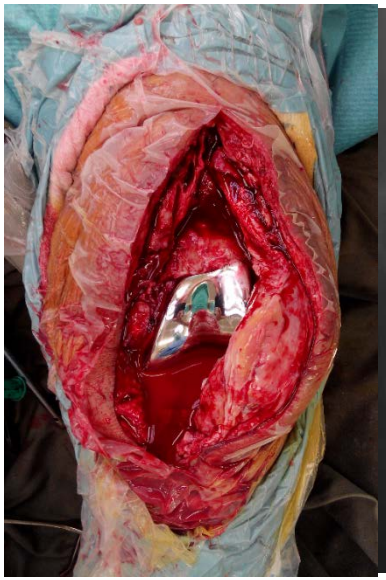
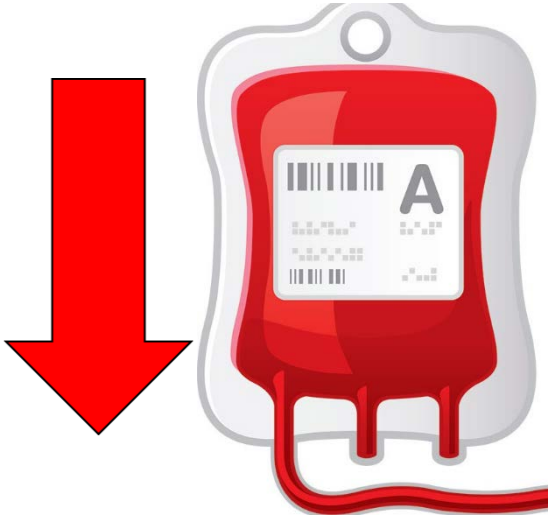
Working towards Transfusion-Free TKR Surgery through Patient Blood Management (PBM) Programme





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Recurrent Blood Shortage in Hong Kong

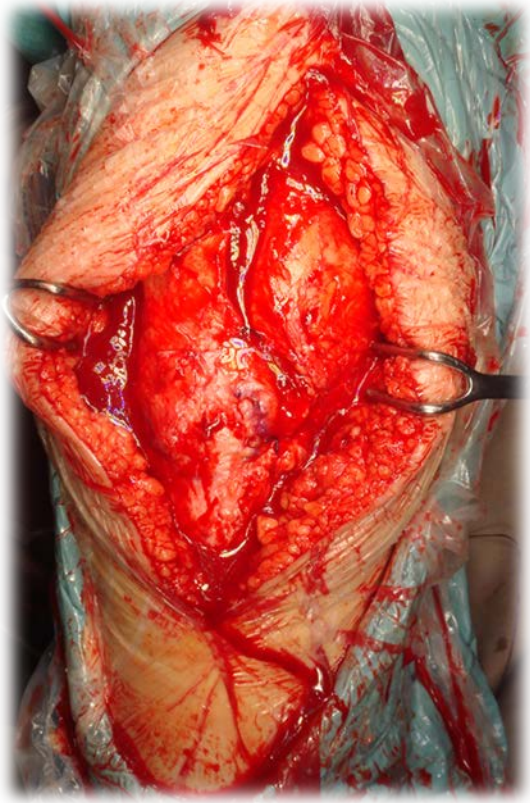
Supply Vs Demand

Supply : Blood Donation (HK Citizen)

Demand : Blood Conservation (Healthcare Professional)

Blood Loss in Total Knee Arthroplasty (TKA)

- Traditionally, TKA can result in substantial blood loss
  - Estimated blood loss : 1500 ml [1]
  - Transfusion rate : 38 % [1]



1. Bong MR et al. Risks associated with blood transfusion after TKA. J Arthroplasty 2004

What is Patient blood management (PBM) ?

