

Project Title

Reducing Rate of Blood Transfusion for Patients Undergoing Orthopaedic Surgery at SGH

Project Lead and Members

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Project Members:

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- Tien Sim Leng, Senior Consultant
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- Hairil Rizal Bin Abdullah, Senior Consultant
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- Eileen Sim Yilin, Consultant

Organisation(s) Involved

Singapore General Hospital

Healthcare Family Group(s) Involved in this Project

Medical, Healthcare Administrators (Clinical Governance & Quality, Process Transformation & Improvement)

Applicable Specialty or Discipline

Orthopedic Surgery, Haematology, Anaesthesiology

Project Period

Start date: Jan 2019

Completed date: Dec 2021

Aim(s)

- To improve Nil Blood Transfusion rate in patients undergoing TKR surgeries from 98.1% to 100% in 6 months.
- To improve Nil 30-Day Blood Transfusion rate in patients undergoing THR surgeries from 81% to 90% and Spinal Fusion surgeries from 87% to 90% in 6 months.

Background

See poster appended/ below

Methods

See poster appended/ below

Results

See poster appended/ below

Lessons Learnt

The project involved multiple stakeholders from Orthopaedics, Anaesthesia, Blood Transfusion Committee as well as the SGH@VDC team made up of many departments. The team learnt the importance of having a coordinated effort from the different stakeholders and to include the various stakeholders early in the discussions. This would facilitate the implementation of improvements as there is buy-in from the stakeholders and any issues would be addressed early.

Conclusion

Reduced blood transfusion rates and its associated complications and costs were the main benefits for the patients undergoing elective orthopaedic surgery.

Additional Information

The standardized workflows for pre-operative anaemia screening and management has been integrated into routine clinical workflow at the Preoperative Evaluation Clinic (PEC) for 6 years since 2016. The standardized workflow for IV iron replacement has also been part of routine clinical workflow for 5 years since 2017. The perioperative anaemia guidelines was also uploaded on infonet in July 2021 (13 months to date).

For this project, one of the solutions implemented in PDCA 1 in Nov 2020 was for early PEC referrals (21 months to date) to allow more time for screening and Hb optimization according to the workflows mentioned above. In addition, routine iSTAT before intra-op blood transfusion was also made part of routine clinical workflow in the same PDCA cycle.

The PBM protocol has been implemented at a hospital-wide level since it was integrated into PEC's routine clinical workflow. The PBM protocol would apply to all disciplines and cover all "at risk" patients undergoing elective surgery at SGH.

Project Category

Care & Process Redesign

Quality Improvement, Workflow Redesign, Job Effectiveness

Keywords

Value Driven Care (VDC), Elective Orthopaedic Surgeries: Total Knee Replacement (TKR), Total Hip Replacement (THR), Spinal Fusion, Blood Transfusion Rate

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Reducing rate of blood transfusion for patients undergoing orthopaedic surgery at SGH

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Background

The Singapore Ministry of Health started the Value Driven Care (VDC) monitoring and analysis for elective orthopaedic surgeries such as Total Knee Replacement (TKR), Total Hip Replacement (THR) and Spinal Fusion surgeries. One of the indicators monitored is the Nil Blood Transfusion rate in which cases with blood transfusion would 'fail' the indicator. The team identified blood transfusion as one of the areas for improvement.

Mission Statement

- To improve Nil Blood Transfusion rate in patients undergoing TKR surgeries from 98.1% to 100% in 6 months.
- To improve Nil 30-Day Blood Transfusion rate in patients undergoing THR surgeries from 81% to 90% and Spinal Fusion surgeries from 87% to 90% in 6 months.

Analysis of problem

Data analysis and case review were conducted by CGQ for the cases with blood transfusion to identify significant causes of blood transfusion.

