Exploring the Benefits and Challenges of Artificial Intelligence (AI) in Nursing

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***Abstract*—This paper discussed the trend of AI (Artificial Intelligence) and its role in the healthcare industry. AI is being used to improve efficiency and effectiveness in healthcare. Still, challenges remain, such as privacy and data protection and healthcare workers' hesitancy to replace their work with technology. This study aimed to see opportunities for using AI in the health sector and understand existing problems, such as barriers to significant initial investments. This study used a qualitative approach and focused on the author's understanding based on secondary sources and personal experience. The study results shown that AI can assist health workers in making diagnoses and providing more efficient health services. However, it still has to be used as a tool and cannot replace the role of health workers as a whole.**

***Index Terms*—artificial intelligence (AI), chatbot, internet of thing (IoT), nursing, robot**

I. Introduction

Today's AI trends are closely related to digital technology and business. AI is used to optimize efficiency and effectiveness in various industries, such as healthcare, manufacturing, transportation and retail [1]. AI is also used to improve customer experience and analyze data to make better business decisions. AI trends are predicted to continue to develop and integrate with the Internet of Things (IoT) and 5G technologies [2]. However, the main challenges to overcome are privacy and data protection, as well as ensuring that AI is implemented in an ethical and non-discriminatory manner. AI is not a new technology. Its roots began in 1956 when Stanford University computer scientist John McCarthy coined the term while leading the Dartmouth Summer Research Project [3].

Several things could be improved with the level of acceptance of AI by health workers. Several factors influence the acceptance of AI in the health sector. The need to understand technology by health professionals is essential. Health professionals need to understand how AI technology works and its benefits before using it effectively [4]. Only now, there is a dependence on humans in managing health and patient care. Some healthcare professionals still need to be more confident to replace their jobs with technology. They are concerned that AI will not be able to perform tasks that humans do.

Another barrier to using AI today is the significant initial investment [5]. Installing an AI system can require a significant initial investment, discouraging some hospitals and healthcare practitioners from investing their money. The amount of this investment is sometimes still controversial, related to the level of privacy and data security concerns. There are concerns about how AI will manage and protect sensitive patient information. So the cost and benefit ratio calculation needs to be studied more deeply [6].

This study looks at various opportunities for using AI in the health sector. Understanding and addressing these issues is crucial for AI to be accepted and used effectively in the healthcare industry.

II. Method

This study was a qualitative study focused on the author's understanding and interpretation based on secondary sources and individual experiences. The study helped us to understand how AI is used in healthcare practice and how it affects nurses and patients. The results of this qualitative study were subjective, so they cannot be applied in general and require further validation through other studies, both quantitative and qualitative.

III. Results and Discussion

A. AI on Nursing

AI is used in the healthcare field, including nursing. AI can help health workers, including nurses, make diagnoses, monitor patients, and provide more efficient and accurate healthcare services [7]. However, AI still cannot replace the role of health workers and must be used as a tool to assist and strengthen their tasks. AI can be used in several forms, including robotics, software, and integrated systems [8]. Some examples of using AI in healthcare include many systems.

1) Chatbot

Nurses can use chatbots to provide information and efficiently serve patients. Chatbots have many benefits in business development, including saving the customer time, being available 24/7, improving the quality of the customer experience, saving on service costs, increasing the number of sales, and helping lead generation [9]. Chatbots also proactively build conversations with customers and collect

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essential data such as visitors' email addresses, phone numbers, and product preferences [10]. Chatbots help businesses reduce customer service costs and improve reputations. Research results show that bot services also have the potential to get an investment return higher [11]. Chatbots can also be utilized in nursing application [12]. Fig. 1 shows the illustration of AI potentials in nursing sector.

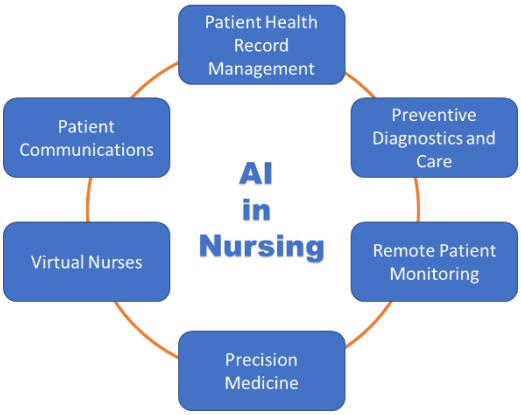

Fig. 1. AI in Nursing [12].

