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An Overview of Nursing and Physiotherapy Informatics: Practices and Perspectives in Saudi Arabia

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Abstract

Nursing and physiotherapy informatics have emerged as essential fields in the evolving landscape of healthcare, enabling the efficient management of patient data, improving care delivery, and enhancing treatment outcomes. In Saudi Arabia, the integration of informatics within these professions remains an ongoing challenge, with both fields showing considerable potential for growth in terms of technology adoption and application. This narrative review examines the current state of nursing and physiotherapy informatics in Saudi Arabia, exploring the historical development, definitions, and scope of each discipline. It highlights the advantages and challenges associated with their implementation, including the need for structured education, training programs, and policy support. Despite the growing recognition of the role of informatics in healthcare, barriers to full integration persist, particularly in the fields of physiotherapy and nursing. The review proposes strategies for overcoming these challenges, including fostering a culture of informatics, improving technological infrastructure, and advancing research in these areas. Ultimately, the goal is to enhance patient safety, improve healthcare outcomes, and ensure the efficient delivery of care through the strategic implementation of informatics systems in nursing and physiotherapy practice in Saudi Arabia.

Keywords: *Nursing Informatics, Physiotherapy Informatics, Healthcare Technology, Patient Data Management, Saudi Arabia, Informatics Education, Evidence-Based Practice, Healthcare Integration, Patient Safety, Informatics Culture, Telehealth, Healthcare Outcomes.*

Introduction

Relying on the rapid growth of the global technological phenomena across healthcare sectors, nursing informatics (NI) and physiotherapy informatics (PTI) have emerged as pivotal entities in healthcare contribution in the world today. NI can be quite important in offering information associated with innovations and technology improvements, which can lead to enhancement in patient care outcomes and professional practices or as an evidence-based practice (Singh et al., 2023)(ARIFFIN et al.2022)(Delaney et al.2022)(Harerimana et al., 2020). The SPA represents a shift in the Saudi health ministry viewpoint about physiotherapy services from a therapeutical-side to more scientific and professional perspective. The healthcare sector is not far behind from all other sectors regarding global technological growth. The development of health software and databases are just one example to prove how much the healthcare sector taking benefits of the global technological opportunities. The combination of health 1.0, health 2.0 and health 3.0 opens up a new horizon for the world healthcare industry, which can also impact the physiotherapy and nursing sectors. The focus of this review is to define NI and PTI practices via SA with

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the viewpoints of global practice and practice across developed countries, industrialized countries. It offers to discuss the global technological advancements, which healthcare practices of nursing and physiotherapy shaped by informatics' implications. The narrative review practices and focuses on SA, starting with the background of the theme, then offering insight to why healthcare professionals, especially nurse and physiotherapist personnel need to know the informatics and how it affects in respect to RTAs as patients. It achieves the focus on the practices itself by pointing out NI, PTI definitions and practices as internationally and SA, and discuss the standards, policies, and guidelines about them. Furthermore, it provides an illustrated SA review practice configuration shaped by respect to; why nursing and physiotherapy personnel need to know about the informatics, NI & PTI practices and focuses on internationally and in the SA, and standards and policy & guidelines for NI & PTI practices. Finally, it discusses the barriers to the NI & PTI practices in community and hospital settings of SA and suggests some solutions prevalently. At the time NI and PTI practiced to date across the globe. They can request for legislation for better practice implementation according to the informatics' focuses. With the help and support of both NI & PTI practices can be stand out as significant practices, ensuring patient care practice improvements. The best practice is necessary here as safety and efficiency are major keys and it can help upgrading professional services, allow scientific and good research based physiotherapy consultations, and it helps as a better time management. A common technology use is another essential entity, as that ensures easiness in patient records and sharing PT reports across both primary and secondary sectors as a case need. A continuous training seeks healthcare personnel with EIP about the NI and PTI practice. (Delaney et al.2022)(Singh et al., 2023)(Delaney et al.2022)(ARIFFIN et al.2022)