The following were identified to be areas for improvement to prevent unnecessary blood transfusion:

1. Haemoglobin (Hb) upon/before admission to determine the severity of anemia

- Significant percentage of patients presented with anemia upon/before admission; 52.9% - 73.3% (n=9 to 42) patients with sub-optimal Hb level.
- Example below shows TKR with 42 patients with sub-optimal Hb:

Patients With Blood Transfusions (TKR) for Jul '18 – Jun '19

Severity of Anaemia	Male		Female	
	No. of cases	%	No. of cases	%
Moderate/Severe Anaemia	3	5.1	22	37.3
Mild Anaemia	5	8.5	12	20.3
No Anaemia	2	3.4	15	25.4
Grand Total	10	16.9	49	83.1

2. Indications for transfusion

- Most transfusions occurred in the post-op phase.
- 1 patient was admitted early for blood transfusion before operation.
- Many patients were transfused with only 1 pint RBC (n=95 for TKR, THR and Spinal Fusion), a few of them only had a minor drop in Hb after operation or the last Hb before the transfusion was >8 g/dL.
- E.g. for TKR, 45 patients were transfused with 1 pint:

OTO Conditions	Phase	No. of units transfused	No. of cases	Proportion (out of 59 cases)
Total Knee Replacement	Pre-op	1	1	1.7%
	Intra-op	1	2	3.4%
		3	1	1.7%
	Post-op	1	42	71.2%
		2	14	23.7%
		4	1	1.7%

3. Perioperative blood management

- High amount of blood loss during operation resulting in a drop in Hb levels despite having optimal Hb upon/before admission.

E.g. THR

Hb pre-/upon admission (g/dL)	Intra-op RBC Transfused	Hb before post-op transfusion (g/dL)	Post-op RBC Transfused	Total RBC Transfused (Index)	Estimated Blood Loss (ml)
13.0	2	8.3	1	3	1700 ml

Shah, A., Palmer, A.J.R. and Klein, A.A. (2020), Strategies to minimize intraoperative blood loss during major surgery. Br J Surg, 107: e26-e38. doi:10.1002/bjs.11393

Moderate/Severe Anemia: Hb<11g/dL, Mild Anemia: 11g/dL ≤ Hb < 13g/dL (Male), 11g/dL ≤ Hb < 12g/dL (Female)
No Anemia: Hb ≥ 13 g/dL (Male), Hb ≥ 12g/dL (Female)

