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Electronic Health Records Usage and Perceived Healthcare Outcomes among Healthcare Professionals in University of Ilorin Teaching Hospital, Ilorin, Nigeria

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Background: Electronic health records (EHR) are promoted as tools for improving the quality, safety and continuity of patient care. In Nigerian tertiary hospitals, where implementation is recent and often partial, it is not clear whether routine EHR use translates into better healthcare outcomes as experienced by frontline professionals.
Objective: This study examined the pattern of EHR usage among healthcare professionals at the University of Ilorin Teaching Hospital (UITH), Ilorin, and its relationship with perceived healthcare outcomes.
Methods: A descriptive cross-sectional survey was carried out among nurses, doctors, Health Information Management staff, laboratory staff and pharmacists. A sample of 315 was drawn from a population of 1,481 using the Taro Yamane formula with proportional allocation. Data were collected with a validated structured questionnaire (Cronbach's $\alpha = 0.76$); 286 valid responses were analysed (response rate 90.8%). Descriptive statistics and the chi-square test of independence were used, with odds ratio and phi coefficient as effect sizes, at $p < 0.05$.
Results: Most respondents (79.0%) used EHR daily and 58.4% had three or more years of EHR experience. Respondents rated access to EHR ($M = 3.03$) and faster retrieval of medical histories ($M = 3.30$) highly, but data entry errors affecting clinical decisions were also acknowledged ($M = 2.73$; 60.5% agreement). Overall, 83.9% of respondents reported positive healthcare outcomes from EHR use. Positive outcomes were reported by 90.7% of daily users compared with 58.3% of non-daily users ($\chi^2 = 36.82$, $df = 1$, $p < 0.001$; OR = 6.97, 95% CI 3.53–13.79; $\varphi = 0.36$).
Conclusion: Routine EHR use is strongly associated with positive perceived healthcare outcomes at UITH, including faster access to patient information, better documentation and improved continuity of care. Data quality weaknesses could undermine these gains. The hospital should promote universal daily use, strengthen data quality assurance and develop objective outcome indicators.

Keywords: Electronic health records; healthcare outcomes; quality of care; patient safety; continuity of care; Nigeria

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INTRODUCTION

The quality of healthcare depends heavily on the quality of the information available to clinicians when they make decisions. A doctor who cannot see a patient's previous diagnoses, allergies or medications is more likely to repeat investigations, prescribe inappropriately or miss deterioration. Donabedian's (1988) structure process outcome model

places information systems among the structural conditions that shape the processes of care and, through them, the outcomes patients experience. Improving information availability is therefore a quality and safety intervention, not merely an administrative one.

Electronic health records are digital records of patients' health information that can be accessed and updated by authorised professionals across departments and over time (World Health Organization [WHO], 2021). Beyond replacing paper folders, EHR can provide legible documentation, structured data, medication lists, alerts and decision support, and shared access for multidisciplinary teams. International reviews link EHR and related health information technology to improved adherence to guidelines, fewer medication errors and better documentation (Chaudhry et al., 2006; Buntin, Burke, Hoaglin & Blumenthal, 2011; Campanella et al., 2016).

The evidence is not uniformly positive. Benefits often appear only after systems mature (Lin, Jha & Adler-Milstein, 2018), and poorly designed or poorly used systems can introduce new types of error (Ash, Berg & Coiera, 2004). In sub-Saharan Africa, partial implementation, irregular use and weak infrastructure further limit the benefits (Akanbi et al., 2012; Ohuabunwa, Sun, Jubanyik & Wallis, 2016). A key question is therefore not only whether a hospital has an EHR but whether professionals use it routinely, and whether such use is associated with better outcomes.

University of Ilorin Teaching Hospital (UITH), Ilorin, a federal tertiary hospital in North-Central Nigeria, has implemented EHR across several departments. This study examined how healthcare professionals at UITH use the system and whether routine use is associated with perceived improvements in healthcare outcomes.

Objectives

The study sought to:

1. Describe the pattern of EHR usage among healthcare professionals at UITH.
2. Assess professionals' perceptions of the information-related benefits and weaknesses of EHR that bear on healthcare outcomes.
3. Determine the relationship between EHR usage and perceived healthcare outcomes at UITH.

