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Assessment of Knowledge and Challenges in the Use of Electronic Coding for Health Information Management: A Case Study of Rivers State University Teaching Hospital

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ABSTRACT

Accurate health information management is crucial for ensuring effective healthcare delivery, billing accuracy, and policy planning. The adoption of electronic coding systems plays a significant role in improving the quality of health records, yet its utilization remains inconsistent in many developing countries, including Nigeria. This study assessed the level of knowledge, extent of use, perceived benefits, and challenges associated with electronic coding systems among Health Information Management (HIM) professionals in selected hospitals. A descriptive cross-sectional research design was used, involving 200 HIM professionals selected through a stratified random sampling technique. Data were collected using a structured questionnaire and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized respondents' characteristics, while inferential statistics using the Chi-square test examined the relationship between knowledge levels and effective use of electronic coding systems at a significance level of $p < 0.05$. The findings revealed that 60% of respondents had a moderate to high level of knowledge of electronic coding systems. However, only 43% reported daily use, and 32% indicated full integration with electronic health records. Major barriers to effective use included inadequate technical infrastructure (85%), insufficient training opportunities (84%), and limited institutional funding (83%). A statistically significant relationship was found between knowledge level and effective use of electronic coding systems ($\chi^2 = 24.68$, $df = 2$, $p < 0.001$). Although HIM professionals demonstrated substantial awareness and knowledge of electronic coding systems, their application remains suboptimal due to infrastructural and institutional challenges. Strengthening digital health capacity through continuous training, policy support, and investment in health information infrastructure is vital for improving coding accuracy and enhancing data quality in Nigeria's healthcare system.

Keywords: Electronic coding systems, Health information management, Knowledge, Utilization, Digital health, ICD-11 implementation, Nigeria

INTRODUCTION

The digitalization of health information management has profoundly transformed how hospitals collect, process, and utilize patient data. One of the key pillars of this transformation is *clinical coding* the systematic conversion of narrative clinical information into standardized alphanumeric codes using international systems such as the International Classification of Diseases (ICD). These codes are essential for several health system functions, including accurate billing and reimbursement, disease surveillance, hospital performance monitoring, and national health planning (World Health Organization [WHO], 2023). With the increasing integration of electronic health records (EHRs), clinical coding processes are gradually being computerized, giving rise to what is commonly described as *electronic coding* or *e-coding*. This innovation represents the transition from traditional manual coding to automated or semi-automated systems that operate within digital health information infrastructures. The move toward e-coding is gaining global traction due to its capacity to enhance coding accuracy, data consistency, and operational efficiency (Evans et al., 2021). However, in low- and middle-income countries such as Nigeria, the shift remains uneven, hindered by infrastructural limitations and insufficient workforce capacity (Oladele et al., 2022). Electronic coding, when effectively utilized, can improve the completeness, reliability, and timeliness of health data. Automated prompts embedded in e-coding software help clinicians document diagnoses more accurately and assist health information officers in selecting precise codes for clinical and administrative use. Studies have reported that hospitals adopting electronic systems record fewer coding errors and generate more comprehensive clinical data compared with those relying solely on manual methods (Afolabi et al., 2020). Nonetheless, challenges such as inadequate ICT infrastructure, limited funding, poor power supply, and lack of continuous professional development remain significant barriers to implementation in Nigerian health facilities (Okafor & Chukwudi, 2021).

Beyond the technical dimension, behavioral and organizational factors also influence the successful adoption of e-coding systems. The *Health Belief Model (HBM)* provides a useful framework for explaining individual readiness to embrace new health technologies. According to the model, a professional's likelihood of adopting e-coding depends on perceived risks associated with manual errors, perceived benefits such as efficiency and data accuracy, perceived barriers like inadequate training or technical support, and self-efficacy the confidence in one's ability to use such systems effectively (Glanz et al., 2015; Champion & Skinner, 2008). Similarly, the *Diffusion of Innovations Theory* (Rogers, 2003) highlights how new technologies spread through social systems, emphasizing that adoption depends on an innovation's perceived advantage, compatibility, and complexity. Understanding these behavioral dimensions among health information management (HIM) professionals is essential for promoting sustainable adoption of e-coding tools.

