Original

Staff-related Predictors of Knowledge and Practice of Clinical Audit among Doctors in a Tertiary Health Facility in a Developing Country: A Cross-Sectional Study

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Abstract

Background: Clinical auditing lowers mortality and morbidity and enhances the quality of patient care. This study identified staff-related determinants of the knowledge and practice of clinical audit (CA) among physicians in a Nigerian tertiary facility.

Method: Convenience sampling of 460 doctors was employed in this descriptive cross-sectional study using pre-tested questionnaires. Frequency distributions, binary and multivariate logistic regression were conducted using SPSS 23.0. A P-value ≤0.05 was considered significant for the inferential statistics.

Results: A response rate of 99.3% was obtained from the analysis of 457 questionnaires. Out of these, only 57 (12.5%) clearly understood the CA process. Those who are consultants (AOR 44.2, 95%CI:4.6, 425.5; p = 0.001), senior registrars (AOR 14.8, 95%CI:1.7, 126.0; p = 0.014), and registrars (AOR 10.2, 95%CI:1.3, 79.0; p = 0.027) were significantly more knowledgeable in CA compared to Interns. Mortality reviews were commoner in Surgery (p=0.021), Obstetrics/gynaecology (p=0.027) and Paediatrics (p<0.001) than in other specialties. Consultants were more involved in mortality audits (p=0.05) compared to other cadres. Survey of patient experiences, process audits and cost of care analyses were more common among physicians with 10-19 years in practice.

Conclusion: Significant gaps exist the knowledge and practice of CA among doctors in this tertiary hospital. Addressing these deficiencies requires targeted efforts in education, policy interventions, and institutional reforms to strengthen clinical governance and improve quality of care.

Keywords: Predictors, knowledge, practice, clinical audit, doctors, University of Port Harcourt Teaching Hospital.

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Introduction

A clinical audit (CA) is a thorough examination of healthcare quality, diagnostic and treatment processes, resource usage, patient care outcomes, and quality of life.[1] This process involves identifying the need for an audit, setting criteria, gathering data on measures of healthcare quality, comparing the performance to the standard, and making recommendations.[2] Although it was initially used to assess medical practice against local standards, CA has evolved as a means to introduce evidence-based guidelines into routine medical practice.[3] Doctors must take time to learn and be willing to be part of CA processes to enrich their practice.[4]

Clinical auditing ensures accountability, demonstrates efforts to provide high-quality care, enhances patient satisfaction, and reduces medical litigation.[5] According to a cross-sectional online survey conducted among surgeons in Queensland, Australia, the audit process has positively impacted their clinical practice by improving patient care when audit recommendations are implemented. This is because the audit process has encouraged greater caution, better reflective practices, and a higher degree of confidence in best practices.[6]

Therefore, healthcare providers must learn to participate in routine and systematic CA to evaluate and enhance their practice.[4] The state of healthcare and socio-economic conditions in sub-Saharan African nations emphasizes the need for quality and effective healthcare. Thus, a growing emphasis on promoting and scaling up CA activities in the Nigerian healthcare system.[7] Despite its importance, CA has not fully integrated into clinical governance, especially in developing countries like Nigeria, where many clinical activities lack systematic and critical quality analysis.[8] For CA to be effective in healthcare delivery, there must be a clear understanding of what it entails. Without proper understanding and planning, it may produce little benefit and discourage involvement in future quality improvement initiatives.[9] Indeed, if the importance of CA in enhancing healthcare is not recognized and intentionally implemented by healthcare practitioners, there may be "clogs in the wheel" hindering health care improvement.[10, 11]

A good understanding of factors that impact CA usage among doctors may facilitate the identification of ways to enhance its use, successfully advance healthcare, and modify provider behaviour. The purpose of this study was to assess the staff-related predictors of the practice of CA among doctors at the University of Port Harcourt Teaching Hospital (UPTH) in Rivers State.

Method

Design of the Study

This was a cross-sectional descriptive study.

