

ASSESSMENT OF A STANDARDIZED NURSING WARD INVENTORY SYSTEM: A QUALITY IMPROVEMENT INITIATIVE

Dissertation Submitted to



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Master of Business Administration (MBA)

in

Hospital and Health Management

by

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Under the Supervision and Guidance of

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2025

RHL/HRD/INT0525/01

TO WHOM IT MAY CONCERN

Date : 31th May 2025
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This is to certify that **Dr. Monika Kriplani** in partial fulfilment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMR University, Jaipur has successfully completed her internship at Mahavir Jaipuria Rajasthan Hospital, Jaipur during **10th March 2025 to 31st May 2025** in **Quality** Department.

She has completed her tenure entirely to the satisfaction of the hospital management.


Suniti Peswani
General Manager – People Operations



CERTIFICATE BY THE FACULTY GUIDE AND SCHOOL DEAN

This is to certify that dissertation “**Assessment of a Standardized Nursing Ward Inventory System: A Quality Improvement Initiative**” is a record of the research work undertaken by Dr Monika Kriplani in partial fulfillment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

A handwritten signature in blue ink, appearing to read 'Sandy'.

Dr Sandipta Chakraborty

Associate Professor

IIHMR University, Jaipur

DATE - 16/06/25

A handwritten signature in blue ink, appearing to read 'Sanjay'.

Dr. Sanjay Gupta

MBA -HM Dean

IIHMR University, Jaipur

DATE – 16/06/25

DECLARATION BY STUDENT

I hereby declare that this dissertation is titled **Assessment of a Standardized Nursing Ward Inventory System: A Quality Improvement Initiative** is bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.


Dr Monika Kriplani

Date-

16/06/25

ABSTRACT

TITLE: ASSESSMENT OF A STANDARDIZED NURSING WARD INVENTORY SYSTEM: A QUALITY IMPROVEMENT INITIATIVE

AUTHOR NAME: Dr Monika Kriplani

ADVISOR NAME: Dr Sandipta Chakraborty

KEYWORDS: TAT, Ishikawa diagram, Pareto chart, PDCA cycle

BACKGROUND

Maintaining patient safety, preventing treatment delays, and facilitating clinical workflow all depend on hospital inventory management, especially at the ward level. However, in hospital settings, inventory systems are often fragmented, non-standardized, and reactive rather than proactive.

Inconsistent inventory practices have caused delays in starting treatment, particularly in the critical first half hour after patient admission. This window of time is essential for setting up IV access, starting fluids, and performing initial investigations—all of which are crucial indicators of how well emergency response and high-quality care are being delivered.

The objective of this Quality Improvement Project (QIP) is to establish a standardized inventory model for each ward, supported by ongoing monitoring, staff training, and structured audit. The project will increase operational efficiency and improve patient satisfaction and outcomes by establishing clear standards (e.g., 100% inventory fulfillment, <30 minutes treatment initiation, defined pharmacy TAT).

OBJECTIVES:

- To assess the current inventory management practices in hospital wards as per requisition
- To ensure that every new admission in the hospital receives first step of treatment (Cannulation, Fluid start, Preliminary investigations) within first 30 minutes of admission.
- To identify factors behind delay (if any) to implement the standard practice

METHODOLOGY:

STUDYDESIGN-Cross sectional study

SETTING- Mahavir Jaipuria Rajasthan Hospital, Jaipur

STUDY POPULATION-

Inclusion Criteria: All new admissions of non-critical wards(B2, B5,C2, MDU-A,B,C,E)

Exclusion criteria: All In-patients, OPD patients, new admissions of critical wards, Daycare patients, Chemo patients

DATA COLLECTION TOOLS - Primary Data through direct observation using audit checklist tool

DURATION OF STUDY-10thApril- 31stMay 2025(Audit cycle 1)

SAMPLE SIZE- 100 (Followed as per new admission intimation during peak hours)

SAMPLING TECHNIQUE- Simple Random Sampling

DATA COLLECTION PROCEDURE-

- Time of cannulation, start of IV treatment, and sample collection for preliminary investigations will be documented.
- HIS requisition will be reviewed to assess availability and request-response time for inventory
- Staff will be interviewed to evaluate familiarity with inventory protocols and perceived challenges

RESULTS/FINDINGS: Audit cycle 1 showed compliance of 69% within benchmark of 30 minutes and 31% showed delay in start of cannulation/IV treatment and interventions were proposed for next audit cycle.

CONCLUSION: Improving early clinical interventions can be greatly enhanced by the evaluation and standardization of nursing ward inventory systems. Hospitals can drastically cut down on delays in cannulation and related treatment steps by making sure that necessary supplies are available, assigning roles, and optimizing workflows.

