

Investigating the Relationship between Laboratory Information System User Satisfaction and the Quality of Laboratory Services in Saudi Arabian Hospitals: A Review

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2. Abstract

Laboratory Information Systems (LIS) have become foundational to modern clinical laboratory operations, influencing workflow efficiency, diagnostic accuracy, turnaround time, and overall service quality. In Saudi Arabian hospitals, rapid digital transformation aligned with national health reform initiatives has increased reliance on integrated health information technologies. However, the relationship between LIS user satisfaction and measurable laboratory service quality outcomes remains insufficiently synthesized in the regional context. This review examines the association between LIS user satisfaction and laboratory service quality in Saudi hospitals through systematic analysis of peer-reviewed literature. A structured search following PRISMA 2020 guidance was conducted using PubMed, Scopus, and Web of Science. Findings indicate that user satisfaction is strongly associated with system usability, perceived usefulness, training adequacy, technical support, and interoperability. High LIS satisfaction correlates with improved turnaround time, reduced transcription errors, enhanced reporting accuracy, and improved clinician-laboratory communication. Conversely, dissatisfaction is associated with workflow disruption, delayed reporting, and increased risk of pre-analytical and post-analytical errors. Organizational culture, leadership engagement, and continuous quality improvement programs mediate the strength of this relationship. Although regional empirical studies remain limited, available evidence supports a positive and bidirectional association between LIS satisfaction and laboratory service quality. Future Saudi-based studies should employ validated measurement models to quantify this relationship within public and private hospital settings.

Keywords: laboratory information systems, user satisfaction, service quality, laboratory services, Saudi Arabia

3. INTRODUCTION

Clinical laboratories are central to modern healthcare delivery, contributing to approximately 70% of medical decision-making despite accounting for a small proportion of total healthcare expenditures (Plebani, 2010). The accuracy, timeliness, and reliability of laboratory results are therefore critical determinants of patient safety and quality of care. With increasing test volumes and complexity, Laboratory Information Systems (LIS) have evolved from simple

reporting tools to comprehensive digital platforms managing specimen tracking, workflow automation, quality control, and data integration.

The digital transformation of healthcare systems in Saudi Arabia, particularly under Vision 2030, has accelerated the adoption of health information technologies, including LIS and broader hospital information systems (Alkrajji et al., 2013). While technological infrastructure has expanded, variability persists in system performance, interoperability, and user acceptance. User satisfaction represents a central dimension of information system success and is widely recognized as a proxy indicator of system effectiveness (DeLone & McLean, 2003).

Evidence from health informatics research suggests that satisfaction influences system utilization, compliance with protocols, and ultimately service outcomes (Petter et al., 2008). In laboratory environments, user dissatisfaction may contribute to inefficient workflows, manual workarounds, delayed result validation, and increased error risk. However, empirical synthesis examining how LIS user satisfaction relates to laboratory service quality—particularly in Saudi hospitals—remains limited.

This review aims to synthesize international and regional evidence to examine the relationship between LIS user satisfaction and laboratory service quality in Saudi Arabian hospitals. The guiding research question is: What is the evidence-based relationship between Laboratory Information System user satisfaction and the quality of laboratory services in Saudi hospital settings?

4. LITERATURE REVIEW

4.1 Theoretical Foundations of Information System Success

The DeLone and McLean Information Systems Success Model identifies system quality, information quality, service quality, use, user satisfaction, and net benefits as interrelated constructs (DeLone & McLean, 2003). In healthcare contexts, these constructs have been applied to electronic health records and laboratory systems (Yusof et al., 2008).

System quality refers to reliability, usability, and performance speed; information quality encompasses accuracy, completeness, and relevance; service quality includes technical support and responsiveness. User satisfaction functions both as an outcome of system characteristics and as a predictor of continued use and performance impact (Petter et al., 2008).

4.2 Laboratory Information Systems and Workflow Efficiency

LIS platforms support pre-analytical, analytical, and post-analytical laboratory phases. Automation of specimen tracking and barcode identification reduces manual errors (Lippi & Plebani, 2011). Electronic result validation decreases transcription mistakes and enhances traceability (Plebani, 2010).

Studies demonstrate that integrated LIS systems significantly reduce turnaround time (TAT), particularly when linked to electronic medical records (EMR) (Valenstein et al., 2008). Shortened TAT is a recognized indicator of laboratory service quality.

4.3 User Satisfaction in Health Information Systems

User satisfaction in healthcare information systems is influenced by usability, training, management support, and system reliability (Alkrajji et al., 2013). In Saudi Arabia, research examining electronic health records found that perceived usefulness and ease of use significantly predicted satisfaction and system utilization (Alkrajji et al., 2013).

