Quality Improvement Project: Specimen Handling in Pathology

Saim S[1], Batool A[1], Salikeen S[2], Khan S[3], Iqbal M[4], Akbar T[5], Owais M[5], Akhter N[6] , Saqib I[6]

[1]Patology Department, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore
[2]Pathology Department, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Peshawar
[3]Quality and Patient Safety Department, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Peshawar
[4]Quality and Patient Safety Department, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore
[5]MIS Department, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore
[6]Business Operation Department, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore

INTRODUCTION

Proper specimen handling is crucial for accurate test results and high-quality patient care. Several issues have been observed affecting the reliability of this process which are patient/ specimen misidentification, improper sample collection techniques, inadequate labeling and preservation, delays or errors in storage and transportation, incomplete or incorrect documentation, gaps in communication among staff. This PDCA cycle aims to improve these processes by continuously monitoring and identifying root causes, then implementing corrective measures to enhance specimen management.

METHODS

Baseline Data from Q1 2024 of major rejection causes with specimen handling (External e.g. CCs related and internal processes was reviewed to identify and tackle issues related to specimen handling, traceability, transportation and subsequently reporting delays at SKMCH & RC enterprise wide. This PDCA aims to identify, analyze, and reduce controllable and high-frequency sample rejection reasons across all sections of the Pathology Department, enterprise wide. The project will focus on rejection reasons that are preventable through process improvement, staff training, or system enhancement.

Included Areas:

All diagnostic sections: Hematology, Routine and special chemistry, Molecular, Microbiology, Flowcytometry, Cytogenetics, Cytology, IHC ,Histopathology and Blood Bank.

Pre-analytical units: Phlebotomy, Nursing, Collection Centers, CC-Office, Sample Receiving, Courier/Transit processes etc.

Involvement of Technical Leads for cross-functional collaboration.

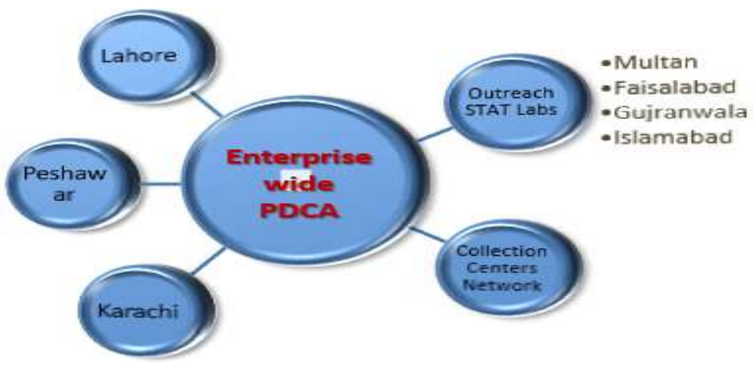

Figure 1: A figure showing summary of PDCA Scope

Key Focus:

- High-volume and repetitive rejection reasons.
- Root cause identification for each major rejection category.
- Development and implementation of corrective and preventive actions.
- Monitoring effectiveness through reduction trends and rejection rates.

Issues/Errors Category Type
Clotted Specimen
CPT Irregularities
Demographic Data Errors
Failure to follow Collection Guidelines/Instructions
Hemolyzed Specimen
Insufficient specimen quantity
Labelling Errors
Missing contact detail of Clinician
Packaging/Transportation issues
Patient History Error
Specimen Not Received (SNR)

Table 1: A summary table showing all type of identified issues/errors categories

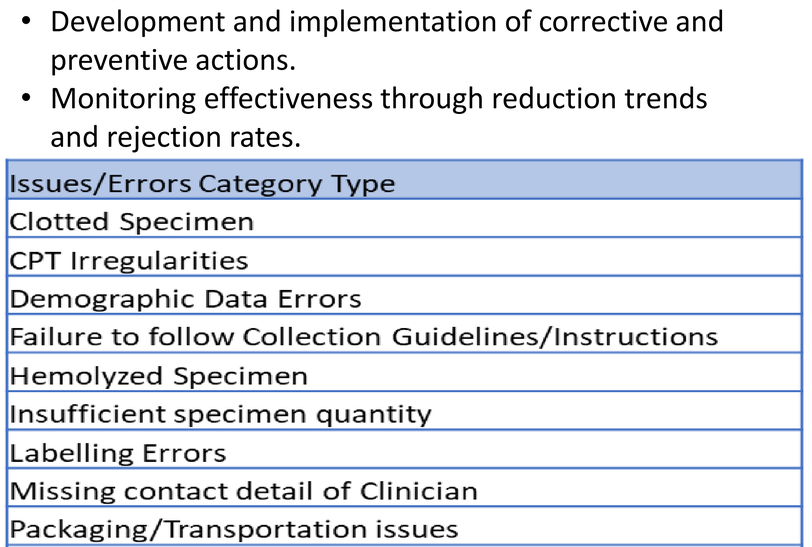

Figure 2: *Fishbone Diagram showing causes of errors/ issues in specimen handling*