Despite the potential of electronic coding, concerns persist about the quality of clinical documentation that forms its foundation. Coders depend heavily on physicians' notes, which are sometimes incomplete, ambiguous, or poorly structured, resulting in inaccurate code assignment and unreliable data (Naylor et al., 2022). Additionally, the emergence of artificial intelligence (AI) and natural language processing (NLP)-based coding systems has raised concerns among HIM professionals about potential job displacement. However, scholars suggest that such technologies are more likely to complement rather than replace human coders by automating repetitive tasks and allowing professionals to focus on data analysis and quality assurance (Hasan et al., 2021).

In Nigeria, studies on electronic coding remain limited despite growing interest in health information digitization. Most available research focuses on general EHR implementation, leaving gaps in understanding the knowledge level and practical challenges faced by HIM personnel in applying e-coding systems. This gap is particularly critical in tertiary health institutions, where reliable and standardized data are essential for clinical governance, research, and policy development. The Rivers State University Teaching Hospital (RSUTH), one of the major tertiary hospitals in South-South Nigeria, provides a valuable context for investigating these issues due to its ongoing efforts to digitize patient records and improve information management practices. Hence, examining the knowledge and challenges of e-coding use among HIM professionals at RSUTH is both timely and relevant. Findings from such research could guide institutional strategies for capacity building, infrastructure improvement, and policy formulation, contributing to Nigeria's broader digital health transformation agenda and alignment with global standards in health information management (WHO, 2023).

METHODS

Research Design

This study employed a descriptive cross-sectional research design, considered suitable for systematically examining and presenting the characteristics, knowledge, and challenges of Health Information Management (HIM) professionals concerning the use of electronic coding systems. This design enables the collection of quantitative data that reflect existing practices, attitudes, and barriers within a natural healthcare environment without manipulation of study variables. It also provides a clear snapshot of current levels of awareness, adoption, and operational constraints surrounding e-coding in a tertiary healthcare institution.

Study Area

The study was conducted at the Rivers State University Teaching Hospital (RSUTH), located in Port Harcourt, the capital city of Rivers State, Nigeria. RSUTH was established in 1980 as part of the Rivers State government's efforts to expand tertiary healthcare services and enhance medical education in the Niger Delta region. Initially known as Braithwaite Memorial Specialist Hospital (BMSH), the facility was upgraded to a teaching hospital in 2018 to support the Rivers State University College of Medical Sciences. The hospital serves as a major referral center for Rivers State and neighboring states in the South-South geopolitical zone of Nigeria. It operates over 375 bed spaces and provides specialized healthcare across various departments, including Surgery, Internal Medicine, Obstetrics and Gynaecology, Paediatrics, Public Health, Radiology, Laboratory Services, and Health Records Management. The Health Records Department plays a critical role in maintaining patient information, ensuring accurate documentation, and supporting the transition toward electronic health information systems. RSUTH's mandate encompasses clinical care delivery, training of medical and allied health personnel, and applied research aimed at improving health service outcomes.

Sampling Technique and Sample Size

The target population for this study comprised all Health Information Management (HIM) professionals employed at Rivers State University Teaching Hospital. This included officers responsible for medical record management, clinical coding, health data processing, and electronic information system administration. At the time of the study, the total number of HIM personnel was approximately 200 staff members, encompassing both senior and junior cadres actively engaged in the hospital's health information management operations. A total enumeration sampling technique was adopted for this study. This method involves including all members of the target population to ensure comprehensive data coverage and minimize sampling bias. Given the relatively manageable population size of 200 HIM personnel, all eligible staff were invited to participate. Accordingly, 200 structured questionnaires were distributed to capture data representative of the entire population of HIM professionals at RSUTH.