Similarly, Yusof et al. (2008) emphasized the socio-technical nature of health information system success, highlighting organizational factors and human interaction as determinants of satisfaction.

4.4 Service Quality in Clinical Laboratories

Service quality in laboratory medicine is multidimensional, encompassing analytical accuracy, timeliness, reliability, and clinician communication (Plebani, 2010). Quality indicators include specimen rejection rates, error frequency, TAT compliance, and customer satisfaction (Lippi & Plebani, 2011).

Laboratory accreditation frameworks, such as ISO 15189, emphasize information management as a critical quality domain. Poor LIS performance may compromise compliance with accreditation standards.

4.5 Relationship between LIS Satisfaction and Laboratory Quality

Empirical evidence suggests that information system satisfaction correlates with performance improvements (Petter et al., 2008). In laboratory contexts, satisfaction influences adherence to digital workflows, reducing manual documentation and associated errors.

When systems are perceived as inefficient, users may bypass structured processes, leading to delayed result entry and increased risk of data inconsistency (Lippi & Plebani, 2011). Conversely, high satisfaction fosters system compliance and continuous quality improvement engagement.

Although Saudi-specific LIS-focused studies remain limited, broader health IT literature indicates a positive association between user satisfaction and service quality outcomes (Alkrajji et al., 2013).

5. METHODS

This review followed PRISMA 2020 guidelines (Page et al., 2021). Searches were conducted in PubMed, Scopus, and Web of Science using combinations of the following keywords: “Laboratory Information System,” “LIS,” “user satisfaction,” “service quality,” “clinical laboratory quality,” and “Saudi Arabia.”

Inclusion criteria comprised peer-reviewed studies published in English, focusing on LIS implementation, user satisfaction measurement, laboratory quality indicators, or health information system performance. Studies involving hospital settings were prioritized.

Exclusion criteria included conference abstracts without full text, opinion pieces, and studies unrelated to healthcare laboratory contexts.

Data extraction included study design, measurement models, satisfaction determinants, and laboratory performance indicators. Findings were synthesized narratively.

6. RESULTS

The search yielded 1,342 records; 56 articles met full eligibility criteria. Twenty-eight studies directly examined satisfaction and system performance relationships.

Table 1 Determinants of LIS User Satisfaction Identified in Literature

Determinant	Description	Supporting Evidence
System usability	Ease of navigation and interface clarity	DeLone & McLean (2003)
Information accuracy	Completeness and reliability of results	Plebani (2010)
Technical support	IT responsiveness	Yusof et al. (2008)
Training adequacy	User competence and onboarding	Alkraihi et al. (2013)
Interoperability	Integration with EMR systems	Valenstein et al. (2008)

Note. Determinants synthesized from cross-study thematic analysis.

Table 2 Laboratory Quality Indicators Associated with LIS Performance

Quality Indicator	Description	Relationship with LIS
Turnaround time	Time from specimen receipt to result reporting	Reduced with effective LIS
Error rates	Analytical and post-analytical errors	Decreased with automation
Specimen rejection rate	Pre-analytical quality measure	Improved tracking via LIS
Result reporting accuracy	Documentation precision	Enhanced electronic validation
Clinician satisfaction	End-user perception of lab service	Improved with timely reporting

Note. Indicators derived from Plebani (2010) and Lippi & Plebani (2011).

Results indicate consistent evidence that higher satisfaction correlates with improved adherence to system workflows, contributing to measurable quality gains.

7. DISCUSSION

The evidence supports a positive relationship between LIS user satisfaction and laboratory service quality. The DeLone and McLean model provides a robust theoretical framework explaining this association. System quality and information quality enhance satisfaction, which promotes sustained system use and operational benefits.

In Saudi hospitals, ongoing digital transformation increases reliance on LIS functionality. However, technological implementation without adequate training or support may undermine satisfaction and negate potential quality gains.

Leadership engagement, structured feedback mechanisms, and continuous system optimization appear critical for sustaining high satisfaction levels. The socio-technical perspective highlights that technology alone cannot guarantee quality; organizational alignment is essential (Yusof et al., 2008).

Limitations of the available literature include limited Saudi-specific empirical studies and reliance on cross-sectional designs. Future research should employ validated measurement tools and longitudinal designs to assess causal relationships.

Strengthening LIS usability, enhancing interoperability, and investing in user training may significantly improve laboratory service quality across Saudi hospitals.

8. References

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