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The Contributions of Artificial Intelligence to Advancements in Healthcare

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ABSTRACT
Artificial intelligence (AI) is a collection of technologies that provide computers the capacity to carry out a wide range of sophisticated tasks, such as data analysis, recommendation making, speech and text comprehension, and vision. The utilization of AI in the medical field has brought about significant changes to the conventional medical setting. The amount of work performed by humans has decreased and managing patient data and administrative responsibilities has become easier. Through the effective promotion of greater diagnostic accuracy based on radiographic, pathological, endoscopic, ultrasonographic, and biochemical investigations, early illness identification, individualized treatment strategies, and improved patient outcomes have been made possible. Machine learning techniques like deep learning and natural language processing have made it easier to analyze medical images, forecast the course of diseases, and make clinical decisions. AI has proven to have exceptional skills in medical imaging, drug development, robotic assisted surgeries, and patient monitoring. While there is no denial that artificial intelligence (AI) has a lot to offer the healthcare industry, it is crucial to stress the significance of ethical considerations. In addition, building confidence and encouraging the ethical application of AI technology in clinical settings depend on making sure AI algorithms are understandable and transparent. This paper investigates the perception of artificial intelligence (AI) in healthcare, user experiences with smart watches and apps, and potential applications of AI in diagnostics in the future. It also looks at ethical concerns including patient privacy and the possibility that AI will replace human healthcare workers in the workforce.

Keywords: *Artificial intelligence, medical field, virtual assistants, ethical concerns*

1. INTRODUCTION

In its widest definition, artificial intelligence (AI) refers to the intelligence displayed by machines, especially computer systems. This area of computer science study focuses on creating and analysing tools and software that allow machines to sense their surroundings and use intelligence and learning to make decisions that will increase their chances of accomplishing specific objectives. AI and modern computer science were pioneered by the British mathematician Alan Turing born in 1950.The Turing test gained popularity after he described intelligent behaviour in computers as the capacity to perform cognitive tasks at a level equivalent to that of a human. Diagnosis of acute abdominal pain was first successfully achieved by Gunn in 1976 with the help of computer analysis. The creation of AI applications meant to assist clinicians in diagnosing patients has been linked to the growth of medical artificial intelligence making therapeutic judgments and forecasting results. Their purpose is to assist with healthcare employees in their daily responsibilities, helping with assignments that depend on knowledge and data manipulation. Artificial neural networks (ANNs), fuzzy expert systems, evolutionary computation, and hybrid intelligent systems are examples of these systems. Recent advances in artificial intelligence (AI), particularly the emergence of deep learning—a subset of computer learning algorithms and the building block of a new generation of AI technology—have allowed for the automatic learning from big data analysis and the subsequent artificial and autonomous decision-making based on the knowledge gained. This includes a variety of neural networks, including the deep belief network, convolutional neural network, long- and short-term memory network, etc. The development of several artificial intelligence systems for use in real-world applications, such as the Internist-1 system, MYCIN system, CASNET system, as well as certain databases and record systems, has sparked a wave of interest in this new technical field.

The healthcare sector now has exciting new opportunities thanks to artificial intelligence (AI). Artificial Intelligence (AI) technologies, including computer vision, natural language processing, and machine learning, have completely changed many facets of healthcare delivery. These developments could lead to substantial improvements in patient care, better diagnostics, more efficient administrative procedures, and a spurring of innovative medical research. Analysis of medical images such as

X Rays, CT scans and MRIs, detection of abnormalities, tumours, cancer cells etc. and other conditions can be done with AI algorithms with high accuracy. Chatbots and virtual assistants driven by AI are also being used in medical settings to give patients individualized information and support. These intelligent systems are capable of triaging patients according to their symptoms, giving advice on self-care, and responding to medical queries. This lessens the workload for healthcare providers while also increasing accessibility to healthcare. Wearable technology and remote monitoring systems with AI capabilities enable continuous vital sign monitoring and real-time alerting for significant changes in a patient's health. AI algorithms can analyse enormous volumes of scientific literature and biomedical data to find possible drug targets, improve drug design, and expedite the clinical trial process. Patients may receive new treatments faster and more effectively because of this. It also helps to identify trends and in the prediction of disease outbreaks and allocate resources effectively. This paper aims to look at the analysis of AI's impact on the medical field and healthcare. It intends to determine whether online appointment scheduling and the use of virtual assistants have significantly streamlined the process of visiting a doctor. To check how many people have encountered various AI technologies within the healthcare sector and see how accustomed they are with the AI-powered medical devices and applications. Also to see if using AI in healthcare raises important privacy concerns and whether it has greatly facilitated administrative duties like patient data management and to know the potential job displacement of human healthcare professionals due to AI.

