



Turnaround Time Analysis in Clinical Laboratory Testing

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Abstract

Turnaround time (TAT) is a critical performance metric in clinical laboratories, reflecting the efficiency of laboratory operations and directly influencing patient care outcomes. This paper explores the definition, significance, and factors affecting TAT, dividing it into pre-analytical, analytical, and post-analytical phases. Key challenges such as resource limitations, interdepartmental coordination, and delays in sample transportation and processing are addressed. Strategies for improvement, including process optimization, automation, and staff training, are discussed, alongside the role of technology integration and benchmarking against industry standards. Emerging trends such as predictive analytics and advanced automation are highlighted as pivotal in enhancing TAT and overall laboratory efficiency. The study underscores the importance of TAT in improving diagnosis, treatment decisions, and patient satisfaction while emphasizing the need for continuous quality improvement in laboratory practices.

Keywords- Turnaround time, clinical laboratories, efficiency, patient care, automation, process optimization, diagnostic testing, benchmarking.

1. Introduction

Turnaround time (TAT) is a key performance indicator used to monitor the time taken to complete clinical laboratory tests from the moment of specimen receipt to the communication of results (Mutema et al., 2021). It is a crucial measure of efficiency that directly impacts both the profitability of the laboratory and, more importantly, the quality of care patients receive (Taoheed Atanda et al., 2017). Laboratories typically distinguish between different types of TAT, such as analytic TAT, which is measured from sample acceptance until result posting, and clinical TAT, which spans from sample collection until the delivery of results to the physician. A comprehensive understanding of the factors that contribute to overall TAT— from initial collection, through transport, processing and analysis, to the dissemination of



results—is essential for effective management and continuous improvement of clinical laboratory services.

2. Importance of Turnaround Time

Turnaround time (TAT) represents the interval between the receipt of a clinical sample by the laboratory and the delivery of the test report and associated interpretative comment to the requesting clinician (Taoheed Atanda et al., 2017). This metric is widely used to monitor clinical laboratory performance and to design process improvements that are subsequently benchmarked against industry best practices. Laboratory TAT encompasses preanalytical, analytical, and post-analytical intervals. Various factors at each stage can accelerate or impede TAT, thereby diminishing patient satisfaction and confidence in laboratory services. As a primary determinant of quality in laboratory services, TAT exerts a critical influence on the timely release of patient results and the ensuing clinical decision-making that underpins effective healthcare delivery.

3. Factors Affecting Turnaround Time

Turnaround time (TAT) for laboratory tests is a well-recognised measure of the efficiency of clinical laboratories and has a direct bearing on patient outcomes, patient management and subsequent length of stay in hospitals and emergency departments (Mutema et al., 2021). Efforts to identify bottlenecks in processes that result in longer waiting times play an important role in patient care. Reducing TAT, especially in wards and emergency departments, should be closely linked to patient safety and is capable of directly influencing waiting times.

However, to ensure that improvements are beneficial and efficient, it is essential to clearly define the start and end points of TAT rather than simply addressing the overall length of the process. A comprehensive and standardised definition (from the clinician's perspective) of TAT that starts when a physician orders a test and ends when the results are received is critical to align laboratory efforts with clinical expectations.

TAT is made up of three distinct phases: pre-analytical, analytical and post-analytical — each with specific factors that contribute to delays. The analysis of these phases uncovers problems that require specific strategies; otherwise, interventions may be unfocused or ineffective. The pre-analytical phase covers the interval when a laboratory test is requested by a clinician until the sample is registered in the laboratory system. This includes all physical movement of the sample between the patient and sample assessment, as well as any preparation required for analysis. The analytical phase starts when test registration is complete and the sample is ready for testing, and ends when the test analysis is completed and results are available. Finally, the post-analytical phase is from test completion until the results are reviewed and authorised for communication to the requesting clinician.



