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ARTIFICIAL INTELLIGENCE SOLUTIONS UTILIZED BY NURSES IN HEALTHCARE

ABSTRACT

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Artificial Intelligence Solutions Utilized by Nurses in Healthcare; -a literature review

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The shortage of nurses not only undermines the quality of nursing and patient care but also increases the workload on nurses. Since the introductions of Artificial intelligence during the 1760s, Health Care sectors has been revolutionized. Artificial intelligence aims to build systems that enhance and scale human expertise and skills rather than replacing them.

This literature review investigates how the health care sector has benefited from artificial intelligence. The aim of this study was to improve the quality of patient care by advocating for a holistic approach towards the development and integration of artificial intelligence in healthcare sectors. This study will benefit healthcare workers, healthcare students and researcher who are looking to know more about artificial intelligence.

The study was conducted in the form of a literature review. Data searches were explored using electronic databases: PubMed, ScienceDirect, and ProQuest. 20 articles were selected for the review. The research was secondary consisting of prior studies on artificial intelligence. We used inclusion and exclusion criteria to develop our study. Articles published 2014 to date were chosen.

The main results from our study showed that artificial intelligence will provide substantial improvements in health care from diagnostics to treatments. It will enhance human work without replacing the work of healthcare professionals. Although artificial intelligence has been partially applied in Health care still it is an immature stage. Doctors and nurses are still the ultimate decision-makers and executors of health care, and Artificial intelligence performs auxiliary functions.

Keywords: Artificial intelligence, robots, nurses, patient care, Nordic countries.

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1 INTRODUCTION

There is a great trend for artificial intelligence to develop and expand in the healthcare sectors. Healthcare workers can incorporate artificial intelligence in their daily operations. With the growing need of patient care, hospitals are evolving from manual use to technology use. With the introduction of smartphones, E-health etc. At the same time, AI tools and hardware performance are also growing rapidly with each passing day. The need for “digital readiness” is essential for the future functioning of healthcare and will continue to challenge current AI practices. The speed being generated in the development of, for example, nanotechnologies, personalized medicine, genomics, robotics, and artificial intelligence in health care is unlikely to stop. There needs to be an educated cultural shift towards digital innovations (Procter et al., 2021).

Human doctors get to view hundreds and hundreds of images for diagnosis. These may make them tired and prone to mistakes. Artificial intelligence can outperform human medical image viewer, due to their ability to do repetitive work without fatigue. Artificial intelligence also does task that humans would completely overlook (Chen & Decary, 2020). The utilization of artificial intelligence has become more popular in today's healthcare system with the introduction of machine learning and deep learning algorithms, AI technologies have exhibited impressive capabilities in domains, such as medical image interpretation, predictive modelling, and natural language processing (Bohr & Memarzadeh, 2020). These advancements have enabled healthcare professionals to utilize data-driven insights to enhance patient outcomes (Esteva et al., 2019). Artificial intelligences are used to make predictions of diabetic retinopathy. Smartphone apps can be used to accurately detect melanomas. Artificial ECG can automatically detect heart disease with ECG images. Wearable devices have developed algorithm to automatically predict the presence of atrial fibrillation, which is an early warning sign of stroke and heart failure. Saliva samples can be tested at small cost, and customers provided information based on their genes. Including who their ancestors were

or potential diseases they may be prone to later in life. It provides accurate health management solutions based on individual and family genetic data. (Bohr & Memarzadeh, 2020).

Clinical doctors usually acquire reasonable explanations for certain medical decisions. Wearable devices for health monitoring enable patients to monitor their overall real-time health condition and give precaution more precisely. Health personnel rely on data for generating guidance, and the possibility that the medical decisions facilitated by this data may result in positive patient outcomes. The World Health Organization (WHO) suggests improvement of artificial intelligence tools for data collection. Artificial intelligence is being used to enhance decision-making, nursing and provision of services (O'Connor et al., 2023). The use of artificial intelligence can be improved through; Reviewing data collection forms and redesigning as required. Design forms to collect data in a logical sequence. Maintain simplicity of design (Byson, 2021; WHO).

The shortage of nurses not only undermines the quality of nursing and patient care but also increases the workload on nurses which in turn leads to fatigue and job dissatisfaction (AL Ma'mari et al., 2020). Nurses serve as the backbone of patient care being the primary caregivers tasked with organizing and delivering comprehensive patient services in various health sectors (Duplaga, 2016). Their responsibilities include a wide range of tasks like monitoring vital signs, administering medications, offering patient education, and collaborating with interdisciplinary healthcare teams. It is also evident that the ability of nurses to comprehend patients' needs and the establishment of mutual trust is a key factor in facilitating the adoption of artificial intelligence in clinical settings (Duplaga, 2016).

Health personnel rely on data for generating guidance, and the possibility that the medical decisions facilitated by this data may result in positive patient outcomes. Artificial intelligence appliances demonstrate superior merits in addressing some challenging problems in drug discovery. Predictions of chemical synthesis routes and chemical process optimizations are valuable in

accelerating new drug discovery, as well as lowering production costs. Artificial intelligence provides accurate health management solutions based on individual and family genetics data. The advancement of Artificial intelligence demands that nurses take the lead in innovative digital practices to benefit patient care. They should acquire skills and knowledge to handle artificial intelligence machinery. Artificial intelligence can help reduce the gaps in care while improving precision, acceleration, discovery and reducing disparities. It can empower patients and potentially allow healthcare professionals to relate to their patients as healers supported by the combined wisdom of the best medical research and analytic technology (Currie et al., 2021). Artificial intelligence has been widely used in a variety of cancer as a new tool for data mining. For cervical cancer, a clinical database has been developed with millions of medical records and pathological data has been built, and artificial intelligence medical tools set has been developed. Prognostic prediction model established by machine learning and a web-based prognostic result calculator have been developed, which can accurately predict the risk of postoperative recurrence and death in cervical cancer patients, and thereby better guide decision making in postoperative adjuvant treatment.

Nursing robots can serve as secondary healthcare assistants in supporting the care of elderly patients at home to combat loneliness and monitor vital signs (Christoforou et al., 2020). Artificial intelligence algorithms are designed in such a way that they can examine medical images. Outline abnormalities, interpret electrocardiograms (ECG), and evaluate data from wearable devices and sensors to identify falls, seizures, or fluctuations in the heart rate or blood pressure (Swan, 2021). Artificial intelligence is best at finding patterns and trends through electronic health records (EHRs). By examining patients' X-rays and MRIs. Nurses can identify potential risks and make informed decisions about their care. This includes identifying patients who may be at high risk of developing serious complications in the future. Additionally, they can analyse possible drug interactions to ensure patients receive safe and effective treatment. It also helps nurses analyse relationships between preventive or therapeutic measures and patient outcomes and ensures effective and efficient

care delivery by reducing the cost and time associated with disease diagnosis and management (Ellahham et al., 2020).

