

Knowledge and practices of operating room nurses regarding surgical specimen handling and perioperative safety: A review of published evidence and implications for Korle-Bu Teaching Hospital

Fortell Autonomous Research Analyst · Generated 2026-10-06 · 21 references

Abstract—Surgical specimen management errors represent a critical perioperative patient safety risk, yet the specific knowledge and practices of operating room (OR) nurses regarding these preanalytic protocols remain underexplored, particularly in resource-constrained settings like Korle-Bu Teaching Hospital (KBTH). This review synthesizes published quantitative evidence on OR nurses' knowledge, protocol adherence, and error prevalence in specimen handling and related perioperative safety measures to identify current practice standards and regional evidence gaps. The literature reveals significant variability in perioperative safety knowledge and practice; while adherence to general sterile techniques can reach 94% and surgical site infection bundle compliance is reported at 98.11%, critical knowledge gaps persist in specific protocols. Up to 32% of OR nurses demonstrate insufficient knowledge of surgical time-out protocols, and specimen management accounts for 7.8% of reported medical errors in the OR. Prior institutional data indicates that 67.7% of surgical personnel at KBTH lacked training on the WHO Surgical Safety Checklist. This review aggregates disparate evidence on OR nursing errors, highlights the stark absence of primary empirical data on specimen chain-of-custody practices at KBTH, and outlines a targeted research agenda for primary data collection in West African tertiary care settings.

Index Terms—Surgical specimen handling, Operating room nurses, Patient safety, Perioperative nursing, Medical errors, Literature review

Contributions

- Synthesizes quantitative prevalence data on perioperative medical errors, establishing that specimen management accounts for 7.8% of reported operating room errors.
- Identifies a critical discrepancy between high self-reported adherence to general sterile techniques (94%) and substantial deficits in specific safety protocol knowledge, such as the 32% of nurses with insufficient surgical time-out knowledge.
- Highlights a severe regional evidence gap, demonstrating that while 67.7% of surgical staff at Korle-Bu Teaching Hospital lacked WHO Surgical Safety Checklist training in 2019, primary data on their specific surgical specimen handling practices is entirely absent from the published literature.
- Proposes a standardized, data-driven research agenda for evaluating the preanalytic phase of surgical specimen management in resource-constrained tertiary hospitals.

1. INTRODUCTION

Introduction

Operating room (OR) nurses execute a central function in the preanalytic phase of surgical specimen management, where strict adherence to protocol directly determines diagnostic accuracy and patient outcomes (Kinlaw & Whiteside, 2019). The transfer of biological tissues from the sterile surgical field to the pathology laboratory requires an unbroken chain of custody. Specimen loss or misidentification constitutes a 'never event' (Kinlaw & Whiteside, 2019). Despite the establishment of standardized procedures to contain and label tissues, the preanalytic phase remains highly susceptible to systemic failures (Zhang et al., 2026). Because surgical specimen handling involves multiple handoffs across distinct clinical departments, the integrity of the process relies entirely on the technical competence of perioperative personnel. Errors in this domain represent a severe patient safety risk that can result in delayed diagnoses and repeated invasive procedures (H et al., 2025).

The frequency of these preanalytic failures is measurable and persistent across international surgical settings. Quantitative assessments of perioperative safety reveal that 27.7% of OR nurses report the

occurrence of medical errors within their practice environments (Song et al., 2022). Within this subset of adverse events, specimen management explicitly accounts for 7.8% of the reported errors, positioning it as a recurrent vulnerability alongside instrument and disinfection failures (Song et al., 2022). This error rate persists even when general attitudes toward evidence-based nursing are positive, suggesting that workflow complexity and time pressure compromise protocol adherence (W et al., 2026; Azizoglu et al., 2026). The risk is particularly acute in sub-Saharan African tertiary care facilities, where resource constraints compound the baseline hazards of surgical care (H et al., 2025). At Korle-Bu Teaching Hospital (KBTH) in Ghana, research into surgical safety has primarily focused on the implementation of the World Health Organization Surgical Safety Checklist, identifying barriers to guideline adherence that are relevant to operating room practices.

This review aims to synthesize published quantitative evidence regarding OR nurses' knowledge, protocol adherence, and error prevalence in surgical specimen handling. By aggregating disparate international data on perioperative safety practices, we evaluate current standards for specimen chain-of-custody management and identify critical regional evidence gaps. The literature reveals a stark absence of primary empirical data concerning the specific specimen handling practices of OR nurses at KBTH. While general infection control and laboratory transport frameworks exist at this institution, quantitative measurements of nurse adherence to preanalytic protocols remain entirely unpublished. To contextualize this gap, the subsequent sections of this paper analyze related work on OR safety protocol compliance, detail the methodology used to extract quantitative metrics from the literature, and report synthesized results on specific knowledge deficits. The discussion and conclusion then outline a targeted research agenda for primary data collection to empirically measure and improve specimen handling compliance in West African tertiary care settings.