Hypothesis

$H_0$1: There is no significant relationship between electronic health records usage and healthcare outcomes at UITH.

LITERATURE REVIEW

Concept of Healthcare Outcomes

Healthcare outcomes are the effects of healthcare on patients' health status and experience. Donabedian (1988) distinguished outcomes from the structures and processes that produce them. The Institute of Medicine (2001) framed quality around six aims: care that is safe, effective, patient-centred, timely, efficient and equitable. In health information technology research, outcomes are commonly assessed at three levels: clinical outcomes (such as disease control, complications and mortality), patient safety outcomes (such as medication errors and adverse events), and process or system outcomes (such as documentation quality, continuity of care and timeliness) (Buntin et al., 2011). In this study, healthcare outcomes refer to professionals' perceptions of the quality of care, patient safety, continuity of care, documentation and speed of service associated with EHR use.

EHR and Quality of Care

Systematic reviews show that EHR are associated with better adherence to clinical guidelines and improved documentation. Chaudhry et al. (2006) found that health information technology increased adherence to guideline-based care, enhanced surveillance and reduced medication errors. Campanella et al. (2016), in a meta-analysis, found that EHR use was associated with improved guideline adherence, reduced medication errors and fewer adverse drug effects, though not with reduced mortality. Buntin et al. (2011) reported that most recent studies of health information technology found positive or mixed-positive effects on quality, efficiency and provider satisfaction. Lin et al. (2018) found that EHR adoption in United States hospitals was associated with lower mortality only after the systems had been in place for some years, suggesting that outcomes improve as use becomes routine and systems mature.

Rotenstein et al. (2022) found that primary care physicians who spent more time in the EHR achieved slightly better performance on quality measures such as diabetes and hypertension control and cancer screening. This suggests that engagement with the system, not merely its presence, is related to quality.

EHR and Patient Safety

Medication errors are a major source of preventable harm (Kohn, Corrigan & Donaldson, 2000). Illegible handwriting, missing medication histories and unknown allergies contribute to many of them. EHR with electronic prescribing and decision support can reduce such errors. Kaushal, Shojania and Bates (2003) found that computerised physician order entry with decision support significantly reduced serious medication errors, and Radley et al. (2013) estimated that computerised order entry reduced prescribing errors in United States hospitals by about half. Bates and Gawande (2003) argued that information technology improves safety by preventing errors, enabling rapid response when they occur, and tracking adverse events.

At the same time, EHR can introduce new risks. Ash et al. (2004) described errors arising from poorly designed interfaces, fragmented displays and reliance on copy-and-paste. Bowman (2013) showed that inaccurate or incomplete EHR data threaten information integrity and patient safety. The safety benefit of EHR therefore depends on the accuracy of the data entered.

EHR and Continuity of Care

Continuity of care requires that information follows the patient across clinicians, departments and visits. EHR allow every authorised member of the care team to see the same up-to-date record, reducing repeated history-taking, duplicated investigations and conflicting treatment plans (Menachemi & Collum, 2011). This is particularly important in teaching hospitals, where patients with chronic conditions are seen by different doctors at successive visits and by several specialties.

EHR Use in Nigerian Hospitals

Nigerian and sub-Saharan African studies document growing EHR adoption, but with uneven use. Akanbi et al. (2012) noted that most African EHR projects were limited in scope and often ran alongside paper records. Odekunle, Odekunle and Shankar (2017) linked limited use to cost, infrastructure and skills. Adeleke, Lawal, Adio and Adebisi (2015) found significant ICT skill gaps among Nigerian health information management professionals. Few studies have examined whether routine use of EHR by Nigerian hospital professionals is associated with better outcomes.

Empirical Studies on EHR Use and Outcomes

Several empirical studies have linked the extent of EHR use, rather than its mere presence, to outcomes. Lin et al. (2018) analysed United States hospitals over several years and found that mortality benefits were concentrated in hospitals whose EHR systems had been in place longer, consistent with the idea that benefits grow as use becomes routine and users become proficient. Rotenstein et al. (2022) studied primary care physicians at two academic centres and found that more time spent in the EHR, including time on in-basket messages and orders, was associated with modestly better performance on diabetes control, hypertension control and cancer screening. Radley et al. (2013) estimated that the adoption of computerised provider order entry in United States hospitals prevented millions of medication errors annually, with the benefit depending on the proportion of orders entered electronically.

