AI Driven Healthcare Enhancing Diagnosis and Treatment

This article explores how Artificial Intelligence can be a game changer in the healthcare industry by revolutionising every aspect of healthcare viz... Getting patient consent, Electronic Health Records and diagnosis and treatment of various diseases including cancer. Before AI takes deep roots in the healthcare industry, there is a need to establish the legislative, ethical and moral framework.

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Gone are the days when Artificial Intelligence (AI) was perceived as a figment of the imagination of a science fiction director. It is not an exaggeration to say that there is no field of science that has remained untouched by the deluge of Artificial Intelligence. The field of medicine is no exception. However, AI is still in its infancy in the field of medicine. Google with its Med-PaLM2 has taken baby steps towards developing a language model that could answer over USMLE questions with 85% accuracy. This model has also been significantly successful ▶

in analysing and interpreting X-ray films and other scans. Such machine learning and Large Language Models have a huge potential in enhancing the patient outcomes by breaching the barriers of language, distance and finances to name a few. In this article, we shall confine ourselves to how AI can enhance patient outcomes for Surgeons.

1. Getting Informed patient consent using AI:

Getting informed consent from the patient is the most important step before performing any medical procedure. However, according to The Journal of Obstetrics and Gynecology India, only 25% of Indian patients are given a full brief about the surgery before getting the consent form signed from them. Also, in many hospitals across India, the process of getting informed consent is delegated to the Hospital staff like nurses rather than the doctor himself to save the latter's time. Also, many patients are unable to comprehend the language in which the consent form is drafted and mostly sign the form as a mere formality. To put it briefly, a signed consent form doesn't mean that the information has been communicated to the patient.

AI comes to the rescue of both the doctor and the patient here. Building interactive chatbots in vernacular languages apart from English which can answer all the patient's questions and address all his fears about the procedure to be performed on him can go a long way in getting informed consent from the patients.

AI models also simplify the language in the consent forms for the better understanding of the patient. Also, AI models can be used to generate customised consent forms by deeply going through the patient's medical history.

2. AI and Electronic Health Records (EHR) :

An Electronic health record is the repository of medical information of a patient stored electronically on a computer. It may include a patient's medical history, diagnosis, allergies etc. Digital India mission has taken a great leap forward with the introduction of Electronic Health Records in the form of Ayushman Bharat Health Account (ABHA). EHRs help doctors to take a call on the treatment plan to be adopted for a patient based on his medical history and a history of allergies. However, it is difficult for doctors to manually identify certain patterns in the huge volume of data in EHRs.

For the purpose of this article, we have analysed WellnessGPT that has integrated AI with ABHA IDs of users. Using the data from ABHA IDs, Wellness GPT provides "AI Powered Doctor Discovery" by analysing the patient symptoms and juxtaposing them with his medical history and suggesting doctors to book appointments with. Similarly, it offers tailored fitness and nutrition plans based on the person's food preferences and allergies. This tool can also preempt health issues by sending timely warnings and tips. This tool also helps to keep all the family EHRs at one place for a comprehensive analysis. This tool

also suggests the best insurance plans that suit the needs of the family thereby reducing the Out of pocket Expenditure of the patients.

3. Early cancer detection and diagnosis:

Early detection and diagnosis of the onset of certain diseases like cancer can drastically improve survival rates. According to studies, 10/10 breast cancer patients whose cancer has been detected in Stage 1 have survived while the survival rate falls to just 3/10 when it is detected in stage 4. The rate of survival in cases where Bowel cancer is detected in stage 1 is 9/10 whereas the same drastically reduces to around 1 in 10. Also, there is a high chance of false positive and false negative results when traditional screening techniques like mammography for breast cancer. However, the final diagnostic assessment is a long drawn process which may further delay the course of treatment.

Google's LYNA (Lymph Node Assistant) detects breast cancer from lymph node biopsies with significantly lesser false. LYNA was able to correctly distinguish metastatic cancer cells from a slide without cancer 99% of the time. LYNA was also successful in identifying cancerous tissues that are too small for a pathologist to detect. Google is working on developing a model that reads the scans and flags for an immediate review by the radiologist. This can reduce the waiting times for patients and improve the rate of survival. Similarly, IBM's Watson for oncology helps provide oncologists with information that is supported by MSK-curated literature and hundreds of journals. These AI models can significantly reduce cancer mortality not only by early detection but also by suggesting treatment plans backed by literature to oncologists. Computer vision backed by AI can detect abnormalities in cells surrounding the organ subjected to such a scan. For example if a patient is scanned for gallstones, AI models can detect abnormalities in cells surrounding the gall bladder.

