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Awareness about the future of artificial intelligence in healthcare among medical students in Kancheepuram District, Tamil Nadu

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Abstract---Introduction: Artificial Intelligence (AI) is expected to influence and has potential to improve various fields in medical care. They have capability of rapidly diagnosing various medical conditions and improve the treatment outcomes in various specializations. The study was done to find out the awareness of AI in Healthcare among medical students in Kancheepuram district, Tamil Nadu. Methodology: This is a descriptive cross-sectional study conducted among 100 medical students studying in a private medical college selected by simple random sampling. A pretested semi-structured questionnaire was used for data collection regarding the awareness of AI in Healthcare. Data was entered in Microsoft excel and analyzed by SPSS version 22. Results: Around 85% of the study participants were aware about Artificial Intelligence and 98% were about the attitude that it could improve healthcare. It was found that 82% of the study participants welcomed the idea of AI being used in Healthcare, while

7% were least accepting. The study participants were of the belief that the medical department which could benefit the most from use of AI were Radiology (38%) and Oncology (30%). Conclusion: AI will help in supporting the future needs of healthcare by helping in the analysis of various forms data which are recorded in the hospitals and help in augmenting and supporting the routine work of physicians. Though they are unlikely to replace physicians it is imperative that future medical students and professionals learn about the fundamentals of AI and how it could help them in providing better treatment to their patients.

Keywords---IBM, medical chatbot, artificial neural network, genetic algorithm.

Introduction

“Artificial intelligence (AI) is a branch of computer science capable of analysing complex medical data. Their potential to exploit meaningful relationship with in a data set can be used in the diagnosis, treatment and predicting outcome in many clinical scenarios.” [1] The aim of AI is to mimic human cognitive functions. AI uses sophisticated algorithms to ‘learn’ features from a large volume of healthcare data and assist healthcare services. It can also be equipped with learning and by integrating self-correcting abilities based on feedback to improve its precision. An AI system can assist physicians and help to reduce diagnostic and therapeutic errors that are inevitable in the human clinical practice. AI system uses its ability to study large patient population and assist in real time screening for any possible health risk alert and predictive analysis of possible outcomes. Popular AI methods include (a) for structured data- machine learning methods such as the classical support vector machine and neural network, (b) and for unstructured data- the modern deep learning and natural language processing. Oncology, neurology and cardiology are major areas that use AI [2].

Data collection in AI

Before AI can become an integral part of the healthcare sector, they need to be ‘trained’ using data that are generated from clinical activities, such as screening, diagnosis, treatment assignment and so on, so that they can learn similar groups of subjects, associations between subject features and outcomes of interest [2]. In addition to processing administrative and clinical data, if we incorporate other patient information regarding their environment such as personal habits, natal history, family history and obstetric information in case of women, AI could help predict risk areas and factors influencing many preventable diseases rather efficiently and rapidly thus improving the quality of life [3].

Artificial Neural Network

Artificial Neural Network (ANN) is the most popular AI technique in medicine. ANNs are computational analytical tools which are based on the biological nervous system. [1].

IBM Watson

International Business Machines Corporation (IBM) released the IBM Watson Analytics software that delivered advanced statistical procedures in 2015. It can handle very large datasets and applies the most common statistical tests required [4]. IBM Watson is a cognitive computing technology that has been configured to support research in life sciences. Currently it includes medical literature, patents, genomics, and chemical and pharmacological data that researchers would typically use in their work. Clinically the technology of Watson has been used to study drug repurposing and other areas of drug target identification. The first results of these studies clearly depict the efficacy of IBM in identification of novel drug candidates and novel drug targets just by utilising huge data [5].

Some current applications of IBM Watson are:

1. By analyzing thousands of data received from medical reports, patient records, clinical trials and medical journals, IBM Watson are being used at Memorial Sloan Kettering Cancer Centre to support diagnosis and create management plans for oncology patients.
2. IBM has partnered with CVS Health for chronic disease treatment.
3. Johnson & Johnson and IBM are using AI to analyze scientific papers to find new connections for drug development [6].

Medical Chatbot

A Chatbot or chatting robot is a communication simulating computer program. It is a program that is designed to imitate a smart communication on a text or spoken ground. They are also referred to as virtual assistant. Chatbots can be flexible and user friendly [7]. In light of their expanding capabilities, conversational agents have the potential to play an increasingly important role in health and medical care [8].