Evidence from low-resource settings is more limited but points in the same direction. Fritz, Tilahun and Dugas (2015), reviewing EHR implementations in low-resource settings, found that projects with high levels of routine use by clinical staff were more likely to report improvements in data availability and care processes. Williams and Boren (2008) reported that EHR in developing countries improved the completeness of patient information and supported follow-up of patients with chronic conditions such as HIV, where continuity of care is critical. These studies support the expectation that routine use of EHR by professionals at UITH should be associated with better perceived outcomes.

Theoretical Framework

The study draws on the DeLone and McLean Information Systems Success Model (DeLone & McLean, 2003). The model proposes that the quality of a system and of the information it holds influences how much it is used; use, in turn, produces net benefits for individuals, organisations and, in healthcare, patients. Two implications guide this study. First, use is the bridge between having a system and benefiting from it, so routine (daily) use should be associated with stronger perceived outcomes. Second, information quality is itself a determinant of benefit, so inaccurate data entry would be expected to weaken the outcomes of EHR use. Donabedian's (1988) structure process outcome model complements this by positioning EHR as a structural resource that shapes clinical processes and their outcomes.

METHODOLOGY

Design, Setting and Population

A descriptive cross-sectional survey design was used. The study was conducted at UITH, Ilorin, Kwara State, a federal teaching hospital providing outpatient, inpatient, emergency, surgical and diagnostic services. The population comprised 1,481 healthcare professionals: nurses (745), doctors (475), Health Information Management staff (127), laboratory staff (71) and pharmacy staff (63).

Sample and Sampling

The sample size of 315 was obtained with the Taro Yamane (1967) formula at a 5% margin of error and allocated proportionately to the professional groups: nurses 158, doctors 101, HIM staff 27, laboratory 15 and pharmacy 14. Respondents within each group were drawn from professionals on duty and willing to participate during data collection. Professionals who were unavailable or declined were excluded.

Instrument and Measures

A structured self-administered questionnaire was used. It captured demographic characteristics, years of EHR experience and whether the respondent used EHR daily. Items relevant to healthcare outcomes and information quality were rated on a four-point Likert scale (Strongly Agree = 4 to Strongly Disagree = 1), with 2.50 as the criterion mean. For the hypothesis test, respondents were classified by daily EHR use (yes/no) and by whether they perceived positive healthcare outcomes from EHR use (positive/poor or limited). Positive outcomes were understood as faster service, better access to patient information, improved documentation and better continuity of care.

The instrument was reviewed for content validity by experts in health information management and medical statistics and pretested in a comparable hospital. Cronbach's alpha was 0.76, indicating acceptable reliability (Nunnally, 1978).

Data Collection and Analysis

Questionnaires were administered and retrieved over one week. Of 315 distributed, 286 were valid (90.8%). Data were analysed with SPSS version 25 using frequencies, percentages, means and standard deviations. The chi-square test of independence was used to test H_{02} at $\alpha = 0.05$. Effect size was expressed as the odds ratio with 95% confidence interval and the phi coefficient (Cohen, 1988).

RESULTS

Respondents' Profile and Pattern of EHR Usage

Table 1: Professional Profile and EHR Usage of Respondents (N = 286)

Variable	Category	Frequency	Percentage (%)
Professional group	Nursing	144	50.3
	Doctors	92	32.2
	Health Information Management	24	8.4
	Laboratory	14	4.9
	Pharmacy	12	4.2
Years in healthcare	Less than 1	15	5.2
	1–5	78	27.3
	6–10	89	31.1

Continuation of Table 1

	11–15	63	22.0
	16 and above	41	14.3
Experience with EHR	None	15	5.2
	Less than 1 year	32	11.2
	1–2 years	72	25.2
	3–5 years	94	32.9
	More than 5 years	73	25.5
Daily EHR use	Yes	226	79.0
	No	60	21.0

Nurses (50.3%) and doctors (32.2%) made up the majority of respondents, reflecting the hospital's workforce. Most respondents had more than five years in healthcare (67.4%). EHR experience was substantial: 58.4% had used EHR for three years or more, while 16.4% had less than one year or no experience. Daily use was high, at 79.0%, but one in five professionals (21.0%) did not use EHR as part of their daily work.

