Artificial Intelligence in Hospital Administration

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Abstract

Artificial Intelligence (AI) is using technology and computer algorithms into softwares to find and implement solutions without direct human intervention. AI in the healthcare sector has helped reduce time and human effort, so that we could focus our manpower more on individualised patient care. Besides heath care, AI has an important role in hospital administration. AI has a role in Managing Medical Records and other Data, Appointments and Billing, Customer Relationship Management, Digital Consultation or Healthcare Bots, Medication Management, Inventory Control and various other services concerning the hospital administration. This article discusses the spectrum of AI application in the administrative side of healthcare i.e. hospital administration.

Keywords: Artificial Intelligence, Hospital administration, Health care, Computer Assisted Coding

1. Introduction

Artificial Intelligence is using technology and computer algorithms into software's to find and implement solutions without direct human intervention. That is to say, AI is the use of intelligent machines to work and act like humans.

AI, as it is commonly known, has already spread its tentacles into almost all the industries not leaving the Healthcare sector, where it has helped reduce time and effort on repetitive and mundane tasks, utilizing skilled and unskilled labor, so that we could focus our manpower more on individualized patient care and thereby reduce costs also.

It has also helped us reduce human errors, economies procedures and evolve patient care along with minimizing variability of treatment cost and quality. AI is now going to help us to shape the future of public health, community health and health care delivery systems.

AI has already made its mark in the Healthcare Industry through Robotic Surgery (Eye, Cardiac, Neuro) – da Vinci Robot[1,] Diagnostic machines (MRI, X-Ray) and Pathology equipment. Now let us look at the areas where AI has made an impact in the administrative side of Healthcare.

1. Managing Medical Records and Other Data

Assimilating the extensive patient data, organizing it, updating and self-correcting it, based on feedback using AI.

E.g. H2O.AI[2]

Flatiron Health-a data and analytics driven cancer research and care service[3]

E.g. IBM Watson[1]

2. Appointments and Billing Including Insurance Claims

Right from booking an appointment or contacting the doctors, without prior appointment is possible at the click of a button. Billing at discharge and insurance claim is all dependent on various softwares.

E.g. PMCS Advance, Fineos, Systema[4]

Denials in insurance claims lead to revenue loss for the organisation, which with the use of AI and technology could help in predicting and preventing problems that lead to denial mostly which occur due to human error[5]. The average turnaround time for processing papers for a claim has been considerably reduced from 5-7 weeks to 2 weeks.

AI is based on CAC (Computer Assisted Coding) which works on Machine Learning and Natural Language Processing (NLP). The CAC automatically identifies the data required from the documents and inserts it into the system. AI can point out the errors immediately and mitigate the added costs and time consumption[6].

E.g. Popul8 used by Pulse8[7]

EMscribe used by EMscribe[(7)]

3. Using stored Data for Treatment Design

AI used as Google Deepmind[1] has a role to supplement and enhance human judgement and not replace physicians and staff. Providing up to date medical information from journals, textbooks, research papers and clinical practices help in quicker diagnosis by the clinician and starting early individually customised treatment plan. Earlier medical data, records, scans, bills, etc. used to be stored haphazardly, or maybe bulk of it even misplaced and destroyed, but now because of AI and its applications in organising patient data, this can be put to use for further predictions of risk, treatment recommendations for cancer patients using IBM Watson[8] and references to other patients for diagnosis keeping in mind privacy issues. Zephyr Health uses AI to help with individualised treatment plans based on their medical history[1].

4. Customer Relationship Management-

Automation in the field of patient care management has brought about a makeover in the field of healthcare. With relationship management developing as a full industry in itself, realising its importance in healthcare has made medical tourism possible around the world.

Websites such as Healthgrades and RateMDs take review of patients and rate their doctors' visits

5. Digital Consultation or Healthcare Bots

Primary health advice may be delivered through chatbots[9].

Apps like Babylon in UK use AI to provide medical consultation based on a patient's medical history and applying it through common medical

knowledge of common illnesses. This app makes use of speech recognition. It then provides a recommended action plan. It can also predict the spread of diseases[10].Sentrain is especially helpful in reaching people in remote areas[1].

6. Virtual Nurses

Molly, a digital nurse has been developed by Sense.ly start-up to help with patient care between doctors' visits for chronically ill patients. It can also be utilised to care for the elderly[1,10].

Boston's Children Hospital developed an app for Amazon Alexa, which has basic health information and gives advice to parents of ill children. It answers questions regarding whether the symptoms told require a visit to the physician or not[10].

7. Confluence of AI and Smart Devices

For monitoring and tracking health of an individual, devices like Fitbit[7], Apple, Garmin and others are available which may be wearable as watches or linked to a smartphone. They monitor the activity levels, step count, calories burnt, heart rate of and individual and send alerts to get more exercise or rest accordingly[10,11].

