

Perceived Challenges and Benefits of Implementing Hospital Information Systems

Xiaochen Li *

Philippine Women's University, 1743 Taft Avenue, Malate, Manila 1004 Philippines

* Corresponding author: (Email: lixiaochen0926@foxmail.com)

Abstract: This study examined the growing impact of Hospital Information Systems (HIS) on nursing practice, with a focus on frontline nurses' experiences, which remain underexplored. Using a descriptive qualitative design, semi-structured interviews were conducted with 15 registered nurses, and the data were analyzed following Colaizzi's seven-step method. The study identified three key themes. First, HIS improved nurses' access to patient-specific information, database knowledge, patient workflow data, and management information. Second, nurses recognized that the functionality of HIS met their clinical nursing requirements. Third, major challenges included repetitive record-keeping, insufficient training, slow technical support response, and the emotional burden of system malfunctions. Overall, HIS contributes positively to nursing quality, patient safety, and nurses' professional confidence. However, despite improving information accessibility, issues such as limited usability and increased implicit emotional labor persist, highlighting the need for improvements in both system design and organizational management to better support clinical nursing practice.

Keywords: Hospital information systems (HIS), Nursing practice, Information access, User experience, Benefits, Challenges.

1. Introduction

In the process of hospital informatization construction, the Hospital Information System (HIS) is the most core and widely used information management system [1-3]. As a tool for hospital administrators to provide information, support medical management decisions, and improve operational efficiency, the HIS has demonstrated enormous development and application potential in improving nursing quality, expanding the scope of nursing, and promoting the development of nursing practice [4-6]. Since 2018, Shandong Province has been designated as one of China's first "Internet Plus Healthcare" pilot provinces. Subsequently, Shandong Province accelerated its informatization construction. By 2020, the province had completed the construction of a health and medical big data system and an internet operation platform, continuously deepening hospital informatization construction and forming a new ecosystem based on information sharing and integration [7]. To date, Shandong Province continues to leverage its advantages as a demonstration province, and the application of hospital information systems and various clinical information systems has transitioned from the stage of large-scale construction and development to the stage of in-depth optimization and application.

Although the implementation of hospital information systems has brought obvious benefits, the development of HIS is complex and requires long-term planning and maintenance, as well as sustained financial investment [8, 9]. Additionally, since time commitment and training are crucial factors in determining the success of a hospital information system implementation, they require the full attention and active support of management [10-12]. Furthermore, over-reliance on technology reduces face-to-face communication and collaboration among healthcare professionals, thereby lowering the quality of care and negatively impacting patient care [13, 14].

To understand how the use of hospital information systems

can optimize nursing workflows, ensure nursing quality and safety, and promote nurses' professional development, researchers were inspired to gather nurses' perspectives on the development and application of hospital information systems. The study aims to investigate how the implementation of HIS affects the work experiences of nurses in Shandong Province, China, and how they cope with the challenges and benefits of HIS.

2. Methodology

2.1. Philosophy

This study is grounded in the constructivist philosophical paradigm and employs a descriptive research design. It is believed that learners construct cognitive meaning for themselves during the learning process, and their individual cognitive state is formed in the interaction between their professional environment and technological scenarios [15]. This method aims to capture nurses' authentic experiences without making prescriptive assumptions, allowing themes to emerge naturally and gradually from the participants' narratives.

2.2. Setting and Participants

Recruitment was conducted in public and private hospitals at or above the secondary level in Shandong Province, China. The 15 eligible participants were all registered nurses from five different types, levels, and geographical locations, and all had at least one year of work experience. Purposeful sampling was employed to ensure that each participant provided unique and insightful information, guaranteeing sample diversity and representativeness. Recruitment was conducted in public and private hospitals at or above the secondary level in Shandong Province, China. The 15 eligible participants were all registered nurses from five different types, levels, and geographical locations, and all had at least one year of work experience. Purposeful sampling was employed to ensure that each participant provided unique and insightful information,

guaranteeing sample diversity and representativeness.

2.3. Data Collection

Data was collected through semi-structured one-on-one interviews. Researchers guided participants to answer questions in a semi-structured interview guide. The study included three core questions and 18 sub-projects, exploring how the Hospital Information System (HIS) influences nurses' work experience from three perspectives: the hospital environment, nurses, and the HIS. Face-to-face interviews were prioritized; when this was not possible, online conferencing software was used. Each interview lasted 20-30 minutes, and all interviews were recorded with informed consent from the participants. During the research, additional interviews were conducted as needed until thematic saturation was reached, meaning no new themes or insights emerged.