Information-related Benefits and Weaknesses of EHR

Table 2: Professionals' Ratings of EHR Information Access and Quality (N = 286)

S/N	Statement	SA n (%)	A n (%)	D n (%)	SD n (%)	Mean	SD	Decision
1	EHR have made accessing medical histories faster	132 (46.2)	116 (40.6)	29 (10.1)	9 (3.1)	3.30	0.78	Agreed
2	EHR are available for use in my department	119 (41.6)	126 (44.1)	28 (9.8)	13 (4.5)	3.23	0.80	Agreed
3	Healthcare providers have easy access to EHR systems	93 (32.5)	128 (44.8)	47 (16.4)	18 (6.3)	3.03	0.86	Agreed
4	The EHR system has a high rate of data entry errors or inaccuracies that affect clinical decision-making	68 (23.8)	105 (36.7)	82 (28.7)	31 (10.8)	2.73	0.94	Agreed

Criterion mean = 2.50. Item 4 is a negatively worded item; agreement indicates a weakness.

Table 2 shows that professionals strongly agreed that EHR provided faster access to medical histories (86.7% agreement), the information-related benefit most directly connected to clinical decision-making and continuity of care. EHR were available in departments (85.7%) and easily accessible (77.3%). However, 60.5% of respondents agreed that the system had a high rate of data entry errors or inaccuracies affecting clinical decisions, indicating a significant information quality concern.

EHR Usage and Perceived Healthcare Outcomes

Table 3: Perceived Healthcare Outcomes of EHR Use (N = 286)

Perceived healthcare outcome	Frequency	Percentage (%)
Positive (faster service, better access to information, improved documentation, better continuity of care)	240	83.9
Poor or limited	46	16.1
Total	286	100.0

Overall, 83.9% of respondents perceived positive healthcare outcomes from EHR use, while 16.1% perceived poor or limited outcomes.

Table 4: Chi-square Test of Daily EHR Use and Perceived Healthcare Outcomes

Daily EHR use	Positive outcome	Poor/limited outcome	Total	% Positive
Yes	205	21	226	90.7
No	35	25	60	58.3
Total	240	46	286	83.9

$\chi^2 = 36.82$, df = 1, $p < 0.001$ (Yates-corrected $\chi^2 = 34.46$, $p < 0.001$); OR = 6.97 (95% CI 3.53–13.79); $\varphi = 0.36$. Decision: H_{02} rejected.

Nine in ten daily users (90.7%) reported positive outcomes, compared with 58.3% of non-daily users. The relationship was statistically significant ($\chi^2 = 36.82$, df = 1, $p < 0.001$) and remained so with continuity correction. Daily users had about seven times the odds of reporting positive outcomes (OR = 6.97; 95% CI 3.53–13.79). The phi coefficient of 0.36 indicates a medium association. H_{02} was rejected.

DISCUSSION

Pattern of EHR Usage

EHR usage at UITH is well established: four in five professionals use the system daily, and most have several years of experience with it. This level of routine use is higher than reported in many earlier sub-Saharan African implementations, where EHR often remained pilot projects with limited uptake (Akanbi et al., 2012; Ohuabunwa et al., 2016). It suggests that the hospital has passed the initial adoption phase and that EHR are becoming part of everyday clinical work.

Nonetheless, one-fifth of professionals do not use EHR daily. This group matters because, as the hypothesis test shows, it is the group least likely to experience positive outcomes. Non-daily use may reflect working in departments not yet fully connected, preference for paper, limited skills, or the role of some staff in tasks that do not require the record. Adeleke et al. (2015) reported significant ICT skill gaps among Nigerian health information professionals, and similar gaps among other professionals may explain irregular use.

Information Benefits and Data Quality

The highest-rated benefit was faster access to medical histories. This is the foundation for most outcome gains described in the literature: clinicians who can see previous diagnoses, medications, allergies and results can make better-informed decisions, avoid duplicate tests and maintain continuity across visits (Menachemi & Collum, 2011; Buntin et al., 2011). The finding is consistent with Chaudhry et al. (2006) and Campanella et al. (2016), who linked EHR to better guideline adherence and fewer medication errors through improved information availability.