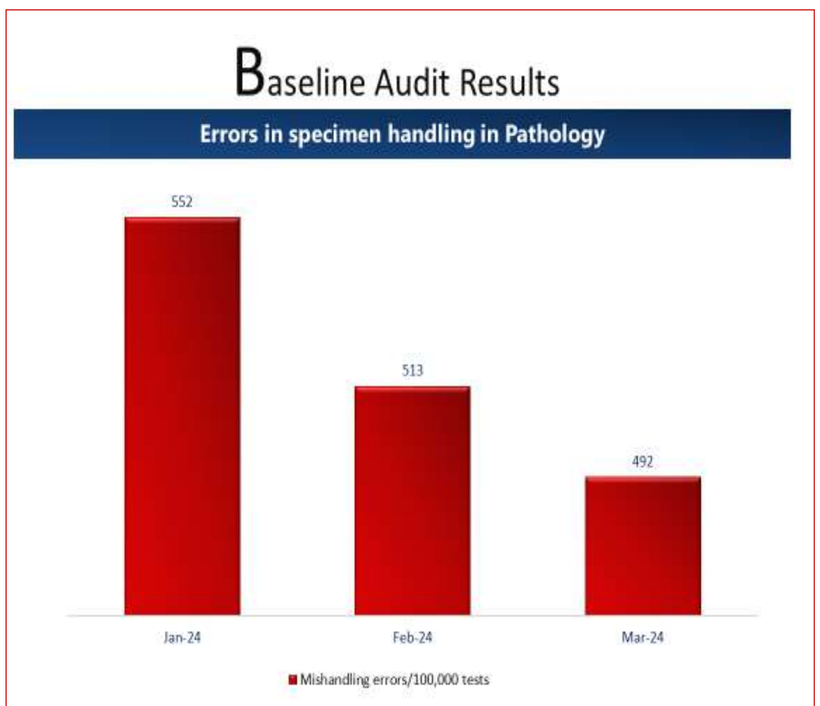

Figure 3: *Figure showing baseline audit results using bar graph*

Target

Objective

To improve the sample management process involving specimen collection, labelling, traceability, transportation, receiving & storage to avoid the incidence of specimen loss, rejection and delays in reporting.

STRATEGIES

Strategies Implementation Summary

	Status	Short	Medium	Long	Total	Remarks
Major (5)	Completed	1	2		3	
	Open		1	1	2	MIS Related
Minor (8)	Completed	3	2	1	6	
	Open			2	2	MIS Related
	TOTAL	4	5	4	13	

MAJOR STRATEGIES

Sr.	Strategy	Term	Status
1	Training of EAR Nursing staff to control high sample rejection rate due to Clotting, Hemolysis and insufficient sample quantities.	Short	Implemented
2	Revamp and execute the refresher training of CC Phlebotomists, focusing on relevant medical terminologies and practical examples of issues and errors caused by CCs and how to avoid such pre-analytical errors.	Medium	Implemented
3	Evaluate and propose solution for misprinted or faded barcode stickers on sample containers, resulting in identification issues and sample rejection.	Medium	Implemented
4	Develop search feature to identify the correct CPT code through keywords/synonyms.	Medium	Partial Complete (HIS Module is developed)
5	Amendment in existing double barcode labelling system (one generated at CC level and another upon receipt in the CC-office). This needs to be done once to avoid errors of wrong labelling/swapping at CC-Office.	Long	In Process