Current use of AI in healthcare services: Some real-world examples

AI-assisted robotic surgery

Robots analyze data from pre-op medical records to guide a surgeon's instrument during surgery. These robot assisted surgeries are considered minimally invasive, thus it can lead to a 21% reduction in a patient's hospital stay as patients won't need to heal from large incisions. Robots can also use data from past operations to inform new surgical techniques.

Virtual nursing assistants

From interacting with patients to directing patients to the most effective care setting, virtual nurses can be made available 24/7, they can answer questions and monitor patients. Most applications of virtual nursing assistants promote regular communication between patients and healthcare providers between office visits to prevent unnecessary hospital visits.

Aid clinical judgment or diagnosis

The concept of patient diagnosis using solely AI is an albeit interesting but a very new idea, however there are still exciting cases available around the world, like:

1. A Stanford study was done at a human level to detect skin cancer against dermatologist using AI.
2. Danish software AI company tested its deep-learning program by having a computer eavesdrop while human dispatchers took emergency calls. The algorithm analysed what a person says, the tone of voice and background noise and detected cardiac arrests with a 93% success rate compared to 73% for humans.
3. Baidu Research from China outperformed humans when identifying breast cancer metastasis using its deep learning algorithm.

Workflow and administrative tasks

To make life easier technology such as voice to text transcription that is used at a minor scale in smartphones but better technology can aid doctors in writing prescriptions, order tests and read out results. An example of using AI to support admin tasks is the partnership between the Cleveland Clinic and IBM's Watson to determine big data and help physicians provide a personalised and more efficient treatment experience.

Image analysis

Image analysis is a very cumbersome process if done manually, but recently an MIT based research team developed a machine-learning algorithm that can analyse 3D scans 1000 times faster than current image processing techniques [10].

Methodology

Study Type and study area: This Descriptive Cross-Sectional Study done in urban area of Kancheepuram district, Tamil Nadu.

Study Population: Medical students of either gender studying in a private medical college were the study participants.

Study sampling: Simple random sampling was done by lottery method and 100 participants were selected.

Data collection: A pretested semi-structured questionnaire was used for data collection regarding the awareness of AI in Healthcare. The questionnaire included questions about general awareness about AI, IBM Watson, Medical

Chatbots, their level of acceptance towards data collection and AI and which branch of medicine would benefit the most with increased implementation of AI. Data analysis: Data was entered in Microsoft Excel and analyzed by SPSS version 22.

Results

Figure 1- Academic year of study participants

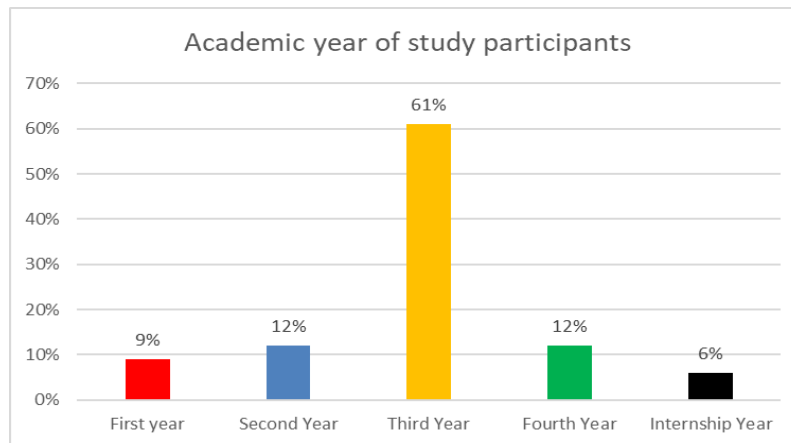


Figure 1- Around 100 medical students were selected for the study out of which 61% were from third year, 12% from both second and fourth year each, 9% from first year and 6% from internship year.

Table 1- Responses of Medical Students on their Current Awareness about AI

Questions	Yes	No
Are you aware about AI	85	15
Do you think AI can be used to improve healthcare	98	2
Do you feel AI will decrease the overall workload of doctors in near future	85	15
Are you aware of any current use of AI in healthcare services	61	39
Are you aware of any current use of AI in any other field	68	32
Would you be comfortable with your data being collected as a doctor	91	9
Are you comfortable with your patients' data being collected	86	14
Do you feel the use of AI will increase the moralðical challenges faced in healthcare	91	9
Are you aware about ANN	58	42
Do you know about genetic algorithm	48	52
Did you know genetic algorithm is used in AI	40	60
Have you heard about IBM	50	50
Have you heard about IBM Watson	35	65
Have you heard of medical chatbot used diagnosis or to get prescription	57	43
Have you used any of them (med chatbot)	46	54
If yes, did you find them useful (N=46)	16	30

Table 1- Among the study participants, 85% of the students were aware about AI, while 15% were not. The students who weren't aware, were told about what AI is. Once everyone was told what AI is, they were asked whether they felt that it could be used to improve healthcare services to which a whopping 98% students replied positively and 85% students believed that it could reduce the workload of doctors in near future.