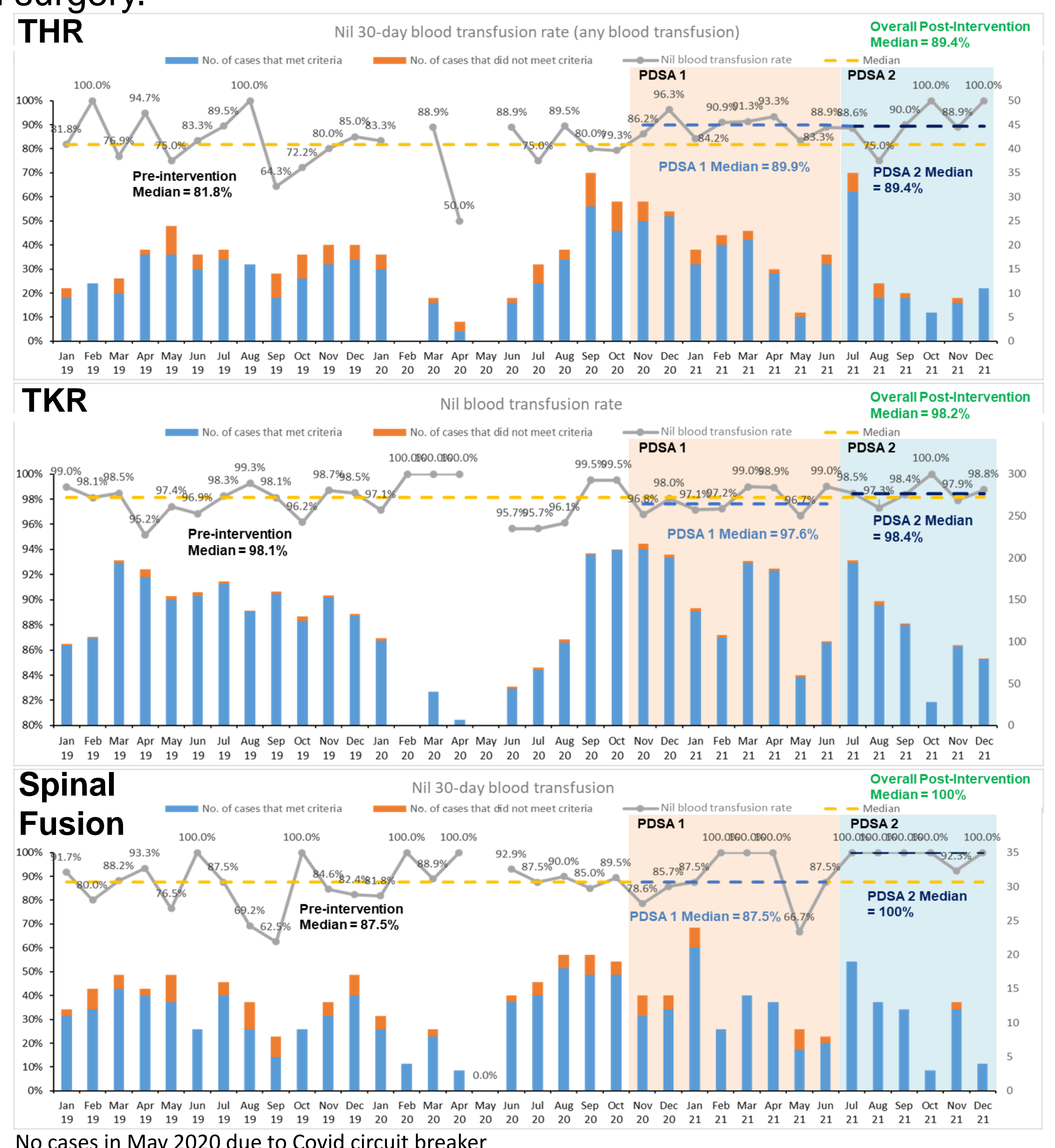
Interventions / Initiatives

Aim of Project	Causes	Concepts to address Root Causes	Specific Solutions
Reducing rate of blood transfusion for patients undergoing orthopaedic surgery (TKR/THR/Spinal Fusion) at SGH	Low Hb levels before surgery	Improve Hb levels before surgery	1. Encourage early PAC appointment* <ul style="list-style-type: none"> List cases 6 weeks to 2 months prior to surgery to allow for Hb optimization 2. PAC optimization of Hb* <ul style="list-style-type: none"> Newly diagnosed pre-op anaemia will be flagged for Hb optimization (IV Iron) Option to delay surgery for investigation of anaemia
	Patient lost significant amount of blood during surgery	Reduce surgical blood loss	3. Conduct routine pre-op check for IV Tranexamic Acid eligibility*
	Blood Transfusion was ordered based on clinician's experience & knowledge	Introduce objective indicators and guidelines for Blood Transfusion	4. Conduct routine pre-transfusion iSTAT to assess HB levels before intra-op transfusion* 5. Implement restrictive blood transfusion guidelines* <ul style="list-style-type: none"> Introduce workflow for senior escalation before transfusions Transfuse when Hb<8 1 pint per order 6. Sharing initiatives and their monitored results to OTO & ANA^

*: PDCA 1
^: PDCA 2

Results

There has been overall improvement in performance for all conditions (the performance has improved from 81.8% pre-intervention to 89.4% post intervention for THR, 98.1% to 98.4% for TKR and 87.5% to 100% for Spinal Fusion respectively). Project goal has been met for patients undergoing Spinal Fusion surgery.



Sustainability Plans

Patient blood management protocol has been uploaded in the department infonet and implemented in the department. The monitoring of the performance will continue via automated dashboards (Spinal Fusion dashboards will be worked on subsequently).