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EXAMINING THE PERCEPTIONS AND EXPERIENCES OF LABORATORY SPECIALISTS AND TECHNICIANS ON THE IMPLEMENTATION OF A NEW LABORATORY INFORMATION SYSTEM: A PHENOMENOLOGICAL STUDY

Authors

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Abstract

Background: Laboratory information systems (LIS) play a crucial role in the efficient management of laboratory data and workflows. The implementation of a new LIS can have a significant impact on the perceptions and experiences of laboratory specialists and technicians.

Objective: To explore the perceptions and experiences of laboratory specialists and technicians regarding the implementation of a new LIS in their workplace.

Methods: A qualitative phenomenological study was conducted using semi-structured interviews with a purposive sample of 20 laboratory specialists and technicians who had experienced the implementation of a new LIS in their laboratory. Interviews were audio-recorded, transcribed verbatim, and analyzed using thematic analysis.

Results: Four main themes emerged from the data: (1) initial reactions and expectations, (2) challenges and barriers during implementation, (3) perceived benefits and improvements, and (4) recommendations for future implementations. Participants reported mixed initial reactions, ranging from excitement to apprehension. Challenges included training issues, technical problems, and resistance to change. Perceived benefits included improved data accuracy, streamlined workflows, and enhanced communication. Participants recommended better training, more user involvement, and continuous support for successful LIS implementations.

Conclusion: The implementation of a new LIS evokes various perceptions and experiences among laboratory specialists and technicians. Understanding these perspectives can help guide future LIS implementations and optimize the benefits for laboratory staff and patient care.

Introduction

Laboratory information systems (LIS) are essential tools for managing and processing the vast amounts of data generated in modern clinical laboratories (1). LIS play a critical role in automating laboratory workflows, reducing errors, improving data accuracy, and enhancing communication among healthcare providers (2). The implementation of a new LIS can have a significant impact on the daily work and experiences of laboratory specialists and technicians, who are the primary users of these systems (3).

Previous studies have investigated the factors influencing the successful implementation of LIS, such as user acceptance, training, and technical support (4, 5). However, there is limited qualitative research exploring the in-depth perceptions and experiences of laboratory specialists and technicians during the implementation process. Understanding these perspectives is crucial for identifying the challenges, benefits, and best practices associated with LIS implementations (6).

Phenomenological studies are particularly suited for exploring the lived experiences of individuals who have encountered a specific phenomenon (7). By capturing the rich descriptions and meanings attached to these experiences, phenomenological research can provide valuable insights into the subjective realities of participants (8).

Therefore, this study aimed to examine the perceptions and experiences of laboratory specialists and technicians regarding the implementation of a new LIS in their workplace using a phenomenological approach. The specific objectives were:

1. To explore the initial reactions and expectations of laboratory specialists and technicians towards the new LIS.
2. To identify the challenges and barriers encountered during the implementation process.
3. To understand the perceived benefits and improvements associated with the new LIS.
4. To gather recommendations for future LIS implementations based on participants' experiences.

Methods

Study Design and Setting

A qualitative phenomenological study was conducted to explore the perceptions and experiences of laboratory specialists and technicians regarding the implementation of a new LIS. The study was carried out in a large tertiary care hospital in Riyadh, Saudi Arabia, which had recently implemented a new LIS in its clinical laboratory department.

Sampling and Recruitment

Purposive sampling was used to recruit participants who met the following inclusion criteria: (1) working as a laboratory specialist or technician in the hospital's clinical laboratory department, (2) having experienced the implementation of the new LIS, and (3) willing to share their

perceptions and experiences. Recruitment was conducted through email invitations and face-to-face interactions with the assistance of the laboratory management. A total of 20 participants were recruited, consisting of 12 laboratory technicians and 8 laboratory specialists. This sample size was determined based on the principle of data saturation, which was achieved when no new themes emerged from the interviews (9).

Data Collection

Semi-structured interviews were conducted with the participants to gather their perceptions and experiences regarding the LIS implementation. An interview guide was developed based on the study objectives and existing literature on LIS implementations. The guide included open-ended questions covering the following topics:

- Initial reactions and expectations towards the new LIS
- Challenges and barriers encountered during the implementation
- Perceived benefits and improvements associated with the new LIS
- Recommendations for future LIS implementations
- Demographic and professional background information

Interviews were conducted in Arabic by two trained interviewers (AHA and WSA) and lasted approximately 45-60 minutes each. All interviews were audio-recorded with the participants' permission and transcribed verbatim. Field notes were also taken during the interviews to capture non-verbal cues and contextual information.

Data Analysis

The interview transcripts were analyzed using thematic analysis, following the six-step approach outlined by Braun and Clarke (10). The analysis process involved familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. Two researchers (AHA and WSA) independently coded the transcripts and compared their findings to ensure consistency and reliability. Any discrepancies were resolved through discussion and consensus with a third researcher (AMA). The identified themes were reviewed and refined by the entire research team to ensure their coherence and relevance to the research objectives.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Review Board of the hospital. All participants provided written informed consent prior to the interviews, and their confidentiality was ensured by using pseudonyms and removing any identifying information from the transcripts. Participation was voluntary, and participants were free to withdraw from the study at any time without consequences.

