Ethical Issues of Artificial Intelligence in Medicine and Healthcare

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Introduction

Artificial intelligence (AI) is a term applied to a machine or software and refers to its capability of simulating intelligent human behavior, instantaneous calculations, problem-solving, and evaluation of new data based on previously assessed data (1). AI heavily influences many industries and fields, including agriculture and farming, manufacturing and production, autonomous vehicles, fashion, sports analytics and activities, healthcare, and the medical system. This technology has the power to impact the future of the industry and human beings, but it is a double-edged sword.

AI applications in healthcare have literally changed the medical field, including imaging and electronic medical records (EMR), laboratory diagnosis, treatment, augmenting the intelligence of the physicians, new drug discovery, providing preventive and precision medicine, biological extensive data analysis, speeding up processes, data storage and access for health organizations.

However, this field of science faces various ethical and legal challenges. Despite tremendous strides made in the field of AI in communities, and its role in improving the treatment process, it is not accessible to all societies. Many low-income and developing countries still do not have access to the latest technologies. It should be noted that the ethical dilemmas, privacy and data protection, informed consent, social gaps, medical consultation, empathy, and sympathy are various challenges that we face in using AI. Therefore, before integrating artificial intelligence with the healthcare system, practitioners and specialists should consider all four medical ethics principles, including autonomy, beneficence, nonmaleficence, and justice in all aspects of health care (2-6) (Fig. 1) (7, 8).

Privacy and Data Protection

General Data Protection Regulation (GDPR) was first enacted by the European Union (EU), as it amended the privacy legislation in other countries, such as the US and Canada. According to these regulations, all personal data and the activities of foreign communities and companies are processed by the union-based data processor or controller in order to protect the information of natural persons with sufficient protection (9). In the United States, the Genetic Information Nondiscrimination Acts (GINA) is an organization that prohibits employers from discriminative de-

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cisions according to the genetic health information of individuals (10). In fact, the role of AI in healthcare is to analyze consumer health data and medical device images, improve diagnoses and outcomes, as well as a helpful role in accelerating health research activities.

Fig. 1: Tommy, the robot nurse, helps keep flesh-and-blood doctors and nurses safe from coronavirus at the Circolo Hospital in Varese, Italy (7, 8)

In addition, social media, as part of AI, play a vital role in disseminating health news or medical advice, especially in pandemics. However, these can be ostensible positive aspects of AI, and ensuring the safety of the patients' data is still a significant concern when using robots:

- In healthcare, current laws are not enough to protect an individual's health data.
- Clinical data collected by robots can be hacked into and used for malicious purposes that minimize privacy and security.
- Some social networks gather and store large amounts of users' data, for instance, individuals' mental health data, without their consent, which can be helpful in the

marketing, advertising, and sales of these companies.
- Also, some genetics testing and bioinformatics companies, which are not legal or closely monitored, sell customer data to pharmaceutical and biotechnology companies.

Informed Consent and Autonomy

Informed consent is a process of communication between a patient and health care provider, which includes decision capacity and competency, documenting informed consent, and ethical disclosure (11). According to the definition of ethical responsibility, patients have the right to be informed of their diagnoses, health status, treatment process, therapeutic success, test results,

costs, health insurance share or other medical information, and any consent should be specific per purpose, be freely given, and unambiguous. Concerns about this issue also increased with the rise of AI in healthcare applications (12). Based on the autonomy principle:

- All individuals have the right to get information and ask questions before procedures and treatments.
- Patients should be able to be aware of the treatment process, the risks of screening and imaging, data capture anomalies, programming errors, the privacy of data and access control, safeguarding a considerable quantity of the genetic information obtained through genetic testing.
- Patients may refuse treatment that the health care provider deems appropriate.
- Patients have the right to know who should be responsible when these robotic medical devices fail or errors. The answer is essential for both patient rights and the medical labor market.

Social Gaps and Justice

Another problem that threatens societies following the development of AI is the social gap issue. In all countries around the world, with every development, discovery and invention, people face greater social inequality and less social justice. Although AI improves the accessibility to more information about science and technology, world events, climate changes, and politics around the world, it exacerbates social inequality (13), as mentioned below:

- Automation and advanced economies have widened the gap between developing and advanced countries.
- Many people lose their jobs as robots grow and develop.
- Bookkeepers and managers in different communities could lose their jobs with the increase of automated systems, and there will be a considerable decrease in salaries.

- The rise of surgical robots and robotic nurses in healthcare environment, operating instead of surgeons and caring for patients instead of nurses, threatens their future job opportunities.

