Public perspectives on Healthcare and Artificial Intelligence (AI): A survey study

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Abstract

Artificial Intelligence is the focus term of the 21st century. It has been widely accepted and adopted in several key areas like education, marketing, retail, and engineering among numerous others however the healthcare sector seems to lag in its welcome. AI has the potential to unlock a new transformation in patient care, diagnosis, and mentoring and support services as seen from a review of relevant literature. It is therefore essential to understand how people view Artificial Intelligence and feel its need or demands in improving their health-related needs. This study was designed, keeping this thought in mind. A survey study was carried out in Delhi-NCR with fifty participants belonging to the age group of 18-50 years, who were health-conscious, and proficient in the use of technology like smartphones and other smart devices. The survey findings reveal that respondents desired the integration of Artificial Intelligence-based solutions to medical services ranging from appointment booking through intelligent chatbots to insightful diagnosis using risk profiles, intricate surgeries guided by intelligent robots to mentoring services which described health goals and discussed sustainable solutions towards achieving desired goals through lifestyle changes. Secondary data showed the application of such technologies in hospitals in form of unique personalized programs aimed at improving patient care and promote good health. The study further recommends the use of Artificial Intelligence in healthcare services in both rural and urban areas to reduce the burden on medical professionals, increase personalized and efficient healthcare service provision especially in times of global pandemic and increase people's consciousness towards the need for good health through the adoption of positive lifestyle changes.

Keywords: Artificial Intelligence; Chatbots; Intelligent mentoring services; Medical professionals; Pandemic; Personalized healthcare;

1. Introduction

Artificial Intelligence or AI is a kind of intelligence demonstrated by machines. It is different from the natural intelligence present in humans which involves emotional and conscious aspects. Artificial Intelligence sometimes emulates natural intelligence and is termed Artificial Biological Intelligence (ABI) while the other is called Artificial General Intelligence (AGI). Artificial Intelligence can thus be understood as a kind of intelligence that is present in machines and can mimic the cognitive functions associated with the human mind such as learning, problem-solving and analytical reasoning. Modern machines are often equipped with artificial intelligence and therefore can understand human speech, compete in strategic

games systems, seen in self-driving cars, content delivery network, military simulations, healthcare sector, robotic sector, etc. The development of powerful, cost-effective tools in form of hardware and software, cloud platforms, the World Wide Web, robotics, etc., has led to the expansion of technology use and the emergence of such intelligent machines and tools (González, et al., 2020).

The goals of AI research include knowledge representation, reasoning, planning, learning natural language processing, and perception ability to manipulate objects. The approaches include statistical methods, computational intelligence, mathematical optimization, neural networks, probability, and economics. Such unique advantages offered by AI over traditional analytics generally used in clinical decision-making processes will enable doctors to gain 'unprecedented insights' into patient history, possible risk factors, treatment thus positively impacting the diagnostic and treatment outcomes (Bresnick, n.d.). Thus, AI draws upon several fields like computer science, information technology, engineering, mathematics, psychology, and linguistics philosophy.

1.1 History of AI

Figure 1. AI history: changes over time
(Adapted from AI timeline-Dr. Paul Marsden infographic cited in Zahid, 2019)

Figure-1 highlights some of the major events in the history of AI. The AI journey started in 1950 with Alan Turing speculating about intelligence in machines and designing a test called the Turing test. 1955 saw the conceptualization and coining of the term Artificial Intelligence by John McCarthy. Since 1964, several

robots, chatbots, and game-playing bots have been developed, the most notable of them being the Deep Blue (1197). Virtual assistants like Siri, Alexa have taken the 21st century by storm through their unique user-friendly human-machine interface and thus we see applications of AI in various spheres of life.

