Patient Blood Management in Acute Care and Critical Illness: A Process Map for the Future

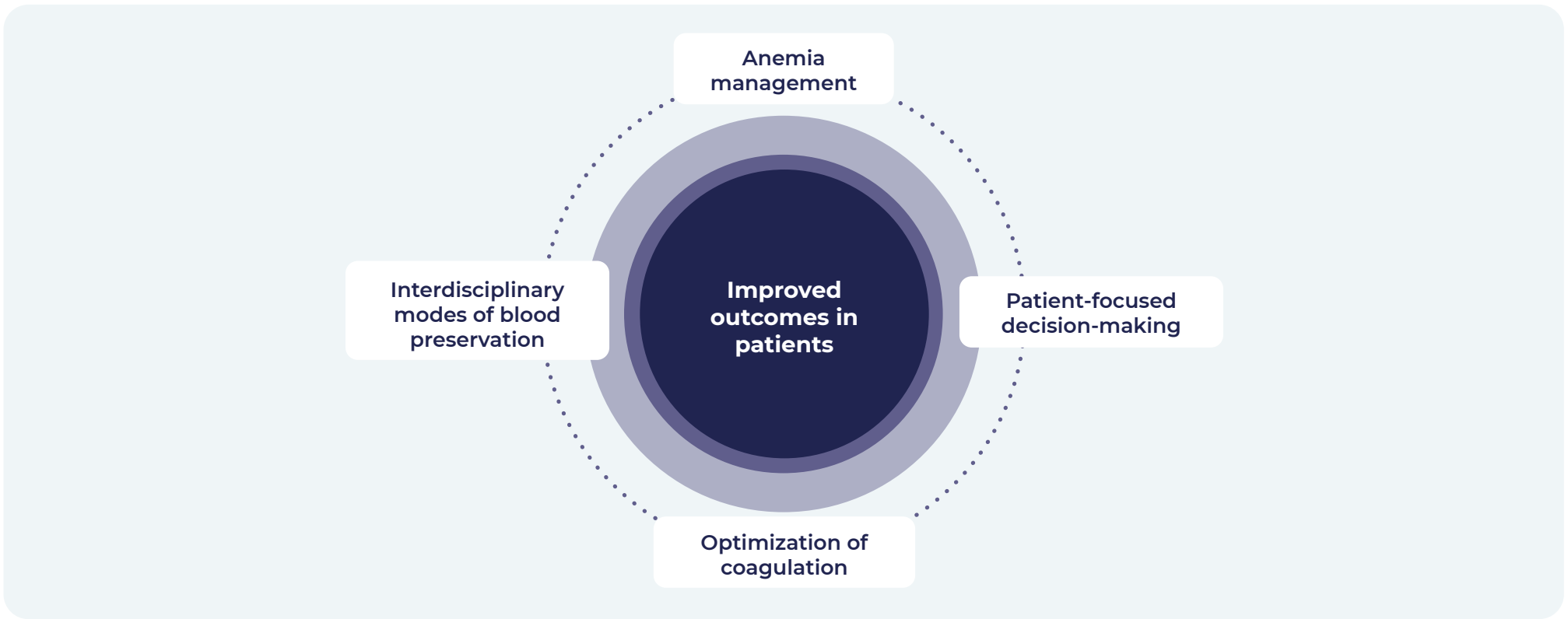
Moderators: Sigismond Lasocki and Patrick Meybohm

Friday, April 25, 2025

1. TRAINING OUR FUTURE LEADERS: WHAT ANESTHESIOLOGISTS AND CRITICAL CARE PHYSICIANS SHOULD KNOW ABOUT TRANSFUSION MEDICINE

Gagan Mathur

Transfusion medicine brings together clinical experience (blood collection, transfusion, apheresis, and cell therapy), biochemistry, and the regulatory perspective. The current trend includes management and preservation of the patient's own blood, while promoting their safety and empowerment. For that purpose, it is required to get away from the transfusion-focused approach and closer to a more holistic, patient-focused, systematic, evidence-based model[1].



The final goal of *patient blood management* (PBM) is to ensure the optimal functionality of all blood components of each individual and their interactions with all other organs and systems[2].

However, a system-wide change is needed because there are several barriers for the implementation of PBM:

- Suboptimal anemia management
- Transfusion-centered culture
- Limited patient involvement
- Fragmented interdisciplinary cooperation

Given that scarce interdisciplinary cooperation hinders the implementation of PBM, training future leaders and setting up interdisciplinary teams is necessary, in order to promote harmonized practices, reinforce the effectiveness of programs, and to improve patient care in all departments.