MINOR STRATEGIES

Sr.	Strategies	Term	Status
6	Strengthening WhatsApp helpline service for accurate CPT selection and guidance to CCs.	Short	Implemented
7	Use of the Slide Miller for slide transportation to avoid slide breakage during transportation.	Short	Implemented
8	Installation of camera at cooler opening and packing areas of LHR, PESH & all outreach labs to resolve the SNR issues.	Short	Implemented
9	Reduction in partial SNR of panel CPTs – HIS development	Medium	Implemented
10	Communicating the physicians through webinars on updates and frequently faced issues related to anatomical sample booking requirements.	Medium	Implemented
11	Use of barcode scanning at each step of histology & cytology processes.	Long	In Process
12	HIS development for: 1- HIS based Transit form - Elimination of manual form - every in-transit item should be recorded in HIS 2- Amendment in existing SNR marking workflow - CCR should mark SNR before section numbering to update the status in HIS instantly for CC information	Long	In Process

RESULT

Over the review period (January 2024 to June 2025), Shaukat Khanum Memorial Cancer Hospital and Research Centre (SKMCH&RC) achieved measurable improvement in reducing specimen-related errors in Pathology. The monthly error count decreased significantly, from 552 in January 2024 to 312 in June 2025 achieving a 43.37 % overall error reduction, reflecting a consistent downward trend successfully met performance target of a 15% reduction in errors. The improvement reflects the effectiveness of implemented corrective actions and quality enhancement initiatives.

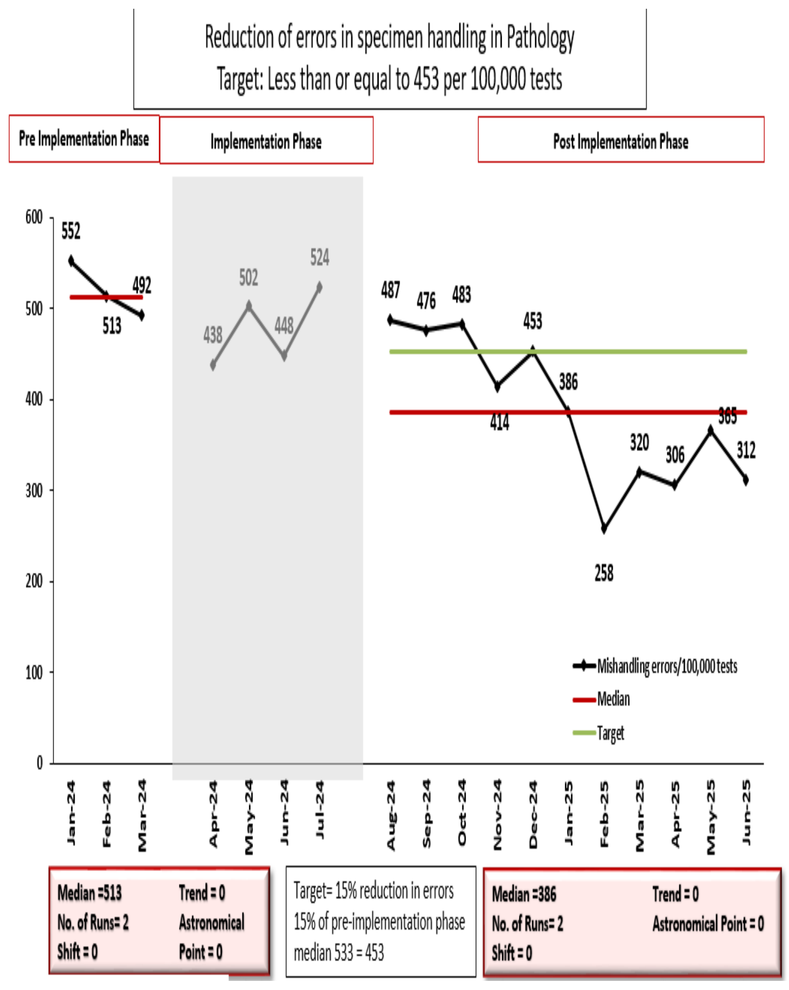

Figure 4: *A run chart showing trend analysis of specimen handling error reduction in Pathology at SKMCH&RC*

CONCLUSION

This analysis highlights the effectiveness of targeted quality improvement initiatives in reducing specimen-related errors across the SKMCH&RC network. Key interventions including staff training, reinforcement of standard operating procedures, and the implementation of digital traceability have led to sustained improvements in compliance and process reliability. Ongoing re-education and close monitoring of Nursing staff remain essential, particularly in light of the continued high turnover rate, which poses a significant challenge. To ensure long-term success, it is critical to maintain proactive monitoring, promptly address deviations, and collaborate with MIS for the timely resolution of system-related tasks.

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