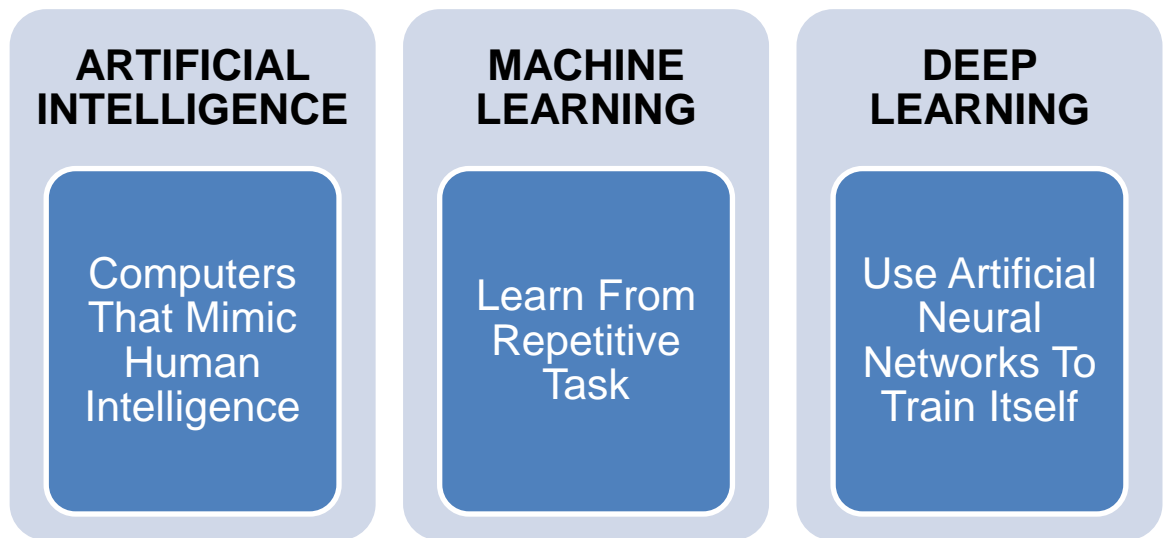
In Norway and Finland, advances in voice recognition, natural language processing, and artificial intelligence have led to the increasing availability and use of conversational agents (chatbots) in different settings. The fact that chatbots do not “think” or form “judgements” it may lead to people with mental health such as depression, feeling more comfortable disclosing personal issues to them compared to a person they may not be willing to share at all with. As much as the use of chatbots has potential, it must be approached with special care due to the sensitive nature of its context (Giunti et al., 2021).

2 ARTIFICIAL INTELLIGENCE AND ITS HISTORY

AI is the theory and development of computer systems able to perform tasks normally requiring intelligence, such as visual perception, speech recognition, decision-making and translation between languages. AI is the science of making machines do things that would require intelligence if done by man (Toosi et al., 2021). The first person who proposed the idea of utilizing computers to mimic human intelligence was Alan Turing. He mentioned that Turing developed a test method that was later referred to as the “Turing Test”. This test is aimed at measuring the computer’s ability to mimic human intelligence (Kaul et al., 2020)

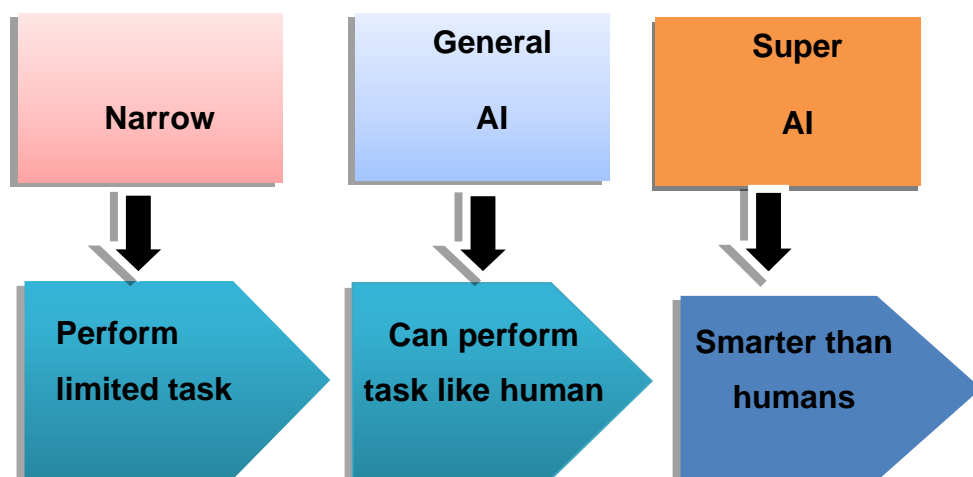
After several years, McCarthy introduced the concept of “Artificial Intelligence” defining it as the “science and engineering involved in developing intelligent machines”. Artificial Intelligence later went through a series of evolutions with more complex algorithms being introduced which resulted in other sub-fields like machine learning (ML) and deep learning (DL) (Rodrigues et al., 2021). Machine learning is defined as the technique by which computers learn from repetitive tasks and patterns presented to them by humans. This process enables this machine to train itself from the data and apply it in future when the same problem is presented (Kaul et al., 2020). Deep learning on the other side involves complex algorithms that create artificial neural networks that autonomously train themselves to recognize features from images (Rodrigues et al., 2021).

Figure 1. AI, Machine learning and deep learning.



According to (Ang et al., 2023) AI can be classified into 3 major subgroups namely, narrow AI, General AI and Super artificial intelligence. Narrow AI majorly deals with specific tasks while general AI creates a machine to have human intelligence. The author also states that super AI is a machine that is capable of outshining humans. It is currently a fictional scenario.

Figure 2. Subgroups of AI



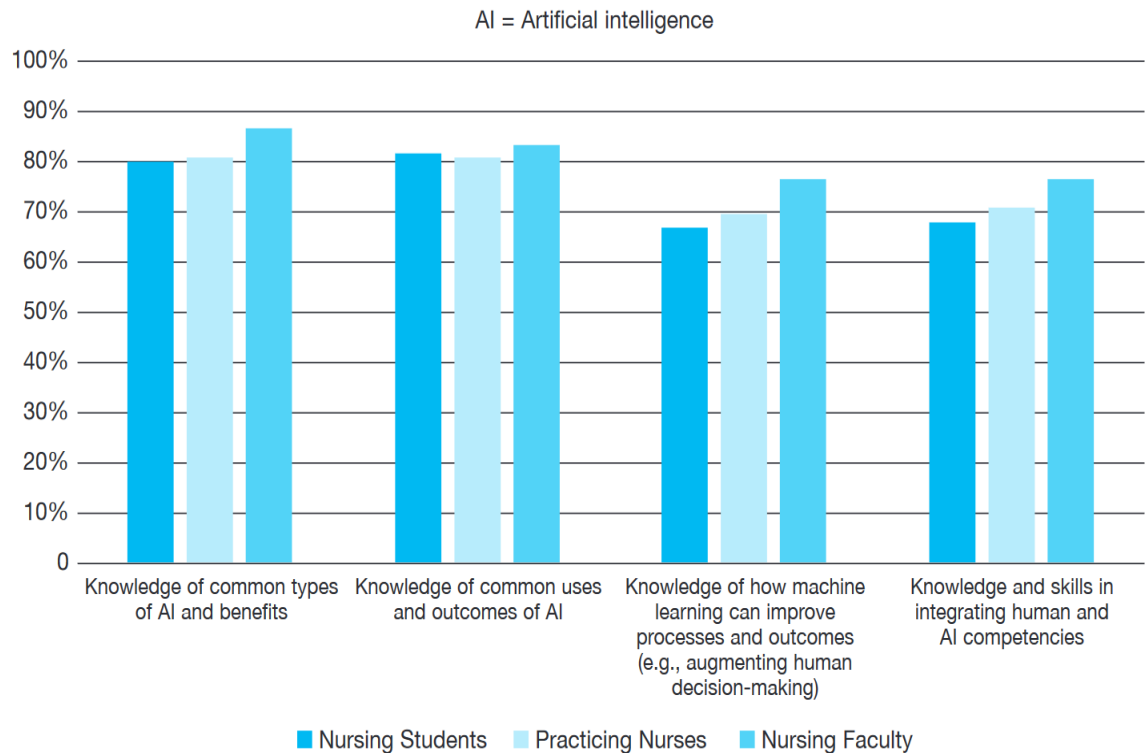


Figure 3. Shows the Competencies of knowledge-related AI. (Swan, 2021)

