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Assessing Digital Health Competencies on Nursing Practices in Bahrain Hospital

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Abstract
Aim: This study assessed the digital health competency levels of nurses in relation to their nursing practices involving digital technologies in a hospital in Bahrain. Specifically, it examined nurses' competencies in digital transformation, leadership and advocacy, data and information quality, and information-enabled care and technology, as well as their practices in terms of utilization, perception, legal concerns, availability, and challenges.
Methodology: A quantitative, descriptive-correlational research design was employed with 47 nurses from different units of the hospital as respondents. A structured questionnaire, validated and confirmed reliable (Cronbach's α = 0.89), was used to measure both digital competencies and nursing practices. Descriptive statistics (mean, frequency, and percentage) summarized the data, while Pearson's Product-Moment Correlation determined the relationship between the two variables.
Results: The analysis revealed a negligible correlation (*r = 0.01*) between nursing practices and digital health competencies, suggesting that variations in one do not significantly influence the other. Based on these findings, a proposed program was developed to address challenges and strengthen digital health integration in nursing practice.
Conclusion: In conclusion, the study highlights the need for targeted training programs to enhance nurses' digital competencies, thereby improving healthcare delivery and facilitating better integration of technology in clinical settings.
Keywords: *Nursing Informatics, Digital Competencies, Healthcare Technology, Nursing Practice, Bahrain*

INTRODUCTION

Healthcare systems worldwide are undergoing rapid digital transformation, driven by innovations such as telehealth, remote patient monitoring, and data-driven care. These technologies improve accessibility, reduce the need for in-person consultations, and enhance overall healthcare delivery (Chauhan, 2023). Furthermore, the integration of electronic health records and advanced analytics has strengthened decision-making processes, quality assurance, and patient outcomes. These developments underscore the growing importance of digital health competencies in nursing practice (Longhini et al., 2022; Ratwani et al., 2021; Pangilinan, 2025).

While these global trends are well documented, their adoption varies significantly across regions. In Bahrain, the government has introduced national strategies such as the Digital Health Strategy 2024 and Tamkeen's Workforce Transformation Program to support healthcare digitalization (Tamkeen, 2024). Despite these initiatives, implementation remains uneven, with hospitals experiencing limited interoperability, infrastructure constraints, and varying levels of technology readiness. Cultural and workforce factors also play a role; Bahrain's nursing workforce is highly diverse, with a large proportion of expatriate nurses who may have different levels of digital literacy and adaptability. Resistance to technological change often stems from insufficient training, reliance on traditional workflows, and hierarchical decision-making structures within clinical settings. Establishing a Bahrain-specific competency framework that aligns with local policies, infrastructure capabilities, and cultural realities is therefore essential (Amihan et al, 2023).

Although studies from other regions have examined digital health competencies among nurses, little is known about how these competencies are defined, measured, and applied within Bahrain's healthcare system. This

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knowledge gap is critical because local policy mandates, institutional readiness, and cultural dynamics strongly influence digital adoption. Addressing this gap will help identify barriers, set standards, and design interventions tailored to Bahrain's unique healthcare ecosystem (Bontuyan, 2025).

Unlike prior research, which has largely focused on Western or broader Gulf contexts, this study provides an in-depth assessment of nurses' digital health competencies in a Bahraini hospital setting. It not only evaluates current competency levels but also proposes a context-sensitive framework for competency enhancement through targeted training and education. The findings aim to strengthen digital readiness in alignment with Bahrain's national eHealth vision, ensuring nurses are equipped to leverage technology for improved patient care and health outcomes. This study is anchored on the Technology Acceptance Model (TAM), which posits that individuals' acceptance and use of technology are primarily influenced by their perceived usefulness and perceived ease of use. This framework is relevant as it provides a basis for understanding how nurses' attitudes toward digital health tools affect their competency development and actual utilization in clinical practice within the Bahraini healthcare context.

Review of Related Literature

Across hospital settings, nurses' digital health competence (e.g., EHR use, data governance, telehealth workflows) is now a core practice capability linked to care quality, safety, and efficiency. Recent syntheses emphasize that competence spans technical, cognitive, and ethical domains and must be cultivated systematically (Longhini et al., 2022). Regionally, the WHO Eastern Mediterranean strategy (2023–2027) urges countries—including Bahrain—to invest in workforce skills and interoperable platforms to operationalize digital, person-centred care (WHO EMRO, 2023). Bahrain's I-SEHA program operationalizes this vision in hospitals by giving clinicians real-time access to unified medical records, streamlining documentation and clinical decision-making—capabilities that raise the bar for nurses' day-to-day digital practice (Government of Bahrain, 2025; Sanchez et al., 2023).

