ORIGINAL ARTICLE

Knowledge and Practice Related to Health Information Technology Among Healthcare Professionals in a Tertiary Care Teaching Hospital in Eastern India: A Mixed-Methods Study

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CITATION

Sarangi L, Behera B, Parhi L. Knowledge and Practice Related to Health Information Technology Among Healthcare Professionals in a Tertiary Care Teaching Hospital in Eastern India: A Mixed-Methods Study. Indian J Comm Health. 2026;38(2):423-426. https://doi.org/10.47203/IJCH.2026.v38i02.036

ARTICLE CYCLE

Received: 14/02/2026; Accepted: 19/03/2026; Published: 31/03/2026

ABSTRACT

Background: Health Information Technology (HIT) has become a cornerstone of modern healthcare systems, supporting clinical decision-making, continuity of care, and operational efficiency. However, optimal utilization remains dependent on workforce competence and organizational readiness. **Objectives**: To assess knowledge, attitudes, and practices related to HIT among healthcare professionals in a tertiary care teaching hospital and to explore perceived barriers and facilitators. **Methods**: A mixed-methods study was conducted among 167 healthcare professionals using structured questionnaires and in-depth interviews. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were analyzed thematically. **Results**: Administrators demonstrated significantly higher knowledge scores than doctors (3.65 ± 0.72 vs 2.97 ± 0.68; $p < 0.01$). Nearly half of participants reported low computer proficiency. Documentation and appointment scheduling were suboptimal, whereas literature searching was frequently practiced. Major barriers included inadequate training, workflow disruption, and cybersecurity concerns. **Conclusion**: Despite perceived benefit of use of Information Technology in Health care management, significant gaps persist in HIT utilization. Structured capacity-building programs and institutional digital governance are required.

KEYWORDS

Health Information Technology; Digital Health; Hospital Management; Mixed Methods;

INTRODUCTION

Effective health systems aim to provide accessible, affordable and quality services to all. Health is not a single place, but an integrated system that includes different organizations, providers and people's environment (1). Health systems must have reliable, relevant and useful health information to guide policy and decisionmaking when planning, designing and implementing health interventions and plans. Continuous monitoring, evaluation and recommendations can help improve the quality of services and therefore improve health outcomes (2).

Without technology, it is difficult to improve health services at the lowest cost while keeping patients safe and satisfied. Health information technology (HIT) is a tool designed to help connect information and communication across different healthcare products (1). Health IT not only improves care for individual patients but also provides many public health benefits across the country, including early detection of infection pain, improved followup of chronic disease management, and provision of health assessment, especially with timely, reliable, effective, and comparative data. (3)

India's healthcare system is a diverse and complex system involving both public and private institutions. While India's public healthcare system is mainly controlled and financed by the government, private providers including hospitals, clinics, and laboratories enjoy these benefit. In order to monitor the quality and healthcare services provided by the NHM, the Department of Health and Family Welfare is working to promote care and monitoring through study, monitoring, conducting ad hoc research, supporting monitoring, quality assurance, etc. HMIS collects information about health facilities as follows:

Delivery services (delivery, maternal and child health related, family vaccination disease, tuberculosis, morbidity and mortality, OPD, IPD service, surgery and other data) once a month. The hospital has its own health information system to monitor medical services and infrastructure. First of all, a good HMIS strategy, introduction of health policy and legislation, health information management policy, central data storage, data collection, consolidation and information management should be established, computer systems health information system (DHIS) and information

management should be established (Central Health Information Centre)(4). However, there is still room for improvement in terms of addressing the basic problems, proper planning of services and timely delivery to all and most importantly continuous monitoring and evaluation of all activities (5). Technical knowledge and skills of health workers are a major problem as it prevents health workers from taking advantage of the great benefits of ICT in health management and administration. According to Pearson Education's Global Knowledge 2012 IT Skills and Salary Report, healthcare professionals can do their jobs better after obtaining IT certification because it brings confidence, trust, and proof that the person has acquired knowledge, experience, and skills in a particular job or practice.

It has also been reported that they can understand new and complex technologies (6). Capture, process, and communicate data through the system's web based portal.

HMIS is one of the six key areas of health promotion. HMIS contributes to decision-making in five other areas: delivery, workforce health, access to essential medicines, health financing, and leadership/management. It also facilitates data collection, operations, and management to guide planning, management, and decision making in hospitals and organizations (7)First, a good HMIS strategy should be the introduction of health policy and legislation, health information management policy, centralized data storage, computer systems for data collection, consolidation and creation, health information system (DHIS) and establish a central health institution (4). However, there is still room for improvement in terms of addressing the basic problems, proper planning and timely services for all, and most importantly, continuous monitoring and evaluation of all activities (5). The use of systems such as IPMS will improve information availability and health integration across
the country. Therefore, it is important to ensure that doctors and patients have the
necessary skills and knowledge**.**

Objective

This study aimed to evaluate knowledge, and practices related to HIT in a tertiary care teaching hospital in Eastern India and to identify contextual barriers and facilitators influencing adoption.