2.1 The future of AI in Nordic Countries

The advancement of AI demands that nurses take the lead in innovative digital practices to benefit patient care. They should acquire skills and knowledge to handle AI machinery. The need for “digital readiness” is essential for the future functioning of healthcare and will continue to challenge current AI practices. The speed being generated in the development of, for example, nanotechnologies, personalized medicine, genomics, robotics, and artificial intelligence in health care is unlikely to stop. There needs to be an educated cultural shift towards digital innovations (Procter et al., 2021).

In Norway and Finland, advances in voice recognition, natural language processing, and artificial intelligence have led to the increasing availability and use of conversational agents (chatbots) in different settings. The fact that

chatbots do not “think” or form “judgements” may lead to people with mental health problems such as depression, feeling more comfortable disclosing personal issues to them compared to a person they may not be willing to share at all with. As much as the use of chatbots has potential, it must be approached with special care due to the sensitive nature of its context (Giunti et al., 2021). With AI being the new game changer in healthcare, there should be a series of measures put in place showing how the patients and the nurses in a healthcare setting will relate to such technology and ethical consideration of AI technology in healthcare (Davenport & Kalakota, 2019).

Treton's theory of Trans active Relationship between humans and artificial Intelligence takes into consideration the concept of a person, health, nursing and nursing environment. He illustrates the relationship between robots and nurse-patient interactions. The quality of the environment has an impact on both nurses and patients as their behaviours are influenced by each other's attitudes and actions (Tanioka et al., 2019). With various technologies like robot use being adopted in hospitals, nurses need to gain more understanding of intelligent machines (McGrow, 2019). Furthermore, nurses must have an extensive understanding of the code of ethical nursing practice to guide the implementation of these new technologies. This can include maintaining a patient's dignity and privacy and being vigilant for any potential risks caused by these technologies. Earlier applications of AI, such as expert systems and decision support tools, have set up the groundwork for more developed AI-based platforms capable of analysing extensive clinical data to aid in diagnostic, therapeutic, and care management decisions (Hosny et al., 2018). Deo & Anjankar (2023) highlight the increasing utilization of robots to substitute human labour in healthcare (Deo & Anjankar, 2023). These include robots assisting in surgeries, and robotics aiding in rehabilitation. This adoption has also prompted the use of natural language to differentiate between good and bad drugs (De et al., 2020). Hospital technologies are now being integrated with robotic technologies, to facilitate continuity of care. These efficient and accurate functionalities have become the priority operational functions desired for developing robots in nursing (Soriano et al., 2022)

2.2 Ethics in AI

AI ethics seeks to answer how developers, manufacturers, authorities, and operators should behave in order to minimize the ethical risks that arise from the use of AI in society. AI machinery should not injure humans or allow humans to come to harm. AI machinery should obey orders given to it by humans. It is difficult to establish accountability for AI machinery without human responsibility. In this case, responsibility is associated with autonomy and personhood. It's upon developers to educate on how to use AI machinery correctly, for machinery to provide errors and answers (Esteva et al., 2019).

Esteva (2020) mentioned healthcare to be considered one of the most attractive and promising fields for AI technologies for example medical imaging to detect cancer faster and earlier than before. As AI deals with humans, it must comply with laws, regulations, and privacy rules. AI can generate bias, privacy issues, patient-clinician trust issues transparency, accountability, and permission problems (Davenport & Kalakota, 2019; Janga et al., 2023). Despite the above-mentioned limitations, AI technologies have the potential to demonstrate expertise, globalize healthcare and make healthcare available in remote areas. It gives humans readable explanations of its intent, reasoning, and decision-making process and can point out whose responsibility it is in case of a bias (Esteva et al., 2019).

3 THE PURPOSE AIM AND RESEARCH QUESTION

The purpose of this literature review is to investigate how the health care sector has benefited from artificial intelligence and to examine how artificial intelligence has been integrated in the improving quality service in the healthcare sectors. The literature review uses previous studies to give an understating of artificial intelligence. The study looks at various types of artificial intelligence, and their use. The aim of this study was to improve the quality of patient care by advocating for a holistic approach towards the development and integration of artificial intelligence in healthcare sectors. This study will benefit healthcare workers, healthcare students and researcher who are looking to know more about artificial intelligence.

The questions used to help guide this study are:

1. What are the benefits of artificial intelligence in the health care sector?

4 METHODOLOGY

4.1 Descriptive Literature Review

In this study, a descriptive Literature review was conducted to explore the available evidence (Paré & Kitsiou, 2017). Descriptive literature presents an overview of knowledge that has been gathered from historical and current literature to present knowledge about a topic, finding evidence where there is none. It also identifies the relationships and characteristics between certain concepts and justifies the need for further additional study (Tranfield et al., 2003). It involves identifying the research question. The form and level of detail in the research question should be considered carefully so that all relevant studies will appear in searches, while the material remains manageable. Decision-making will be eased if the research question is clarified, and the purpose of the study is identified. Once the research question and study purpose are clear, relevant studies are identified and screened, with only those addressing the research question included in the literature review (Booth et al., 2021).

4.2 Data Collection

Data collection for this descriptive literature review was collected through articles between 2014 to 2024. Database on the internet was searched with Boolean search moderators. Keywords: Artificial Intelligence AND robots and robotics AND patient care AND Nursing AND ethics AND AI in Nordic countries. A detailed slight alteration was made to keywords to cater to the database guidelines. The most relevant and most recent articles were prioritised. Articles with full free text available were considered. Ultimately 20 articles were chosen for this study. (List of chosen Articles are shown in Appendix: 1. Summary Table) shows the articles chosen to be reviewed for this thesis. Each study represents the benefits of AI, ethics, and the improvement of patient care.

A descriptive literature review entails looking deeply and widely to articles that are relevant to the research topic and the study objectives. The entire process of selecting the articles to arrive to the appraised articles was open and clear. In addition, the interpretation, analysis, and summarization of the information were flawless and unbiased (Paré & Kitsiou, 2017). The articles used were sourced from PROQUEST, Pub Med and Science Direct for the data collection. The database searches were recorded and screened. The data collection process is presented in a PRISMA flow diagram in Figure 4. Article Selection Process Flow Diagram to present the data collection transparently (Page et al., 2021).