Study area

The study was conducted at the University of Port Harcourt Teaching Hospital (UPTH) in Obio-Akpor Local Government Area (LGA) of Rivers State, Nigeria. UPTH is a postgraduate and undergraduate medical teaching facility and tertiary hospital, serving patients within Rivers State and its environs.

UPTH is an 800-bed multi-specialist hospital with various clinical specializations providing in-patient care, ambulatory care and emergency care. Its clinical departments include Paediatrics, Internal Medicine, pathology, Surgery, Dentistry, and Obstetrics and Gynaecology. Other specialties include Neuropsychiatry, Ophthalmology, Family Medicine, Ear, Nose and Throat (ENT), Radiology and Anaesthesia.[12]

Study Population

The University of Port Harcourt Teaching Hospital had about 695 doctors in its employ as at 2020 comprising 200 consultants, 460 residents and house officers across the different specialties with their ages ranging between 25 – 70 years.

Study Procedure

Advocacy visits were made to the Chief Residents and Heads of departments before the study to inform them, obtain consent, and notify the clinical staff in the departments. On-line and direct administration of questionnaires was deployed.

The Questionnaires were administered on days that coincided with departmental activities e.g., clinics, seminar presentations, mortality meetings, etc in different departments. A self-administered questionnaire was provided to each physician who consented to take part in the study and it was later retrieved. The administration of the questionnaire took place between 30th April and 30th May 2021.

Inclusion criteria

Doctors employed in clinical departments in UPTH.

Exclusion criteria

Doctors who declined participation or were unable to participate in the study. Questionnaires with up to 30% of unanswered questions.

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Sampling method
This study employed convenience sampling method. A list of doctors in each of the specialties in the various working cadres—consultants, senior registrars, registrars, and house officers was retrieved.

Data source/study Instrument
The respondents' age, gender, department, years of practice and cadre, and other sociodemographic data were gathered using a self-administered semi-structured questionnaire.

Study variables
Forms of CA reviewed were mortality reviews, patient satisfaction surveys, adverse event monitoring, treatment outcomes, cost of care and reflective practice/self-assessment audits.

Validity/ reliability of study instrument
The study instrument was initially pretested among 30 doctors at the Rivers State University Teaching Hospital (a tertiary center in Port Harcourt LGA, Rivers State) to ascertain the feasibility/appropriateness of the methodology and improve on likely areas of limitations. Required changes were made following the pretest and the internal consistency reliability measure using Cronbach's alpha coefficient was 0.853.

Sample size
With only very few local studies on the subject, a proportion of 50% of doctors with adequate knowledge of CA was assumed. The minimum sample size of 384 participants in this study was calculated using the formular $n = (Z \propto \text{^}2\, pq)/e\text{^}2$ where: $Z_{\propto}$ = (standard normal deviation corresponding to the selected level of 0.025 in each tail=1.96); n = sample size, p = proportion of physicians with adequate knowledge of CA = 50% (0.5); q= 1 – p = 1 – 0.5= 0.5, e = precision of 5% at 95% degree of confidence.[13] A 20% upward adjustment for the calculated sample size was carried out to provide for non-response or inappropriately entered data bringing the total sample size to 460 respondents.

Data analysis
Data analysis was performed using the Statistical Package for Social Sciences (SPSS) version 23.0 software. Gender, age, job title, and years of experience were expressed as frequencies and proportions in tables. Staff-related predictors of the practice of CA were derived from these. The knowledge and practice of the respondents were compared with sociodemographic (age category and sex) and work-related (cadre and practice years) characteristics using the chi-squared bivariate analytical test. A p-value ≤0.05 was defined as statistically significant. Where applicable, statistically significant variables were incorporated into simple or multiple linear regression models, to control for confounders and to identify predictors.

Results
A total of 457 questionnaires were analyzed yielding a response rate of 99.3%. From Table 1, the male to female ratio of physicians in this study was 1:1. Majority were below 40 years of age (314, 68.7%) and had practiced for between 1 and 9 years (227, 49.7%). Registrars made up the largest group of respondents (149, 32.6%) and highest rate of responses were from the departments of Medicine (30.6%) and Surgery (31.1%).