2. REVIEW OF LITERATURE

Ramalingam et al (2023) portrays the applications and possibilities of AI in healthcare. In this paper, machine learning is applied to the analysis of images from MRIs, X-rays and CT scans where tumours or abnormalities can be detected with high accuracy. The goal is to predict the recurrence of cancer and provide personalized treatment based on the patient's medical history, genetics, and other pertinent factors. Decision-making and treatment planning can both benefit from machine learning. Natural Language Processing (NLP) is another branch of AI that enables computers to understand and interpret human language such as to extract information from clinical notes and electronic health records (EHRs) to improve clinical decision-making and patient care & can also be used to develop chatbots and virtual assistants that can help patients manage their health. Another potential to transform healthcare is in robotics which enhances to monitor patients and perform robotic surgeries with faster recovery, and improved surgical outcomes for patients. (Ramalingam et al, 2023)

Ashrafur Rahman et al (2023) describes the enhanced diagnostic accuracy, efficiency in administrative tasks, positive and negative impact of AI in healthcare. Surgical procedures, gastroenterology, medical imaging, online counselling, and therapy are among the medical specialties that have embraced AI. It is possible to identify lesions, write reports, and make differential diagnoses using deep learning (DL). Since then, DL has grown even further, being able to screen for diabetic retinopathy, distinguish between melanoma and nonmelanoma, lower cardiovascular risk, and predict the course of Alzheimer's disease through the analysis of amyloid data. To make the right diagnosis and recommend the best course of treatment, a doctor will review the patient's medical history, current symptoms, and test results. Because AI systems can access multiple databases simultaneously, they can complete the same task faster and with higher accuracy. An AI system could identify a rare combination of symptoms or strains of bacteria far more quickly than a doctor or lab. which in the case of novel illnesses or outbreaks, might mean the difference between a pandemic that is out of control and one that can be contained. The most popular AI platform, Chat GPT, has been found to generate inaccurate medical articles, raising concerns about its accuracy. Ethical concerns also arise from the use of electronic health records, which could contain sensitive patient information and be targeted in data breaches. Additionally, the use of AI in healthcare raises concerns about clinical implementation, as humans fear that AI and robots may eliminate some jobs. (Rahman et al., 2023)

A N Ramesh et al (2014) has emphasized artificial neural networks, fuzzy expert systems, evolutionary computation and hybrid intelligent systems. The most widely used AI method in medicine is called ANN. Artificial Neural Networks (ANNs) are computer analytical tools modelled after the biological nervous system that are composed of "neurons," or networks of highly connected computer processors. They have become a particularly desirable analytical tool due to their capacity to learn from past examples, analyse non-linear data, manage imprecise information, enabling application of the model to independent data. The science of reasoning, thinking, and inference known as fuzzy logic acknowledges and makes use of real-world phenomena. Because fuzzy logic allows for ambiguity in data handling, it is especially well-suited for use in medical applications. It has also been utilized to forecast patient survival and diagnose cancer. To solve practical problems, evolutionary computation mimics the principles of natural selection and the survival of the fittest. They are used for a variety of purposes, including planning, medical imaging and signal processing, diagnosis and prognosis. Finally, using a hybrid intelligent system, the authors dealt with imprecision, leverage human-like reasoning mechanisms, accommodate common sense, and learned to adapt to a quickly changing and unfamiliar environment. (Ramesh et al., 2004)

3. OBJECTIVES

- To determine the impact of artificial intelligence on the medical industry
- To determine public awareness of usage of AI in healthcare
- To analyse the accuracy of diagnosis along with privacy of patient's data

- To check if the administrative tasks have been easier
- To examine the challenges regarding potential displacement of healthcare professionals and the loss of human touch