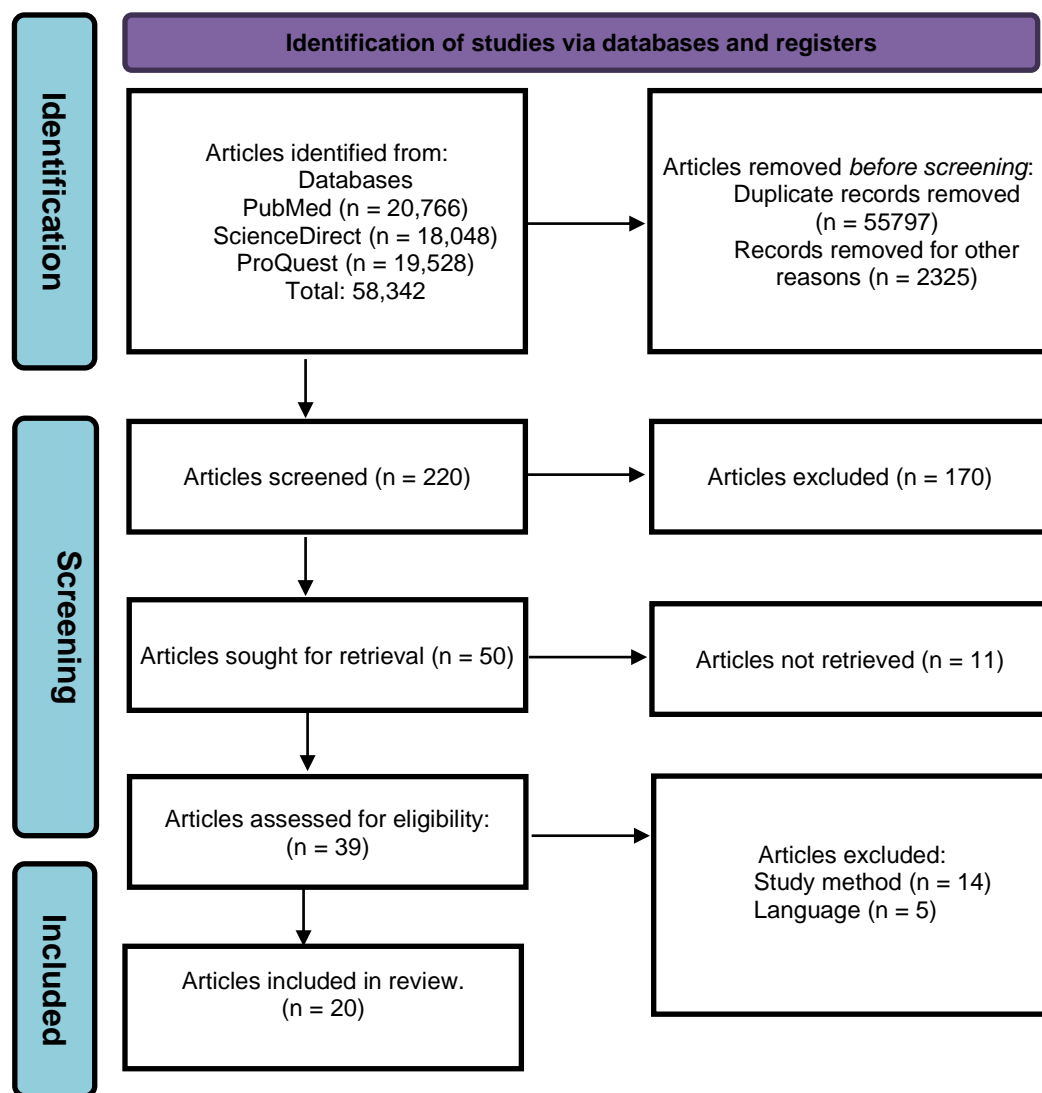


Figure 4. Data Collection Prisma Flow Diagram (Page et al., 2021).

Table 1. Detailing data collection and selection of 20 articles.

Key Words	Search Method	Data Base	Results	Number of Selected Articles
Benefits and Types of AI	The potential of AI AND the application of AI	PubMed 5 ProQuest 2 Science Direct 1	11 Benefit AI, 7 Deep and Machine Learning in Healthcare	7 Articles
Robots and Robotics	Types of AI AND History of AI	PubMed 5	Robots and Robotics and Caring 5	4 Articles
Nursing Practices and Patient Care	Role of AI AND Health care AND Patient Care	PubMed 6 Science Direct 1	Clinical Practices and Health Care Leaders 8	4 Articles
AI Ethics and Nordic Countries	Future of AI AND Integration of AI AND Finland OR Other Nordic Countries	PubMed 4 Science Direct 4	Role of Nurses and education of Healthcare Professions and Improvement of patient Care Using AI 8	5 Articles

The articles were many, but we had to narrow it down to 20 articles through the inclusion and exclusion criteria. By doing this, the authors arrived at the most appropriate full-text literature relevant to the study. The process is shown in above Table: 1.

4.3 Inclusion and Exclusion Criteria

It is important to define inclusion and exclusion criteria in the process of literature review. Understanding the topic makes it easier to determine studies that are relevant to answering the research question. The articles chosen for this study were based on the following criteria. Inclusion criteria were relevant to the study, and they included articles that answered research questions and were written in English language. Articles that were published between 2014-2024. Studies that were within Nordic countries such as Norway and Finland. Studies that were not relevant to the study fell under the exclusion criteria and were excluded from the study as illustrated in the table 2.