4. AI in cancer surgery & treatment:

Wrong site surgery is a significant challenge affecting the patient outcomes in cases of General Surgeries and affects about 40% of cases in orthopaedic surgery. AI coupled with Computer Vision Technology has the capability to reduce such errors by providing real time feedback to surgeons. This can help in reducing the instances of reducing wrong site surgeries and reducing the damage to surrounding organs ▶

> Who is accountable for decisions AI makes? is a million dollar question that could redefine the trust in the medical system.

and tissues. Also, smaller cancer tissues that a surgeon can't identify while performing surgeries can be detected by Computer Vision Technologies. This minimises the chances of leaving behind a small cancerous growth that may lead to recurrence of cancers. Computer Vision technology can also be used to train surgeons with the help of Virtual Reality and Augmented Reality Technologies.

AI has taken chemotherapy to the next level by making it easy to use drugs based on the patient's genetic makeup i.e. pharmacogenomics. AI based simulation studies can pre-empt and anticipate the possibilities of treatment. This will improve the outcomes of chemotherapy. AI based N-of-1 trials help in quick deployment of new drugs and treatments. 3D printing of drugs and the development of systems designed for smart drug delivery systems also have the potential to improve treatment outcomes manifold. Incidents of Chemotherapy Induced Neutropenia have been predicted using AI and statistical models.

5. Concerns with reliance on AI in medicine:

a. Data Privacy: All the AI Systems are based on Machine Learning algorithms which are fed with sensitive patient data. Without strict data protection laws in India, the patient data is further bound to be compromised. The patient data used to train the machine learning models can be used by commercial entities to target the individuals for certain kinds of treatments, medicine etc. All without obtaining patient consent. Also imagine a case where insurance companies use this data to reject patient claims citing dubious reasons. Many cases of identity theft and identity frauds can also be committed using this data. Without strict data privacy norms, AI in healthcare is a nightmare.

b. Fixing accountability: Currently, it is the doctor, who prescribes the treatment plan and the follow ups. If something goes wrong, the doctor is held legally liable for any acts of omission or commission committed by him. But when AI is involved in the decision making, the question is who is held liable to errors committed by AI? The AI service provider or the doctor who followed AI instructions. This can ultimately lead to a loss of trust in the healthcare system.

c. Cost: Integrating AI in healthcare could be costly as it involves purchasing and subscribing to various hardware and software and maintaining them too. This will increase the overall cost of treatment for patients leading to a higher out of pocket expenditure further

contributing to inflation in the healthcare sector.

d. Bias: Bias in the training and test data sets due to underrepresentation or overrepresentation of certain populations may lead to biases in outputs leading to issues in diagnosis and treatment.

e. Cybersecurity issues: Integrating AI in healthcare leads to an increased use of Computers and IoT devices which may lead to cybersecurity issues like Denial of Service Attacks, Ransomware attacks, Phishing attacks and other cybersecurity issues potentially disrupting services with huge implications to patients and other stakeholders in the system. There is a need to upgrade the cybersecurity infrastructure at all levels for a comprehensive adoption of AI in Healthcare.

f. Doctor Patient relationship: Increased use of AI may reduce the interaction between the Doctor and patient. As the AI now becomes central to diagnosis and treatment plan, it may replace the existing rapport between the Doctor and the Patient.

g. Job losses: As is the case with other sectors, AI in healthcare could effectively handle hospital administration tasks like scheduling appointments. As AI can better interpret diagnostic reports, it may reduce the need for experts in these sectors leading to job losses. Also, increased virtual care may lead to job losses to care givers at hospitals.

In conclusion, the role of AI in healthcare is still in its infancy but has made a lot of difference to different stakeholders in the healthcare industry from improving patient outcomes through precise diagnostics, treatment plans and improved informed consent. However, there is a need to use AI with potential ethical and moral considerations like handling patient data safely and improving accountability. There is a need to up skill the existing employees in the healthcare sector for them to better face the prospects of AI taking over their jobs. ◼

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Dr. V.M. Sankar Reddy completed his MBBS at Sri Venkateswara Medical College (SVMC), Tirupati, and Andhra Pradesh, India. He underwent General Surgery training through the prestigious Diplomate of National Board (DNB) program in New Delhi, India. He obtained his superspecialization in Surgical Oncology through DNB training at the Southern Command Hospital, Armed Forces Medical College, Pune, and Maharashtra, one of the top medical centers in India. Currently, he serves as the Head of the Department (HOD) and Chief Consultant at Malla Reddy Cancer Hospital & Research Institute and Malla Reddy Narayana Multispecialty Hospital, Hyderabad.