Within these phases, the sample transit period represents a major component of pre-analytical time. While resources and sample hand-offs are required to move samples throughout a healthcare facility, the process can be optimised to reduce delays. Assuring that transportation methods do not degrade sample quality is also essential to avoid analysis problems and lengthy repeats. Automated pneumatic-tube systems, for example, can comply with these requirements and transfer samples efficiently. Inappropriate collection techniques that produce hemolysis continue to present major challenges (Cakirca, 2018).

The analytical phase typically comprises waiting time before being analysed and the actual analysis time. To reduce delays in analytical testing, laboratories may add new equipment or revise schedules to improve analytical capacity or enable a specific test to move to a faster or more efficient instrument. The post-analytical phase typically goes either to the laboratory information system (LIS) for technologist and management review, or directly to the information system of the physician. The most significant factors affecting turnaround time include the number of tests ordered, the nature of the tests ordered and the analytical turnaround time (Li et al., 2015).

3.1. Pre-analytical Factors

Turnaround time (TAT) is a crucial indicator of efficiency in clinical laboratories (Mutema et al., 2021) and is determined by the time taken to perform a laboratory test cycle, encompassing pre-analytical, analytical and post-analytical phases. The pre-analytical phase begins with goal definition, selection of specimens, collection and preparation of specimens, and sample transportation. It has a significant impact on the accuracy of laboratory results and represents up to 70% of laboratory errors (Cakirca, 2018). From nurses' perspective, hemolysis is a common pre-analytical problem affecting laboratory results. The phlebotomy process is the leading cause of hemolysed blood specimens and the occurrence of hemolysed blood samples is greater in emergency departments. Several factors are known to contribute to prolonged laboratory test TAT.

3.2. Analytical Factors

The analytical phase, encompassing the actual testing process, constitutes approximately 12–20% of the total laboratory turn-around time (TAT). Optimizing this phase is crucial for enhancing overall laboratory performance.

Analytical TAT comprises three key components: sample processing, analyte examination, and result verification and interpretation. Sample processing—from sample withdrawal to the commencement of examination—accounts for over 75% of the analytical TAT and is therefore the dominant aspect (Mutema et al., 2021). The analyte examination phase includes pre-treatment procedures such as clotting of blood, dilution of plasma or urine, centrifugation



and separation of blood components, sample analysis, and calculation of test results. The final phase involves scrutinizing the data and interpreting the results post-calculation.

3.3. Post-analytical Factors

Clinical laboratories typically divide turnaround time (TAT) into pre-analytical, analytical, and post-analytical phases (Mutema et al., 2021). The post-analytical stage can further encompass distribution of an authorized report, delivery of the test report, and interpretation of results. The post-analytical phase is therefore the time interval between the completion of instrumentation (analysis) and the review of results and transmission of the report to the user (Cakirca, 2018). An important goal of clinical laboratories is to provide prompt reporting of results once analysis is complete. Post-analytical delay, or time, is the interval between completion of all analytical testing steps and the time at which the test report is received by the requesting clinician, participant, or patient (Taoheed Atanda et al., 2017).

4. Measurement of Turnaround Time

Turnaround time (TAT) is an indicator of laboratory efficiency as well as a quantifiable parameter of medical treatment, since a quick report frequently influences both diagnosis and patient management. Pre-analytical concerns, such as an insufficient blood sample, are significant explanatory issues (Taoheed Atanda et al., 2017). The process continues with sample registration, sorting and processing, until the sample is ready for testing. Variability in all TAT components can prolong the total TAT. Because of different definitions used by laboratories and clinicians, the contribution of all the different components making up the laboratory test cycle should be determined (Mutema et al., 2021).

Measuring TAT is challenging because the exact start and end points are difficult to determine. Various terms are used to represent similar concepts. A study of laboratory TAT measurement considered the time from sample receipt in the laboratory to the time the results became available to the requesting physician. Time stamps derived from the first and last process steps of the total testing process provide the simplest approach to determining laboratory TAT. Hence laboratory turn-around time (LTAT), defined as the time interval commencing immediately the sample has been registered in the laboratory and ending when the result of the test is ready for collection by the patient, serves as a straightforward performance measure.

