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Research Article

Perception of Medical Professionals on Integration of Artificial Intelligence in Healthcare Practices- An Exploratory Study

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Abstract

Background: The application of artificial intelligence (AI) in the field of healthcare has paved the way for improved diagnostic accuracy, personalized treatment regimens, and overall enhancement in patient outcomes. The AI-related technologies are increasingly being applied in the healthcare sector, with the potential to bring about significant transformations in patient care and routine administrative operations, linking patients, providers, and society at large.

Objectives: The current article seeks to explore the perceptions of Indian doctors and nurses regarding the implementation of AI in their respective work areas.

Methods: Focused group discussions (FGDs) and individual in-depth interviews (IDIs) were conducted separately with the target respondents (doctors: FGD: n = 13, IDI: n = 9; nurses: FGD: n = 25, IDI: n = 16) to identify their perspectives and real-time experiences regarding AI integration in everyday workplace practices. The study design is qualitative in nature, with open-ended questions asked to the target respondents. Purposive sampling was used to recruit participants for the study.

Results: Two main themes and seven subthemes were identified. The findings suggest that while AI certainly demonstrates potential for enhancing healthcare services, it is important to carefully consider its possible impact on healthcare workforce motivation, patient care, perceptions of patients, and the need to redesign existing healthcare practices.

Conclusions: Artificial intelligence has significant scope and application in the healthcare industry. Indian healthcare professionals, including doctors and nurses, perceive that intelligent automation can effectively enhance the management of repetitive workflows. However, a section of respondents also expressed concern about potential job losses due to AI integration.

Keywords: Perception; Artificial Intelligence; Healthcare; India

1. Background

Big data analytics and the availability of vast datasets have profoundly impacted modern life, enabling customizations across various fields based on individual choices and preferences. There is considerable optimism surrounding artificial intelligence (AI) and its applications in healthcare services — not only for diagnosis but also for managing treatment regimens and follow-ups — resulting in a significant transformation of traditional medical practice and delivery systems (1).

Artificial intelligence is a comprehensive intelligent tool comprising numerous technologies that have the potential to improve healthcare access, efficiency, service delivery, and overall quality within healthcare systems (2). Researchers working in the field of intelligent automation in healthcare performance have explored the technical aspects of AI-driven decision-making using complex clinical datasets to support diagnosis, screening, and treatment (3, 4). Bini (5) assessed AI applications in routine healthcare operations, such as resource allocation, triage, workflow optimization, compliance, among others. However, the findings of these studies are often limited by geographical context and specific issues, requiring deeper investigation within real-world healthcare service scenarios and patient care environments (6).

The core model of health technology assessment (HTA) encompasses clinical, technological, human and cognitive, professional, organizational, legal, and ethical dimensions to evaluate real-world situations, practical challenges, and contextual outcomes. These assessments can be instrumental in determining how AI impacts healthcare systems and services. Analyzing these dimensions enables decision-makers to understand AI-based interventions in practical contexts, transcending geographical boundaries (7).

With India's population exceeding 1.4 billion, there is an urgent need for healthcare access, support, and delivery systems that focus on proactive healthcare management, awareness, and systematic monitoring to reduce the disease burden (8). Researchers have already implemented AI systems in areas such as diabetes management, including grading diabetic retinopathy (9). More recently, AI was employed for contact tracing during the COVID-19 pandemic (9). As the demand for healthcare services continues to rise — along with persistent mismatches in the doctor-to-patient ratio — AI-based tools and services could serve as a strong bridge to address this gap, potentially reducing out-of-pocket healthcare expenditure.

Globally, numerous studies have substantiated the potential of AI in healthcare, with various AI algorithms designed for diagnosis, treatment, and follow-up care support programs (1). On-demand healthcare services and service tracking offer a valuable platform for people, particularly in regions lacking proper healthcare infrastructure. The AI-enabled tools, therefore, can play a key role in reducing both operational and delivery costs.

2. Objectives

Doctors and nurses are integral to healthcare services, and their perceptions of technology adoption and integration will influence its ultimate implementation (10). A comprehensive understanding of their views on AI integration within the healthcare system could revolutionize the Indian healthcare landscape. Therefore, this study aims to explore the perceptions and attitudes of doctors and nurses toward utilizing AI-based technological interventions in their routine healthcare operations.