1st pillar

optimize preop Hb

2nd pillar

minimize blood loss and bleeding

3rd pillar

optimize tolerance of anemia

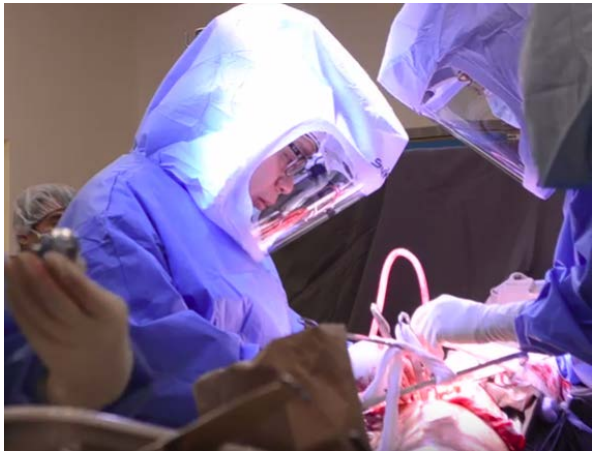
Multidisciplinary team approach

Shander Br J Anaesth. 2012; 109: 55
Spahn & Goodnough Lancet 2013;381:1855

QMH Multi-disciplinary Team in PBM (TKA)

Aim : Judicious use of transfusion in TKA

O&T Surgeon



Anaesthesiologist

Haematologist

PRE-OP ↑ HB

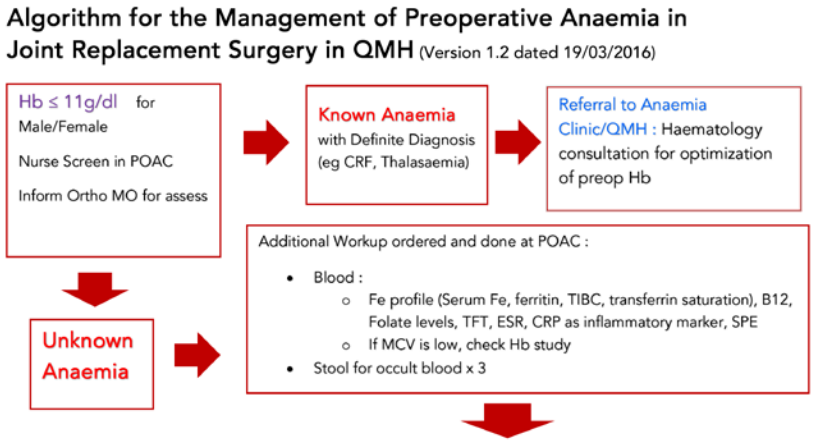
↓ BLOOD LOSS

↓ UNNECESSARY TRANSFUSION

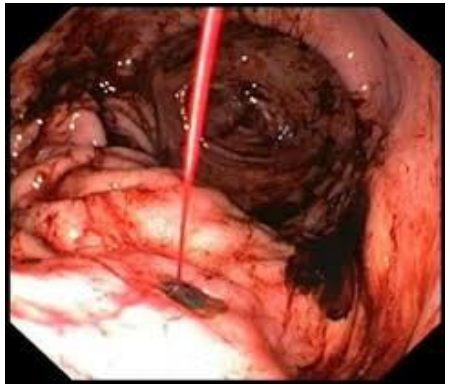
PRE-OP ↑ HB

Preoperative Anemia Identification/Mx

- QMH **320** patients in 2016
  - **Anemia (Hb < 11) : 10%**
  - Protocol (Anemia Workup)
    - Chief causes of anaemia
      - **Iron deficiency** (25%)