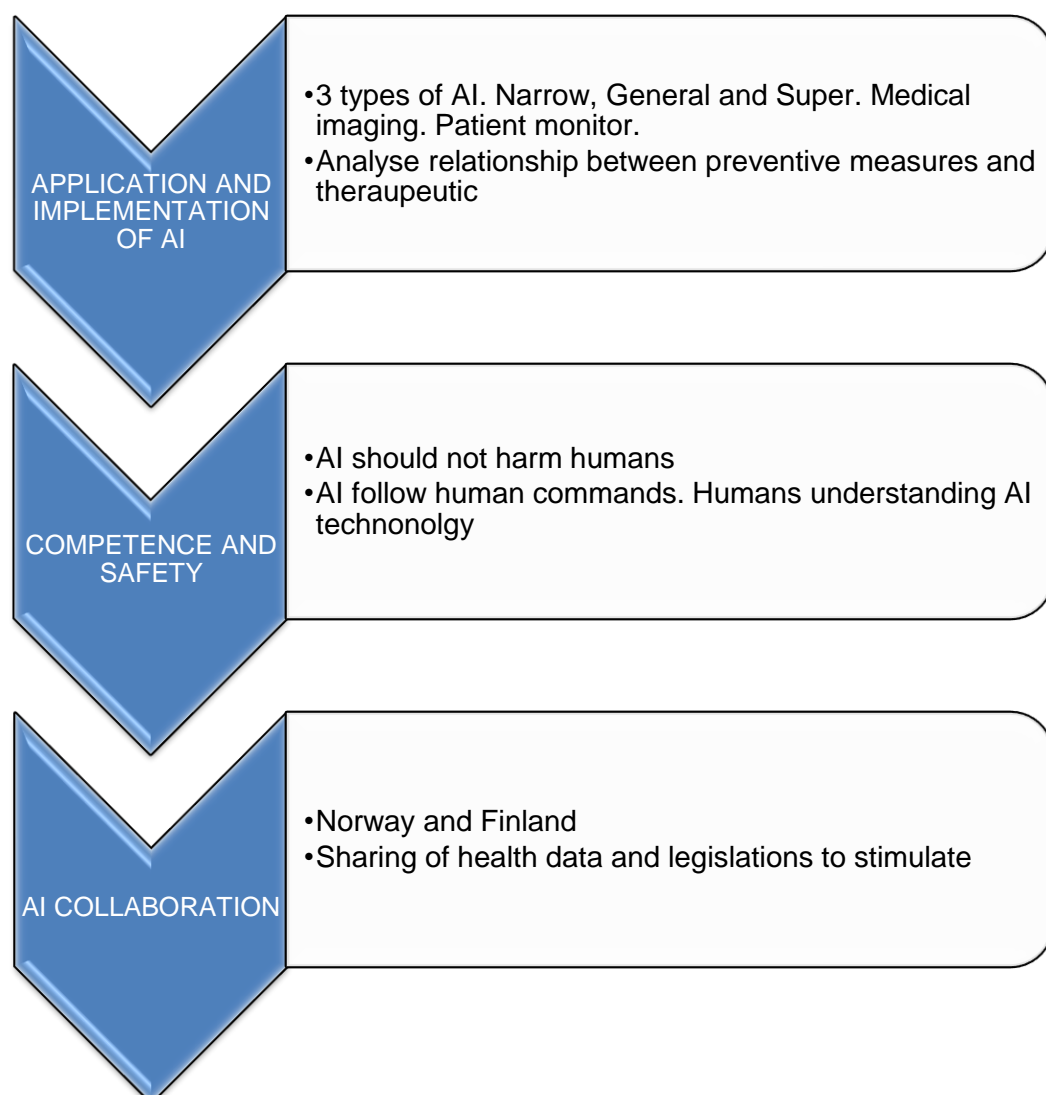
Table 2: INCLUSION AND EXCLUSION CRITERIA OF LITERATURE REVIEW.

Inclusion criteria	Exclusion criteria
Articles in the English language	Articles in other languages
Keywords used to “Artificial Intelligence, nursing, Robots and robotics and patient care and AI in Nordic Countries”	Articles that dealt with other matters concerning AI
Articles whose titles and abstract focus were on Nordic countries (Norway and Finland)	Articles whose titles and abstract focus were other parts of the world.
Articles published from 2014- to date	Articles published older than 2014

4.4 Data Analysis

The data for analysis was gathered from 20 articles, each article is reviewed multiple times thoroughly. The analysis process encompassed the classification, evaluation, and verification of qualitative data obtained from reputable sources, including research articles, journals, books, and scientific research (Sutton & Austin, 2015). The conclusions drawn from the analysis will be substantiated by nursing theory (The Transactive Relationship Theory of Nursing) and the hypothesis posited by the authors (Tanioka et al., 2019). Furthermore, the data analysis will be aligned with the thesis topic and questions at hand.

FIGURE 6: THEMES FROM Data Analysis



4.5 Critical Appraisal

The Critical appraisal was done by used of “JBI Critical Appraisal Checklist for Qualitative Research”. Critical Appraisal is a systematic process of carefully examining research articles to determine their value and level of trustworthiness. The study analysed by the research question was critically evaluated to ensure its suitability for further studies (Snyder, 2019). To achieve this, a descriptive literature review was selected as a reliable research method too (Paré & Kitsiou, 2017).

The study's results were based on selected articles published between 2014 and 2024, specifically those focused on Nordic countries and AI in healthcare. A total of 20 articles from PubMed, Science Direct and ProQuest were used due to their reliability and accessibility. It is important to note that the search was conducted in English, which may limit the generalizability of the findings. The goal is to include only studies that fit the criteria for credible and evidence-based literature in the qualitative research phase of the literature review. The 'JBI Critical Appraisal Checklist for Qualitative Research' is included in APPENDIX 3.

4.6 Ethical Considerations

In this study, Ethical guidelines were used to prevent misconduct. This study abides by the Finnish National Board Research Integrity Guidelines (2019) to follow proper research ethics and research integrity. Research ethics is a foundational principle of modern medical research across all disciplines. Through the entire process of data analysis, we ensured there was no misinterpretation, altering or omission of crucial information based on individual biases (Barrow et al., 2022). The topic of this study has been accepted by Diaconia Helsinki University Thesis Writing Guide. The guide shows the proper way of citation and referencing, which is a key aspect of ethical research writing. This ensures proper recognition of authors and ensuring that readers can refer to all sources utilized in writing the study. The authors of this study are

registered degree students at Diaconia University of Applied Science hence they used their right of access to access the available academic databases and then find the articles needed for this paper.

The authors cross-checked with the supervising Diak lecturer for guidance and advice to ensure that they adhered to the rules and guidelines stipulated. The authors used free full-text information throughout the thesis paper to avoid confusion and delusions. The authors tirelessly and keenly maintained the integrity of the entire thesis process. Every information that has been used in this paper that does not originate from the two authors has been properly referenced. The articles that have been used were published between the years 2014 to date. All are scientific and evidence based. It is, therefore, accurate to state that this thesis is credible, reliable and can be used by healthcare students, teachers, healthcare professionals or policymakers.

5 RESULTS

The study aimed to identify the benefits of AI in healthcare sectors and identify how it has improved patient care. Therefore, 20 articles were abstracted on the benefits of Artificial intelligence, types of artificial intelligence, ethical considerations in using artificial intelligence, nursing practice and artificial intelligence. The data analysis focused on answering the research question. Ultimately, 20 articles publications were chosen for this study. The articles chosen to be reviewed for this thesis are included in Appendix 1: Summary Table.

5.1 Application and Implementation of AI

Artificial intelligence (AI) has significantly transformed the healthcare industry and nursing practice by enhancing patient care. Deep learning has the potential to improve the quality of research, such as cancer detection. Esteva (2019) mentioned healthcare to be considered one of the most attractive and promising fields for AI technologies. E.g. medical imaging to detect cancer faster and earlier than before (Esteva et al., 2019). AI technologies have the potential to demonstrate expertise, globalize healthcare and make healthcare available in remote areas. It gives humans readable explanations of its intent, reasoning, and decision-making process and can point out whose responsibility it is in case of a bias (Esteva et al., 2019). Other benefits include Human recognition, care coordination, drug management and documentation (Bohr & Memarzadeh, 2020). AI algorithms are designed in such a way that they can examine medical images. Outline abnormalities, interpret electrocardiograms (ECG), and evaluate data from wearable devices and sensors to identify falls, seizures, or fluctuations in the heart rate or blood pressure.