3. Methods

3.1. Thematic Analysis

The current research, conducted qualitatively, explores the perspectives and experiences of doctors and nursing professionals and has identified two main themes. These themes revolve around their perception of using and integrating AI-based automations in regular workplace healthcare delivery processes. The main themes are: (a) Perspectives of medical practitioners and nurses on AI implementation for managing healthcare operations, and (b) perceptual challenges faced by medical practitioners and nursing staff on AI implementation and automation.

The first theme, Perspectives of medical practitioners and nurses on AI implementation for managing healthcare operations, investigates the point of view of medical practitioners and nurses on AI integration, alterations in workflow practices, and its possible impact on their job roles.

The second theme, Perceptual challenges faced by medical practitioners and nursing staff on AI implementation and automation, brings out the challenges they have experienced in real-life settings within healthcare facilities, and the degree of difficulty they perceive in addressing these potential issues.

The interviews were conducted across a wide range of selected respondent profiles, in terms of age, experience, position, and qualifications, to ensure a diverse set of data points.

3.2. Design

The data collection, analysis, and interpretation of doctors' and nurses' perceptions regarding AI implementation in regular healthcare services were conducted through focused group discussions (FGDs) and in-depth interviews (IDIs), followed by thematic analysis (11).

Focused group discussions, conducted separately for doctors and nurses, aimed to explore how AI-driven mechanisms could help nurses and doctors deliver efficient and effective healthcare within their respective domains. Socio-demographic and other relevant details are reported in Table 1.

Table 1. Socio-demographic Details of Respondents

Socio-demographic Attributes and Descriptions	No. of Respondents	
	FGD	IDI (n = 25)
Medical profession		
Doctor	13	9
Nurse	25	16
Gender		
Male	13	
Female	12	
Education		
Graduation	13	
Post-graduation	8	
Above post graduation/super-specialty	4	
Monthly income (INR)		

< 30,000	12
30,000 - 50,000	5
> 50,000	8
Work experience (y)	
2 - 3	6
3 - 5	11
> 5	8

3.3. Sample Description and Inclusion Criteria

Purposive sampling (11) has been used to recruit willing doctors (FGD: n = 13, IDI: n = 9) and nurses (FGD: n = 25, IDI: n = 16) who have a minimum of 2 years of work experience in private healthcare facilities. As private healthcare establishments are pioneers in adopting advanced technologies, the inclusion criteria considered medical professionals working in private establishments.

3.4. Ethical Considerations

Ethical consent has been collected from all the respondents as per the Declaration of Helsinki (12). Written consent has been obtained from the respondents after detailed explanation of the research protocol.

3.5. Data Collection, Analysis and Identification of Themes

Data collection and analysis occurred concurrently. The outcomes from the FGDs were used to prepare the IDI schedule, along with insights from the existing literature. The FGDs were conducted in a tertiary-care private hospital, where detailed notes were taken by the researcher. IDIs were conducted via recorded telephonic interviews. These discussions aimed to capture doctors' and nurses' reflections on implementing AI for more efficient healthcare delivery processes. The interviews, conducted in English and Bengali, ranged from 20 to 40 minutes and underwent back translation where necessary (11). All interviews were recorded verbatim and analyzed thematically (13). Initially, data from doctors and nurses were analyzed separately; however, similar codes were eventually grouped under unified themes.

The main themes identified were:

(a) Perspectives of medical practitioners and nurses on AI implementation for managing healthcare operations, and

(b) Perceptual challenges faced by medical practitioners and nursing staff on AI implementation and automation.

Theme (a) includes three sub-themes:

(i) Daily clinical data management

(ii) Delegation of scheduled assignments, efficient management, and overall coordination

(iii) Customized care and patient engagement

Theme (b) includes four sub-themes:

(i) Digital technology and its know-how

(ii) Unintended mistakes, technical glitches, and data manipulation

(iii) Potential loss of patient connect, lower engagement, and fear of job loss

(iv) Legal attributes and data validation

The themes and sub-themes are illustrated in Figure 1. Selective transcripts corresponding to the themes are presented in Table 2. The Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines were followed in designing and reporting the data (8).

