



“Art Corner for Kids” – specific populations

Moderators: Gabor Erdoes, Patricia Guilabert

Thursday, April 30, 2026

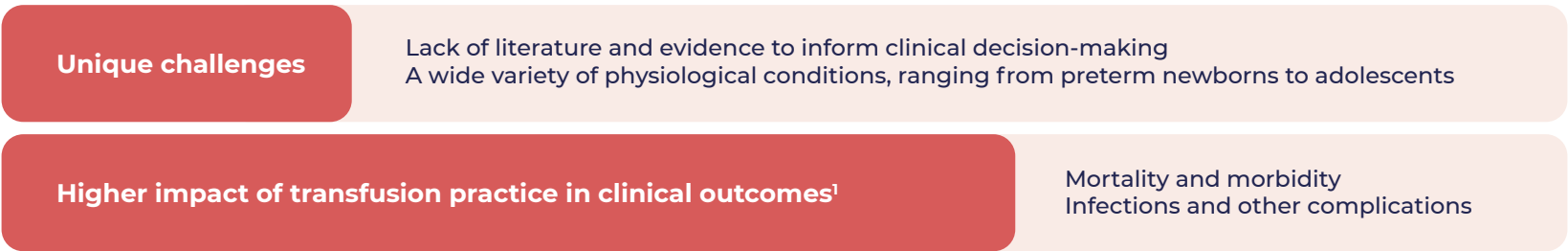
1. PBM IN PAEDIATRICS

Vanessa Marchesini

Patient Blood Management (PBM) is a systematic, multidisciplinary, multiprofessional concept aimed at minimizing risk factors and improving clinical and health outcomes in patients. According to the World Health Organization, it applies to all populations that require it, including children. PBM is a multimodal strategy focused on the patient and blood health.

BLOOD HEALTH IS AN INNOVATIVE CONCEPT, including the optimization of blood function, prevention, diagnosis and treatment of blood conditions.

PBM in paediatric patients has certain unique characteristics that must be considered:



For all these reasons, and although the 3 pillars of PBM in paediatrics remain the same, it is crucial in this population **to prioritize the preservation of the patients’ own blood**.

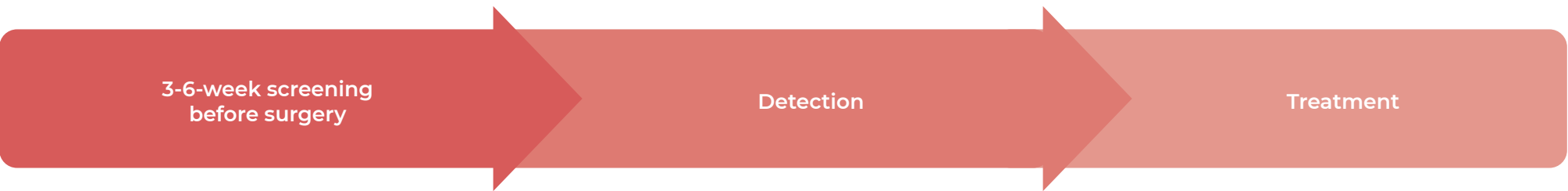
PAEDIATRIC PBM IN PERIOPERATIVE PERIOD

1. Pre-surgery

Preoperative anaemia in data:



Preoperative anaemia management²:

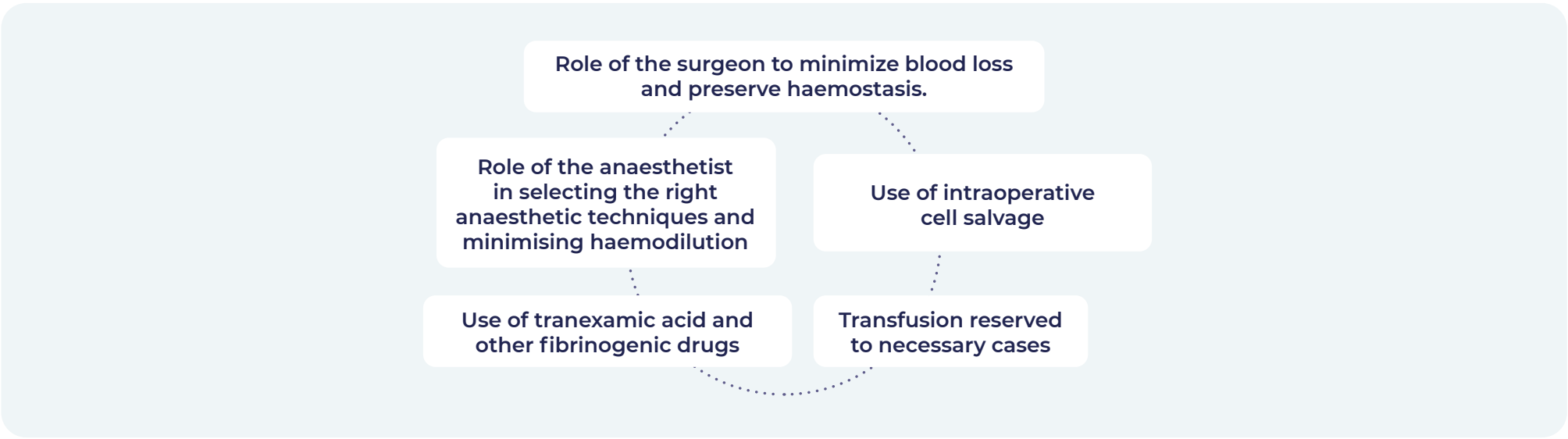


The current recommendation is to postpone scheduled surgeries, if needed, in order to correct preoperative anaemia.

In most cases, this anaemia corresponds to a diet-related iron deficiency, and there is evidence that correcting it through iron supplementation reduces the need for a transfusion^{3,4}.

2. Surgery

During the intraoperative period, applying certain elements is key:



Blood cell salvage should be applied to children under 10 kg and estimated volemia loss of at least 10%.

Within the concept of cell salvage, normovolemic haemodilution should be mentioned, which is about preserving the patient's blood and maintaining normovolemia with crystalloid serum infusion. This technique requires training, preparation and organization, as well as a careful selection of patients, and IT MUST NOT BE APPLIED to low-volemia or anaemic patients.

3. Post-surgery

It is essential to prevent iatrogenic or hospital-induced anaemia.

In paediatric patients in which, despite everything, a transfusion is needed, the following recommendation must be taken into account⁵:

- Administering the right **product**,
- in the right **dose**,
- to the right **patient**,
- at the right **time**,
- for the right **indication**.

In general, in paediatrics, the recommendation is to never transfuse a haemodynamically stable paediatric patient with a haemoglobin concentration above 7 g/dL. It is key to avoid overtransfusion and to aim for a target of 9 - 9,5 g/dL after the transfusion. It is also crucial to consider several factors to set personalized transfusion thresholds, rather than basing transfusion decisions on a single value: age, weight, but also comorbidities, physiological status, prematurity, cause of the anaemia, etc.

PBM implementation is essential in paediatrics and should be a team effort. Actions and changes are required at various levels to implement PBM in paediatrics.



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2. PBM IN CARDIAC SURGERY

Kyung Hwan Kim

Cardiac surgery carries a high risk of perioperative bleeding and allogenic transfusion due to the invasive nature of the procedure, the need for anticoagulation and the use of extracorporeal circulation. The latter is a part of cardiac surgery, and the heart was typically primed with blood, but nowadays this is done with crystalloid solutions.

In this context, PBM may help to optimise haemostasis, minimise bleeding, reduce the need for transfusions, improve clinical outcomes and decrease healthcare costs.

In cardiac surgery, PBM should not be limited to intraoperative haemostasis, and it should be viewed as a comprehensive care package ranging from preoperative correction of anaemia to the implementation of strict postoperative protocols, including surgical excellence.