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Dr Monika Kriplani

MBA – Hospital and Health Management

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ABBREVIATIONS

• Turn Around Time	TAT
• Standard Operating Procedure	SOP
• Intravenous	IV
• Treatment	T/t
• Value Stream Mapping	VSM

RESEARCH TOPIC:

**ASSESSMENT OF A STANDARDIZED NURSING WARD INVENTORY
SYSTEM:**

A QUALITY IMPROVEMENT INITIATIVE

CHAPTER 1: INTRODUCTION

1.1 Background

A persistent issue has been brought to light by recent observations at Rajasthan Hospital: the inability to reliably start IV cannulation within the desired benchmark of 30 minutes after entering the ward. Ward-level inventory systems' inefficiency and irregularities are a major cause of these delays. Many wards suffer from stock-outs, replenishment delays, and unclear accountability in the chain of action—from pharmacy indent to bedside readiness—despite the existence of supply protocols.

Efficient and timely clinical intervention is central to delivering quality patient care, particularly during the first critical moments after hospital admission. One of the most immediate and essential actions during this period is the initiation of intravenous (IV) cannulation, along with starting fluids and conducting preliminary investigations. Delays in this initial phase can compromise patient outcomes, disrupt clinical workflows, and lower overall care efficiency.

Challenges: There may be avoidable treatment delays if necessary supplies like IV fluids, supportive supplies, and cannulas are not easily accessible at the time of admission due to the lack of a standardized, proactive inventory model. The issue is further made worse by staffing shortages, shoddy shift coordination, and a lack of real-time inventory status visibility.

Rationale: By connecting ward inventory readiness with clinical response timelines—with a focus on cannulation delays—this Quality Improvement Project (QIP) aims to directly address these operational barriers. With the use of a structured PDCA cycle and qualitative techniques like Pareto and Fishbone analysis, the project seeks to:

- Minimize delays brought on by shortages in inventory or human resources
- Reach at least 90% adherence to the 30-minute cannulation standard.

This initiative, which focuses on inventory optimization, staff accountability, and process simplification, has the potential to improve patient outcomes and staff efficiency by lowering treatment delays and increasing hospital wards' overall responsiveness.

Establishing a standard operating procedure (SOP) for prompt cannulation and putting basic clinical standards into practice are necessary to guarantee high-quality patient care.

1.2 Aims and Objectives

Aim: To develop and implement effective hospital ward inventory management system that guarantees the prompt delivery of necessary medical equipment and supplies, thereby eliminating treatment delays and improving patient care.

Objectives:

- a) To assess the current inventory management practices in hospital wards as per requisition
- b) To ensure that every new admission in the hospital receives first step of treatment (cannulation, IV fluid start, preliminary investigations) within 30 minutes from arrival in the ward.
- c) To identify factors behind delay (if any) to implement the standard practice.

1.3 Standards set

- a) All wards to have 100% inventory as per decision made
- b) <30 minutes TAT to start IV / oral treatment and send out preliminary investigations
- c) 100% replenishment from pharmacy within 4 hours from 8am to 8pm and within 6 hours after that.

CHAPTER 2: REVIEW OF LITERATURE

Several studies have emphasized the impact of streamlined inventory systems on improving patient care outcomes and reducing delays in critical interventions.

Title	Author	Published in	Description
1. "Inventory Control Techniques and its Impact on Patient Care: A Hospital-Based Study"	Kumar, S., & Jain, P.	International Journal of Healthcare Management (2020)	This study highlighted the significance of effective inventory control in minimizing delays in treatment and improving patient satisfaction. The authors demonstrated that proactive inventory practices led to better care timelines and emphasized those clinical teams should be integrated into supply chain discussions to ensure readiness at the point of care.
2. Hospital Inventory Management:	Zepeda, E. D., & Labadie, J. G	Journal of Healthcare Supply	The paper examined structural weaknesses in hospital inventory

Challenges and Strategies for Improvement"		Chain Management (2017)	systems and advocated for the implementation of automated tracking, role clarity, and better coordination between departments. It concluded that inventory delays are not solely logistical issues but significantly influence clinical outcomes, particularly during early admission periods.
3. "Improving Hospital Inventory Efficiency: A Lean Six Sigma Approach"	Kumar, R., & Sharma, R	Journal of Health Organization and Management (2022)	This paper applied Lean Six Sigma principles to hospital inventory workflows. Through root cause analysis and process mapping, the authors showcased improvements in inventory turnaround times and treatment readiness. Their findings supported the use of quality

			improvement tools such as PDCA cycles and Pareto analysis, which are integral to the current project.
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CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research design: Cross-sectional study

3.2 Problem statement:

Delay in first step of treatment due to inefficient ward inventory systems has led to suboptimal patient care and administrative inefficiencies. There is a need to assess and revamp current inventory management practices to ensure prompt and consistent availability of essential medical supplies during patient admissions.