Table I: Socio-demographic characteristics of respondents

Variable	Category	Frequency (%)
Sex	Male	230 (50.3)
	Female	227 (49.7
Age	<40 years	314 (68.7)
	40-60 years	134 (29.3)
	>60 years	9 (2.0)
Department	Medicine	140 (30.6)
	Surgery	142 (31.1)
	Obs. & Gyne	46 (10.1)
	Paediatrics	71 (15.5)
	Lab. Medicine	58 (12.7)
Years in practice	1-9 years	227 (49.7)
	10-19 years	180 (39.4)
	>19 years	50 (10.9)
Cadre	Interns	77 (16.8)
	Registrars	149 (32.6)
	S. Registrar	129 (28.2)
	Consultant	102 (22.3)

Obs. & Gyne- Obstetrics and Gynaecology. S. Registrar- Senior Registrar.

Figure 1 presents data on the knowledge of the CA process among doctors. Of the 457 physicians, only 57, (12.5%) of them were able to correctly identify the sequence of activities in the CA cycle.

From Table 3, multivariate logistic regression fitted to ascertain the predictors of correct knowledge of CA showed that being a consultant, senior registrar, or registrar were significant predictors of correct CA knowledge at P = 0.001, 0.014, and 0.027 respectively. Consultants, senior registrars, and registrars were 44.21

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times, 14.82 times, and 10.15 times more likely to have correct knowledge than interns.

Table 4 presents data on predictors of non-practice of CA. Multivariate logistic regression showed that being male (P = 0.01, AOR = 0.45) or a consultant (P = 0.05, AOR = 0.17) were predictors of non-practice of mortality review audit. Doctors who have been in practice for 10 to 19 years were 13.46 times less likely to practice cost of care audit (P = 0.010).

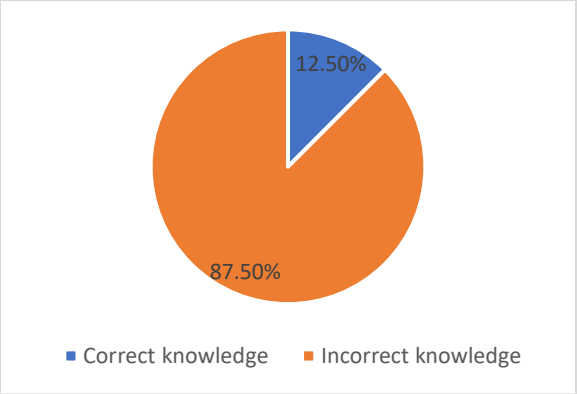

Figure 1: Knowledge of CA process

Discussion

The importance of the CA process to the healthcare industry, particularly considering its relevance in raising the standard of care cannot be overemphasized. To perform CA effectively, the necessary knowledge and attitude must be possessed. Doctors and other medical professionals need to be aware of what CA entails and how it may be implemented for efficient healthcare delivery. This study assessed the knowledge and practice of clinical audit (CA) among doctors in a tertiary healthcare facility in Nigeria, identifying staff-related predictors that influence these aspects. The findings indicate a concerning gap in the understanding and application of CA, despite its critical role in improving healthcare quality.

The findings of this study revealed a varied level of knowledge of clinical audits (CA) among healthcare professionals, reflecting trends observed in similar settings. While many respondents demonstrated a basic understanding of CA, only 57 respondents (12.5%) correctly identified the steps of the CA cycle, which was the objective means of assessing respondents' level of knowledge. There were significant gaps in comprehensive knowledge, particularly concerning the purpose, methodology, and impact of audits on healthcare quality. This is similar to a study in India that showed that while many healthcare professionals, including doctors, recognize the importance of CA for quality improvement, they have limited knowledge and lack the training or resources to participate effectively in audit processes.[14] For these reasons, Gupta et al.[15] emphasize the need for formal training and integration of CA into medical education curricula to bridge these gaps. Additionally, Fadare et al.[16] highlighted that despite recognizing the importance of CA for improving patient care, healthcare professionals in Nigeria displayed limited awareness of its systematic process. These findings suggest a persistent global gap in CA knowledge among healthcare workers, particularly in low- and middle-income countries (LMICs), where systemic challenges often hinder professional development opportunities.