1.2 Healthcare and AI

The strong need for AI systems in healthcare is felt across several areas such as a) *during medical emergencies:* AI can help in integrating data across healthcare channels towards the generation of timely alerts for timely medical intervention by doctors; b) *patient care and follow up:* AI can ensure that patients receive timely follow up services thereby reducing the cognitive burden on doctors as well as patients to schedule their appointments by issuing alerts through SMS, Whatsapp, emails, etc.; c) *intelligent analytics*: AI can show new therapies and options to target disease like cancer, based on the unique genetic makeup of the individual; d) *patient data mining:* AI can support to locate relevant data from within stored patient data and old reports which offer a wealth of information helping to provide better services through intelligent prediction of possible diseases like stroke, high blood pressure, etc. Such deep learning algorithms used by AI can predict based on connections between seemingly unrelated data and also e) *help in monitoring patient health through smart wearable devices:* like step trackers, smartwatches, pulse rate checkers, and other such 'intelligent devices' which are seamlessly connected through smart applications to mobile devices, personal computers, tablets thereby allowing ease of report sharing with the medical team for timely action. Hence, AI can bring a 'paradigm shift' within the medical sector through the use of its sophisticated algorithms, predictive power, and in-depth insight into risk and health outcome prediction helping physicians and patients alike (Jiang et al., 2017) as seen in figure-2 below.

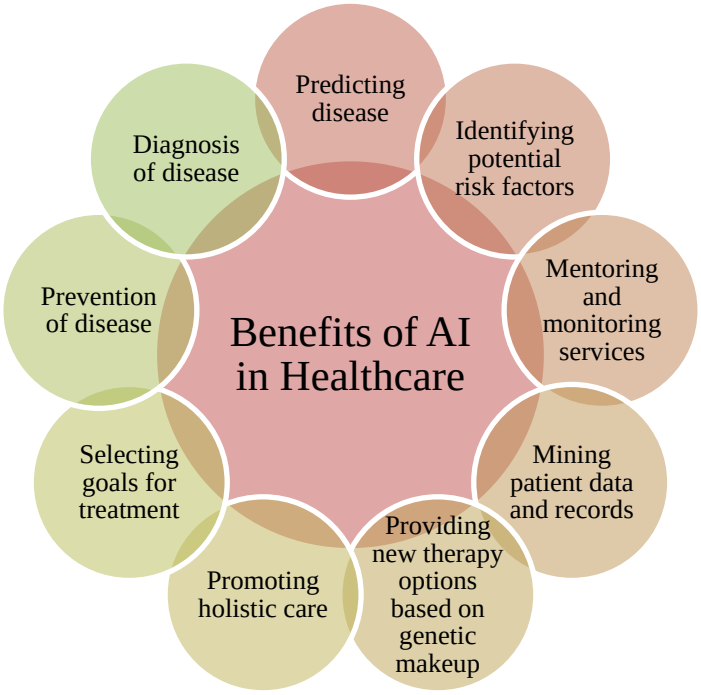

Figure 2. Benefits of AI in healthcare

1.3 Need and significance of the study

The present study tries to explore the feelings and perspectives of people about AI in the healthcare sector. A review of the relevant literature suggests that AI is capable of transforming the healthcare landscape by assisting doctors and patients in accessing personalized and efficient healthcare services, however, are the people ready for the change?, do they feel the need for such high-end technologies?, do they feel the need to integrated AI-based services for diagnosis, mentoring, and surgeries?. India is a highly populated nation, with an ever-growing demand for quality healthcare services in both rural and urban areas, needs AI-based support in form of intelligent diagnosis and health assessment facilities, disease predicting capacities which will reduce the burden on the healthcare professionals and increase the effectiveness of delivered services. In times of global pandemic, such virtual technologies can ease human problems by delivering accurate solutions through online mediums reducing human contact, and benefiting patients located even in geographically inaccessible localities. Hence the study is of prime importance as it will help healthcare professionals and the medical fraternity gain insight into patient demands and perspectives concerning AI.

2. Research methodology

The present survey study was carried out in Delhi-NCR. Fifty participants comprising of both men and women (age groups 18-50 years) were selected based on convenience using non-probability sampling techniques. All participants selected for the study were highly proficient in the usage of smartphones, mobile applications, kept themselves updated with developments in the field of technology, and also regularly visited hospitals for routine health checks.