3.3 Setting of study: Mahavir Jaipuria Rajasthan Hospital, Jaipur

3.4 Study Period: 10THApril- 31STMay 2025 (Audit cycle 1)

Step	What	Why	How		When						Where
				Apr' 25	1-15 th May' 25	15-31 st May' 25	1-15 th Jun' 25	15 th Jun-30 th Jun' 25	1 st - 15 th July' 25	15 th - 31 st July' 25	
1	Identify Problem	Management Focus	Audit Findings	P							Rhl
				C							
2	Target Setting	Important Direction	Data Analysis		P						Rhl
					C						
3	Activity Planning	Process Management	Process Workflow		P						Rhl
					C						

4	Analyzing Factor	Root Cause Validation	Fish Bone Analysis		P						Rhl
						C					
5	Implementat ion	Target Achieveme nt	Assessme nt & Monitori ng			P	P				Rhl
6	Observation al Period							P	P		
7	Confirmatio n Of Effectiveness	For Sustainabil ity	Re-Audit						P		Rhl
									P		
8	Standardizat ion And Control	Avoid Reoccurre nce	Preventi ve Action							P	Rhl
										P	

*(P=PENDING, C=COMPLETE, RHL=RAJASTHAN HOSPITAL LIMITED)

3.5 Sample size: 100

3.6 Sampling method: Simple random sampling (Whenever any new admission registered in hospital, intimation popped up on official id of Quality department and this intimation was followed in real time after the arrival of patient in ward till bedside procedures start)

3.7 Study population:

Patients admitted at the Mahavir Jaipuria Rajasthan Hospital, Jaipur (Rajasthan)

Inclusion Criteria: All new admissions of non-critical wards (B2, B5, C2, MDU A, B, C, E)

Exclusion Criteria: IPD patients (already admitted in wards), OPD patients, new admissions of critical wards, day care patients, chemo patients

3.8 Study procedure:

The below given audit tool was filled by real-time tracking after new admission intimation with Patient details of IP number, Name, Date and Time of admission, ward attached.

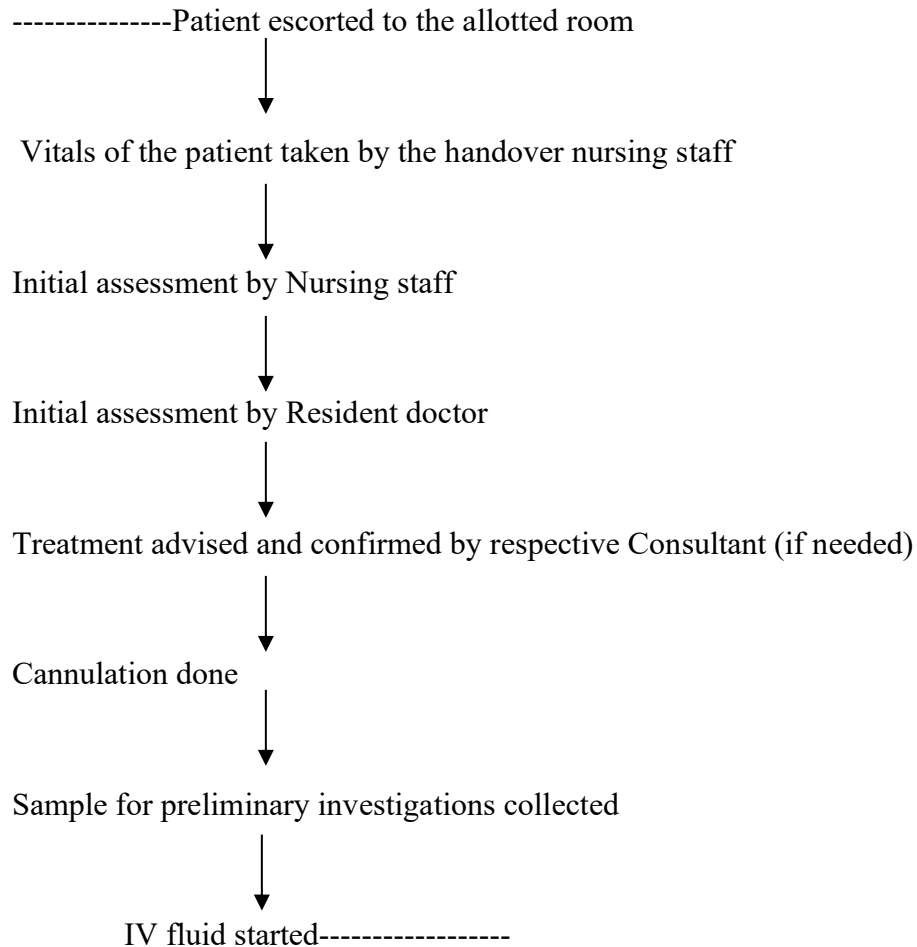
Time of arrival in ward, start of cannulation, Investigations time, Pharmacy indent was collected in real time.

Primary data by Audit tool checklist:

Pt. Ipd no.	Ward	Pt. Name	Staff handover	Time of admission	Time of arrival	Start of cannulation	Investigations done	Time of investigations	Drip start	Pharmacy indent	Replenishment time	Delay >30 min. (yes/no)	Reason for delay

Table 3.8.1

Real time tracking of the patient was done starting from the arrival of patient in the ward till IV treatment started. An observational study was taken for sequential events:



The data was collected as per standards set and reason for any delay was noted in detail.

