



Use of FMEA to reduce the risk of errors for medication delivery service in outpatient oncology pharmacy

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INTRODUCTION

- National Cancer Centre Singapore (NCCS) saw an increase in demand of medication delivery service (MDS) during the COVID pandemic and its quick adoption could potentially increase the risk for medication errors
- MDS is also part of the National Pharmacy Strategy to provide patients with timely and convenient access to medication¹
- Failure Mode and Effect Analysis (FMEA) is a risk analytical tool employed in this study to identify known and potential errors ('failure modes') and assign Risk Priority Numbers (RPNs) to the failure modes by taking the product of severity, occurrence and detectability based on a scale of 1 to 5 (Table 1)
- Areas with higher RPNs are prioritised for corrective interventions^{2,3}

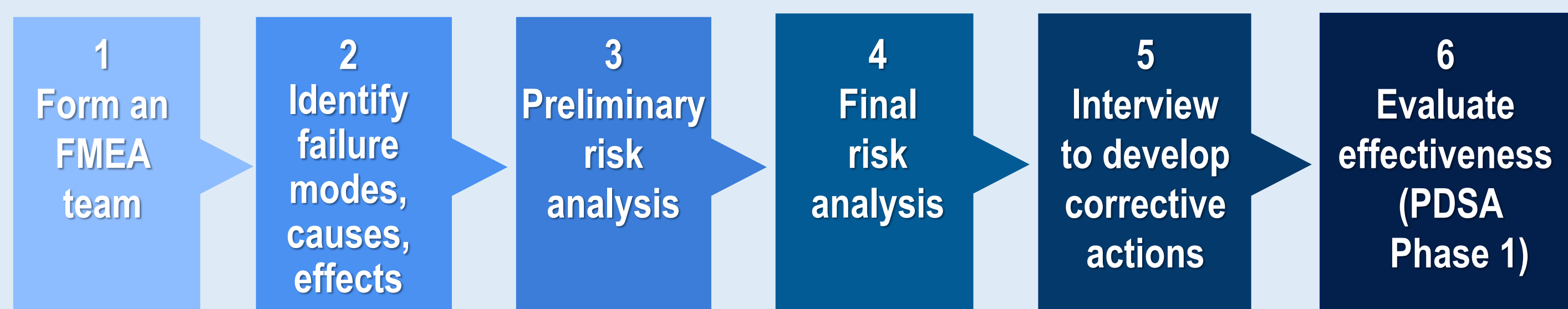
OBJECTIVES

- To investigate the potential failure modes of MDS processes in an outpatient oncology pharmacy using FMEA
- To recommend corrective measures to minimise risks in areas with higher RPNs.

METHODS

Study design

- A prospective observational study conducted at the Specialist Outpatient Clinic (SOC) pharmacy of NCCS, from June to September 2020



Sample size

- Preliminary risk analysis:** n=19, mean practice period=8.58 years (SD 9.90)
- Final risk analysis:** n=8, mean practice period=11.80 years (SD 12.80)

Table 1. Rating Scale of 1 to 5 to calculate RPN

Score	Severity	Occurrence	Detectability
1	Negligible	Less than once a year	Almost certain
2	Minor	Yearly	Moderately high
3	Moderate	Quarterly	Low
4	Major	Monthly	Remote
5	Catastrophic	Weekly	Absolute uncertain

