In The Name Of GOD

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Application of Patient Blood Management (PBM) for the usage of blood components in the field of pediatric Oncology

Patient Blood Management(PBM)

- **Definition**
- PBM is the scientific use of safe and effective medical and surgical techniques designed to **prevent anemia** and **decrease bleeding** for maintain Hgb concentration, optimise hemostasis and minimise blood loss for improve patient outcome

Patient Blood Management(PBM)

- **Concept**
- PBM incorporates the treatment regimes , using a multidisciplinary team approach to conserve a Medication or patient's own blood. Techniques may involve the use of pharmaceutical agents and medical devices to reduce the need for allogeneic blood transfusion.

Why increasing focus on PBM

- By a number of factors including:
- The adverse effect blood transfusion, increased length hospitalization , higher risk of morbidity and mortality
- Rising costs, both direct and indirect, associated with provision and transfusion of allogeneic blood
- Challenges of maintaining an adequate blood supply by increased demand due to ageing population

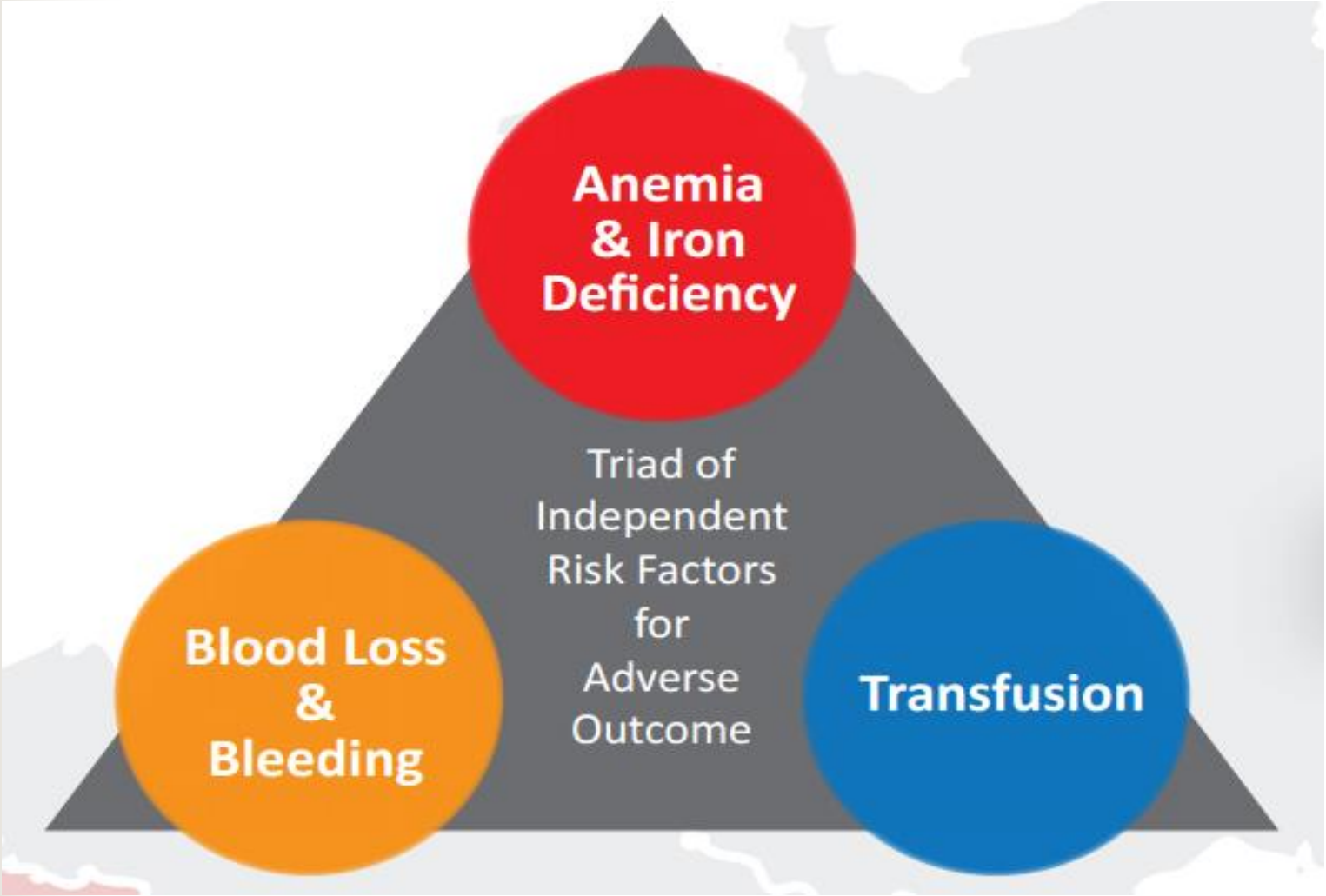
Patient Blood Management (PBM)

