

Factors Influencing Utilization and Compliance with Technology-Based Monitoring System and Outcome on Critically Ill Patients Among Nurses at Tertiary Hospitals, South-South, Nigeria

Abam, Akaninyene Ben¹ & Maureen Dike Frank²

¹College of Nursing Sciences University of Uyo Teaching Hospital.

²Department of Nursing Science, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers state University, Port Harcourt, Rivers State, Nigeria. ORCID ID: <https://orcid.org/0000-0002-6155-5806>

*Corresponding Author: Abam, Akaninyene Ben

DOI: <https://doi.org/10.5281/zenodo.21543981>

Article History	Abstract
Original Research Article	<i>Technology-Based Monitoring Systems have become indispensable tools in the management of critically ill patients helping with positive health outcome. Despite their recognized benefits, several factors have been implicated in influencing their optimal use in the management of critical ill patients. This study determined factors influencing utilization and compliance to technology-based monitoring systems and outcomes on critically-ill patients among Nurses at tertiary hospitals, Akwa Ibom State, south-south, Nigeria. The objectives were to explore factors influencing nurse's Utilization and Compliance with Technology-based Monitoring system in the management of critically- ill patients and determine the influence on outcome for critically ill patients in the studied tertiary hospitals. The theory used for the study was Technology Acceptance Model, population comprised of 158 nurses working in Intensive Care Units and Accident and Emergency Units of tertiary hospitals in Akwa Ibom State. total population sampling was used for the study. Data were collected using structured questionnaire, hospital ward records and the reliability coefficient of the questionnaire was 0.80, data was analyzed using descriptive statistics. Findings revealed that facility-based, personnel-based and monitoring system-based such as frequency of training, inadequate training, Nurses' years of working experience, personnel inefficiency and equipment malfunction respectively were among factors influencing effective utilization and compliance with Technology-based Monitoring systems. Also, Utilization($R = 0.345$ $R^2 = 0.119$, $F = 21.012$, $P 0.05$) and compliance ($R = 0.510$, $R^2 = 0.260$, $F = 54.725$, $P 0.05$) with monitoring protocols also significantly predicted/influenced patient outcomes. Study concludes that regular training and adherence to technology-based monitoring protocols were among factors to enhance utilization and compliance thereby contributing positively to outcomes among critically ill patients. study recommends continuous professional training, provision of functional monitoring equipment, and institutional support to strengthen compliance and optimize patient outcomes in critical care settings.</i> Keywords: Factors, Influence, Utilization, Compliance, Technology-based, Outcome, Patients, Nurses.
Received: 01-06-2026	
Accepted: 30-06-2026	
Published: 25-07-2026	
Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited. Citation: Abam, A. B., & Frank, M. D. (2026). Factors influencing utilization and compliance with technology-based monitoring system and outcome on critically ill patients among nurses at tertiary hospitals, South-South, Nigeria. <i>UKR Journal of Medicine and Medical Research</i>, 2(4), 50-59.	

Introduction

Technology-Based Monitoring Systems (TBMs) refers to the use of digital tools and devices to track and manage patient health data aiming to improve care quality, reduce cost and enhance efficiency. Also, it is the integration and application of advanced electronic, digital, and computerized devices used in monitoring, assessing, and

managing patients' physiological conditions in healthcare setting (Topaz et al., 2023). In the past few decades, technology-based monitoring systems have become an integral part of critical care of modern Intensive Care Units (ICUs) and Accident and Emergency (A/E).

Advent of technology and the rapid advancement in healthcare has revolutionized the way it is delivered, mostly in critical care settings and other emergency departments (Olubiyi et al., 2023). In ICUs and A/E, the state of health of patients can deteriorate rapidly, requiring timely and accurate technology-based monitoring to guide clinical decisions and actions (Adegboyega and Adebayo, 2022). The introduction of these technology-based monitors in healthcare systems has gained global traction as a means of improving care delivery, they have transformed patient monitoring particularly for critically ill patients (Fernandez et al., 2020). Medical devices with technology can improve patient's safety, through automation, alerting for medications, reminding clinicians and nurses of important information, better diagnostic and consultation reports, sharing information, enhancing clinical decision-making, preventing errors, standardizing practices, addressing staff shortages and ensuring complete patient information (Munajian et al., 2023).

Thus, the introduction of technology – based monitoring system in critical care presents a unique opportunity for improving patient care through continuous, real time data collection. Its use is widely considered a key factor in enhancing the quality of care for critically ill patients, yet they remain underutilized in the health care setting within developing countries (Fernandez et al., 2020).