Secondary data by HIS for pharmacy indent and replenishment time:

HIS data for pharmacy indent time and replenishment time was noted to find any pharmacy delay.

CHAPTER 4: RESULTS AND OBSERVATIONS

Study participants were Adults >8years of age, admitted for either medical management/surgical management irrespective of male/female as per objectives and aim of study. Only newly registered in-patients are included in study.

1. PERCENTAGE COMPLIANCE TO TAT:

Out of 100 patients, the delay was observed in 31 patients. The frequency of delay was observed in following wards:

S.NO	WARD	NO OF DELAYS (%)
1	B2	17 (54.9%)
2	MDU E	5 (16.1%)
3	MDU B	5 (16.1%)
4	MDU C	4 (12.9%)

Table 4.1.1

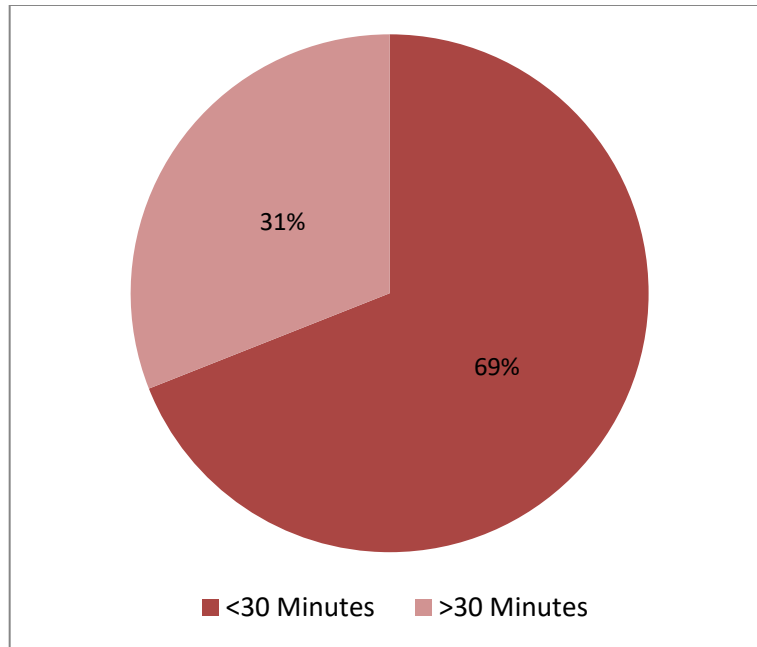


Fig. 4.1.1

2. TIME TAKEN TO START IV TREATMENT (> 30 MINUTES TAT) : Only delay patients (31)

The following line graph is made between time taken to start cannulation from the arrival time and number of observations as per raw data for patients where delay (more than 30 minutes as benchmark set) was observed.

TAT control line of 30 minutes benchmark has been shown in graph and remaining 69 were within benchmark.

