Reduction of Fresh Frozen Plasma Wastage in Sengkang General Hospital

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1. Introduction

Background

Fresh Frozen Plasma (FFP) is ordered either as an individual blood product or part of massive transfusion protocol (MTP). Over the recent years, Blood Bank in Sengkang General Hospital (SKH) observed a significant annual trend of FFP wastage due to the return of un-transfused thawed plasma after the clinical order. This is further complicated by the short 24-hour shelf life of FFP after thawing, beyond which it has to be discarded if unused. As a result, thawed FFP that is not transfused is discarded, wasting precious limited resource.

The national median public hospital annual rate of FFP wastage is approximately 5%. However, the annual FFP wastage in SKH has been above the national hospital median (Table 1). It has been observed that a significant source of FFP wastage comes from over-activation of massive transfusion protocols in the hospital (Table 2).

	2017	2018	2019	2020	2021
Annual FFP wastage in SKH	9%	12%	8.6%	5.38%	5.44%

Table 1. Trend of the annual FFP wastage in SKH between 2017 – 2021.

Year	Number of MTP Activations	Number of MTP over-activations[1]	FFP units returned (wastage) from issued MTP Packs containing FFP	MTP share of total hospital FFP wastage
2018 (July – Dec)	10	6 (60.0%)	16/87 (18.4%)	84%
2019 (full year)	26	16 (61.5%)	30/190 (15.8%)	58%
2020 (full year)	25	20 (80.0%)	32/139 (23.0%)	54%
2021 (full year)	29	21 (72.4%)	28/157 (17.8%)	62%

Table 2. Annual MTP over-activations and associated FFP wastage in SKH between 2018 – 2021.

[1]Not fulfilling at least one of the following criteria):

- *Reached MTP Pack 3 or > 8 RBC units during MTP active period (before MTP standdown/deactivated)*
- *Had 10 units or more RBC within 24 hours of MTP activation*
- *Patient demise within 24 hours of MTP*

Objectives

❖ Problem statement: Thawed FFP that is not transfused is discarded, wasting precious limited resource

❖ Mission statement: To achieve a median monthly FFP return rate of below 4% within 6 months

❖ Outcome measure: The rate of FFP return is computed using the formula:
Returned FFP units / (Transfused Units + Returned units)

2. Methodology

Root cause analysis

Common root causes of the problem are shown in Figure 1, with the modifiable risk factors highlighted in yellow.

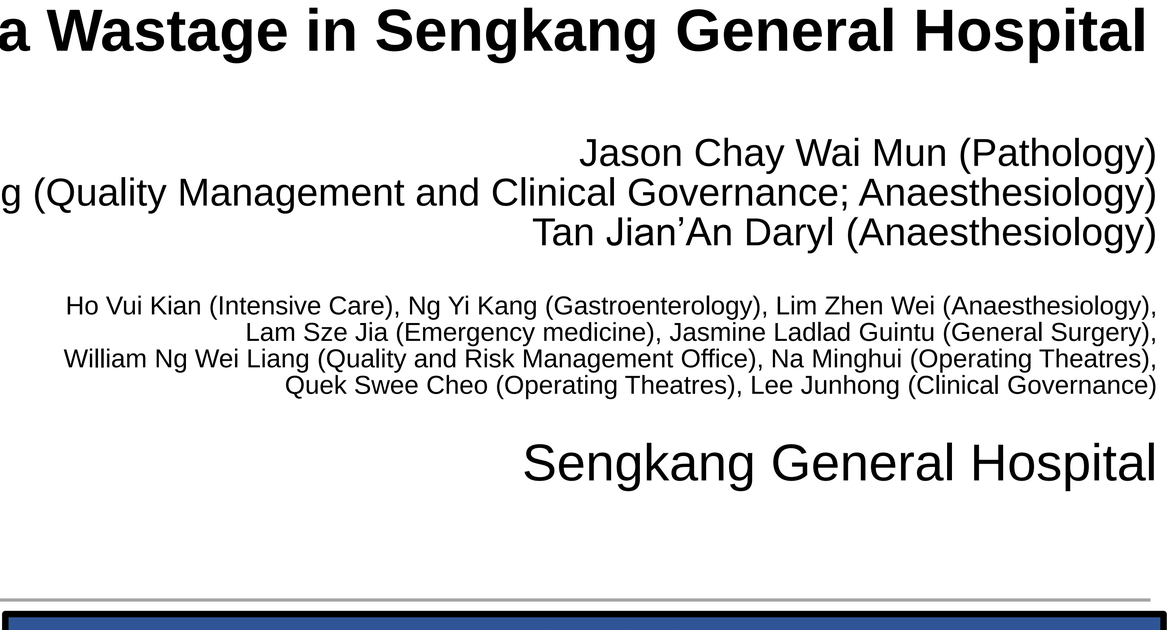


Fig 1. Fishbone diagram outlining the root causes that contributed to unnecessary FFP wastage.

