HA Convention 2019
Masterclass 1 - Patient Blood Management [COC(ANA)]

Dr. Cheng Hung Kai [Tseung Kwan O Hospital / KEC]
SAVE BLOOD, SAVE LIVES

Transfusions are one of the most overused treatments in modern medicine, at a cost of billions of dollars. Researchers are working out how to cut back.

BY EMILY ANTHES

Courtesy of Dr. CW Lau (BTS)
Risks & Complications
Infectious Risk of Transfusion
Risks & Complications
Adverse Patient Outcomes
Demand Supply Imbalance
Patient Blood Management (PBM)

Evidence-based, Patient-centered, & Multidisciplinary approach to improve patient outcomes through the safe and rational use of blood and blood products and avoiding unnecessary transfusions.
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Evidence-based, Patient-centered, & Multidisciplinary approach to improve patient outcomes through the safe and rational use of blood and blood products and avoiding unnecessary transfusions.
Improved outcomes and reduced costs associated with a health-system-wide patient blood management program: a retrospective observational study in four major adult tertiary-care hospitals

Michael F. Leahy,1,2,3 Axel Hofmann,4,5,6 Simon Towler,7 Kevin M. Trentino,8 Sally A. Burrows,1 Stuart G. Swain,8 Jeffrey Hamdorf,9,10 Trudi Gallagher,11,12 Audrey Koay,11 Gary C. Geelhoed,11,13 and Shannon L. Farmer9,14

BACKGROUND: Patient blood management (PBM) programs are associated with improved patient outcomes, reduced transfusions and costs. In 2008, the Western Australia Department of Health initiated a comprehensive health-system-wide PBM program. This study assesses program outcomes.

STUDY DESIGN AND METHODS: This was a retrospective study of 605,046 patients admitted to four major adult tertiary-care hospitals between July 2008 and June 2014. Outcome measures were red blood cell (RBC), fresh-frozen plasma (FFP), and platelet units transfused; single-unit RBC transfusions; pretransfusion hemoglobin levels; elective surgery patients anemic at admission; product and activity-based costs of transfusion; in-hospital mortality; length of stay; 28-day all-cause emergency readmissions; and hospital-acquired complications.

RESULTS: Comparing final year with baseline, units of RBCs, FFP, and platelets transfused per admission decreased 41% (p < 0.001), representing a saving of AUD$7779,915 (95% CI: AUD$6,181,963 to AUD$9,373,867).

CONCLUSION: Implementation of a unique, jurisdiction-wide PBM program was associated with improved patient outcomes, reduced blood product utilization, and product-related cost savings.

The term patient blood management (PBM) was coined in 2005 to help bring about a realignment of transfusion practice from product focus to patient focus.1,2 PBM is an evidence-based bundle of care that optimizes medical and surgical patient outcomes by clinically managing and preserving a

From the 1School of Medicine and Pharmacology, The University of Western Australia; the 2Department of Haematology, Royal Perth Hospital; and the 3PathWest Laboratory Medicine, Royal Perth Hospital, Perth, Western Australia, Australia; the 4Department of Anesthesiology, University Hospital Zurich, Zurich, Switzerland; the 5School of Surgery, University of Western Australia; and the 6Centre for Population Health, University of Western Australia.

FANZCA Fellow of the Australian and New Zealand College of Anaesthetists
Surgical Outcomes and Transfusion of Minimal Amounts of Blood in the Operating Room

Victor A. Ferraris, MD, PhD; Daniel L. Davenport, PhD; Sibu P. Saha, MD, MBA; Peter C. Austin, PhD; Joseph B. Zwiskenber, MD

Objective: To examine outcomes in patients who receive small amounts of intraoperative blood transfusion.

Design: Longitudinal, uncontrolled observational study evaluating results of intraoperative transfusion in patients entered into the American College of Surgeons National Surgical Quality Improvement Program database. We made propensity-matched comparisons between patients who received and did not receive intraoperative transfusion to minimize confounding when estimating the effect of intraoperative transfusion on postoperative outcomes.

Setting: We queried the American College of Surgeons National Surgical Quality Improvement Program database for patients undergoing operations between January 1, 2005, and December 31, 2009.