The chatbot market is growing rapidly and is projected to reach $314 billion by 2023. The healthcare industry is also adopting this technology, as a recent study in the USA showed that people are willing to use healthcare app solutions for remote consultations. AI is revolutionizing the healthcare industry, with its market expected to exceed $150 billion in 2026 [13].

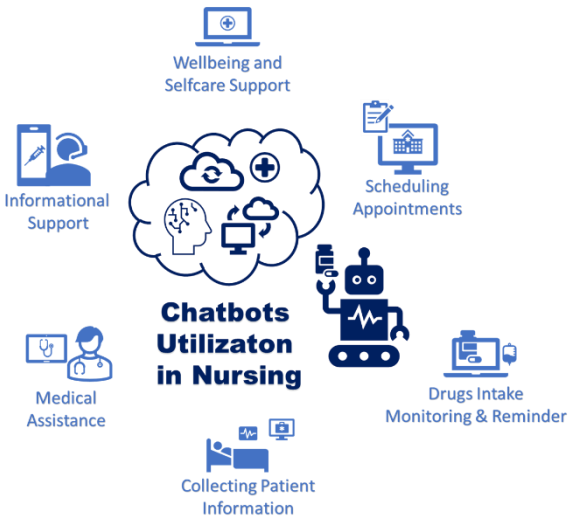

Fig. 2. Chatbots in Nursing.

Fig. 2 illustrates the chatbot potentials in nursing. Chatbots are AI-powered robotic applications that offer precise communication tools for audio and textual messaging. There are three types of chatbots in healthcare: task-oriented, information-oriented, and open/close domain. AI is being used in many aspects of healthcare, such as illness detection and treatment [14]. Chatbots are helping patients by providing better healthcare support and diagnosing serious health conditions. They also assist health workers in collecting crucial health data. AI-enabled chatbots are highly responsive and offer professional communication skills, which will improve basic healthcare services in countries with low doctor-patient ratios [15]. Chatbots are revolutionizing the healthcare industry by giving a personal touch to the diagnostic and treatment procedure by enabling early detection of illness and improving the treatment process [16].

2) Patient Monitoring Systems

AI can continuously monitor patient conditions and alert nurses in case of unusual changes in condition [17]. AI help monitor patients who are in the hospital. AI is used to continuously monitor the patient's vital parameters, such as temperature, pulse and blood pressure and analyze these data to monitor the progress of the patient's condition [18]. AI also explore a patient's sleep pattern and alert nurses if there is an unusual change in sleep pattern. AI can also monitor a patient's medical history and compare it to other patient data. It helps nurses make decisions about the proper care for a patient.

The example of this system is using federated learning. Federated learning is a solution to the challenge of health systems and hospitals not sharing patient data for machine learning models, due to legal, privacy, and cultural reasons. It trains an algorithm on decentralized devices or servers without exchanging data samples [19]. A study by Penn Medicine shows that federated learning is successful in analyzing MRI scans of brain tumor patients and distinguishing healthy tissue from cancerous regions [20]. Fig. 3 depicts an illustration of AI-based Patient Monitoring System.

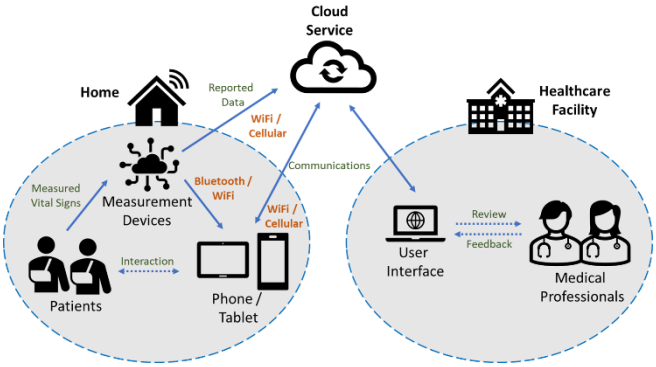

Fig. 3. AI-based Patient Monitoring System.

