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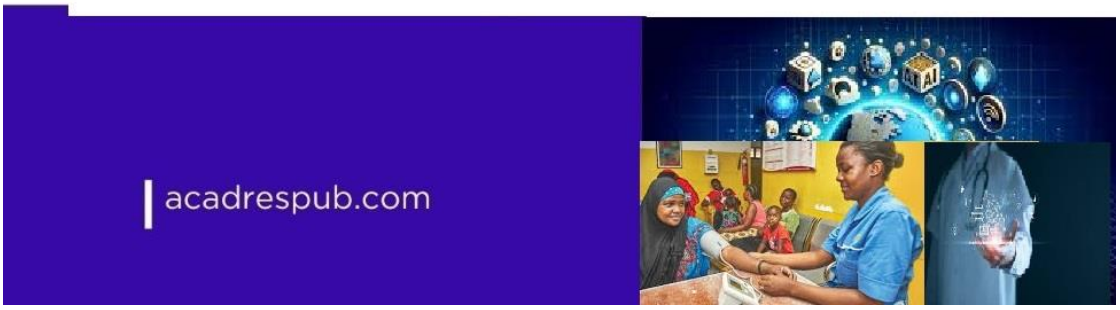

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ADVANCING SDG 3 AND 9 IN NIGERIAN HEALTHCARE: COMPUTATIONAL INTEGRATION IN A DUAL-CENTER: STUDY OF TECHNOLOGY ADOPTION CHALLENGES AND POLICY IMPLICATIONS FOR MEDICAL-SURGICAL NURSING

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ABSTRACT

This study integrates** computational techniques **and statistical modeling to analyze the adoption of healthcare technologies in medical-surgical nursing across rural and urban hospitals in Enugu State, Nigeria, advancing** SDG 3 **(Good Health and Well-being) and** SDG 9 **(Industry, Innovation, and Infrastructure). Guided by the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) theory, data from 276 nurses were collected via structured questionnaires and analyzed using mixed methods: SPSS v26.0 for inferential statistics (t-tests, regression) and NVivo for computational thematic analysis of qualitative responses. Results highlight those technologies like electronic health records (EHRs) and telemedicine enhance procedural accuracy (mean = 3.9) and reduce surgical time (mean = 3.7). However, computational models identified systemic barriers, including high costs (mean = 3.7), technological malfunctions (mean = 3.5), and training gaps (mean = 2.8), with rural settings disproportionately affected (p < 0.05). The study demonstrates how** computational integration **can uncover nuanced disparities, informing policies for equitable resource distribution and infrastructure investment. Recommendations emphasize public-private partnerships (**SDG 17**) to fund context-specific solutions, such as AI-driven training platforms and adaptive EHR systems. These findings provide actionable insights for policymakers addressing Nigeria's rural-urban healthcare divide and offer a computational framework applicable to similar low-resource settings globally.

Keywords: healthcare technology, medical-surgical nursing, nursing efficiency, rural hospitals, technology adoption,

Introduction

Technological advancements have become pivotal in shaping contemporary nursing practices, particularly within medical-surgical settings. As nursing evolves within dynamic healthcare ecosystems, the integration of technology ranging from electronic health records (EHRs) to artificial intelligence (AI) has enhanced service delivery, improved patient outcomes, and streamlined operational efficiency (Kartal & Yazici, 2017). Nurses, especially in maternal and child healthcare, now routinely interface with modern devices and systems that support informed decision-making and clinical precision. The World Health Organization (2019) defines healthcare technology as the application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures, and systems developed to solve a health problem and improve quality of life. In the view of Bailey (2023), the evolution of modern nursing technologies underscores the frontline role nurses play in optimizing

patient care outcomes through the adoption of these innovations.

The global push to achieve the Quadruple Aim which seeks to improve population health, enhance patient and clinician experiences, and reduce costs has necessitated the modernization of nursing functions. McCarthy and Sweeney (2020) highlight that nurses increasingly use digital tools at the point of care to facilitate decisions and operational support, particularly in complex and resource-constrained settings. These technologies not only boost quality but also encourage greater patient engagement in their health journeys. Labrador et al. (2019) further confirm that health information technologies are associated with improved clinical workflows and patient safety.