Protocol for Anemia Workup



Causese : GIB/ Ca colon

Anemia Optimization :
Fe supplement / Erythropoietin

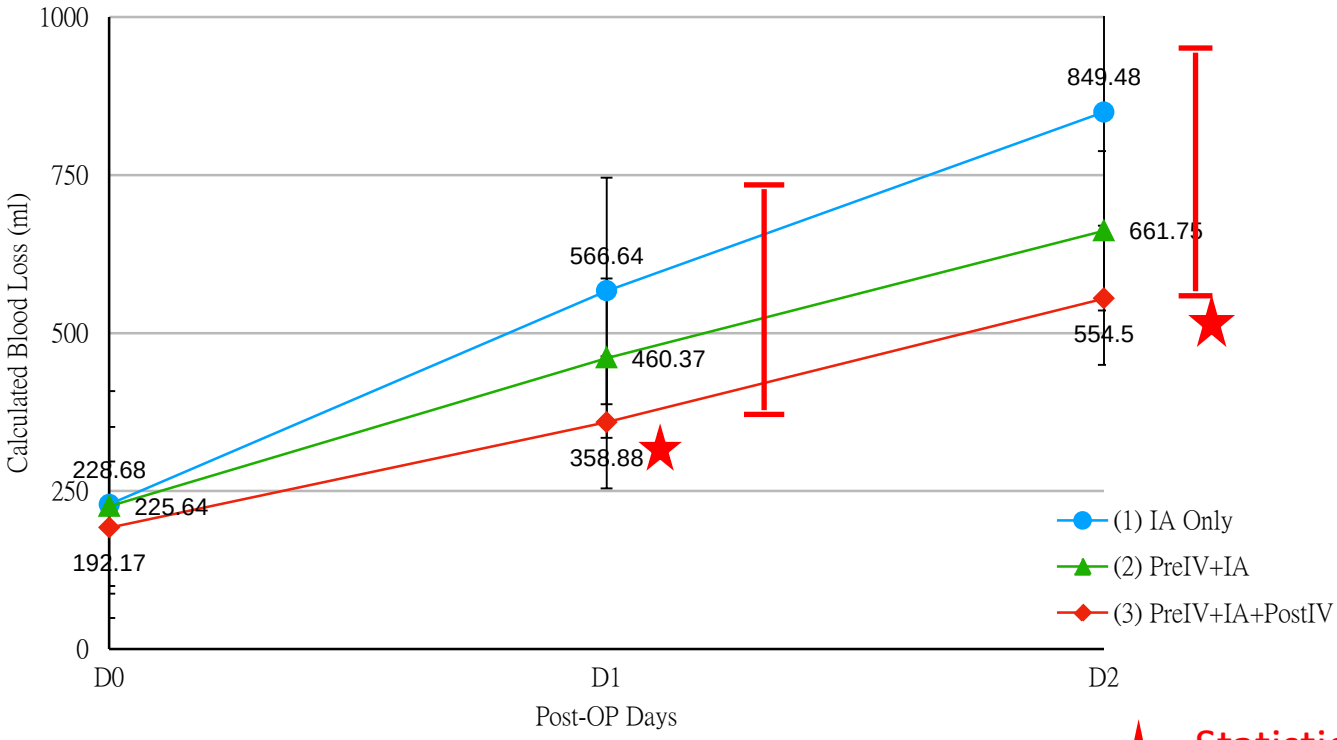
Measures to min Intraop Blood Loss

- Decrease blood loss during surgery
  - Spinal Anaesthesia
  - Surgical techniques
  - Drug
    - Enhance Haemostasis
      - Tranexamic Acid (TXA)

QMH : Pioneer in **Combined TXA in HK**

Combined Intra-Articular and Intravenous Tranexamic Acid Most effectively in Reduction of Blood Loss in TKA

A Prospective Randomized Controlled Trial (2017)



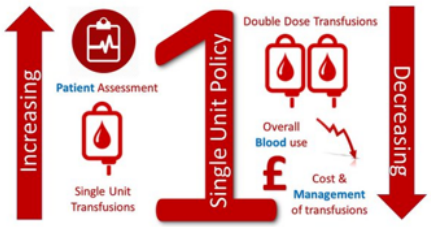
★ Statistically Significant

Calculated Blood Loss By Gross Formula (D0, D1, D2)

UNNECESSARY TRANSFUSION

Judicious Use of Blood

- Single Unit Transfusion Policy
  - Prescribing 1 unit Blood at a time



Single Unit Transfusion Policy

- Restrictive transfusion Protocol (cut-off 7g/dL)
  - Reduced in-hospital mortality