Transfusion medicine acts as a bridge between the clinical and operational settings. These are the three basic pillars for its implementation:

EDUCATION

Education in the following aspects is essential to enable the healthcare team and to implement an evidence-based PBM:

- Reinforcing best practices related to transfusion thresholds, anemia, coagulation, and goal-directed therapy.
- Educating students, residents, interns, and healthcare professionals in the principles of PBM.
- Educating nurses on the reduction of the phlebotomy, transfusion safety, and early detection of anemia.

DATA GENERATION AND ANALYSIS

Generating robust data is required for a successful implementation of PBM:

- Driving the implementation of PBM and monitoring its performance.
- Harnessing electronic records (lab as a source of data).
- Access and resources (for regulatory and qualitative purposes).

LEADERSHIP

Leadership is essential to implement PBM at an institutional level:

- Generating clinical practice guidelines and protocols.
- Configuration of expert committees and working groups.
- Fostering a cultural shift based on data use, commitment, and education.

KEY MESSAGES:

- **Transfusion medicine should be taught as a cross-discipline skill from the residence.**
- **PBM leadership requires technical knowledge, management skills, and educational ability.**
- **There are international programs that may be used as a model for Europe.**

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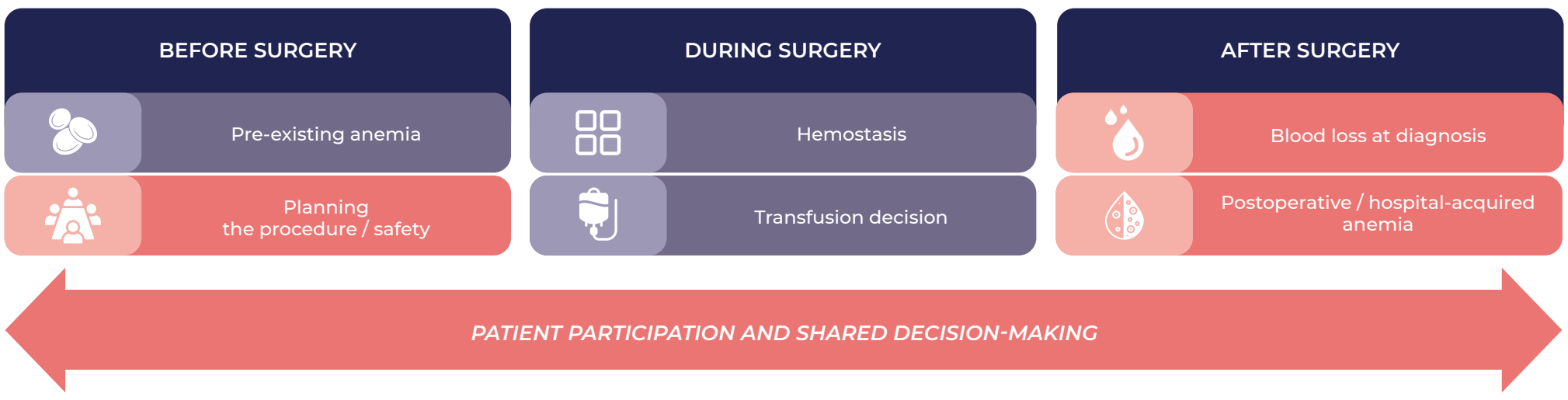
2. PATIENT BLOOD MANAGEMENT IS THE FUTURE OF ACUTE CARE AND PATIENT RECOVERY

Matthew Warner

PBM is an intervention carried out at three specific times. The goals are different at each one of them[3]:



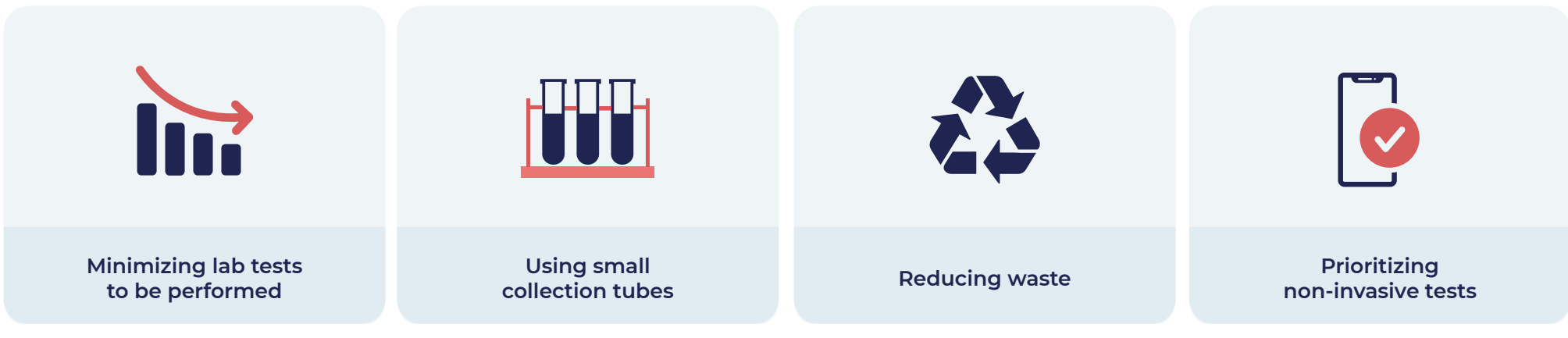
Next, different strategies are defined to achieve each one of the four goals on which the presentation is focused, as well as to reinforce the patient participation and shared decision-making between the patient and the clinician.

1. PROCEDURE PLANNING

- Team work is a must.
- The use of technology can help improve clinical outcomes.
- Patients should get involved in decision making.

2. BLOOD LOSS AT DIAGNOSIS

Anemia is frequent in critical patients, and it may get worse due to phlebotomy-related iatrogenic blood loss. Each 100 ml of phlebotomy volume during hospitalization is associated with a 15% increase in transfused red blood cell units. In fact, patients in the top quartile of cumulative blood collection experience the highest transfusion rates[4].



An optimized blood collection tube program may entail a 41% reduction in collection tubes, and $25,000 in related costs, a 59% decrease in collected blood, and 1,071 L of blood saved every year[5]. The use of small tubes has also been reported to entail a decrease in red blood cell transfusion, with no impact on the number of collected insufficient samples[6].

3. POSTOPERATIVE ANEMIA

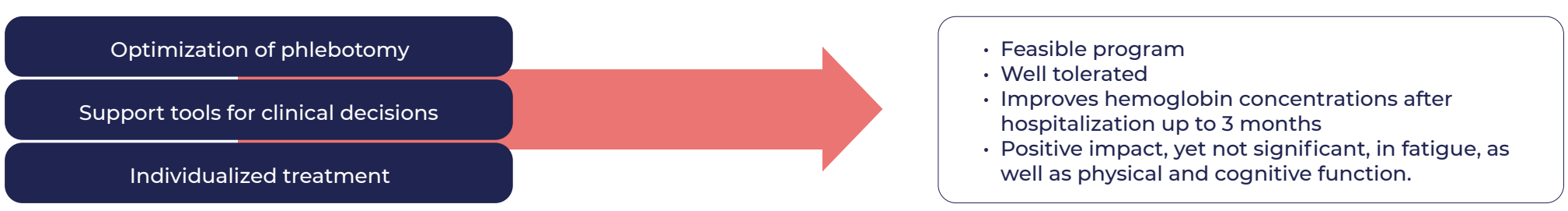
Postoperative anemia is common yet not benign, and it involves a number of significant consequences:

- A decrease of 1 g/dL in hemoglobin at hospital discharge produces a 10% increase in the risk of re-admission within 30 days[7].
- Postoperative anemia has an impact on survival, which is dependent on hemoglobin concentration[8].
- Recovering 1 g/dL within a month entails a 13% decrease in the re-admission risk, and an 18% reduction in the risk of death[9].

Intravenous iron is a potential treatment, although there are not enough studies available yet and its effect on the transfusion rate or the clinical outcomes is not very conclusive[10–12].

IV Fe	• Increases Hb • It may reduce the number of transfusions and improve relevant outcomes for patients

The results of a study were recently published assessing the effect of a multifaceted anemia control program on the recovery of hemoglobin after hospitalization and on the functional results in survivors of acute diseases[13].



4. PATIENT PARTICIPATION AND SHARED DECISION-MAKING.

A study in the United Kingdom assessed the practice of obtaining informed consent for blood transfusion, observing it only occurred in 43% of cases[14]. Both patients and clinicians declared having discussed or mentioned the following items:

	Patients (n=2243)	Clinicians (n=1633)
Discussion of transfusion	76%	85%
Mention of risks	38%	38%
Mention of alternatives	8%	14%

Another qualitative study with preoperative patients concluded that discussions on transfusion are superficial, and that some patients would rather delegate decision making to the medical team, whereas others consider their preferences should be included, but most patients are willing to participate in strategies to reduce the number of transfusions[15].

