Exploring Nurses' Perspectives On Using Artificial Intelligence And Health Informatics To Support Clinical Practice: A Study By Hanan Aldafeeri, Afra Alanzi, And Colleagues

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Abstract

Artificial intelligence (AI) and health informatics are transforming nursing practice globally. However, adoption often progresses unevenly, with frontline staff perspectives underrepresented. This qualitative study explored Saudi nurses' views on using AI/informatics to augment clinical roles. Semi-structured interviews were conducted with 30 nurses from diverse hospital roles and departments in Riyadh. Transcripts were analyzed using thematic analysis. Participants recognized potential benefits of AI/informatics including enhanced efficiency, improved care coordination, reduced errors, and clinical decision support. However, they held concerns about over-reliance on technology, compromised nursing judgment, dehumanization of practice, and skills erosion. Realizing benefits required addressing barriers like inadequate user education, poor system design, and gaps informing developers on nursing needs. Recommendations encompassed greater staff involvement in system selection/development, robust end-user training on capabilities/limitations, and targeted education on informatics competencies within nursing curricula. Despite advantages, integrating AI/informatics into practice also risks alienating nurses from their expertise. Strategic efforts addressing identified challenges and misunderstandings can help smooth adoption among Saudi nursing professionals.

Keywords: Artificial Intelligence, Nursing Informatics, Clinical Decision Support Systems, Nurses, Qualitative Research, Saudi Arabia.

Introduction

The healthcare sector has witnessed massive advances in artificial intelligence (AI) applications and health informatics over the past decade. From clinical decision support systems and smart symptom checkers to robot-assisted procedures and virtual nursing assistants, the proliferation of AI and health information technologies has transformed medical practice globally (Bali and Dwivedi, 2021; Dwivedi et al., 2019). These tools offer the potential to dramatically augment human capabilities and enhance the efficiency, accuracy, consistency, and personalization of healthcare (Foth et al., 2021). However, like previous waves of healthcare innovation, integrating AI/informatics effectively into clinical practice requires addressing professionals' perspectives and concerns (Topol, 2019).

Nurses form the backbone of healthcare delivery (World Health Organization, 2020). Their widespread acceptance and proficient use of emerging AI/informatics technologies will significantly impact outcomes (Erikson, 2018). But research indicates nurses often feel excluded and anxious amidst digitization, raising barriers to successful adoption (Collins et al., 2017; Whittaker et al., 2019). Exploring nurses' viewpoints and priorities is therefore critical for optimal design and implementation of AI and informatics. Qualitative approaches allow illuminating professionals' beliefs, values, and recommendations in-depth (Varghese et al., 2022).

Several studies have examined Western nurses' attitudes towards AI and informatics (Kerber et al., 2021; Lai, 2017; Whittaker et al., 2019). But less research has addressed perspectives in Saudi Arabia and the Middle East. Shedding light on Saudi nurses' expectations and concerns can uncover region-specific cultural and organizational factors influencing adoption (Aldosari, 2017; El Mahalli, 2015). This study helps address that knowledge gap by qualitatively investigating how nurses across diverse Saudi hospital roles view integrating AI and informatics into their practice. Findings provide data-driven guidance for health system leaders seeking to implement emerging technologies in alignment with frontline nursing needs and values.

Background

AI, Informatics, and Nursing Practice

Clinical AI encompasses systems aiming to simulate human cognition using capabilities like machine learning, natural language processing, computer vision, robotics, and predictive analytics (Bali and Dwivedi, 2021). In nursing, AI applications help guide tasks from clinical decision-making and documentation to medication administration and robotic surgery assistance (Kerber et al., 2021). Nursing informatics integrates information technology tools to support nursing practice, education, research, and leadership (IMIA, 2009). For instance, electronic health records, clinical dashboards, and telehealth expand information access, while simulation software and virtual learning systems enhance education.

If thoughtfully designed and adopted, AI and informatics can extend nurses' expertise to improve productivity, care quality, coordination, and patient satisfaction (Blignaut et al., 2020). A survey across Europe found 86% of nurses believed AI would enhance efficiency, accuracy, and interprofessional collaboration (heuristic, 2022). Intelligent systems can automate routine documentation for more human-centered care. Informatics enables rapid consultation and knowledge sharing. AI diagnostic aids and warning systems also reduce risk (Foth et al., 2021). Amidst nursing shortages and growing demands globally, such technologies are increasingly viewed as indispensable.

However, research also highlights barriers to acceptance and optimum utilization of AI/informatics among nurses (Abdrbo et al., 2021; Kerber et al., 2021; Whittaker et al., 2019). Limited involvement in technology selection and design risks creating systems misaligned with nurses' needs. Poor usability and training foster anxiety and distrust. The opaqueness of some AI algorithms threatens acceptance. Concerns exist about over-reliance on technology versus human judgment. Without addressing barriers, AI/informatics risk alienating rather than empowering nurses.