5.2 Competence and Safety

AI helps nurses analyze the relationship between preventive or therapeutic measures and patient outcomes and ensures effective and efficient care

delivery by reducing the cost and time associated with disease diagnosis and management. For nurses and healthcare sectors to benefit from AI, there needs to be Trust and training to allow the full functional integration of AI into research and practice in healthcare (Ellahham et al., 2020). It is also evident that the ability of nurses to comprehend patients' needs and establishment of mutual trust is a key factor in facilitating the adoption of AI in clinical setting (Duplaga, 2016). Robots are believed to be able to perform tasks like humans in mitigating loneliness among the elderly and also handling routines of monitoring patient's vital signs (Soriano et al., 2022). In Finland, The Ministry of Social Affairs and Health, (2020) has encouraged the use of AI to implement robotic medication management. This enables the elderly to manage their medication (Turjamaa et al., 2023). The implementation of AI in homecare has been hindered by a lack of knowledge and skills as well as the adoption of new work methods (Wang et al., 2024). There are more benefits of AI if the elderly competence to use robots is evaluated and the elderly are advised on the use of robots. However, there is a need to examine how the elderly use AI, and how effective it is in medication management (Turjamaa et al., 2023).

As AI deals with humans, it must comply with laws, regulations and privacy rules, AI can generate bias, privacy issues, patient-clinician trust issues transparency, accountability, and permission problems (Davenport & Kalakota, 2019). AI is a promising technology in Nordic countries. AI is considered to have autonomous features, while on the other hand, Nordic states wish to retain control in the decision-making process (Tucker, 2023). The Nordic Association of Process. Studies (NASs) envisioned the future of technology used to have the possibility of multiple challenges once public health grants access to the health data registry without proper regulations. It sets out a vision where AI will step in to carry out tasks that are currently done by healthcare staff. The association argues that with time, several jobs will be taken over by AI which will automate activities like record keeping, managing patient logistics and using robots to perform surgery. Demonstration of competence and safety will be necessary in the use of robots. To realize this vision the Nordic countries, have the task of sharing public health data and legislation to stimulate innovation

while reducing potential harm to individuals and stemming from this advancement (Bramhe & Pathak, 2022). AI is viable only if used judiciously with standardized reporting and monitoring systems in place (Deo & Anjankar, 2023). Wider adaptation of robots will depend on successful implementation and demonstration in clinical practice and evaluation based on quality care (Christoforou et al., 2020).

5.3 AI Collaboration

There's fear that the use of robots will affect human caring and may impact patient care (Tanioka et al., 2019). Patients' perspectives are valuable in guiding the implementation of PHR systems (Currie et al., 2021). Physicians should not view AI as humans versus machines but as a partnership in improving clinical outcomes (Kaul et al., 2020). A joint effort between patients and healthcare professionals in self/monitoring and managing chronic conditions (Chen & Decary, 2020). When nurses and assistive robotics are employed together in healthcare, they can improve the efficiency of the care without compromising the quality while reducing expenditures (Christoforou et al., 2020). The use of assistive robots in the healthcare industry aims to support the caregiving process, improve patients' well-being, and reduce caregiver workload (D'Onofrio & Sancarlo, 2023).

Kim and her colleagues had a comprehensive discussion on the topic of care robots and the human-centred artificial intelligence framework, with a focus on the ethical design for care robots and the creation of a robot tailored for frail older adults. Additionally, Aygun and his team conducted a thorough analysis of data from a simulated driving study to assess the cognitive workload induced by different tasks. They utilized machine learning methodologies and statistical analyses of physiological signals to accurately determine cognitive workload levels. In a separate study, Michel and his team showcased a prototype robot designed to assist surgeons during otological surgery, addressing issues such as patient movement during the procedure (D'Onofrio & Sancarlo, 2023).

6 DISCUSSION

In this section, we will discuss our findings and goals, explain their significance, address the benefits, and elaborate on the role of AI in the healthcare sector. With this thesis process our finding is that in recent years, the healthcare sector has undergone a significant transformation with the integration of artificial intelligence (AI) solutions. The AI has reformed patient care delivery, providing substantial opportunities for nurses and healthcare providers to enhance disease detection, improve treatment efficiency and enable personalized care (Alowais et al., 2023).

The goal of AI is to help nurses with decision-making support by analyzing vast amounts of patient data to identify patterns, trends, and potential issues. AI-powered decision support systems can help nurses diagnose conditions, develop treatment plans, and predict patient outcomes with greater accuracy and efficiency (Al Kuwaiti et al., 2023). By leveraging AI algorithms, nurses can access real-time insights and recommendations that inform clinical decision-making, leading to improved patient safety and outcomes (Jeong, 2020).

There are previous studies done which show the benefit of AI-powered tools which significantly help nurses, healthcare workers and researchers to make clinical decisions by analyzing vast amounts of patient data to identify patterns and trends (Alowais et al., 2023). With predictive analytics, AI can anticipate potential health complications, enabling proactive interventions and personalized treatment plans. For instance, AI algorithms can predict patient deterioration, allowing nurses to allocate resources effectively and prioritize care delivery. Moreover, AI-powered diagnostic tools can assist in early disease detection, leading to timely interventions and improved patient outcomes (Bohr & Memarzadeh, 2020).

According study done by Nadarzynski (2019), AI also enhances patient engagement by delivering personalized care and support throughout the

healthcare journey. Virtual health assistants equipped with AI capabilities offer patients tailored education, reminders, and self-care instructions, promoting better adherence to treatment plans and healthier lifestyle choices. AI-powered telehealth platforms such as chatbots enable nurses to conduct remote monitoring and virtual consultations, expanding access to care for patients in underserved areas or those with limited mobility. By leveraging AI to enhance patient engagement, nurses empower individuals to take an active role in managing their health and well-being (Nadarzynski et al., 2019).

However, the widespread integration of AI in nursing practice raises ethical and regulatory considerations that must be addressed. Nurses must receive adequate training and support to effectively utilize AI technologies while upholding ethical standards and professional integrity. Moreover, regulatory frameworks must be established to govern the development, deployment, and evaluation of AI-driven nursing solutions, ensuring compliance with legal and ethical standards (Soriano et al., 2022) .

The integration of AI into nursing practice offers significant opportunities to improve patient care, optimize workflows, and enhance patient engagement. By leveraging AI technologies, nurses can make more informed clinical decisions, streamline workflows, and deliver personalized care that meets the unique needs of each patient. However, addressing ethical and regulatory considerations is crucial to ensure that AI-driven nursing solutions are deployed responsibly and ethically. Through continued education, training, and collaboration, nurses can harness the full potential of AI to transform healthcare delivery and improve patient outcomes. In recent times, the healthcare sector has undergone a significant transformation with the integration of artificial intelligence (AI) solutions. AI has revolutionized patient care delivery, enabling healthcare providers and nurses to enhance disease detection, improve treatment efficiency, and enable personalized patient care.

Most of the study results of our review have also proved that artificial intelligence robots can assist doctors and nurses in performing repetitive tasks

and administrative duties. This benefit plays a vital role in reducing the workload of caregivers. By automating tasks, nurses can effectively perform their duties by allocating more time and attention to direct patient care. In addition, this advantage has also addressed the challenge of the shortage of healthcare workers in healthcare settings.

This literature review has enabled us to view various authors' views on artificial intelligence. Our knowledge on artificial intelligence has developed. Our understanding of different types of AI in health care has proven to be useful in our career lines. Extracting data from other literatures and critically evaluating what is useful during the thesis process was challenging. This thesis was done by 2 students. We learnt that we automatically don't develop team working skills when we are assigned to groups. It is vital to have goal setting and accountability to achieve a good teamwork.