A multivariate logistic regression analysis of predictors of knowledge about CA revealed that a significant predictor of correct CA knowledge was cadre, with consultants, senior registrars, and registrars having higher odds of understanding CA compared to interns. This finding is consistent with studies that explored the relationship between professional hierarchy and knowledge acquisition in clinical settings. A European audit review in 2021 found that the frequency and quality of clinical audits were strongly influenced by the cadre of healthcare professionals with senior roles not only leading more audits but also facilitating their integration into routine care.[17] Similarly, an Australian study emphasized that senior cadres, especially consultants, were pivotal in driving audit participation and ensuring adherence to quality standards while interns and junior doctors showed limited engagement.[18] Fadare et al[16] also found that senior healthcare professionals in Nigeria were more familiar with quality improvement tools, including clinical audits, due to their greater exposure to training opportunities and leadership responsibilities. In addition, Gupta et al,[15] demonstrated that institutional support for continuing professional development (CPD) is more readily available to senior cadres, enhancing their capacity to stay updated on best practices like CA. This suggests that professional experience and training impact knowledge acquisition and retention in clinical practice, with senior doctors benefiting from more exposure to clinical processes and quality improvement frameworks.

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Table 3: Predictors of correct knowledge of clinical audit

VARIABLE	CATEGORY	B	OR (95% CI)	AOR (95% CI)	P-Value
Gender	Male	0.333	1.46 (0.83 - 2.56)	1.40 (0.74 - 2.64)	0.305
	Female	1	1	1	1
Age	< 40	1.419	1.18 (0.14 - 9.79)	4.14 (0.38 - 44.64)	0.242
	40 - 60	1.462	1.18 (0.06 - 4.34)	4.31 (0.47 - 39.73)	0.197
	> 60	1	1	1	1
Department	Medicine	-0.229	1.59 (0.70 - 3.61)	0.80 (0.33 - 1.90)	0.606
	Surgery	-0.337	1.61 (0.71 - 3.67)	0.71 (0.30 - 1.69)	0.441
	Obs. & Gyn.	-1.004	3.36 (0.88 - 12.84)	0.37 (0.09 - 1.48)	0.158
	Pediatrics	-0.727	2.14 (0.77 - 5.93)	0.48 (0.16 - 1.45)	0.195
	Lab. Medicine	1	1	1	1
Years in practice	19	0.326	2.94 (1.34 - 6.45)	1.39 (0.38 - 5.02)	0.622
	1019	-0.406	2.16 (0.99 - 4.72)	0.67 (0.26 - 1.71)	0.399
	≥ 20	1	1	1	1
Cadre	Consultant	3.789	0.04 (0.01 - 0.31)	44.21 (4.60 - 425.53)	0.001*
	S. Registrar	2.696	0.11 (0.01 - 0.84)	14.82 (1.74 - 126.04)	0.014*
	Registrar	2.317	0.10 (0.01 - 0.78)	10.15 (1.30 - 78.96)	0.027*
	Intern	1	1	1	1

* Significant at 95% confidence interval; OR = odds ratio; AOR = adjusted odd ratio; CI = confidence interval.