4.1. Definition and Metrics

The turnaround time (TAT) of clinical laboratory test determines the time between specimen submission to the laboratory and results dispatch, encompassing all phases in the process flow (Mutema et al., 2021). The analytical phase of a laboratory test typically generates most of the delays, although pre- and post-analytical phases can also contribute (Taoheed Atanda et al., 2017). TAT is usually quantified as the average time elapsed during a specific period



(e.g., a day, a week, a month) for a determined test or all tests; in this regard, minimum, maximum, and standard deviation of TAT may be also reported.

4.2. Data Collection Methods

The collection of measurement data must be carefully planned. Depending on the particular test and reporting system, the delay may be in the order of an hour or several days. Data collection methods must provide an analysis of each stage through which the analysis passes, identifying where delays occur and giving accurate direct library or laboratory times. Examples of this process are given in the blood cell analysis and the comprehensive chemistry test turnaround time analysis. Automated scientific instruments and reporting systems can log timing data at critical points along the processing chain. However, these raw data require significant experimental design and analysis before they provide meaningful trends and insights useful for management decision support (Mutema et al., 2021). In some cases, well-structured interviews with key personnel and internal statistics can provide valuable information that may highlight opportunities for immediate improvement. If direct digital data from key locations are available, more in-depth statistical analyses become both feasible and informative.

5. Benchmarking Turnaround Time

Turnaround time (TAT) serves as a critical metric for evaluating the efficiency of testing processes in clinical laboratories. Benchmarks for TAT vary widely depending on the laboratory type, the technologies employed, and the specific tests conducted (Mutema et al., 2021). Despite this variability, recommended TAT benchmarks exist, and the use of appropriate technologies and processes aids laboratories in meeting their specified performance targets. Benchmarking provides laboratories with a tool for self-assessment relative to industry standards and comparable peer groups and encourages the identification of process improvements and the adoption of cutting-edge technologies (Taoheed Atanda et al., 2017).

5.1. Industry Standards

International standard ISO 15189 sets clinical laboratory turnaround times according to test type and complexity, with examples such as 90 minutes for routine haematology tests, 4 hours for blood gases, 7 hours for special haematology, and 10 hours for clinical chemistry (Mutema et al., 2021). Laboratories should therefore designate TAT targets responsive to the clinical setting and in consultation with users (Taoheed Atanda et al., 2017).

5.2. Comparison with Peer Institutions

The laboratory test cycle begins when a specimen or patient sample is received; the laboratory examination process subsequently involves pre-analytical, analytical and post-



analytical phases (Mutema et al., 2021). Turnaround time (TAT) constitutes the period between requesting a specific laboratory test or examination and the delivery of the report to the clinician or patient. Laboratories employ the overall turnaround time (TAT) metric to objectively assess performance. Because laboratories and clinicians define TAT differently, evaluating every component of the laboratory test cycle contributing to the turnaround time is essential.

6. Impact of Turnaround Time on Patient Care

Laboratory testing turnaround time (TAT) has a direct impact on patient care. The availability of inpatient TAT information to clinicians is associated with shorter emergency department (ED) length of stay (LOS) and earlier initiation of laboratory tests (Li et al., 2015). Laboratory TAT influences hospital bed management efficiency by reducing wait times for diagnostic information needed to facilitate patient movement. Shorter laboratory TAT allows clinical decisions to be made quickly, potentially improving patient outcomes (Taoheed Atanda et al., 2017). Fast TAT also increases patient satisfaction in an emergency healthcare setting. The overall performance of laboratory medicine in terms of service quality can be assessed using the overall TAT (Mutema et al., 2021). In addition, greater adherence to the recommended laboratory TAT leads to decreased clinician complaints.

6.1. Timeliness of Diagnosis

Provision of laboratory facilities does not itself guarantee utilization or, indeed, provide a major health impact unless results are acted upon by those requesting them (Emmanuel et al., 2020). results from clinical laboratory investigations are widely considered to be the most utilitarian service that a laboratory performs. As an initial step in the physicians' decision processing (Mutema et al., 2021) , a longer turnaround time (TAT) means a longer time to diagnosis or clinical decision (Taoheed Atanda et al., 2017). Clinical laboratories, therefore, focus on reducing the time between specimen reception and generation of result as an essential service characteristic.