Technology-based monitoring in critically ill patients involves the use of various advanced tools and systems that utilize technological innovations to continuously observe, assess, measure, analyze and manage various physiological status and processes of patients in Intensive Care Units (ICUs) and other emergency settings. Advanced technological monitoring tools are designed to support health care professionals including nurses in managing critically ill patients; they assist in facilitating on the spot data collection and analysis, thus enhancing clinical decision making process (Ajade, 2022). Also, they are very significant for timely detection of deterioration and intervention for improvement of patient outcomes. Some key components include wearable devices for vital signs of heart rate, oxygen saturation, blood pressure, respiratory rate, temperature, wireless telemetry for the remote monitoring of patient's heart rates, rhythms, others include electrocardiogram, capnometers and smart IV pumps (Brouwer, 2021a). These technological systems provide real-time monitoring of critically ill patients by continuously tracking and analyzing patient's vital signs, physiological parameters and other critical health indicators. It provides instantaneous or timely alerts for abnormal readings hence allowing for early detection of potential complications and enabling early and for prompt intervention and taking corrective actions swiftly thereby

improving critically ill patient outcomes and reducing mortality rates (World Health Organizations (WHO), 2022).

Despite the integration of electronic health technologies in some parts of the healthcare systems, challenges remain in terms of the extent to which nurses are adequately trained to use these technology-based monitoring, their level of compliance, and the overall impact of these systems on critically ill patient and its outcomes. Studies have shown that in many health facilities worldwide, particularly in developing countries like Nigeria, the use of technology-based monitoring has not been fully implemented or optimized due to several factors that hinder compliance which may stem from inadequate or prior negative experience with technology, workload, time constraints, high-patient nurse ratio, poor institutional support, inadequate infrastructure, limited access to training, lack of technical support, technological complexity, financial constraints and frequent malfunction among other factors resulting in high mortality rate of critically ill patients (Ogunyemi et al., 2020; Chukwu et al., 2023, Dehghan, 2022 and Sharma et al., 2021). These challenges can hinder the optimal use of technology-based monitoring systems, potentially compromising patient outcomes especially in critically ill patients where timely and accurate interventions are crucial (Sharma et al., 2021).

This study therefore seeks to determine the factors that influence utilization and compliance with technology-based monitoring and outcome on critically ill patients among Nurses at the two Tertiary Hospitals in Akwa Ibom State, South-South, Nigeria.

Statement of the Problem

In recent years, the integration of technology in the healthcare of patients particularly for monitoring critically ill patients has become increasingly prevalent (Fernandez et al., 2020). The availability of continuous monitoring promotes early detection of complications, facilitates rapid response, and ultimately contributes to improved patient outcomes (Ibrahim and Eze, 2023). Despite these proven benefits of technology-based monitoring systems, low reliance on technological monitoring systems has been observed in tertiary health care institutions which underscores the need for consistent and effective usage by healthcare providers, especially Nurses (Sharma et al., 2021). Their compliance and utilization of these technological advancements and advantages it offers such as continuous data collection, real-time alerting and improved patient safety is of great importance to care outcomes of critically ill patients (Zhang et al., 2024).

However, challenges in its adoption, utilization, integration and compliance into everyday nursing practice in critical

care settings remains an issue of concern (Venkatesh et al., 2020). In many developing countries like Nigeria, the use of technological monitoring systems has not been fully implemented or optimized due to factors such as inadequate infrastructure and equipment, limited access to training and financial constraints (Brouwer et al., 2021a). However, with the growing recognition of the importance of technology in improving healthcare outcomes, there has been increasing interest in understanding how Nurses perceive and comply with the use of technological monitoring in the management of critically ill patients (Davis et al., 2019, Johnson, 2025). Utilization and compliance with technology-based monitoring systems by nurses in critical care setting can either facilitate or hinder its effectiveness. Nurses make up the largest group of healthcare work force and in the Nigerian context, they are the frontline caregivers in the critical care settings (Afolabi et al., 2023). Non-compliance or suboptimal utilization of these systems can lead to inadequate patient monitoring and poor health outcomes in critically ill patients (Ekong et al., 2023). These can result in delayed responses to patient deterioration, missed alerts and overall suboptimal patient monitoring care to severe complications, longer ICU stays or increased mortality rates among critically ill patients.

Remarkable low level of utilization and non-compliance with technology-based monitoring systems has been reported among nurses which stemmed from the complexity of operating the monitoring devices (58%), leading to frustration, ultimately impacting their ability to provide optimal patient care resulting in negative patient outcome (Khairat et al., 2023; Glover and Koonce, 2020). Additionally, reports have shown that inadequate training, instances of alarm fatigue, causing frequent alarm desensitization and potential oversight of crucial signals among many staff resulting in poorly recovery of critically ill patient (Mccoy, 2018). Also, many nurses reported experiencing anxiety or resistance due to inadequate training or limited exposure to digital systems, which was further compounded by the inconsistent availability of functional equipment, frequent power outages and lack of technical support which are recurrent issues in many Nigerian health care facilities (Ibrahim and Eze, 2023).

