EDITORIAL

Artificial Intelligence and the Future of Healthcare in Pakistan: Opportunities and Challenges

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Artificial Intelligence (AI) is rapidly transforming healthcare across the world. However, in Pakistan, the use of AI in healthcare is still in its early stages. AI has the potential to improve healthcare delivery, particularly in low and middle-income countries (LMICs).[1,2] In the Pakistani context, AI presents an opportunity to address the scarcity of healthcare workforce and resources in Pakistan.[3] In particular, AI can help bridge the healthcare gap by providing services to underserved populations in rural and remote areas of the country.[4]

Pakistan is ranked in the lowest 25 percentile of the 195 countries evaluated for healthcare and disease burden.[5] With the aid of AI, healthcare may become more accessible, efficient, and affordable for patients in our region. An example is AI-assisted diabetic retinopathy screening. The scarcity of ophthalmologists in Pakistan is well-established. There are only 5.5 ophthalmologists per million in Pakistan, compared to the World Health Organization (WHO) recommended 20 ophthalmologists per million. To make things worse, majority of ophthalmologists are concentrated in urban centres, leaving rural communities with limited access to essential eye care services. AI-enabled smartphone devices may be used to capture fundus images of diabetic patients and identify those who are in urgent need of a referral to an eye specialist, reducing the need for patients to travel long distances for diabetic retinopathy screening.

While there is a lot of excitement about the potential of AI in healthcare, there is a need for rigorous evidence to evaluate its effectiveness. Randomized controlled trials (RCTs) are required to establish the effectiveness of AI in different healthcare settings. A recent systematic review found no RCTs of AI from Pakistan.[6] There is a need to curate high-quality evidence to evaluate the potential utility of AI in healthcare in the local settings. Examples of some initiatives include HEC, Pakistan Science Foundation (working under Ministry of Science and Technology) and Ignite (working under Ministry of IT). Local research in AI should inform evidence-base and improve health outcomes for the local population.

One major concern about AI in healthcare is the potential for bias in the algorithms used to train models. These biases may lead to inaccurate disease classification and patient harm. Because models are trained on large datasets with biased population representation (mostly white European population), their generalisation to LMICs such as Pakistan may not be appropriate.[7] For example, in a recent review of medical datasets for AI in ophthalmology, no dataset was identified from Pakistan.[8] Policymakers in Pakistan must prioritise and promote research to gather reliable and comprehensive indigenous data about diseases that have significant healthcare implications and cost for both patients and society. One such disease is diabetic retinopathy. Pakistan has the highest prevalence of diabetes in the world[9] and is only second to China and India in terms of the number of people with diabetes in a country. Despite the high prevalence of diabetic retinopathy in Pakistan, there are no published datasets of retinal images that Pakistani data scientists could use to train indigenous AI models.[10]

Healthcare providers should be educated about AI and its potential uses in healthcare. Clinicians should be trained to use AI algorithms effectively and to interpret accurately the output provided by AI. Additionally, healthcare providers should be taught of the potential limitations and biases unique to AI algorithms and should learn to take steps to minimize them. AI should also be incorporated into the medical education curriculum in Pakistan. Medical students should be trained in the basics of AI algorithms, data curation, and the potential limitations of AI. Social sciences and management subjects are being made compulsory across all disciplines for up to 20-30% of the curriculum, similarly technology subjects such as data science, AI/ ML and their impact should also be made compulsory across the fields for up to 5-10% of the curriculum. Clinicians and especially clinician educators in Pakistan should be educated about the importance of AI in healthcare.

In a recent survey, Ahmer H et al.[11] found nearly 77% participants supported inclusion of AI in the curriculum.[11]

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Similarly, a recent survey of healthcare workers and learners in Pakistan by our group reported 66% of participants felt AI should be taught at undergraduate level (unpublished data). Interestingly, a recent study reported a well-known large language models (LLM) performed in the passing range in medical licensing exams of the United States.[12] To complicate things further, AI systems and (LLMs) such as ChatGPT can fabricate completely untrue information, often called "hallucinations". This can have serious adverse consequences for patients.

The use of AI in healthcare raises important ethical concerns. Healthcare providers must ensure that patient data is protected and AI algorithms are designed and used ethically. Concerns about the privacy and security of patient data are real, particularly in LMICs where data protection laws are either not well developed or are not enforced. Similarly, there are concerns about potential physician liability for AI system errors.[13]

Health authorities in Pakistan need to develop a robust but transparent regulatory pathway for AI systems.[14,15] Data ownership, security, and privacy should be the main focus of the regulatory process. In Pakistan, the Drug Regulatory Authority of Pakistan (DRAP) is responsible for regulating medical devices, including AI-powered medical devices via Medical Device Rules, 2017.[16] The Medical Device Board (MDB) at DRAP is responsible for the registration and enlistment of medical devices, as well as the licensing of establishments involved in their manufacturing. The establishment license covers activities such as manufacturing, export, import, storage, distribution, and sale of medical devices. When evaluating the licensing of a new medical device, the MDB considers various factors, including clinical investigations and tests conducted or reported by the manufacturer, reports from scientific literature, experiences and studies related to the device's properties, labelling errors, batch changes or deterioration, failure to meet specifications, and any unexpected side effects or reactions associated with its clinical use. However, it is important at this stage to further elaborate on assessment parameters such as safety, ethics, data privacy and security, software testing, detailed technical performance, and system robustness. The Government of Pakistan in the spring of 2023 formed a task force to discuss, streamline and regulate AI's role in various industries including healthcare.[17] We strongly suggest that Medical Device Rules, 2017 be updated to address these requirements including AI and ML challenges.

In conclusion, AI has the potential to improve healthcare in Pakistan by reducing costs and increasing access to healthcare services. Healthcare providers in Pakistan should be educated about AI and its potential uses in healthcare, and AI should be incorporated into medical education programmes. It is important to ensure that these AI-based solutions are designed and implemented in a way that is culturally appropriate, ethical, and sustainable, taking into account the unique needs and challenges of Pakistan. By harnessing the power of AI, we can improve healthcare outcomes for our patients and tackle health disparities in the country.

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