Understanding the Potential Impact of Implementing Artificial Intelligence [AI] in the Functioning of Nurses and Patient Outcomes: A Systematic Literature Review

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Abstract

Studies show that there has been an increasing incorporation of AI in different sectors with increasing technological advancement, a trend that can also be observed in the healthcare sector. Considering the growing significance of AI in the medical field in this study, the researcher has aimed to enumerate the different scopes of its implementation in nursing and its impact on patient outcomes. An understanding of these potential areas of AI implementation in nursing and its effect on patient outcomes would be beneficial for the implementation of future advancements related to AI in nursing. In this systematic literature review, the researcher has focused on analyzing the potential areas of implementing AI in the functioning of nurses and the ways it would impact patient outcomes. The review has considered analysing the areas of application and the role of AI in the functioning of nurses, the potential impact of implementation in the functioning of nurses, and how it impacts patient outcomes. With regards to the areas of application, the findings of the reviewed studies have revealed that AI has considerable scope for implementation in areas of clinical decision-making the performing of administrative work, and the identification of patterns and features in healthcare data. It has been reported to positively impact their clinical decision-making processes, minimizing the risk of medical errors along with improving accuracy, which inevitably positively impacts the quality-of-care services being received by the patients and the patient outcomes.

Keywords: Artificial Intelligence (AI), AI in Nursing, AI and Patient Outcomes, AI in the Functioning of Nurses, AI Impact on Nursing, Decision-Making in Nursing, and AI.

Introduction

Concept of AI

Technology in particular, through the use of artificial intelligence (AI), is innovatively solving outstanding voids in healthcare diagnosis, management and data storage. These protest machine learning and natural language processing techniques explore different categories of healthcare data that includes electronic medical records and medical imaging [1, 2]. For instance, AI algorithms can learn the diseases in the radiology images faster and better compared to traditional human vision; in skin cancer detection, it reaches a 95+% efficiency. AI also improves decision making in robotic surgery performing, virtual nursing, and chatbots in patient interaction. Artificial intelligence is now able to process big data about patients and suggest the best therapies considering their history and their DNA [3, 4, 5]. Additionally, platforms with AI for drug discovery help to bring out new treatments much faster [6]. The integration of AI with healthcare has several advantages, they are as follows: However, the following issues are a concern: Finally, it makes patients satisfied and benefits them through fast, precise and inexpensive treatment.

Areas of Implementations

AI is applying in many fields of medicine but with specific focus on diagnosis services. AI can perform the diagnosis of diseases on patient records and scan images including MRI just as effectively, if not more, than a doctor. Also, patient treatment advice can be customized through genetic details given by the patient [3]. AI chatbots and virtual assistants increase administrative productivity as they are responsible for schedules and handling non-emergent queries [4]. AI also specifically assists in the discovery of new drugs based on assessment of molecular data and literature content. Moreover, AI applies in telehealth through remote patient monitoring, and personalized care. Nonetheless, there is still a clear belief among GPs that patient privacy needs to be protected, AI's working sensitive to patients, their data, and the treatment process should be transparent; the data being used for beneficial or nefarious purposes needs to be clarified, and so on.

Recent Advancement

Research shows that the integration of artificial intelligence (AI) in health care has improved in recent years especially in diagnosis. Advanced picture interpretation techniques mean that AI could be used to identify for instance tumours, pneumonia or diabetic retinopathy from X-rays and MRI with the same or better precision as that of radiologists [5,6]. It also incorporates natural language processing (NLP) that allows consideration of doctors and notes, and electronic health records to make decisions for nurses and other healthcare givers. Further, the AI-enabled chatbots and voice support improve health literacy while the first point of patient interaction with a system. In the future, AI is expected to provide a contribution to precision medicine by studying genome data as well as their risks and treatments [7]. Nevertheless, the translation of these technologies into the clinic is rather limited because of issues, like the approval process, the acceptance of physicians, and compatibility with other information technologies [8]. In general, AI is a very promising set of tools to augment healthcare professionals and enhance patient care. The purpose of the research is to establish the extent and potential effects of artificial intelligence in the Indian cardiology nursing specialization. In an era where AI technology is fast developing, it is crucial to know how the nurses perceive, incorporate or respond to with poor acceptance of AI in and around their practices.

Need of the Study

In order to accomplish the following goals and objectives the researcher intends: To examine the viability of AI, and the reception and rejection of AI by the cardiology nurses in the Indian Nursing Scenario [5]. The worry for this research stems from the increasing trends of AI adoption in the healthcare industry with a special emphasis on cardiology. Knowledge of cardiology nurses about AI is important in order to avoid resistance to change and to achieve effective implementation. This study aims to establish the prospects and adverse effects of applying Artificial Intelligence in Cardiology nursing as a way of enhancing patient delivery with better results in the Indian health sector.