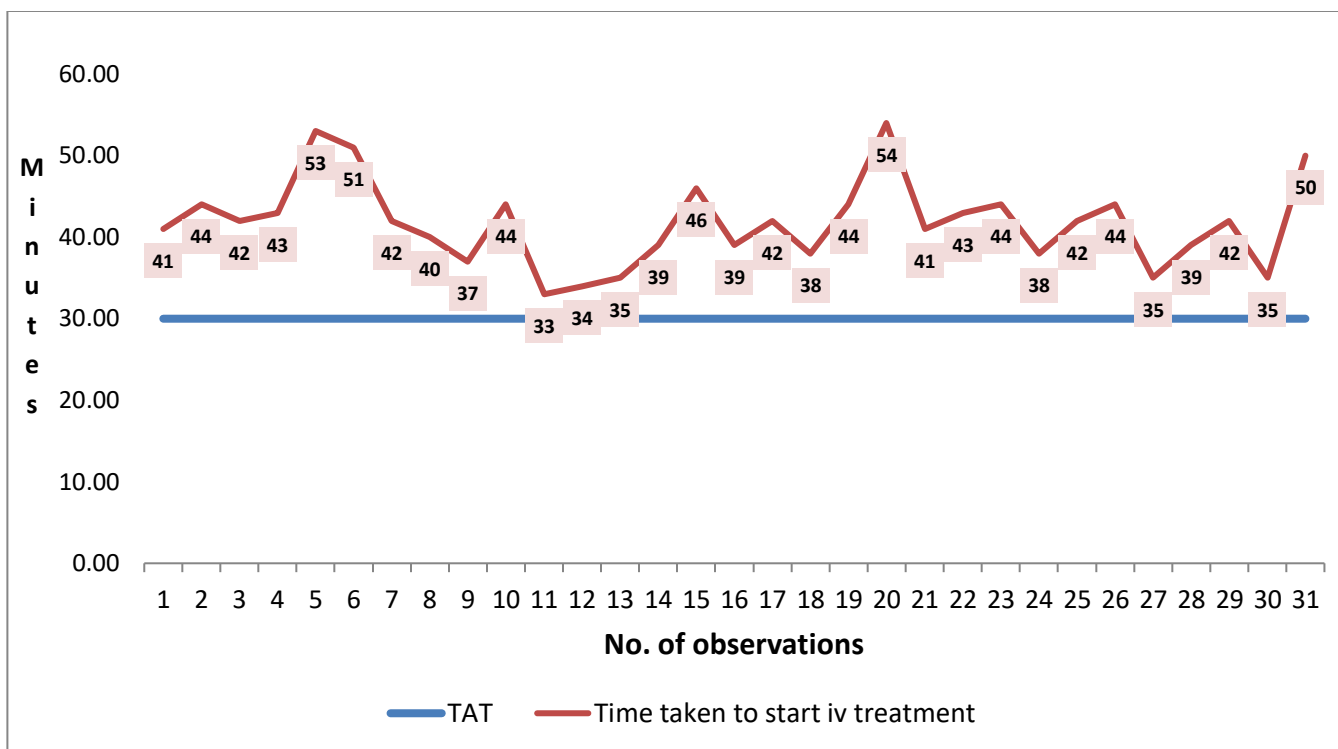


Fig.4.2.1

3. ANALYSIS: By using Quality tools as below-

- a) **ISHIKAWA DIAGRAM:** A visual tool used to systematically explore root causes of a problem by categorizing them into major contributing domains.

Delay in cannulation time or start of IV treatment was observed in 31 patients and problems were identified by observation/real time tracking of the process starting from arrival of patient in ward till iv treatment starts, to know the causes of delay as shown:

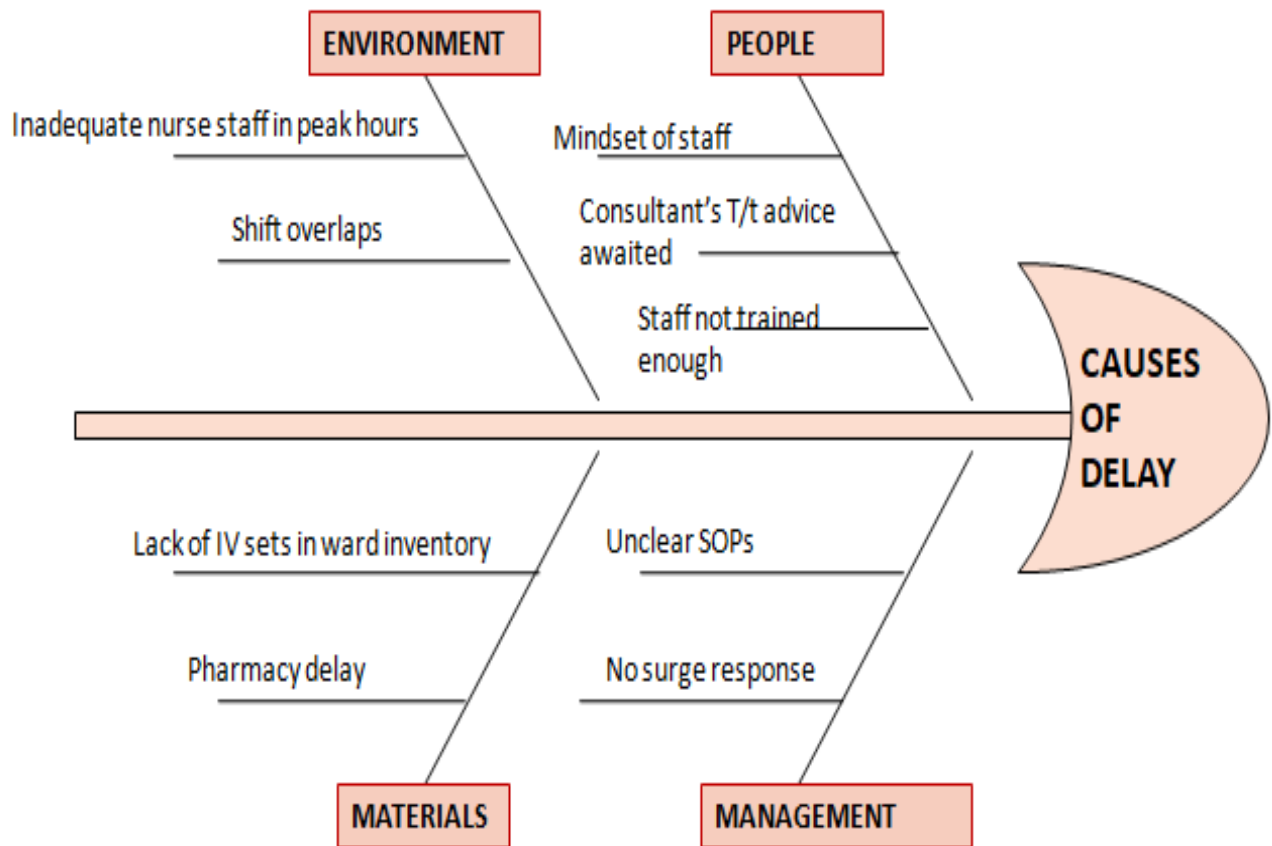


Fig. 4.3.a.

b) VALUE STREAM MAPPING:

A Lean tool called value stream mapping is used to graphically depict the flow of information, materials, and procedures needed to provide a service. VSM assists in locating waste, redundancy, and delays in clinical operations in the healthcare industry.