On Surgery

Patient Blood Management(PBM)On surgery

- For adult patients undergoing elective surgery , three main predictors for RBC Tx:
- preoperative anemia,
- volume of surgical blood loss
- failure to adopt a more restrictive threshold for transfusion.

The Triad of Anemia, Blood Loss, and Transfusion: Three Independent Risk Factors for an Adverse Outcome



PBM is based on three pillars.

1. Optimization of the endogenous RBC mass through the targeted stimulation of erythropoiesis and the treatment of modifiable underlying disorders.
2. Minimization of diagnostic, interventional, and surgical blood loss to preserve the patient's RBC mass.
3. Optimization of the pt specific tolerance to anemia through strict adherence to physiological transfusion thresholds.

PBM Strategies On Surgery

Pre-Operative

- Early detection
- Evaluation and management of anemia
- Iron
- Eprex
- Restrictive phlebotomy

Peri-Operative

- Controlled hypo-tension
- Normothermia
- Cell Saver
- Surgical technique / meticulous hemostasis
- Volume replacement
- Pharmacological agents to reduce or control bleeding
- Restricitve phlebotomy

Post-Operative

- Optimum fluid and volume management
- Restrictive phlebotomy
- Iron
- Eprex

PBM Pre-Operative

- **EARLY DETECTION** ; screening blood work at least 4-6 weeks prior to surgery
- **EVALUATION** ; etiology of anemia needed in order to treat
- **MANAGEMENT** ; options may include:
  - Diet modification and patient education to support adherence to plan
  - Medication ; oral or parenteral iron, EPO, vit B12, folic acid, tranexamic acid, OCP to control bleeding (pre-surgical with menorrhagia)
  - Referrals to other services, i.e., hematology, gastroenterologist

Peri-operative Strategies

- Controlled hypotension
- Normothermia
- Cell Saver
- ANH- Acute Normovolemic Hemodilution
- Surgical technique/ meticulous hemostasis
- Body Position
- Anti-fibrinolytics