The updated guidelines of the *European Association for Cardio-Thoracic Surgery* and the *European Association of Cardiothoracic and Vascular Anaesthesia and Intensive Care* (EACTS/EACTAIC), launched in 2024, includes new recommendations to bring about changes throughout the perioperative period in cardiac surgery⁶:

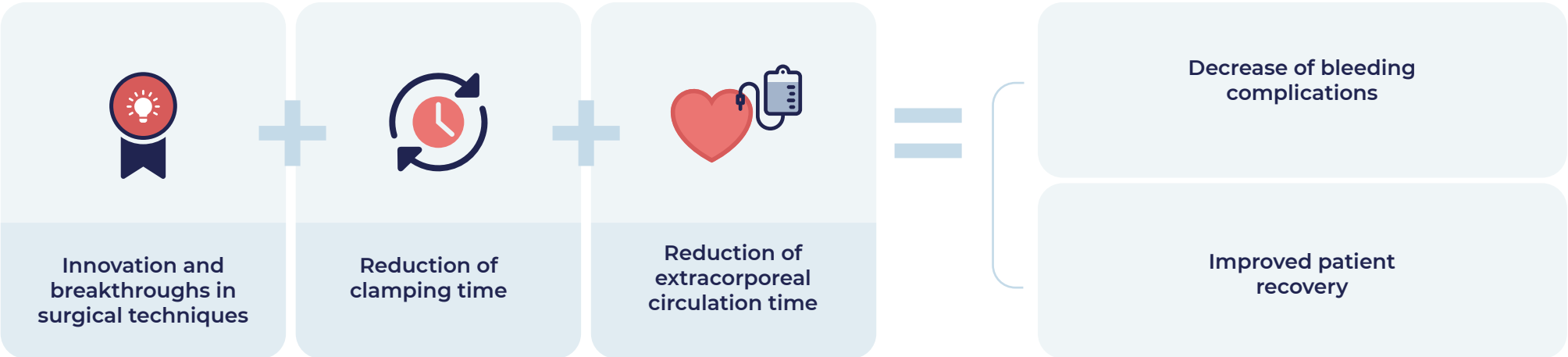


The goal during the preoperative period is to optimise the patient before the surgery in order to reduce the risk of anaemia and bleeding during the surgery.

- Correction of anaemia and iron deficiency.
- If there is enough time, increase the red blood cell count (with iron and erythropoietin).
- Management of anticoagulant and antiaggregant therapy, following the guidelines, in patients taking such medication.



With regard to intraoperative strategies, the surgical technique is fundamental to successfully develop PBM:



It has been reported that prolonging extracorporeal circulation beyond 2-3 hours and aortic clamping beyond 60-90 minutes is associated with higher rates of acute kidney injury, stroke, prolonged ventilation and mortality.

In this context, the use of devices that reduce surgical times, such as the COR-KNOT® self-stitching mechanisms or the INNOVA-ELITE systems for high-definition videoscopy-guided aortic replacement, can be very useful and should be regarded as an integral tool within PBM strategies.

Another example is the use of hybrid aortic arch prostheses and thoracic endoprostheses (TEVAR), which can reduce the complications associated with the repair of the aortic arch and the descending thoracic aorta.

It is recommended that intraoperative transfusion algorithms be used, guided by viscoelastic tests that reflect the patient's haemostatic capacity⁷.



With regard to postoperative management, it is fundamental to understand that allogenic transfusions should be reserved as last-resort treatment, as in cardiac surgery even the transfusion of a single unit of packed red blood cells is associates with an increased risk of morbidity, complications and mortality⁸.

PBM in cardiac surgery should be managed using a multidisciplinary approach throughout the preoperative, intraoperative, and postoperative periods. The choice of the right surgical techniques is also part of PBM strategies. In this context, transfusion should always be seen as a last-resort therapy measure.