Purpose:

- To highlight every step in a patient's care journey (e.g., from admission to cannulation).
- To differentiate between value-added steps (e.g., cannulation itself) and non-value-added steps (e.g., waiting for a nurse or missing supplies).
- To reduce waste, waiting time, and treatment delays.

Process steps: Admission, ward transfer, nurse assignment, IV tray preparation, cannulation, etc.

Time metrics: Waiting time, process time, lead time.

Information flow: Who is responsible, communication between staff.

The current state of diagram below shows:

- Delay in cannulation due to late nurse assignment.
- Pharmacy indent raised only after patient arrives → adds delay.
- No pre-assembled IV kits available → causes search time.

Future state VSM would aim to:

- Assign nurse upon patient transfer to ward.
- Keep IV kits ready before patient arrival.
- Automate indent generation via HIS.

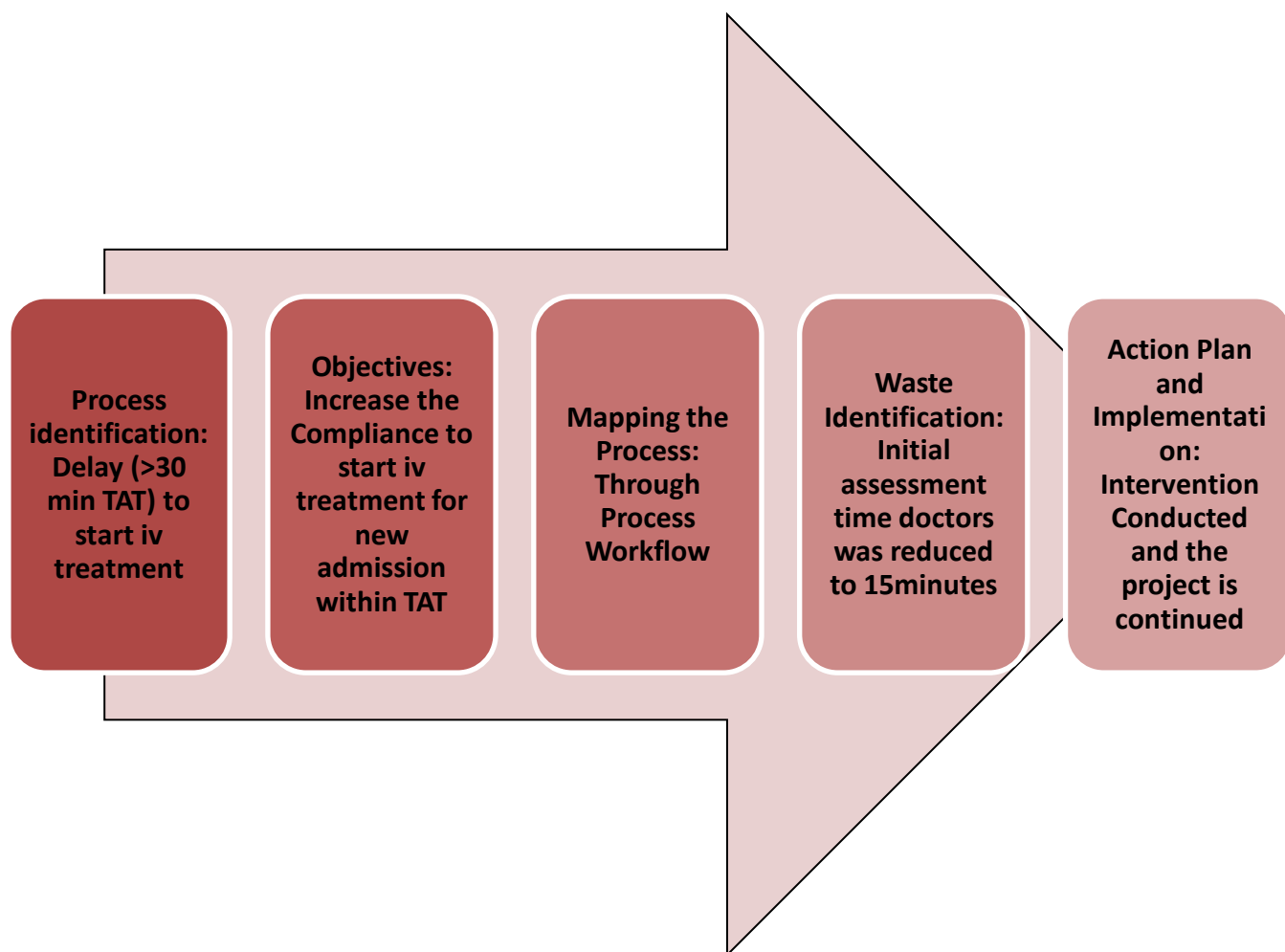


Fig. 4.3.b.

c) PARETO CHART: Based on Pareto Principle: 80% of problems are caused by 20% of causes.

