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How Artificial intelligence in healthcare institutions helps healthcare worker and patients

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ABSTRACT:

Background: Advances in artificial intelligence (AI) have created a plethora of opportunities for clinical practice and healthcare. Evidence suggests that AI has the potential to improve healthcare delivery by increasing diagnostic accuracy, optimising treatment planning, and improving patient outcomes
Methodology: Health care workers in the AI need to learn how to use and interact with information systems, as well as have a foundational education in information retrieval and synthesis, statistics and evidence-based medicine appraisal, and predictive model interpretation in terms of diagnostic performance measures.
Results:AI-augmented healthcare systems have the potential to significantly reduce the burden on KSA healthcare systems. The new frontiers opened by Al in healthcare will greatly benefit the KSA population
Conclusions: The Artificial intelligence's ability to process massive amounts of data and provide critical insights quickly will have a significant impact on how medical health services are delivered and managed

1. Introduction

Advances in artificial intelligence (AI) have created a plethora of opportunities for clinical practice and healthcare. Large language models (LLMs) like BERT, GPT, and LaMDA have grown exponentially, with some now containing over a trillion parameters.[1]
This advancement in AI capabilities enables seamless integration of different types of data, resulting in multimodal applications in a variety of domains, including medicine. Evidence suggests that AI has the potential to improve healthcare delivery by increasing diagnostic accuracy, optimising treatment planning, and improving patient outcomes.[2]

A doctor's decision aided by AI could be more accurate (and timely) than without AI, reducing risk for patients and improving decision-making process, quality of service, and efficiency. However, one viable way to enable the "use" of AI is through "collaboration." Following the principles of human-in-the-loop and human-AI collaboration, a structure for leveraging AI's potential can be built.[3]

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AI applications in health include self-referral, in which individuals enter personal health information into AI applications to obtain recommendations on whether they should seek care for their condition; triage of patients in health facilities; image-based diagnosis in radiology and pathology; treatment recommendations to clinicians through clinical decision support systems; fraud detection by identifying unusual patterns in claim data; and disease surveillance.[4]

2. Literature review

In practice, artificial intelligence refers to computer systems that simulate or exhibit a particular aspect of human intelligence or intelligent behaviour, such as learning, reasoning, and problem solving.[5]

A recent study found that when AI is combined with expert human evaluation, the accuracy of diagnosis and clinical decisions improves, emphasising the collaborative nature of AI and physicians. This collaboration can add to an often-overlooked value proposition for addressing the disparities. AI has a higher value in acting as a complementary tool, or knowledge augmentation mechanism, to fill the gaps, particularly in low-resource settings, such as rural areas or underdeveloped countries, towards improving diagnosis, patient communication and education, and reducing language barriers.[6]

However, developing and implementing AI technology is difficult and expensive. In order for AI to be successful, health organisations must overcome a number of obstacles. These challenges include the following: (1) a lack of understanding about what a particular type of AI technology can or cannot do; (2) a lack of clear strategies for integrating different AI technologies into the existing care systems to effectively solve the most pressing problems that health organisations currently face; (3) a shortage of a well-trained workforce for AI implementation; (4) AI technologies' incompatibility with legacy infrastructure; and (5) a lack of access to good and diverse medical.[7] Medical robots demonstrate the capabilities of all of the AI technologies mentioned previously. Medical robots can aid in surgical procedures, rehabilitation, social interaction, assisted living, and other applications. AI-assisted surgical robots are one of the most commonly used medical robots, as they can analyse data from pre-operative medical records and physically guide a surgeon's instrument during a procedure in real time. [8] For the best AI integration in healthcare, AI technologies must be embedded in workflows to support clinical decision-making at the point of care. By integrating AI into workflows,[9] we can achieve the following:

- Utilize big data for patient insights;
- Encourage evidence-based decision-making to improve quality, safety, and efficiency;
- Improve patient experience and outcomes;
- Deliver value and lower costs;
- Optimize health system performance.

Currently, there appear to be three trends in developing healthcare AI. Machine learning is a dominant approach that has been shown to be trustworthy for disease detection, diagnosis, and management. In recent years, machine learning algorithms have proven to be reliable for disease detection and diagnosis. Many such algorithms have been approved by the US Food and Drug Administration (FDA) for safe use in healthcare.[10]

Aside from disease detection and diagnosis, hospitals have begun to use ML for predictive analytics for hospital management (e.g., predicting adverse events, mortality rates, and the number of patients seen in the emergency department). Because of this predictability, hospitals can take proactive measures for foreseen events days in advance.[11]