3) AI Diagnostics

AI algorithms can assist in making medical diagnoses based on symptoms and test results [21]. AI is playing a critical role in the medical imaging field. From reducing the computation time needed to produce images from CT scans to performing real-time inferences on endoscope cameras, AI streamlines workflows and improves medical care. Precision medicine is one example of AI applications in healthcare. It leverages genomic analytics and other patient data to provide tailored care for each individual. Predictive analytics is also an essential part of AI applications in healthcare [22]. It helps health systems understand trends and improve public health strategies by monitoring and anticipating care needs. Fig. 4 shows the use of AI on diagnostic activity.

Fig. 4. AI for Diagnostic [23].

Digitization of pathology has improved clinical lab workflows, but AI must be considered for full benefits in clinical diagnostic. AI is faster and more accurate in image

analysis, increasing productivity and accuracy of pathology labs. AI models trained to detect tumors showed higher accuracy compared to human pathologists and could result in cost savings for hospitals by reducing misdiagnosis. AI also improves staff satisfaction by reducing manual tasks and workload and enabling flexible working. Better diagnostic accuracy and consistency with AI assistance results in improved patient outcomes.

4) Nurse Robots

Nurse robots can perform basic care tasks, such as helping patients move from bed to wheelchair or taking medication. Nurse robots can perform various tasks, such as assisting patients in moving, monitoring patient conditions and sending information to nurses, helping change patient positions, and helping patients consume food and drinks [24]. However, nurse robots cannot perform critical tasks such as providing medical care, conducting medical interventions, and evaluating patient conditions. These tasks still have to be done by professional nurses. Fig. 5 shows the nurse robot in market [25].

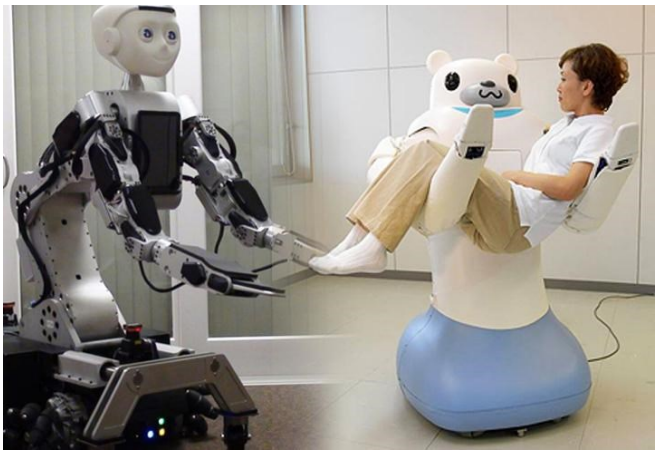

Fig. 5. Nurse Robot in Market [25].

Those are some examples of the use of AI in the healthcare field. However, it is essential to remember that AI is only used as a tool, and the role of nurses remains critical in providing excellent and safe healthcare services.

The Global Robotics in Nursing Market is expected to grow significantly, reaching Million US$ in 2027, with a Compound Annual Growth Rate (CAGR) of +XX% within the period of the forecast [25]. The report covers market scenarios, competitive analysis, and profiles of top players in the market, including ABB, Cummins, Eaton, General Electric, Honeywell, and Siemens. The report also answers key questions about market growth factors, demand, latest opportunities, key players' strengths, and market key aspects.

B. Will Nurses be Replaced by Robots with AI?

Machine learning is a solution to the challenge of sharing patient data for machine learning models in health systems and hospitals [12], [18]. It trains algorithms on decentralized devices or servers without exchanging data samples [19]. The digitization of pathology has improved clinical lab workflows, and AI has the potential to bring further benefits in clinical diagnosis. AI models trained to detect tumors have shown higher accuracy compared to human pathologists and could result in cost savings for hospitals by reducing misdiagnosis. AI also improves staff satisfaction by reducing manual tasks and workload and enabling flexible working, leading to improved patient outcomes.