Cortana, Siri, Alexa, Google's DeepMind Health[7] all provide tremendous value when combined with healthcare apps[8].

8. Medication Management

The National Institutes of Health have created an app AI Cure to keep a check on the medication taken by a patient. The smart phone's camera is paired with AI to confirm if patients are taking their prescriptions. Users are patients involved in clinical trials and geriatric patients[10].

9. Tracking Vital Stats of ICU Patients

Tracking devices have evolved which have the ability to raise an alarm in case of an emergency by tracking the patients' blood pressure, pulse rate, heart rate, breathing patterns through ventilators and intravenous drip management connected to the nursing station / doctor's mobile phone[11]. Autonomous Healthcare, based in Hoboken, N.J. is designing and building one of

the finest AI systems for the ICU for critically ill patients[12]. Careskore manages the vitals of non-admitted patients.[1]

10. Decoding Laboratory Results

Diagnostic lab tests are currently using AI to decode the results, interpret and present the results. Most of the machines are computerised in such a way that they need minimal human handling over the period of the tests being conducted. Laboratory tests, X-Ray, CT Scans interpretation and data entry, MRI Scans, Radiology and Cardiology data analysis are repetitive and time consuming which can now be done using advanced softwares[13,14].

11. Increasing Working Efficiency of the Hospital

Softwares are being developed which can prioritise activities to provide better patient care. This includes comprehensive data to show availability of beds, helping choose mode of payment and insurance policies, look at the critical cases on priority, dispatch ambulances immediately and faster discharge of the patient.

12. Duty Dispatch and Emergency Medical Services

Preparation and delegation of duties of doctors, nurses and other medical staff and even substitute immediately required substitutes sent are also easily controlled by customised softwares. Ambulance dispatch in emergency services is another area where AI makes a mark. E.g. Corti analyses the full spectrum of the audio signal, tone, background noises, symptoms, etc., through layers of neural network for the dispatcher and guides him regarding the treatment protocol to be followed[15].

13. Precision Medicine

Genetics and Genomics look into the DNA of an individual for any link to disease. With the use of AI, body scans can spot and maybe predict cancer, anomalies, and vascular issues and predict health of people at large.

E.g. BRCA 1 & 2 gene mutation for breast cancer diagnosis, RET mutation for thyroid cancer[10].

14. Personal Life Coach

Healthcare providers who treat patients with chronic illnesses have realised the importance of maintaining contact with their patients outside of the hospital, providing them guidance, motivation and help to lead a good quality of life thereafter by introducing life coaching services. It may include medical advice or a motivational voice that encourages fitness and healthy eating habits. The coach may then send a feedback to the physician[16].

15. Inventory Control

AI has made its mark in the pharmacy. (OptumRx - dealing with acquiring, storing and dispensing). It also deals with managing a complex supply chain with manufacturers and wholesalers and even home delivery options[17].

16. Laundry

Inmate Aps based in Denmark has been acquired by the Jensen Group which uses high end AI in X-Ray machines to detect foreign particles/ blood/ pus in garments and segregate them[18].

17. AI in the Kitchen

Hitachi is planning to use AI to analyse the leftover food of patients in their plates to access recovery since the meals are customised according to patient requirements. AI is being used to calculate calories and nutrients[19].

Smart kitchen appliances use AI for bulk production, to robots delivering patient meals in hospitals, removing dirty dishes and cleaning them afterwards. These are the TUG robots being used at UC San Francisco Medical Centre's newest hospital[20].

18. AI in Security of Hospitals-

CCTV cameras with a surveillance room to monitor the entry and exit points, corridors, etc. deal with security.

Healthcare organisations are soft targets for cyber-crime dealing with data related to identity theft and healthcare reimbursement fraud[7].

19. AI in Housekeeping

Precise scheduling of HVAC machines uses HUNTAIR designed CLEANSUITE system in critical environment to maintain proper airflow and temperature[4].

Cleaning Robots use high intensity UV Light[21]. Facility management and crowd management helps in manpower utilisation for patient care.

20. AI in Clinical Trial

AI is making its mark in a big way in Clinical Research trials by being faster, more accurate and reducing cost. IBM's Watson is one such supercomputer which can solve algorithms in minutes[16].

2. Conclusion

Though AI is going to provide instant relief to the much stressed out healthcare community but it is yet to be seen how AI is going to replace human touch, examination and counselling revolving around individual patient behaviour and reaction and responses.

We also need to keep in mind privacy issues regarding patient information and medical ethics. It must be handled with care.

Also another major issue is credibility of all the data that is available on the net linked to the various apps and this may also be providing misinformation and hence mismanagement of a medical condition.

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