Table 2. Excerpts from the Interviews with Medical Practitioners and Nurses

Themes	Sub-themes	Excerpts
Perspectives of medical practitioners and nurses on AI implementation for managing healthcare operations	Daily clinical data management	"I have faced this many a times. My staff might schedule back-to-back appointments. In such situations, often patient turn up late and it creates a lot of chaos and confusion to manage the OPD consultations. Having an artificially intelligent system shall help to distribute OPD scheduling evenly distributed" (doctor: 43 years): "I feel information shall be easily available and I can access it to know the patient better. All previous medical histories and hospitalizations, not only in this hospital, but also outside would be recorded in these AI systems and as a nursing staff; I can utilize this prior information to make the patient feel at ease during hospitalization" (nurse: 24 years).

	Delegation of scheduled assignments, efficient management and overall coordination	"AI driven initial assessments shall definitely lessen the time that I spend documenting clerical matter. Given the volume of patients, often I find it challenging interacting with all. This technology shall definitely help me to enhance by contact time with patients" (doctor: 51 years):"Reliance on data collected by AI for designing the therapeutic regimen for my patients is something; I won't do at the moment! I feel AI research is still in its infancy and a lot more is to be done before we can completely leave it up to AI for initial management. Also, the physician's eye has an important role to play during early diagnosis and treatment planning" (doctor: 68 years): "It will be pretty easy and smooth if every information regarding the patient is well documented via AI systems that can predict any errors or check for possible changes" (nurse: 44 years).
	Customized care and patient engagement	"I will always have the entire patient database and detailed information handy which will help me and my team to provide specific services to the patients and their care givers... I feel this will create a positive and satisfactory environment for my patients" (doctor: 49 years): "I have some understanding of machine learning and deep learning algorithms. With some more training, I think it will help me to identify patients who are largely at risk and further help to improve precision while monitoring patients" (nurse: 31 years).
Perceptual challenges faced by medical practitioners and nursing staff on AI implementation and automation.	Digital technology and its knowhow	"I have no formal training of AI system. In our times, computers were new and we wrote manual prescriptions and writing pads to document something. I think I need some training to be fully sure of what I am doing, to rule out any mistakes" (doctor: 61 years): "Working here as a nurse, I don't have the time to learn anything new or enroll for any course. I spend more that 12-13 hours to travel and go back home. I am therefore little scared to use this, at this age…" (nurse: 37 years).
	Unintended mistakes, technical glitch and data manipulation	"I am not well versed with how AI systems work. While entering any data, what are the chances of data theft, breach or someone changing some findings? I am not sure and thus I fear using it. One simple change can change the layout of disease management." (doctor: 49 years): "I heard fraudsters nowadays hack systems. What if they hack this system too and make changes, we will not be able to know. Also, there could be service outages, technical glitch and I am not sure how to manage the patient load of those days in both OPD and IPD" (senior nurse: 48 years)

	Potential loss of patient connect, lower engagement and fear of job loss	"Patients might not like the idea of reporting their ailments to AI based machines. Since they are paying and seek help of doctors, they might want to interact with a human being that documents their information and cross-checks things instead of a virtual device. Trusting the system might be difficult and patients might hop from one hospital to the other. This will lower their satisfaction and trust on the system" (doctor: 42 years): "I fear that if most of the work is done by machines, what will we do? Chances are ...hospitals shall employ lesser people than the current numbers. What will happen to us?" (nurse: 26 years)
	Legal attributes and data validation	"With such stringent laws and legal compliances for various patient related information and declarations, if laws to prevent data leaks and privacy concerns are not covered, it will create disastrous results and doctors would be behind bars. It would also raise serious concerns on ethicality of medical practice where human driven decisions would be overruled by AI driven decisions" (doctor: 55 years): "We are the caregivers to patients. We comply with whatever is instructed by doctors or the team. If AI gives us initial suggestions, not sure if they will be correct or not! What if, complications enhance after applying AI suggestive measures?" (nurse: 33 years)

[z] Abbreviation: AI, artificial intelligence.