Bars: Each represents a cause (e.g., “surgical cases deferred cannulation”).

Height: Shows frequency.

Line: Shows cumulative percentage.

80% line: Helps identify vital few causes.

The most frequent cause is: **"Immediate cannulation not necessary in surgical patients" (16 cases)**. Along with **"Consultant's treatment advice awaited" (8 cases)**, these two reasons account for over **80%** of all delays. According to the 80/20 rule, these top 2 causes should be prioritized for any process redesign or intervention.

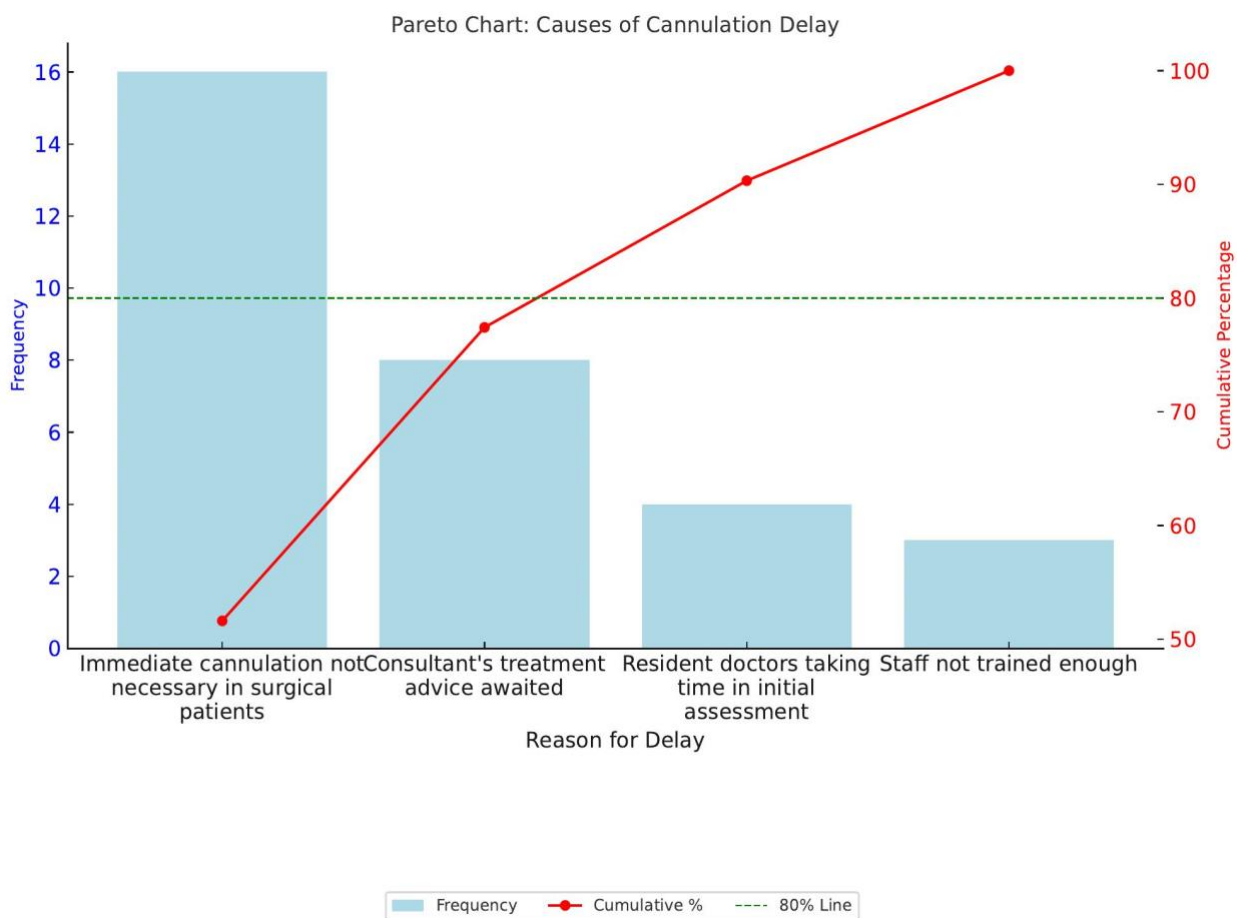
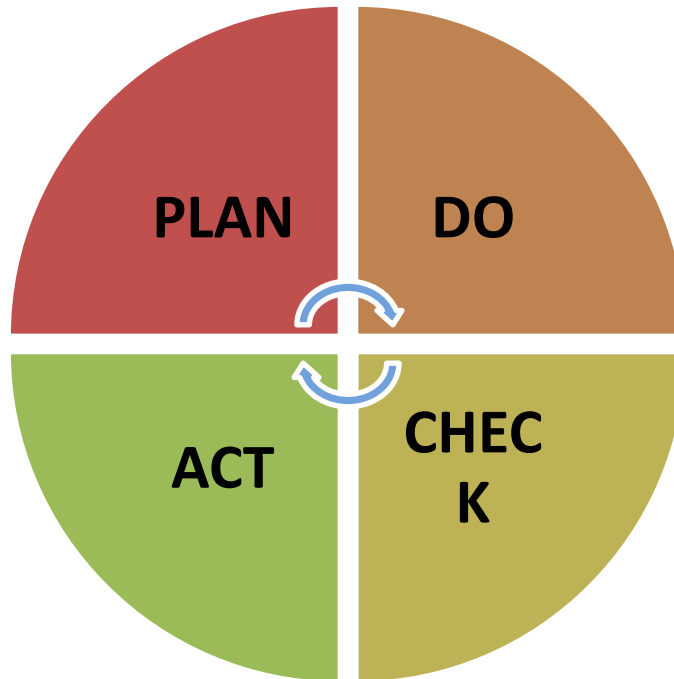