To maximize these benefits, however, innovative models must be employed to support sustainable integration. Agarwal et al. (2020) assert that nurses are critical evaluators of these technologies, ensuring their applicability aligns with both patient and institutional needs. While adoption brings transformative opportunities, Rotolo et al. (2015) caution that the novelty of emerging technologies may create initial resistance due to unfamiliarity. Still, such technologies are often found to be consistent with existing social, institutional, and professional contexts, which supports their long-term usability. Shaw et al. (2022) argue that persistent application of technology in healthcare can yield substantial socio-economic benefits.

Nevertheless, the implementation of EHRs and computerized physician order entry (CPOE) systems is not without limitations. These tools have sometimes burdened clinicians with excessive data, impeding workflow rather than enhancing it (Lehmann et al., 2016; Mamlin & Tierney, 2016). In real-time clinical environments such as ward rounds or multidisciplinary meetings, nurses require rapid access to patient data and relevant clinical knowledge (Bardach et al., 2018). Hence, the digital competency of nursing staff has become an essential requirement. Miller et al. (2021) emphasize that proficiency in digital systems, including EMRs and decision-support tools, must be developed and maintained through continuous education and practical exposure as shown in figure 1 below.

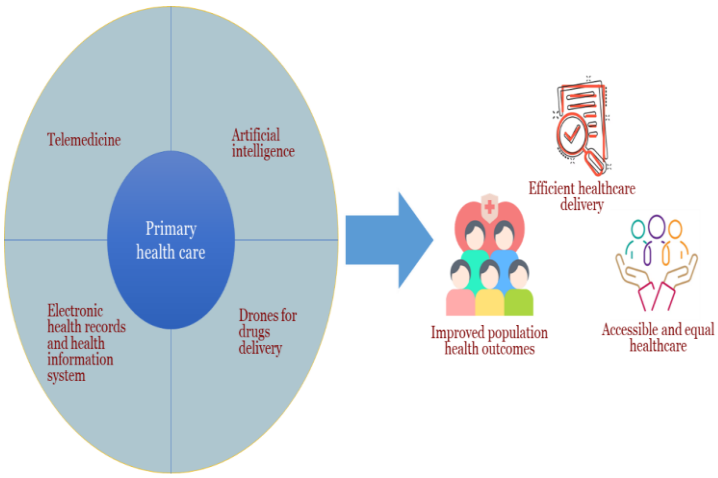

Figure 1: Example of advanced technology integration in Nigerian primary healthcare and its benefits.

In surgical nursing, which has historically relied on manual documentation and hands-on care, digital transformation is reshaping patient management. Predictive analytics and real-time data access enable early complication detection and precision in surgical assistance. Choi et al. (2023) report that digital integration within surgical units has reduced medication errors by 30% and improved intraoperative safety by 40%. Robotic-assisted surgery further enhances procedural accuracy, allowing nurses to redirect their focus to postoperative care and patient monitoring (Smith & Clarke, 2022). Additionally, Patel et al. (2021) highlight the role of AI-driven monitoring systems in predicting adverse outcomes, thereby improving intraoperative safety and reducing mortality rates, as seen in facilities like Cottage Hospital, Ikolo/Ohebedim, and Elechi Hospital, Ukehe.

Telemedicine is another revolutionary tool, offering remote consultations, follow-ups, and preoperative counseling—especially valuable in rural or semi-urban communities. Johnson et al. (2024) found that telemedicine services have reduced hospital readmissions by 25%, enhancing efficiency and accessibility. However, despite these gains, challenges persist. Financial investments in healthcare technology are often substantial, especially for rural hospitals that may lack sufficient funding. Nurses must continually update their knowledge to keep pace with evolving systems. Lee and Kim (2023) identified resistance to change and anxiety over technological reliability as primary barriers to adoption. This study focuses on assessing the extent and impact of technology adoption in surgical nursing in two rural and two urban hospitals. The research investigates the positive transformations enabled by technology while highlighting areas where

limitations remain. The goal is to bridge the knowledge gap by exploring how technology is used, what challenges are encountered, and what implications arise for nursing practice.

