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EDITORIAL

Will doctors be replaced by artificial intelligence?

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ABSTRACT

Progress in artificial intelligence (AI) and robotics with their applications in various medical disciplines are likely to be a noteworthy feature of medical learning and practice in the future. The dilemma arising from this unprecedented progress is whether the medical profession is threatened by such technological innovations and whether it will render many practitioners obsolete. This editorial highlights these important considerations for provoking discussion and hopefully a rational resolution.

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INTRODUCTION

The application of artificial intelligence (AI) in modern clinical practices has resulted in the advent of precision medicine along with advancements in genomics and novelty in teleconsultation. The term "Medical Technology" is broadly used to address a variety of medical gadgets and appliances that enable healthcare professionals to render good quality of life for patients as well as society at large. Advancements in medical technology help the white coats in timely diagnosis of a disease, provide less invasive procedures resulting in the reduction of preoperative & postoperative complications thereby ensuring quicker recoveries. Before the arrival of mobile era, all medical technologies were limited to classic medical devices (e.g., Neural Networks, Implantable Loop Recorder, Buoy Health, Artificial Pancreas & Automated Insulin Delivery Systems, etc.). The arrival of smartphones and sensing recorders has revolutionized clinical medicine. They have been modified and designed in a way to contain AI.[1] AI has dramatically transformed medical devices in a way that the devices can now take in hand many multiplex problems; alas there is a huge amount of data in this area with limited theoretical evidence.[2]

Intelligent medical technologies (i.e., AI-powered) are opted for eagerly by developing nations because it has qualified 4P model of medicine (Predictive, Preventive, Personalized, and Participatory). AI-incorporated devices are capable of explaining patient autonomy in ways that would not have been possible otherwise.[2] For example, currently smartphones are the go-to items with inbuilt health Apps which fills and records electronic personal health,[3] they are even able to monitor some vital functions with biosensors,[4] thus assisting physicians to gain optimal therapeutic compliance for patients.[5] These advancements in intelligent medical technologies have revolutionized new fields in the world of medicine. It has led to the emergence of augmented medicine which use latest medical technologies improving various facets of clinical practices. Food and Drug Administration (FDA) have approved AI-based technologies in the last decade which might be implemented in near future. Augmented medicine works on AI-based technologies along with other digital tools like surgical navigation systems which makes computer-assisted surgeries possible;[6] these devices are applicable in pain management; virtuality-reality based surgeries are being introduced to the curriculum.[7]

The domain of augmented medicine has encountered success with patients but is met with certain challenges and reluctance by our healthcare providers, to be specific, physicians. There are several reasons regarding the reluctance towards opting AI over individual critical thinking. Firstly, there is unpreparedness due to lack of basic and continuing education regarding this area.[8] Secondly, due to early digitalization of healthcare processes there is an increase in administrative burden connected to e-medical records, which has led to physician burnout.[9] Foremost there is a growing fear that AI might replace physicians,[10] although it is said to complement physicians' intelligence in the coming times.[11] Lastly, there is a lack of global legal policy regarding opting AI in clinical practices, leaving our physicians to worry about potential legal consequences of using AI.[12]

Despite the fact that there is a lack of education and evidence in digital medicine, different medical institutes are getting future medical leaders ready to face and challenge augmented medicine. They are doing so by integration of medical curriculum courses with biomedical sciences to upgrade their curriculum by digitalizing education.[12]

The aim of the editorial was to shed light on recent advances of AI in medicine, where AI-powered medical technologies are already brought to use in clinical practices in various developed nations. There can be disagreements and risks by healthcare professionals and institutions if they are planning to implement augmented medicine in the curriculum and clinical practices for the betterment of future medical leaders.

REFERENCES

1. Steinhubl SR, Muse ED, Topol EJ. The emerging field of mobile health. Sci Trans Med. 2015;7:283rv3.

2. Peng Y, Zhang Y, Wang L. Artificial intelligence in biomedical engineering and informatics: an introduction and review. Artif Intell Med. 2010;48:71-3.

3. Abdulnabi M, Al-Haiqi A, Kiah MLM, Zaidan AA, Zaidan BB, Hussain M. A distributed framework for health information exchange using smartphone technologies. J Biomed Informat. 2017;69:230-50.

4. Biffi C, Oktay O, Tarroni G, Bai W, De Marvao A, Doumou G, et al. Learning interpretable anatomical features through deep generative models: Application to cardiac remodeling. [Paper presented at MICCAI 2018]. Available at: https://arxiv.org/abs/1807.06843.

5. Morawski K, Ghazinouri R, Krumme A, Lauffenburger JC, Lu Z, Durfee E, et al. Association of a smartphone application with medication adherence and blood pressure control: the MedISAFE-BP randomized clinical trial. JAMA Int Med. 2018;178:802–9.

6. Overley SC, Cho SK, Mehta AI, Arnold PM. Navigation and robotics in spinal surgery: where are we now? Neurosurgery. 2017;80:S86–99.

7. Tepper OM, Rudy HL, Lefkowitz A, Weimer KA, Marks SM, Stern CS, et al. Mixed reality with HoloLens: where virtual reality meets augmented reality in the operating room. Plast Reconstruct Surg. 2017;140:1066-70.

8. Haag M, Igel C, Fischer MR, German Medical Education Society (GMA) "Digitization-Technology-Assisted Learning and Teaching" joint working group "Technology-enhanced Teaching and Learning in Medicine (TeLL)" of the German Association for Medical Informatics Biometry And Epidemiology (GMDS) and the German Informatics Society (GI). Digital teaching and digital medicine: a national initiative is needed. GMS J Med Educ. 2018;35:Doc43.

9. West CP, Dyrbye LN, Shanafelt TD. Physician burnout: contributors, consequences and solutions. J Int Med. 2018;283:516-29.

10. Kieseberg P, Weippl E, Holzinger A. Trust for the doctor-in-the-loop. In: European Research Consortium for Informatics and Mathematics (ERCIM) news: Tackling big data in the life sciences. Sophia Antipolis, France: European Research Consortium for Informatics and Mathematics. 2016;104:32-3.

11. Verghese A, Shah NH, Harrington RA. What this computer needs is a physician: humanism and artificial intelligence. JAMA. 2018;319(1):19-20.

12. Lake BM, Ullman TD, Tenenbaum JB, Gershman SJ. Building machines that learn and think like people. Behavioral and Brain Sciences. 2017;40:e253.