MATERIAL & METHODS

Study Design and Setting: A mixed-methods observational study was conducted between April and August 2024 at a private tertiary care teaching hospital in Bhubaneswar, Odisha. The hospital has approximately 1000 inpatient beds and serves over 2,500 outpatients daily.

Study population:The study population included doctors, hospital administrators, and IT professionals(taken as controls).

Sample size: Applying the formula $n=z^2pq/L^{2,}$
taking p=34% (4) and q= 100-34
Z=1.96 and L = margin of error=5%
The sample size was calculated as 161. Taking a non-response rate of 10%, final sample size calculated was 161+16= 177.

Out of 177 sample size, 10 participants did not give consent to be a part of the study, so they were excluded. The data was analysed on 167 study participants.

Sampling: Stratified random sampling ensured proportional representation. Of 177 eligible individuals, 167 consented and completed the study.

Stratified random sampling was used to select the required sample
Total doctors - 300, administrators - 60 and IT - 35, Total = 395 (sampling frame)
Proportion of doctors = 300/395 = 0.759
Proportion of administrators = 60/395 = 0.152
Proportion of IT personnel = 35/395 = 0.089
Therefore, Doctors sample size = 0.759×167 = 122
Administrators sample size = 0.152 ×167 = 35
IT Personnel 0.089 ×167 = 10

Data Collection Instruments: A structured, pretested expert validated questionnaire assessed socio-demographic characteristics, computer proficiency, access to digital systems, knowledge of HIT, utilization practices, and attitudes. Responses were recorded on five-point Likert scales.

The principal investigator used an interview schedule to guide the in-depth interviews, also adapted from a validated tool to fit the study. Five participants were purposively selected to include all the different cadres of healthcare workers in the study (Doctors, Hospital administrators and IT personnel) following completion of semi-structured questionnaires. The number was fixed till the responses got repetitive. The principal investigator conducted the in-depth interviews, and the interviews took 45-50 minutes. They were recorded and transcribed manually from audio. Written informed consent was obtained from the healthcare workers and questionnaires and interviews were conducted at a time convenient to them.

Semi-structured in-depth interviews explored perceived barriers, challenges, and recommendations. Interviews were conducted until thematic saturation.

Validity and Reliability: The questionnaire was adapted from validated instruments and pretested. Internal consistency was assessed using Cronbach's alpha (α = 0.81).

Data Analysis: Quantitative data were analyzed using SPSS version 25. Descriptive statistics were computed. Associations were examined using chi-square tests and independent t-tests. Statistical significance was set at $p < 0.05$. Qualitative data were transcribed verbatim and analyzed using thematic content analysis.

Ethical Considerations: Institutional ethical approval was obtained. Written informed consent was secured. Confidentiality and anonymity were maintained.

RESULTS

A total of 167 healthcare professionals participated in the study and the following result was observed.

Table 1 Socio-Demographic Characteristics of Study participants

Variable	Category	n (%)
Gender	Male	98 (58.7)
	Female	69 (41.3)
Age	20–30	72 (43.1)

	30–40	45 (26.9)
	≥40	50 (29.9)
IT Experience	<1 year	38 (22.8)
	1–5 years	97 (58.1)
	>5 years	32 (19.1)

Table 1 showed most were male (58.7 percent) and aged 20–30 years (43.1 percent). The majority had 1–5 years of IT experience (58.1 percent).

Table 2 Mean Time Spent on Professional Activities (Doctors and Administrators)

Activity	Mean Minutes/Day (± SD)
Patient care	288 ± 63.7
Teaching	120 ± 12.3
Supervision	18.3 ± 2.4
Administration	14.4 ± 1.8
IT-related	15.8 ± 2.8

From the above table (2), it was seen that the participants dedicate 15.8 minutes to IT related activities. Majority of their mean work time (288 minutes) was spent on patient care in a teaching hospital followed by teaching of undergraduate and post graduate students (Mean time 120 minutes)

Table 3 Self-Reported Computer Proficiency of participants

Proficiency Level	n (%)
Unsophisticated	78 (46.7)
Proficient	28 (16.8)
Highly proficient	10 (6.0)

Table 3 shows that 78 (46.7 percent) participants self-identified themselves as unsophisticated in computer proficiency. Those 10 participants who self-reported as highly proficient were all IT personnel.