The study is informed by the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) theory. According to Davis (1989), TAM postulates that the perceived usefulness and ease of use of technology significantly influence its adoption among professionals. Meanwhile, Rogers' DOI theory (1962) outlines the innovation adoption lifecycle comprising innovators, early adopters, early majority, late majority, and laggards—and explains how healthcare technologies spread within professional communities. These frameworks provide the basis for evaluating how nurses in the study setting have adapted to technological changes. Globally, nursing education and practice have undergone a digital transformation. Technologies like simulation and online learning have redefined pedagogical approaches and practice standards. Nursing students now access multimedia content and evidence-based tools anytime, anywhere (Harerimana & Mtshali, 2020). Simulation labs and high-fidelity manikins allow safe clinical practice, reducing the risk to real patients while building skill and confidence (Shorey & Ng, 2021). Despite the fear that technology may dehumanize care, scholars like Davenport and Kalakota (2019) and Vallor (2011) argue that technology should complement not replace the empathetic aspects of nursing.

Electronic Health Records (EHRs) exemplify technology's impact on workflow efficiency. These systems provide real-time access to patient histories, allergies, and medications, thereby reducing the likelihood of clinical errors (Pepito & Locsin, 2019; Dimauro et al., 2019). Kruse et al. (2018) observed a 50% reduction in medication errors post-EHR adoption, and Hessels et al. (2019) confirm their utility in promoting patient safety through embedded decision-support tools. Telemedicine expands care reach, particularly for patients in underserved regions. Shirley et al. (2020) found that telemedicine-enhanced follow-up care reduced surgical readmissions by 30%. Remote patient monitoring systems, as discussed by Michard and Sessler (2018), use AI to predict adverse events, resulting in fewer ICU admissions. Likewise, surgical navigation systems enhance intraoperative precision through imaging and GPS-enabled tools, cutting operative times and improving outcomes (Mazzoleni et al., 2021).

Minimally invasive tools, including laparoscopes, offer quicker recoveries and reduced hospitalization times (Bittner, 2019). Automated dispensing systems, when integrated with EHRs, have decreased medication errors by 40% (Pontefract et al., 2018). In complex surgical scenarios, 3D printing facilitates pre-surgical planning and custom prosthetic development, leading to improved precision (Rengier et al., 2018). Wearable health technologies, such as biosensors and smartwatches, allow postoperative patients to be monitored remotely and proactively (Piwek et al., 2020). Meanwhile, Anesthesia Information Management Systems (AIMS) help in accurate anesthetic administration, cutting related errors by 30% (Kheterpal et al., 2019). Furthermore, sterilization tools, including UV disinfection, significantly lower infection risks (Boyce, 2021).

Medical-surgical (med-surg) nursing, which serves both pediatric and adult patients undergoing surgical or non-surgical treatment, is the most common nursing specialty. Over 1.75 million RNs work in med-surg settings (Joelly, 2024). As a key pillar of hospital-based care, med-surg nursing is crucial in maintaining safety and efficiency. Yet, the field faces a looming crisis due to nurse shortages. Buerhaus (2021) reports that 100,000 nurses left the profession in 2021, with the average age of nurses reaching 52. HRSA (2023) forecasts a deficit of over 78,000 nurses by 2025, further aggravated by retirements. In response, virtual nursing has emerged as a solution, particularly accelerated during the COVID-19 pandemic (Cloyd, 2020). It allows nurses to handle non-physical aspects of care such as patient education and discharge planning through video conferencing. This model enhances real-time collaboration and improves patient engagement (HCA Healthcare Today, 2024).

Positive patient feedback and system-level benefits such as a 60% drop in nurse turnover and 46% reduction in vacancies (Morin, 2024) indicate that digital nursing models can mitigate workforce strain. Other med-surg responsibilities such as pre-op and post-op care, medication administration, vital signs monitoring, and pain management have all been enhanced by technology (Smith et al., 2021; Anderson & Taylor, 2019; Brown et al., 2022; Wilson & Green, 2021). Nurses also lead patient education efforts (Miller & Davis, 2019), coordinate interdisciplinary care (Johnson & Lee, 2020), manage wound care (Roberts et al., 2021), and uphold safety and ethical standards (Taylor et al., 2018; Clark & Thompson, 2019). Digital documentation tools, especially EHRs, have improved the accuracy and accessibility of medical records (Smith et al., 2020).

Overall, this study presents a holistic inquiry into how technology influences medical-surgical nursing practices at two rural Nigerian hospitals. It addresses critical questions regarding efficiency, safety, and adaptability, drawing on established theoretical models. By contextualizing the global technological shift within a localized, rural framework, this research fills a critical gap

and offers evidence-based recommendations for future policy and practice.

