Bang Med J Khulna 2023; 56: 01-02

EDITORIAL

Artificial Intelligence: Risk-Benefit in Health Care

We are in the era of **artificial intelligence (AI)**, which has advanced enough to compete with human brains in many fields. Al has attained the capability to understand language, recognize patterns, make predictions, compose creative work, and to do much more. Once these set of rules are accomplished it becomes as intelligent as human beings, there will be almost nothing it cannot do or cannot learn to do quickly.

During the first industrial revolution, human and animal-powered machinery was replaced by steam-driven ones, the second revolution increased industrial production using electric energy, and the third revolution replaced lot of jobs with partial automation using computer-based technology. In 2021 the Government of Bangladesh pledged in preparing the country to take advantage of the fourth industrial revolution to expedite economic growth to the optimum level. Even though, it is anticipated that a good number of jobs involving direct human participation may be eliminated, but many new areas for jobs might be created, which will need special expertise and training.[1]

Generative AI are expected to swiftly **transform** medical practice. It is a type of machine learning capable of generating data in a range of formats (including text, image, audio, video, or code) and adapting to new tasks in real time, following simple text-based prompts. Chatbots are already helping to redesign the medical workflow, schedule appointments, and even answer routine patient questions. Optimists see advantage in an instantaneous review of a voluminous medical record, machine learning interpretation of diagnostic scans, and analysis of diverse data ranging from published literature to patient physical signs. Skeptics, on the other hand, point out that definitive diagnosis often involves a careful and meticulous history and bedside physical examination, neither of which come naturally to a machine, and nor these are adequately quantified by digital methods.

Machine learning and artificial intelligence are providing new opportunities to operationalize rapidly growing sources of data for patient benefit. Despite much promising research currently being undertaken, particularly in imaging, the literature as a whole lacks' transparency, clear reporting to facilitate replicability, exploration for potential ethical concerns, and demonstrations of effectiveness. Among many reasons why these problems exist, one of the most important is the current lack of best practice guidance specific to machine learning and artificial intelligence. However, it is believed that interdisciplinary groups pursuing research and projects involving machine learning and artificial intelligence for health would benefit from exclusively addressing a series of questions concerning transparency, reproducibility, ethics, and effectiveness (TREE).[2]

Al-driven expert systems, which are modeled after human experts and trained in a supervised fashion on more narrowly defined, gold standard datasets (eg, a large databank of digital photographs of skin lesions with definitive diagnoses made by expert pathologists), are designed for accuracy and have been shown to rival or even exceed the diagnostic accuracy of experienced clinicians (eg, dermatologists viewing the same images). Another example, a common clinical dilemma is the patient in the emergency department complaining of dizziness. The cause could be nonthreatening (such as benign positional vertigo) or dangerous (such as a brain stem stroke). The most useful diagnostic information comes from patient symptoms and bedside eye movement examinations, but these findings are rarely documented correctly. For Al systems to aid in differentiating inner ear disease from stroke, underlying datasets must include a reliable record of these diagnostically relevant patient histories and physical examinations, as well as key diagnostic test results and accurate final diagnoses.

Digital innovations have the **potential** to decrease the environmental harm from health systems in several ways. First, digital innovations are expected to help reduce the greenhouse gas emissions associated with existing healthcare facilities by improving their efficiency. In the UK the NHS has predicted carbon savings through the use of real-time monitoring, including artificial intelligence, to better control buildings (eg, lights, heating, and cooling) and to forecast resource allocation more effectively. However, digital innovations have its own environmental cost.

Al has transformed the capability of a machine to mimic intelligent human behaviour. Many clinicians may prefer to use their voice rather than keyboard and mouse to interact with technology. Some, such as radiologists, already interact with digital systems using voice and physical gestures, and studies suggest important productivity gains. Most doctors have never had their communication skills formally assessed and do not know how they compare with their peers. Glyn Elwyn (Professor, Institute for Clinical Practice, USA) explains how Al might facilitate this and help improve interactions with patients.

Primary care is desired by patients and is central to delivering high-quality health care, but it's worse challenge is shortage of primary care clinicians. While the potential to enhance the quality and safety of health care in general and of primary care specifically using AI has been discussed for over two decades. The technological advancement to widespread availability of generative AI suggests that use will soon affect the practice of primary care on a daily basis.

In contrast to other industries, health care has several attributes that increase the challenge of getting the promised benefits of technology tools. Nevertheless, scientists are optimistic that the two key factors that have historically been critical in overcoming the productivity paradox. The ability of the digital tools to rapidly improve

and the capacity of organizations to implement complementary innovations that allow IT tools to reach their potential- are more advanced than in the past. Because of this, generative AI will deliver meaningful improvements in health care more rapidly than was the case with previous technologies.