Table 4 Knowledge score of participants on use of Information Technology in health care management*

Question	Responses	Doctor (n=122)	Administrator (n=35)	Chi square (P value)
Do you have access to a computer at workplace?	Yes	48 (39.3)	25 (71.4)	11.25 (Sig)
	No	74 (60.7)	10 (28.6)	(0.000794)
How would you rate your training in IT?	Good	26	15	3.402 (NS)
	Adequate	10	8	(0.1819)
	Poor	12	2	
How do you rate your knowledge on use of IT in healthcare management	5-Very good	13 (10.7)	8(22.8)	15.7616
	4- Good	31(25.4)	16(45.7)	(Sig)
	3- Adequate	24(19.7)	5(14.3)	(0.003356)
	2- Poor	48(39.3)	3(8.6)	
	1- Very poor	6(4.9)	3(8.6)	

In Table 4, it was seen that the difference in access to computers among doctors and health administrators was found to be statistically significant and knowledge to use IT in health care setup is mostly poor in doctors (39.3 percent) and good among administrators (45.7 percent) which was found to be statistically significant.

Table 5 Mean Knowledge Scores

Group	Mean (SD)		p-value
Doctors	2.97	±	The *t*-value is 3.10812.
	0.68		The *p*-value is .00112.
Administrators	3.65	±	(Sig)
	0.72		

In above table 5, the mean knowledge score was just adequate (mean score 2.97) in doctors while it was higher in administrators and this difference was statistically significant (*t*-value is 3.10812, p<0.05)

Table 6. Utilization of HIT by doctors and administrators

Task	Mean Score
Patient documentation	1.97
Appointment scheduling	1.98
Clinical guidelines	2.60
Literature search	3.12
Email communication	1.40

It was observed in the study that 43.4 percent never carried out documentation of patient information even though they had access to computers. Whereas similar proportion of participants (43.4 percent) always used computers for medical literature searching. Table 6 shows the least mean score 1.4, 1.97 and 1.98 was for emailing patients, patient information documentation and patient appointment scheduling respectively whereas the highest mean score 3.12 was for medical literature search and mean score 2.6 for clinical diagnosis guidelines.

Table 7 Thematic Analysis of Qualitative study

The following themes emerged on thematic analysis for IT use in Healthcare management
1) Human factors
"Interoperability Issues"
"Data Security and Privacy Concerns"
"Resistance to Change"
"Cost Constraints"
"Lack of technical Support and maintenance"
2) System level barriers
"Lack of Standardization of software"
"Limited IT Literacy among Healthcare Staff"
"Implementing IT systems may disrupt with existing workflows"
"Patient may be Reluctant"
"Unnecessary complexity to healthcare delivery, making work more burdensome'
3) Facilitators
"Developing standards for health IT systems"

"Training Programs" "user-friendly training for healthcare professionals"
"Hand holding"
"Robust Cybersecurity"
"User friendly designing health IT systems"

Qualitative Findings (Table 7)- On thematic analysis, three major themes emerged: "human factors" "system-level barriers" and "facilitators". Participants highlighted poor interoperability, data security concerns, limited IT literacy, resistance to change, and perceived workload. Facilitators included leadership support, continuous training, and user-friendly system design.

Discussion

The current study shows a significant gap between what health professionals know and how they practice using Health Information Technology (HIT), especially among clinicians. While most participants had a positive view of digital systems, their actual use was mostly limited to academic tasks like searching medical literature. Previous studies from low- and middle-income areas have noted similar differences between how useful people think these technologies are and how often they use them in their daily work. Limited integration of digital tools into standard procedures limits effective use (Hersh, 2004; Ward et al., 2008).(6,7)

The relatively low ratings for electronic documentation and appointment scheduling are a reflection of the workflow challenges and time constraints that exist in busy healthcare settings. In high-volume healthcare settings, healthcare providers tend to focus on direct patient care rather than documenting electronically, especially if they perceive the electronic process to be time-consuming and not well-integrated (Sukums et al., 2014; Olok et al., 2015). (8,9). This suggests that the mere availability of technology is not a guarantee for its effective use.

The significantly higher knowledge levels observed among administrators suggest disparities in access to training opportunities and institutional resources. Administrative personnel typically have greater exposure to digital systems and formal capacity-building initiatives, which perhaps enhance their competence and confidence in HIT use.

Issues pertaining to data security, privacy, and system interoperability were some of the concerns that came to the fore in the qualitative part of this research. These concerns are in line with the global literature that has identified trust, data protection, and system reliability as essential pre-requisites for the long-term adoption of digital health (Alotaibi & Federico, 2017; Ayatollahi et al., 2015) (1,10). Inadequate cybersecurity frameworks and perceived unsecured information systems may undermine user confidence, thereby limiting long-term engagement with digital platforms which needs to regulate the negative perception about data security.

Conclusion

Although there are positive attitudes towards HIT, its implementation is limited by human and organizational factors. For a sustainable digital transformation, there is a need for continuous training and involvement of leadership in institutional governance with secured data policy.

Limitation of the Study

Strengths include the mixed-methods design, multidisciplinary participation, and contextual relevance. Limitations include the single-center setting, self-reported measures, and limited generalizability.

Authors Contribution

All authors have contributed equally.

Financial Support and Sponsorship

Nil

Conflict of Interest

There are no conflicts of interest.

Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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