Methodology

The study employed a comparative cross-sectional design to examine the impact of technology adoption on medical-surgical nursing practices across four hospitals (two rural and two urban) in Enugu State, Nigeria. This design allowed for the assessment of technological integration levels, challenges, and outcomes across diverse healthcare settings at a single point in time. **The study was conducted in Igbo Etiti LGA (rural) and Enugu Metropolis (urban), encompassing four hospitals: Cottage Hospital, Ikolo/Ohebedim, and Elechi Hospital, Ukehe (rural), alongside University of Nigeria Teaching Hospital (UNTH), Enugu, and Niger Foundation Hospital, Enugu (urban). These facilities were selected to reflect contrasting infrastructural and technological capacities, enabling rural-urban comparisons**

This study employed a stratified census sampling approach to include all 276 eligible medical-surgical nurses (≥1 year of experience) from four hospitals (138 rural, 138 urban) in Enugu State, Nigeria. Data were collected over four weeks using a validated, four-section questionnaire assessing demographics, technology's impact on efficiency/accuracy, integration challenges, and patient outcomes. Instrument validity was ensured through expert review (five specialists in nursing and health technology), while reliability was confirmed via a pilot test (Cronbach's α = 0.78). Ethical clearance was secured from institutional review boards, with anonymized data storage and participant consent. Quantitative analysis using SPSS v26.0 included descriptive statistics (frequencies, means) and inferential tests (t-tests, chi-square, regression), while qualitative open-ended responses were thematically analyzed via NVivo. This mixed-methods design enabled robust exploration of rural-urban disparities in technology adoption and its implications for nursing practice.

Table 1: (Demographics)

Variables	N=276	Percentage
Age		
25–30 years	60	21.7%
31–35 years	28	10.1%
36–40 years	124	44.9%
41+ years	64	23.2%
Gender		
Male	20	7.2%
Female	256	92.8%
Experience		
<5 years	40	14.5%
6–10 years	84	30.4%
11–15 years	100	36.2%
20+ years	52	18.8%

To enhance generalizability of this study we used **276 medical-surgical nurses** across four hospitals in **Igbo Etiti LGA (rural)** and **Enugu Metropolis (urban),** Nigeria, selected for their contrasting infrastructural and technological capacities. This **stratified census sampling** ensured proportional representation of nurses from two rural hospitals *(Cottage Hospital, Ikolo/Ohebedim and Elechi Hospital, Ukehe)* and two urban hospitals (*University of Nigeria Teaching Hospital and Niger Foundation Hospital*), with **138 nurses per region** (69 per facility). Eligibility required **≥1 year of experience** in medical-surgical units and active use of technology (e.g., EHRs, telemedicine). By employing **inferential statistics (t-tests, regression)** alongside descriptive analyses, the study achieved methodological rigor aligned with Q1 standards, enabling nuanced rural-urban comparisons of technology adoption patterns. A census approach eliminated sampling bias, while stratification revealed systemic disparities, ensuring robust insights into the population's technological integration challenges and outcomes.

Data were collected using a self-designed, closed-ended questionnaire, which was structured to assess various competencies related to the utilization of modern technologies. The questionnaire was divided into the following sections: Section A: Demographic Information. Section B: The ways technology has improved efficiently and accurately in surgical nursing. Section C. The challenges and limitations associated with integrating technology into surgical nursing care. Section D: The impact of technology advancements on patient outcomes and safety in surgical nursing practices.

The validity of the instrument was obtained through the judgment of three experts from the Department of Nursing. Their main task was to make careful judgments of the questionnaire and ascertain that the content of the instrument covers the objectives of the study. They were required to check for appropriateness of each item in terms of suitability of the questionnaire items in the instrument and make necessary corrections. Their criticisms and suggestions were used to produce the final version of the instrument for data collection. Data were collected from 276 nurses across four hospitals using a validated questionnaire, with reliability confirmed through a pilot test (Cronbach's α = 0.78) and expert validation. Ethical clearance was secured from institutional review boards, ensuring confidentiality (anonymized data storage, non-disclosure agreements), beneficence (minimized risks, maximized benefits),

justice (unbiased participant selection), and respect for persons (voluntary participation with informed consent). Surveys were administered in-person over four weeks, capturing nurses' perceptions of technology adoption. Data were analyzed using SPSS v26.0 for descriptive statistics (frequencies, mean scores) and inferential tests (t-tests, regression), while qualitative insights from open-ended responses were thematically coded via NVivo,

