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Original Research Paper

Nursing

ARTIFICAL INTELLIGENCE - TRANSFORMING NURSING

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ABSTRACT	Health care delivery system has been challenging and complex over the past few years. In the current technology erg there is an emerging need to deliver patient-centric care. Artificial intelligence along with			

other technology era, there is an emerging need to deliver patient-centric care. Artificial intelligence along with other technologies like Block chain, IoT, and Robotics etc. enable us to design advanced decision-support systems. Healthcare is among the top industries where a lot of patient and clinical research related data is available. It is high time we use AI to uncover the hidden insights in this sea of data and apply them to improve the traditional Nursing practices.

KEYWORDS: Artificial intelligence, Nursing, Analytics

INTRODUCTION:

Artificial intelligence (AI) and other newer technologies like Machine Learning are fast becoming mainstream in various fields of business and healthcare. These technologies have a great potential to change nursing care being provided to the patient as well as handling administrative aspects of patient related information. Some of the real-world examples of adoption of AI are - BioXcel Therapeutics uses AI to identify and develop new medicines in the fields of immuno-oncology and neuroscience. PathAI is developing machine learning technology to assist pathologists in making more accurate cancer diagnoses. Vicarious Surgical transformed surgical operations by employing AI-enabled robots and virtual reality. As AI is transforming healthcare, the global market intelligence firm Tractica forecasts that by 2025 global AI healthcare spending will equal \$36.1 billion (1). In 2017, China announced its goal is to become a global leader in AI by 2030. And on February 11, 2019, the US issued the executive order Maintaining American Leadership in Artificial Intelligence, directing all federal government agencies to implement strategic objectives aimed at accelerating AI research and development (2). For all these reasons, it becomes essential for nurses to have basic understanding of artificial intelligence. The primary aim of health-related AI applications is to analyze relationships between prevention or treatment techniques (3).

AI Fundamentals

McCarthy was one of the founders of the discipline of artificial intelligence (4). He coined the term "artificial intelligence" (AI) (5). AI is the tendency of machines to mimic problem solving and learning functions of human brain. (6), (7). AI isn't one technology, but rather a collection of technologies that perform various functions depending on the task or problem being addressed (8).



AI Cognitive technologies

AI works through machine learning (ML) algorithms and deep learning. Machine learning is the frequently used technology in which computers act intelligently on a specific task or problem without being explicitly programmed. The computer uses algorithms to derive knowledge from data and interprets data for itself (9). Deep learning is a subset of Machine Learning. In deep learning, a set of mathematical instructions such as an algorithm, which is called a node, works like a neuron to fire the algorithm, process it as instructed, and pass its information to another node in the computer. The word "deep" in "deep learning" refers to the number of layers through which the data is transformed (10). A common application of deep learning in healthcare is recognition of potentially cancerous lesions in radiology images (11).

AI AND ANALYTICS

Nurses should understand how AI is being utilized to improve patient care. Some of the transformational uses of the technology are accelerating innovation, improving decisionmaking, automating and speeding up processes. In healthcare, AI has as shown potential solution for handling massive increases in complex medical data, but only 15% to 20% of end users are using it to drive changes in the delivery of patient care (12).

Three Types Of Analytics:

- Clinical analytics generate insight and improve treatment and outcomes of patient care. Among the many examples of AI for clinical analytics are clinical pathway prediction, disease progression prediction and health risk protection.
- Operational analytics improve the efficiency and effectiveness of systems that provide and manage care processes like maintaining equipments and identify fraud.
- Behavioral analytics studies consumer behavior of patients using health services and inform the stakeholders who are parts of healthcare value chain to provide better experience.

APPLICATIONS OF AI NURSING

Healthcare is disrupted by the influx of new technologies in the Information Age in the case of automation, machine learning, and AI, doctors, nurses, hospital. According to a 2016 report from CB Insights, about 86% of healthcare provider organizations, life science companies, and technology vendors to healthcare are using artificial intelligence technology. By 2020, these organizations will spend an average of \$54 million on artificial intelligence projects (13).