4. RESEARCH METHODOLOGY

The methodology aims to dig into the analysis of AI's impact on the medical field and healthcare. As a matter of fact to check the merits and challenges faced by people and healthcare professionals with upcoming changes that are taking place due to AI. To support this study, primary data was collected by conducting a survey using a standard questionnaire which included questions regarding the encounter of various AI aided technologies along with the potential job displacement of healthcare professionals. Participants raised various concerns and opinions from different age groups and several professions. Secondary data was included from a variety of sources like articles, journals, papers etc

5. DATA ANALYSIS

This section of the paper details the analysis and interpretation of data gathered from the responses of 105 people worldwide, depending on variables such as age, level of education, and occupation.

Age	Freq	CF	Percentage
0-18	6	6	5.7
18-25	72	78	68.6
25-40	18	96	17.1
40-60	9	105	8.6
Above 60	-	-	-
Education	Freq	CF	Percentage
High school	14	14	13.3
Graduate	49	63	46.7
Post graduate	38	101	36.2
Other	4	105	4
Occupation	Freq	CF	Percentage
Student	67	67	63.8
Employed	35	102	33.3
Homemaker	-	-	-
Other	3	105	3

Table 1: Demographic Data

Table I demonstrates that the largest percentage of respondents are in the 18 to 25 and 25 to 45 year old age groups, with the majority of them being both students and workers where 75.2% of the respondents were females and 23.8% of them males. Furthermore, it was observed that 46.7% of them were graduates.

7.1 Awareness of the impact of AI on healthcare

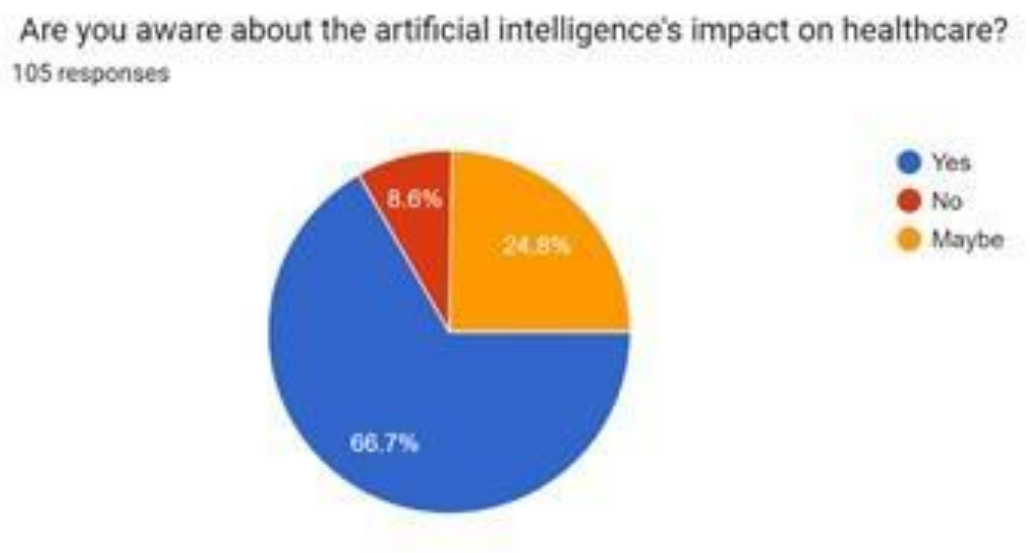

Figure 1: Awareness of the impact of AI on healthcare

According to the pie chart above, out of 105 respondents, 66.7% were aware of how AI is affecting healthcare, 8.6% were unaware of it, and 24.8% were unsure.

7.2 Experience of AI technologies in healthcare

The biggest percentage of respondents, or almost 79% of them, utilised smart watches and apps to track their activities and health, while 67.6% of them had medical imaging procedures like CT, MRI, and X-rays. In the meantime, 42.9% of the participants reported using chatbots and virtual assistants to schedule appointments and get answers to questions. Last but not the least,

12.4% of respondents said they had dealt with AI-enhanced robots.