Turnaround time (TAT) is a key service indicator frequently used in laboratories across the world to monitor clinical test performance with the aim of achieving rapid and accurate results. The term TAT is used throughout this article and applies to every phase in clinical laboratory testing.

6.2. Treatment Decisions

The primary objective of laboratory testing in patient care is to influence treatment decisions made by healthcare providers (Compeau et al., 2016). This goal presupposes several critical conditions: clinicians will request the appropriate tests, expect results within a timeframe that aligns with clinical requirements, anticipate results to be accurate, and are capable of correctly interpreting the outcomes. Under these conditions, turnaround time (TAT) becomes



a paramount consideration, as delays in delivering test results can hinder effective treatment and jeopardize patient outcomes.

6.3. Patient Satisfaction

In high-throughput histopathology laboratories, assay interval—measuring the time elapsed since specimen accessioning—provides the most robust indicator of service quality (Alshieban & Al-Surimi, 2015). Patient satisfaction reflects the caliber of services (Taoheed Atanda et al., 2017). A survey among gynaecologists ranks timely response, effective communication, and efficiency, in that order, as critical contributors to satisfaction. Ninety-eight per cent identified turnaround time as the prime metric for assessing laboratory performance.

7. Strategies for Improvement

Various tactics—such as streamlining procedures, embracing automation, and enhancing staff education—can improve clinical laboratory test turnaround times (TATs). Identifying the precise causes of delays facilitates the development of targeted improvement plans. For instance, quality enhancement techniques reduced surgical pathology report TAT in a healthcare department to achieve Clinical Laboratory Improvement Amendments standards (Alshieban & Al-Surimi, 2015). The total duration required for clinical tests comprises multiple segments, each of which should be separately assessed to determine the overall TAT (Mutema et al., 2021).

7.1. Process Optimization

In the clinical laboratory setting, process optimization entails the systematic evaluation and reconfiguration of procedures to improve performance, quality, and efficiency for the benefit of patients, healthcare providers, and other stakeholders. Laboratories face mounting pressures to maintain turnaround time (TAT) standards imposed by regulatory agencies, optimize internal operations, and meet the needs of customers and clinicians without compromising cost or quality (Mutema et al., 2021). TAT not only influences the timeliness of diagnosis but also serves as an indicator of laboratory efficiency. Delays can adversely affect early diagnosis, treatment decisions, and the overall dynamics of patient care.

Process optimization in clinical laboratories involves the collaboration of numerous professionals who undertake activities, rotate procedures, and create semi-finished goods (Taoheed Atanda et al., 2017). These actions are driven by specific event-durations that coordinate the labor required to transform raw materials into final products. Translating this concept to laboratory testing, optimization focuses on individualized activities necessary for generating symptomatic data from a single order; the objective is to expedite the delivery of test results.



Enhancing efficiency demands a thorough understanding of existing processes coupled with the identification of areas for refinement. Consequently, each process undergoes an analysis to evaluate the sequence of its underlying activities with the aim of augmenting speed without sacrificing reliability. Broadly characterized as a systematic approach for improving the effectiveness of an organization, process optimization addresses the fundamental question: "Which sequence of activities quickest generates a test report without compromising quality?" Quality encompasses the accuracy and reliability of reports provided to clinicians. Presently, the absence of a designated optimization procedure has hindered the continuous improvement of laboratory processes (Alshieban & Al-Surimi, 2015). Addressing this gap is essential to sustain rapid TATs and uphold exceptional quality standards.

7.2. Technology Integration

The need for rapid and reliable diagnostic testing makes turnaround time (TAT) one of the most important measures to laboratories and clinicians (Agosto-Arroyo et al., 2017). Larger proportion of TAT among the total test-related process occurs during sample transportation and preparation before the analysis. Automation has completely changed the clinical laboratory testing, e.g., mass spectrometry (MS), significantly reducing TAT (Zhang et al., 2021).