KEY MESSAGES:

- **PBM is applicable and necessary in critical patients, not only surgical ones.**
- **Transfusion should be a reasoned exception, not a default response.**
- **Implementing PBM in the ICU improves clinical outcomes, costs, and healthcare safety.**

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3. MOVING THE NEEDLE IN CARDIAC SURGICAL PROCEDURES

Linda Shore-Lesserson

The results of a study published in 2008 concluded that there is a significant variability in perioperative transfusion practice in the context of cardiac surgery between sites from different countries[16]. Another study published in 2010 also described a wide variability in transfusion rates of red blood cells and other blood products between patients undergoing coronary artery bypass surgery with cardiopulmonary bypass in hospitals in the United States[17]. This variability may be due to differences in practice patterns, as well as a potentially inappropriate use of transfusion.

The *Society of Thoracic Surgeons* (STS) and the *Society of Cardiovascular Anesthesiologists* (SCA) published a set of guidelines for preoperative transfusion and blood preservation in cardiac surgery in 2007[18]. Adherence to such guidelines was subsequently studied and a wide variability was observed in current practices of preoperative, perfusion, surgery, and pharmacological testing, and the following results were obtained[19]:

- Institutional discussion after checking guidelines **20%**
- Institutional action after checking guidelines **14%**
- Change in practice which was effective in the reduction of transfusion rates **26%**
- The adherence to recommendations on the use of erythropoietin did not reach **30%**

When the mentioned guidelines were updated in 2011, they included quality measures related to four recommendations in class 1, 100%-compliance of which leads to certification[20]:

- Use of lysine analogues
- Use of minicircuits or retrograde autologous priming or ultrafiltration volume
- Use of *cell salvage*
- Use of algorithm and test at the point of care

Later on, Joshi et al. published the results obtained from a study with 30-item questionnaire assessing adherence to measures in *Anesthesia Quality Institute's* (AQI49)[21], leading to the following results:

WIDESPREAD ADOPTION OF BEST PRACTICES ON:

- Lower tolerance to hemoglobin
- Antifibrinolytics
- Minimizing hemodilution
- Cell salvage

IDENTIFICED BREACHES:

- Preoperative anemia management
- Use of algorithms and tests at the point of care

HIGHER ACHIEVEMENT IN ALL 4 CRITERIE IN SITES WITH PBM MULTIDISCIPLINARY TEAMS.

When the guidelines were updated in 2021, they included certain developments, such as the recommendation of assessing anemia and the determination of its etiology in all patients undergoing cardiac surgery, as well as treatment with intravenous iron if time allows[22]. This recommendation may go a little further in future editions.

The guidelines of the *European Association for Cardio-Thoracic Surgery* (EACTS) and the *European Association of Cardiothoracic Anaesthesiology and Intensive Care* (EACTAIC), published in 2024, already provide specific recommendations for PBM before admission, before, during, and after surgery[23]. For the first section, the following recommendations are put forward, among others:

Identification of anemia, causes and appropriate treatment (I-B).

- **Oral iron supplementation in patients with Hb < 120-130 g/L (IIa-B)**
- **Intravenous iron supplementation in patients with Hb < 120-130 g/L (IIa-A).**
- **Erythropoietin (IIa-A).**

Last, in 2025, the recommendations generated in a consensus on bleeding control and transfusion management were published, including qualitative measures suggested in cardiac surgical bleeding[24]. These are the new items in the guideline:

- Universal definition of excessive bleeding soon after surgery.
- Production pressure as a non-measured bleeding risk factor.
- Immediate reexploration for bleeding to reduce risk of adverse results.
- Quality indicators should be expanded beyond reexploration rates, comprising factors such as surgical bleeding *checklists* and time to reexploration.
- Individualized assessment of risks and benefits of discontinuing or not anticoagulant and antiaggregant treatment.

KEY MESSAGES:

- **Cardiac surgery is the paradigm where PBM shows a higher clinical impact.**
- **Viscoelastometry allows for rational guided hemostatic replacement.**
- **Developing protocols for PBM in major surgery is feasible and it is associated to less transfusions and better prognosis.**

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