Recent instrument development offers practical ways to assess nurses' digital practice skills beyond generic "computer literacy." The Digital Competence Questionnaire for Nurses targets clinical digital tasks (e.g., data handling, digital communication) and shows solid psychometrics for hospital use (Golz et al., 2024). Similarly, the Nursing Digital Application Skill Scale (NDASS) captures applied skills such as operating digital devices and using technology to analyze nursing problems—relevant to documentation and workflow in inpatient units (Qin et al., 2024). Complementing tool development, a 2025 meta-analysis on hospital digitalization found workforce "digital readiness" strongly hinges on targeted training and supportive environments—implicating nurse education, leadership, and protected learning time as levers for better practice uptake (Alotaibi et al., 2025; Carvajal et al., 2025).

In Bahrain, hospital-based telehealth and EHR services have expanded alongside I-SEHA. Healthcare workers, including nurses, generally report favorable telehealth perceptions but also flag training and workflow integration needs that map directly onto digital competence domains (Haffadh et al., 2024). Patient-facing evaluations likewise show high satisfaction with teleconsultations, underscoring how competent clinical use of digital tools can sustain care quality (Shareef et al., 2023). Current government guidance highlights I-SEHA's role in providing clinicians with unified records and histories, reinforcing the everyday digital tasks nurses must perform reliably in Bahrain's hospital services (Ministry of Health—Kingdom of Bahrain, 2025).

Theoretical Framework

The Technology Acceptance Model (TAM) serves as the foundation of this study because nurses' ability to apply digital health tools effectively depends on both their competency and their acceptance of these technologies. Even if nurses possess technical skills, low perceived usefulness or difficulty in using systems such as I-SEHA or telehealth platforms may hinder their integration into daily practice. By linking digital competence with TAM constructs, the study can explain how proficiency in digital health technologies influences nurses' attitudes, confidence, and actual usage in clinical workflows. This theoretical alignment helps interpret whether improving digital health competencies directly supports the acceptance and sustained use of digital innovations in Bahrain's hospital setting (Amihan & Sanchez, 2023).

Statement of the Problem

The rapid integration of digital health technologies in hospital settings has significantly transformed the delivery of nursing care worldwide. In Bahrain, initiatives such as the I-SEHA program seek to improve patient outcomes through electronic health records, telehealth services, and digital documentation. These innovations require nurses to possess strong digital competencies to ensure efficiency and quality in healthcare delivery.

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However, variations in nurses' proficiency and adaptability to such technologies may influence the effectiveness of nursing practices and, ultimately, the overall performance of the healthcare system.

General Objective

This study aims to assess the digital health competencies of nurses and their influence on nursing practices in a hospital in Bahrain.

Specific Objectives

1. To evaluate the extent to which nursing practices rely on digital technologies.
2. To determine the level of digital health competency among nurses.
3. To examine the relationship between digital health competencies and nursing practices on digital technologies.
4. To develop an intervention program based on the salient findings of the study.

Research Questions

1. What is the level of nursing practices in the use of digital technologies?
2. What is the level of digital health competency among nurses?
3. Is there a significant relationship between digital health competencies and nursing practices on digital technologies?
4. Based on the findings of the study, what intervention program may be proposed to enhance nurses' digital health competencies and nursing practices?

Hypotheses

At the 0.05 level of significance, the following hypotheses were tested:

- ***Ho:*** There is no significant relationship between digital health competencies and nursing practices on digital technologies among nurses.
- ***H_a:*** There is a significant relationship between digital health competencies and nursing practices on digital technologies among nurses.

METHODS

Research Design

This study employed a descriptive-correlational research design to examine the relationship between the level of digital health competencies and nursing practices on digital technologies among nurses. This design was appropriate because the study aimed to measure existing variables without manipulation and determine whether an association exists between the two constructs, rather than establishing causation. Similar to how academe-industry collaborations explore existing literacy gaps without altering variables, descriptive-correlational studies provide a structured way of uncovering relationships in real-world contexts (Amihan & Sanchez, 2023). This approach allowed for a comprehensive assessment of both competency levels and practice behaviors in a real hospital setting.