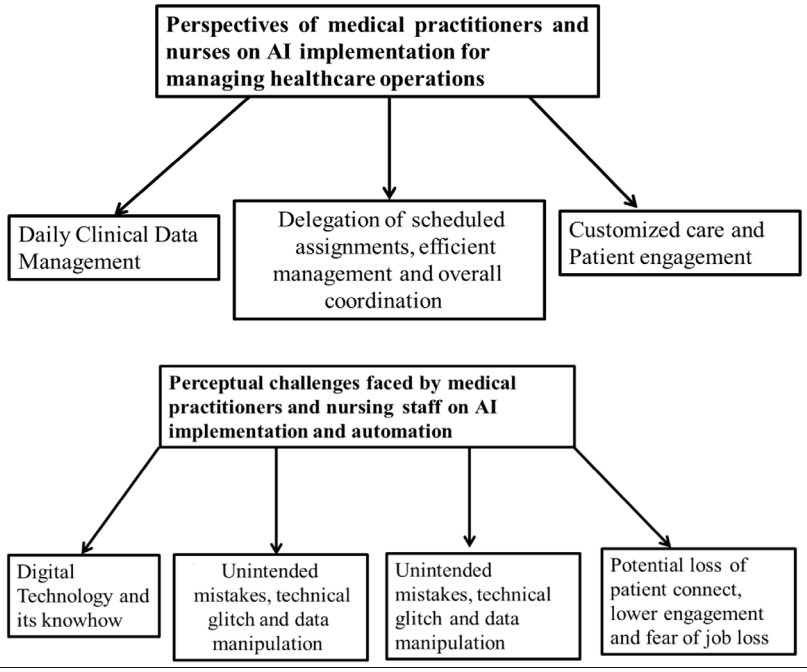

Figure 1. The themes and sub-themes

4. Results

Interviews were conducted with 25 respondents (doctors: n = 9, nurses: n = 16). Two main themes and seven sub-themes were identified, taking into account the respondents' backgrounds, experiences, perceptions, and personal factors. The respondents' viewpoints were compared and interconnected during the process of generating the final themes.

The results are reported below.

4.1. Perspectives of Medical Practitioners and Nurses on the Implementation of Artificial Intelligence in Managing Healthcare Operations

Perceptions of medical practitioners and nurses vary across age groups, locations, and the stature of healthcare facilities. Most of them, however, opined that AI implementation would help them in many ways. The AI integration can assist nursing professionals by reducing the burden of menial tasks, as artificially intelligent processes can guide them to undertake need-based interventions.

4.1.1. Daily Clinical Data Management

Managing routine data for patients is a labor-intensive, mechanical job and requires coordinated manpower activities. Many practitioners opined that AI can be integrally utilized for regular activities like scheduling appointments, setting reminders for patients, booking specific tests, following diagnostic protocols, and documenting patients' health records with ease using technology.

"I have faced ……scheduling evenly distributed" (doctor: 43 years)

Nursing professionals are open to technological updates, as they are often overburdened with documentation work in addition to their central role of being caregivers to in-patients. Many perceive that such planned interventions will help regularize coordination and enhance patient safety and engagement.

"I feel information …… during hospitalization" (nurse: 24 years)

4.1.2. Delegation of Scheduled Assignments, Efficient Management, and Overall Coordination

Scheduled assignments like basic medical examinations, probing the cause of hospital visits, radio-imaging, biochemical reporting, and therapeutic suggestions can be obtained using AI. However, mixed opinions were recorded when asked about task delegation to AI.

"AI driven initial …… with patients" (doctor: 51 years)

"Reliance on data …… treatment planning" (doctor: 68 years)

Interdepartmental patient transfers or shift handovers are difficult times for nurses, where ensuring crisp communication and clear documentation is essential. Any complacency during such times may pose potential risks for patients and the team. AI-driven systems can help minimize human errors and alert them to potential risks or oversights, especially during interdepartmental transfers, handovers, and discharges.

"It will be pretty easy …… for possible changes" (nurse: 44 years)

4.1.2. Customized Care and Patient Engagement

The AI processes shall help connect all patient information and documentation centrally, thereby enabling easy access to patient data with just a few clicks. Additionally, AI-enabled hospital operations shall also design customized and specific patient care and support regimens. This will positively impact patients and enhance patient engagement.

"I will always have …… for my patients" (doctor: 49 years)

Nursing personnel reported,

"I have some …… monitoring patients" (nurse: 31 years)

4.2. Perceptual Challenges Faced by Medical Practitioners and Nursing Staff in Artificial Intelligence Implementation and Automation

4.2.1. Digital Technology and Its Know-How

Technological advancements are significant, and while all medical professionals (doctors and nurses) acknowledge the growing reliance on them, they also express skepticism regarding technological know-how and the new insights they may require before they can fully harness the potential of AI. Many practitioners reported difficulties in learning and cited concerns about implementation.