2.4. Data Analysis

The interview transcripts were transcribed verbatim by the researchers and cross-checked with the audio files to ensure accuracy. The transcribed texts underwent inductive analysis following Colaizzi's seven-step process, and systematic open coding was performed using NVivo 12 qualitative data analysis software. Initial codes were iteratively grouped into candidate topics, subsequently reviewed, refined, and integrated to ensure content coherence, conceptual uniqueness, and consistency with the research questions.

3. Findings

Through a thematic analysis of semi-structured interview data from 15 registered nurses, this study identified three core themes that explain these nurses' work experiences and perspectives regarding the use of the hospital information system (HIS) across different departments: (1) Access to information, (2) HIS user experience, and (3) Implementation challenges. Each theme is further subdivided into several subthemes, which are presented below.

3.1. Theme 1: Access to information

The first theme that emerged in this study was nurses' perceptions of access to information. This theme illustrates the process by which frontline nurses working in various departments collect and utilize information through the hospital information system, as well as the impact of this process on their nursing practice.

3.1.1. Patient Specific Clinical Information

Nurses provide comprehensive care by obtaining specific information about patients' health conditions and treatment plans. By accurately interpreting patients' clinical information, nurses deliver treatment and nursing services. Based on the feedback collected, nurses have confirmed that access to nursing records and medical histories is a key advantage of the system, including the storage and retrieval of vital signs, medication records, lab reports, and diagnostic information.

"Log in the job number in the system, then enter the password, and then you will see all the patient information after entering. Such as medical history, valid doctor's orders, invalid doctor's orders, medication records, and nursing records, etc. Just like a patient who is about to be discharged from the hospital, the case needs to be printed, and it must also be printed from the system." (P1)

"..... you can first collect this information about the

patient, and then check his previous cases or past medical history, vital signs, and so on, which are useful."(P2)

3.1.2. Database Information

All the information is stored in the database. Nurses believe this helps them better organize patient information and incorporate it into their care plans, thereby reducing their workload. In addition, nurses have repeatedly noted that the database's data analysis capabilities save time in clinical work while also enhancing nursing education.

"Because all the data are real. If we were to write a quality control, it would be more convenient for us to go through the database, retrieve the data, and then organize the data, and then write the document after it is organized."(P4)

"I think especially for this aspect of education, because it is easier to extract information. If you need some special cases for guidance, you can use the information in the database to write courses and use real classical cases for guidance, which will be more effective." (P3)

3.1.3. Administrative Information

The topic demonstrates how nurses can easily access administrative information to assist them in self-management. Nurses have shared their perspectives, noting that system notifications and administrative updates ensure they do not feel isolated from the hospital, as everyone receives the same information at the same time, leaving no one behind.

"I think it can play a role. Our OA system can cover the whole hospital staff. Medical workers can query, salary, and administrative notices, holiday notices, personnel notices and other important notices on this system. As long as the hospital releases information, we will get it as soon as possible." (P1)

3.2. Theme 2: HIS User Experience

This topic discusses how nurses benefit from using the HIS in their work. From the system's functionality to career development opportunities, nurses recognize that the HIS enables them to work more efficiently and supports their professional growth, thereby boosting their confidence in the future.

3.2.1. System Availability and Usability

This topic explains the versatility of the HIS by showcasing how nurses utilize its functions to meet numerous clinical needs. The storage, retrieval, and transmission of clinical diagnostic and treatment information fulfill multiple needs of nursing staff in clinical practice. Furthermore, the system standardizes nursing documentation writing by providing various templates and guidance. They believe this significantly reduces operating costs and improves work efficiency.

"For nurses, we can obtain the required information in the shortest possible time by using an integrated system." (P1)

"Because the system has a template, nurses just need to fill out one by one according to the template..." (P6)

3.2.2. System Security

Given the significant threat that the leakage of patient information poses to patients' health and privacy, the hospital not only requires nurses to maintain the confidentiality of patient information but also implements robust security controls on the system. As mentioned by nurses in interviews, using account and password logins and prohibiting external devices from connecting to the computer hosting hospital information are crucial measures for protecting patient information.

"Each login account has a password, and only those who

know the password can access the system. Moreover, the computer we usually work on is not connected to the Internet, and then the confidentiality of the information is also very strong.” (P4)

“This is something that can be done. Like I just said, the computer will lock up the system if it is not operating, maybe half a minute to a minute. The login after the lockup requires a password, including access to these accounts where we edit accounts and view patient cases.” (14)

3.2.3. Build confidence in the future

This thematic group represents nurses' confidence in their own abilities and the hospital's management level, as well as their positive attitude towards future career development. Clinical information systems (HIS) support the changing roles of nurses. HIS encourages nurses to assume roles not only as caregivers, but also as educators, researchers, and managers.