Population and Sampling

The study was conducted at Awali Hospital in Bahrain and included 47 purposively selected nurse-respondents. Purposive sampling was chosen because the study required participants who had direct exposure to and experience with digital technologies in their nursing practice. Inclusion criteria included being an active staff nurse in Awali Hospital with at least six months of continuous service and involvement in patient care using digital health tools. The sample consisted of 10 nurses from Nursing Services, 11 from the Outpatient Department and Occupational Health, 6 from the Operating Theatre, 12 from the Inpatient Ward, 3 from the Inpatient Maternity Unit, and 5 from the Refinery Clinic.

Instrument

A self-constructed, structured questionnaire was used, developed based on existing literature and modified items from validated tools to ensure contextual relevance. The instrument consisted of two major sections:

- **Nursing Practices on Digital Technologies**
  - Domains: (a) Utilization, (b) Perception, (c) Legal Concerns, (d) Availability, and (e) Challenges.

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- Scale: 4-point Likert scale (1 = Strongly Disagree to 4 = Strongly Agree).

- **Digital Health Competencies**
  - Domains: (a) Digital Transformation, (b) Leadership and Advocacy, (c) Data and Information Quality, (d) Information-Enabled Care, and (e) Technology.
  - Scale: 5-point Likert scale (1 = Never to 5 = Always).

Validation Process: The instrument was reviewed by three experts in nursing research and healthcare informatics (two with doctoral degrees in nursing and one with extensive experience in hospital IT systems). Their feedback led to revisions in item clarity and domain alignment. A pilot test was conducted with five nurses (not part of the final sample), and reliability was established using Cronbach's alpha, which yielded an acceptable coefficient of 0.89, indicating high internal consistency. The careful validation process aligned with recent findings that robust instruments are necessary to address varying challenges in competency assessment (Pangilinan, 2025).

Data Collection

Data were collected between March and April 2025. Permission to conduct the study was obtained from the Chief of Awali Hospital. Following approval, the researcher distributed the questionnaires personally to nurses across different hospital units and provided email notifications beforehand. This approach ensured accessibility and allowed respondents to ask for clarifications when needed. Completed questionnaires were collected within the same work shifts to ensure timely retrieval.

Treatment of Data

Data were processed and analyzed using descriptive and inferential statistics:

- Frequency and Percentage were used to describe respondents' demographic characteristics.
- Mean and Standard Deviation were applied to summarize responses on interval-scale items.
- Weighted Mean was used to determine the overall level of digital health competencies and nursing practices, addressing the first and second research objectives.
- Pearson's Product-Moment Correlation was employed to test the relationship between nursing practices and digital health competencies, addressing the third research objective.

Ethical Considerations

The study strictly adhered to ethical research standards. Prior to data collection, informed consent was obtained from all participants, ensuring they understood the purpose of the study, procedures, confidentiality measures, and their right to withdraw at any time without consequences. Participation was voluntary, and no identifying information was collected. Institutional approval was secured through the hospital's ethics committee, which reviewed and approved the study protocol before implementation.

RESULTS and DISCUSSION

This section provides an overview of nursing practices on digital technologies, digital health competencies, and the correlation between nursing practices on digital technologies and digital health competencies.

Nursing Practices on Digital Technologies

The table shows the level of nursing practices on digital technologies in terms of utilization, perception on the use of digital technology, legal concerns related to digital technology, availability of digital technology and artificial intelligence.

Table 1. Nursing Practices on Digital Technologies

Nursing Practices on Digital Technologies in terms of Utilization	WX	Interpretation
I understand the concept of digital technology and artificial intelligence	3.3	Strongly Agree
I am technically comfortable of utilizing digital technology and artificial intelligence	3.1	Agree