2.1 Sampling design

Table 1. Details of the participants in terms of age, gender, and occupation

No.	**riable type**	**mber**
	nder	
	ale	20
	male	30
	ge	
	-30 years	28
	-50 years	22
	cupation	
	llege students	2
	orking professionals	48

2.2 Inclusion criteria

- Participants in the age group of 18-50 years were included.
- All participants were proficient in the use of smartphones, mobile applications, smart-watches.
- They were health conscious and regularly went for routine medical checkups, consultations.

- The occupation of selected participants included college-going students, corporate workers, educators, private employed, and public servants.

2.3 Research tool

The survey questionnaire titled: "AI and healthcare: My views" was validated using face validity by 5 experts. The questionnaire involved 5 'yes' and 'no' questions and respondents had to tick mark their response in the appropriate column. For ease of data collection, a Google form was designed for the same.

Table 2. Details of survey questionnaire

S. no.	Item	Response type
1.	Would you prefer AI for booking /canceling hospital appointments?	Yes/No
2.	Would you prefer AI for medical diagnosis-related needs?	Yes/No
3.	Would you prefer the use of AI for performing complex medical surgeries?	Yes/No
4.	Would you prefer AI for the provision of Covid-19 related support	Yes/No
5.	Would you prefer AI for maintaining general well-being through mentoring support?	Yes/No

2.4 Procedure

The participants were selected using convenience sampling and their informed consent was taken, link to Google form (questionnaire) was emailed or shared through Whatsapp. Their responses were collected, then entered and coded in an excel sheet. Descriptive analysis in form of percentage analysis was carried out.