"I have no formal training ……any mistakes" (doctor: 61 years)

"Working here as, …… use this, at this age" (nurse: 37 years)

4.2.2. Unintended Mistakes, Technical Glitch and Data Manipulation

Limited knowledge, trust issues, and multiple access points for patient data might lead to data breaches, manipulation, or unauthorized access to vital patient information. This concern was expressed by both respondent groups during focus group discussions and individual interviews. In the absence of a corrective protocol to address this issue, many senior consultants and nurses are hesitant to use AI-driven technologies for patient management.

"I am not well versed …… of

disease management" (doctor: 49 years)

"I heard fraudsters ……. in both OPD and IPD" (senior nurse: 48 years)

4.3. Potential Loss of Patient Connect, Lower Engagement, and Fear of Job Loss

While technology definitely enables work, automated systems often lose the human touch and dialogue. The crux of the doctor-patient relationship is communication, and medical practitioners feel that excessive automation might lead to reduced patient engagement, diminished trust in the system, and increased patient attrition. Out-of-pocket expenditure is the main source of healthcare revenue, and doctor-patient rapport plays a crucial role in patient retention. Doctors believe that too much automation could be detrimental to sustaining healthy provider-recipient relationships, while nurses fear that automation might reduce entry-level and general nursing job opportunities.

"Patients might not like the …… trust on the system" (doctor: 42 years)

"I fear that …… happen to us?" (nurse: 26 years)

4.4. Legal Attributes and Data Validation

The AI-driven outcomes and suggestions require validation by human medical professionals to ensure the validity and reliability of the data. This validation process may be time-consuming and require additional manpower, which may not always be feasible. Such scenarios raise concerns about the dependability of data-driven AI system suggestions and may lead to potential legal and ethical complications.

"With such stringent …… by AI-driven decisions" (doctor: 55 years)

"We are the …… applying AI suggestive measures?" (nurse: 33 years)

5. Discussion

The current study attempts to explore the perceptions of medical practitioners and nursing personnel regarding the introduction and implementation of artificially intelligent systems in their day-to-day operations. Doctors and nurses from departments such as medicine, surgery, ENT, pathology, radiology, and gynecology have been interviewed to understand their perceptions of AI-driven systems and practices. The results obtained have been categorized under two main themes.

The first theme, entitled 'Perspectives of medical practitioners and nurses on AI implementation for managing healthcare operations', strives to understand how they perceive AI systems enabling them in their workplace operations. The second theme, entitled 'Perceptual challenges faced by medical practitioners and nursing staff on AI implementation and automation', intends to investigate the different challenges related to AI implementation at healthcare facilities.

The results highlight that a significant portion of respondents perceive AI systems as helpful in managing repetitive workflow, coordination, and smooth functioning of departments. If the patient is mapped from the very beginning, even if hospital or healthcare staff changes, the underlying information shall aid the corresponding healthcare personnel in taking over and providing appropriate resolution. Machine learning and deep neural networks are expected to pave the way forward by analyzing past data, health records, and numerous clinical studies to identify complicated and risky areas faster (14). Additionally, user experience and customization are expected to improve, shifting the healthcare outlook from curative to preventive disease management (15, 16).

Alongside positive perceptions of AI, many participants expressed concerns regarding automation replacing human-driven processes. Firstly, healthcare data confidentiality is pivotal, raising concerns about data safety and security. Issues surrounding patient consent and privacy are key elements under consideration. Existing laws on data breach, safety, and management should be re-examined and amended as per current needs. Similar results have also been documented by (17, 18).

5.1. Conclusions

AI implementations, if moderately complemented by human interventions, can prove to be the best match. Complete reliance on AI tools might not always be effective, particularly in situations where certain strata of people are underrepresented, which could lead to confusion and distortions. Since the predictions of AI-enabled systems cannot always be directly correlated with available data, system or technical failures may result in serious consequences, and legal accountability for such issues may be challenging. Insights into data quality, awareness, and proper reporting will aid AI-driven healthcare processes. In the absence of standard guidelines in India, over-reliance on AI-enabled systems might raise serious ethical and social concerns and erode the trust of patients and families in healthcare service providers.

5.2. Limitations

This current study has a few limitations, which form the basis for future research. Firstly, the focus of this research is on tertiary care private healthcare establishments in West Bengal and does not reflect the perceptions and opinions of medical practitioners working in government health setups of varying capacities. Secondly, an in-depth quantitative study with a larger respondent sample size is needed to better capture the viewpoints of a more representative target audience.

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