Here are some of the applications of AI in healthcare directly or indirectly affecting nursing field now as will in the future. (14)

APPLICATION	POTENTIAL	KEY DRIVERS FOR
	ANNUAL VALUE	ADOPTION
	BY 2026 (U.S)	

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Robot-assisted surgery	\$40B	Technological advances in robotic solutions for many types of surgery
Virtual nursing assistants	\$20B	Increasing pressure caused by medical shortage labor
Administrative workflow	\$18B	Easier integration with existing technology infrastructure
Fraud detection	\$17B	Need to addresses increasingly complex service and payment fraud attempts
Dosage error reduction	\$16B	Prevalence of medical error, which leads to tangibles penalties
Connected machines	\$14B	Proliferation of connected machines/devices
Clinical trial participation	\$13B	Patent cliff; outcomes driven approach
Preliminary diagnosis	\$5B	Interoperability/data architecture to enhance accuracy
Automated image diagnosis	\$3B	Storage capacity; greater trust in technology
Cybersecurity	\$2B	Increases in breaches; pressure to protect health data.

CONCERNS ABOUT ARTIFICAL INTELLIGENCE

- Emotional connect: In healthcare, we concentrate almost exclusively on processing the medical information. Usually we collect medical data, analyze it and make a provisional diagnosis/final diagnosis. In contrast to doctors, nurses require good psychomotor and emotional skills like giving painful injection to the newborn. The healthcare industry which takes care of the sick, injured, disabled is likely to remain a human support for a long time. Therefore it is difficult now to comment upon the complete replacement of emotional component of humans. However, missing of human touch may pose a problem, because at the end of the day, the most valuable and non-replaceable thing is human-human interaction (15).
- Data readiness: Machine learning works by training machine on positive and negative samples of a problem. The prediction accuracy increases when we are able to capture and define all the features and their relationship with the outcome variable well. So, one of the decisive factors in adopting AI in healthcare is the quality and readiness of data for training. In November 2018, the International Data Corporation (IDC) published a report assessing the "data-readiness" of four industries (including healthcare) on a scale of 1 (Critical) to 5 (Optimized). IDC ranked the healthcare sector at 2.4, reporting that 60% of survey respondents in the healthcare sector lack a data strategy.
- Trust issues: To many, AI is just a black-box which ingests medical information, processes it and produces certain output. If the training dataset does not cover all the scenarios related to a problem, then it will throw random results for those scenarios. Hence, patients are likely to be reluctant to trust AI-based recommendations as they cannot be sure how particular software processed and produced its outcome.

FUTURE OF NURSING PRACTICE WITH ARTIFICAL INTELLIGENT MACHINES

The ultimate question that arises: Can nurses remain relevant to technology advancement? Nursing personnel should learn about emerging technologies in healthcare. In the past, we have seen technological advancements leading to replacement of humans where the process could be automated with the code – Be it the onset of computers era or the industrial production. Machines have often replaced humans in the search of better efficiency and efficacy. A report by McKinsey Global Institute (16) estimates that 800 million workers worldwide could get replaced by robots by the year 2030. Less than 4% of all physician-patient interactions involve AI today; by 2023, one in five interactions will include this strange technology (17).

But with our experience in the past, we have seen that these technological advances often bring with them new ways of working and functions overtaken by humans. So, even though it looks that new technologies replace humans but it is not often true. In longer run if we evaluate, these advances not only help streamline the current processes but also open up new innovative opportunities.

Artificial Intelligence in nursing could be capable of improved organization of patient routes or treatment plans and would also provide all relevant information needed for physicians and nurses to make correct decisions (16). Powerful artificial intelligence techniques can determine clinically significant information underneath a massive amount of data and this can aid in clinical decision making for nurses (17), (18), (19). Artificial intelligence systems can also reduce therapeutic and diagnostic errors that are inevitable in human clinical practice (17), (20), (21), (22). Global consultancy firm Accenture predicts that clinical health AI applications could save the US healthcare economy \$150 billion annually by 2026(17).

However, there exist wide ranges of challenges which prevent mass-scale adoption of AI technologies in healthcare – from trust issues to regulatory barriers to emotional disconnect. But with carefully crafting the digital strategy framework to treat data and fostering the culture of innovation in our nursing practices, these challenges can be overcome. The opportunities offered by AI certainly take us closer to our mission of establishing value-based care system.

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