Furthermore, studies on TBMs utilization in Nigerian hospital have shown that despite the availability of some digital monitoring technologies, utilization among Nurses remains below optimal levels due to poor knowledge, limited institutional support, inadequate training opportunities, and inconsistent access to equipment (Olubiyi, et al., 2023).

Significance of the Study

Findings from the study will bridge the knowledge gap on technological monitoring utilization among health care

providers including nurses in Nigeria healthcare facilities. Policy makers and administrations of health care institution. It will inform them on policy formulation, guide training programs and improve the integration of technology in critical care, ultimately enhancing patient outcome. In addition, by identifying factors influencing compliance and analyzing perceptions hospitals can develop targeted training programmes and improve technological integration policies to foster a more conducive environment for effective monitoring. Furthermore, it will be used by the stakeholder including institution that train these healthcare providers to design strategies as well as adopt curriculum that will improve nurses' compliance and enhance patients outcome.

Literature Review

Historical Review of Technological-Based Monitoring Systems in Healthcare

The evolution of Technology-based monitoring systems in healthcare reflects the broader advancement of medical technology, telecommunications, and digital health, (Fernandez et al., 2020).

Historical timeline highlighting key milestones and developments in technology-based monitoring systems for healthcare:

- (a) Pre-Digital Era (Before 1960s). Monitoring was manual and analog. Nurses and doctors manually recorded vital signs like temperature, pulse and respiration.
- (b) Emergence of Electronic Monitoring (1960s – 1970s) First Intensive Care Unit Monitoring Systems introduced, using electronic displays and basic sensors, development of electrocardiography (ECG) machines and central monitoring stations in hospitals, signals were still mostly local, with no remote or networked capability.
- (c) Telemedicine Foundations (1980s). This witnessed the introduction of Telephone-based remote consultations. Military pioneered early remote physiological monitoring for astronauts and soldiers. Development of early portable medical devices e.g. Holter Monitors for ECG.
- (d) Digital and Networked Systems (1990s) Integration with computers enabled better data storage processing and analysis. Hospitals began implementing electronic health records (EHRs).
- (e) Internet and Mobile Revolution (2000s). This period showed introduction of internet connected medical devices. Development of

mobile health (mHealth) apps and Bluetooth enabled sensors. First-generation wearable devices like early Fitbits and heart rate monitors were launched.

- (f) Rise of Smart Health Tech. (2010s). This era highlighted the emergence of wearables (e.g. Apple watch, Garmin, Fitbit), gained health monitoring capabilities and surge in telehealth adoption, especially in managing chronic conditions and rural care. Approving more digital health devices for clinical use.
- (g) COVID-19 Pandemic Impact (2020 – 2021) Rapid acceleration of remote monitoring systems due to lockdowns and overwhelmed hospitals. Use of pulse oximeters, temperature sensors and symptom tracking apps for COVID-19 monitoring at home. Governments and hospitals adopted technology-based monitoring system solutions at scale virtual wards and remote ICU oversight systems expanded rapidly.
- (h) AI and Advanced Technology-based monitoring system (2022 – present). This period shows remarkable use of AI and machine learning in technology based monitoring to detect patterns and predict

health events (e.g. sepsis prediction, arrhythmia of detection). Rise of smart wearables with medical-grade sensors (e.g. Apple watch with ECG, continuous glucose monitors like Dex com). Integration of TBMs with electronic medical records and digital twins of patients. Personalized, real-time monitoring for high-risk patients using combined data sources (e.g. wearables, apps, hospital devices)

Theoretical Framework

Technology Acceptance Model (TAM)

This technology acceptance model was propounded by David, Bagozzi and Warshaw in 1989, (Davis, et al., 1989b) it is an information system model that explains how users accept and use new technologies. The actual system use is the end-point where people use the technology. TAM postulates that the acceptance of technology is predicted by the users' behavioural intention, which is, in turn, determined by the perception of technology usefulness in performing the task and perceived ease of its use. The theory suggests that when users are presented with a new technology, a number of factors influence their acceptance and utilization of the new technology.

Diagrammatic Representation of Technology Acceptance Model (TAM):