Theoretical Foundations of Nursing and Physiotherapy Informatics

In the broadest and most traditional sense, the term informatics describes the extensive study of information along with its complex interactions, particularly with respect to systems and various resources that handle it in multifaceted ways. A more contemporary and nuanced definition has also emerged as we delve into the context of technological information systems and increasingly specialized domains, such as medical informatics, which has gained significant traction. These systems have been increasingly designed and carefully deployed with the explicit benefit of enhancing workflow efficiency and decision-making capabilities in clinical practice and service in mind, particularly making this a focal point of interest and progression in the field. Informatics thus places a unique perspective and asks for a set of skills that may be unfamiliar to those who are less acquainted with it, particularly clinicians who are entrenched in routine service operations. Consequently, a comprehensive map needs to be provided to explore some of the essential concepts, innovative models, and established frameworks developed specifically within the realms of nursing and physiotherapy informatics in order to conduct a thorough guided tour through some of the pertinent literature and research findings. Beginning with a broader frame, this exploration proceeds with an illustrative description, an in-depth discussion, and a critique of a few specific models and frameworks that are essential to understand the discipline. The core issues that arise in health informatics, where nursing informatics offers important contributions, are vividly illustrated by the plethora of complex questions relating to the automation of tasks: What aspects of clinical processes can be automated that should indeed be automated? What might be the unintended consequences of introducing automation into healthcare settings? What specific tasks or components might be deemed to be unsuitable for automation? Which data collection, storage, handling, display, processing, or decision-making components can best benefit from the integration of automation? And what are the fundamental design principles for automation that appropriately addresses all of these crucial points? Early on in the development of nursing informatics, practitioners and researchers alike were challenged to ask 'meaningful questions' to maximize and fully leverage the emerging opportunities available to enhance patient care, education, and vital research. The term 'nursing informatics' was first proposed in 1976, when thought leaders Scholes and Barber elaborated on the vast potentialities of computer technology for an evolving practice discipline like nursing, specifically discussing the various contributions these advancements could make to service, education, and research endeavors; since that pivotal moment, nursing informatics has been rightfully established as one of the foundational cornerstones of the interdisciplinary realm of health informatics. (Moen & Merete Mæland Knudsen, 2013)

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Key Concepts and Definitions

Due to their inherently diverse backgrounds and a wide array of perceptions, nurses and other healthcare providers tend to view and implement the concept of nursing informatics in markedly different ways. Given that previous efforts to precisely define and distinguish the boundaries of nursing informatics predominantly centered around the discipline of nursing itself, this paper endeavors to encompass these varying viewpoints in a manner that can be suitably applied in analogous comparisons and discussions, particularly when examining the emerging field of physiotherapy informatics. The primary aim of information technology-based systems and processes is to enhance various aspects of patient care chronicles, as well as to improve clinical and administrative decision-making and facilitate interaction and communication between patients and healthcare providers. This broad category includes an array of essential tools and systems, such as electronic health records (EHR), personal health records (PHR), medication purchase systems, computerized doctor order entry systems, laboratory and radiology systems, in addition to various communication and information exchange platforms like picture archiving systems, e-mail services, and much more. When it comes to measurement and assessment, relevant process and outcome data can be gathered to offer insights into both the patient's health status and the quality of healthcare being provided. Historically, healthcare providers have tended to practice informatics predominantly within clinical settings, which means their focus has been mainly on routine clinical care and the support of such endeavors. This clinical approach reinforces an evidence-based quantitative practice that promotes easier, more accurate, and comprehensive understanding, exploration, and dissemination of knowledge through the preparation and application of learning organizations. Patient-centered care is a holistic approach that actively incorporates the perspectives of patients, ensuring that care is aligned with their values, needs, wishes, and methodologies when it comes to their involvement in clinical decisions relating to their individual management. Within this framework, models are defined as structured schemas or architectures that have been developed to visually represent the relationships among model purposes, concepts, and diverse perceptions. On the other hand, a theory is understood as a logical or conceptual explanation crafted from general principles and offered with the intention of describing or predicting specific events or circumstances. An illustrative example of this can be found in what is often referred to as "DT," which represents the integration of various principles and practices of care modeling, defined as the systematic process and outcomes resulting from the incorporation of established theories into the fabric of care delivery. (Moen & Merete Mæland Knudsen, 2013) (Kleib et al.2021)(Delaney et al.2022)(Mohsam, 2022) (Kleib et al.2021)(Delaney et al.2022)