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I confidently apply the digital technology in nursing practices	3.2	Agree
I've read the concept of digital technology, but I am not adept at applying it in nursing practices	2.7	Agree
I have no idea of digital technology and artificial intelligence	1.7	Strongly Disagree
Grand Mean	2.8	Agree
Nursing Practices on Digital Technologies in terms of Perception on the use of digital technology	WX	
Digital nursing technology plays an important role in nursing practices	3.1	Interpretation
The digital nursing technology makes my work efficient	3.2	Agree
The digital nursing technology improves the quality of healthcare of patients	3.1	Agree
The uses of digital technologies in the healthcare system are safe and effective	2.9	Agree
Digital technology will replace nursing practices in the future	2.2	Agree
Digital technology improves communication and collaboration in the hospital system	3.1	Agree
Digital technology strengthens communications and healthcare literacy with patients and patient's care-dependent individuals.	3	Agree
Grand Mean	2.94	Agree
Nursing Practices on Digital Technologies in terms Legal Concerns related to digital technology	WX	Agree
Digital technology protects the demographic data of the patients	2.9	Interpretation
Digital technology is free from identity theft	2.4	Agree
Digital technology provides consent to disclose medical information to the third party and consent for admission	2.9	Agree
On-line booking, appointment, reservation, and confirmation using digital technology is free from mischievous act	2.8	Agree
Medical procedures, laboratory tests, and hospital billing statement produce by digital technology is accurate	2.9	Agree
Grand Mean	2.78	Agree
Nursing Practices on Digital Technologies in terms Availability of Digital Technology and Artificial Intelligence	WX	Agree
Artificial Intelligence is available in digital technology	3	Interpretation
Digital Technology can access health monitoring system and devices	3.2	Agree
Medical procedures for patient can be check using digital technology	3	Agree
Patient information and documentation system is found on digital technology	3.2	Agree
Telemedicine such as assessment, diagnosis and	3	Agree

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referral system can be provided by digital technology		
Grand Mean	3.08	Agree
Nursing Practices on Digital Technologies in terms Challenges of Digital Technology	WX	Agree
Digital technology is widely accepted in nursing practices	3.2	Interpretation
Nurses' lacks competencies in utilizing digital technology	2.9	Agree
There is a need for continuous professional development training for nurses in employing digital technology in the workforce	3.3	Agree
Digital technology is highly dependent on internet system	3.3	Strongly Agree
Digital technology limits the humanistic approach in nursing practices	3.1	Strongly Agree
Grand Mean	3.16	Agree

	Interval	***Interpretation***
4	*3.26-4.00*	*Strongly Agree*
3	*2.51-3.25*	*Agree*
2	*1.76-2.50*	*Disagree*
1	*1.00-1.75*	*Strongly Disagree*

The findings reveal that nurses' overall practices related to digital technologies were rated Agree (grand mean = 3.22), indicating moderate application in daily work. Utilization of electronic health records and telehealth tools scored relatively higher, reflecting a gradual shift toward digital workflows. However, legal safeguards and identity protection scored the lowest (mean = 2.78), highlighting gaps in compliance with data security and privacy protocols. This aligns with Mendoza et al. (2022), who reported that inadequate legal awareness and weak cybersecurity practices remain significant barriers to digital health adoption among Filipino healthcare professionals. Similarly, Ratwani et al. (2021) emphasized that usability and security challenges in electronic health record systems compromise data protection. Likewise, Longhini et al. (2022) identified insufficient legal and ethical training as a core barrier to digital health integration in nursing practice.

Perceptions toward digital health were generally positive, with nurses acknowledging its role in improving patient outcomes. However, resistance to change persists, particularly among older nurses—a finding consistent with Longhini et al. (2022), who observed generational differences in technology acceptance. This is further supported by Lee et al. (2022), who found that younger nurses and nursing students showed higher readiness and positive attitudes toward AI and digital tools compared to older counterparts. Similarly, Mlambo et al. (2022) noted that inadequate training and change management strategies contribute to reluctance among seasoned healthcare workers.

Availability of resources scored moderately, suggesting that while basic tools exist, infrastructure and IT support remain suboptimal for large-scale implementation. This observation parallels Tamkeen (2024), which reported that Bahrain's healthcare system is still transitioning toward comprehensive digital readiness, requiring stronger IT infrastructure and workforce training. Comparable findings were also noted by Liu et al (2021), who highlighted disparities in digital health adoption due to uneven resource distribution, and by Chauhan (2023), who stressed that successful telehealth and digital care require robust technological and organizational support.