Use of 5S Lean Manufacturing in Step 5

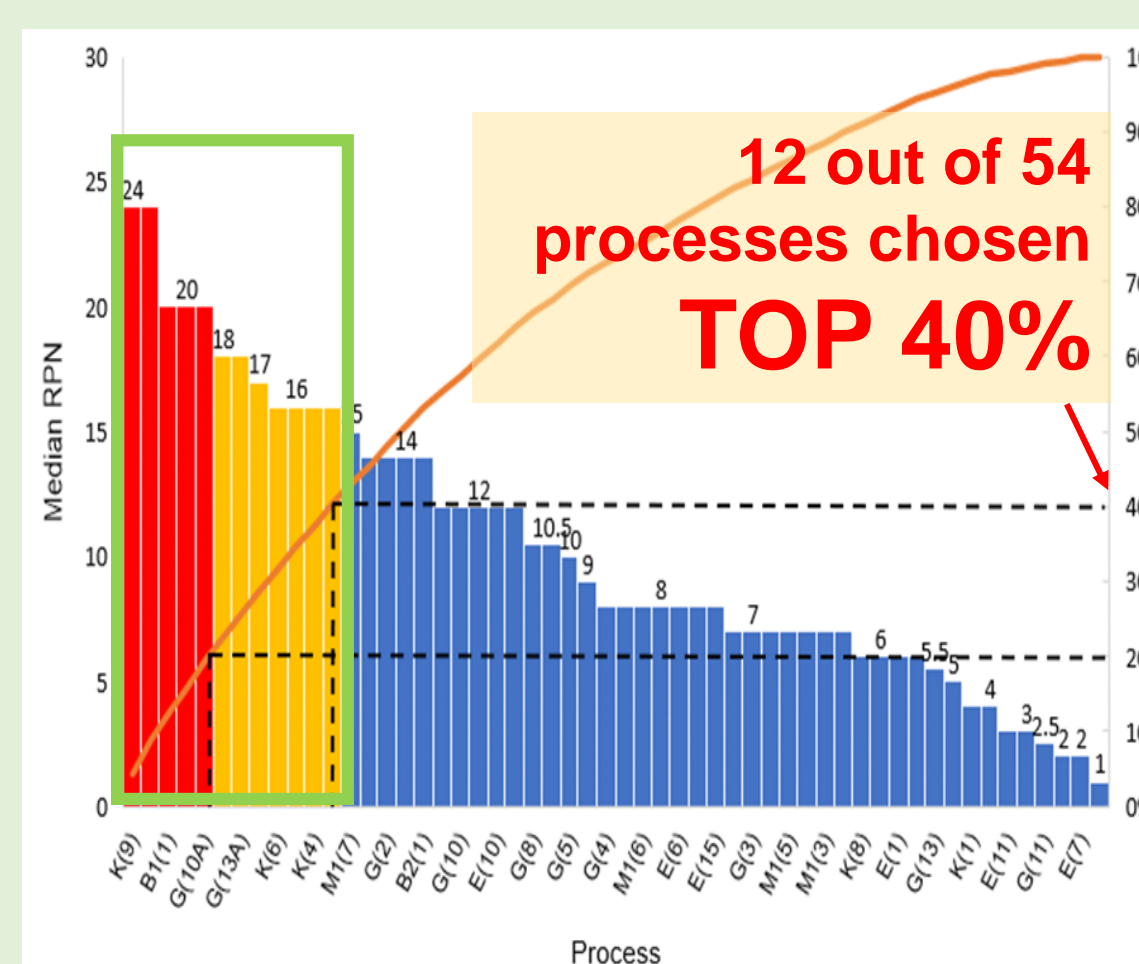
- Originally used as a housekeeping tool in production setting⁴, we adopted its concept to facilitate devising corrective actions in a more systematic manner
- 5S: **S**ort, **S**et in order/ **S**traighten, **S**hine/ **S**crub, **S**tandardise, **S**ustain

Implementing Plan Do Study Act (PDSA) cycle

- Used to help to systematically plan the details and means of monitoring changes
- Monitor the reduction in near misses/ actual error rates
- Gather feedbacks from pharmacy staff

RESULTS (cont.)

Final risk analysis findings



Process	Process (top 40% with higher RPN) to devise corrective actions	RPN
E	Review laboratory readings/other investigations	24
K	Place prescription and consent form in appropriate trays	
G	Enter remarks for MDS	20
B1	Receive patient or caregiver's call for MDS/ Retrieve prescription from file for processing	
G	(If applicable) Record cross-month billing on order slip	18
K	Complete assembly process	
M1	Retrieve summary labels for cross month billing	17
G	(If applicable) Select "3rd Party Payer"	
K	Check drug(s) packed/ Connote ^b / Check if order slip matches processed order	16

