

Issues And Challenges In Adopting Robotics In Healthcare-A Conceptual Study

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Abstract

Advance technologies growing rapidly in all sector including healthcare. Health care industry has seen a varied technological advancement like Artificial intelligence, IOT and Robotics that helped the hospitals to gain a competitive advantage. Robotics is one such advancement that helped the hospitals to develop a niche through precision, automation, speed and reduced duration. These factors help the healthcare professionals to sharpen their skills and adopt to the changes at a faster speed. Adoption of robotics demands high technical orientation, intuitiveness to learn and accepting challenges from healthcare professional. This paper makes an attempt to know how robotics transform healthcare from traditional hospital to smart automated hospital. and also shed lights on issues and challenges occurs while implementing robotics technology in hospitals. Study is descriptive in nature to explore applications of robotics in healthcare and relies on secondary data like journals, scholarly articles, websites and reference books. Outcome of this study is providing insights robotics in reducing burden of workload to healthcare professional.

Keywords: Robotics, Healthcare and Medical Personnel.

Introduction

Continuous innovation paved the way for advanced technologies like Artificial Intelligence, the Internet of Things and Robotics. Growing competitors and a shortage of manpower are forcing hospitals to invest in these advanced technologies for their sustainable development. Many super-speciality hospitals promote their potential to offer robotic surgeries for better care service. While Robotics is still very expensive, it provides a broad spectrum of benefits for healthcare professionals to gain competitive advantages. Most of the stakeholders of healthcare including doctors, Nurse, technician, attenders, patients and management are still accepting the innovation and developments in the field of robotics. Implementing Robotics in

healthcare faces difficulties in training these advance technologies among healthcare professionals and also with legal issues, regulations and social acceptance in hospitals. This study attempts to explore the issues and challenges faced by healthcare while implementing robotics in their hospitals.

Literature of review

Mr Alojz PETERLE reiterated that AI, robots and digitization will mark the EU healthcare system in the years to come and closed by remarking that while it is unclear whether AI will serve to humanize societies or contribute to more social differentiation, it is hoped these applications will remain instruments that are used for a more personalized health approach.

Katherine M. Tsui and Holly A. Yanco survey represents a small number of medical and healthcare professionals and staff. In a more representative study, insights can be gained from comparing responses from students versus professionals and the impact of profession on their attitude towards medical and healthcare roboticsⁱⁱ

N. Sharkey, A. Sharkey stated the various types of surgical robotic systems are reviewed and a range of ethical problems is discussed. Topics include the patient experience of such techniques, how robotic systems are marketed, training and the balance of cost versus access, as well as challenges relating to remote robotic surgery and automated hospitals and applications of specific systems such as da Vinci and RoboDocⁱⁱⁱ.

Jung Kim, Gwang Min Gu and Pilwon Heo focus on research and clinical activities that have followed successful demonstrations of early pioneering robots such as daVinci telesurgical robots and LOKOMAT training robots.

Objectives

The main purpose of this study is to explore the applications of robotics in healthcare encompassing associated technologies, applications avenues and its impact. This study sheds light on identifying issues and challenges encountered while implementing robotics by healthcare workers in hospitals. This study also highlights the benefits of robotics application in healthcare and to know societal context of the promising applications.

Research Methodology

Researcher attempted to review previous literatures on Robotics applications in healthcare. The paper is descriptive in nature and based on secondary data like journals, scholarly articles, websites and reference books.

Robotics in healthcare

Today's perception of modern robotics is integration of computers and mechatronics disciplines, but its core function is still the automation of physical work. And now, extending its area has intelligence in interacting with humans. Major avenues of robotics in healthcare are surgical robots, rehabilitation robots, and assistive robots. Robotics are providing better quality, precision access and efficiency in the healthcare system to gain a competitive edge among other hospitals. Therefore, many corporate and super-specialty hospitals are coming forward investing in robotics technology to ease the doctor's tasks and provide better services to patients.

Avenues of robots in healthcare

Surgical Robots

Doctors can use robots to help them execute complex surgeries with less incision. Surgical robotics is the most well-known robotics use in healthcare and medicine. They enable surgeons to make more precise incisions and have aided in the development of novel minimally invasive methods.

Radiologist Robots

"Robot radiologists" will be able to analyse even the most complicated clinical images. They will consider not only previous imaging findings but also a patient's entire medical history. The robot radiologists will work around the clock, 365 days a year, and will not suffer from weariness.

Rehabilitation Robots

Robotic exoskeletons are lightweight wearable devices that help with limb mobility. Other types of rehabilitation robots might help the nervous system repair adequate neural connections after stem cell and other medical

treatments. Research is being carried out to develop robots that mimic human movement in order to fool our nervous system into adapting.