Table 4: Predictors of non-practice of clinical audit

Variable	Category	Forms of Clinical Audit						
		Mortality Rev AOR (p-value)	Pt Exp AOR (p-value)	Process Audit AOR (p-value)	Adv. Evt. M AOR (p-value)	Treat. Out. AOR (p-value)	Cost of Care AOR (p-value)	Ref. Prac AOR (p-value)
Sex	Male	0.45 (0.01)	1.35 (0.497)	0.84 (0.737)	1.95 (0.385)	0.54 (0.208)	0.73 (0.638)	1.30 (0.637)
	Female®	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Age	<40years	3.25 (0.213)	0.00 (0.99)	0.85 (0.916)	5.01 (0.339)	0.52 (0.630)	2.80 (0.510)	0.88 (0.930)
	40-60years	5.25 (0.053)	0.00 (0.99)	0.74 (0.800)	2.19 (0.546)	0.64 (0.703)	1.52 (0.739)	2.24 (0.529)
	>60years®	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Dept	Medicine	0.44 (0.183)	0.48 (0.375)	0.65 (0.605)	0.79 (0.852)	0.98 (0.982)	0.22 (0.201)	0.153 (0.085)
	Surgery	0.25 (0.021)	0.71 (0.693)	0.73 (0.713)	1.13 (0.923)	0.91 (0.888)	0.87 (0.912)	0.96 (0.972)
	Obs. & Gyne.	0.22 (0.027)	0.25 (0.116)	0.52 (0.506)	0.35 (0.438)	0.50 (0.398)	0.64 (0.767)	0.15 (0.110)
	Pediatrics	0.10 (0.000)	0.73 (0.732)	0.00 (0.997)	1.86 (0.680)	1.16 (0.868)	0.50 (0.601)	1.51 (0.780)
	Lab. Medicine®	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Years in Practice	1-9	0.70 (0.570)	2.67 (0.295)	3.88 (0.245)	0.00 (0.994)	2.22 (0.403)	5.95 (0.159)	10.99 (0.045)
	10-19	1.24 (0.657)	5.53 (0.019)	5.16 (0.049)	2.53 (0.312)	1.99 (0.300)	13.64 (0.010)	3.53 (0.138)
	≥20®	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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Variable	Category	Forms of Clinical Audit						
		Mortality Rev AOR (p-value)	Pt Exp AOR (p-value)	Process Audit AOR (p-value)	Adv. Evt. M AOR (p-value)	Treat. Out. AOR (p-value)	Cost of Care AOR (p-value)	Ref. Prac AOR (p-value)
Cadre	Consultant	0.17 (0.05)	0.62 (0.642)	0.97 (0.977)	0.00 (0.997)	0.13 (0.123)	0.00 (0.997)	0.00 (0.997)
	S. Registrar	0.45 (0.119)	0.72 (0.705)	1.10 (0.928)	0.00 (0.997)	0.28 (0.301)	0.00 (0.997)	0.00 (0.997)
	Registrars	1.18 (0.714)	0.44 (0.242)	1.05 (0.954)	19.36 (0.999)	0.30 (0.284)	0.00 (0.997)	0.00 (0.997)
	Interns®	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Mortality Rev – mortality review; Pt Exp. – patient experience/satisfaction survey; Adv. Evt. M – adverse event monitoring; Treat. out–treatment outcome; Cost of C–cost of care; Ref. Prac – reflective practice/self-assessment, Obs – obstetrics; Gynea – Gynaecology; ® - reference/baseline category

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Regarding the practice of CA, our study revealed that doctors with 10-19 years of practice were more likely to engage in CA activities, reflecting the influence of institutional culture and experience. However, this trend did not extend to doctors with over 20 years of practice, suggesting that sustained CA practice requires continuous intentional professional engagement, regardless of years of practice. Regional studies reflect variability in clinical audit uptake and effectiveness based on cultural and systemic healthcare differences, with audits being shown to be more successful in settings where continuous professional development and quality improvement culture are strong.[8,19]

The study also identified that Consultants and doctors in specific specialties (surgery, obstetrics and gynaecology, and paediatrics) were more likely to engage in mortality reviews. This is consistent with global trends where mortality reviews are often mandated in high-risk specialties where morbidity and mortality assessments are integral to improving patient care.[20 ,21] In contrast, participation in other forms of CA, such as patient experience surveys and cost of care audits, was low across all cadres and specialties. This is not surprising, as these types of audits are underutilized despite their importance in improving healthcare systems.[22] Unlike mortality reviews, patient experience surveys and cost of care audits fall outside the traditional scope of clinical duties, and require a broader understanding of healthcare delivery systems, making it more challenging to engage with them.[23] Additionally, many clinicians reported feeling inadequately trained to assess financial metrics, which further hinders their participation in cost of care auditing.[24] A study in Sub-Saharan Africa found that cost audits were virtually nonexistent in many health facilities due to fragmented health systems and inadequate data infrastructure.[25]