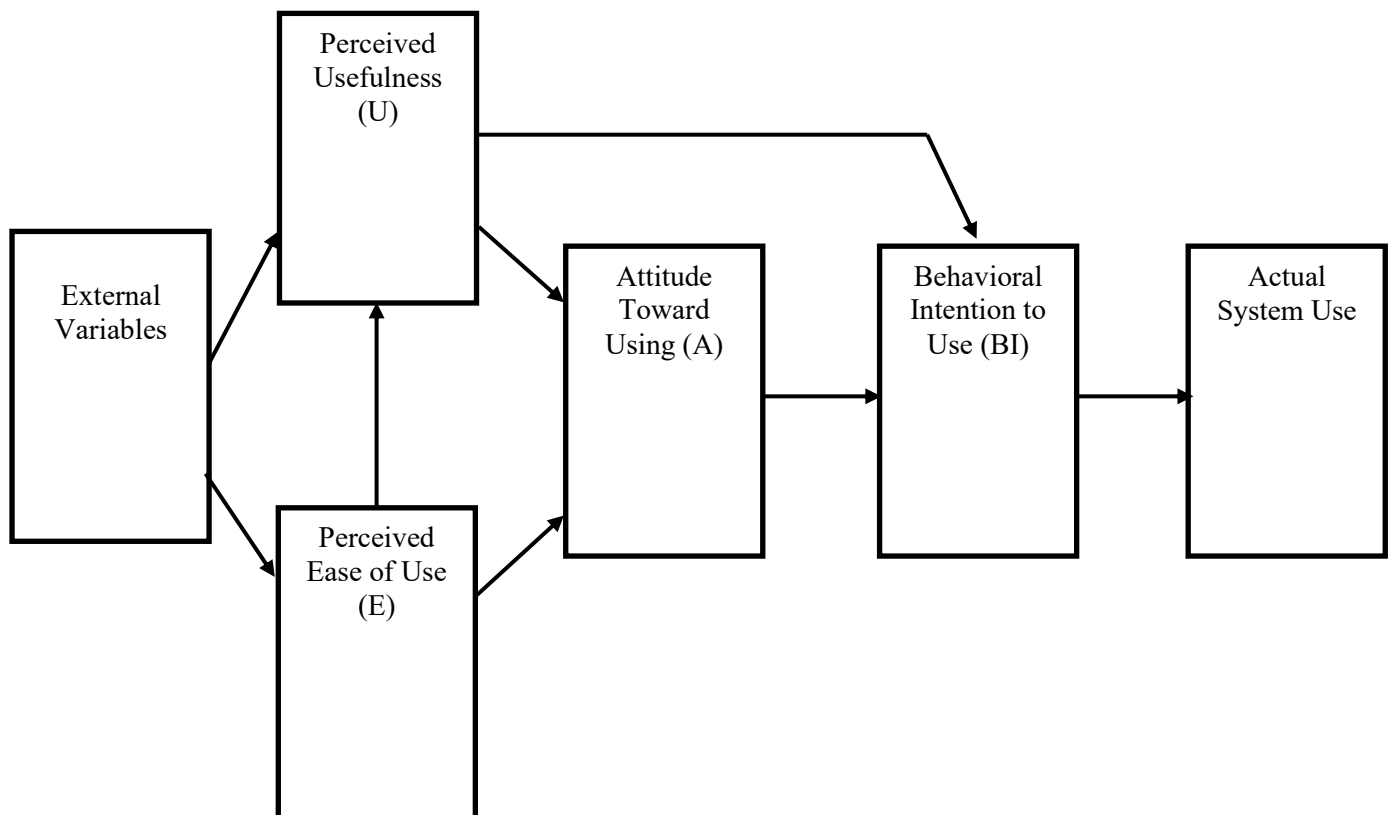


Figure 1. Representation of Technology Acceptance Model (TAM)

Source: Davis et al., (1989b)

Materials And Methods

Study Design

A Cross-Sectional descriptive design was employed to assess the perception and utilization of technology-based monitoring system among nurses in the studied setting.

Study Settings

The setting of this study was University of Uyo Teaching Hospital (UUTH) and Ibom Specialist Hospital (ISH), where Technology-based monitoring system are actively used because of referred case and critically-ill patient they care for. The University of Uyo Teaching Hospital is a Federal Hospital playing a pivotal role in the provision of excellent healthcare services to over 6 million population of Akwa Ibom State and beyond.

Study Population

The target population for this study consisted of all Registered Nurses working in Intensive Care Units and Accident and Emergency settings of the two tertiary hospitals (University of Uyo Teaching Hospital and Ibom Specialist Hospital). The accessible population made up of all the registered Nurses who met the inclusion criteria in the two tertiary hospitals, working in ICU and Emergency Unit. These consisted of thirty-two (32) Nurses in ICU and forty eight (48) Nurses in Accident and Emergency Units (totaling 80) in UUTH and thirty five (35) Nurses working in ICU and forty-three (43) Nurses in Accident and Emergency (78) in Ibom Specialist Hospital, totaling one hundred and fifty eight (158) in the two tertiary hospitals.

Sample Size

The study used total sampling (census) of all accessible Nurses because of small population of Nurses working in ICU and A/E in these tertiary hospitals.