Data Analysis

Data for the study were obtained using a structured, self-administered questionnaire specifically developed for this research. The instrument was designed following an extensive review of relevant literature on electronic health records, digital health adoption, and clinical coding practices. It comprised several sections that gathered information on respondents' demographic characteristics, their knowledge and awareness of electronic coding systems, perceived benefits of e-coding, challenges and barriers to its adoption, as well as the extent of use and integration of e-coding in routine health information management activities. Data collection was carried out through direct, in-person administration of the questionnaires to all 200 HIM staff at RSUTH. This approach facilitated prompt distribution, completion, and retrieval while allowing the researcher to address any questions or clarifications raised by participants. Respondents were informed about the purpose of the study and their rights as participants before providing informed consent. Participation was voluntary, and strict confidentiality was maintained throughout the process. Completed questionnaires were collected either immediately or within a short agreed-upon timeframe to ensure a high response rate. The completed questionnaires were first checked for accuracy and completeness before being coded and entered into the Statistical Package for the Social Sciences (SPSS) version 25.0 for analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations were employed to summarize the demographic characteristics of respondents as well as their knowledge, perceptions,

and use of electronic coding systems. To test the study hypotheses and examine relationships between key variables, inferential statistical analyses were performed. Specifically, the Chi-square test of independence was used to assess the association between the level of knowledge of electronic coding and its effective use among Health Information Management (HIM) professionals. The level of statistical significance was set at $p < 0.05$. Findings were presented in tables and interpreted in relation to the study objectives.

Ethical Considerations

Ethical approval for this study was obtained from the Rivers State University Teaching Hospital Health Research Ethics Committee (RSUTH HREC). All participants were informed about the purpose of the study and their voluntary participation was ensured through written informed consent. Respondents were assured of the confidentiality and anonymity of their responses, and all data collected were used solely for academic and research purposes.

Results

Table 1: Socio-Demographic Characteristics of Respondents (n = 200)

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	78	39.0
	Female	122	61.0
Age Group (years)	19–25	52	26.0
	26–32	84	42.0
	33–39	38	19.0
	40 and above	26	13.0
Mean ± SD			29.7 ± 6.21
Marital Status	Single	118	59.0
	Married	74	37.0
	Others (Divorced/Widowed)	8	4.0
Educational Qualification	Industrial Training (IT)	30	15.0
	Records Clerk Certificate	28	14.0
	National (ND)/Technician Diploma	38	19.0
	Higher National Diploma (HND)	82	41.0
	Bachelor’s Degree or Higher	22	11.0
Years of Work Experience	0–3 years	46	23.0
	4–6 years	68	34.0
	7–9 years	34	17.0
	10–12 years	28	14.0
	13 years and above	24	12.0
Religion	Christianity	122	61.0
	Islam	60	30.0
	Others	18	9.0
Ethnic Group	Yoruba	10	5.0
	Igbo	129	64.5
	Hausa	24	12.0
	Others	37	18.5

Table 1 presents the socio-demographic characteristics of the 200 Health Information Management (HIM) professionals who participated in the study. The results show that the majority of respondents

were female (61.0%), while males accounted for 39.0%, indicating a predominance of women in the HIM workforce at Rivers State University Teaching Hospital. The age distribution revealed that the largest proportion of respondents (42.0%) were within the 26–32 years age group, followed by 26.0% aged 19–25 years, 19.0% aged 33–39 years, and 13.0% aged 40 years and above. The mean age of respondents was 29.7 ± 6.21 years, suggesting that most participants were relatively young professionals. In terms of marital status, a higher percentage (59.0%) of respondents were single, 37.0% were married, while 4.0% were either divorced or widowed. Regarding educational qualifications, the largest proportion held a Higher National Diploma (HND) (41.0%), followed by those with National Diploma or Technician certificates (19.0%), Industrial Training certificates (15.0%), Records Clerk certificates (14.0%), and Bachelor’s degrees or higher (11.0%). This indicates that most HIM personnel possessed mid-level professional qualifications. The distribution of work experience showed that 34.0% of respondents had 4–6 years of experience, 23.0% had 0–3 years, 17.0% had 7–9 years, 14.0% had 10–12 years, and 12.0% had 13 years and above, suggesting a moderately experienced workforce. With respect to religion, the majority of participants were Christians (61.0%), followed by Muslims (30.0%), while 9.0% belonged to other faiths. The ethnic distribution indicated that the majority were Igbo (64.5%), reflecting the predominant ethnic composition of Rivers State, followed by Hausa (12.0%), others (18.5%), and Yoruba (5.0%).