Proposed corrective actions

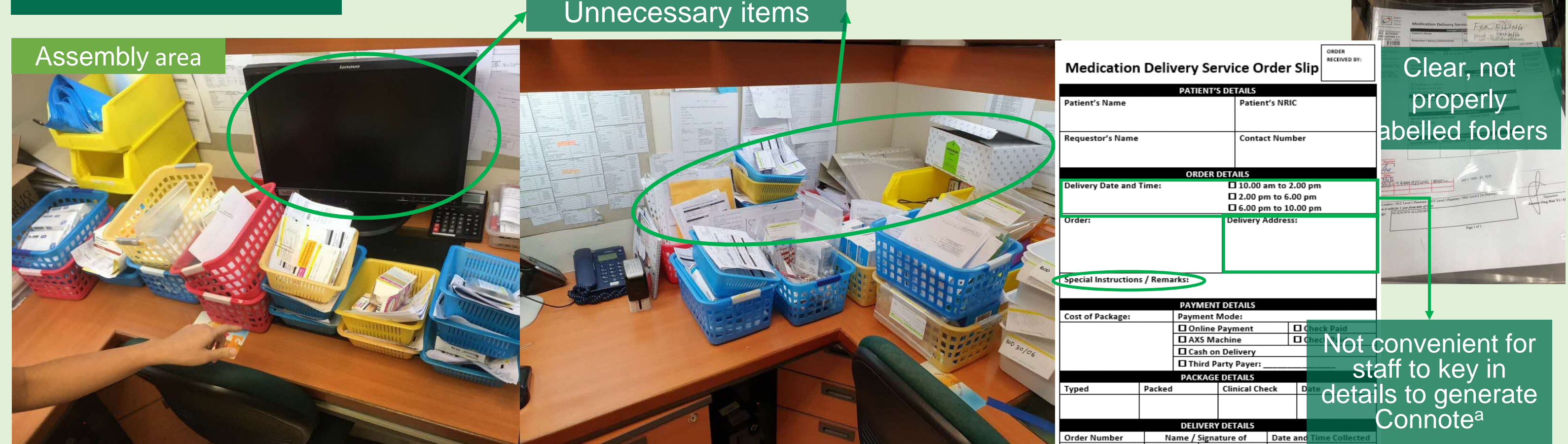
- 38 general and process-specific measures were devised using 5S methods: 2 sort, 14 set in order, 7 standardize, 3 shine and 12 sustain strategies
- Most focused on improving the modes of MDS activation, design of MDS order slip, and working environment, and reducing workload
- 8 were implemented in phase 1 of the PDSA, with positive reduction in incidence of near misses and encouraging feedback from pharmacists