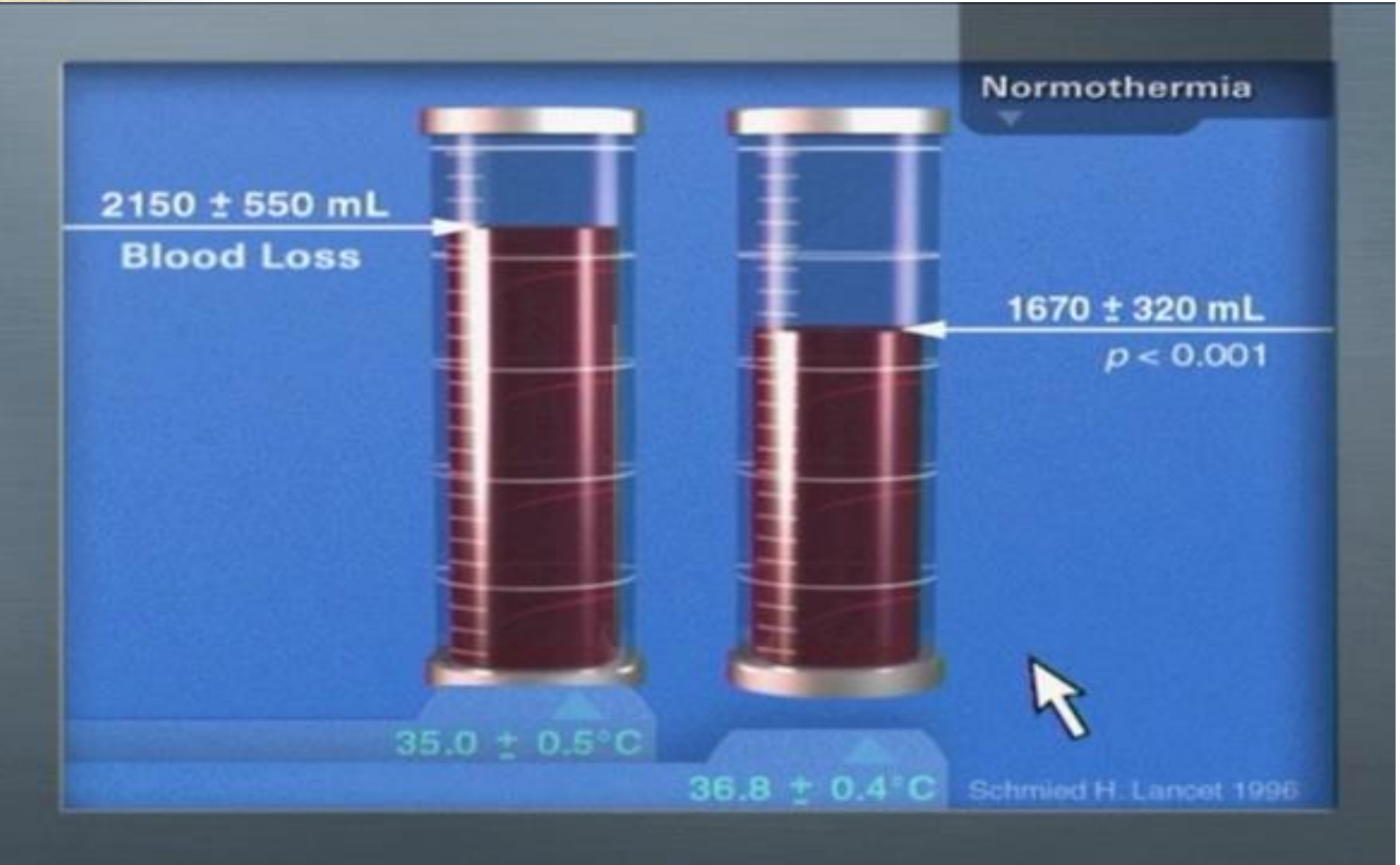
Temperature

Peri-operative hypothermia pre-disposes surgical patients to:

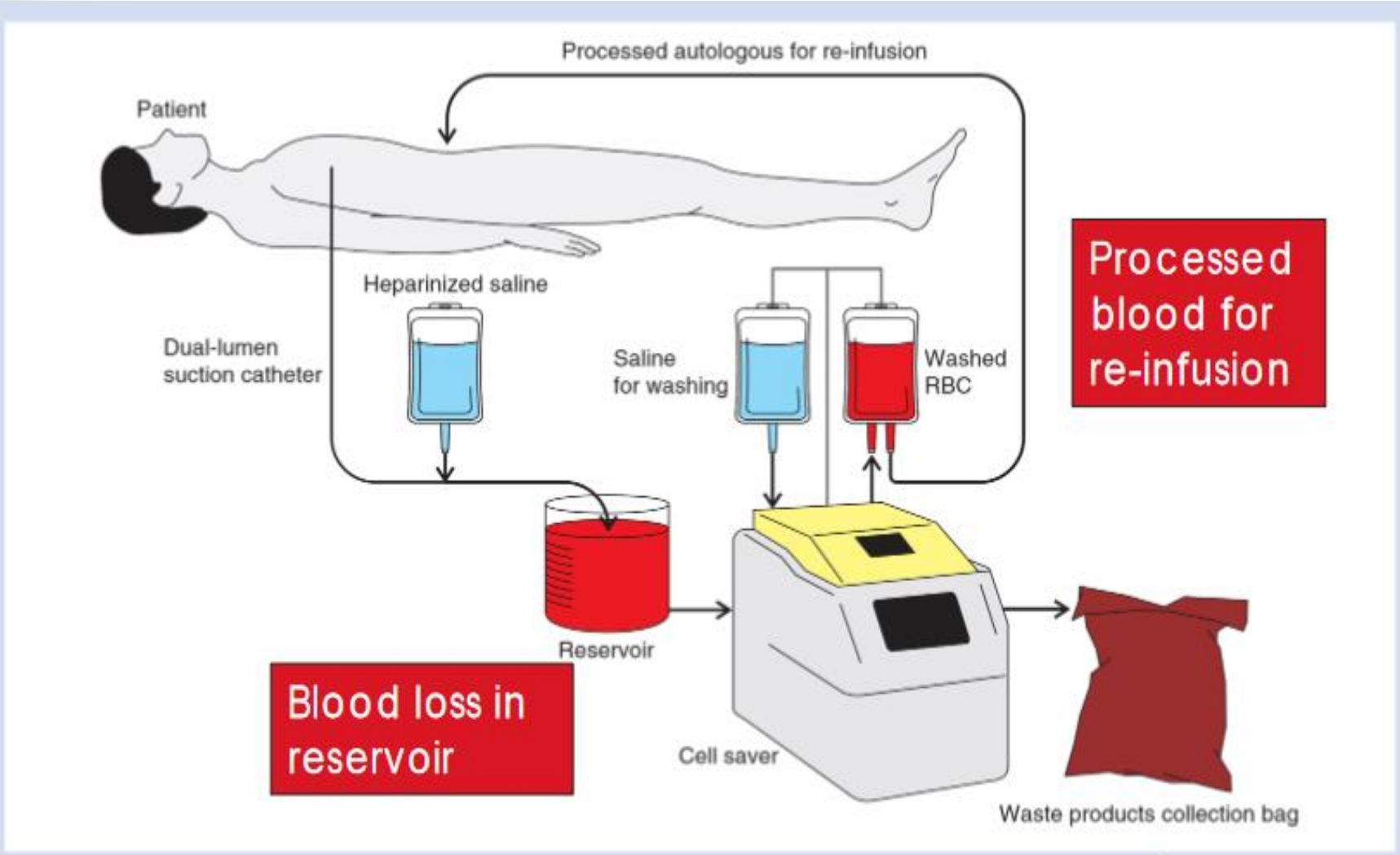
- Bleeding
  - As little as 0.5 degrees below normal may increase blood loss by one unit of blood
- Infection
  - 1.9 degrees cooler may increase risk of wound infection by 19%