Benefits of robotics

Robotics and AI applications ranges from collecting and analysing medical data for diagnostics to improving motor sensory applications in active prosthesis are applied in healthcare. the advantages of these applications and how they can improve quality of life, such as by assisting or assisting humans through emotional support (e.g., robot companions), assisting or assisting people with impairments or disabilities in performing or improving motor functions (e.g., active prosthesis) or assisting surgeons in performing various surgical functions (e.g., interactive instruments and augmented reality). In predictive medicine, robot and AI applications are being utilised to give patients greater control over their health. One example is IBM's Watson System, which utilises statistics, a patient's profile, and other comparable profiles to determine the likelihood of a person getting any diseases. And also reduces readmission rate and post operative complications resulting safer and cost effective.

Robots have transformed traditional method of training surgeons with the use of simulations. This evolution is defining and standardising new training to improve the skills of surgeons. current robotics in healthcare ranges office automation to chatbots applications for improving safety, quality and efficiency of health care services.

Another robotic application in mental health care, which focuses on three major areas: mental illnesses, mental disorder prevention, and optimization. The employment of "Robo Retman" to assist Children's in controlling their emotions is on the rise. However, one has to overcome barrier in order to maximize these benefits.

Barriers

Main impediment is a negative attitude, as certain robotic applications are not well received by healthcare stakeholders and the general public. There was a perception of trust between robots and healthcare workers. Integration of robotic applications into established healthcare staff work procedures is another roadblock. The contradictions that exist in the healthcare business between standardisation through automation and the unpredictable nature of healthcare labour may be difficult for robotic applications to reconcile. Robotic applications built to function in specialised settings with a small number of humans around them as a tool (e.g., surgical robot) were thought to be easier to execute than those meant to operate in human-dense environments.

Another barrier is concerned with the emergence of new ethical and legal issues. There is no established responsibility or ethical framework in this sector, and it is difficult for the law to keep up with the rapid speed of technical advancements. While regulation is necessary, it should be implemented in such a manner that it encourages regular usage without suffocating innovation.

Surgical robots required for all surgeons, and those in charge of determining which patients are operated on using this technology should be held accountable. By moderating expectations, education can help increase the rate of adoption of new technologies. As a result, it's critical that interventions are created by well-trained experts who are capable of regulating expectations. It is also critical to ensure that policy is evidence-based for these goals, but science is critical at the start and throughout the process.

Ethical aspects of using robots in healthcare

In the judicial system, robots have produced new ethical and societal hazards and difficulties. Previous studies have outlined these dangers, emphasising the implications for privacy, human dignity, and autonomy (e.g., isolation), the potential for human augmentation, and technical dependencies that might have the opposite effect of stimulating learning (e.g., medicine without doctors). Health Datahub project in France as an example of how data utilisation creates privacy concerns and what may be done to mitigate this risk. The Health Datahub project provides a platform for the interchange of health data between public and commercial entities.

Challenges

Three major policy Challenges surrounding the use of robots in healthcare are studied in this paper

- The growth of robot roles and capabilities
- privacy and data protection in care and therapeutic settings
- robots as convergent technologies

1. The growth of robot roles and capabilities;

Sustainable and desired output these problems must be considered at the robot design and implementation stages. The short- and long-term repercussions of having automated interventions embedded into these capacities are less well understood. Robots will play a significant part in the collecting and processing of data for health monitoring, raising a variety of privacy and data security concerns.

2. privacy and data protection in care and therapeutic settings

Healthcare domain comes with its own set of ethical principles which are deeply entrenched and heavily regulated (e.g., confidentiality, doctor-patient relationship, shared decision-making, and resource allocation). Regulation will therefore need to extend beyond technical

requirements by considering intersecting normative frameworks due to the convergence of AI and robotics in the healthcare domain.

3. robots as convergent technologies

Ageing population, shortages of healthcare workers, differentiating points of care, waste and overuse of prescription medicine, an increase in lifestyle diseases, long diagnosis timelines, and the disproportionate rise of chronic and noncommunicable diseases in lesser populations. AI and robot technologies are unlikely to solve all of these problems, with high-performance computing, big data (e.g., 5G/6G connectivity), nanotechnology, and the Internet of Things holding the majority of the prospects (IoT). Machines can now conduct more precise and efficient operations because to this expanding technological stack. To fully realise AI and robots' potential, they must be well integrated with current systems.

Robotics promises to improve healthcare's efficacy and efficiency, namely in the areas of optimization and prediction These include real-time prevention and more precise monitoring over time, decreased waste and increased healthcare delivery efficiency, mass-customization, and monitoring of the cost effectiveness and overall performance of health therapies throughout their life cycle.

Conclusion

People are concerned with the loss of the human element associated with care giving. In the domain of medical and healthcare robotics, it is clear that robots are not a substitute for human contact. The field of human-robot interaction is essential to integrating robots as care giving teammates.

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