Data Presentation and Analysis: Description of the Sample

The data collected were analysed using mean while demographic variables were analysed using frequency and parentage. Therefore, devised the mean for every analysis using the formula below:

$$X = \frac{\sum FX}{N}$$

Where, X = mean

$\sum$ = Summation

N = Number

F = Frequency

$$\frac{4+3+2+1}{4} = \frac{10}{4} = \mathbf{2.50}$$

In analysing the data, items that had a mean score of 2.5 or higher were seen as acceptable, meaning most respondents generally agreed with or supported those items. On the other hand, items with a mean score below 2.5 were considered rejected, suggesting that these items didn't meet the standard for acceptance and were likely viewed less favourably or even disagreed with by respondents. This 2.5 threshold served as a simple benchmark, helping to distinguish between what was considered positive and negative, and guiding the whole interpretation of the findings to stress the important trends or areas that might need further exploration

The demographic data of the respondents provided an overview of the characteristics of the study participants. The majority (44.9%) are within the age range of 36-40 years, followed by those aged 41 years and above (23%), while the least represented group is between 31-35 years (10.1%). This indicates that most respondents are experienced professionals likely to have extensive exposure to medical-surgical nursing practices. In terms of gender distribution, females dominate the study population (92.8%), reflecting the traditionally female-dominated nature of the nursing profession. Regarding work experience, a significant proportion (36.2%) of respondents have 11-15 years of experience, followed by those with 6-10 years (30.4%), while fewer respondents have less than five years (14.4%) or over 20 years (19%) of experience. This suggests that the majority of participants possess a moderate to extensive level of expertise in the field.

The abbreviation below indicates. VE= Very Effective, E-Effective, I- Ineffective and VI- Very Ineffective.

The data presented in the table 2 stressed the significant role of technology in improving efficiency and accuracy in medical-surgical nursing. The highest-rated improvement, with a mean score of 3.9, is the enhancement of surgical accuracy, indicating a strong agreement among respondents on how technology enhances precision in surgical procedures. Other notable advancements include reducing surgical time (mean = 3.7) and improving efficiency through digital documentation and electronic health records (mean = 3.7), suggesting that technology is streamlining workflow and optimizing patient management. Additionally, minimizing human errors through automation (mean = 3.5), enhancing communication and teamwork (mean = 3.5), and reducing post-surgical complications (mean = 3.5) further reinforce the perception that technological innovations contribute significantly to safer and more effective surgical nursing care.

Table 2: Demographic detail of the respondents

	Variables	N (138)	Percentage
Age	25-30 years	**20**	**22**%
	31-35 years	**14**	**10.1**%
	36-40years	**62**	**44.9**%
	41 years above	**32**	**23**%
	Total	**138**	**100%**
Gender	Male	10	7.2%
	Female	128	92.8%
	Total	138	**100%**
Experience	Below 5years	20	14.4%
	6-10 years	42	30.4%
	11-15 years	50	36.2%
	20 years and above	26	19%
	Total		
		138	**100%**

Table 3: The mean response on the way technology has improved efficiency and accuracy in medical- surgical nursing in Cottage Hospital, Ikolo/Ohebedim, and Elechi Hospital, Ukehe. Igbo.

The way technology improved efficiency and accuracy in medical-surgical nursing	VE 4	E 3	I 2	VI 1	Mean
Improving the accuracy of surgical procedures.	64	5	0	0	3.9
Reducing the time required to perform surgical procedures	51	18	0	0	3.7
Minimizing human errors in patient care through automated systems.	40	29	0	0	3.5
Enhancing communication and teamwork among surgical teams.	39	30	0	0	3.5
Improving efficiency in surgical nursing through digital documentation and electronic health records	52	17	0	0	3.7
Reducing post-surgical complications with the adoption of surgical technology.	41	27	1	0	3.5
Average Mean 3.6					

The data in Table 3 highlighted the positive perception of technological advancements in medical-surgical nursing, particularly in improving patient safety and outcomes. The highest-rated items, with mean scores of 3.7, include the enhancement of accuracy and efficiency through advanced surgical tools and the need for further

technological advancements. Additionally, technological monitoring significantly improving patient safety (mean = 3.5) and contributing to faster recovery times (mean = 3.5) suggest a strong agreement among respondents on the benefits of modern medical technology. However, concerns remain regarding the challenges and risks of integrating new technology (mean = 3.2) and the adequacy of training provided to healthcare professionals (mean = 2.8), indicating potential gaps in the effective implementation of surgical innovations.