Then they were inquired about data collection. 91% students were comfortable with their data being collected as a doctor while 9% weren't and 86% students were comfortable with their patients' data being collected while 14% students weren't. Around 91% students believe that with the increased use of AI, the moral and ethical challenge in healthcare services will increase. Students were questioned about medical chatbots. 57% students had heard about them. 46% had tried it themselves, out of these 46 students only 16 students found them useful. When asked about IBM, 50% had heard about the company while the rest hadn't and 35% were aware about IBM Watson while 65% weren't. Around 58% students knew what ANN is, while the rest 42% students didn't and 48% students knew about the genetic algorithm and 40% knew that it is used in AI.

Figure 2- Responses of Medical Students when asked how accepting they were towards AI being used in healthcare services

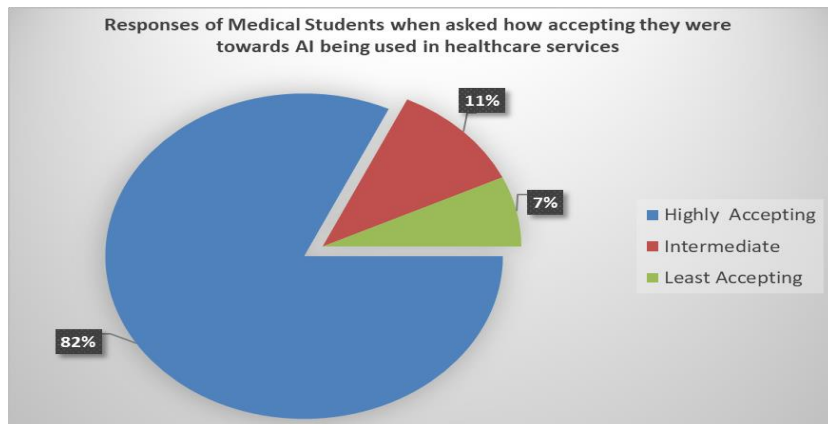


Figure 2- Among the study population, 82% students are highly welcoming towards the idea of AI being used in providing healthcare services while 11% are adaptable towards it, but 7% students are against it.

Table 2- Responses of Medical Students when asked which branch of medicine would benefit the most with increased implementation of AI. (Multiple response)

Branch of Medicine	Percentage
Oncology	30
Cardiology	4
Orthopedic	2
Radiology	38
Neurology	9

Forensic	1
General Med/Internal med	5
Gynecology	2
Surgery	9
Ophthalmology	6
Pathology	4
Preventive and Social Medicine	1
Dermatology	1
Pharmacology	1
Anatomy	1

Table 2- When asked which branch of medicine would benefit the most with the increasing implementation of AI, 38% of students believed it would benefit Radiology followed by 30% who believed it would benefit oncology. For general surgery and neurology, there were 9 students for each that believed it would benefit the respective fields.

Discussion

We are at that point in history where technology is welcomed and celebrated. However the growth and development of the same in the medical field is facing a lot of complications, likely so mostly due to the rapport, emotional attachment to traditional medicine and other technical difficulties that make trying new things difficult for both patients and doctors.

Studies have shown that physicians tend to lack data analytical expertise, most likely due to insufficient training in statistics while in medical school or not using statistics on a regular basis. Moreover, there is evidence that teaching statistics to students outside of their health care specialty area has been relatively unsuccessful. Contrastingly there has been an explosion of healthcare data in the past decade due to journals, cloud storage, etc, thus, the need for data analytical expertise by health care personnel has grown exponentially. Clinicians and other health care workers would benefit from tools that could produce descriptive, predictive, and visual analytics more rapidly and easily than tools currently available in most analytical software packages and with little training required for users [4].