Regarding gender differences, our study found that male doctors were more likely to participate in mortality audits, while female doctors were more actively engaged in patient experience surveys. This aligns with broader trends in healthcare, where male clinicians are more often involved in audits focused on surgical outcomes and mortality.[26] A study in the UK also found that male clinicians were more likely to participate in mortality audits, attributing this to their overrepresentation in leadership and decision-making roles within certain specialties.[27] It is possible that female clinicians, who often adopt more empathetic communication styles, may find that patient surveys align more closely with their approach to patient care, as supported by a study which showed that female doctors tend to score higher in patient-centred communication and are more likely to initiate or participate in feedback mechanisms like patient experience surveys.[28] In contrast, an Australian study reported no significant gender differences in clinical audit participation, suggesting that organizational culture and equal representation in leadership could mitigate these disparities.[29] These findings highlight the intersection of gendered approaches to healthcare practices which should improve patient outcomes in healthcare quality improvement.

In conclusion, this study provides valuable insights into the current knowledge and practices surrounding clinical audits (CA) among doctors in a tertiary hospital. While knowledge about the CA process was generally low among doctors, its knowledge was higher among higher professional cadres, especially consultants and senior registrars. Participation in various forms of CA was influenced by cadre, gender, and specialty, with significant differences in the uptake of mortality audits, patient experience surveys, and cost audits. Addressing these disparities requires a concerted effort to integrate CA into medical education and continuous professional development programs, as well as fostering an organizational culture that supports equitable participation across all cadres.

Implications of the findings of this study

The significance of CA in assessing and improving the standard of patient care cannot be downplayed. It is implied by the study's findings that physicians in tertiary facilities have an inadequate understanding of the CA process and the role that it plays in the improvement in the quality of patient care. This knowledge deficits may contribute to underutilization or ineffective implementation of CA processes in improving the structure, processes and outcomes in care delivery. Without adequate understanding, audits risk being perceived as mere administrative tasks rather than tools for transformative changes and innovations in healthcare quality. The observed low engagement in CA highlights systemic and institutional barriers which may include inadequate training, limited resources, and lack of structured CA frameworks in the healthcare system. There is therefore a pressing need to advance the systematic application of CA and increase its comprehension especially at the level of the teaching hospitals.

Strengths and Limitations of the Study

It is important to consider some limitations while evaluating the empirical results presented in this study. The study's adoption of a convenience sampling approach may contribute to some bias in the findings, as may not be fully representative of the population. Also, administration of the questionnaires was through direct and electronic approaches. Answers to questions in the

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electronic versions that were distributed to physicians who were not physically accessible might be different from those that were administrated directly by the research team. In addition, responses received from respondents in only one institution may not be generalisable to the entire medical community.

Conclusion

This study underscores the critical need for systematic CA processes to improve healthcare delivery in resource-limited settings. The low level of practice and knowledge of CA among doctors in this tertiary healthcare facility portends negative consequences for providing high-quality care and establishing ongoing quality improvement. Efforts to enhance understanding and practice of CA, especially through education and structural integration, are essential for achieving sustainable health system improvements. Embedding CA into hospital governance frameworks and incentivizing participation may foster a culture of accountability and continuous quality improvement.

Declarations

Ethical Consideration: Ethical permission was obtained from the Research and Ethics Committee of UNIPORT (UPH/CEREMAD/REC/MM74/103). All doctors who partook in the study signed a written informed consent form. Throughout the study, anonymity and confidentiality were maintained.

Authors' Contribution: Ezioma Alinnor: Conceptualization and design of the study, collection and analysis of data, interpretation of analysis results, drafting of manuscript, revision of manuscript and final approval.
Daprim Ogaji: Conceptualization and design of the study, collection and analysis of data, interpretation of analysis results, drafting of manuscript, revision of manuscript and final approval.
The manuscript has been read and approved by both authors. Requirements for authorship have been met

Conflict of interest: The authors declare no competing interest.

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