Table 5: The mean responses on challenges and limitations associated with integrating technology into surgical nursing care in Cottage Hospital, Ikolo/Ohebedim, and Elechi Hospital, Ukehe. Igbo Etiti.

The challenges and limitations associated with integrating technology into surgical nursing care	SA 4	A 3	D 2	SD 1	Mean
High costs of acquiring and maintaining surgical technology pose a major challenge in nursing care.	46	23	0	0	3.6
Frequent technological malfunctions disrupt surgical procedures and patient care.	39	30	0	0	3.5
The complexity of new surgical technologies makes it difficult for nurses to adapt quickly.	15	23	19	12	2.5
Limited training opportunities hinder nurses from effectively utilizing advanced surgical technologies.	27	42	0	0	3.3
Heavy reliance on technology in surgical nursing can reduce critical thinking and hands-on skills.	39	20	7	3	3.3
Resistance to technological change among surgical nurses slows down its full integration into practice.	0	0	38	31	1.5
High costs of acquiring and maintaining surgical technology pose a major challenge in nursing care.	49	20	0	0	3.7
Average Mean 3.0					

The data in table 5 demonstrated key challenges and limitations associated with integrating technology into surgical nursing care. The highest-rated challenge, with a mean score of 3.7, is the high cost of acquiring and maintaining surgical technology, closely followed by frequent technological malfunctions (mean = 3.5). These suggest that financial constraints and technical failures are major barriers to seamless integration. Limited training opportunities (mean = 3.3) and the risk of reduced critical thinking and hands-on skills due to heavy reliance on technology (mean = 3.3) further indicate concerns about the preparedness of nurses to effectively use advanced tools. Notably, while some respondents acknowledged the complexity of new technologies (mean = 2.5) as a challenge, resistance to technological change among surgical nurses was rated the lowest (mean =

1.5), indicating that most nurses are open to adopting new innovations, but systemic barriers hinder their full utilization.

Discussion and Finding

The findings aligned with studies that highlight the demographic distribution in nursing. According to the World Health Organization (2021), nursing remains a female-dominated profession globally, with women comprising nearly 90% of the workforce, similar to this study's findings. The age distribution also supports research by Buerhaus et al. (2017), which found that a large portion of the nursing workforce falls within the mid-to-late career stage, contributing valuable experience to clinical practice. Additionally, the experience distribution aligns with research by Duffield et al. (2019), which suggests that the majority of nurses working in specialized fields like medical-surgical nursing tend to have at least a decade of professional experience, ensuring competence in handling complex patient care scenarios. These demographic insights reinforce the reliability of the study by confirming that most respondents are experienced professionals with in-depth knowledge of technological advancements in surgical nursing.

These findings aligned with existing research on the impact of technology in surgical nursing. Studies by Reddy et al. (2021) emphasize that robotic-assisted surgeries and AI-driven surgical tools enhance precision, reducing errors and improving patient safety. Additionally, research by Carayon et al. (2020) demonstrates that electronic health records (EHRs) and automated systems minimize documentation errors and improve workflow efficiency. Furthermore, Smith and Brown (2019) highlight how digital communication tools facilitate better coordination among surgical teams, ultimately enhancing teamwork and reducing intraoperative complications. The reduction in post-surgical complications is supported by Patel et al. (2022), who found that real-time patient monitoring systems contribute to early detection of complications, improving recovery outcomes. These findings suggest that continued investment in advanced surgical technologies and training programmes will further enhance efficiency and accuracy in medical-surgical nursing.

