Blood Transfusion Failures in Hospital Settings

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INTRODUCTION

Blood transfusion is a life-saving procedure which can help to replace blood lost due to any surgical procedure or injury. It's also can help if any illness prevents our body from producing blood or blood components (example; thalassaemia). As a correct blood transfusion can save a patient life likewise wrong infusion leads to patient death. Therefor it's very important to safe blood transfusion. For conducting a safe blood transfusion, we must ensure a systematic process and correct completion of each process. Starting form patient identification, adequate information on blood requisition form to delivering of correct and valid blood as per request and lastly monitoring of patient vitals before, during and after transfusion.

Rationale, Research Question & Objective of the Study

Rationale

- As there were one hundred nine sentinel incidents reported for Blood Transfusion from past 4 months in this hospital have urged to conduct to study the existing process identify the failure occurring areas and improve it.
- Therefore, utilising FMEA tool can help the management to effectively and efficiently on their improvement plans to specific process associated with the highest number of failure mode events.

Research Questions

- What are common errors for entire process of blood transfusion in a 1200 bedded hospital ?
- Which of these processes have the maximum and most severe failure mode events?

Objectives

- To study the Blood Transfusion Process
- To study the type of error occurs in Blood Transfusion process which leads to incidents
- To evaluate the failure risk and patient harms associated with the blood transfusion process.
- To suggest action plan and implement the action plan

Methodology

Study Design - A cross-sectional observational study was used for this study

Sampling Technique - Convenience sampling technique was used for collecting data.

Sample Size - The total sample were collected for this study was 180

Data Collection Procedure - Data was collected through direct observation who were advised for blood transfusion starting from doctor's advice to completion of transfusion process & some data collected from system which were raised for Blood Transfusion related incidents.

Data Collection Tool - The tool use for collecting the data was, observation checklist which was developed using Failure Mode and Effects Analysis (FMEA)

..\..\..\Downloads\FMEA Checklist.xlsx

What is FMEA ?

- FMEA (Failure Mode Effect Analysis) is a systematic tool to mitigate risk.
- It is also a tool to improve system performance by identifying ;
    1. Effects of potential product or process failure
    2. Methods to eliminate or reduce chances of failure
- A systematic, proactive method for recognizing and evaluating a process to identify where and how it might fail.

The emphasis is on **preventing failure, errors, accidents BEFORE they happen**

FMEA includes review of the following :

1. Modes
2. Causes
3. Effects

Steps and when to perform a FMEA

STEPS :

1. Team : Identify relevant team members
2. Define focus and scopes
3. Define failure modes
4. Identify causes of failure
5. Identify effects of failure
6. Determine risks of failure
7. Corrective actions

When to do A FMEA :

FMEA can be done more than once, at a various stages of a change, development or project.

- **Early** in the process improvement investigation
- When **new** systems, products, and processes are being designed
- When **changes** are made to the existing design or processes

FMEA Procedure

1. For each process input, determine the ways in which the input can go wrong.
2. For each failure mode, determine effects- select a severity level for each effects.
3. Identify potential causes of each failure mode- select an occurrence level for each causes.
4. List of current controls for each causes- select a detection level for each causes.
5. Calculate the Risk Priority Number (RPN).
6. Develop recommendation actions, assign responsible persons and take actions- Give priority to high RPNs (Must look at severities rated as 4).
7. Set time period to implement the action plans and again do RPN scoring for highest RPN scoring area and compare.

Hazard Matrix for RPN scoring -

Table 1 Hazard Scoring Matrix

Rating	Severity of Hazard (S)	Occurrence of Hazard (O)	Detectability of Hazard (D)
1	No injury, or patient monitoring Only	Rare – Failure unlikely to occur (happens in 1 out of 10,000 observed episodes).	Always detected: Detected 9/10 times
2	Temporary injury with need of additional interventions or treatments	Low – Relatively few failures (happen in 1 out of 1000 observed episodes).	Probably detected: 7/10 times
3	Temporary injury with increased length of hospital stay or increased level of care	Moderate – Occasional failures (happen in 1 out of 200 observed episodes).	middle probability of detection: detected 5/10 times
4	Permanent lessening of body function	Often – Repeated failures (happen in 1 out of 100 observed episodes).	Probably undetected (low): detected 2/10 times

Table 1. Hazard Score Matrix and Intervention Level

Severity Probability	Minor Event (1)	Moderate Event (2)	Major Event (3)	Catastrophic Event (4)	Intervention level
Frequent (4)	4	8	12	16	Emergency
Occasional (3)	3	6	9	12	Urgent
Uncommon(2)	2	4	6	8	Programming
Remote(1)	1	2	3	4	Monitoring