Adopting a total population sampling technique (census method) is feasible and helps to obtain richer and more representative data. Furthermore, ICU and A/E Units are highly technology-driven environments where critically ill patients are managed on daily basis. Including all nurses in these units for the study ensure that the study captures a comprehensive representation of Nurses involved in monitoring critically ill patients across different shifts, years of experience and professional cadres. Nurses in these specialized units are the primary users of TBMs such as

cardiac monitors, pulse oximeters, infusion pumps ventilators and automated blood pressure monitors.

Instrument for Data Collection

The instrument for data collection was a structured questionnaire with 2 sections of close-ended questions. Section A with 20 items elicited information on Nurses perception while section B used 20 items for the respondent's utilization of technology-based monitoring system. fourlikert scale questions, strongly Agreed, Agreed, Disagreed and Strongly Disagreed was used.

Procedure for data collection

For quantitative data collection, eight (8) research assistants were trained by the researcher, two from each unit of each setting, they assisted to administer the developed, pretested and validated copies of the questionnaire to the respondents on face to face bases in the two tertiary hospitals. Principle of voluntary participation and written informed consent was ensured, 158 questionnaire were distributed and filled by the respondents, all the 158 questionnaire were completely retrieved for storage, safe keeping for data analysis, giving a return rate of 100%.

Method of Data Analysis

Data was checked, cleaned and subjected to descriptive statistics to determine frequencies and percentages. Statistical Package for the Social Sciences (SPSS) version 23 was used to analyze the data. The result was presented using mean, standard deviation for survey, frequency table, figure and percentage.

Ethical Consideration

Ethical approval was obtained from those responsible for it. Participation was voluntary, with informed consent obtained from all respondents. Informed verbal and written consent were obtained for voluntary participation, right to withdraw from the study anytime. The privacy and confidentiality was assured by asking them not to include their names in the questionnaire. To ensure confidentiality, all questionnaires were collected from the research assistance and put in a locked cabinet in the researcher's office.

Results

Factors influencing Nurses' Utilization and Compliance with Technology based Monitoring system in management of critically ill patients in Tertiary Hospitals

Table1. Facility Based Factors

S/N	ITEMS	SA	A	D	SD	Mean	SD	Remark
1	The training provided for the system was adequate to help me understand its functions	81	59	16	2	3.39	0.73	Agreed

2	The hospital management provides sufficient resources for using the technology-based monitoring system effectively	48	62	35	13	2.92	0.93	Disagreed
3	My hospital provides adequate technical support for monitoring systems	45	70	31	12	2.94	0.90	Disagreed
4	I received sufficient formal and hands-on training on the monitoring system	64	58	28	8	3.13	0.89	Agreed
5	My unit has enough functioning monitoring equipment for all critically ill patients	44	68	37	9	2.93	0.86	Disagreed
6	The hospital provides regular updates, or upgrades to monitoring technologies	37	83	34	4	2.97	0.76	Undecided
7	Management encourages the use of technology-based monitoring systems	65	81	11	1	3.34	0.64	Agreed
8	I am motivated by the hospital management to use technology-based monitoring in my daily practice.	49	88	19	2	3.17	0.69	Agreed
9	There are clear institutional policies guiding the use of monitoring technologies	51	95	10	2	3.24	0.63	Agreed
	Grand Total					3.11	0.78	Agreed

The data presented in Table 1 above showed that Nurses agreed that the facility based factors influencing nurses' Utilization and Compliance with Technology based Monitoring system in management of critically ill patients in Tertiary Hospitals in Akwa Ibom State includes: adequate training (Mean=3.39, SD=0.73), sufficient formal and hands-on training on the monitoring system

(Mean=3.13, SD=0.89), adequate functioning monitoring equipment (Mean=2.93, SD=0.86), management's encouragement on the use of technology-based monitoring systems (Mean=3.34, SD=0.64), and clear institutional policies guiding the use of monitoring technologies (Mean=3.24, SD=0.63).

Table 2: Monitoring Systems Based Factors

S/N	ITEMS	SA	A	D	SD	Mean	SD	Remark
1	There is always technical support available when problems arise with the monitoring system	37	78	33	10	2.90	0.83	Disagreed
2	The availability of monitoring equipment affects my ability to comply with monitoring protocol	60	73	19	6	3.18	0.79	Agreed
3	A shortage of equipment discourages consistent use of monitoring system	63	78	17	0	3.29	0.65	Agreed

4	System errors or malfunctions reduce my trust in the monitoring devices	52	79	23	4	3.14	0.76	Agreed
5	Frequent false alarms affect my willingness to rely on the system	51	75	28	4	3.10	0.78	Agreed
	Grand Total					3.17	0.77	Agreed

The data presented in Table 2 above showed that Nurses agreed that the monitoring systems based factors influencing nurses' Utilization and Compliance with Technology based Monitoring system in management of critically ill patients in Tertiary Hospitals in Akwa Ibom State includes: availability of technical support and

monitoring equipment (Mean=2.90, SD=0.83; Mean=3.18, SD=0.79) respectively, shortage of equipment (Mean=3.29, SD=0.65), system errors or malfunctions (Mean=3.14, SD=0.76) and frequent false alarms (Mean=3.10, SD=0.78).

