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Improving the Laboratory Investigation Process at the Outpatient Department of Teaching Hospital Kalutara: A Quality Improvement Initiative

Dissanayake D.M.A.K[1], Samarawickrama M.S.[1], Premadasa N.[1], Bandara R.A.M.C.H.[1]

[1]Post Graduate Institute of Medicine, University of Colombo

Correspondence to:
Dr. D.M.A.K. Dissanayake

E-Mail
dr.asela.kumara1977@gmail.com

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Abstract

This study provides a comprehensive analysis of the laboratory investigation process at the outpatient department (OPD) laboratory of Teaching Hospital, Kalutara, highlighting existing challenges and proposing feasible solutions for improvement. The OPD laboratory, which is essential in managing a high patient load across various specialties, faces issues related to a lack of standardized guidelines, legibility of request forms, sample handling, availability of consumables, equipment functionality, and staffing. These challenges contribute to long patient waiting times, missed investigations, and inconsistencies in report quality. Evidence-based recommendations include implementing a Hospital Information Management System (HIMS) lab module, developing Standard Operating Procedures (SOPs), streamlining sample handling, and improving infrastructure and training. The proposed solutions aim to reduce waiting times, enhance patient care, and optimize resource utilization. By prioritizing actionable steps and involving key stakeholders, these measures will ensure continuous quality improvement and operational efficiency.

Introduction

Teaching Hospital (TH) Kalutara is a major healthcare institution, offering diverse services to approximately 352,840 outpatients and 107,885 inpatients annually. The laboratory services are integral to patient diagnosis and management, supporting various specialties. Efficient lab operations rely on accuracy, precision, timeliness, and authenticity. However, prolonged waiting times and inconsistent report quality indicate gaps in current practices.

Laboratory operations can be broken down into three phases:

1. Pre-analytical: From test ordering to sample reception
2. Analytical: Test processing
3. Post-analytical: Report generation and distribution

For the second half of 2021, the OPD lab processed a significant number of tests across different categories, including biochemistry and hematology. Currently, the lab lacks standardized guidelines for test requests, with samples sometimes brought in directly by patients, leading to inefficiencies and dissatisfaction. Human resources, however, are stretched thin, with limited staff dedicated solely to OPD lab services.

Objective

To assess the OPD laboratory process at Teaching Hospital Kalutara, identify existing gaps, and recommend practical solutions to enhance the efficiency and quality of laboratory services.

Literature review

A timely turnaround time (TAT) for laboratory results is critical in healthcare delivery. TAT measures the time from investigation to result in receipt, although there is debate among clinicians and lab personnel on the exact definition (1). Prior studies emphasize the importance of standard operating procedures, efficient equipment maintenance, and the need for standardized procedures to streamline processes and reduce TAT (2).

Clinical laboratories have focused on quality control and assessment related to the analytical aspects of testing. However, research conducted in recent decades has highlighted that quality in clinical laboratories cannot be assured solely by focusing on

analytical aspects. The major proportion of errors occurs in the pre-analytical phase (3).

Successful attempts to achieve cost savings by improving the effectiveness of test utilization have several things to follow. First and foremost, it is important to improve the ordering of tests; the clinical questions behind the test requests must be thoroughly understood. Using the appropriate clinical experts' opinion, the laboratory must establish standards and guidelines for appropriate test use (4). These procedures can be developed to review and monitor test utilization and determine compliance with the standards and guidelines. These cost-effective improvements in the use of laboratory tests may require strategic modification in clinicians' test ordering behavior. Such problem-oriented requests form administrative policy changes and review of the clinical laboratory's testing procedures to ensure they are appropriate for improving the effectiveness of the laboratory investigation process (4). As laboratory tests are important elements of medical practice, the cost-effective use of laboratory tests and services is clearly joined with the responsibility of clinicians and the clinical laboratory (4).

Accurate and prompt disease diagnosis depends on an effective laboratory investigation process. Making effective treatment options depends on the laboratory's ability to recognize and measure illness indicators (5). As a result, any enhancement to the laboratory investigation process will directly affect patient outcomes and care (6).