Current Practices in Nursing Informatics in Saudi Arabia

Nursing informatics and physiotherapy informatics are subsets of healthcare informatics concerned with the application of informatics principles, methods, and technology to the discipline of nursing and the profession of physiotherapy, respectively. This aims to increase understanding and provide an overview of the definition, professional standards, core competencies, and practices of nursing informatics and physiotherapy informatics in Saudi Arabia. It also discusses nursing and physiotherapy informatics from three main perspectives: education and training, practice and context, and research and scholarship. This narrative review may serve as a baseline description of the current status of nursing and physiotherapy informatics in Saudi Arabia. The boons, banes, and perspectives discussed may also help identify areas for innovation and improvement in these practices.

The Royal Decree initiated by the Saudi Arabian government in 1992 has resulted in an increasing number of Saudi nationals entering the nursing and physiotherapy professions. Despite being in the early stages of integration and development, information systems are now permeating both nursing and physiotherapy workflows. Many institutions and organizations are showing a commitment to adopting and encouraging the use of informatics among nurses and physiotherapists. Nursing informatics utilization currently focuses on patient care, followed closely by administration-related duties. Challenges associated with the process of re-creating archaic paper-based workflows with new screen-based informatics systems have been noted. Moreover, a need for further education and training influenced by systemic factors is identified, including

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wider educational outreach and the need for concurrent technological improvements. (Almutairi, 2023)(Almarhabi, 2024)(Alharbi, 2022)

Technological Infrastructure

Technological Infrastructure. A rapidly advancing health informatics area that supports the processing, storage, retrieval, and management of nursing data is rapidly expanding worldwide. Acceptance, deployment, and use of informatics by Saudi nurses are still at elementary levels. Consequently, governmental and institutional stakeholders should work together to assess current and required nursing health information technologies (HITs) and periodically evaluate these technologies' growth and benefits. This narrative aims to comprehend Saudi nursing informatics practices and assimilates essential opinions for advancing nursing informatics in future Saudi context.

Technological underpinnings are a considerable initial constituent of nursing informatics that facilitates the correct achievement and use of data, intelligence, attention, and communique using information and communique technologies (ICTs). An apposite nursing HIT foundation is crucial for operationality and, finally, the effectiveness of other three nursing informatics workings. Maytas based electronic health record (EHR), Naeem system, and QuadraMed system have been predominantly utilized in Saudi nursing settings. Medical professionals' perceptions of the effectiveness of nursing informatics are analyzed by means of Six Sigma and Naeem-based surveys in this manuscript. Both nursing operations and extracts on which the nurses are performing practices are already made of exact kinds in the Naeem system to the maintenance. Owing to user-friendliness, nurses' practice obtaining data and performing nursing operations (NOs) was ticked off with Naeem while the desired and required thing was the e-checkbox. Nurses were not provided with PDAs and the Naeem system was not compatible with their mobile tablets, which was all rooted in the paper system's being notorious in the Saudi medical community already for about a decade (Aboshaiqah et al., 2023). Naeem-based nursing systems do not bolster access with smartphones or other HITs other than desktops and laptops by the end of printing while informatics remains at the area of paper charting today among Saudi nurses.