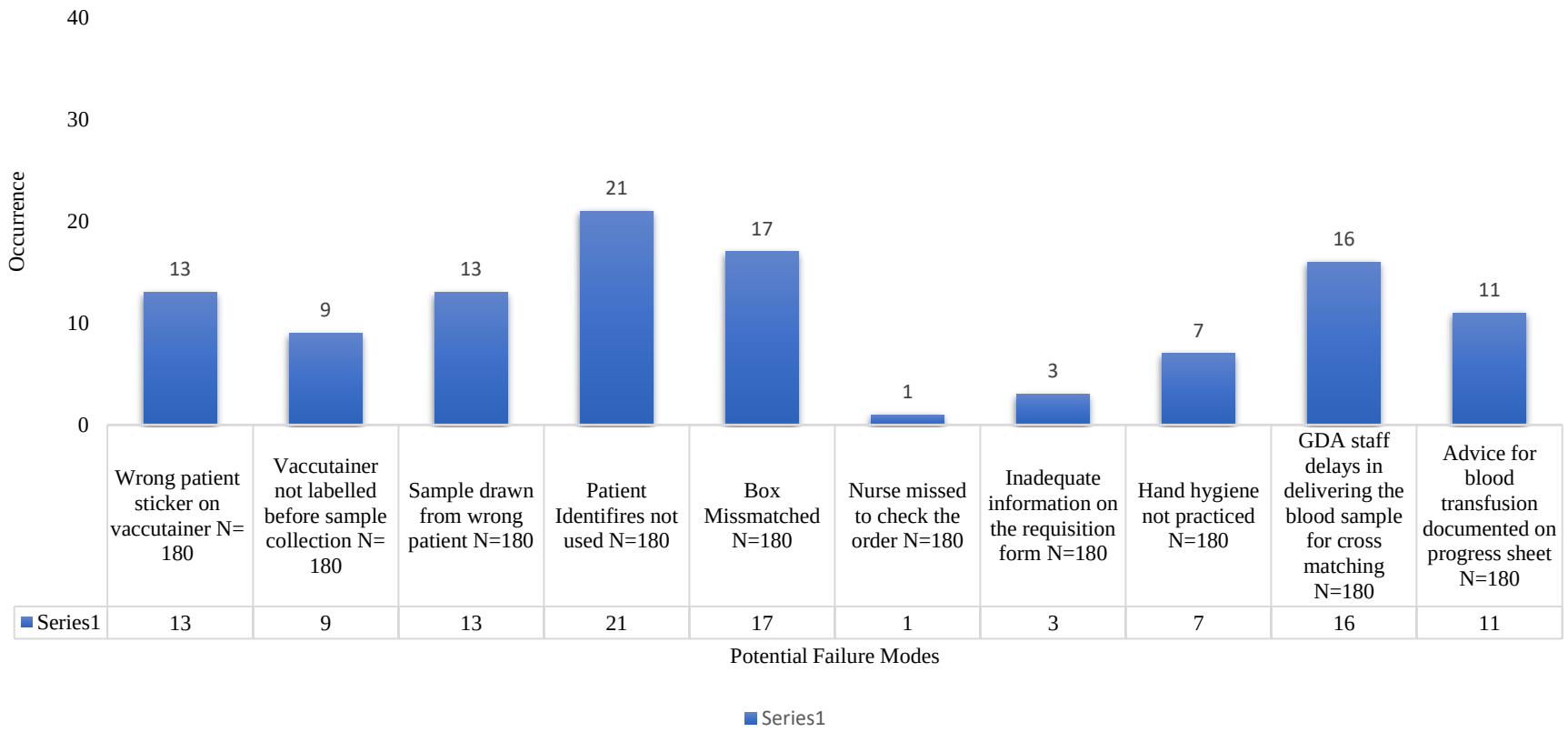
Reference:
https://www.researchgate.net/publication/270652000

HAZARD ANALYSIS		
SCORING		PROBABILITY RATING
OCCURANCE RATING	4	Frequent Probable to take place right away or soon (may happen several times in one year)
	3	Occasional - Probability is that (may happen several times in 1 to 2 years)
	2	Uncommon - Possibly taking place (may happen sometime in 2 to 5 years)
	1	Remote - Not likely to happen (may happen sometime in 5 to 30 years)
SEVERITY RATING	4	Catastrophic Event(Traditional FMEA Rating of 10 -Failure could cause death or injury)
	3	Major Event(Traditional FMEA Rating of 7 –Failure causes a high degree of customer dissatisfaction.)
	2	Moderate Event (Traditional FMEA Rating of "4"–Failure can be overcome with modifications to the process or product, but there is minor performance loss.)
	1	Minor Event(Traditional FMEA Rating of "1"–Failure would not be noticeable to the customer and would not affect delivery of the service or product.)
DETECTIBILITY RATING	4	Unlikely to detect
	3	Difficult to detect but can be done
	2	Easily detectable as the control measures are in place
	1	Very easy to detect by visual assessment or comparison