Anesthetized patients have an impaired ability to respond to hypothermia that lasts for several hours post-op… we must prevent hypothermia as a first line of defense.

Temperature



Cell Salvage

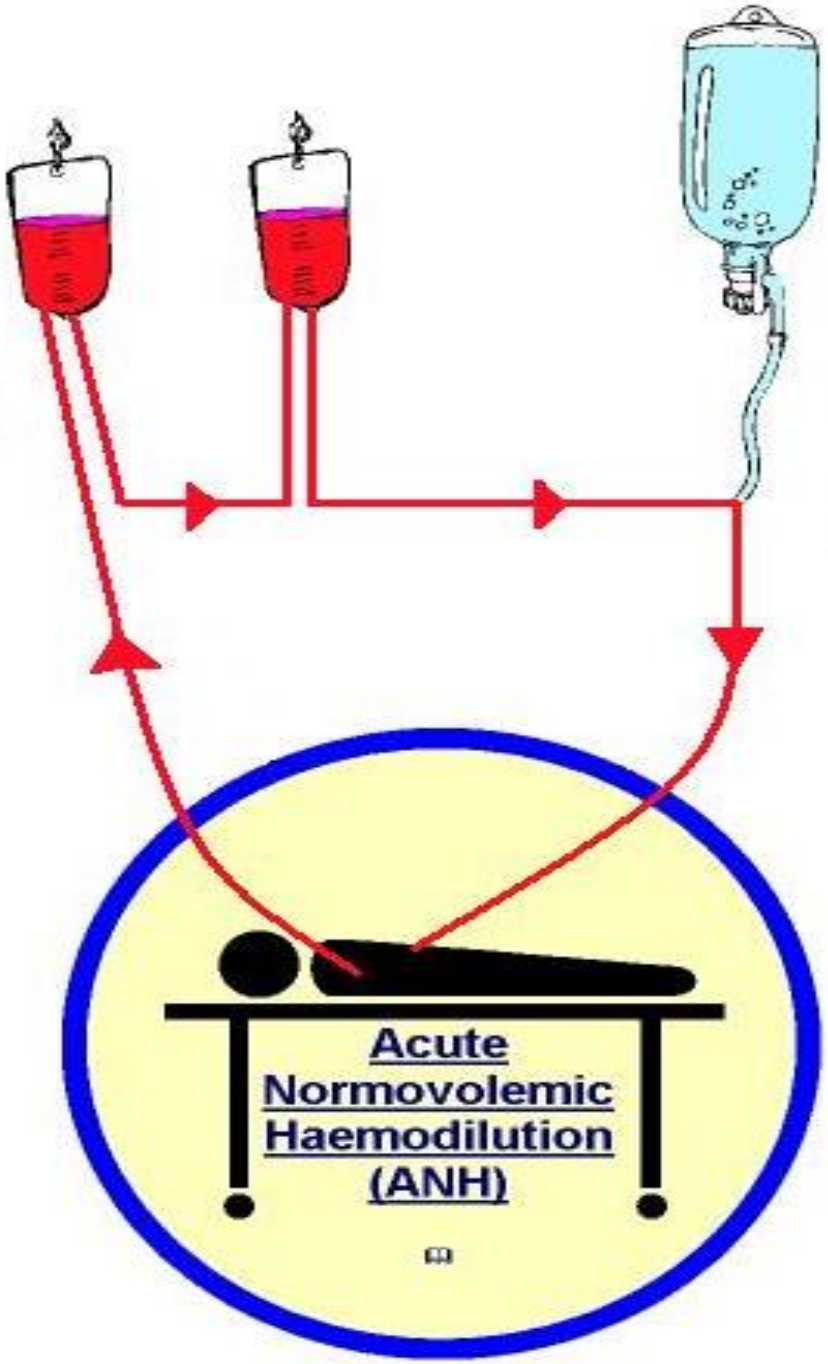


Ashworth, A. & Klein, A. A. (2010). Cell salvage as part of a blood conservation strategy in anaesthesia. British Journal of Anaesthesia, 105 (4), 401–16.

ANH

1

Collect patient's blood before the operation starts



2

Simultaneously restore blood volume using volume expanders

When major bleeding has stopped, the patient's own blood is returned.

The tubing remains connected at all times, maintaining a closed circuit.

Body Positioning in the OR

- Circulatory modifications induced by perioperative positioning can be increased or decreased by anesthetic techniques. They will promote or oppose venous drainage in the surgical field. The aim is to decrease blood loss on the surgical zone concerned by bleeding.

Tranexamic Acid(TXA)

- Evidence supports the routine use of TXA in hip and knee Arthroplasties to decrease intra and post-operative blood loss (patient outcomes & adverse events considered)
- Economic studies support routine TXA as cost savings
- When a patient who is bleeding sometimes the blood clot is broken down too fast, which does not allow the body to stop and the wound to heal. TXA works by blocking the breakdown of clots in the body.

Fluid balance

- Appropriate fluid resuscitation peri/post operative & maintaining adequate perfusion pressure.
- Dehydration + low Hgb = MORE dizziness & hypotension. Fluid boluses help patient to tolerate lower Hgb levels. Assess for dehydration.
- Encourage oral fluid intake after IV discontinued & prompt treatment/prevention of post-op nausea & vomiting to prevent fluid losses.

PBM (IN ICU)

Patient Blood Management (PBM) IN ICU

For Critically ill patients in ICU , three main predictors for RBC or component Tx:

- ✓ **Correction of anemia,**
- ✓ **Decrease of volume of blood loss**
- ✓ **Consider of more restrictive threshold for Tx**

Anemia

- Anemia is a strong and independent predictor of adverse outcomes such as average hospital length of stay and the composite outcome of morbidity and mortality. One of the main contributing factors to this clinically significant condition including :
- iron deficiency, chemotherapy, radiation, certain medications, menorrhagia, and congenital disorders can also cause anemia

Correction of Anemia

- The cornerstone of an integrative strategy designed to reduce the transfusion rate in intensive care medicine consists of the use of a restrictive transfusion threshold of 7 to 8 g/dL.
- Such an integrative strategy should comprise three components: appropriate treatment of anemia based on iron supplementation and, possibly, the administration of iron and/or erythropoietin before major elective surgical procedures;

Management ; Considering Safety Tx

- Because the pts in ICU are
- Severly ill, Imm deficient, Have many catheters in different sites of their bodies , ….
- Use As Much As Safe Product :
- Regular Donor product ,
- Leukoreduced, irradiated, CMV Neg , Sickle Neg

Goals: Minimize Anemia and Avoid Allogeneic Blood Transfusion.

Risk

Anemia (Reduced Hgb)

Allogeneic Transfusion

Transfusion has risks,
but bleeding to death is fatal !