Restrictive Transfusion Trigger

World Health Organisation, World Health Assembly, 2010 : Availability, safety and quality of blood products.
Salpeter SR et al. (2014) Impact of more restrictive blood transfusion strategies on clinical outcomes: a meta-analysis and systematic review. Am J Med 127(2)

Study Aim

To review the effectiveness of

- Patient Blood Management (PBM) in TKA in QMH

Hypothesis

PBM effectively Reduce Blood Transfusion in TKA in QMH

Materials & Methods

Case control study

Control group:

- Patients received TKA from QMH in 2013
  - ***before*** *PBM implementation*

Case group:

- Patients received TKA from QMH in 2017
  - ***after*** *the full PBM implementation*

Outcome Measures

Primary outcomes:

- Transfusion rate

Secondary outcomes:

- Medical complication (CVA / IHD)
- Length of stay at hospital (LOS)

Materials & Methods

Data Source

- CDARS (Clinical Data and Analysis Reporting System)
- QMH Joint Replacement Registry database

Statistical Analysis

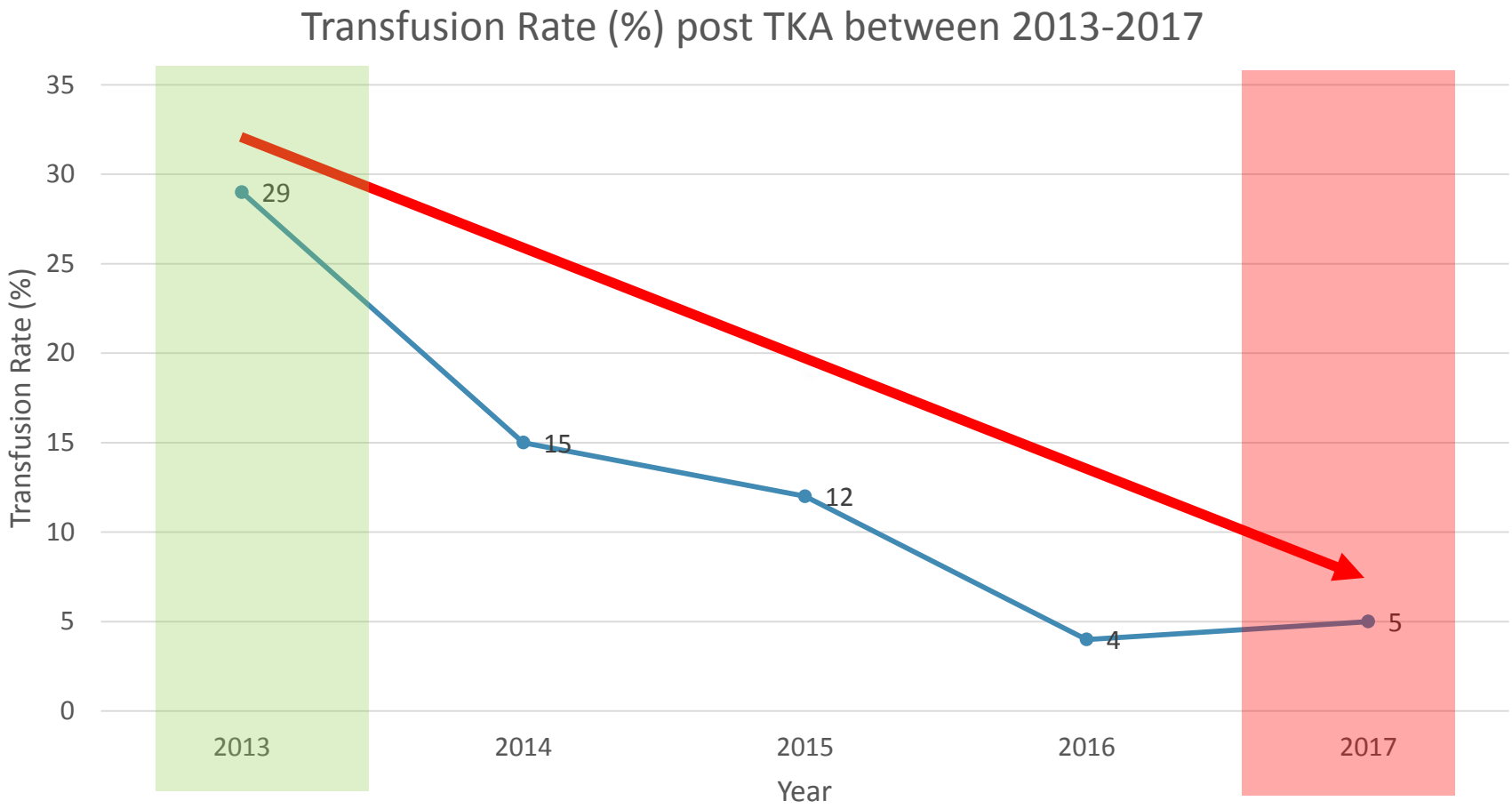
- Paired t-test
  - Statistically significant if $p < 0.05$