Table 3: Personnel Factors Influencing Nurses' Utilization and Compliance with Technology based Monitoring system in management of critically ill patients

S/N	ITEMS	SA	A	D	SD	Mean	SD	Remark
1	I have access to adequate technical support when issues arise with the monitoring system	59	60	30	9	3.07	0.89	Agreed
2	Training improves my willingness to comply with technology-based monitoring protocols	48	95	9	6	3.17	0.70	Agreed
3	Recognition from supervisors encourages me to consistently use monitoring systems	46	68	36	8	2.97	0.86	Agreed
4	I have received sponsorship on a seminar from the hospital management on technology-based monitoring	20	45	45	48	2.23	1.02	Disagreed
	Grand Total					2.86	0.87	Agreed

The data presented in Table 3 above showed that Nurses agreed that the personnel based factors influencing nurses' Utilization and Compliance with Technology based Monitoring system in management of critically ill patients in Tertiary Hospitals in Akwa Ibom State are access to adequate technical support (Mean=3.07, SD=0.89),

personnel training (Mean=3.17, SD=0.70), and recognition from supervisors (Mean=2.97, SD=0.86). However, the nurses disagreed on being sponsored on seminar from the hospital management on technology-based monitoring (Mean=2.23, SD=1.02).

Table 4: Overall Patient Outcomes of Nurses' Utilization and Compliance with Technology based Monitoring system in management of critically ill patients by Unit (June–December 2025)

Unit	Total Admissions	Total Recovered	Total Deaths	Overall Recovery %	Overall Mortality %
UUTHICU-	325	272	13	83.7	4.0
UUTHA/E-	448	386	8	86.2	1.8
ISHICU-	322	279	6	86.6	1.9
ISHA/E-	612	451	11	73.7	1.8

Total	1,707	1,388	38	81.3	2.2
--------------	--------------	--------------	-----------	-------------	------------

Over the seven month- study period, a total of 1,707 critically ill patients were admitted across the four units, with 1,388 patients recovering (overall recovery rate of 81.3%) and 38 deaths recorded (overall mortality rate of 2.2%). The Accident and Emergency unit at Ibom Specialist Hospital (ISHA/E) managed the highest patient volume (612 admissions) but posted the lowest recovery rate (73.7%) among all units. Conversely, ISH-ICU achieved the highest recovery rate (86.6%), followed closely by UUTH-A/E (86.2%). Although UUTH-ICU had the highest overall mortality rate (4.0%), the absolute number of deaths was similar across units, ranging from 6 to 13 fatalities. These findings suggest that while patient survival was generally -favourable with positive patient outcome because of utilization and compliances with technology-based monitoring system on crucially ill patients, the A/E unit at ISH had disproportionately poorer outcomes relative to its heavy caseload as presented in Table 4 above.

Discussion of Findings

Factors Influencing Nurses' Utilization and Compliance with Technology-Based Monitoring System on outcome of critically ill Patients

The finding of this study identified several factors that significantly influence nurses' utilization and compliance with technology-based monitoring systems and outcome on critically ill patients. The major factors identified included adequate training on monitoring technologies, management support and encouragement, availability of monitoring equipment, organizational policies, access to technical assistance, and continuous professional development opportunities. The respondents generally agreed that these factors played crucial roles in determining how effectively they utilized monitoring technologies and complied with established monitoring protocols. The findings suggest that successful implementation of technology-based monitoring systems depends not only on the availability of the technologies themselves but also on the presence of supportive organizational and professional environments.

Also, utilization and compliance with technology-based monitoring systems significantly influenced patient outcomes among critically ill patients. The result demonstrated a statistically significant positive relationship between nurses' utilization and compliance with technology-based monitoring systems and patient outcomes, indicating increased and improved quality of care, early detection of complications, prompt clinical

interventions, enhanced patient safety, reduced mortality risk, and improved recovery rates.

The finding regarding the personnel factors such as importance of training is in agreement with the findings of other studies: Vander et al., (2019), who reported that training was one of the strongest determinants of successful technology adoption among healthcare professionals. Their study revealed that healthcare workers who received regular training demonstrated higher competence levels, greater confidence, and improved compliance with technology-related protocols; Mansour (2023), who found that nurses who participated in structured training programmes exhibited significantly higher utilization rates of digital monitoring technologies than those who had not received formal training. Mansour concluded that training improves technological literacy and strengthens healthcare professionals' willingness to adopt, utilize and comply with innovative healthcare technologies; Jalal et al., (2025), who reported that regular educational interventions and technical workshops significantly improved nurses' acceptance and utilization of advanced monitoring systems.