7.3 Ease of online appointment scheduling and virtual assistants

Approximately 31.4% of the participants expressed agreement, on a 1–5 scale, that utilizing virtual assistants and online appointment scheduling greatly streamlined the process of visiting or calling to make an appointment before seeing a doctor. Thirty-five percent of them were unsure about the same. Conversely, 8.6% of them disagreed and 3.8% strongly disagreed. Finally, regarding the ease of use of the online schedule, 25.7% of respondents strongly agreed.

7.4 Rating of experience with the AI-based healthcare tool or app

42.% of respondents said their encounters with AI-based healthcare tools and applications were average, on a scale of 1 to 5. 3.8% of respondents had an exceptional experience, compared to about 36.2% who had a decent experience. Along with the use of X-rays, MRIs, and CT scans, they discovered that it was simpler to use and keep track of their number steps. While 3.8% of them reported having a poor experience and 13.3% reported having a fair experience when using the same

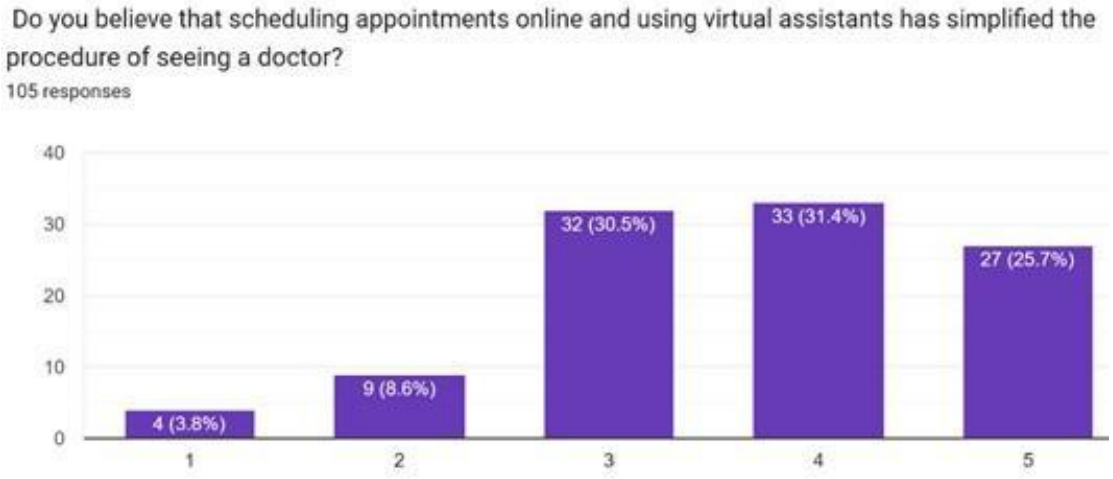

Figure 2: Experience of AI technologies in healthcare