Table 2: Knowledge of Electronic Coding among Health Information Management Professionals (n = 200)

Variable	Category	Frequency (n)	Percentage (%)
Awareness of Electronic Coding Systems	Aware	176	88.0
	Not aware	24	12.0
Familiarity with Coding Standards (e.g., ICD-10, ICD-11)	Very familiar	64	32.0
	Moderately familiar	82	41.0
	Slightly familiar	38	19.0
	Not familiar	16	8.0
Knowledge of Benefits of E-Coding in Health Information Management	Good knowledge	112	56.0
	Fair knowledge	68	34.0
	Poor knowledge	20	10.0
Ability to Apply E-Coding in Daily HIM Tasks	Always apply	58	29.0
	Sometimes apply	84	42.0
	Rarely apply	38	19.0
	Never apply	20	10.0
Training on E-Coding Systems	Received formal training	126	63.0
	No formal training	74	37.0
Overall Level of Knowledge	High	86	43.0
	Moderate	82	41.0
	Low	32	16.0

Most Health Information Management (HIM) professionals demonstrated a substantial level of awareness and understanding of electronic coding systems. A large proportion (88.0%) of respondents indicated that they were aware of electronic coding, while only 12.0% reported being unaware. Familiarity with international coding standards such as ICD-10 and ICD-11 was also relatively high, with 32.0% of participants being very familiar and 41.0% moderately familiar, although 27.0% reported only slight or no familiarity. In assessing knowledge of the benefits of electronic coding in health information management, over half of the respondents (56.0%) displayed good knowledge, 34.0% had fair knowledge, and 10.0% demonstrated poor knowledge. Application of e-coding skills in daily HIM operations followed a similar trend, as 29.0% of respondents reported always applying

e-coding, 42.0% sometimes applied it, 19.0% rarely did so, and 10.0% had never applied it. The findings further show that a majority (63.0%) of HIM professionals had received formal training on electronic coding systems, while 37.0% had not undergone such training. When the overall level of knowledge was assessed, 43.0% of respondents exhibited a high level of knowledge, 41.0% demonstrated a moderate level, and 16.0% showed a low level of knowledge.

Table 3: Perceived Benefits of Electronic Coding Systems among Health Information Management Professionals (n = 200)

Variable	Category	Frequency (n)	Percentage (%)
Improvement in Accuracy of Health Records	Strongly agree	112	56.0
	Agree	68	34.0
	Disagree	12	6.0
	Strongly disagree	8	4.0
Enhancement of Data Retrieval and Analysis	Strongly agree	118	59.0
	Agree	62	31.0
	Disagree	14	7.0
	Strongly disagree	6	3.0
Reduction in Documentation Errors	Strongly agree	96	48.0
	Agree	78	39.0
	Disagree	18	9.0
	Strongly disagree	8	4.0
Facilitation of Timely Billing and Reimbursement	Strongly agree	84	42.0
	Agree	82	41.0
	Disagree	22	11.0
	Strongly disagree	12	6.0
Support for Evidence-Based Decision Making	Strongly agree	98	49.0
	Agree	74	37.0
	Disagree	20	10.0
	Strongly disagree	8	4.0
Contribution to Quality Improvement in Health Service Delivery	Strongly agree	106	53.0
	Agree	72	36.0
	Disagree	14	7.0
	Strongly disagree	8	4.0

