REVIEW ARTICLE

ARTIFICIAL INTELLIGENCE IN HEALTHCARE SETUPS: PROS AND CONS AND WAY FOR WARD TO MANAGE

Sikandar Hayat Khan

Pakistan Naval Ship, Hafeez Hospital, Islamabad Pakistan

ABSTRACT

Artificial intelligence employs machine base algorithmic processes which are now entering into the clinical domain. While the medical doctors and paramedical staff are usually not formally taught the subject in their primaries so a little understanding about various machine learning processes are essential. Apart from staff the requirements, knowledge, systems, training and understanding the best possible utility of the processes is also needed. This article attempts to address the processes linked within this new via of patient-doctor interface leading to decision making by taking the help of algorithmic approaches with input details guiding them about regulatory guidelines, ethics, links to requisite data repository and applicable evidence based practices. The article further elaborates upon the needs of such artificial intelligence interfaced healthcare system in terms of patient related understanding requirements, technical human resource, systems to establish, physician clientele focus along with some novel added features for healthcare expanding domains. Following this the pros and cons as perceived by newly introduced clientele have been discussed with their concerns and a way forward for installing such system. The articles primarily focus on the beginner's need especially those living in resource-bound countries.

Keywords: Artificial intelligence, Healthcare, Machine learning.

INTRODUCTION

Analogous with our ancestral history of thousand miles beginning from the caveman striving just to find food to the journey embarking upon the greatest blessing as human evolution of mind to critically analyze the environment and surrounding, homo sapiens always intended a path to up-grade and improve their livings in ways they understood life[1]. The concept of "Artificial Intelligence" (AI) has allowed mankind leapfrog into completely versatile and innovative world where we can actually segregate conventional industrial revolution from the plight of information technology[2]. Artificial intelligence is defined as an information technology based mechanized system that multi-tasks to incorporate multiple algorithmic information and consult with built in or online data bases to provide you the with solutions to your queries[3]. Currently AI has entered into every possible domain of our lives and created multiple short cuts and easy way forwards to complex issues in return pushing our lives to apparently better comfort zones.

Promises Associated With Artificial Intelligence in Healthcare

Healthcare, like other set ups is no different, and information technology is fast entering into every aspect of this newly explored business empire. While the both critics and defenders are on board any new idea or concept which is always mandatory for a healthier debate, progression, I guess similar situation does prevail with considerations to "AI in healthcare" with slightly more shift for the latter category as of now. Not only that the inter and intra departmental data transfer has now become speedier than ever before, equipment interacting with hospital information and management system just suck in all data as per clinical presentation and provides you beepers, flashers and changing color coders to sensitize patient's concerns in real-time[2]. The next stage was to allow the

Correspondence: Dr Sikandar Hayat Khan, Consultant Chemical Pathologist, PNS Hafeez, Islamabad, Pakistan
Email: sik_cpsp@yahoo.com
Received: 19 May 2019; revised received: 05 Nov 2019; accepted: 25 Nov 2019

treating physicians with algorithmic approach to help interpret data and at the same time via to transfer information to consultants and requisite data repositories for further understanding and in nut shell managing the best possible medical decisions by this newly in vogue human-machine interface[4]. Not only the system disallows the laborious data recording but can provide a feedback to interventions with a time line to reduce the verbally contrasting and time consuming statements in case of any error[5,6]. The future would further strengthen the system by incorporating links with worldwide interfaces and mechanized scan and data readers to improve our understanding of patient's disease progression, depiction of prognostic models and guidance to the best possible interventional approaches[2]. These early evolving systems with better equipped AI software would soon be potentiated with more muscles to define triage like scenario to supersede the existing first generational technologies. Implied with this evolution remains the promises of accuracy and micro precision based healthcare in terms of full body mechanized examination, diagnostics linked with large data repositories, data banks and algorithmic information to shape improved final outcome for physicians and patients[7]. The processes will be shortlisted with associated miniaturized technologies, smaller healthcare set ups, and ultimately improved patient outcomes. Theological concept of AI design in interface with physician interface for future is depicted in fig-1.

AI Domains

Key components of near future AI in healthcare would involve following domains:

Data Sources: Information regarding a particular patient flow will incorporate additional information from previous electronic healthcare records (EHRs), some information from far-flung are as throughtele medicine and through health information exchange[8]. Physicians should add their personal inputs about patient condition to these interfaces through their own judgments but as per protocols developed by system managers.