Research Aim and Objectives

The primary aim of the present study is to understand the potential impact of implementing AI on the functioning of nurses and the ways in which it may impact patient outcomes. In alignment with the topic of the study, the objectives would be addressed through this systematic literature review is as follows:

1. To analyse the areas in which Artificial Intelligence [AI] is applicable in the functioning of nurses
2. To determine the potential ways in which implementation of AI in the functioning of nurses would impact their operation

3. To examine the ways in which implementation of AI in the functioning of nurses would impact patient outcomes
4. To evaluate the potential challenges in the application of AI in the functioning of nurses

Research Questions

In alignment with the objectives of the study, the research questions which would be addressed through this study are as follows:

1. What are the areas in which Artificial Intelligence [AI] is applicable in the functioning of nurses?
2. How the implementation of AI in the functioning of nurses would impact their operation?
3. What are the ways in which the implementation of AI in the functioning of nurses would impact patient outcomes?
4. What are the potential challenges in the application of AI in the functioning of nurses?

Methods

Study Selection

The researcher would search key resources using search strings like:

1. Artificial intelligence in nursing
2. Artificial intelligence in nursing care
3. Artificial intelligence role in nursing care
4. Artificial intelligence's impact in nursing care
5. Artificial intelligence impact on patient outcome and nursing
6. Artificial intelligence challenges in nursing care

Next, databases like *PubMed, Science Direct, Emerald, Wiley online, and Taylor & Francis* were accessed. Google Scholar was used to access these sites and collect data accordingly. Preliminary articles were identified using this method. Next, inclusion and exclusion criteria were identified following which the resources were sorted and selected for the study.

Inclusion Criteria

1. Studies between 2015-2023
2. Studies related to AI and nursing, patient outcomes, its application and challenges
3. Studies published only in English
4. Studies which have complete access

Exclusion Criteria

1. Studies published in languages apart from English
2. Studies that are only abstracts, books, and conference proceedings
3. Studies focusing on the concept of AI, the technical aspect of the technology
4. Studies published prior 2015
5. Studies that are not aligned with the objectives of the study

PRISMA Sheet and the Summary of Final Studies

Data Extraction

The data extraction process of the study involved systematically reviewing literature related to the potential impact of implementing artificial intelligence (AI) in the functioning of nurses and patient outcomes. The researchers identified and selected relevant articles, papers, and studies that focused on AI in healthcare, particularly in nursing and patient care. They extracted data from these sources, including information on the concept of AI in healthcare, areas of AI implementation, recent advancements, and the potential benefits and challenges associated with AI integration in healthcare settings. Additionally, the process may have involved synthesizing insights from various studies to provide a comprehensive overview of the current state of AI in healthcare and its implications for nurses and patient outcomes.
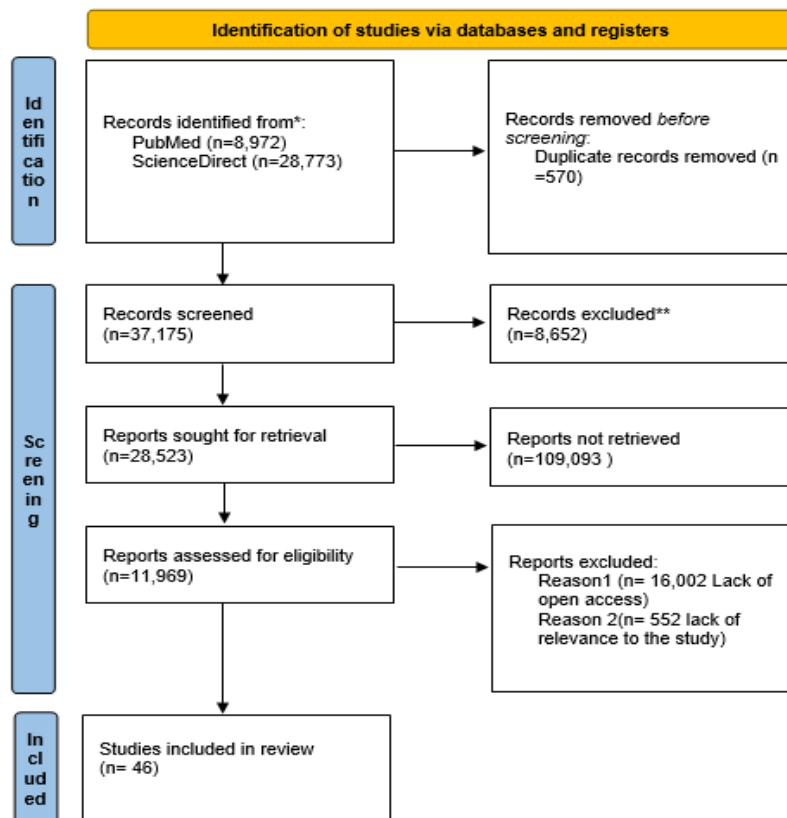
Figure 1. PRISMA Model (Source: Self-created)