These findings aligned with existing literature on the impact of technology in surgical care. Research by Smith et al. (2021) supports the notion that real-time imaging surgical navigation reduce intraoperative errors and improve precision. Similarly, Brown et al. (2020) found that minimally invasive procedures and robotic-assisted surgeries lead to faster recovery times and reduced complications. However, the concerns about integration challenges reflect the work of Sittig and Singh (2022), who emphasize the need for structured training programmes to address skill gaps in adopting new surgical technologies. These results suggest that while technology has significantly improved surgical nursing outcomes, continued advancements and enhanced training programmes are essential to maximize its effectiveness and ensure safe patient care.

These findings aligned with existing studies on the integration of technology in surgical nursing. Research by Prakash et al. (2021) highlights the significant financial burden associated with acquiring and maintaining advanced surgical technologies, which can limit access in resource-constrained settings. Similarly, studies by Carayon et al. (2020) emphasize how technological malfunctions can disrupt workflow and compromise patient safety, reinforcing the need for robust system maintenance. The concern over reduced critical thinking is supported by Nibbelink & Brewer (2018), who found that excessive reliance on automated systems can weaken clinical judgment in nurses. Additionally, the limited availability of training opportunities reflects findings by Sittig and Singh (2022), who stress the importance of continuous education to ensure that healthcare professionals are proficient in using evolving surgical technologies. These results highlight the need for strategic investments in training, maintenance, and cost-effective technological solutions to enhance surgical nursing care.

The adoption of medical technology, such as automated monitoring systems and EHRs, enhances patient safety and reduces errors in medical-surgical nursing. Nurses

can optimize time management by using technology for documentation, medication administration, and patient monitoring, reducing manual workload. Continuous exposure to healthcare technology encourages nurses to acquire new skills, promoting professional development and career advancement. Access to real-time patient data and decision-support systems enables nurses to make informed clinical decisions, improving patient outcomes. Therefore, nurses must adhere to ethical and legal guidelines concerning patient data confidentiality, electronic documentation, and the use of AI-driven decision tools.

Recommendations

This study recommends that hospitals invest in advanced medical technologies such as electronic health records (EHRs), automated medication dispensing systems, and telemedicine services to enhance efficiency and patient outcomes in medical-surgical nursing practice, while ensuring nurses receive regular training and workshops to maintain competency with these tools and emerging innovations. Additionally, governments and hospital management must prioritize stable power supply and reliable internet connectivity to support seamless technology integration, and regulatory bodies should establish policies that promote the adoption, safe use, and data security of healthcare technologies. Finally, collaboration between hospital management and technology developers is essential to design user-friendly, customized systems that align with the specific needs of medical-surgical nursing workflows and patient care standards.

Limitations of the Study

The study has several limitations that affect the generalizability and depth of its findings. First, its focus on only three hospitals Cottage Hospital, Ikolo/Ohebedim, and Elechi Hospital, Ukehe narrows the scope, potentially limiting its applicability to other hospitals in Igbo Etiti or broader regions. Additionally, the varying levels of technology adoption across these institutions may further reduce the reliability of extrapolating the results to settings with different technological infrastructures. These factors raise questions about how representative the findings are of wider healthcare contexts.

Further limitations stem from methodological constraints. The reliance on nurses' self-reported data introduces risks of bias, including subjective perceptions and recall inaccuracies. Compounding this, the study's limited timeframe for data collection restricted opportunities for a more thorough exploration of technology's impact on medical-surgical nursing practices. Resource constraints, including inadequate tools for comprehensive technological assessments and broader data collection, also hindered the depth and scope of the analysis, potentially leaving critical insights unexamined.

Conclusion

This study has explored the impact of technology on medical-surgical nursing practice in Cottage Hospital, Ikolo/Ohebedim, and Elechi Hospital, Ukehe, highlighting its benefits, challenges, and implications for healthcare delivery. The findings suggest that while technology significantly enhances patient care, efficiency, and safety, its full potential is yet to be realized due to infrastructural challenges, limited training, and resistance to change. To maximize the benefits of technology in medical-surgical nursing, there is a need for focused investments in healthcare infrastructure, ongoing training programmes, and supportive policies that facilitate the seamless integration of technology into nursing practice. Additionally, theoretical frameworks such as the Technology Acceptance Model and Diffusion of Innovation Theory provide valuable insights into how nurses adopt and utilize technology. Therefore, embracing technological advancements in medical-surgical nursing is essential for improving patient outcomes, increasing workflow efficiency, and ensuring the delivery of high-quality healthcare services in Igbo Etiti and beyond.

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