KEY MESSAGES IN PBM GUIDELINES FOR CARDIAC SURGERY IN ADULTS:

RECOMMENDED	SHOULD BE CONSIDERED	NOT RECOMMENDED
• Institutional PBM programmes • Preoperative assessment of bleeding risk • Anaemia treatment • Limiting haemodilution • Optimising ECC priming • Protat:heparin ratio<1:1 • Antifibrinolytics • Restrictive transfusion thresholds • Multidisciplinary protocol to manage bleeding	• Supplementation with iron/EPO • PCC rather than FFP to revert Vit k antagonists • Cell saver, ultrafiltration • Normothermia, normo pH • Supplementing fibrinogen if there is bleeding and levels< 1.5 g • Desmopressin in platelet dysfunction • Platelet counts>50,000 • Early surgical exploration if bleeding	• Routine use of VET to predict bleeding • Preoperative transfusion in anaemic patients • Preoperative platelet transfusion • Preoperative andexanet in patients with DOACs • Routine use of topical sealants • Use of colloids in ECC priming • Prophylactic use of plasma, fibrinogen, desmopressin or recombinant factor VII to reduce bleeding

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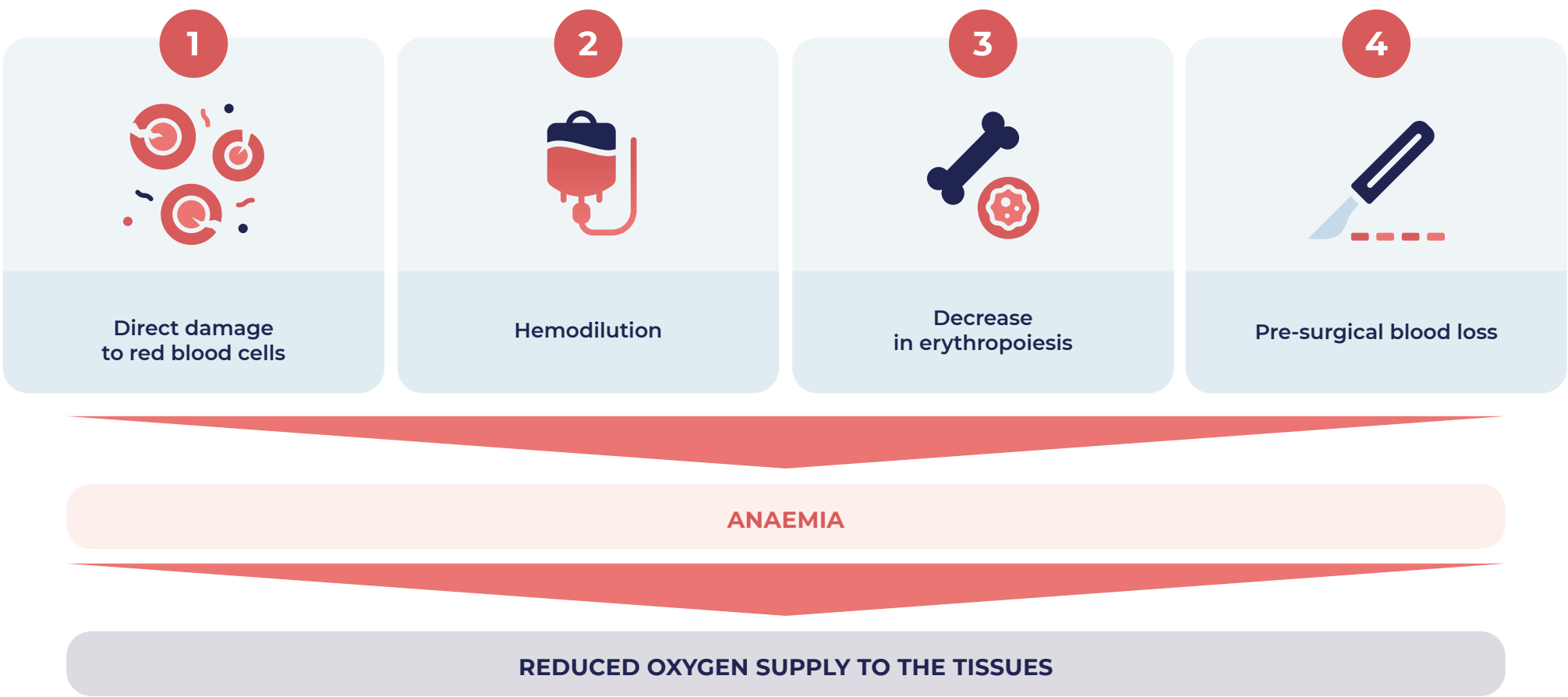
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3. PBM IN BURNS