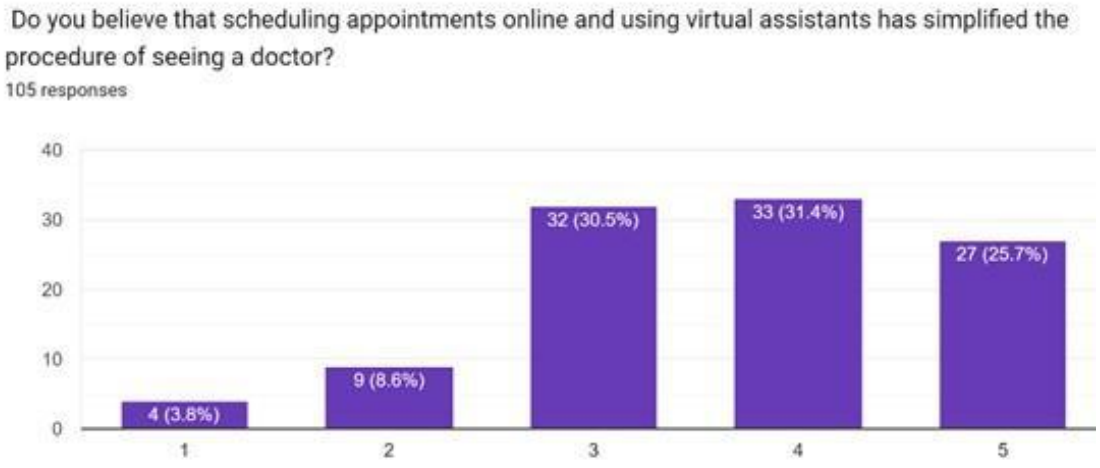

Figure 3: Ease of online appointment scheduling and virtual assistants

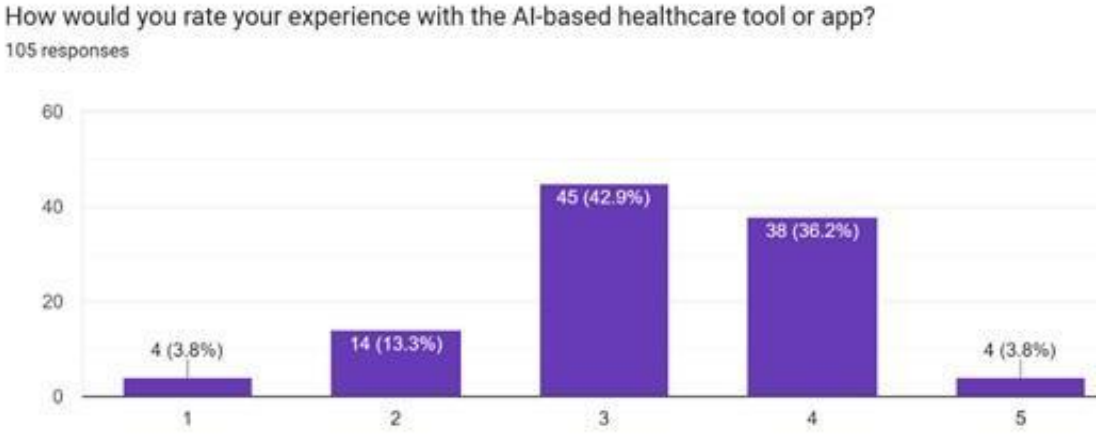

Figure 4: Rating of experience with the AI-based healthcare tool or app

7.5 Potential areas of AI in healthcare

Around 61.9% of respondents believed that administrative jobs are best suited for AI since it reduces the need for manual labour and enhances data accuracy. The method is quicker than gathering data manually, and 54.3% of respondents believe

AI has been helpful in keeping an eye on patients, particularly while they are recovering from surgery. Of those surveyed, around 46.7% believed AI could be used to effectively diagnose diseases like cancer, while 37.1% said AI would improve the effectiveness of a patient's treatment plan in a systematic manner.

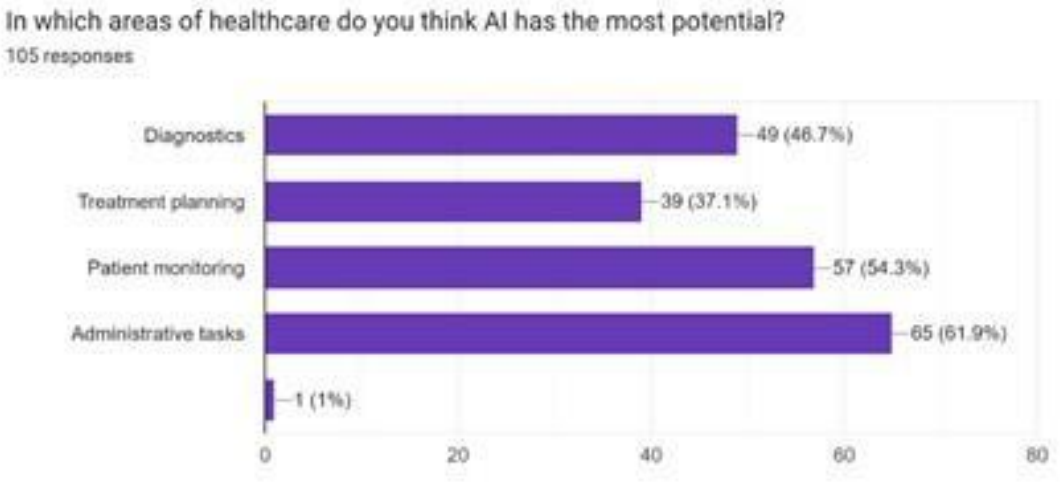

Figure 5: Potential areas of AI in healthcare

7.6 Privacy of patient data in AI

Nearly 81.9% of respondents thought that patient data privacy was crucial while utilising AI in healthcare, compared to 16.2% who were doubtful and 1.9% who didn't think privacy was essential.