Results

Primary TKA Patients in QMH

- 345 patients (2013) Vs 331 patients (2017)
  - Comparable for analysis
    - Patients demographics
    - Preoperative haemoglobin level (p>0.05)
- **Decreased Transfusion rate after full PBM implementation in 2017**
  - 29% in 2013 (No PBM)
  - **5% in 2017** (*p<0.05*) (After full PBM)
- No medical complications in both groups (CVA/IHD)

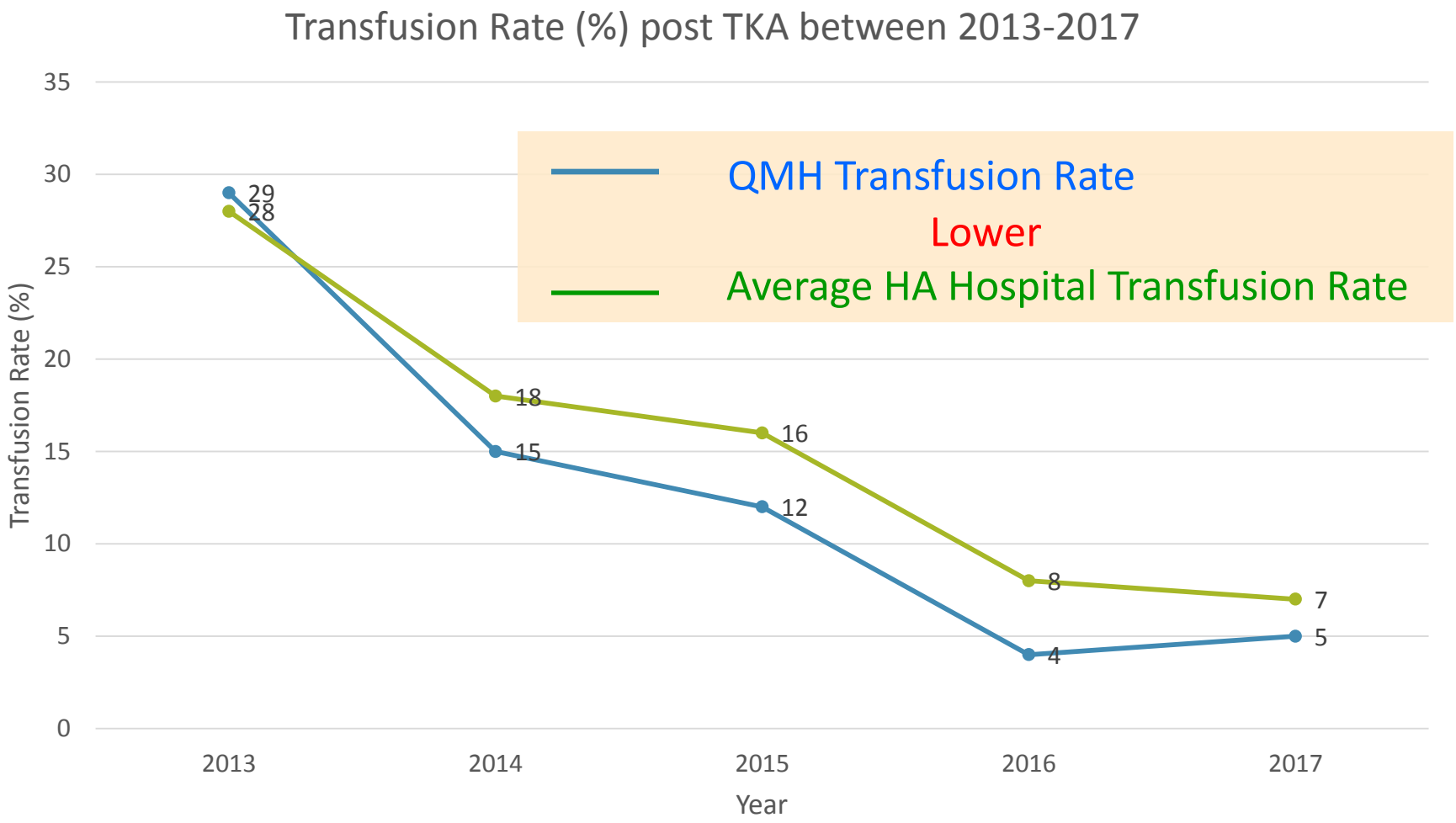
Transfusion Rate before and after PBM at QMH