Patricia Guilabert

Los pacientes quemados presentan una fisiología especialmente dinámica y compleja que los hace únicos. En esta población de pacientes se produce una respuesta inflamatoria masiva, daño endotelial, incremento de la permeabilidad capilar, hemoconcentración inicial por hipovolemia y entrada en estado de shock, cuya resucitación agresiva con fluidos conlleva hemodilución.

1. In burn patients, haemoglobin levels do not necessarily provide an accurate reflection of tissue oxygen supply. Anaemia in these patients is multifactorial, and not exclusively associated with blood loss.



2. In burn patients, coagulation abnormalities are not always easily detectable, and the value of conventional coagulation tests is limited:

- Abnormalities in prothrombin time (PT) and activated partial thromboplastin time (aPTT) associated with acute burn-induced coagulopathy are not detected by viscoelastic testing.
- Coagulopathy in burn patients is related to severity, not bleeding.
- In burn patients, dynamic changes occur over time, with an evolution toward a hypercoagulability state.

3. It is important to consider the significant decrease in plasma FXIII levels experienced by patients with severe burns from the time of admission until 24 hours after surgery, possibly associated with haemodilution resulting from intensive fluid resuscitation. It must be remembered that FXIII stabilises the fibrin mesh that makes up the clot, maintains endothelial integrity and is essential for healing. FXIII levels in burn patients experience a significant decrease during the first 24 hours, and gradually rise again over time^{9,10}.

4. Burn patients present a pattern of coagulation abnormalities that is not clearly reflected in viscoelastic testing.

Given these characteristics inherent to burn patients, PBM should be approached using a multimodal strategy:



PBM should also be specifically tailored to burn patients, as many of the current strategies are extrapolated from other areas and patient profiles. In that regard, specific evidence must be generated for this population.

Currently, it is crucial to identify which strategies are genuinely useful to burn patients and which ones have not proven to be beneficial in this context^{11–14}:

✓ WHAT WORKS	✗ WHAT CAN HELP	? WHAT DOESN'T WORK / IS UNCERTAIN
- Restrictive transfusion strategy - Reducing blood loss - Point-of-care-guided coagulation - Minimising iatrogenic losses	- Optimising erythropoiesis - Adequate nutritional support - Adjuvant surgical techniques - Cell salvage	- Liberal transfusion strategies - Fixed transfusion ratios (1:1:1) - Standard coagulation tests used in isolation - Therapies commonly used without clear evidence

Last, in burn patients it is important to set haemoglobin transfusion threshold of 7 g/dL (restrictive strategy) in those who are haemodynamically stable. However, clinical reality is usually more complex:

- The 7 g/dL threshold is not always applicable, particularly in cases of active bleeding, repeated surgery or haemodynamic instability. **7 is a reference, not a rule.**
- Besides haemoglobin levels, oxygen supply, tissue perfusion, and the patient's overall clinical context should be taken into account.
- Haemoglobin levels below 6 g/dL are indeed associated with worse clinical outcomes.

- AREAS FOR FURTHER RESEARCH (MOVING FORWARD)
1. Hidden coagulation problems in these patients, which are not detected by standard laboratory tests and which may be clinically significant and associated with an increased risk of bleeding.

2. Interactions between resuscitation and haemostasis

3. Beyond haemoglobin. Haemoglobin does not mean O2 delivery—physiological assessment and monitoring support are required.

4. Specific PBM measures for burn patients, because currently used strategies are extrapolated from other scenarios.

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