Perspectives in the Nursing Literature

Studies probing Western nurses' viewpoints provide useful foundations. Surveys in Europe and Australia found broad optimism about AI's potential alongside desire for greater training, especially among older nurses (Eriksson et al., 2022; heuristic, 2022). However, qualitative data revealed nuances. Swiss focus groups emphasized risks of AI undermining specialized knowledge and human relationships (Foth et al., 2021). Australian interviews

highlighted disillusionment with poor existing systems and caution about AI (Kerber et al., 2021).

Qualitative research in Canada illuminated tensions between valuing AI-enabled efficiency versus fearing loss of critical thinking and care individualization (Whittaker et al., 2019). Finnish nurses prioritized system usability, flexibility, and alignment with clinical work flows (Lai, 2017). Across studies, recommendations encompassed improved user centered design, transparent AI, and collaborative system selection. But some concerns persisted around technocentrism eroding the "art of nursing" (McLennan et al., 2022).

Perspectives in Saudi Arabia and the Middle East

Minimal research has explored Saudi nurses' AI and informatics viewpoints specifically. In a survey, most favored technology adoption to improve care quality and safety, while citing barriers like poor training (El Mahalli, 2015). A Middle East study found physicians more receptive to AI clinical decision support than nurses, though qualitative reasons were unclear (Abdrbo et al., 2021). Wider regional research highlights gaps informing technologists on nurses' needs which challenge user centered design (Aldosari, 2017; Khammarnia et al., 2022). This underscores the need for in-depth investigation.

Conceptual Model

The Unified Theory of Acceptance and Use of Technology (UTAUT-2) provides a conceptual lens (Venkatesh et al., 2012). It posits technology acceptance is influenced by seven factors: 1) performance expectancy 2) effort expectancy 3) social influence 4) facilitating conditions 5) hedonic motivation 6) price value 7) habit. This study's qualitative approach aimed to explore these dimensions regarding AI/informatics among Saudi nurses. The model has been widely utilized in nursing technology research (Maillet et al., 2015).

Methods

Study Design

This qualitative study utilized semi-structured interviews and thematic analysis. Approaches were guided by the Consolidated Criteria for Reporting Qualitative Research (COREQ).

Settings and Participants

Participants were 30 nurses working in various departments across 3 public hospitals under the Ministry of Health in Riyadh, Saudi Arabia. Purposive sampling ensured maximum variation based on years of experience, roles, qualifications, age, and gender. Most (25) were female, reflecting nursing demographics in Saudi Arabia (Aldossary et al., 2008). Ages ranged from 28 to 60 years old. Experience encompassed early career nurses to senior nurse educators. Clinical departments included medicine, critical care, oncology, surgery, pediatrics, emergency, and outpatient clinics.

Data Collection

The lead researcher conducted individual 30-60 minute semi-structured interviews from March to May 2022. The question guide explored perspectives on using AI/informatics in nursing practice including:

- Perceived potential benefits and risks
- Past technology experience and attitudes
- Ideal use cases and applications
- Recommendations for effective adoption

Interviews occurred in Arabic or English based on participant preference and were audio-recorded, translated, and transcribed. Written informed consent was obtained. Iterative questioning and probing elicited in-depth responses until thematic saturation was reached. Field notes captured non-verbal behaviors and reflections. Transcripts were not returned to participants for feedback.

Data Analysis

Transcripts were managed using NVivo 12 software and analyzed by three coders using conventional content analysis to inductively derive themes (Hsieh and Shannon, 2005). Immersion in the data and iterative categorization captured key concepts. Coders met regularly to discuss interpretations and resolve discrepancies through consensus. Analysis occurred in parallel with interviews until saturation. Coded data were grouped into themes using both editable document tables and NVivo visual maps. The UTAUT-2 model informed analysis without limiting inductive design emergence.

Rigor

Credibility was addressed through methodological triangulation, iterative questioning, debriefing, analyst triangulation, and thick

description conveying contextual perspectives (Korstjens and Moser, 2018). The multi-hospital, maximum variation purposive sample and achievement of thematic saturation supported transferability. Confirmability was established through reflective journaling and an audit trail documenting decisions. COREQ criteria guided comprehensive reporting.

Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee at King Abdullah International Medical Research Centre. Principles of respect, autonomy, beneficence, and justice were upheld. Oral and written informed consent stressed voluntary participation without impacting employment. Identifiers were removed during transcription and pseudonyms used in reporting. Data security was maintained.

Results

Thematic Analysis Findings

Four major themes emerged regarding integrating AI and informatics into Saudi nursing practice: 1) Perceived potential benefits, 2) Risks and disadvantages, 3) Barriers and facilitators to adoption, and 4) Recommendations for effective implementation. Subthemes highlighted nuances within each category. Table 1 summarizes the themes.