The risk of Al at this point seems unclear, however, although the danger to science and research is clear and present. However, the booming of Al can no longer be halted, and the only reasonable response, is to ensure that the 'development and evaluation of safeguards' should go in parallel with the 'development and evaluation of generative Al models.[3] The AI tools are rapidly progressing and alongside these advancements, emergent risks are becoming increasingly apparent. Key pillars of pharmacovigilance- including transparency, surveillance, and regulation- may serve as valuable examples for managing these risks and safeguarding public health.

There is a reason why the nuclear bombs on Japan made it a prominent supporter of nuclear disarmament; why poor countries that are year after year victims of floods, fires, and droughts are some of the loudest voices demanding action on climate change; why some of the people closest to the latest wave of Al technologies are the loudest voices of strict regulation. Thus, humanity's greatest existential crisis is that we react only when we feel the crisis grip us.

In a digital world, people increasingly rely on the internet for food-related and nutrition-related information. However, a recent report showed that almost one-half of online, nutrition-related information was inaccurate (48.9%) or was of low quality (48.8%). Currently, the capability of Al-chatbots to provide personalized dietary advice, such as specific nutrition guidelines and exact portion sizes, is limited. Chat-GPT is also unable to provide accurate common household units to consumers.

Artificial intelligence (AI) shows promise in identifying abnormalities in clinical images, such as pneumonia from chest radiographs, diabetic retinopathy from fundus images, or skin cancer from histopathology images. Al models in clinical care analyse patient data, identify patterns and make predictions. Integrating AI into clinical decision-making may result in higher accuracy than a clinician without Al. However, systematically biased AI models can lead to errors and potential harm. Physician performance can be harmed by following incorrect predictions, a phenomenon known as overreliance. Ideally, clinicians would be able to follow AI predictions when correct but ignore incorrect Al predictions. However, the extent to which AI can be safely integrated to support diagnostic decisions is still largely unknown.[4]

The most complex **cognitive task** in medicine is the act of diagnosing the cause of a patient's symptoms. Errors in diagnosis have been estimated to account for nearly 800 000 deaths or permanent disabilities each year in the US, more than 80% of which are associated with cognitive errors or clinical reasoning failures. This burden creates a unique quality improvement opportunity for Al-based systems to save lives at public health sector.

Diagnostically accurate Al systems require high-quality data at both the front end (patient demographics, symptoms, signs, laboratory and radiographic findings) and at the back end (accurate final diagnoses, treatment effects and outcomes). However, for a medical diagnosis, it is obviously not enough for an AI system to approximate the cognitive skills to be equivalent to an average clinician, given the current rate of diagnostic errors in clinical practice. According to Ghassemi (Assistant professor at MIT's Department of EECS), developers should be aware that they have a responsibility to clinicians and patients who could one day be affected by their tools.[5]

AI will have a major impact on jobs in fields such as medicine, engineering, law and even journalism. However, jobs that require human creativity, morality, judgement, and critical thinking, and work relying heavily on social and emotional skills, will not be replaced in the near future. Higher education in Bangladesh is now primarily responsible for producing graduates with knowledge of technology and skills that can be applied in a variety of settings. These skills include high-order thinking, as well as cognitive and physical skill, along with a drive for lifelong learning. Curiously, our education system still lags far behind the expectation to supply the qualified human resources for rapidly advancing technology.

"**AI must be governed**", a landmark executive order was introduced by US President on October 2023. Addressing the explosive promise and grave risks posed by Al, the executive order outlines the vision for ensuring that Al is developed and used responsibly. It outlines the roles for government and the private sector and it has important implications for health care organizations.

During the surge of scientific innovation, the timeless art of medicine remains a foundational aspect of patient-centered health care. Despite the advances in technology, the qualities of compassion, assistance, active listening, respect, and empathy continue to be vital. These qualities not only contribute to better patient outcomes and increased satisfaction, but also play a crucial role in improving overall well-being.

CH Rasul FCPS, Professor of Paediatrics, KCMC&H (chrasul@yahoo.com)

References

1. Kabir R; Impact of Artificial Intelligence: Threats or new opportunity. The Daily Star; Sat Oct 1,2022
2. Villmer S et al. Machine learning and artificial intelligence research for patient benefit: 20 critical questions on transparency, replicability, ethics, and effectiveness BMJ 2020; 368: 16927
3. Abbasi K; Reacting too late, BMJ 2023; 382: 1781
4. Jabbour S, MSE Measuring the Impact of AI in the Diagnosis of Hospitalized Patients-A Randomized Clinical Vignette Survey Study. JAMA 2023; 330: 2275-2284
5. Anderer S. AI developers should understand the risk of deploying their clinical tools. JAMA 2023; 331: 629-631