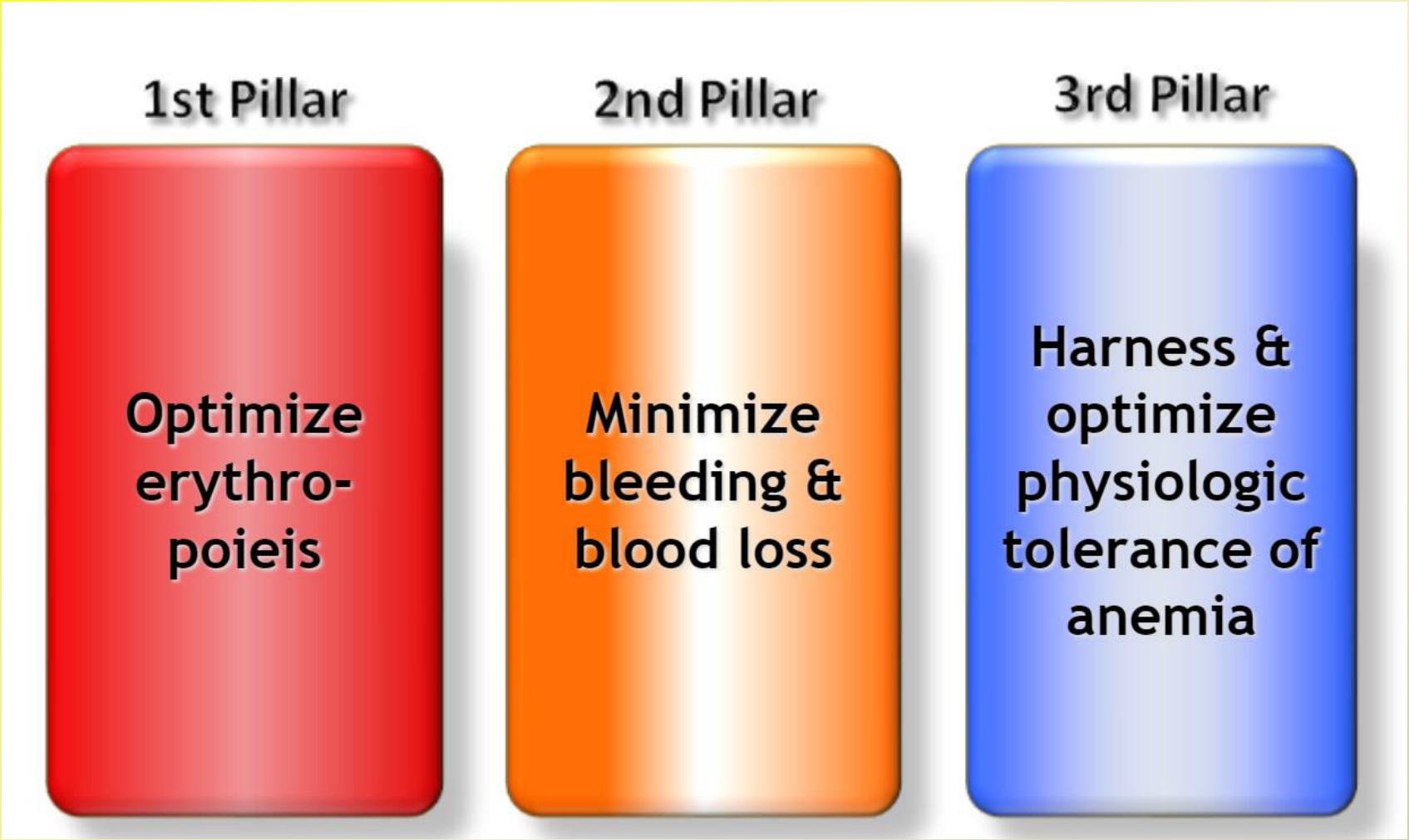
and , if we didn't do anything from the previous one, the last option is:

3. **Intra-operative Cell Salvage** (and in some cases post-operative cell salvage from dreinage)

Criteria:

- Haemoglobin > 110g/L
- The admission and operation days must be guaranteed

PBM – has three main objectives-3 pillars



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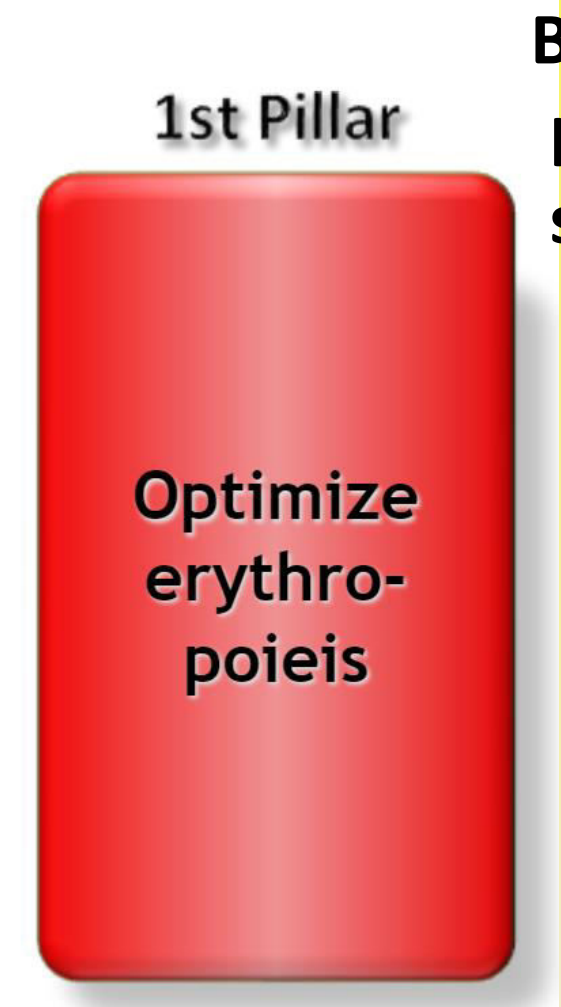
PBM – 1st pillar – anaemia management



Blood transusion is correlated with preoperative Anaemia-not with surgical preocedure, and the aim is

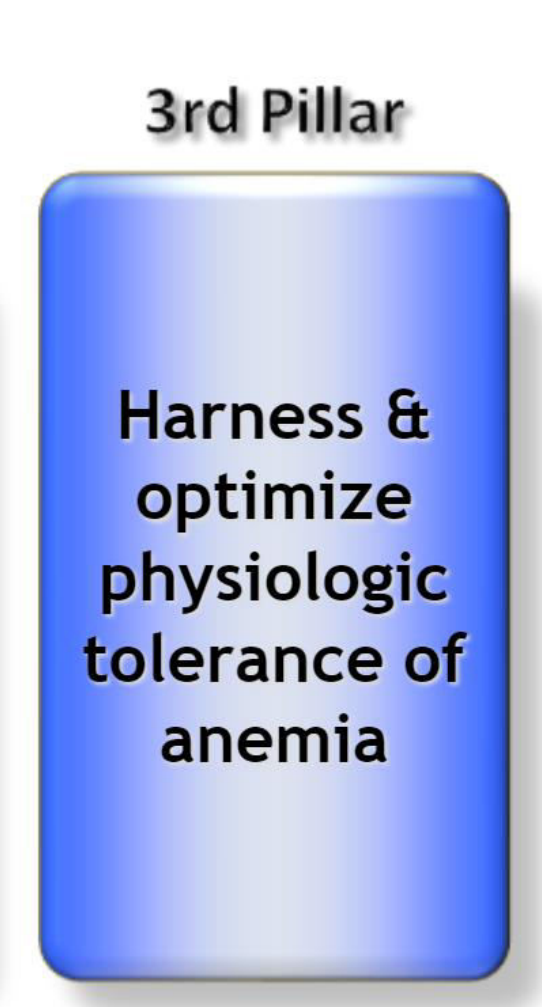
- detect anemia&determine etiology
- Use pharmacologic agents to correct anaemia (oral or I.V. Fe, B12, EPO)
- Optimise haemoglobin, and
- Time surgery with the optimisation of erythropoiesis – red cell mass - **Hb**

PBM – 2nd pillar – minimize bleeding

Requires Multidisciplinary blood conservation strategies:

- Use Minimally invasive procedures and surgical techniques that limit blood loss
- Optimise anaesthetic techniques
- Position and warm the patient
- Minimize phlebotomy for lab. testing
- Detect blood loss and coagulopathy
- Use Haemostatic agents (TXA and desmopressin)
- Intraoperative Autologous Transfusion

PBM - 3rd pillar - tolerance of anaemia



In 3rd pillar should

- Optimise cardiopulmonary function
- Optimise ventilation
- Optimise oxigenation
- decrease oxygen consumption

To enchance the patient's tolerance of anaemia and tolerance to blood loss

PBM

- In an era of cost reduction and pressure to reduce tests and procedures that are not beneficial to patient care, PBM is an important aproach
- Furthermore, by standardizing care and reducing unnecessary testing and costs, this changes in practice are according to the goals of campaign **Choosing Wisely**.

PBM

To summarize:

- **Avoid transfusion whenever is possible**
- Use all types of autologous transfusion when the patient's clinical condition allows
- Use pharmacological ESA (Fe, B12, Folic acid, EPO), to correct anaemia
- Use pharmacological agents to control bleeding (Tranexamic acid, Desmopresin)
- Optimise surgical and anaesthetic techniques
- **Mandatory transfuse at Hb<60 g/L, and**
- **Always use leukodepleted blood components**

P B M

Choose Wisely

Thank You

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