Results

Areas of Application and the Role of AI in the Functioning of Nurses

In healthcare, artificial intelligence (AI) enhances efficiency and streamlines functions while providing valuable patient information. Nurses, as key members of the care team, must be actively involved in integrating AI into their practice [9, 10]. AI's primary role in nursing is to improve clinical decision-making. By utilizing electronic health records (EHRs) and medical devices for data analysis, healthcare organizations can offer better diagnoses, treatment suggestions, and prognoses. Natural language chatbots also assist in triage and symptom assessment, reducing errors and enhancing adherence to best practices [11, 12].

AI tools can help nurses maintain warm, holistic relationships with patients while allowing them to focus on priorities and preferences [13, 16]. Furthermore, AI enhances care coordination by integrating records across different service providers and using predictive analytics to identify high-risk patients [14, 15]. Virtual nursing assistants track recovery and medication compliance, enabling timely interventions.

In administrative tasks, AI simplifies scheduling and inventory management, alleviating nurses from paperwork and allowing them to concentrate on patient care. While AI can significantly improve workflow and decision-making, nurses must ensure ethical use and critical assessment of AI recommendations [17]. By embracing these technologies collaboratively, nurses can enhance service delivery while preserving the core values of their profession.

The Potential Impact of the Implementation of AI in the Functioning of Nurses

From what the study has found it seems like you did some research on how AI can shape nursing and enhance practices [18]. I

completely concur with the foregoing post by acknowledging that AI holds a vast opportunity in enhancing clinical decision-making, workflow optimization, patient personalized care as well as education through the analysis of data and predictive attributes [19, 20, 21]. Yet, findings suggest that nurses have a crucial patient advocacy function; therefore, one does not want to lose that human touch with the added integration of AI. Questions regarding data protection, responsibility, and prejudice in the programs also require extreme attention [22, 23]. All in all, the most reasonable and sensible strategy – is the joint human-AI paradigm with all its advantages, such as reputation, data-oriented solution applicability, and efficiency combined with the distinctive features of nurses, namely empathy, critical thinking, and patient communication [24, 25, 26]. When solutions are developed, with nurse-implanted ideas in and around this field, AI could be a great addition to the nursing profession but not a replacement for this noble profession [27, 28]. Three things must be achieved, improving the quality-of-care services, increasing access and efficiency, while retaining the human aspects to it. It is a promising area but not without its challenges and so as we innovate in this noble profession so too do we need to be careful.

Impact of Implementation of AI on Patient Outcomes

As a concept, artificial intelligence (AI) in nursing has continued to rise and has been applauded for its impact on patient care. AI increases diagnostic credibility by…Considering a great amount of patient data including laboratory results, imaging studies, which could be beyond the prospectus of a human practitioner. Research proves that AI has a major impact on earlier diagnostics of diseases including cancer and cardiovascular diseases due to timely interference thus improving the results of treatment [29, 30].

Such diagnostics are useful in combination with the use of AI in the field of predictive analysis that will help identify patients who are at high risk for adverse events such as readmission to a hospital. This is because it improves patient safety and assists in the right distribution of resources while focusing on dealing with patient needs that are at risk [31]. AI also prescribes treatment plans based on the patient's data collected and hence results in better patient compliance and satisfaction [32, 33]. Telehealth adopted with AI support enhances the availability of convenient means of health care delivery for especially patients in remote zones [34, 35, 37]. However, it is important to note that the use of AI technology brings several issues of an ethical nature to the forefront, most notably data protection and the issue of algorithmic reinforcement of prejudice [36, 38, 39]. Being able to retain patient trust is crucial; therefore, there ought to be the right deployment of AI, and this has to be ethical [41, 42]. On balance, the appropriate adoption of AI systems in the healthcare industry can greatly benefit patients, their satisfaction, and quality of life as well as approach the issue of ethical concerns.

Potential Challenges in the Application of AI in the Functioning of Nurses

Automating nursing work through the use of artificial intelligence has countless benefits, including automation, better decision-making, and patient individualization. Still, various difficulties that can hinder its successful utilization in nursing are discussed below. Data privacy and security are the leading factors considered for the adoption of any technology [43, 44]. Patient details are processed and maintained by nurses who can easily leak patient information and health information is used extensively to perform AI tasks [45]. A University study suggests that because AI relies on the personal health information of patients, its threat of cyberattacks remain high; this can put the patient's privacy at risk with legal implications for the facilities [46, 47, 48].