Healthcare Bioinformatics (AI) Mergers: The information from the above sources will go the mainsteam bio informatics set up where guidance in terms of ethics, technical input from data repositories like COSMIC, Pubmed, Medscape, USGC can consulted / automatic guideline links appearance for help in line with local/ national / international regulations willbe added to the earlier information[9]. Their requirement is well-established due torapidly expanding and changing evidence and with the introduction of
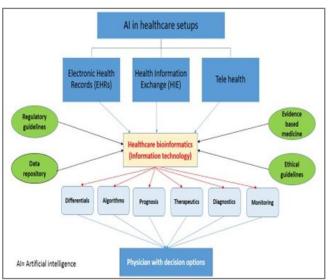

Figure-1: An overall view of AI incorporation and transfer of information at machine- human interface concluding at physician's end to choose intelligent decision making.

concepts like "personalized medicine" and timely pharmacogenomics advice.

Healthcare Systems With Inflow And Outflow Data Mechanisms: The platforms which would be needed to smoothly sustain the inflow and outflow data from patients to physicians and back and AI resource additions from medical data repositories, linked regulatory guidelines and firewall protections and limits of access to data would all require strong, faster and sustainable data bioinformatics servers and portals which should function without interruption and along with data storage and reproduction mechanism on physician's click[5].

Apart from the aforementioned EHR, HIE, tele medicine related compatible software and hardware, need will be there to have electronic portal, heavy data storage servers with back-ups, and policies to incorporate both insurance and funding related aspects[10]. The role of service provider would be needed to define various aspects of these procedures based upon prevailing resources, ethics, and regulations invogue.

Physician Role: The physician and paramedical staff will also be needed to undergo this transformation, as the prevailing medical
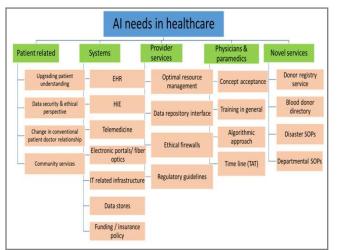

Figure-2: An overview of futuristic needs for successful incorporation and possible addition of novel healthcare services through AI incorporation in our set up.

experts need to be motivated first, followed by generalized understanding and specificuse of AI in healthcare set ups[11]. Role models for such practices are required to be included in basic sciences at MBBS level and later during specific specialty training. Paramedical staff of all categories will be needed to be part of the system. The system sooner or later has to be needed to right-size there source utilization, but also to ring transparency and improvement in financial management along with evolving current trends in biostatics and bioinformatics knowledge[12].

Novel Services: The evolving concept of AI can help in other areas with regards to community participation. Specific areas could be mul-

tiple and specialty wise varying but in general the AI incorporation would bring the whole region under one umbrella coverage to benefit the common clientele i.e., the patient. Areas like blood donor directories, organ donor information along with information on HLA typing and volunteer status, standard operating procedures, vaccination schedules, and so on and so forth[13].

Finally, I feel futuristic investment in this arena will open up an avenue for industry and job market and can attract a lot of foreign investment due to cost effective human resource availability.

Problem Areas: The promises mentioned above are unprecedented, and if translated in true essence can have the potential to revolutionize the existing healthcare set ups. At present we can see AI in bits and pieces being incorporated in and around various requirements and some starters like "Hospital Management and Information System (HMIS)"; though its role with in healthcare is bound to expand incoming days[14]. However, at present the linked issues and thorny rose stem has not been tackled up for reality check. The fears and concerns shared at the moment are minimal but I fore see them like thetipofaniceberg for reasons that the concept is yet in evolution with number of "unknowns" related to the desirable clinical application not yet clearly tangible[15]. There will be more visibility with its further clinical incorporation. Like every new step in evolution, the rearech allenges and obstaclestocross. Some of the anticipated problems will included finances, cultural change, new definitions for patient doctor relationships, patient data security, ethical considerations, development of IT infrastructures, networking security atmosphere, need for new guidelines for hospital functioning and most importantly the training of the patient from convention to this new style of medical care[16-18]. Concerns for a self AI evolution is mostly fictional and notreally based upon any relay-time evidence, but yes the concerns of wrong/irreversible commands/ viruses/malwares and spywares can pollute heath care for worst[19,20] (fig-2). Such like system

will be highly dependent upon IT expertise in terms of trained medical experienced professionals.

Way Forward To Incorporate It in Healthcare: The current status does not present any positive omen for development of this industry with in our country. However, the opportunity criesout for attention as timely incorporation of such facilities will not only be financially productive, but will also streamline healthcare system in this exploding population with convergence to provision of quality healthcare. Phase wise induction of such technologies was suggested as:

- Training of medical and non-medical IT professionals in health bioinformatics on massive scale.

- Development of needed ethical and regulatory bodies with IT professionals included to help secure concepts like back up data, patient datamanagement, and national regulatory guidelines.

- Incentives for generating country specific plausible bioinformatics systems.

- Health incentives for patients and doctors who prefer to utilize in these technologies in private and publicsectors.