No PBM

After FULL implementation PBM

Transfusion Rate before and after PBM at QMH

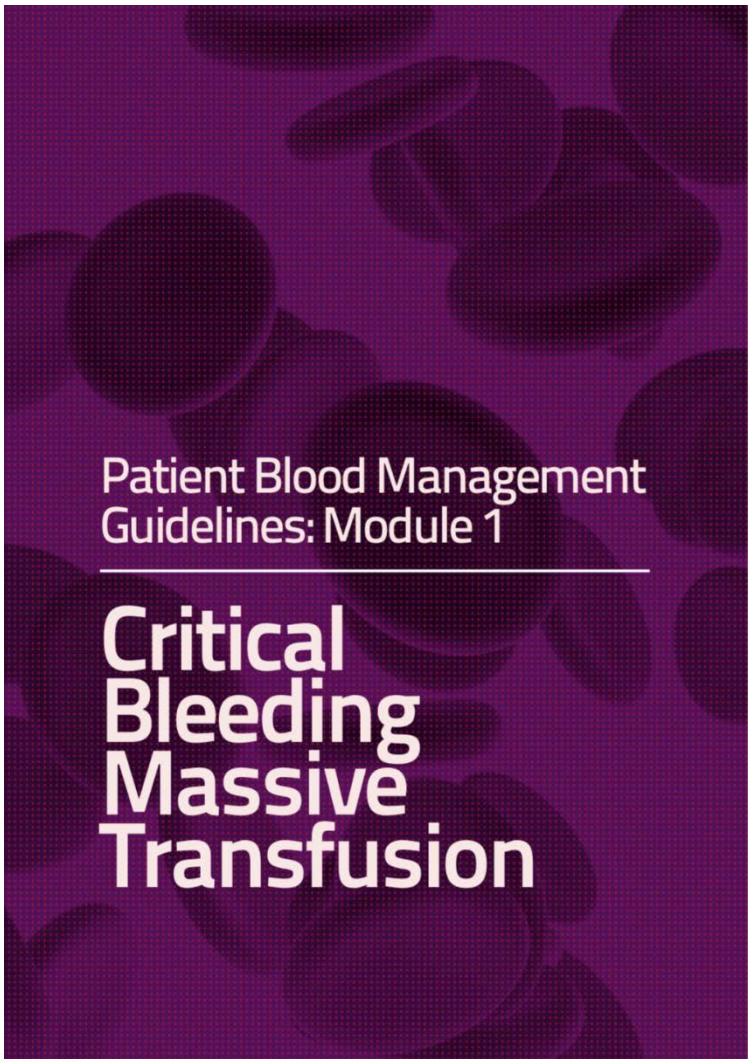


The Average Length of Stay post TKA at QMH

- Increased Proportion : Discharge on postop 1-3 Day
  - 2013 Vs 2017 = 0% Vs 5% ($p < 0.05$)