The results indicate that Health Information Management (HIM) professionals generally held positive perceptions regarding the benefits of electronic coding systems in healthcare delivery. A majority of respondents (56.0%) strongly agreed that electronic coding improves the accuracy of health records, while 34.0% agreed, and only a small proportion (10.0%) disagreed or strongly disagreed. Similarly, 59.0% strongly agreed and 31.0% agreed that e-coding enhances data retrieval and analysis, highlighting the perceived value of digital coding tools in promoting efficient data management. In terms of reducing documentation errors, 48.0% of the participants strongly agreed and 39.0% agreed that electronic coding contributes to minimizing errors, whereas only 13.0% expressed contrary views. Furthermore, 42.0% strongly agreed and 41.0% agreed that e-coding facilitates timely billing and reimbursement processes, suggesting that respondents recognize its role in improving financial and administrative efficiency within the healthcare system. When asked about the contribution of e-coding to evidence-based decision-making, 49.0% strongly agreed and 37.0% agreed, indicating widespread acknowledgment of its importance in supporting data-driven healthcare practices. In addition, 53.0% strongly agreed and 36.0% agreed that electronic coding contributes to overall quality improvement in health service delivery, with only 11.0% disagreeing or strongly disagreeing.

Table 4: Challenges Affecting the Use of Electronic Coding Systems among Health Information Management Professionals (n = 200)

Variable	Category	Frequency (n)	Percentage (%)
Inadequate Technical Infrastructure (Computers, Internet, Software)	Strongly agree	94	47.0
	Agree	76	38.0
	Disagree	20	10.0
	Strongly disagree	10	5.0
Insufficient Training and Capacity-Building Opportunities	Strongly agree	102	51.0
	Agree	66	33.0
	Disagree	22	11.0
	Strongly disagree	10	5.0
Resistance to Technological Change among Staff	Strongly agree	78	39.0
	Agree	84	42.0
	Disagree	26	13.0
	Strongly disagree	12	6.0
Frequent System Downtime or Power Supply Interruptions	Strongly agree	88	44.0
	Agree	74	37.0
	Disagree	26	13.0
	Strongly disagree	12	6.0
Limited Institutional Funding and Policy Support	Strongly agree	96	48.0
	Agree	70	35.0
	Disagree	22	11.0
	Strongly disagree	12	6.0
Concerns about Data Security and Privacy	Strongly agree	82	41.0
	Agree	76	38.0
	Disagree	28	14.0
	Strongly disagree	14	7.0

The findings reveal that several key challenges hinder the effective use and integration of electronic coding systems among Health Information Management (HIM) professionals. A significant majority of respondents (47.0% strongly agree; 38.0% agree) identified inadequate technical infrastructure such as limited access to functional computers, unreliable internet connectivity, and outdated software as a major barrier to e-coding adoption. Similarly, more than half of the participants (51.0% strongly agree; 33.0% agree) reported insufficient training and capacity-building opportunities as a major challenge. This highlights the pressing need for continuous professional development and hands-on training to equip HIM personnel with the necessary technical competencies for effective e-coding practice. Resistance to technological change among staff also emerged as a notable concern, with 39.0% strongly agreeing and 42.0% agreeing that attitudinal and behavioral factors impede the smooth adoption of electronic systems within the health information management environment. Operational challenges were also evident, as 44.0% strongly agreed and 37.0% agreed that frequent system downtime and erratic power supply disrupt workflow and data processing. Additionally, 48.0% strongly agreed and 35.0% agreed that limited institutional funding and inadequate policy support constrain the sustainability of e-coding initiatives. Concerns about data security and privacy were also prevalent, with 41.0% strongly agreeing and 38.0% agreeing that these issues pose significant risks to digital health record management.

Table 5: Extent of Use and Integration of Electronic Coding Systems among Health Information Management Professionals (n = 200)