7 CONCLUSION

In conclusion, AI technology is revolutionizing in many sectors across the global and healthcare sectors. This research aims to gain a deeper understanding of how Artificial Intelligence technology can elevate nursing practice and strengthen healthcare delivery. AI machinery is now offering a variety of beneficial services in healthcare from patient monitoring, surgery, drug manufacturing, imaging, and automation of administrative tasks in hospitals to improve quality and efficiency of healthcare delivery. AI tools such as chatbots have brought the world closer to doctors. These chat-bots can offer medical support anywhere anytime without having to visit a doctor at the hospital. Artificial intelligence, which applies to the medical field requires systematic regulation and policy. The leadership of decision-making should participate in health systems as well. Although artificial intelligence has been partially applied in Health care still it is an immature stage. Doctors and nurses are still the ultimate decision-makers and executors of health care, and AI performs auxiliary functions. Our study concluded that AI could facilitate progress and nurses should embrace it and collaborate with other professions in improving patient care. AI is not able to take care of humans as human nurses can. They developed activities of nurses or others who think they know what nursing is or know the role of nurses. Do the activities of nurses and the completion of those activities result in nursing care?

8 Professional and Self-Development

The comprehensive literature review has provided us with diverse perspectives from various authors on the topic of artificial intelligence. Our comprehension of artificial intelligence, particularly in the realm of healthcare, has significantly advanced, offering valuable insights relevant to our professional trajectories. The process of extracting and critically evaluating data from existing literature during the thesis posed a notable challenge, yet it has honed our analytical

acumen. This collaborative thesis, undertaken by two students, has underscored the imperative of actively cultivating teamwork skills. It has become evident that the establishment of clear objectives and individual accountability are pivotal for fostering effective teamwork.

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APPENDIX 1. Summary Table

Article .	Author(s)/ Year	Article Title	Study aim	Methods	Results
1	Ang, T. L., Choolani, M., See, K. C., & Poh, K. K. (2023)	The rise of artificial intelligence: Addressing the impact of large language models such as ChatGPT on scientific publications	Ethics of AI and progress of AI	mixed review method.	The study found that AI is a game changer and Facility progress.
2	Bohr, A., & Memarzadeh, K. (2020)	The rise of artificial intelligence in healthcare applications. <i>Artificial Intelligence in Healthcare</i>	AI applications and types of AI	Overall Literature review method	The advancement is expected to significant enhance diagnosis and treatment.
3	Bramhe, S., & Pathak, S. S. (2022)	Robotic Surgery: A Narrative Review	Use of Robots and robotic skills	Narrative review method	The demonstration of competence and safety is necessary in the use of robots.
4	Chen, M., & Decary, M. (2020)	Artificial intelligence in healthcare: An essential guide for health leaders	Guide and recommendation to AI decision-making	Systemic review method	A joint effort between patients and healthcare professionals in self-monitor and managing the cornice condition
5	Christoforou, E. G., Avgousti, S., Ramdani, N., & Panayides, A. S. (2020)	The Upcoming Role for Nursing and Assistive Robotics: Opportunities and Challenges	Identify today's landscape in nursing and robotics. Highlights Benefits in Standard Clinical Practice	General Review method	Wider adoption of robots will depend on successful implementation and demotraction in clinical

		Ahead			practices and evaluation based on quality care.
6	Currie, L. M., Rush, K., Burton, L., Mattei, M., & Görges, M. (2021)	Perceptions of Personal Health Records in Rural Primary Health Clinics in Canada—Patient Perspectives	Personal health records and technology	Thematic Review Method	Patient perspectives are valuable in guiding the implementation of PHR systems
7	Deo, N., & Anjankar, A. (2023)	Artificial Intelligence With Robotics in Healthcare: A Narrative Review of Its Viability in India	To examine the adaptability and viability of AI and identify major challenges.	A Narrative Review	AI is viable only if used judiciously with the standardized reporting and monitoring systems in place.
8	Davenport, T., & Kalakota, R. (2019)	The potential for artificial intelligence in healthcare	The ethical issues of AI application of AI	Mixed review method	The future healthcare worker will lose their job if they refuse to work alongside AI.
9	Esteva, A., Robicquet, A., Ramsundar, B., Kuleshov, V., DePristo, M., Chou, K., Cui, C., Corrado, G., Thrun, S., & Dean, J. (2019)	A guide to deep learning in healthcare	Types of Robotics and deep learning	Mixed review method	Deep learning can enhance the quality of research e.g. DNA and cancer detection.
10	Ellahham, S., Ellahham, N., & Simsekler, M. C. E. (2020)	Application of Artificial Intelligence in the Health Care Safety Context: Opportunities and	Provide safer and clear guidance to developers and adopt safer AI applications	Literature review method	Trust and training will allow the full functional integration of AI into research and practice in

		Challenges			healthcare
11	Giunti, G., Isomursu, M., Gabarron, E., & Solad, Y. (2021)	Designing Depression Screening Chatbots	Consideration for the useful design of a chatbot for healthcare context	Literature review method	Chatbot designers should explore expanding users' knowledge to address the burning challenges of modern healthcare
12	Kaul, V., Enslin, S., & Gross, S. A. (2020)	History of artificial intelligence in medicine. <i>Gastrointestinal Endoscopy</i>	A brief history of AI evolution over the last several decades and the introduction of AI to medicine in present years	Comprehensive review method	Physicians should not view AI as "human versus machine" but rather as a partnership in improving clinical outcomes
13	O'Connor, S., Yan, Y., Thilo, F. J. S., Felzmann, H., Dowding, D., & Lee, J. J. (2023)	Artificial intelligence in nursing and midwifery	Understanding of AI application in real world	Systemic review method	Educated professionals about AI so they lead and take part in digital initiatives in healthcare
14	Paré, G., & Kitsiou, S. (2017)	Methods for Literature Reviews. In <i>Handbook of eHealth Evaluation: An Evidence-based Approach</i>	Assisting practitioner academics and students in finding and evaluating the context of imperial and conceptional papers.	Literature review method	Identify different types of literature reviews that are central in the development of healthcare
15	Procter, P., Hübner, U., & Yuan, C. (2021)	Building Nursing Knowledge to Meet the Needs of Disruptive Technology Healthcare Re-Design. <i>Studies in</i>	Impact of AI in nursing workforce	Mixed review method	There needs to be an educated cultural shift towards these digital innovations

		<i>Health Technology and Informatics</i>			
16	Soriano, G. P., Yasuhara, Y., Ito, H., Matsumoto, K., Osaka, K., Kai, Y., Locsin, R., Schoenhofer, S., & Tanioka, T. (2022)	Robots and Robotics in Nursing. <i>Healthcare</i>	Stresses that AI are useful and practical for patients.	A systematic review method	The relationship between Ai and empathy contributes to understanding AI and impacting nurses and nursing theories.
17	Swan, B. A. (2021)	Assessing the Knowledge and Attitudes of Registered Nurses about Artificial Intelligence in Nursing and Health Care	Studying the attitudes of nursing student about AI in health care	Mixed review method	Nursing students the attitude that AI will revolutionize nursing and health care may facilitate changing their understanding of AI integral.
18	Tanioka, T., Yasuhara, Y., Dino, M. J. S., Kai, Y., Locsin, R. C., & Schoenhofer, S. O. (2019)	Disruptive Engagements with Technologies, Robotics, and Caring: Advancing the Transactive Relationship Theory of Nursing	The purpose of this article is to explore this disruptive technology, along with its functions and characteristics	A systemic review method	Will the use of robots affect the human caring nature of nurses, and will it impact patient care?
19	Tucker, J. (2023)	The future vision(s) of AI health in the Nordics: Comparing the national AI strategies	Identify the role of the state in using AI	A systemic Review	The common future imagination in the Nordic NASs sees the state as Simultaneously driving and being driven towards the future of AI in health

20	Turjamaa, R., Vaismoradi, M., Kajander-Unkuri, S., & Kangasniemi, M. (2023)	Home care professionals' experiences of successful implementation, use and competence needs of robot for medication management in Finland	To describe home care professionals' individual experience in AI use and competence needs of robots in medication management in elderly care.	Thematically review method	Future research is needed to examine the experience of the elderly in AI use medication management.
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APPENDIX 2. Chosen Articles

The following 20 articles were chosen based on the inclusion and exclusion criteria given in the table above.