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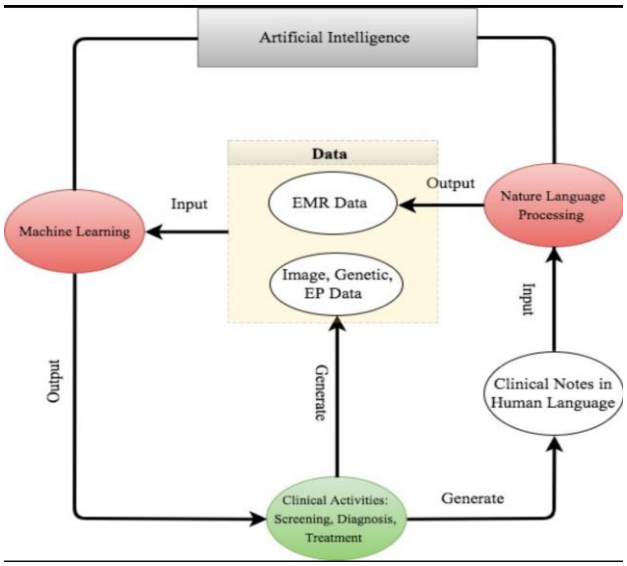

Figure (1): The path from clinical data collection to natural language processing data enrichment, machine learning data analysis, and clinical decision making. EMR is an abbreviation for electronic medical record, while EP stands for electrophysiology.

Radiology is one field that has received a lot of attention for its potential use with AI. Chest X-rays are the most common type of medical scan, with over 2 billion performed globally each year. [12]

A very high likelihood of short-term survival for a critically ill patient may assist the patient, their family, and their doctor in making decisions about resuscitation, endotracheal tube insertion for mechanical ventilation, and other invasive procedures. Similarly, AI predictive tools may make it easier to determine which patients would benefit from palliative care and who is at risk of developing sepsis or septic shock. [13]

3. Methodology

Health care workers in the AI need to learn how to use and interact with information systems, as well as have a foundational education in information retrieval and synthesis, statistics and evidence-based medicine appraisal, and predictive model interpretation in terms of diagnostic performance measures. Such interactions will necessitate an attitudinal shift in providers, as AI may be perceived as a colleague rather than a tool.

It is critical that HPE leaders take immediate action to ensure that all providers are prepared to contribute to the responsible deployment of AI.[14]

4. Results

To provide better care to patients, HCPs must be able to leverage the benefits of Al technology. Working with AI systems in healthcare to support clinical decision-making will be an essential skill in the future. Healthcare systems around KSA must adapt and scale up Al-based medical practice to address the human resource shortage. AI-augmented healthcare systems have the potential to significantly reduce the burden on KSA healthcare systems. The new frontiers opened by Al in healthcare will greatly benefit the KSA population.

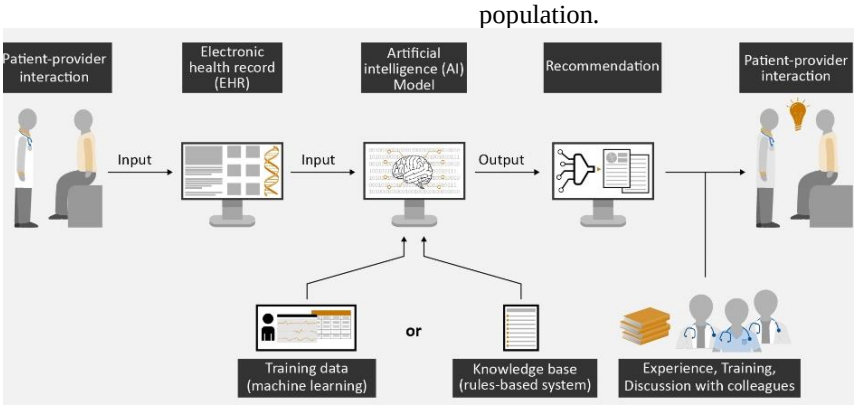

Figure (2): Sample workflow for an Al-based clinical decision support system.

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Aside from developing technical knowledge, HCPs must be made aware of the ethical and legal implications of using AI in healthcare. They should also be trained in social skills, which machines cannot easily learn, such as leadership, emotional intelligence, and communication.

5. Discussion

The use of Al technologies in health holds great promise and has already led to significant advances in fields such as drug discovery, genomics, radiology, pathology, and prevention. Al could help health-care providers avoid errors and allow clinicians to focus on patient care and complex case resolution. The potential benefits of these technologies, as well as the economic and commercial potential of Al for care, point to an increase in its use around the world.[15]

It may reduce the size of the workforce, limit, challenge, or degrade workers' skills, and require them to retrain to adapt to the use of Al. Centuries of medical practice have been built on relationships between provider and patient, and care must be taken when introducing Al technologies to ensure that they do not disrupt these relationships.[16]

Continuous testing and improvement are required to advance human-AI interaction because most AI technologies require a lengthy learning period and can only achieve dependability over time. Controlling telehealth services is especially difficult because some parts of the service delivery infrastructure may only include one person at a time.

6. Conclusions

The Artificial intelligence's ability to process massive amounts of data and provide critical insights quickly will have a significant impact on how medical health services are delivered and managed.

Artificial intelligence solutions have the potential to change how healthcare is delivered. However, as we continue to develop these solutions, it is critical to consider key future considerations such as the development of AI-powered diagnostic tools, standardised data collection and analysis, ethical considerations regarding bias and healthcare disparities, and ongoing effectiveness evaluation. By doing so, we can ensure that AI-powered solutions live up to their promise of improving healthcare outcomes and increasing efficiency.[17]

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