Variable	Category	Frequency (n)	Percentage (%)
Frequency of Electronic Coding Use	Daily	86	43.0
	Weekly	58	29.0
	Occasionally	40	20.0
	Rarely/Never	16	8.0
Type of Records Coded Electronically	Inpatient records	84	42.0
	Outpatient records	60	30.0
	Both inpatient and outpatient	56	28.0
Level of Integration with Electronic Health Records (EHRs)	Fully integrated	64	32.0
	Partially integrated	90	45.0
	Not yet integrated	46	23.0
Use of Automated Coding Tools (Software-Assisted)	Always	54	27.0
	Sometimes	82	41.0
	Rarely	40	20.0
	Never	24	12.0
Perceived Ease of Using E-Coding Systems	Very easy	48	24.0
	Moderately easy	84	42.0
	Difficult	50	25.0
	Very difficult	18	9.0
Overall Perception of E-Coding Adoption in RSUTH	Highly satisfactory	58	29.0
	Satisfactory	82	41.0
	Unsatisfactory	42	21.0
	Very unsatisfactory	18	9.0

In the table above, the findings present the extent of use and integration of electronic coding systems among Health Information Management (HIM) professionals at the Rivers State University Teaching Hospital (RSUTH). The results reveal that 43.0% of the respondents reported using electronic coding systems daily, while 29.0% used them weekly. However, 20.0% used the systems only occasionally, and 8.0% rarely or never engaged with them. This indicates that although electronic coding is being adopted in routine operations, consistent and widespread utilization remains limited among HIM professionals. Regarding the types of records coded, 42.0% of respondents stated that e-coding was used mainly for inpatient records, 30.0% for outpatient records, and 28.0% for both. In terms of integration with Electronic Health Records (EHRs), 32.0% of respondents reported full integration, 45.0% noted partial integration, and 23.0% indicated that integration had not yet occurred. The use of automated coding tools also varied among respondents: 27.0% always used such tools, 41.0% sometimes used them, while 20.0% rarely or never did. Concerning perceived ease of use, 24.0% of respondents described the system as very easy to use, 42.0% as moderately easy, while 25.0% and 9.0% found it difficult or very difficult, respectively.

Table 6: Use of Electronic Coding Systems among Health Information Management Professionals (n = 200)

Knowledge Level	Effective Use	Not Effective Use	Total
High	70	10	80
Moderate	54	26	80
Low	16	24	40
Total	140	60	200

Chi-square (χ^2) = 24.68 df = 2 p-value = 0.000

In the table above, the relationship between the level of knowledge and the effective use of electronic coding systems among Health Information Management (HIM) professionals was examined. The findings show that respondents with a high level of knowledge demonstrated a significantly higher rate of effective use (87.5%) compared to those with moderate (67.5%) and low (40.0%) knowledge levels. Conversely, ineffective use was more common among respondents with low knowledge levels (60.0%) than among those with moderate (32.5%) or high (12.5%) knowledge. The Chi-square test of independence revealed a statistically significant association between knowledge level and the effective use of electronic coding systems ($\chi^2 = 24.68$, $df = 2$, $p = 0.000$).

DISCUSSION OF FINDINGS

This study investigated the knowledge, perceived benefits, challenges, and extent of use of electronic coding (e-coding) systems among Health Information Management (HIM) professionals at Rivers State University Teaching Hospital (RSUTH). The findings revealed substantial awareness and positive perceptions toward e-coding but also highlighted critical gaps in infrastructure, training, and institutional support that hinder its full-scale implementation. The demographic characteristics showed that most respondents were young professionals aged between 26 and 32 years, predominantly female, and held National Diploma (ND) or Higher National Diploma (HND) qualifications. This aligns with previous studies indicating that the HIM workforce in Nigeria is largely composed of young, mid-level practitioners who possess practical experience but often require further digital training to optimize performance (Musa & Ajayi, 2020; Ojo et al., 2021). The youthful demographic profile presents a strategic advantage for digital health advancement, as younger professionals tend to demonstrate greater adaptability to new technologies when provided with adequate institutional support and resources. Findings on knowledge revealed that while 88% of respondents were aware of e-coding systems, only 43% demonstrated a high level of overall knowledge, suggesting partial understanding of the system's functionality. This observation is consistent with Afolabi et al. (2020) and Oladele et al. (2022), who noted that despite growing awareness of electronic health tools among Nigerian HIM staff, practical competence and consistency in use remain limited. The significant association between knowledge level and effective e-coding utilization ($\chi^2 = 24.68$, $p = 0.000$) emphasizes that proficiency is a major determinant of successful system adoption. Hasan, Lutfiyya, and Stone (2021) similarly found that structured training programs on ICD-11 and related systems markedly improved coders' performance and confidence. Respondents' perceptions of e-coding benefits were highly favorable. A majority agreed that e-coding improves the accuracy of health records, enhances data retrieval, and supports evidence-based decision-making. These outcomes reinforce the findings of Evans, Lloyd, and Pierce (2021) and Kim, Park, and Lee (2022), who established that e-coding significantly improves data quality, coding accuracy, and operational efficiency in clinical and administrative settings. Furthermore, Al-Muammar, Alharbi, and Almalki (2023) found that automated e-coding systems enhance documentation completeness and reduce manual errors, outcomes that were also reflected in this study. The positive perception among RSUTH staff demonstrates increasing confidence in digital tools as enablers of quality health information management and healthcare delivery.