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Digital Health Competencies

This section shows the digital health competencies in terms of digital transformation, leadership and advocacy, data information and quality, information enabled care, and technology,

Table 2. Digital Health Competencies

Digital Transformation: Professional development	WX	Interpretation
I will employ digital technologies in personal learning and professional development.	3.8	Most of the Time
I am aware of the technologies to improve practice and monitor continuing professional development.	3.9	Most of the Time
Procedural knowledge		
I maintain a professional responsibility to adhere to digital health legislation, policy and ethics, including confidentiality, privacy and security, and professional conduct.	4.3	Always
Digital identity		
I recognize that their professional digital footprint should showcase nurses' skills, education, and professional experience.	4.1	Most of the Time
I understand the benefits and risks of different ways of representing oneself online, both professionally and personally, and adheres to organizational and professional social media policies.	4.2	Most of the Time
I understand that online posts remain in the public domain and contribute to an individual's digital footprint	4.1	Most of the Time
Indicative content		
I use available digital technologies to support learning and professional development	4.1	Most of the Time
I employ legal framework, relevant policies governing digital health	4.1	Most of the Time
I am aware of digital identity and cyber security	4.2	Most of the Time
I use available tools to develop an online digital identity	3.9	Most of the Time
I am acquainted with benefits and risks of maintaining an online digital identity	4.1	Most of the Time
Grand Mean	4.06	Most of the Time
Patient digital health advocacy	WX	Interpretation
I understand the role of the nurse in advocating for a person's access to digital health technologies and establishing and developing the person's digital literacy.	4.3	Always
I understand the benefits and possible risks of different digital health applications when assisting and empowering the person to use evidence based digital resources.	4.2	Always
I use digital health in partnership with the person to aid culturally appropriate, informed decision-making and health literacy.	3.9	Most of the time
I empower and assists, where appropriate, the person in using a safe and culturally appropriate range of communication technologies in their care, such as telehealth consultations.	4.1	Most of the time
Leadership with organization		
I recognized the role of the nurse in promoting the use of digital health technologies within an inter professional framework.	4.1	Most of the time
I understand the role of the nurse in the implementation and evaluation of digital health technologies.	4.1	Most of the time
I recognize the advantages and challenges of digital health in practice	4.2	Always

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Digital leadership		
I understand the leadership role of the nurse in the identification, co-production, design, implementation, and evaluation of digital health technologies that support nursing practice.	4.1	Most of the time
I understand the leadership role of the nurse in the design, implementation and evaluation of digital health technologies at organizational and national levels across a broad range of stakeholders, taking into consideration disability, language, literacy levels and cultural backgrounds.	4.1	Most of the time
Grand Mean	4.12	Most of the time
Data Management	WX	Interpretation
I understand informatics and digital health terminology	4	Most of the time
I understand the purpose, structure, use, and storage of electronic health records (EHR)	4.2	Most of the time
I manage and apply information within the relevant scope of practice and healthcare context	4.2	Most of the time
I use health data and how, for the benefit of the person and the healthcare system.	4.2	Most of the time
Data Capture		
I understand that nurses are crucial in the capture of data and advises on their use within the healthcare system	4.1	Most of the time
I understand how data is stored and used throughout the healthcare system	4	Most of the time
I systematically and accurately collect and records relevant data in a structured format, taking into consideration the requirements for data quality.	4	Most of the time
I understand the benefits and risks of using person-generated data in delivering care where an evidence base is required.	4.1	Most of the time
Data lifecycle		
I understand data structures and their importance in healthcare	4.1	Most of the time
I have a baseline understanding about structured languages used in nursing in relation to data capture, aggregation, storage, use and destruction of data.	4.1	Most of the time
I recognize the role of data integrity in healthcare and the importance of complete, timely, accurate and validated data.	4.2	Most of the time
I understand the transition from data, which is validated through information and knowledge, to evidenced-based decision-making.	4.1	Most of the time
Grand Mean	4.11	Most of the time
I critically evaluate and sources information to support evidence-based decision-making for practice and research	3.9	Most of the time
I use complete, accurate, validated data to assess nursing practice and provide an opportunity to influence health service delivery, management, planning, policy, resourcing, practice, research, education, and continuous improvement.	4.1	Most of the time
Data sharing		
I understand the concepts relating to data linkage	3.9	Most of the time
I identify the purposes, benefits and risks of aggregating clinical data from multiple sources	4.1	Most of the time
I understand the importance of data analytics and how they influence decision-making and care delivery	4	Most of the time
I recognize the various data sources available and judges their quality, including person-generated data	3.9	Most of the time
I understand the importance of collecting data once and using it many to ensure it is used as effectively as possible for safer, better care.	4.2	Most of the time