1. Ang, T. L., Choolani, M., See, K. C., & Poh, K. K. (2023). The rise of artificial intelligence: Addressing the impact of large language models such as ChatGPT on scientific publications. *Singapore Medical Journal*, 64(4), 219. <https://doi.org/10.4103/singaporemedj.SMJ-2023-055>
2. Bohr, A., & Memarzadeh, K. (2020). The rise of artificial intelligence in healthcare applications. *Artificial Intelligence in Healthcare*, 25–60. <https://doi.org/10.1016/B978-0-12-818438-7.00002-2>
3. Bramhe, S., & Pathak, S. S. (2022). Robotic Surgery: A Narrative Review. *Cureus*. <https://doi.org/10.7759/cureus.29179>
4. Chen, M., & Decary, M. (2020). Artificial intelligence in healthcare: An essential guide for health leaders. *Healthcare Management Forum*, 33(1), 10–18. <https://doi.org/10.1177/0840470419873123>
5. Christoforou, E. G., Avgousti, S., Ramdani, N., & Panayides, A. S. (2020). The Upcoming Role for Nursing and Assistive Robotics: Opportunities and Challenges Ahead. *Frontiers in Digital Health*, 2. <https://doi.org/10.3389/fdgth.2020.585656>
6. Currie, L. M., Rush, K., Burton, L., Mattei, M., & Görges, M. (2021). Perceptions of Personal Health Records in Rural Primary Health Clinics in

- Canada—Patient Perspectives. *Studies in Health Technology and Informatics*, 284, 285–289. <https://doi.org/10.3233/SHTI210724>
7. Deo, N., & Anjankar, A. (2023). Artificial Intelligence With Robotics in Healthcare: A Narrative Review of Its Viability in India. *Cureus*.
<https://doi.org/10.7759/cureus.39416>
 8. Davenport, T., & Kalakota, R. (2019). The potential for artificial intelligence in healthcare. *Future Healthcare Journal*, 6(2), 94–98.
<https://doi.org/10.7861/futurehosp.6-2-94>
 9. Esteva, A., Robicquet, A., Ramsundar, B., Kuleshov, V., DePristo, M., Chou, K., Cui, C., Corrado, G., Thrun, S., & Dean, J. (2019). A guide to deep learning in healthcare. *Nature Medicine*, 25(1), 24–29.
<https://doi.org/10.1038/s41591-018-0316-z>
 10. Ellahham, S., Ellahham, N., & Simsekler, M. C. E. (2020). Application of Artificial Intelligence in the Health Care Safety Context: Opportunities and Challenges. *American Journal of Medical Quality: The Official Journal of the American College of Medical Quality*, 35(4), 341–348.
<https://doi.org/10.1177/1062860619878515>
 11. Giunti, G., Isomursu, M., Gabarron, E., & Solad, Y. (2021). Designing Depression Screening Chatbots. *Studies in Health Technology and Informatics*, 284, 259–263. <https://doi.org/10.3233/SHTI210719>
 12. Kaul, V., Enslin, S., & Gross, S. A. (2020). History of artificial intelligence in medicine. *Gastrointestinal Endoscopy*, 92(4), 807–812.
<https://doi.org/10.1016/j.gie.2020.06.040>

13. O'Connor, S., Yan, Y., Thilo, F. J. S., Felzmann, H., Dowding, D., & Lee, J. J. (2023). Artificial intelligence in nursing and midwifery: A systematic review. *Journal of Clinical Nursing*, 32(13–14), 2951–2968.
<https://doi.org/10.1111/jocn.16478>
14. Paré, G., & Kitsiou, S. (2017). Chapter 9 Methods for Literature Reviews. In *Handbook of eHealth Evaluation: An Evidence-based Approach [Internet]*. University of Victoria.
<https://www.ncbi.nlm.nih.gov/books/NBK481583/>
15. Procter, P., Hübner, U., & Yuan, C. (2021). Building Nursing Knowledge to Meet the Needs of Disruptive Technology Healthcare Re-Design. *Studies in Health Technology and Informatics*, 284, 203–208.
<https://doi.org/10.3233/SHTI210705>
16. Soriano, G. P., Yasuhara, Y., Ito, H., Matsumoto, K., Osaka, K., Kai, Y., Locsin, R., Schoenhofer, S., & Tanioka, T. (2022). Robots and Robotics in Nursing. *Healthcare*, 10(8), 1571.
<https://doi.org/10.3390/healthcare10081571>
17. Swan, B. A. (2021). Assessing the Knowledge and Attitudes of Registered Nurses about Artificial Intelligence in Nursing and Health Care. *Nursing Economics*, 39(3), 139–143.
18. Tanioka, T., Yasuhara, Y., Dino, M. J. S., Kai, Y., Locsin, R. C., & Schoenhofer, S. O. (2019). Disruptive Engagements With Technologies, Robotics, and Caring: Advancing the Transactive Relationship Theory of Nursing. *Nursing Administration Quarterly*, 43(4), 313–321.
<https://doi.org/10.1097/NAQ.0000000000000365>

19. Tucker, J. (2023). The future vision(s) of AI health in the Nordics: Comparing the national AI strategies. *Futures*, 149, 103154.
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20. Turjamaa, R., Vaismoradi, M., Kajander-Unkuri, S., & Kangasniemi, M. (2023). Home care professionals' experiences of successful implementation, use and competence needs of robot for medication management in Finland. *Nursing Open*, 10(4), 2088–2097.
<https://doi.org/10.1002/nop2.1456>

APPENDIX 3: Critical Appraisal Checklist for Qualitative Research



JBIC Critical Appraisal Checklist for Qualitative Research

Reviewer _____ Date Spring 2024

Author Daisy and Adeel Year 2024 Record Number _____

	Yes	No	Unclear	Not applicable
1. Is there congruity between the stated philosophical perspective and the research methodology?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there congruity between the research methodology and the research question or objectives?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Is there congruity between the research methodology and the methods used to collect data?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Is there congruity between the research methodology and the representation and analysis of data?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Is there congruity between the research methodology and the interpretation of results?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Is there a statement locating the researcher culturally or theoretically?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Is the influence of the researcher on the research, and vice-versa, addressed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Are participants, and their voices, adequately represented?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include ☒ Exclude ☐ Seek further info ☒

Comments (Including reason for exclusion)