Facility and equipment based factors: Respondents agreed that support from hospital administrators and nursing managers positively influenced their willingness to utilize monitoring systems and comply with monitoring protocols. Management support may include provision of adequate equipment, encouragement of technology use, supervision of monitoring practices, allocation of training opportunities, and establishment of supportive policies.

This result agrees with Venkatesh et al., (2020), who reported that organizational support significantly influences healthcare technology adoption and utilization. According to the authors, healthcare workers are more likely to embrace technological innovations when organizational leaders actively support implementation efforts and provide the necessary resources.

The finding is also consistent with Omani-Samari et al., (2019), who identified leadership support as an important determinant of compliance with healthcare technology protocols. Their study demonstrated that healthcare institutions with strong managerial support systems recorded higher levels of technology utilization and adherence to operational guidelines.

Respondents indicated that adequate access to monitoring devices facilitated regular use and enhanced adherence to monitoring protocols. Nurses are more likely to utilize technology-based monitoring systems when functional

equipment is readily available and accessible during patient care activities.

This finding agrees with Booth et al., (2019), who reported that equipment availability significantly influences healthcare technology utilization. The authors found that healthcare workers in facilities with adequate technological resources demonstrated higher levels of technology use than those in resource-limited settings. The present finding also supports the work of Garcia et al., (2022), who found that availability of technological resources positively influences healthcare workers' attitudes towards technology adoption and utilization. According to the authors, adequate access to monitoring devices enhances user confidence and promotes routine integration of technology into clinical practice.

Conclusion

The study on "Factors influencing Utilization and compliance with Technology-Based Monitoring Systems on Outcome on Critically Ill Patients among Nurses at Tertiary Hospitals in Akwa Ibom State established that nurses in the state possess a high utilization and compliance with technology-based monitoring systems on outcome of critically ill patients. The findings revealed that nurses are well-informed about the operational principles and significance of technology-based monitoring tools such as digital patient tracking systems, electronic vital sign monitors, and alarm-based surveillance devices. This high level of knowledge and awareness is linked to their participation in regular training, exposure to modern clinical technologies, and institutional encouragement toward evidence-based care practices.

The study further found that nurses' utilization and compliance with technology-based monitoring systems significantly influence patient outcomes. Higher utilization and adherence to monitoring protocols were associated with improved detection of patient deterioration, timely interventions, and better overall patient recovery.

These outcomes corroborate previous empirical evidence who observed that consistent and accurate use of monitoring systems enhances clinical decision-making and care escalation in critical settings. The results also revealed that the relationship between nurses' compliance and patient outcomes is statistically significant, underscoring the pivotal role of adherence to technology-based monitoring in improving the quality of critical care.

Moreover, the study established that nurses' years of working experience and frequency of training significantly affect compliance levels. Experienced nurses demonstrated higher compliance due to their deeper clinical judgment, technical competence, and familiarity with hospital technologies, while frequent training sessions enhanced

nurses' confidence and technical proficiency. These findings are consistent with the studies which emphasized the role of experience and continuous professional development in effective technology integration.

Despite the overall high compliance and utilization levels, several factors that influence these were identified, including equipment shortages, frequent malfunctioning of monitoring devices, inadequate institutional policies, and excessive workload. These challenges limit consistent use and full optimization of technology-based monitoring systems. Therefore, the study concludes that while nurses demonstrate strong capacity and willingness to utilize and comply with technology-driven patient monitoring systems, sustained improvement in patient outcomes requires strengthening hospital infrastructure, providing regular technical training, ensuring reliable equipment maintenance, and formulating clear institutional guidelines for technology use.

References

1. Adegboyega, M.A., & Adebayo, T. S. (2022). Assessment of Nurses' knowledge and utilization of electronic monitoring devices in intensive care using *Nigerian Journal of Clinical practice*, 25 (4) 412 – 418.
2. Afolabi, M. O., Oyeleke, S. A., Adejumo, P. O. & Akinyemi, O. A. (2023). Nursing perception and utilization of health information technologies in tertiary healthcare institutions in Nigeria. *African Journal of Nursing and Midwife*, 25((2), 455-57.
3. Ajibade, B. (2022). Facilitators to Technology Adoption in Nursing: A Nigeria Perspective. *Journal of Nursing Practice*, 35 (2) 88 – 101.
4. Booth, R. G., Wosnick, I. G., Mahendran, B. A. & Wathes, D. C. (2019). Workplace barriers to medical technology compliance in hospitals. *Journal of Nursing Administration*, 47(5), 236 – 244.
5. Brouwer, A. (2021). *Nurses' perception and compliance to Technology-based monitoring on Patient Care Journal of Critical Care Nursing* 40 (3) 106-112.
6. Chukwu, E., Ali, M., & Adeoye, S. (2023). Advancing Critical Care in Nigeria. The role of Computer-Aided Monitoring Systems. *International Journal of Nursing practice*. 29(1) 23 – 45.
7. Davis, F. D., Bagozzi, R. P. & Warshaw, P. R., (2019). User Acceptance of Computer Technology: A comparison of Two Theoretical Models *Management Science* 35(8), 982 – 1003.
8. Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. (1989) User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35, 982-1003.