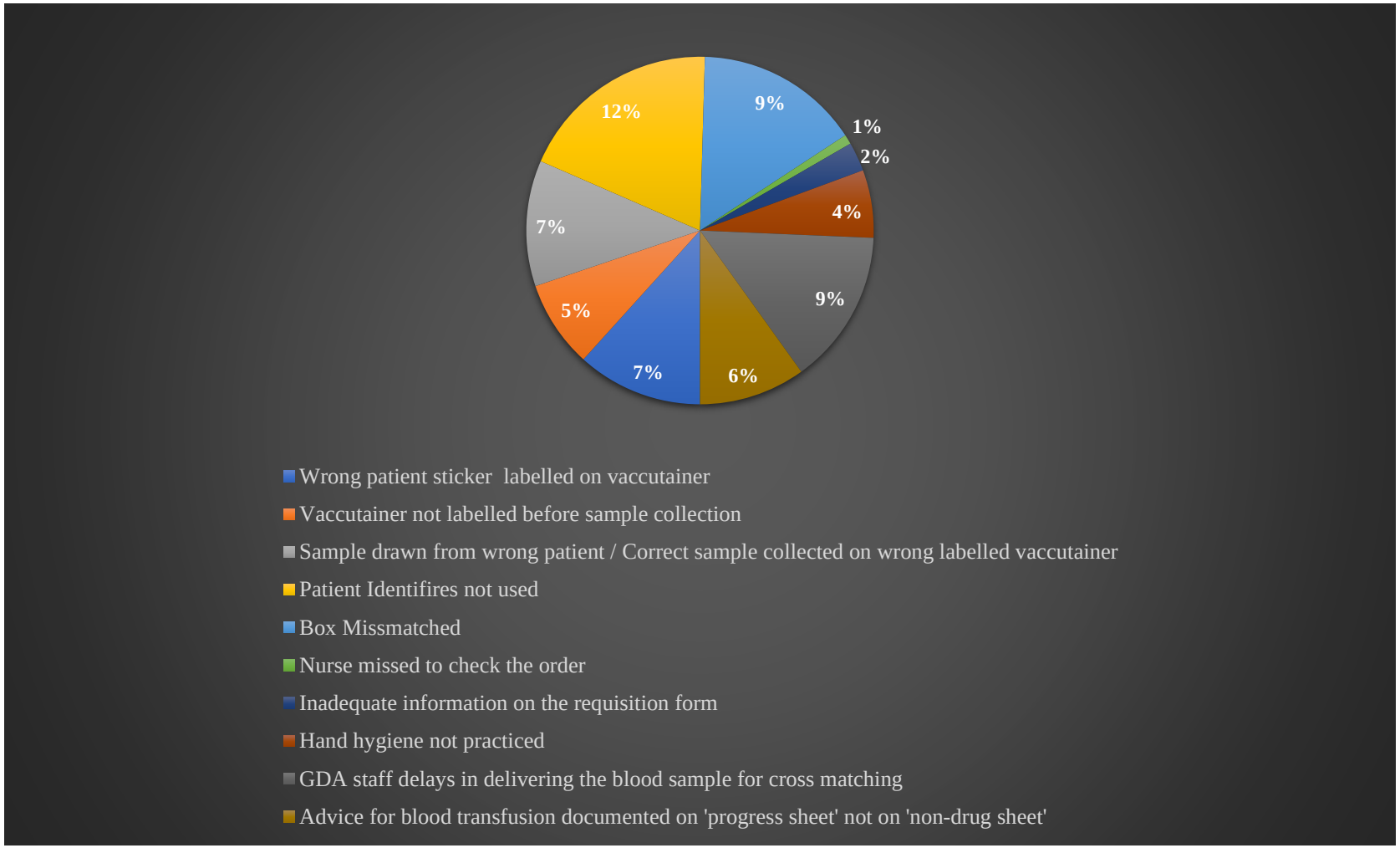
Results

FMEA Checklist.xlsx

Graphical representation of occurrence error of highest RPN scoring area



Percentage of occurring error of highest RPN scoring area



Discussion

This study results indicated the inappropriate steps which were practicing on most vital steps for blood transfusion that could lead a serious morbidity or mortality. The steps include:

a. Failure to comply with standard for patient identification & prevent patient form Hospital Acquire Infection (HAI)
b. Inadequate or wrong information documented on requisition form to order blood components
c. Mismatching of blood bag carrying box
d. Documentation for transfusion on inappropriate form that leads a big delay for transfusion which can adversely effect on patient health
e. Lack of documentation of the patient's vitals & symptom during the transfusion

Discussion

To address these issues, this research study recommends some corrective actions to avoid further errors for blood transfusion:

a. To improve patient identification; Daily briefing, weekly training & evaluation can be done about standard policies & protocols as many of staffs were new joiners. Patient identifiers should be double checked (2nd verification can be done by nursing TL or Nursing supervisor).
b. To prevent mismatching of blood carrying box Hemovigil box can be use. The special function of this box is it can be locked with passcode and the same passcode will have on patient wrist band. Therefor if any mismatching takes place without correct passcode the box will not open. Secondly, training for GDA staff also require about hospital's standard policies and protocols.
c. To improve delay in delivering blood sample to blood bank for cross matching nurse can use pneumatic chute to deliver the blood sample.
d. To improve documentation, require random audits and share with responsible department head to improve it by training & evaluation.

Conclusion

FMEA has proven to be a successful methodology for analysing and re-engineering healthcare procedures, particularly complex procedures that could be dangerous for patients. In this work, we used FMEA to identify many critical failure modes that could endanger patient safety. With the introduction of information technology, enhance the entire transfusion procedure.

Remember…
Safety First!

Thank You