Current Practices in Physiotherapy Informatics in Saudi Arabia

This section investigates the state of physiotherapy informatics practices within the Saudi Arabian healthcare system. To that end, the discussions aim to address the following questions: How do physiotherapists use informatics in their practice? What is the state of physiotherapy informatics practices in Saudi Arabia? Evidence of practices is provided through various examples and case studies. Physiotherapists assess patients and establish criteria-based treatment plans, or prescribed therapeutic intervention(s) according to the problem diagnosis. Studies have shown that an informatics system can support this role (Abdullah Alshehri et al., 2018). Physiotherapy examination guidelines (PTG): Based on clinical practice, expert consensus recommendations; the guideline design is used as an Informatics tool. By utilizing the important thing of the format in structuring patient assessment and treatment planning, PTG has developed a system to monitor and evaluate implementation. This system contains components for Physiotherapists, such as guidelines, training, Support decision; and a patient-based component, such as report formats, pamphlets supplements. Informatics implementation in physiotherapy assessment and treatment planning is illustrated through the following examples and case studies. A 30-year-old male experienced LBP with physical work. Main problems were decreased muscle endurance weakness and diminished flexibility. As treatments, deep heat and remedial exercise techniques were applied. The man had his normal state again. Other companies have the same process called industrial physiotherapy, they send post-educated physiotherapists abroad in their branches in order to apply techniques. A 46-year-old female MERS-CoV cured over 5 years. She is examined again and still had findings, restricts shoulder Rom with a possible complex syndrome. Ultrasound, scapular stabilization exercises, to be ppls RTC other toxins injections were planned but therapist gave the PWCs brochures process, she was now good, and also recommended the other patients. Another aspect is the patient is important relate to the exercises and education while planning treatments in phases but implementing it, is another as finally deciding. A 25-year-old male that a radical placement of a completely torn cuff when he was 17, 10 years ago. New cuff while moving with MMT and TCU was detected muscles. MMT + (5) repetitious contraction. The therapist

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told him to exercise at home and avoid lifting/repeating backhand movements. But the patient did not and re-tore his ectotendineous muscles. After 2 similar incidents, the patient was decided to give brochures and explain the subject educatively. (Al Awadh, 2022)(Rasheed, 2022)(Awadh, 2022)

Integration with Electronic Health Records

Information technology has considerably transformed healthcare practices over the past few decades. With the introduction of Electronic Health Records (EHR), storing and managing patient data electronically has become more efficient than ever. EHRs are capable of storing comprehensive data about patients, including patient history, medication, allergies, diagnosis, results of physical examination, laboratory tests, vital signs, and ultra sound. Moreover, it has the capability of sharing information with different health care providers across different healthcare organization. This technological revolution can enhance communication and collaboration among different health professionals who provide patients' cares since each profession has his own unique perspective and knowledge. Physiotherapy informatics can operate more effectively by having shared access to the same record and can use such information to plan suitable interventions, delegate relevant appointments, and improve the overall care quality (Hazazi & Wilson, 2021). Access to patient data will make the clinical decision-making easier. Against a background of routine screening of patients having the same conditions, a pattern may become apparent and this may reduce the number of inappropriate appointments or the need for referral. Real time access to a record can make a positive difference to patient care, and this is not limited to the review of pathology or the monitoring of medication. Insights into a patient's life-style, social circumstances or management issues can lead to more appropriate support. There are a number of benefits expected from physiotherapists having access to patient computer records, but this is not inevitable. Poorly designed systems, professional jealousy or cryptic data fields may mean it is of little value. Regional or healthcare situation may not allow the sharing of record between organizations, and patients might fear that full access to that records could be a breach of confidentiality. In any case, whether the sharing of record leads to improved patient outcome and greater health professional satisfaction has not been entirely clear. (Stoumpos et al., 2023)(Iyanna et al.2022)(Singh et al.2021)(Haleem et al.2022)

Challenges and Opportunities in Nursing and Physiotherapy Informatics in Saudi Arabia

An accelerated uptake in the adoption of informatics can improve care efficiency, quality of service, and patient satisfaction. This narrative not only acknowledges the opportunities for informatics in nursing and physiotherapy, but also recognizes the wide range of challenges and potential barriers which confront innovative implementation. These challenges may be the drivers for effective and strategic actions aiming to improve health informatics in nursing and physiotherapy. (Liaw et al.2021)(Njoku et al.2023)(Wiljer et al., 2021)

The situation in Saudi Arabia is relevant to many other low- and middle-income countries worldwide (LMICs) and by discussing the theory and sharing the experience and the reality, healthcare workers, hospital administrators, policy makers, and professionals can make informed decisions. At the same time, informatics practices represent an extension of current nursing practices in caring for patients and providing a high standard of healthcare. Therefore, this narrative seeks to present both realities, with the aim of providing a call for action which is grounded in a perspective that informatics in both nursing and physiotherapy is both necessary and positive.