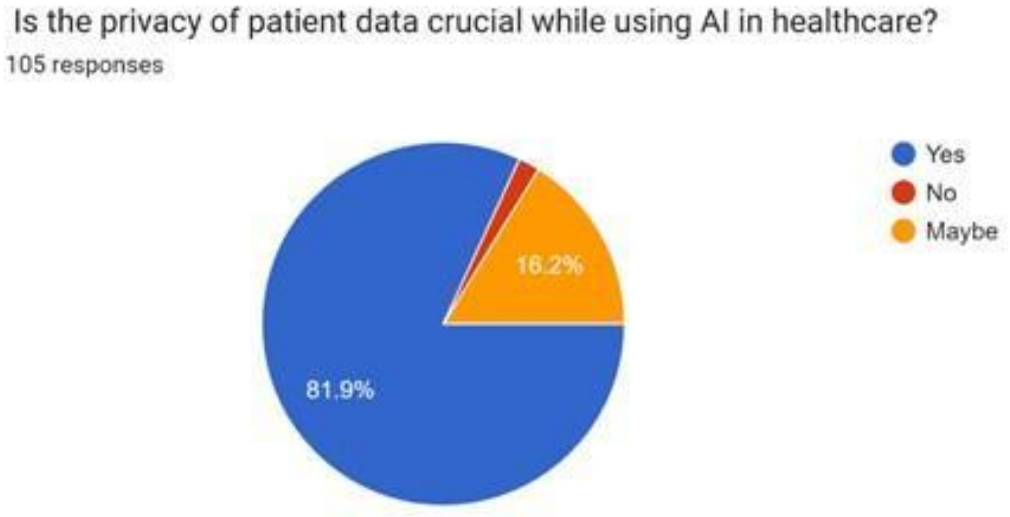

Figure 6: Privacy of patient data in AI

7.7 Ease of managing administrative tasks in AI

About 73.3% of respondents said that artificial intelligence (AI) had been beneficial in handling administrative activities, which in turn had assisted in capturing patient data instead of doing so manually, while 26.7% of them were unsure.

7.8 Job displacement of human healthcare professionals due to AI

According to the above graph, 34.4% of respondents expressed average concern about AI replacing human healthcare workers, while 30.5% strongly agreed, citing worker concerns about job loss and patient concerns about the inability of robots to convey human emotions. 22.9% of respondents voiced concern about this issue. About 8.6% of them disagreed, while 3.8% strongly disagreed with the same statement.