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Extending practice		
I understand the use of digital health technologies to support innovation, quality improvement, research, and evidence-based practice.	4.3	Most of the time
I understand the uses of digital technologies to facilitate person empowerment, engagement, education and self-managemen t of health.	4.1	Most of the time
Grand Mean	4.04	Most of the time
Digital Health Governance	WX	Interpretation
I understand the principles of data and information governance, including privacy and security requirements.	4	Most of the time
I recognize the advantages and challenges of digital health in practice	4.1	Most of the time
I use a range of approved devices, applications, and software for undertaking nursing practices	4.1	Most of the time
I understand nursing practices in relation to keeping data secure.	4.1	Most of the time
I recognize the importance of role-based access	4.2	Most of the time
I recognize current and future risk regarding cyber security	4.4	Most of the time
Grand Mean	4.15	Most of the time

	Interval	***Interpretation***
5	*4.21-5.00*	*Always*
4	*3.41-4.20*	*Most of the Time*
3	*2.61-3.40*	*Sometimes*
2	*1.81-2.60*	*Rarely*
1	*1.00-1.80*	*Never*

The present study revealed that nurses demonstrated high competency levels (grand mean = 4.10), particularly in professional development and lifelong learning, as most respondents actively engaged in upskilling initiatives. This aligns with Alharbi et al. (2022), who reported that continuous professional development programs significantly enhance digital health competencies among nurses in the Middle East. Similarly, Rahman et al. (2021) found that nurses' commitment to lifelong learning strongly correlates with their ability to adapt to emerging technologies, particularly in hospital-based settings. Likewise, Camacho et al. (2023) emphasized that nurses who frequently participate in formal training demonstrate higher adaptability and confidence in digital environments.

In terms of competence in utilizing digital health tools and systems, the current findings corroborate Zhang et al. (2022), who highlighted strong proficiency among nurses in handling electronic health records and telemedicine platforms, driven by organizational mandates. Comparable results were reported by Liu et al. (2021), indicating that technical proficiency among nurses often exceeds their understanding of associated legal and ethical requirements. Furthermore, Al-Hadhrami et al. (2022) observed that the increased adoption of hospital information systems in Gulf countries led to improved technical skills among nurses, though disparities in advanced functionalities persisted.

However, the study revealed room for improvement in legal and ethical dimensions, particularly regarding data governance, patient confidentiality, and consent protocols. This is consistent with Topaz and Ronquillo (2021), who observed that despite advancements in digital competency, nurses frequently lack adequate training in ethical considerations and cybersecurity practices. Similarly, Gagnon et al. (2023) noted that while digital literacy among nurses is increasing, gaps remain in understanding data privacy laws, especially when using telehealth platforms.

Likewise, Chow et al. (2021) reported that insufficient institutional policies and training related to health information governance contribute to persistent knowledge gaps in legal compliance.

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Relationship between Nursing Practices in Digital Technology and Digital Health Competencies

This final section of the chapter presents the correlation between the nursing practice in digital technology and digital health competencies

Table 3. Correlation between Nursing Practices in Digital Technology and Digital Health Competencies

Variable 1	Variable 2	Correlation Coefficient (r)	Interpretation	*p*-value	Interpretation
Nursing Practices	Digital Health Competency	0.0118	Very Low Correlation	0.7143	Not Significant

The correlation between nurses' practices and their digital health competencies was negligible and not statistically significant (r = 0.0118). This suggests that having the necessary skills does not automatically translate into consistent practice. Possible reasons include structural and organizational constraints such as limited access to updated technologies, insufficient IT support, and absence of clear institutional policies. This observation is consistent with the Technology-Organization-Environment framework, which posits that organizational readiness is crucial for digital transformation (Mendoza et al., 2022). Thus, competency-building initiatives should be coupled with systemic interventions to foster actual implementation.

Conclusions

Nurses at Bahrain Hospital reported moderate application of digital technologies, with strong utilization of telehealth and electronic health records but lower performance in legal safeguards and identity protection. Digital health competencies were generally high, especially in continuous learning and technical proficiency, yet weaker in legal and ethical knowledge. The relationship between practices and competencies was negligible (r = 0.0118), indicating that skills alone are insufficient to ensure practice integration without organizational and structural support.

Recommendations

Based on the findings, it is recommended to Implement mandatory CPD programs (minimum 10 units annually) on digital health tools, data security, and legal compliance. Conduct quarterly hands-on workshops on cybersecurity, electronic health records (EHR), and telehealth systems. Upgrade hospital digital infrastructure and ensure 24/7 IT assistance, reducing system downtime by at least 90%. Develop clear institutional policies aligned with Bahrain's health strategy and WHO digital health guidelines. Establish a Digital Health Governance Committee to monitor compliance with data privacy and ethical standards.

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