9. Dehghan, M. (2022). Barriers to Compliance with Evidence-Based Nursing Practice in ICUs. *Applied Nursing Research*.
10. Ekong, B., Udo, J. J. & Adewale, T. (2023). Challenges of implementing CAM in tertiary hospitals. A case study of UUTH, Uyo. *Medical Journal*, 20(2), 89 – 101.
11. Fernandez, R., Garcia, A., Moreno, L. & Pinard, R. (2020). Evaluating the effectiveness of Computer-Aided Monitoring System in Critical care. *Critical medicine*, 48(1), 25-32.
12. Garcia, M., Patel, R. & Connor, J. (2022). Exploring the impact of utilization of Technology on Nursing practice in Critical Care: A mixed-method approach. *Nursing management Journal* 48(6) 34 – 40.
13. Glover, D. & Koonce, J. (2020). Nurses compliance to Technology-based monitoring on critical settings. *Nursing Technology Journal* 14(2) 35-45.
14. Ibrahim, Y. M., & Eze, I. O. (2023). Institutional support and technology adoption among critical care nurses in Nigeria. *Journal of Nursing Administration and Education*, 12(3): 188–196.
15. Jalal, S.M., Jalal, S.H., Alasmakh, K.E., Alnasser, Z.H., Alhamdan, W.Y., & Alabdullatif, A.A. (2025). Nurses' perception of artificial intelligence driven monitoring systems for enhancing compliance with infection prevention and control measures in Al-Ahsa, Saudi Arabia. *Cureus* 17(4): 1-12
16. Johnson. (2025). Tele-ICU Implementation and its Impact on Nursing Practice. *Applied Nursing Research*, 10(2), 97–101.
17. Khairat, S., Liu, S., & Kitzmiller, R. (2023). Nurse workload and compliance with vital sign monitoring protocols: A retrospective analysis. *BMJ Health & Care Informatics*, 30(1):56-82
18. Mansour, M. (2023). Barriers to Nurses use of Technology in Monitoring critical patient. A cross section Survey. *Nursing Critical Care*, 28(2), 78-85.
19. McCoy, L., (2018). Nurses perceptions of the Technology in critical care: Safety first. *Journal of Critical Care Nursing* 2(3) 107 – 140
20. Munajiam, T., Habimana, J., & Uwitonze, D. (2023). Outcomes of technology-enhanced monitoring in critically ill patients in Rwanda. *BMC Health Services Research*, 23(1), 678-695
21. Ogunyemi, O. A., Adebayo, A. M., & Akinmoladun, A. O. (2020). Barriers to the adoption of health information technology in Nigerian hospitals. *Journal of Health Informatics* 34(2), 125 – 133.
22. Olubiyi, S. K., Anyebe, E. E. Akinsunlola, O. T., Okesina, K. B., Omoniye, S. O., & Adeola, R. (2023). Availability and utilization of digital health technology for improved patient care: A cross-sectional study of Nurses perspectives at a state general hospital in North-central Nigeria. *West African Journal of Open and Flexible Learning*.
23. Omani-Samani, R., Brown, A., & Black, J. (2019). Barriers to health technology adoption among nurses in Iran. *Iranian Journal of Nursing and Midwifery Research*, 24(3), 196 – 202.
24. Sharma, M. Naidu, S. & Nair, R. (2021). Compliance of Nursing Staff with technology-based monitoring systems in critical care units. *Nursing Technology Journal*, 16(1), 30 – 45.
25. Topaz, M., Ronquillo, C., Peltones, L. M., Pruinelli, L., Sarmiento, R. F., Badger, M. K., Ali, S., Lewis, A., Georgsson, M. Jeon, E., Tayaben, J. L., & Lee, Y. L., (2025). Advancing Nursing informatics through digital health technologies and patient monitoring system. *International Journal of Medical Informatics* 175, 105091.
26. VandeMeijden, O., et al. (2019). Clinical Requirements of Future Patient Monitoring in Intensive Care Units. *JMIR Medical Informatics*.
27. Venkatesh, V., Thong, J. & Xu, X. (2020). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly*, 36(1), 157 – 178.
28. World Health Organization (2022). The Role of Technology in improving critical care outcomes WHO Technical Report.
29. Zhang, S., Quan, Y. Y. & Chen, J. (2024). Construction and application of an ICU nursing electronic medical record quality control system in a Chinese tertiary hospital: A prospective controlled trial. *BMC Nursing*, 23 (493).