Improvements made during phase 1 of the PDSA

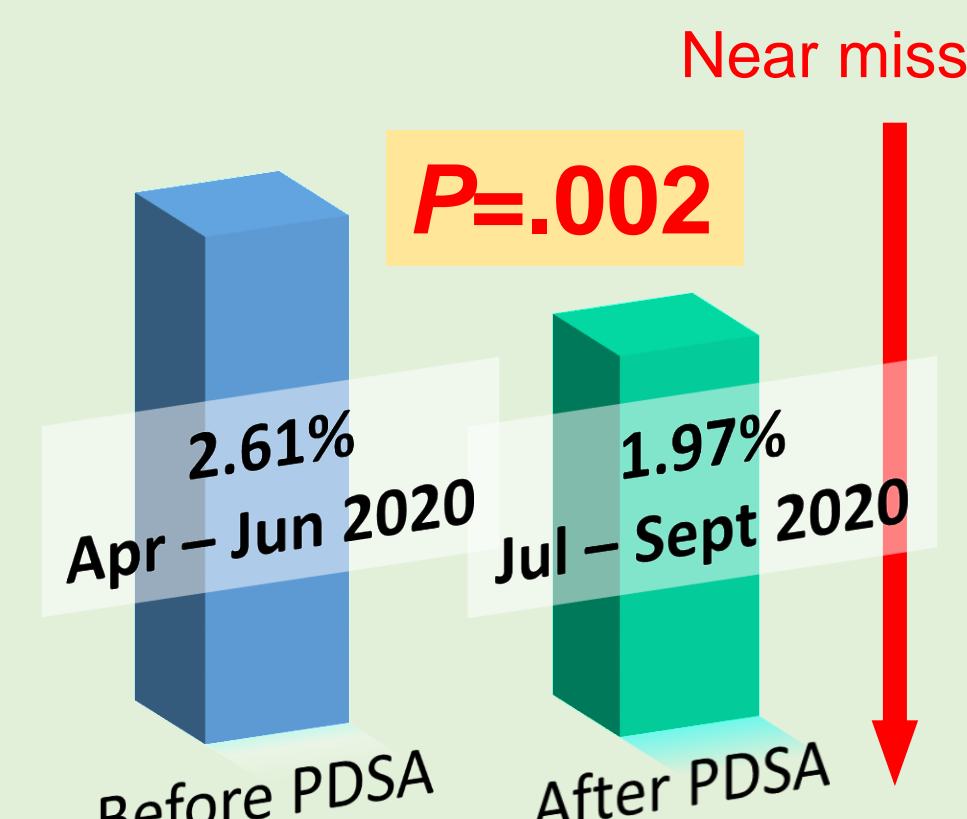
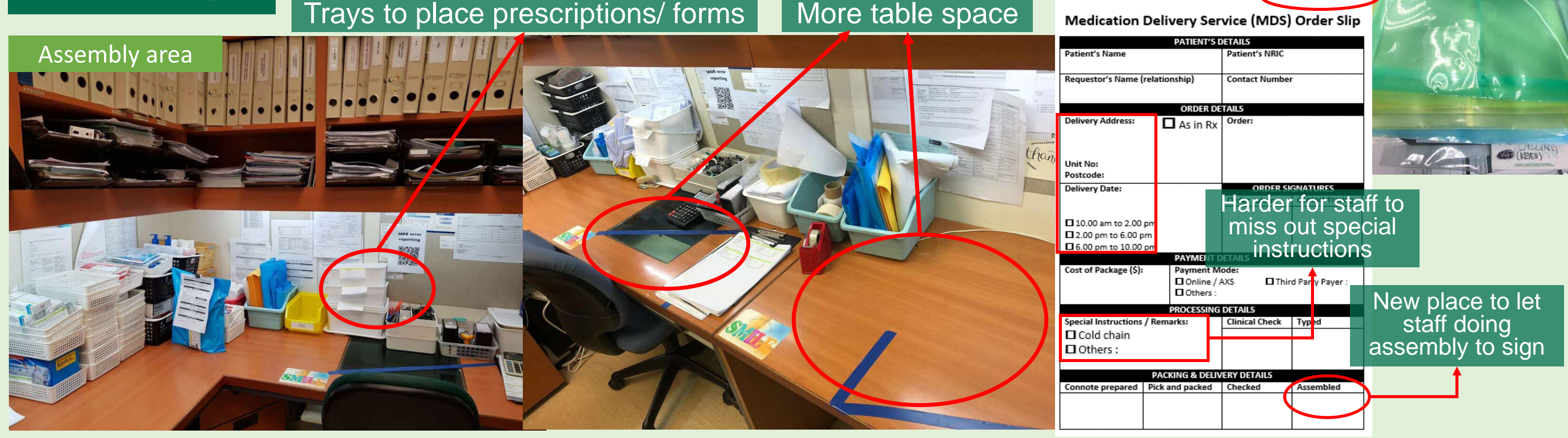
Sort	<ul style="list-style-type: none"> Use colored, labelled folders to store prescriptions intended for storage or processing Sort the necessary and unnecessary to remove the unnecessary equipment/ items from assembly area
Set in order	<ul style="list-style-type: none"> Redesign the MDS order slip Change from white to colored paper to paste summary labels for cross-month billing
Shine	<ul style="list-style-type: none"> Place dedicated trays on table strategically to ensure easy access for staff doing assembly
Sustain	<ul style="list-style-type: none"> Preparation of database to allow auto-population of patient details using NRIC to generate Connote^b