However, several barriers to e-coding adoption persist. Inadequate technical infrastructure, such as unreliable internet connectivity and limited access to functional computers, was the most reported challenge (85%). This mirrors the findings of Okafor and Chukwudi (2021), who observed that poor infrastructure and limited funding undermine digital health initiatives in Nigerian tertiary hospitals. Additionally, 84% of respondents identified insufficient training and limited capacity-building opportunities as significant obstacles—an issue corroborated by Bello, Salawu, and Yusuf (2023), who emphasized that lack of continuous professional development hampers digital transformation in health institutions. Resistance to technological change among staff, coupled with frequent system downtime and erratic power supply, further impedes smooth adoption, reflecting systemic challenges also noted by Adewole and Oladipo (2022). Concerns about data security and privacy—reported by 79% of respondents—echo global warnings that digitalization must be accompanied by strong governance, cybersecurity frameworks, and ethical data management practices (WHO, 2021). The extent of use and integration of e-coding at RSUTH suggests gradual but incomplete adoption. Nearly three-quarters of respondents (72%) reported using e-coding daily or weekly, and 77% indicated that the system was either fully or partially integrated with electronic health records (EHRs). While this reflects progress, the relatively low rate of full integration (32%) indicates that RSUTH remains in the intermediate stages of digital transformation. This finding is consistent with Naylor, McBride, and Link (2022), who argued that many healthcare institutions in developing countries face infrastructural and policy bottlenecks that limit the transition from partial to full digital integration. The moderate use of automated coding tools and the mixed perception of ease of use suggest that while staff are increasingly engaged, usability and system support remain areas for improvement.

The significant relationship between knowledge level and effective use of e-coding validates theoretical insights from Bandura's (2001) Social Cognitive Theory, which posits that behavior change and performance depend on self-efficacy—the belief in one's ability to execute actions successfully. Similarly, the Health Belief Model (Champion & Skinner, 2008; Glanz, Rimer, & Viswanath, 2015) suggests that professionals' engagement with digital systems depends on their perception of benefits, barriers, and cues to action. These frameworks underscore the importance of continuous training, supportive policies, and institutional motivation to foster positive behavioral and attitudinal change toward digital health innovations. Overall, this study highlights a promising trajectory toward e-coding adoption in RSUTH but underscores the need for strategic interventions to bridge existing gaps. Infrastructural investment, standardized capacity-building programs, and policy enforcement are essential to ensure sustainable integration of e-coding systems. These findings are consistent with global recommendations by the World Health Organization (2023), which emphasize human resource development and digital literacy as central pillars of digital health implementation.

CONCLUSION

The study demonstrates that HIM professionals at RSUTH possess considerable awareness and positive attitudes toward e-coding, recognizing its value in improving data accuracy and healthcare delivery. Nonetheless, infrastructural inadequacies, insufficient training, and policy constraints continue to impede optimal utilization. Strengthening institutional support, expanding access to digital tools, and enhancing professional competencies are therefore critical to achieving sustainable e-coding integration in Nigeria's health information systems. These efforts will not only advance the quality of health data management but also align Nigeria's health sector with global standards of digital health governance and interoperability.

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