3. Findings

3.1 The findings from the primary research data

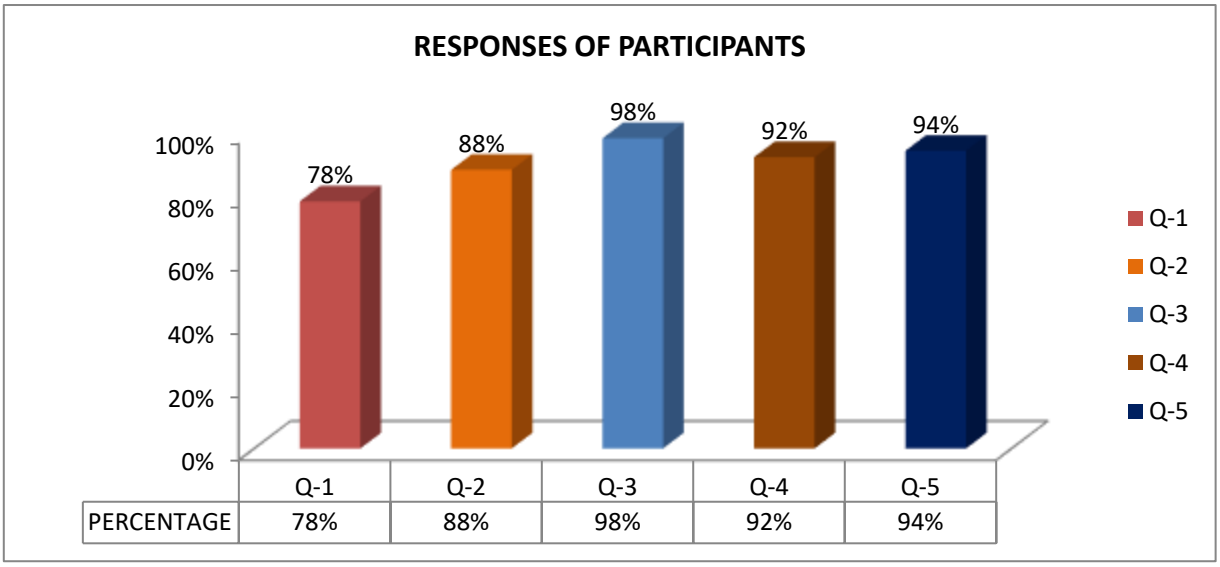

Figure 3. Responses of participants regarding the use of AI in healthcare

As seen from 5he figure 1, we can see that the participants were supportive of the use of futuristic tools like AI in improving healthcare services. 78 % of participants prefer to use AI for appointments, While 88% of respondents said they would prefer to use AI for comprehensive diagnosis of conditions and risk factors based on intelligent analysis of their risk profile and lifestyles, while 98% opined preference of AI during complex surgeries. 92% of participants wanted to use AI-based support services to deal with COVID 19 related queries and 94% said they would prefer AI-based solutions for the maintenance of their general health.

3.2 Findings from secondary data

The secondary data sources included published articles, reports, magazine snippets, etc the following case studies were gathered from such sources:

pHRA program (Apollo Hospitals)

Several hospitals and medical institutions are joining the AI bandwagon to offer improved and customized services to their clients. Apollo Hospitals, one of the leading private hospital chains has recently integrated AI into its preventive health care program (pHRA) intending to offer high quality and effective health care management through health checkups, directions, and mentoring services (BS Reporter, 2019). The (pHRA) Personalized Predictive Health Risk Assessment, is a unique, personalized, health risk assessment system that can predict potential risks, helping in the early identification of diseases based on a person's lifestyle, habits, and factors like age, gender, diet, personal history, family history, and history. It is designed as a comprehensive three-year program (-Set, Build and Achieve).

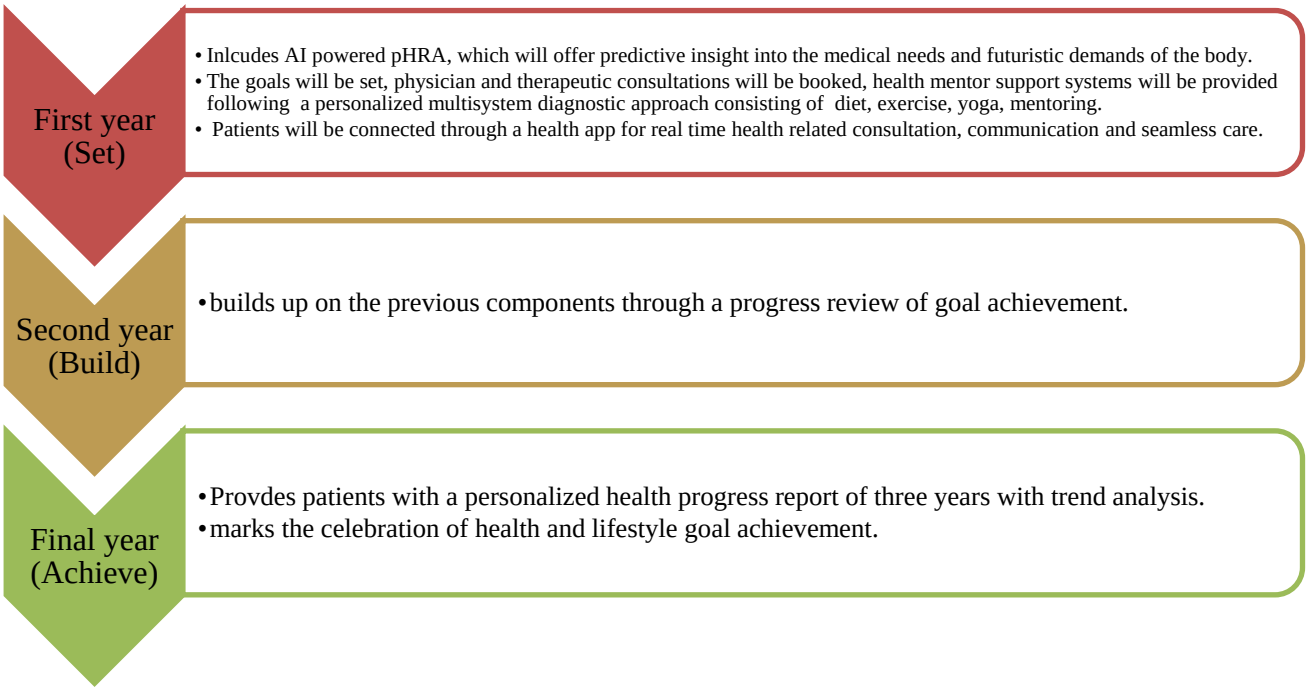

Figure 4. Details of pHRA (AI-driven health program of Apollo Hospitals)