Patients: A large sample of surgical patients from 173 hospitals throughout the United States.

Main Outcome Measures: Operative mortality and serious perioperative morbidity (≥1 of 20 complications).

Results: After exclusions, 941,496 operations were analyzed in patients from 173 hospitals. Most patients (893,205 patients [94.9%]) did not receive intraoperative transfusions. Patients who received intraoperative infusion of 1 unit of packed red blood cells (15,186 patients [1.6%]) had higher unadjusted rates of mortality and more serious morbidity. These rates further increased with intraoperative transfusion of more than 1 unit of packed red blood cells in a dose-dependent manner. After propensity matching to adjust for multiple preoperative risks, transfusion of a single unit of packed red blood cells increased the multivariate risk of mortality, wound problems, pulmonary complications, postoperative renal dysfunction, systemic sepsis, composite morbidity, and postoperative length of stay compared with propensity-matched patients who did not receive intraoperative transfusion.

Conclusions: There is a dose-dependent adverse effect of intraoperative blood transfusion. It is likely that a small, possibly discretionary amount of intraoperative transfusion leads to increased mortality, morbidity, and resource use, suggesting that caution should be used with intraoperative transfusions for mildly hypovolemic or anemic patients.

**Preoperative**

- Preanaesthetic Assessment Clinic
  - Iron replacement

**Intraoperative**

- Timing surgery with haematological optimisation
- Normothermia
- Autologous blood
- Haemostatic agents
- V/Q
- Goal Directed Fluid Therapy

**Postoperative**

- Treat anaemia/iron deficiency
- Stimulate erythropoiesis
- Be aware of drug interactions that can cause/increase anaemia
- Vigilant monitoring and management of post-operative bleeding
- Avoid secondary haemorrhage
- Rapid warming – maintain normothermia (unless hypothermia specifically indicated)
- Autologous blood salvage
- Minimising iatrogenic blood loss
- Haemostasis/anticoagulation management
- Prophylaxis of upper gastrointestinal haemorrhage
- Avoid/treat infections promptly
- Be aware of adverse effects of medication

**1st Pillar**
Optimise haemopoiesis

**2nd Pillar**
Minimise blood loss and bleeding
- Identify and manage bleeding risk (past/family history, current medications, etc)
- Minimise iatrogenic blood loss
- Procedure planning and rehearsal
- Preoperative autologous blood donation (in selected cases or when patient choice)

**3rd Pillar**
Harness and optimise tolerance of anaemia
- Optimise tolerance of anaemia
- Treat anaemia
- Maximise oxygen delivery
- Minimise oxygen consumption
- Avoid/treat infections promptly
- Restrictive, evidence-based transfusion strategies

Post-op. Multi-disciplinary Ward Round

- Joint decision management plan for each case
- Discussion and feedback
- Promote Team Building

- Transfusion requirement
- Pain / PONV
- Fluid therapy
- Haemodynamics / volume status
- Physiotherapy
Anaesthetist

Training

Clinical Pharmacology

Cardiac & Respiratory physiology

**Oxygen flux:**
- The amount of $O_2$ leaving the Lt. Ventricle per minute in the arterial blood has been termed the "oxygen flux".
- It represents $O_2$ delivers to the tissues.

$$O_2 \text{ flux} = CO \times \text{Arterial } O_2 \text{ saturation} \times Hb \text{ conc} \times 1.31.$$  
  - $5000 \text{ ml/min} \times 98/100 \times 15.6/100g/\text{ ml} \times 1.31 \text{ ml/gm.} = 1000\text{ ml/min}.$

Normally about 250ml of this $O_2$ is used up in cellular metabolism and the rest returned to the lungs in the mixed venous blood.