“The more fully functional the system, the more confident nurses will be in their work.” (P1)

“I think no matter what, hospital information technology must be strong, which is like a strong guarantee to make us work more confidently to face patients.” (P12)

3.3. Theme 3: Application Challenges

This theme highlights the numerous challenges nurses face when using the HIS, as well as their impact on work procedures and the hospital environment.

3.3.1. Manpower Challenges

Training is an ongoing process. As participants describe it, it involves continuously teaching, re-teaching, and assessing nurses to enhance their practical skills. Prior to the implementation of the HIS system, all staff members will undergo standardized hospital-wide training. The hospital has a dedicated department responsible for training new employees, so nurses need not worry; however, passing the final assessment is essential.

“Of course, before it is implemented, it must go through many people's operation practice, training and so on, and then directly implement it.” (P2)

“The hospital will regularly launch training on the use of the system and will also conduct regular evaluations.” (P5)

3.3.2. Technical Challenges

This topic addresses the barriers that nursing staff encounter when using the HIS while providing patient care. It clearly highlights the need for improvements and adjustments in the hospital environment to meet the needs of frontline staff. By outlining their desired improvements, nurses have identified shortcomings in the system's current use and articulated the ideal outcomes following system enhancements.

“The system may lag, and then there is a problem with the total price of the system.” (P10)

“Some systems, the computer configuration can not keep up with the operation of the system, there is no way to carry. That hardware can not carry its operation, in fact, but will add to the burden of clinical work, or dragging the leg, and then it is hoped that regular updates, or focus on the optimization of these hardware.” (P11)

3.3.3. Organizational Challenges

This discussion group explores how the implementation and development of HIS systems are constrained by organizational factors. Strict government oversight of HIS applications has gradually compelled hospitals to

continuously update and enhance the performance of their HIS systems in order to provide better services to patients. Nurses strongly urge hospitals to address the shortcomings of the HIS system through upgrades and maintenance. While this represents a significant financial investment for hospitals, it is essential and helps nurses feel more confident when interacting with patients.

“Because the hospital's work is now detailed, he is subject to many restrictions. The system is also subject to many restrictions in terms of national policies.” (P14)

“Our hospital also has a limited annual budget for hospital information systems.” (P9)

4. Discussion

This study investigated the experiences of 15 registered nurses in their work through semi-structured interviews to explore how they coped with the challenges and benefits of the HIS.

“Access to information” reflects how nurses effectively utilize the HIS to improve nursing care and patient safety. Effective access to patient information is crucial for nurses, as it forms the foundation and core of nursing practice [16, 17]. The HIS enables nurses to access patients' basic information, medical history, diagnostic results, test results, and treatment plans, while also helping them retrieve and manage information more efficiently. In addition, nurses use the HIS to participate in training and professional development, thereby enhancing their nursing knowledge and skills. Through HIS's support in helping nurses access, manage, and share information, nurses have come to recognize and appreciate the system's contribution to improving the quality and safety of nursing care [18].

Regarding “HIS user experience”, it stems from the practical insights nurses gain from HIS functionality—specifically, how the system's features benefit both nurses and patients in their daily work [14, 19]. The system ensures that nurses can quickly locate the information they need, reducing the likelihood of errors and minimizing various costs. The system's security measures guarantee that patient information is not disclosed, thereby protecting patient privacy [20, 21]. Through their acceptance of the HIS and the transformation of their professional roles, nurses are able to gain a new understanding of themselves and build confidence in their future career development.

“Application challenges” arise from the various barriers HIS systems face in clinical practice and must be addressed in the future. Organizations play a crucial role in the implementation and development of HIS systems, and their influence cannot be overlooked [22, 23]. Furthermore, hospital support and training form the foundation for the adoption and promotion of HIS systems; however, issues such as technical instability and operational complexity may hinder nurses' work efficiency and, consequently, affect the quality of care [7, 24, 25]. Therefore, they urgently hope that hospitals will resolve this issue.

5. Conclusion and Recommendations

Hospitals have demonstrated significant potential in the development and application of HIS systems to promote patient health, and these systems have had a profound impact on the work of nurses. As the most frequent users of HIS and the primary point of contact with patients in clinical settings, it is essential to understand how the implementation of HIS

affects nurses' work experiences in order to support their professional development in the future. Within the broader context of patient-centered information technology development, the management of patient medical data through HIS provides crucial reference support for nursing staff's clinical decision-making and nursing interventions. The findings of this study have identified the challenges and difficulties posed by HIS. Consequently, hospitals should proactively implement measures in technical, organizational, and human resource aspects, continuously optimize relevant processes, effectively reduce nurses' workloads, and empower them to provide more efficient and high-quality nursing services to patients.

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