Fig.4.3.c

CHAPTER 5: DISCUSSION

PDCA CYCLE FOR IV TREATMENT DELAY REDUCTION



P-PLAN:

Patients experience delays in initiating cannulation beyond the 30-minute benchmark from ward arrival. To reduce the percentage of cannulation delays >30 minutes from 31% to <10% over the next 4 weeks:

- Revise nursing rosters based on patient inflow data.
- Implement a “rapid nurse assignment” protocol upon ward arrival.
- Keep pre-assembled cannulation trays ready for immediate use.
- Educate doctors and nurses about the 30-minute benchmark.

D-DO: IMPLEMENTATION

- Apply interventions in one ward (e.g., Medical Ward A).
- Audit cycle -2 as per checklist to monitor TAT
- Conduct staff orientation sessions on the new protocol.
- Use a daily checklist to monitor cannulation time.
- Assign a QI nurse to ensure process adherence.

C-CHECK: MONITORING AND EVALUATION

- Measure % of patients receiving cannulation within 30 minutes (daily log).
- Track reasons for any remaining delays.
- Compare Audit cycle 1 and audit cycle 2 data
- Conduct feedback interviews with staff.

Expected Outcome:

- $\geq 90\%$ compliance with benchmark within 2 weeks.
- Reduced reliance on individual staff discretion.

A-ACT:

If Successful:

- Standardize the new protocol across all inpatient wards.
- Include cannulation timing in routine nursing audits.
- Schedule quarterly reviews to sustain compliance.

If Partially Successful:

- Reassess bottlenecks (e.g., timing of pharmacy indent, handoff delays).
- Reinforce training or consider tech solutions (e.g., automated alerts).

If Unsuccessful:

- Revisit root causes.
- Consider alternate workflows (e.g., task-shifting or automation).

- This project revealed that 31% of newly admitted patients in non-critical wards experienced delays in IV initiation beyond the 30-minute benchmark. The leading causes, identified through qualitative tools, were primarily related to clinical communication gaps, perceived non-urgency in surgical cases, and resource readiness, including staff and inventory.
- The integration of inventory readiness with clinical performance indicators—such as IV initiation time—offers a holistic view of patient flow and care quality. Unlike conventional audits that focus only on material availability, this project adopted a more comprehensive approach by aligning people, process, and material readiness.
- A major insight was that delays were not always due to physical stock-outs; often, they were due to unclear handoffs, lack of prioritization, and absence of defined responsibility in the early minutes of admission. These findings mirror themes in the literature, where systemic and behavioral factors are often more critical than supply chain issues alone.
- Moreover, introducing interventions grounded in PDCA methodology might prove valuable for audit cycle 2. The project's reliance on low-cost, high-impact changes made it feasible and replicable in similar settings. However, sustainability of these outcomes will depend on continued monitoring, staff engagement, and policy reinforcement.

CHAPTER 6: CONCLUSION

The assessment and standardization of nursing ward inventory systems can play a transformative role in improving early clinical interventions. Hospitals may greatly cut down on delays in cannulation and related treatment stages by making sure that necessary supplies are available, assigning roles, and optimizing workflows.

The implementation of organized techniques like audit cycles, root cause analysis, and PDCA planning not only increases operational efficiency but also raises the standard of patient care, as this quality improvement project shows.

The model is scalable and may serve as a framework for other hospitals aiming to optimize time-sensitive clinical processes.

CHAPTER 7: REFERENCES

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