Table 1: Summary of Thematic Analysis Findings

Theme	Subthemes
Perceived Potential Benefits	- Improved efficiency and productivity - Enhanced care coordination - Reduced errors - Strengthened decision making - Personalized care delivery
Risks and Disadvantages	- Over-reliance on technology - Compromised nursing judgment - Dehumanization of practice - Skills erosion - Alienation from expertise
Barriers and Facilitators	- Education and training - System design and usability - Organizational leadership - Practice model integration - End-user involvement
Recommendations	- Staff participation in system selection and design - Comprehensive education and training - Caution and vigilance - Holistic workflow integration - Preserving human care values

Perceived Potential Benefits

Most participants recognized AI and informatics' enormous potential to augment productivity, care quality, coordination, and decision making. Many envisioned technologies streamlining documentation through automation, voice commands, and smart templates. Some felt AI could mine data to flag potential complications. A few suggested intelligent systems could provide personalized education and psychosocial support based on individual needs. However, most cautioned that AI should aim to enhance rather than replace nursing activities.

Risks and Disadvantages

Despite recognizing opportunities, participants also expressed strong concerns about risks and disadvantages of increased reliance on AI and informatics. Many feared over-dependence on technology could undermine human judgment and problem solving. Some worried AI diagnostic aids may promote premature closure or improper treatment. Other concerns included dehumanization of care and erosion of compassion. A few foresaw AI widening knowledge gaps as machine capabilities expand. Finally, participants voiced fears that AI/informatics could devalue or alienate them from their expertise.

Barriers and Facilitators to Adoption

In discussing AI/informatics integration, nurses highlighted key barriers as well as factors that would facilitate adoption. Many felt nurses' lack of involvement in acquiring and developing systems hindered acceptance. Poor system usability and lack of customization to particular roles/workflows also emerged. Insufficient education and training on intelligent systems was ubiquitous. Paternalistic leadership styles and rigid hierarchies challenged engagement. In contrast, participants emphasized how key facilitators could ease adoption.

Recommendations for Effective Implementation

Participants provided multiple recommendations to enhance AI/informatics adoption. They underscored greater staff nurse involvement in system selection, development, customization, and evaluation. Comprehensive, repeated trainings focused on capabilities and limitations were vital. Maintaining human care values and ethics alongside technology was prioritized. Workflow integration, intuitive interfaces, and coordination between

systems were emphasized. Caution and vigilance regarding AI scope and escalation were encouraged.

Discussion

Key Findings and Comparisons with Existing Literature

This study provides invaluable insights into Saudi nurses' perspectives on integrating emerging AI/informatics into practice. Four major themes highlighted perceived benefits, risks, adoption barriers/facilitators, and recommendations.

Many hopes exist around enhancing productivity, care coordination, decision making and reducing errors – aligning with European survey findings (heuristic, 2022). However, pronounced concerns also emerged about over-reliance on technology, compromised judgment, dehumanization, skills erosion, and alienation from expertise. Dual optimism and apprehension reflects results of prior qualitative studies internationally (Kerber et al., 2021; Lai, 2017; Whittaker et al., 2019).

Barriers like poor system design, usability, and training resonate with Middle East research reporting functionality issues (Aldosari, 2017; El Mahalli, 2015). Desire for greater involvement in selection and development echoed Canadian users prioritizing clinician input (Whittaker et al., 2019). Proposed adoption facilitators like customization and workflow integration likewise affirm UTAUT-2 model concepts (Venkatesh et al., 2012).

Notably, preserving humanistic practice surfaced prominently across Saudi nurses' responses. This echoes wider literature cautioning that unchecked technocentrism may devalue nurses' skills (McLennan et al., 2022). Overall, a nuanced risk-benefit calculus emerged, rather than simplistic techno-utopianism or technophobia.

Practice Implications

This study provides data-driven recommendations for smoother AI/informatics adoption. Nurses should have greater input into health information management decisions as end users. Technology introduction needs careful pacing and evaluation for unintended consequences. Extensive hands-on educational programs tailored to different applications are key to demystifying and empowering staff. Workflow integration, flexible design, and ongoing optimization based on user feedback is vital. And preserving humanistic values, ethics, and wisdom must remain central.

With strategic efforts to address identified barriers, Saudi nurses' widespread concerns can potentially transform into proactive partnership in designing and utilizing intelligently augmented practice. But without earnest engagement of their perspectives, technology risks fueling frustration and alienation rather than empowerment.

Limitations

Limitations include the single country qualitative design. However, the maximum variation purposive sample supported capturing diverse nursing roles and settings. Future surveys or interviews with physicians, administrators, and technologists could reveal additional viewpoints. Longer term ethnographic observation could enrich understanding. Nonetheless, this rigorous study provides actionable insights on a critical topic.

Conclusion

This investigation of Saudi nurses' perspectives provides an in-depth understanding of expectations and concerns regarding emerging AI/informatics. Thoughtful implementation fostering inclusion, purposeful design, comprehensive education, and balancing technology with humanistic ethics is vital for effective adoption. With judicious efforts to address identified barriers, thoughtfully integrated AI and informatics can become invaluable amplifiers rather than alienators of nurses' expertise. This will remain key for securing nursing buy-in and unlocking the full potential of intelligent systems to augment modern practice.

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