It is wise to discuss the trials and tribulations of automation, things that require minimal effort are also the most complicated to implement due to its intricacies. Automation can pose serious safety concerns if not monitored effectively but its not that easy, the long term threats to humanity and social implications are untested [8]. There might be privacy issues, chances of giving monopoly to one company or business with sensitive mass data is always a probability that should be avoided [9]. Given the potential for bias in the design of these applications (example. majority target population being white men), they may contribute to disproportionally affect groups that are already discriminated against, based on gender, race, or socioeconomic background. The social impact of AI should be consistently considered, from conception to real-world dissemination, given the

potential to negatively influence the health of particular populations [8]. Algorithms can be designed to perform in unethical ways and hence will not be easily trusted by the masses [9]. And no one knows whether the data is encrypted before it gets saved to a database [7].

The combination of big data and AI, referred to by some as the fourth industrial revolution, will change radiology and pathology along with other medical specialties. However as mentioned earlier, it is undeniable how AI could change the face of medical imaging. Radiologist and pathologists who are considered 'information specialists' in the healthcare industry, they interpret the important data, advise on the added value of another diagnostic test, such as the need for additional imaging, anatomical pathology, or a laboratory test, and integrate information to guide clinicians. If AI becomes adept at screening for lung and breast cancer, it could screen populations faster than radiologists and at a fraction of cost. The radiologists and pathologists can work together and ensure that AI has yielded neither too many false-positive nor too many false-negative results. Obviously this will require training but it's nothing that can't be learned by medical students. In this scenario no jobs are lost, rather, roles are redefined, humans are displaced to tasks needing a human element [11]. Like every other upcoming field, there are a lot of doubts in everyone's mind, specially using AI in healthcare as it is a very sensitive field, hence first step should be making the medical students aware about it then the general population¹¹.

Conclusion

AI can never truly replace the human touch of a doctor but it's scope in aiding the future is visionary. Better technology is always a blessing, these methods can be used by surgeons in procedures like laparoscopic surgery, endoscopy and MRI scans amongst other things. At present, it should be focused on enlightening the aspiring doctors and medical professionals about the current AI scenarios. There are a lot of drawbacks to AI but a lot more advantages, thus the advancements should be thoroughly studied before applying it to general population and more such studies should be done.

References

1. AN Ramesh, C Kambhampati, JRT Monson, PJ Drew, Artificial intelligence in medicine, *AnnR CollSurgEngl* 2004; 86: 334–338
2. Char DS, Shah NH, Magnus D. Implementing machine learning in health care—addressing ethical challenges. *The New England journal of medicine*. 2018 Mar 15;378(11):981.
3. Chen Y, Argentinis JE, Weber G. IBM Watson: how cognitive computing can be applied to big data challenges in life sciences research. *Clinical therapeutics*. 2016;38(4):688-701.
4. Dahiya M. A tool of conversation: Chatbot. *International Journal of Computer Sciences and Engineering*. 2017 May 30;5(5):158-61.
5. Forbes. How Is AI Used In Healthcare - 5 Powerful Real-World Examples That Show The Latest Advances by Bernard Marr. Available on <https://www.forbes.com/sites/bernardmarr/2018/07/27/how-is-ai-used-in->

- healthcare-5-powerful-real-world-examples-that-show-the-latest-advances/#c48effd5dfbe. Accessed on 21th June2019
6. Harvard Business Review. Why Health Care May Finally Be Ready for Big Data by Nilay D. Shah and Jyothishman Pathak. Available on <https://hbr.org/2014/12/why-health-care-may-finally-be-ready-for-big-data>. Accessed on 17th May2019.
 7. Hoyt RE, Snider D, Thompson C, Mantravadi S, IBM Watson Analytics: Automating Visualization, Descriptive, and Predictive Statistics JMIR Public Health Surveill 2016;2(2):e157
 8. IBM. IBM Watson Health. Evolution of Artificial Intelligence in medicine. Available on <https://www.ibm.com/watson-health/learn/artificial-intelligence-medicine>. Accessed on 7th June 2019.
 9. Jha S, TopolEJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. JAMA. 2016;316(22):2353–2354.doi:10.1001/jama.2016.17438
 10. Jiang F, Jiang Y, Zhi H, et al. Artificial intelligence in healthcare: past, present andfuture. Stroke and Vascular Neurology 2017;2: e000101.
 11. Laranjo L, Dunn AG, Tong HL, Kocaballi AB, Chen J, Bashir R, et al.. Conversational agents in healthcare: a systematic review. Journal of the American Medical Informatics Association. 2018 Jul 11;25(9):1248-58.