	2013	2014	2015	2016	2017
% of patients discharged D1-D3	0%	1%	3%	3%	5%
Transfusion Rate	29%	15%	12%	4%	5%

Discussion



PBM in Australia
Pioneer in the World

Evidence-based clinical practice guidelines for better patient blood management

Lower Transfusion Rate
Better Surgical Outcome

National Blood Authority
Australia

Australian Government
National Health and Medical Research Council

Discussion

QMH Pioneer Experience in PBM after TKA

- Transfusion rate
  - 29% in 2013 Vs 5% in 2017
    - – Reduction of 24%
  - Without increasing medical complications
- Shorten LOS after TKA

DKCH Joint Replacement Centre : Similar PBM after TKA

- Transfusion rate < 1%
  - Service since 2015
    - – Similar PBM Protocol with Fitter Patient

Clinical Implication : Quality / Safety

- Advantage of minimizing transfusion
  - Decrease General Risk of Transfusion

HIV	1 in 2,400,000
Hepatitis C	1 in 8,000,000
Hepatitis B	1 in 58,000
Bacteria in transfusion	1 in 500,000

公院過往輸錯血型事故

5 日大 B 型血男嬰體內仍帶 O 型血母親的 B 型抗體，只能接受 O 型血，但配血出錯致男嬰被輸 B 型血，幸對男嬰身體無大礙。

74 歲 O 型血老婦因貧血入院，實習醫生未有做妥病人確認步驟，錯向鄰床病人抽血，致老婦先後三次被輸入 B 型血。

20 歲 O 型血男子因交通意外送院，在深切治療部輸入的 6 包血中，有 2 包 A 型血及 2 包 B 型血，病人 2 小時後死亡。

  - Specific in TKA
    - Decrease surgical site infection [1]
  - Cost-saving in Healthcare Expenditure
    - Cost of 1 unit of Blood ~ HKD 1000/unit
    - 2017: 3219 patients

1. Richard Friedman et al. Allogenic Transfusion and Post-operative Infection after THA/TKA. JBJS (Am) Feb 2014

Clinical Implication : Quality / Safety

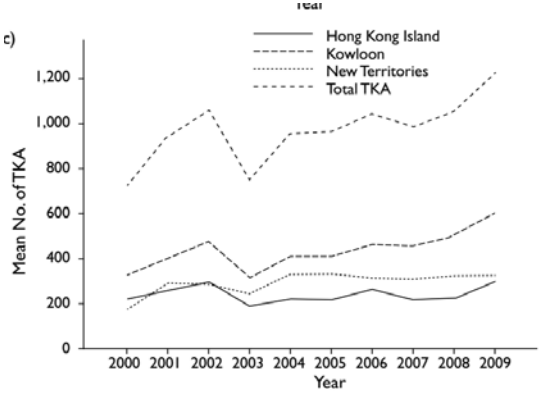
Transfusion-related Workload

- Enhanced Recovery after Surgery (ERAS)

  Discharge D1 after left TKA

Importance of PBM in future

- Aging population of HK ⇨ Increasing demand for TKA
  - PBM : improved surgical outcomes/safety/cost-saving



- Generalization/Applicability

  Easily applicable to **ALL specialty in HK**

  Multi-disciplinary collaboration

Yan CH et al TKA for primary knee osteoarthritis changing pattern over the past 10 years. HKMJ 2011

Conclusion

Patient Blood Management (PBM)

- Effective in reduction of Transfusion after TKA
- Without increasing medical complications
- Potentially improved in Surgical Outcome
  - Enhanced Recovery after Surgery (ERAS)

- Part of Modern Surgical Practices
  - All Surgical Specialty


Thank You
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