One of the significant and overarching issues that is faced by Low and Middle-Income Countries (LMICs) is that of building and maintaining an adequate technological infrastructure. In Saudi Arabia, a range of computer systems designed for various tasks have been introduced to hospitals within the last two decades. Moreover, governmental hospitals initiated a comprehensive health informatics system only since 2005, which highlights the recent nature of these developments. However, it is important to note that their usage is currently limited primarily to administrative purposes, which restricts their potential benefits. The existing health informatics systems are not fully adapted to support multi-disciplinary team working environments effectively. Additionally, the designed computer interfaces are considered less than user-friendly by many healthcare professionals. Moreover, a significant lack of training in health informatics is identified as a

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considerable barrier to the successful completion of the expected levels of practice in this field. At the 'work environment' level, resistance to change has been reported from healthcare professionals, which acts as an obstacle toward the successful adoption of health informatics. The resistance stems from a variety of factors, including a lack of understanding of the new systems and apprehension about integrating technology into their established routines. These important results emphasize the critical need for a thorough investigation of health informatics to not only embrace the technological components but also to incorporate social and organizational aspects. Understanding these dimensions is essential to foster better acceptance and utilization of health informatics within healthcare institutions. (Alsadaan et al., 2021) (Siddiqui & Majeed, 2023)(Al-dossary et al.2021)(Alasiri & Mohammed, 2022)(Binkheder et al.2021)

Conclusion

The integration of Nursing Informatics (NI) and Physiotherapy Informatics (PTI) into healthcare systems, particularly in Saudi Arabia, represents a significant step towards enhancing patient care, improving clinical decision-making, and optimizing workflows in both nursing and physiotherapy practices. The rapid technological advancements across healthcare sectors, including the development of health software, electronic health records (EHR), and health information technologies (HIT), provide numerous opportunities to improve the efficiency and quality of healthcare services. Saudi Arabia's healthcare sector is increasingly adopting informatics in both nursing and physiotherapy fields, driven by initiatives such as the Royal Decree and Vision 2030. However, the integration of informatics into clinical settings faces challenges, including insufficient infrastructure, a lack of training, resistance to change, and limited system interoperability.

The need for comprehensive education and training in NI and PTI remains crucial, as well as a continuous effort to improve technological infrastructure and user-friendliness. Furthermore, global practices and standards should guide the development of policies, guidelines, and frameworks to ensure that informatics is implemented effectively across healthcare institutions.

Recommendations

- Enhance Educational and Training Programs: To ensure the successful integration of informatics in nursing and physiotherapy, healthcare professionals in Saudi Arabia must receive targeted education and training. This will equip them with the necessary skills to use health information technologies effectively, especially in clinical settings where data management and patient care are critical.

- Improve Technological Infrastructure: Saudi healthcare institutions should invest in robust, scalable, and user-friendly systems that support the integration of informatics across nursing and physiotherapy. A focus on systems that are compatible with mobile devices and electronic health records is essential to improve data accessibility and collaboration.

- Promote Interdisciplinary Collaboration: Encouraging collaboration between nursing, physiotherapy, and other healthcare professionals can enhance the implementation of informatics. Shared access to patient data through EHRs will facilitate better communication and decision-making, leading to improved patient outcomes.

- Address Resistance to Change: It is essential to address the resistance to informatics adoption by creating awareness about the benefits of technology in improving patient care and the efficiency of healthcare services. Healthcare professionals should be involved in the design and implementation phases of informatics systems to ensure their acceptance and successful integration.

- Implement Continuous Monitoring and Evaluation: Regular monitoring and evaluation of the effectiveness of NI and PTI systems are necessary to ensure that these technologies meet the needs

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of both healthcare providers and patients. Feedback loops should be established to assess the usability and performance of informatics systems.

- Legislate for Better Practice Implementation: To formalize the use of informatics in healthcare, legislation may be required to ensure compliance with national and international standards. This would ensure consistent and safe application of informatics in nursing and physiotherapy practices.

- Encourage Research and Innovation: Ongoing research and innovation should be encouraged to develop new models and frameworks for NI and PTI that address emerging healthcare challenges. Collaboration with international experts and participation in global initiatives will help improve Saudi Arabia's healthcare informatics landscape.

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