Effective laboratory investigation processes lead to increased efficiency and productivity, which can result in cost savings for the healthcare institute. By identifying areas for improvement and implementing changes, the laboratory can streamline processes and reduce wastage, leading to more efficient use of resources (7).

Methods

This descriptive cross-sectional study was done at Teaching Hospital, Kalutara, from 1st of March to 1st of April 2023. The study employed a mixed-methods approach, integrating observational data, interviews, document review, and literature analysis to thoroughly assess the OPD laboratory investigation process at Teaching Hospital, Kalutara. The methodology focused on identifying gaps within the pre-analytical, analytical, and post-analytical phases of the laboratory service to propose evidence-based solutions.

Data Collection

1. Observational Visits:
   To gain firsthand insights into patient waiting times and workflow efficiency, observational visits were conducted at the OPD laboratory. A pre-tested checklist documented key metrics such as the average waiting time for patients, the time taken from sample collection to report issuance, and other relevant observations that could impact service quality.

2. Key Informant Interviews (KII):
   Interviews were conducted with various stakeholders, including the Medical Officer in the quality management unit, special grade Medical Laboratory Technologist (MLT), chief MLT, and patients. This qualitative approach provided insights into the perceptions and challenges faced by both staff and patients, shedding light on operational bottlenecks and areas needing improvement.

3. Desk Review:
   Hospital records and other relevant documented sources were examined as secondary data to provide context for the laboratory's operations, including workforce allocation and overall performance. This analysis also extended to process-related information, such as records of equipment maintenance and historical data on patient volumes.

Literature Review:

To benchmark the hospital's laboratory practices against industry standards, a comprehensive review of journal articles and web-based resources was conducted. This analysis included best practices and performance indicators pertinent to laboratory quality, such as turnaround time, procedural accuracy, and equipment reliability, to inform evidence-based recommendations.

Each method contributed to a holistic understanding of the existing workflow and identified practical areas for intervention. The combined insights from these approaches facilitated an in-depth situation analysis, providing a basis for prioritizing key issues and formulating targeted recommendations to enhance laboratory efficiency and service quality.

Results

Challenges identified through situational analysis included:

1. Pre-analytical phase: No standardized guidelines, illegible request forms, and sample handling errors
2. Analytical phase: Consumable shortages, equipment breakdowns, and insufficient staffing
3. Post-analytical phase: Clerical errors and delays in report distribution

Average patient waiting time ranged from 3-4 hours, with some patients leaving without results due to prolonged waiting times. Approximately 40% of investigations remained unattended or unreported daily, reflecting inefficient processes and resource waste.

Problem prioritization using a matrix highlighted "long waiting times" as the most pressing issue. Root cause analysis revealed infrastructure, staffing, and procedural inefficiencies as key contributors.

Discussion

The long waiting times and report inconsistencies underscore the need for systematic improvements in lab processes. Introducing a HIMS lab module could digitize requests and tracking, reduce human errors, and speed up workflows. SOPs would standardize the test ordering and handling processes, ensuring consistent practices. Other recommendations, such as improving sample-handling procedures and reinforcing infrastructure, align with previous findings advocating for structured workflows and optimized equipment use (8,9).

Conclusion

Improving the OPD laboratory process at TH Kalutara is essential for quality patient care. Implementing the recommended HIMS module and SOPs will streamline operations, reduce patient waiting times, and enhance service reliability. Regular supervision and quality audits will support continuous improvement.

Recommendations

1. Develop SOPs for OPD lab processes and implement basic guidelines for investigation requests
2. Integrate the bleeding center with the OPD lab to reduce patient movement
3. Introduce numbered sample trays to improve sample handling efficiency
4. Repair infrastructure to prevent electricity disruptions
5. Deploy HIMS for electronic lab request management

Implementation plan

- The implementation plan involves assigning specific roles to departments:
- Directorate: Lead SOP development
- Quality Unit: Oversee integration of the bleeding center and numbered trays
- Maintenance Unit: Address infrastructure repairs
- Information Technology Unit: Implement HIMS module

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