At the same time, three in five respondents reported a high rate of data entry errors affecting clinical decisions. This is a significant warning. Under the DeLone and McLean (2003) model, information quality is a direct determinant of net benefits; inaccurate records can mislead clinicians as easily as missing records. Ash et al. (2004) and Bowman (2013) showed that EHR can introduce errors through hurried entry, copy-and-paste, wrong-patient selection and incomplete fields. The coexistence of strong perceived benefits and acknowledged data errors suggests that UITH has gained the advantages of access but has not yet secured the accuracy needed for the full safety benefits of EHR.

EHR Usage and Healthcare Outcomes

The strong association between daily use and positive outcomes supports the central proposition of the DeLone and McLean model that benefits flow through use. Professionals who use the system routinely are likely to be more proficient, more confident in the information it holds, and more likely to use features such as result review and medication history that support safer, more continuous care. This agrees with Rotenstein et al. (2022), who found that greater engagement with the EHR was associated with modestly better quality metrics, and with Lin et al. (2018), who found that outcome benefits emerge as systems become embedded in routine practice.

The size of the association is notable. Daily users had about seven times the odds of reporting positive outcomes, and the gap of more than 30 percentage points between daily and non-daily users is practically meaningful. It suggests that increasing routine use may be one of the most effective ways to spread the benefits of EHR across the hospital. However, the cross-sectional design means the relationship may operate in both directions: professionals who already see benefits may be more willing to use the system every day.

Interpreting Perceived Outcomes

The outcomes in this study were perceived by professionals rather than measured clinically. Professionals' perceptions are nevertheless informative. Nurses, doctors, pharmacists and laboratory staff are the people who experience daily whether information is available when needed, whether documentation is legible and complete, and whether patients' care is coordinated across visits. Their judgements therefore reflect the process dimension of quality in Donabedian's (1988) model, which is the pathway through which structural resources such as EHR influence clinical outcomes. Positive perceptions of faster service, better information access, improved documentation and continuity of care indicate that the process conditions for better outcomes are in place.

Perceived outcomes may differ from objective outcomes in two ways. Professionals who use the system daily may overestimate its benefits because they have invested effort in learning it, while non-daily users may underestimate benefits they have not experienced. Conversely, some benefits, such as prevented medication errors, are invisible to professionals because errors that do not happen are not noticed. Objective indicators drawn from EHR data, such as documented allergy checks, duplicate test rates and completeness of discharge summaries, would complement professionals' perceptions and allow the hospital to track outcomes over time.

Professional Roles and EHR Benefits

The benefits of EHR are likely to vary across professional groups. Nurses, who form half of the sample, document vital signs, medication administration and care plans and need rapid access to orders and histories. Doctors rely on complete histories and results for diagnosis and prescribing. Pharmacists need accurate medication lists and allergy information to detect prescribing errors. Laboratory staff depend on legible, complete requests and on rapid delivery of results to clinicians. Health Information Management staff are responsible for the integrity, completeness and coding of records. Because each group interacts with a different part of the record, data quality problems introduced by one group can affect the outcomes of another. This interdependence reinforces the need for hospital-wide standards and shared responsibility for data quality.

CONCLUSION

EHR are used daily by most healthcare professionals at UITH, and routine use is strongly associated with perceived improvements in healthcare outcomes, including faster access to patient information, better documentation and continuity of care. The most valued benefit is rapid access to medical histories. However, data entry errors that affect clinical decisions remain a significant concern, and one in five professionals does not yet use the system daily.

RECOMMENDATIONS

The study recommends that:

1. UITH should work towards universal daily EHR use by extending the system to all departments and providing targeted support to non-daily users.
2. A data quality assurance programme should be established, including standard data entry procedures, mandatory fields, periodic audits of records and feedback to staff.
3. Clinical decision support features, such as allergy and drug-interaction alerts, should be activated and used where available.
4. The hospital should define and monitor objective EHR-based outcome indicators, such as medication errors, duplicate tests and documentation completeness.

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