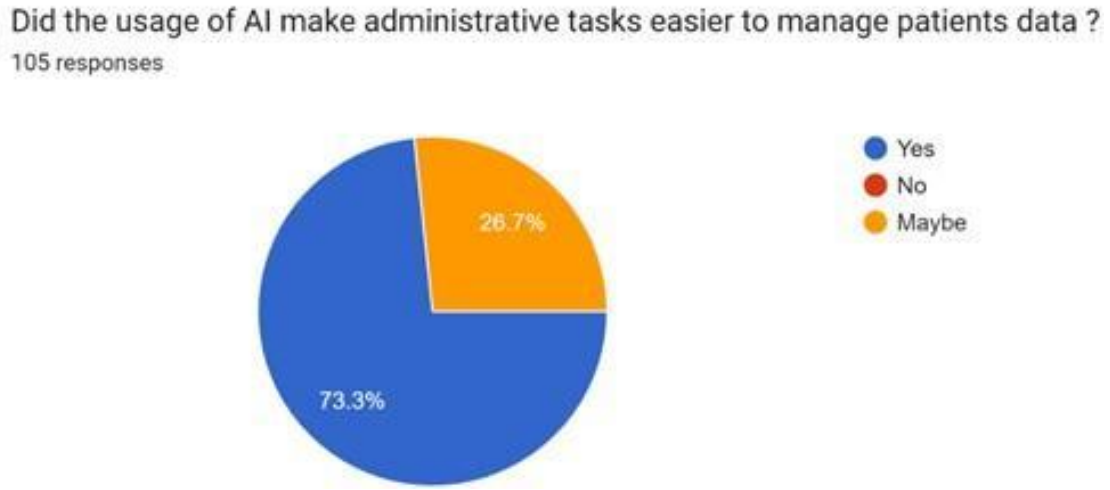

Figure 7: Ease of managing administrative tasks in AI

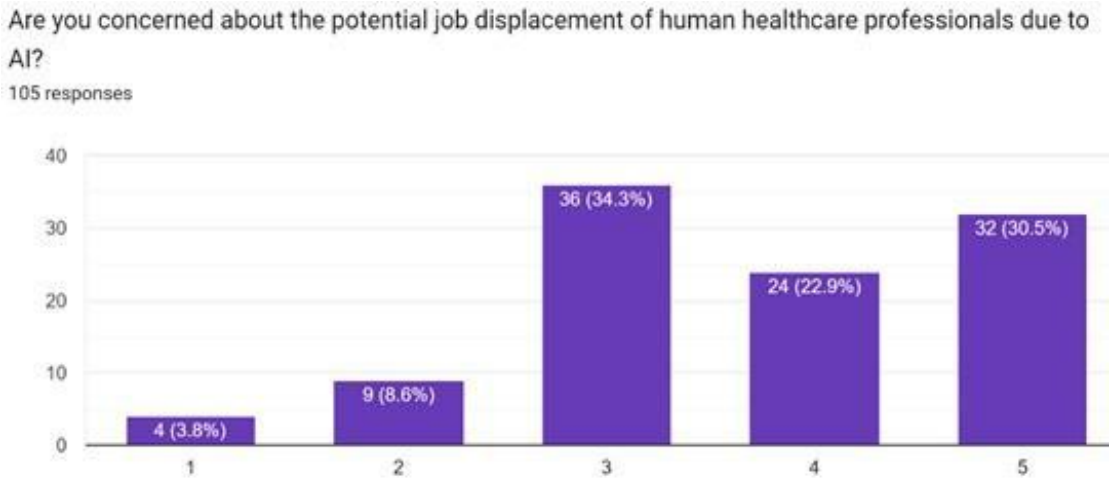

Figure 8: Job displacement of human healthcare professionals due to AI

7.9 Concerns of AI in Healthcare

Numerous people have voiced a variety of worries regarding AI in healthcare. They are listed below. 76.2% of the respondents think that as more positions are being replaced by machines, there will be a lack of personal touch in patient care. Of these, 56.2% voiced concerns about data privacy and security, 41.9% were concerned about ethical issues, and 58.1% were worried about the accuracy and dependability of employing AI.

7.10 Impact of artificial intelligence: Benefits, Challenges and Experience

An open-ended inquiry regarding a person's experience and thoughts on the application of AI in healthcare was included in the questionnaire's conclusion. The responders provided multiple answers. These are a few of the best ones:

- AI is contributing to a healthcare system that is more responsive, efficient and accurate but like I said we're losing human touch in patient care that would the major disadvantage since at the end of the day it's about humanity and saving person life with care and love.;
- As it creates an environment which enhances and simplifies the medical field, it is also essential to keep in mind that ethnicity and genuinity is not lost and moreover that no harm will be caused to human life.