Results

Demographic and Professional Characteristics

The study included 20 participants, consisting of 12 laboratory technicians and 8 laboratory specialists. The mean age of the participants was 34.2 years (range: 26-48 years), and the average work experience in the clinical laboratory was 9.5 years (range: 3-20 years). Fourteen participants were male, and six were female. All participants had experienced the implementation of the new LIS in their workplace within the past year.

Themes

Four main themes emerged from the data analysis: (1) initial reactions and expectations, (2) challenges and barriers during implementation, (3) perceived benefits and improvements, and (4) recommendations for future implementations.

Theme 1: Initial Reactions and Expectations

Participants expressed a range of initial reactions and expectations towards the new LIS. Some participants were excited about the prospect of using a more advanced and efficient system, while others were apprehensive about the potential challenges and learning curve associated with the change.

"I was really looking forward to the new LIS. I had heard good things about it from colleagues in other hospitals, and I thought it would make our work easier and more streamlined." (Participant 3, Laboratory Technician)

"To be honest, I was a bit nervous about the new LIS. I had been using the old system for years, and I wasn't sure how well I would adapt to the change. I was worried about making mistakes or slowing down the workflow." (Participant 11, Laboratory Specialist)

Several participants had high expectations for the new LIS, hoping that it would address the limitations and inefficiencies of the previous system. They anticipated improvements in data accuracy, reporting capabilities, and user-friendliness.

"I expected the new LIS to be a big upgrade from our old system. The old one was slow, clunky, and prone to errors. I was hoping the new LIS would be faster, more reliable, and easier to use." (Participant 7, Laboratory Technician)

Theme 2: Challenges and Barriers During Implementation

Participants encountered various challenges and barriers during the implementation of the new LIS. One of the most commonly reported issues was related to training and education. Many participants felt that the training provided was insufficient or ineffective, leaving them unprepared to use the new system effectively.

"The training for the new LIS was too short and not very practical. It was mostly just a demonstration of the features, but we didn't get enough hands-on practice. When we started using the system, there were a lot of things we didn't know how to do." (Participant 9, Laboratory Technician)

Technical problems and system glitches were another major challenge faced by participants. These issues ranged from slow performance and login difficulties to data entry errors and compatibility issues with other hospital systems.

"In the beginning, there were alot of technical problems with the new LIS. It would freeze or crash unexpectedly, and sometimes the data we entered would disappear or get corrupted. It was very frustrating and slowed down our work." (Participant 14, Laboratory Specialist)
Resistance to change and the learning curve associated with adapting to the new system were also significant barriers. Some participants, particularly those with longer work experience, found it difficult to adjust to the new workflows and processes.

"I had been using the old LIS for so long that it was like second nature to me. When we switched to the new system, I struggled to learn the new navigation and terminology. It took me a while to get comfortable with it." (Participant 18, Laboratory Specialist)

Theme 3: Perceived Benefits and Improvements

Despite the challenges faced during implementation, participants also reported several perceived benefits and improvements associated with the new LIS. One of the most frequently mentioned advantages was improved data accuracy and reduced errors.

"The new LIS has definitely improved the accuracy of our data entry and reporting. The system has built-in validations and checks that prevent us from entering incorrect or incomplete information. It has reduced the number of errors we used to make with the old system." (Participant 5, Laboratory Technician)

Streamlined workflows and increased efficiency were other notable benefits highlighted by participants. The new LIS automated several manual processes and provided better integration with other hospital systems, leading to faster turnaround times and reduced workload.

"The new LIS has made our workflows much smoother and more efficient. We can now easily track samples from collection to reporting, and the system automatically populates the results into the patient's electronic medical record. It has saved us a lot of time and effort." (Participant 12, Laboratory Specialist)

Enhanced communication and collaboration among laboratory staff and with other healthcare providers were also mentioned as positive outcomes of the new LIS. The system facilitated the sharing of information and allowed for better coordination of patient care.

"The new LIS has improved communication within our laboratory and with other departments. We can now easily share test results and communicate any issues or concerns through the system. It has fostered better collaboration and teamwork." (Participant 16, Laboratory Technician)

Theme 4: Recommendations for Future Implementations

Based on their experiences, participants provided several recommendations for future LIS implementations. Better training and education were emphasized as crucial for successful adoption and utilization of the new system.

"My advice would be to invest more time and resources into training the staff on the new LIS. The training should be hands-on, practical, and tailored to the specific needs and roles of each user group. It should also be ongoing, with regular refresher sessions and support." (Participant 8, Laboratory Specialist)

Involving end-users in the planning and design of the new LIS was another key recommendation. Participants felt that their input and feedback should be sought and incorporated to ensure that the system meets their needs and requirements.