^b Connote: Delivery label with patient's delivery address and order number

Before PDSA

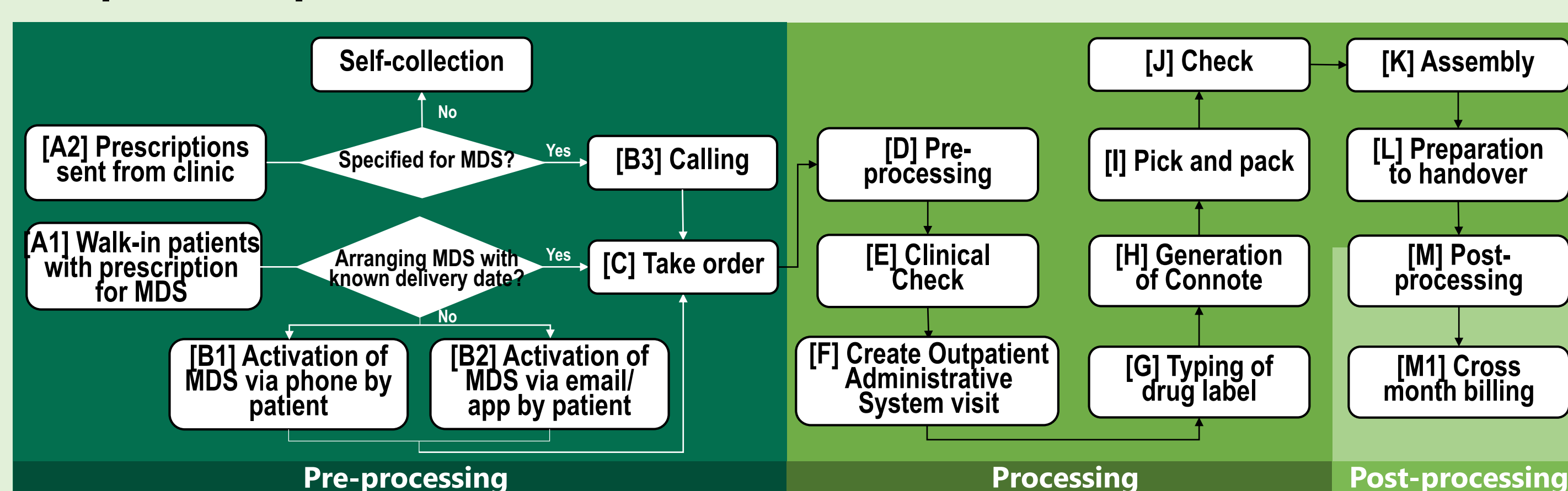


After PDSA

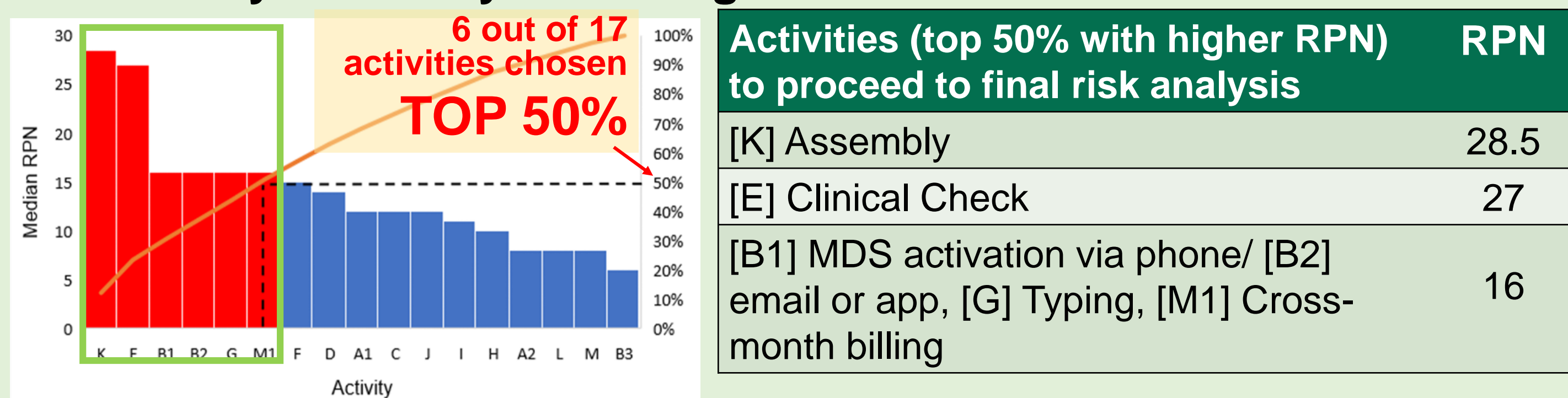


RESULTS

Graphical representation of MDS activities



Preliminary risk analysis findings



DISCUSSION & CONCLUSION

- Majority of processes in MDS activation via phone and assembly were flagged out with higher RPNs. Both were critical as majority of MDS orders was activated by calling and assembly was the last activity before medications were sent out for delivery.
- Messy work environment, absence of measures to ensure protected space and time for staff doing assembly, and lack of standardised way of assembling medications were some major problems identified.
 - Immediate solution: increase number of telephone lines and dedicated phone receptionists; long-term solutions: promote use of email and mobile applications to facilitate convenient activation of MDS.
 - Improve IT software to allow electronic transmission of medication order for auto-populations of fields to produce drug labels.
- The study highlighted the shortcomings of near-misses self-reporting system. Improvement to the system is needed to allow staff to report – when, where and how the near-miss occurred.
- FMEA findings helped to illustrate the complex nature of MDS and prioritised various critical key failures for corrective actions.

Acknowledgement

We would like to thank all the SOC pharmacists and pharmacy technicians in NCCS for their participation in the surveys and assistance in the recommendations of corrective actions.

Reference

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