**HEMOGLOBIN DISSOCIATION CURVES**
Anaesthesitst – Peri-Operative Physician

Preoperative

PeriOperative Medicine Clinic

1. Anaesthetic & Clinical assessment;
2. Optimization of co-existing medical conditions;
3. Correction of iron deficiency anaemia
   - PBM, iron transfusion;
4. Cardiac Echo study / Risk stratification;
5. Pain Management planning; preemptive analgesics
6. Malnutrition screening & Referral;
7. Stress reduction (e.g. CHO drink, fasting instructions);
8. Patient (and relatives) education and empowerment
Anaesthetist – Peri-Operative Physician

Intraoperative
Anaesthetist – Peri-Operative Physician

Postoperative
ERAS vs. PBM

Patient Blood Management
- Optimise blood volume & red cell mass
- Minimise blood loss
- Optimise tolerance of anaemia

Decrease inappropriate transfusion

Audit of compliance and outcomes
- Thoracic epidural analgesia
- Non-opioid oral analgesia/NSAIDs
- Prevention of nausea & vomiting
- Avoidance of salt & fluid overload
  - Early removal of catheter
  - No nasogastric tube
  - Early oral nutrition
  - Early mobilization
  - Simulation of gut motility
- Multidisciplinary round

Preadmission counseling
- Fluid and carbohydrate loading
- No prolonged fasting
- No/selective bowel preparation
- Antibiotic prophylaxis
- Thromboprophylaxis
- No Premedication
- Smoking/drinking cessation

Anaemia management
- Physiotherapist engagement
- Dietitian referral

ERAS

Postoperative
- No drains
- Normothermia
- Short-acting anaesthetic agents
- Thoracic epidural anaesthesia/analgesia
- Avoidance of salt & fluid overload (Goal directed fluid therapy)

Preoperative

Intraoperative

ANAESTHETIST

ERAS

PBM
TKOH (since 2015)
Anaesthetist-led Patient Blood Management (& ERAS) services
Patient Blood Management:

IV iron infusion service (TKOH since 2015)
**2016 HA Convention – Poster Presentation:**

**PBM & ERAS**

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**THE PATIENT BLOOD MANAGEMENT APPROACH FOR COLORECTAL SURGICAL PATIENTS DECREASED PERIOPERATIVE TRANSFUSION RATE**

**Early Experience in Tseung Kwan O Hospital**

C Yeung¹, R Wan¹, D Lee¹, G Wong²

¹ Department of Anaesthesia and Operating Theatre Service, Tseung Kwan O Hospital
² Department of Surgery, Tseung Kwan O Hospital

**INTRODUCTION**

Patient blood management (PBM) is a multidisciplinary evidence-based approach to optimizing the care of patients who may require blood transfusion. The three pillars of PBM are optimization of blood volume and red cell mass, minimization of blood loss and optimization of the tolerance of anaemia.

**OBJECTIVE**

By adopting the PBM approach in our colorectal surgical patients, we aim to avoid unnecessary and inappropriate use of blood and blood products.

**METHODOLOGY**

At our Perioperative Medicine Clinic (POMC), colorectal patients receive oral iron supplement pre-op. Intraoperative minimally-invasive techniques, maintenance of normothermia and appropriate intravenous fluids are employed. In the post-op period, patient’s physiologic function is optimized with early structured physiotherapy and good pain control. We tolerate a patient-specific restrictive transfusion threshold. Frequency of diagnostic phlebotomy is minimized. The decision to transfuse is a joint decision with multidisciplinary input at Combined Ward Rounds. We make sure that the decision to transfuse is a clinical one and not based on a single number as the 'transfusion trigger'. Transfusion rate in patients treated from Nov 2015 is compared to a historical control group who were treated in the same institution from Jul to Dec 2014.

**RESULTS**

From Nov 2015 to Mar 2016, 29 colorectal cases were managed with the PBM approach. Two required transfusion. In the historical control of 30 colorectal cases from Jul to Dec 2014, the perioperative transfusion rate was 26.6%. This difference is statistically significant (p=0.043).

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<tr>
<th></th>
<th>Transfused</th>
<th>Not transfused</th>
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<tbody>
<tr>
<td>Historical (n=30)</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>PBM (n=29)</td>
<td>2</td>
<td>27</td>
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χ² test, \(p=0.043\)

**CONCLUSION**

PBM decreased perioperative transfusion in colorectal patients without increase in morbidity or mortality.
2018 HA Outstanding Team Award

Fitter for speedier recovery in operation journey
Acknowledgement

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BTS
Dr. Lee Cheuk Kwong (CE&MD)
Dr. Lau Ching Wa (AC)

TKOH
Department of Anaesthesia & OT Services/ASC
Department of Surgery
Department of O&T
Department of Gynaecology