Alternative Treatments

Alternate Rx ; Correction of Anemia

- According to the Etiology and pt condition:

✓ Supplemental Therapy

✓ Nutritional Support

✓ Decrease Blood sampling

✓ Use of safe Synthetic products (if needed)

Synthetic Products : EPO

Alternate Rx ; Decrease Blood loss or Bleeding

- According to the Etiology and pt condition:

✓ Best monitoring (eg; TEG Assay,Rotem)

✓ Treatment of Original problem

✓ Decreased Bleeding by antifibrinolytic drugs (TXA)

✓ Use of safe Synthetic products (if needed ; Coagulation factors, Fibrinogen , VWF; Plasma derived or recombinant)

Coagulation factors; Plasma derived or recombinant

Factor IX

Factor VII

Factor VIII

Fibrinogen

VWF

Fac. XIII

Immunoglobulin's

IV IgG

Albumin

Summary Comments for PBM

- Protect the patient from unnecessary or excessive transfusions
- Inform transfusion decisions not simply by hemoglobin, but by patient symptoms and comorbidities
- Utilize restrictive transfusion strategies
- Reduce iatrogenic anemia through reduction in both the volume and frequency of blood Sampling
- Consider transfusion alternatives for anemia management

Patient Blood Management improves outcome in oncologic surgery

World J Surg Oncol. 2018; 16: 159.

- Retrospective analysis of pts 2 yr before and after PBM implementation. The primary endpoint was Overall Survival at 2 years after surgery. We identified a sample size of 824 to detect a 10% improvement in survival in the PBM group.
- The analysis comprised of 836 patients that underwent oncologic surgery, 389 before and 447 after PBM, was implemented.The No of Tx was significantly reduced from 5.5 ± 11.1 to 3.0 ± 6.9 units/patient ($p < 0.001$); moreover, the percentage of patients being transfused during the clinic stay was significantly reduced from 62.4 to 40.9% ($p < 0.001$). Two-year OS was significantly better in the PBM+ and increased from 67.0 to 80.1% ($p = 0.001$).
- **Conclusion :**PBM is a quality improvement tool that is associated with better mid-term surgical oncologic outcome. The root cause for improvement is the increase of patients entering surgery with normal hemoglobin values.

Impact of a PBM Program and an Outpatient Anemia Management Protocol on RBC TX in Oncology Inpatients and Outpatients

Oncologist. 2016 Mar; 21(3): 327–332.

- The impact of a PBM program on blood usage and patient outcomes in cancer patients, particularly in the setting of restricted use of erythropoiesis-stimulating agents (ESAs).
- A retrospective observational study was performed of patients with malignancy as inpatients or outpatients, from Jan2008 to July 2013.
- The use of ESAs decreased from 2.9% in 2008 to 1.1% in 2013 ($p < .001$). An increase occurred in the mean dose of intravenous (IV) iron from 447 mg to 588 mg . The mean RBC units transfused per inpatient and outpatient episode decreased from 0.067 to 0.038 unit ($p < .001$).
- Despite the decreased use of ESA therapy, the implementation of a PBM program and outpatient anemia management protocol in cancer patients at our medical center was associated with significant reductions in RBC usage.

Patient blood management program in oncological surgery: A multicenter prospective study _J.Clin.oncologyO.2018.36.15

- Investigate the impact of PBM on **transfusion appropriateness** of consecutive oncological pts submitted to major surgery.
- An observational, prospective, multicenter study between 2014 and 2017 assessed the pts transfused with RBC units limited to the post-operative period and was divided in 3 phases. Phase 1: 400 consecutive pts, before PBM implementation, Phase 2: 3 months of teaching personnel involved in the care of pts, on 300 pts; Phase 3: introduction of Point of Care for PBM on 228 pts in the post-operative period,
- 928 oncological pts were included in the analysis (Phase1:400; Phase 2: 300; Phase 3: 228). Evidenced an appropriateness of P.1.50% (26/52 pts) P.2 (teaching and training activity increased to 76% (62/81 pts) . P.3 the transfused pts were 39/228.
- **Conclusions:** PBM providing a systematic approach to increase the appropriateness of transfusion therapy.

Conclusion

- *Use from Alternatives If it is possible*
- *Use the Right product for Right Patient in Right time*

Thank you