Previous measures

I. Blood Bank proceeded with FFP thawing when the ordering physician gave verbal confirmation.

II. Blood Bank issued appropriate advice to all requestors for plasma, to reduce FFP wastage from inappropriate orders as per below:

For MTP activations:

- Verbal reminder to the ordering doctor to only activate MTP if patient satisfies institution MTP criteria.
- Verbal reminder that FFP would expire soon after thawed.
- Offered the option of urgent blood order "a-la-carte" of red cells alone or combinations of red cells/plasma/platelets, instead of MTP (fixed ratio including thawing of FFP).

For Non-MTP orders for FFP:

- Verbal reminder that FFP would expire soon after being thawed.
- Verbal reminder that FFP would "standby" as a frozen product in blood bank until confirmed required, rather than thawed immediately upon order.
- If the requestor insisted on thawed plasma to standby physically on-site, blood bank would suggest ordering only 2 units thawed FFP, instead of 3 - 4 units.

III. Blood Bank provided FFP wastage report every 6 months.

New interventions from current cycle

Increased staff education

- **Widespread physician education** (eg. roadshows and department presentations) on appropriate ordering of FFP and activation of MTP.
- Guides on MTP activation & clinical ordering of plasma for transfusion were **shared with the various departments/clinical areas**.

Regular feedback

- Blood Bank provided a **monthly report** of FFP wastage and usage, allowing **more targeted awareness and follow-up** by respective departments to reduce FFP wastage.

Exploring alternatives to FFP

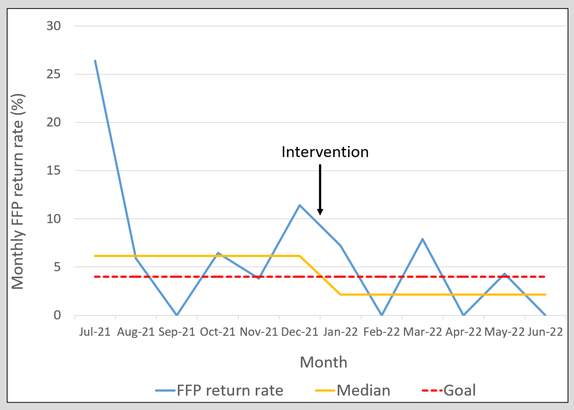
- Alternatives such as 4-factor prothrombin concentrate and fibrinogen would be routinely suggested by Blood Bank during clinical ordering of FFP, where appropriate.

3. Results

The mean monthly FFP wastage rate during the QI intervention from January to June 2022 was 3.05% and the median monthly FFP wastage was 2.15% (Table 3 and Fig 2 respectively). In addition, MTP over-activation rate had dropped to 23.5% during the QI project, and the FFP wastage as a percentage of FFP issued in MTP packs had also dropped to 8.8%.

	Jan	Feb	Mar	April	May	June
Monthly FFP wastage (%)	7.2	0	7.9	0	4.3	0

Table 3. Monthly FFP wastage during QI project.

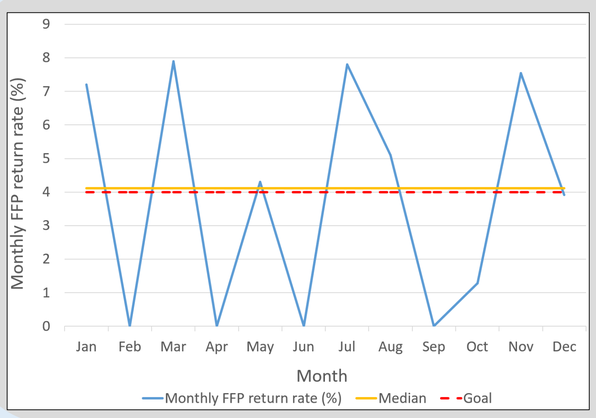


	Median FFP wastage
Before intervention	**6.17%**
After intervention	**2.15%**

Fig 2. Run chart during QI project. The median FFP wastages before and after interventions were 6.17% and 2.15% respectively.

Beyond QI project

After the QI project had concluded, the newly introduced interventions continued. Figure 3 shows the run chart of FFP wastage for 2022, with the median monthly wastage at 4.11%. The average FFP wastage in whole of 2022 was 3.5%. Also, MTP over-activation rate dropped to 44.1% in 2022, with a corresponding reduction in FFP wastage to 7%.



	Median FFP wastage
Whole of year 2022	**4.11%**

Fig 3. Run chart for the entire 2022. The median FFP wastage rate was 4.11%.

4. Conclusions

- Potential number of FFP packs saved in 2022 was 23.4 units, leading to estimated cost savings of S$3,744.00
  (Based on median FFP wastage rate of 5.4% in 2021, and 3.5% in 2022).
- The new interventions significantly reduced thawed FFP wastage from cancelled clinical orders during the 6 months project duration. This improvement was sustained in the second half of 2022 (median FFP wastage of 3.92%).
- There was a reduction in inappropriate hospital MTP activations, consequently reducing FFP wastage.