- Regular and specific workshops for patients and medics for learning the technologies.

CONCLUSION

AI in healthcare is here to stay and will expand with every passing day. Tools of patient engagement will be changing, and so be the desires service providers and of patients. Therefore, this paper must be read with a futuristic vision which if rightly and timely adopted can help any setup evolve to achieve better end patient end points, consumer profits, a unified system helping majority and with adoption of some medical insurance concept. Linked to the sebaseline ideas, can be the donor information, cancer registries, tele medicine for far flung areas, virtual treatment concepts, medical educational programs, webinars and concepts like continuous

professional development for medical staff. I strongly suggest a complete focus under the umbrella organization like government sponsorship to explore further on its feasibility aspects.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

REFERENCES

1. Branco C, Arenas M. Selecting among alternative scenarios of human evolution by simulated genetic gradients. Genes (Basel) 2018; 9(10): 1-15.
2. Handelma GS, Kok HK, Chandra RV, Razavi AH, Huang S, Brooks M, et al. Peering into the black box of artificial intelligence: evaluation metrics of machine learning methods. Am J Roentgenol 2019; 212(1): 38-43.
3. Techopedi A. Artificial Intelligence (AI). Available at: https://www.techopedia.com/definition/190/artificial-intelligence-ai
4. Miller DD, Brown EW. Artificial intelligence in medical practice: the question to the answer? Am J Med 2018; 131(2): 129-33.
5. Schiff GD, Volk LA, Volodarskaya M, Williams DH, Walsh L, Myers SG, et al. Screening for medication errors using an outlier detection system. J Am Med Inform Assoc 2017; 24(2): 281-87.
6. McCoy AB, Waitman LR, Lewis JB, Wright JA, Choma DP, Miller RA, et al. A framework for evaluating the appropriateness of clinical decision support alerts and responses. J Am Med Inform Assoc 2012; 19(3): 346-52.
7. Mamlin BW, Tierney WM. The promise of information and communication technology in healthcare: extracting value from the chaos. Am J Med Sci 2016; 351(1): 59-68.
8. Bhavaraju SR. From subconscious to conscious to artificial intelligence: A focus on electronic health records. Neurol India 2018; 66(5): 1270-75.
9. Jimeno-Yepes A, Verspoor K. Literature mining of genetic variants for curation: quantifying the importance of supplementary material. Database (Oxford) 2014; 2014: bau003.
10. Thielst CB. At the crossroads: NRTRC white paper examines trends driving the convergence of telehealth, EHRs and HIE. World Hosp Health Serv 2010; 46(4): 17-23.
11. Marini CP, Ritter G, Sharma C, McNelis J, Goldberg M, Barrera R. The effect of robotic telerounding in the surgical intensive care units impact on medical education. J Robot Surg 2015; 9(1): 51-56.
12. Yala A, Barzilay R, Salama L, Griffin M, Sollender G, Bardia A, et al. Using machine learning to parse breast pathology reports. Breast Cancer Res Treat 2017; 161(2): 203-11.
13. Khorzad R, Montague E, Nannicelli AP, Woods DM, Ladner DP, Brown A, et al. Redesigning transplant organ labeling to prevent patient harm and organ loss. Prog Transplant 2018; 28(3): 271-77.
14. Maekawa Y, Majima Y. Issues to be improved after introduction of a non- customized Electronic Medical Record system (EMR) in a Private General Hospital and efforts toward improvement. Stud Health Technol Inform 2006; 122(1): 919-20.
15. Ahn TS, Park IS, You OS, Shin HJ, Woo KS, Jo EM. Nurses' perceptions of and attitudes toward an electronic medical record

system at Seoul National University Hospital. Stud Health Technol Inform 2006; 122(1): 851-59.

16. Kim KK, Sankar P, Wilson MD, Haynes SC. Factors affecting willingness to share electronic health data among california consumers. Bio Med Center Med Ethics 2017; 18(1): 1-10.

17. Vezyridis P, Timmons S. Dissenting from care data: an analysis of opt-out forms. J Med Ethics 2016; 42(12): 792-96.

18. Chen RF, Hsiao JL. An investigation on physicians' acceptance of hospital information systems: a case study. Int J Med Inform 2012; 81(12): 810-20.

19. Hyken S. Will AI take over the world? Forbes 2017. Available at: https://www.forbes.com/sites/shephyken/2017/12/17/will-ai-take-over-the-world/#77c2e87e5401

20. Sulleyman A. Stephen hawking is concerned that artificial intelligence could replace humans. Independent. 2017. Available at: https://www.independent.co.uk/life-style/gadgets-and-tech/news/stephen-hawking-artificial-intelligence-fears-ai-will-replace-humans-virus-life-a8034341.html

....