Contemporary clinical mass spectrometers have sufficiently advanced to make this method a crucial complementary approach to conventional time-consuming methods (Theparee et al., 2017). Given the capabilities and performance of MS, clinical laboratories continue to adopt this technology to increase throughput as well as facilitate the testing to develop resistance, disease pathogenesis, health monitoring, and provide more accurate prognosis during organ transplantation. Automation enables laboratories to focus on testing techniques and isothermal diagnostic mass spectrometry systems with lower start-up cost and smaller sample volume requirements.

7.3. Staff Training and Development

Staff training and development play a crucial role in addressing challenges that impact the turnaround time (TAT) of clinical laboratory testing. Building on the Foundations module, this section explores how enhanced staff expertise contributes to quality control and TAT improvements. Even with sophisticated automation and technology, human operating interfaces remain integral to test systems. Consequently, staff training programs are prioritized to ensure an optimized and executable laboratory quality model.

Achieving smooth turnaround generally requires establishing clear priorities and having well-trained operator personnel. Since TAT directly affects patient outcomes, every team member must understand their specific responsibilities within the laboratory testing process and receive training accordingly (Taoheed Atanda et al., 2017). For instances of equipment



malfunction, troubleshooting is performed using the appropriate computerized systems. Rather than inconveniencing patients by requesting repeat samples, laboratories invest in training technicians to resolve such issues promptly. This approach promotes proficiency and reduces reliance on external support. Regular, on-going training is organized for both new recruits and existing staff, emphasizing the need for continuous personnel development to maintain consistent service delivery. If inadequate training is provided to new laboratory users, particularly after extended facility closures, test delays are an inevitable consequence. Moreover, laboratory technicians unfamiliar with new equipment installation or operation are more likely to encounter operational hurdles, further contributing to prolonged TAT.

8. Case Studies

Extensive literature on turnaround time (TAT) reporting underscores heightened demand for timely delivery of laboratory results, given their crucial role in efficient patient care and management (Taoheed Atanda et al., 2017). Lengthy TATs for clinical investigations delay diagnosis and impede treatment decisions, potentially compromising patient safety, diminishing satisfaction, and increasing hospitalization lengths. Faced with escalating workloads and staff shortages, laboratories must accelerate result generation and reporting through multifaceted approaches.

Pathology and Laboratory Medicine departments address this need by identifying bottlenecks within the testing process to enhance TAT. A retrospective study analyzing statistical data for samples tested by the Histopathology Department from July 2011 to March 2012 revealed that approximately 40% of routine cases failed to meet the College of American Pathologists (CAP) standard of reporting within two days, indicating the need for quality improvement initiatives (Alshieban & Al-Surimi, 2015). Similarly, histopathology laboratories continue to face challenges in maintaining competitive and time-efficient TATs, as emphasized by countries such as England, Tunisia, and South Africa (Mutema et al., 2021). In-depth investigations advocate for comprehensive consideration of analytical, pre-analytical, and post-analytical phases to establish achievable TAT targets based on laboratory capacity, test complexity, and patient requirements.

8.1. Successful Implementations

Turnaround time (TAT) is a key measure of clinical laboratory quality, directly impacting patient care and laboratory efficiency. Whereas TAT refers to the length of time it takes to complete an entire clinical laboratory test cycle (Mutema et al., 2021), it is more strictly defined as the time interval from specimen receipt to the transmission of test results to the requesting physician (Taoheed Atanda et al., 2017). This latter definition corresponds to a laboratory cycle measurement of TAT that excludes pre- and post-analytical phases. Although pre- and post-analytical factors often dominate the overall TAT, focusing on the



core laboratory cycle enables a clearer understanding of the analytic process and subsequent improvement planning. Successful TAT-improvement strategies or systems therefore address core laboratory activities, although they may also incorporate external procedures.