Another challenge is the resistance to change which is evident in many organisations' today (50). Some may perceive that AI will displace their jobs, or at least limit their autonomy in their professional practice; as such, many may express concern over their roles [49]. This could demoralise and reduce desire among employees to work among nursing personnel; this requires enhanced training methods to ensure proper assimilation of AI to nursing services. Much also has to do with acceptance that organizations create a culture of learning and communication as a way of insisting.

Ethical and legal considerations add another layer of challenge into the mix of AI integration. While AI systems make decisions independently there emerges the issue of responsibility [51, 52]. These complexities mean that, in undertaking this work, nurses will have to work within stipulated ethical and legal requirements hence the need for well-articulated guidelines when it comes to use of AI in nursing. Thus, the problem of integrating AI tools and applications requires interprofessional collaboration [53, 54]. Lack of standardization in the usage of technology by members of the healthcare team can allow for gaps in successful coordination and can affect the delivery of care [51]. Such research can point to the need for interdisciplinary training in order to improve the perception of AI systems and, thereby, the experiences of patients. Last but not the least; access related problems and issues of inequitable distribution of resources may hinder the effectiveness of Execution of AI in Emergent regions [55]. All in all, to achieve the full benefits of AI, healthcare organizations have to actively counter these challenges with a wide spectrum of strategies improving interprofessional relationships, professional development, and ethical foundations of nursing practice.

Discussion and conclusion

Discussion

This systematic literature review examines the impact of artificial intelligence (AI) on nursing functions and patient outcomes in healthcare. It highlights AI's role in bridging gaps in traditional diagnostics, management, and data storage, utilizing technologies like machine learning and natural language processing to detect patterns in healthcare data. Applications include robotic surgery, virtual nursing assistants, and chatbots for patient interaction, demonstrating high accuracy in tasks like disease diagnosis and image analysis. While AI shows promise for enhancing patient outcomes, concerns about privacy, transparency, and data security remain. The findings indicate that while AI can significantly improve healthcare delivery, these challenges require careful consideration.

Linking with Objectives

The findings discussed are in line with the research objectives. As the study concludes, traditional and advanced use of AI comprises diagnostic, predictive, personalized and organizational AI for the nursing field. The fact-based AI increases the measure of certainty in diagnostics, as well as it helps the nurses to produce more precise clinical decisions. Secondly, the implementation of AI reduces bureaucratic processes within the business environment meaning that the nurses will spend more time with patients. It is anticipated that this change will enhance nurses' job satisfaction and morale due to increased meaningful talk with the patient.

Also, AI brings value to the decision-making process focusing on increasing diagnostic precision and contributing to improving the treatment plans, and in total, the quality of patient treatment, reduction of complications, and increased patient satisfaction level. However, the study recognizes that the implementation of AI has some issues: data

security, organizational culture, and ethical issues. Its' evident that the shaded areas need to be approached through a combination of standard training and specific policies for the integration of AI to be effective in nursing. On balance, the study strongly portrays the promise of AI in transforming the nursing profession to warn that there are significant impediments, which need to be surmounted in order to sustain the powering of the care outcomes through the potential of AI.

Future Area of Study

Future studies in the field of AI in healthcare may focus on enhancing precision medicine through the analysis of individual patient data, genetic information, and medical history. Additionally, there could be an emphasis on developing AI systems capable of interpreting doctors' notes and electronic health records to assist care providers and nurses in diagnosis and treatment planning. Furthermore, there may be a continued exploration of the use of AI-powered chatbots and virtual assistants for tasks related to health literacy and initial patient assessment, as well as the refinement of AI algorithms for improved accuracy in diagnostic imaging and disease detection.

Recommendations

Several important implications for an improved integration of AI in nursing are put forward in the course of the study. Firstly, its aim is to enhance nurses' knowledge and skills on AI technology through conducts of professional development sessions and workshops. It is therefore important for healthcare organizations to implement a specific type of AI for nurses in the form of intelligent interfaces integrated into currently used EHRs. More support should be given to the promotion of relations between nurses and technology developers for the reason of possible risk reduction, connected with application usage, as well as for the improvement of health care given to the patients. Also, there are arguments touching on data privacy and other ethical matters which should come up, with the employer adequately briefing the nurses about these matters. The rationalisation of the role of AI within the nursing profession will enhance its cohesiveness by policing patients' evaluation and treatment recommendation procedures. Non-experimental research and evaluation of AI applications in nursing care practices should be carried out regularly to improve the systems to enhance optimal results in the patient's care. It will also help to strengthen communication with nurses about their experiences with the integration of AI.

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