3.3 Discussion

Thus we see that individuals understand the benefits involved in the use of advanced technologies like AI in medical practice and are open to the idea of benefiting from such futuristic technologies to maintain

good health and enjoy better living. AI can be used in various ways in the hospitals ranging from integration within appointment booking systems making it more user-friendly and in the process generating valuable data for the medical researchers to understand their patients and their needs. Also, the study suggests that the usage of high precision technologies will permit the provision of more personalized healthcare services to the clients who can afford such treatments and remedies allowing them access to timely identification of possible risk factors and helping them to improve their lifestyles by constant monitoring and mentoring through smart applications. The usage of such AI-based technologies will help patients to take more interest in their health-related needs, increasing health consciousness, promoting the adoption of healthier lifestyles like meditation, yoga, therapies which will further increase the longevity of humans, reduce the burden on the country's health machinery, increase human productivity ultimately contributing to the nation's growth. The usage of AI will also benefit the medical fraternity as doctors gain a greater and deeper insight into their patient's health analytics and vitals, understand their needs, and also predict future outcomes thereby increasing their efficiency.

The study also shows that usage of AI can prevent serious illness through timely or before –time – identification, thereby increasing chances of survival and giving ample time to doctors and patients to fight the disease.

Thus AI holds great promise for the field of health care by providing potential benefits to both the medical care-giver and the care receiver, improving medical diagnosis, services, and prevention measures.

AI holds tremendous potential especially in the medical field AI can help doctors by giving an uplift to their services, increase their efficiency and help them fulfill the Hippocratic oath "*I will apply dietetic measures for the benefit of the sick according to my ability and judgment; I will keep them from harm and injustice*" (medicinenet.com).

3.4 Recommendations

- The widespread adoption of AI in healthcare practices remains isolated to metropolitan cities and high-end hospitals. With the spread of COVID-19 health risks to villages and low-income groups, there is a need to adopt AI-based solutions in simple but effective ways in hospitals and small clinics in rural and semi-urban areas.
- The use of AI has the potential of positively impacting the healthcare professionals, serving them in effective ways thereby reducing their burden and demand in repetitive tasks. Hence medical professionals should be made aware of the potential advantages of this futuristic technology to facilitate greater adoption and use within hospitals.
- Technology developers should develop simple and smaller medical devices capable o integrating high-end AI-based technologies to ensure greater portability and seamless use across hospitals.
- Patients should be made aware of the benefits of AI-based technologies in all medical-related procedures ranging from booking of the appointment to post-surgical mentoring to reduce hesitance towards use especially among technology immigrants.

4. Conclusion

Thus we see that AI is being used as an impactful, powerful tool to offer holistic healthcare services to the clients, predicting health status, foretelling possible risk factors, indicating needed lifestyle management techniques like yoga, meditation, and other therapies, planning desired health goals for the patient, offering to follow-ups, and even celebrating the achieved goals thereby promoting good health. In times of global health crisis such as the COVID-19 pandemic, such AI-based solutions can be immensely beneficial as they would reduce the burden on healthcare givers and frontline workers in hospitals by providing patient mentoring, observation, and guidance roles. The already overburdened health care professionals will be able to offer personalized services by harnessing the intuitive and analytical powers of AI-driven technologies, improving customer satisfaction and health. Thus despite numerous challenges and obstacles, it is seen that AI holds tremendous potential for the better and effective functioning of the healthcare system thereby promising equitable opportunities to access quality healthcare to residents from both urban and rural areas.

5. References

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