8.2. Lessons Learned

Strategies employed to reduce laboratory turnaround times (TATs) include process redesign, implementation of new technologies, staff training, and improved communication channels (Compeau et al., 2016). The successful application of these interventions often depends on a comprehensive understanding of the existing laboratory workflow and constraints, coupled with a commitment to continuous process assessment and enhancement. Many conglomerate institutions use artificial intelligence (AI) to improve the laboratory TAT of critical drugs and increase the efficiency of clinical laboratories (Mutema et al., 2021).

The correct way to decrease laboratory TATs is to use the multivariable linear regression model to analyze the required step TATs and the proportion of packages that require each step. Regression analysis helps identify steps that disproportionately affect the TAT and can be targeted for improvement. However, numerous challenges impede turnaround-time management in many countries. Amidst the COVID-19 crisis, the disruptions in the supply chain continue to pause the expansion of medical institutions and prevent some institutions from introducing information system technologies. Many clinical laboratories remain heavily dependent on manual operations, leading to high turnaround times. Additionally, some operational processes cut across several departments, making cooperation and coordination among departments difficult and posing another significant obstacle to managing turnaround times.

9. Regulatory Considerations

Regulatory frameworks and accreditation standards significantly shape turnaround time (TAT) management across pathology disciplines (Taoheed Atanda et al., 2017). Diagnostic service providers must both comply with various requirements and recognize the benefits of maintaining well-organized TAT measurements and monitoring. AMTAC guidelines, for example, stipulate an overall laboratory TAT of 24 hours for Clinical Pathology and 10 days for Histopathology and Cytology (Mutema et al., 2021). Metric-setting organizations such as Clinical Pathology Accreditation (CPA-UK) and the College of American Pathologists (CAP) have also established benchmarks yet emphasize that individual laboratories should tailor TAT limits according to context: “Although a laboratory should make every effort to deliver the final report within the established limits, these limits may need to be revised if the laboratory finds them not achievable” (CAP (US), 2009). Compliance assurance methods include peer assessment—such as CPA’s external, impartial evaluations—and self-assessment procedures conducted by organizations like ISO. Adherence becomes more



critical when CAP requirements serve as a basis for US Laboratory Improvement Amendments (CLIA) certification.

9.1. Compliance with Standards

The demand for quality laboratory services is increasing globally, with greater appreciation of its contribution to the success of clinical diagnosis and management. Quality in the laboratory includes the quality of turnaround time (TAT), which is the time taken from receipt of a sample to when the results are ready to be dispatched to the requesting clinicians (Mutema et al., 2021). TAT therefore heavily affects patient safety. It is one of the first things clinicians check to see if their results are ready. Timely communication of critical and life-threatening laboratory results enables early diagnosis, prompt treatment, reduction in morbidity, mortality and length of hospital stay. However, delays in TAT remain one of the greatest causes of dissatisfaction among patients and clinicians. Laboratories may have very high-quality results but if the results are not communicated within the required time frames, the need for quality laboratory services becomes questionable.

The International Organization of Standardization (ISO) 15189: 2012 highlights the importance of monitoring, evaluating, and analyzing key laboratory processes, including TAT. This requirement ensures that the laboratory has the relevant data to monitor and improve quality. Compliance with minimum acceptable standards outlined by the ISO 15189: 2012 is critical for all clinical laboratories worldwide for accreditation and medical-legal considerations.

9.2. Accreditation Requirements

Turnaround time (TAT) is recognized as a key performance indicator for clinical laboratories (Mutema et al., 2021). Laboratories may select and specify components of the complete testing cycle to be included within TAT definitions, and these definitions and associated TAT limits are considered during accreditation.