Chatbots, AI-powered applications, offer precise communication tools for audio and textual messaging. There are three types of chatbots in healthcare: task-oriented, information-oriented, and open/close domain [13]-[15]. AI is used in many aspects of healthcare, such as illness detection and treatment. Chatbots are helping patients by providing better healthcare support and diagnosing serious health conditions and assisting health workers in collecting crucial health data. AI-enabled chatbots offer responsive and professional communication, improving basic healthcare services in countries with low doctor-patient ratios and revolutionizing the healthcare industry by giving a personal touch to the diagnostic and treatment process.

Robots with AI can only replace the role of nurses partially [24]. While AI has tremendous capabilities in assisting and amplifying nurses' tasks, nurses have emotional and interpersonal skills that are critical in providing good, holistic health care. The nurse is responsible for evaluating the patient's overall condition, determining appropriate courses of action, and assisting patients and their families in coping with health and emotional problems [22]. AI-enabled robots can't do any of these things, so the role of nurses remains vital in the healthcare field. In other words, AI can help nurses perform their tasks more efficiently and accurately. Still, it will always stay the role of nurses to provide excellent and humane health care services.

C. Remarks: AI Benefits and Challenges in Nursing

Artificial Intelligence (AI) has become increasingly popular in the healthcare industry, particularly in nursing. AI technology can help healthcare professionals streamline their workflows, reduce errors, and provide better care to patients. There are several benefits of AI in nursing, including improved patient outcomes, increased efficiency, and reduced healthcare costs. AI can also help nurses make informed decisions by analyzing vast amounts of data and providing personalized care plans for patients.

One of the primary benefits of AI in nursing is its ability to improve patient outcomes. AI can analyze patient data, identify potential health risks, and alert nurses to potential problems before they become severe. For example, AI-powered monitoring systems can detect changes in a patient's vital signs and notify nurses immediately. This allows nurses to respond quickly and provide the appropriate care, potentially saving the patient's life.

AI can also increase efficiency in nursing by automating time-consuming tasks, such as data entry and documentation. This can free up nurses' time, allowing them to focus on providing direct patient care. Additionally, AI can help nurses manage their workload by prioritizing tasks based on patient acuity and need.

However, there are also several challenges associated with implementing AI in nursing. One of the main challenges is the ethical implications of using AI in healthcare. There are concerns about the potential misuse of patient data and the impact of AI on patient privacy. Nurses must ensure that they use AI technology ethically and transparently, while also protecting patient confidentiality and autonomy.

Another challenge is the potential for AI to replace human interaction and empathy in patient care. While AI can provide personalized care plans, it cannot replace the human touch that is essential in nursing. Nurses must strike a balance between

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using AI technology to improve patient care while maintaining human connection and empathy.

In conclusion, AI technology has the potential to revolutionize nursing practice by improving patient outcomes, increasing efficiency, and reducing healthcare costs. However, nurses must be mindful of the ethical implications of using AI in healthcare and ensure that they continue to provide human connection and empathy in patient care. With careful implementation and monitoring, AI technology can enhance the nursing profession and improve patient care.

IV. Conclusion

AI has significantly impacted the healthcare and nursing fields, increasing efficiency, speeding up the diagnostic process, and helping to monitor patient conditions continuously. Many AI technology solutions are available to assist nurses and medical personnel in carrying out their duties, such as nurse robots, bedside terminals, and predictive analytics. While AI can simplify some of the tasks of nurses, there are some things that AI cannot replace, such as the specific human interactions and relationships between nurses and patients. In using AI in nursing, it is crucial to ensure that the technology is used ethically and takes patient safety and privacy into account. One challenge of using AI in nursing is ensuring that AI technologies are developed and implemented in a way that aligns with ethical and legal considerations, including patient privacy and informed consent. Additionally, there may be concerns around the potential loss of the "human touch" in nursing care, as well as the need for ongoing education and training to ensure that nurses are equipped to effectively use and integrate AI technologies into their practice. Finally, there may be challenges around the potential for bias or inaccuracies in AI algorithms, which could impact the quality of care provided to patients.

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