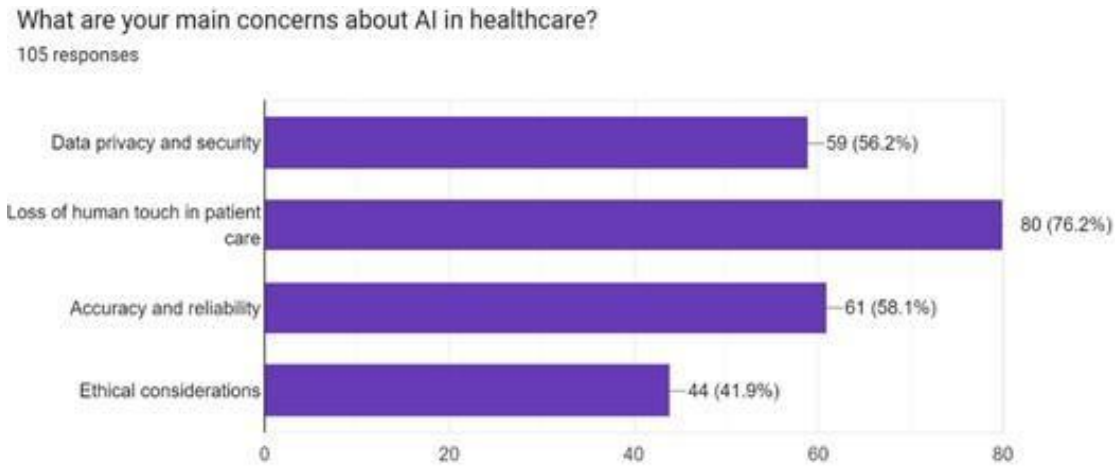

Figure 9: Concerns of AI in Healthcare

- I have only used the health care apps. I believe that if AI is being used in healthcare platforms, then data security should be of utmost importance and all the employees working there should have a HIPAA equivalent certificate. Also, strict actions should be taken if rules related to data security are being breached.
- AI is an upcoming concept and can be used to a large extent in medical science, but replacing human touch and empathy would be a great challenge if we look through the eye of the patient.; The ease of booking appointments, the accurate and time efficient receiving of test results, advancement in medicine.
- Benefits - Easy to make appointments, get information etc. Challenges - Loss of Human Touch, since healthcare is one such industry that needs to be from heart-to-heart which AI can never replace
- AI isn't superior to any human knowledge. It can give suggestions based on what we tell it, but healthcare professionals see, ask questions, analyse our answers and then treat the person. So, there's a connection between them, that makes the patient feel better, that someone is asking them by giving some time.
- Al can never completely replace healthcare, especially doctors who connect emotionally to patients.
- I think it makes the process more efficient if used for scheduling appointments, billing etc. but a doctor/human must be present for diagnostics and treatment. AI can be an aide, but it shouldn't be completely left to AI.;
- AI tools can be used to streamline data collection and management, break down data silos, optimize trial enrollment and more in medical research. These technologies are especially valuable for accelerating clinical trials by improving trial design, optimising eligibility screening and enhancing recruitment workflows.

6. LIMITATIONS

- It was challenging to find enough time to collect primary data on a bigger scale.
- Another drawback was the scarcity of books on this specific subject in the library.
- There was inadequate uniqueness on the websites because there were too many identical research papers.

7. FINDINGS

- It was discovered that using chatbots and virtual assistants to make appointments online was more convenient for users.
- Additionally, it was found that administrative duties were streamlined because managing patient data was simple, and artificial intelligence had the greatest promise in this area.
- Furthermore, many respondents did not know if they had used AI-based healthcare tools or apps, even though most of them used smart watches to track their health.
- Finally, most of them expressed worries about patient data privacy and the possibility that robots will eventually replace humans in the workforce.

8. CONCLUSION

In conclusion, artificial intelligence has had a significant influence on the medical industry. A growing number of people—mostly young people between the ages of 18 and 25—are becoming aware of the application of artificial intelligence (AI) in

healthcare. AI has been included into chatbots, virtual assistants, and AI-enhanced robotics, as well as diagnostic procedures like MRIs, X-rays, CT scans, etc. The management of patient data has become significantly easier, leading to a major simplification of administrative responsibilities. When compared to human experts, AI-powered image analysis algorithms have shown comparable or even higher accuracy in identifying abnormalities in medical images, presenting a useful tool for early disease detection and diagnosis. However, worries about patient privacy and the possibility of robots taking human jobs have been raised. Many expressed concerns about the results' accuracy and dependability, as well as the loss of the human element in medical care.

However, even if technology largely develops, emotions can never be conveyed through a robot or technology. A patient's pain can only be conveyed accurately to the doctor who is examining, and AI can never replace that. It has been observed that booking appointments online has been easier than before rather than physically being present there. Surgeries are being conducted by robots nowadays, which is good up to some extent as too many cuts can be avoided but there have been cases which reported emergency post-robotic surgery which is a serious issue of concern. While developing, all these things are to be taken into consideration. Healthcare systems can open up new avenues for patient care and precision medicine by ethically and responsibly utilising AI technologies. This will usher in a time when AI-driven innovations will improve people's health and well-being everywhere. Inco-operating AI into medical field must be done carefully and thoughtfully making sure that the ethnicity and genuinity is not lost causing harm to human life

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