10. Future Trends in Turnaround Time Analysis

Future trends in turnaround time (TAT) analysis underscore the crucial role of emerging information systems and the effective utilization of existing databases. Where information systems are at hand, their forthcoming maturity will potentially enable the real-time production of historical TAT data. This advancement is anticipated to provide a richer, more precise portrayal of TAT performance along the entire critical path. Historical data comparisons likely constitute an important determinant of workable plans. Conversely, in laboratories without information systems, ready access to historical TAT data may constitute a substantial barrier. A further expansive approach may yet be possible, which involves recording indicative details of all TAT-influencing events—purchasing, delivery, store issues and laboratory activities—which would facilitate a clearer picture of operative times and



resource impediments such as machinery downtime, faulty delivery, and stock-out problems (Mutema et al., 2021).

10.1. Emerging Technologies

Turnaround time (TAT) is a critical variable in laboratory medicine and a widely used performance indicator in clinical laboratories, encompassing steps from sample collection to result reporting (Agosto-Arroyo et al., 2017). Recent advances, particularly in matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS) and total laboratory automation (TLA), have markedly improved TAT (Theparee et al., 2017). Significant reductions in TAT and variability were observed when these technologies were implemented individually or together, decreasing the times for organism identifications, antimicrobial susceptibility test (AST) reports, and negative urine culture results. Such improvements in TAT have potential downstream effects on patient care, underscoring the importance of connecting enhanced laboratory performance with clinical outcomes. Further reduction of delays in patient treatment has also been achieved by the clinical use of machine-learning algorithms that can predict the need for medical intervention on admission.

10.2. Predictive Analytics

As the demand for rapid processing of tests has increased, so too has the need for turnaround time metrics that better identify causes of delay and predict workflow to provide more accurate estimation of when results will be available. Predictive modelling has been applied across a range of pathology disciplines, and has proved useful in healthcare more generally in predicting hospital discharges (Rajiv Jain et al., 2021). One such approach, Fishbone analysis, has been applied to identify key factors affecting turnaround time. The most prevalent factor leading to delay was shown to be email notification, which is notable considering that email remains a common method of disseminating notification for unexpected results (Taoheed Atanda et al., 2017).

11. Challenges in Turnaround Time Management

Laboratories measure turnaround time (TAT) from specimen receipt to report authorization, but clinical practitioners observe the interval from sample extraction to report availability (Mutema et al., 2021) (Taoheed Atanda et al., 2017). Meeting these expectations requires stakeholder commitment, adequate resources, and integrated laboratory information systems. Laboratories requesting external services, laboratories dependent on reagent and consumable supplies, or those operating with insufficient workforce face challenges in meeting customer demands. Large organizations comprising several specialized units separated by considerable distances require a coordinated approach to unify structure and management, and support timely sample collection, transportation, importation, analysis, interpretation, and release of laboratory test reports.



11.1. Resource Limitations

The turnaround time (TAT) for results from clinical laboratories is a crucial performance indicator (Mutema et al., 2021). In order to influence managerial decisions to improve TAT, it is essential to examine the various components that constitute the overall laboratory test cycle.

A persistent challenge faced by laboratories is the limitation on personnel, equipment, and allocated service times, which may negatively affect TAT (Taoheed Atanda et al., 2017). Furthermore, clinical demand for rapid results often exceeds the capacity of laboratories to deliver promptly, resulting in communication breakdowns that impede the integration of laboratory findings into clinical decision-making. Coordination at the interfaces between laboratory phases therefore becomes critical for meeting expected TAT standards.

11.2. Interdepartmental Coordination

Turnaround time (TAT) quantifies the total time between sample collection and analyte quantification delivery (Mutema et al., 2021). Interdepartmental coordination in clinical laboratories involves requisition delineation, sample collection, sample processing and testing, and report distribution. Delays arise from communication, staffing, transportation, and reporting. Significant interdepartmental coordination effort ensures smooth handover between departments and staff, resulting in smaller stall times (Taoheed Atanda et al., 2017).

12. Conclusion

Turnaround time is an important indicator of clinical laboratory performance as it directly influences patient care, hospital stay, costs, and the satisfaction of both physicians and patients (Taoheed Atanda et al., 2017). Several elements contribute towards the overall TAT of a laboratory test, and these should be fully understood before undertaking any data collection or analysis, potentially requiring initial investigations (Mutema et al., 2021).

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