Medical Consultation, Empathy, and Sympathy

Integrating artificial intelligence (AI) with all areas of health care seems difficult and impossible. Due to uniquely human emotions, human and medical robots might not evolve together in a short time. Physicians and other care providers should seek consultation from or provide consultation to their colleagues, which is not possible in autonomous (robotic) systems. On the other hand, it seems unlikely that patients will accept "machine-human" medical relations instead of "human-human." Doctors and nurses are expected to provide treatment in an empathetic and compassionate environment, which will significantly affect the healing process of patients. This will not be achieved with robotic physicians and nurses. Patients will lose empathy, kindness, and appropriate behavior when dealing with robotic physicians and nurses because these robots do not possess human attributes such as compassion. This is one of the most significant negative aspects of artificial intelligence in medical science. For instance:

- In Obstetrics and Gynecology, any clinical examination requires a sense of compassion and empathy, which will not be achieved with robotic doctors.
- Children usually experience fear or anxiety as they engage in healthcare settings and meet professionals. Their behavioral manifestations are lack of cooperation, withdrawal, and aggression that could be uncontrollable with the new robotic medicine system.
- The use of medical robots in psychiatric hospitals may adversely affect patients who have severe psychiatric disorders. (Fig. 2) (14)

In brief, the rapid advancement of Artificial intelligence (AI) in the clinical and biomedical fields is considered a great approach in many communities that may augment professionals in the healthcare system. Nevertheless, despite the great potential and advancement of AI in the field of medical and health care, this achievement has imposed new requirements in the field of medical ethics. Consequently, we should be aware that its negative aspects might outweigh its benefits. To overcome this problem, experts must consider humanity and ethics in this regard.
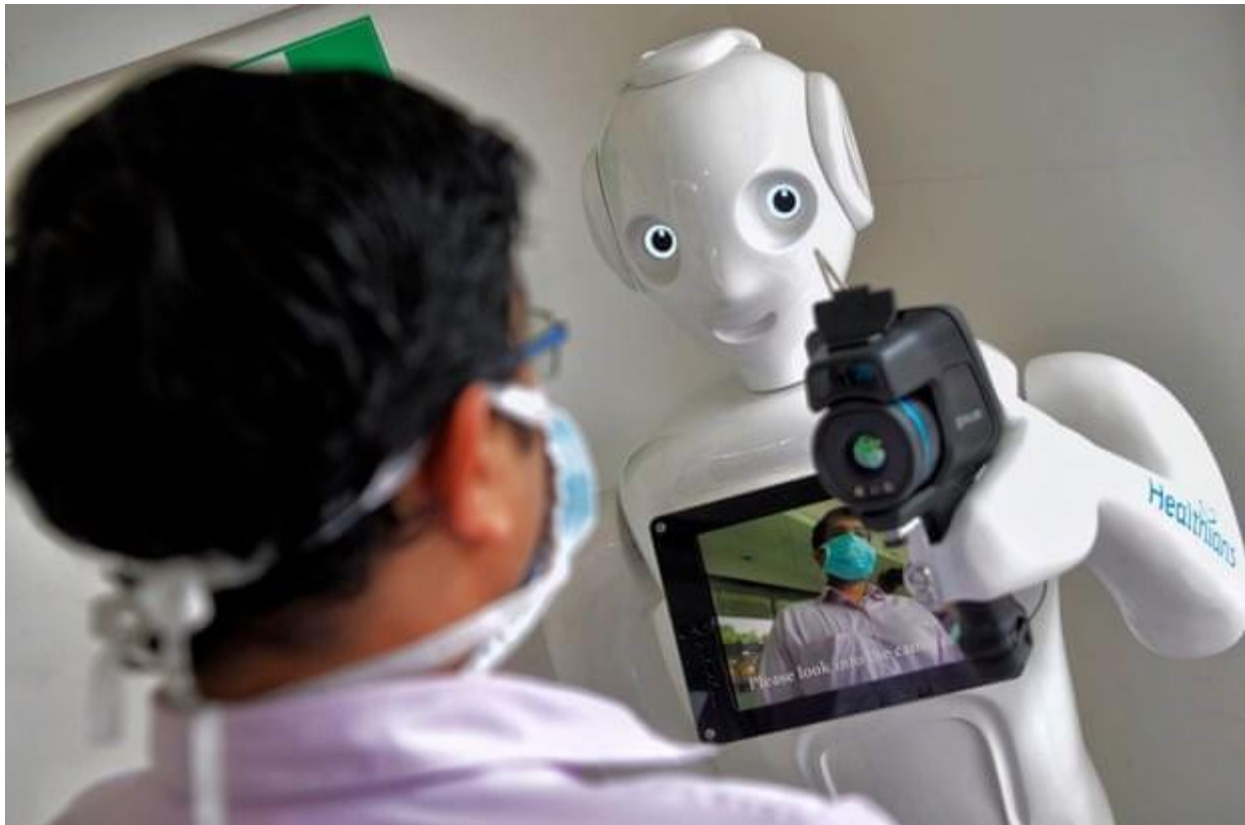

Fig. 2: India's robots such as Mitra are being used to reduce the risk of infection for medical staff and taking care of Covid-19 patients (14)

Conflict of interest

The authors declare that there is no conflict of interests.

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