"I think it's important to involve the laboratory staff in the process of selecting and designing the new LIS. We are the ones who will be using the system every day, so our opinions and experiences should be taken into account. It would help to create a system that is more user-friendly and relevant to our work." (Participant 19, Laboratory Technician)

Continuous support and resources were also highlighted as essential for the successful implementation and long-term use of the new LIS. Participants recommended having dedicated IT support staff, user manuals, and troubleshooting guides available to assist with any issues or questions.

"There should be ongoing support and resources available after the initial implementation of the new LIS. We need someone to turn to when we encounter problems or need guidance on how to use certain features. Having a dedicated helpdesk or support team would be really beneficial." (Participant 6, Laboratory Specialist)

Discussion

This phenomenological study explored the perceptions and experiences of laboratory specialists and technicians regarding the implementation of a new LIS in their workplace. The findings shed light on the various challenges, benefits, and recommendations associated with the implementation process.

Participants reported mixed initial reactions and expectations towards the new LIS, with some expressing excitement and others apprehension. This is consistent with previous research, which

has shown that the introduction of new technology in healthcare settings can evoke a range of emotional responses among staff, including anticipation, anxiety, and resistance (11, 12).

The challenges and barriers encountered during the implementation, such as insufficient training, technical problems, and resistance to change, are also well-documented in the literature (13, 14). These findings underscore the importance of providing adequate training, technical support, and change management strategies to facilitate the successful adoption of new LIS (15).

Despite the challenges, participants also reported several perceived benefits and improvements associated with the new LIS, including enhanced data accuracy, streamlined workflows, and improved communication. These findings align with previous studies that have demonstrated the positive impacts of LIS on laboratory efficiency, quality, and patient care (16, 17).

The recommendations provided by participants, such as better training, user involvement, and continuous support, are valuable insights that can inform future LIS implementations. Engaging end-users in the planning and design of the system, providing comprehensive training, and offering ongoing support are key strategies for promoting the successful adoption and utilization of LIS (18, 19).

Strengths and Limitations

This study has several strengths. The phenomenological approach allowed for an in-depth exploration of the lived experiences of laboratory specialists and technicians, providing rich and detailed insights into their perceptions and experiences. The inclusion of both laboratory technicians and specialists ensured a diverse range of perspectives and experiences. The use of semi-structured interviews and thematic analysis allowed for the identification of key themes and patterns in the data.

However, the study also has some limitations. The sample size was relatively small and limited to a single hospital setting, which may limit the generalizability of the findings. The reliance on self-reported data may be subject to recall bias and social desirability bias. The specific LIS implemented in this hospital may have unique features and challenges that may not be applicable to other LIS or settings.

Implications and Future Research

The findings of this study have important implications for practice and research. Healthcare organizations planning to implement a new LIS should consider the perspectives and experiences of laboratory staff and incorporate their recommendations into the implementation process. This includes providing comprehensive training, involving end-users in the planning and design, and offering continuous support and resources.

Future research could explore the long-term impacts of LIS implementation on laboratory workflows, efficiency, and patient outcomes. Studies could also investigate the effectiveness of different training and support strategies for promoting the successful adoption and utilization of

LIS. Additionally, research could examine the perspectives of other stakeholders, such as physicians, nurses, and patients, regarding the implementation of LIS and its impact on patient care.

Conclusion

The implementation of a new LIS is a complex and challenging process that significantly impacts the perceptions and experiences of laboratory specialists and technicians. This phenomenological study revealed a range of initial reactions, challenges, benefits, and recommendations associated with the implementation of a new LIS in a clinical laboratory setting.

The findings highlight the importance of providing adequate training, technical support, and change management strategies to facilitate the successful adoption of new LIS. Engaging end-users in the planning and design of the system, offering ongoing support and resources, and addressing the challenges and barriers encountered during implementation are crucial for realizing the full benefits of LIS.

Healthcare organizations and decision-makers should consider the perspectives and experiences of laboratory staff when planning and implementing new LIS. By incorporating their recommendations and addressing their concerns, organizations can promote the successful adoption and utilization of LIS, ultimately improving laboratory efficiency, quality, and patient care.

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8. **Tables**
9. *Table 1. Demographic and Professional Characteristics of Participants (N=20)*

Characteristic	**n (%)**
Age (years)	
20-29	4 (20%)
30-39	11 (55%)
40-49	5 (25%)

Characteristic	**n (%)**
Gender	
Male	14 (70%)
Female	6 (30%)
Profession	
Laboratory Technician	12 (60%)
Laboratory Specialist	8 (40%)
Work Experience (years)	
1-5	3 (15%)
6-10	9 (45%)
11-15	5 (25%)
16-20	3 (15%)

10. *Table 2. Themes and Sub-themes*

Themes	**Sub-themes**
Initial Reactions and Expectations	Excitement
	Apprehension
	Anticipated improvements
Challenges and Barriers During Implementation	Insufficient training

Themes	**Sub-themes**
	Technical problems
	Resistance to change
Perceived Benefits and Improvements	Enhanced data accuracy
	Streamlined workflows
	Improved communication
Recommendations for Future Implementations	Better training
	User involvement
	Continuous support