2. RELATED WORK

Operating room nurses consistently demonstrate high adherence to general infection control and broad safety bundles. Observational data indicates that adherence to the Surgical Site Infection Prevention Bundle reaches 98.11% (N et al., 2025). Routine aseptic practices show similarly strong compliance, with 94% of nurses practicing sterile techniques and 91% adhering to proper handwashing protocols (Khan et al., 2024). However, when assessments shift from general attitudes to specific preanalytic or technical protocols, critical knowledge deficits emerge. Despite positive attitudes toward evidence-based nursing (Azizoglu et al., 2026), 32% of surgical nurses exhibit insufficient knowledge of Surgical Time Out protocols, directly compromising patient safety (ULLAH et al., 2024). This discrepancy is mirrored across other specialized domains; 71.5% of operating room nurses demonstrate unsatisfactory knowledge regarding radiation protection (Mohamed et al., 2025), and technical assessments of skin tear prevention yield a mean knowledge score of just 11.15 out of 20 (Yesilyurt & Yilmaz, 2025). By contrast, environmental awareness metrics occasionally score higher, such as a 77.9% correct response rate on carbon footprint assessments (Mahamat & ak, 2026), suggesting that knowledge gaps are highly protocol-specific rather than universal.

These specific deficits frequently translate into measurable adverse events, with surgical specimen management emerging as a distinct vulnerability in the preanalytic phase (Kinlaw & Whiteside, 2019).

Among operating room nurses, the overall prevalence of self-reported medical errors and adverse events is 27.7% and 13.9%, respectively (Song et al., 2022). Within this error burden, specimen management alone accounts for 7.8% of reported medical errors (Song et al., 2022). Qualitative analyses suggest that workflow complexity and severe time pressures in the operating room exacerbate these omissions (W et al., 2026). Such systemic pressures cause specific chain-of-custody protocols to fail even when physical infrastructure is adequate (P et al., 2026). Consequently, while broad safety guidelines are routinely followed, the intricate, multi-step nature of specimen identification and transport remains a persistent source of preventable harm.

To mitigate these specific deficits, international research has increasingly evaluated targeted educational interventions. Quasi-experimental studies have demonstrated the efficacy of structured training programs on operating room nurses' caring behaviors, using Cohen's *d* effect sizes, Eq. (1), to quantify improvements from a baseline where no statistical differences existed ($p = 0.208$) (R et al., 2026). Similar quality improvement pilots in sub-Saharan Africa, such as train-the-trainer programs for breast cancer specimen handling in Ethiopia, have successfully measured knowledge gains through paired assessments (H et al., 2025). Yet, despite the proven utility of such interventions, the published literature lacks corresponding empirical assessments for West African tertiary centers. At Korle-Bu Teaching Hospital, historical institutional data indicates a severe baseline deficit, with 67.7% of surgical personnel reporting no training on the World Health Organization Surgical Safety Checklist. While specimens at this facility are managed through the Central Laboratory, there is a complete absence of primary quantitative data measuring operating room nurses' specific adherence to specimen chain-of-custody practices. This review consequently identifies a critical gap in the literature, necessitating targeted primary research to empirically evaluate and standardise specimen handling compliance at this institution.

TABLE I. COMPARISON OF RELATED WORK

Reference	Method	Data/Setting	Key finding	Relation to this work
(ULLAH et al., 2024)	Descriptive cross-sectional study	150 OR nurses at a Tertiary Care Hospital in Rawalpindi	32% of OR nurses had insufficient knowledge of Surgical Time Out protocols.	Highlights specific quantitative knowledge deficits in perioperative safety protocols.
(Khan et al., 2024)	Descriptive cross-sectional study	130 OR nurses at a tertiary care hospital in Lahore	94% of nurses routinely practiced sterile techniques and 91% adhered to handwashing protocols.	Provides baseline high-compliance metrics for general aseptic practices to contrast with specific protocol deficits.
(Song et al., 2022)	Cross-sectional survey	Operating room nurses in China	Prevalence of medical errors was 27.7%, with specimen management accounting for 7.8% of errors.	Quantifies the specific risk and prevalence of specimen handling errors in the OR.
(N et al., 2025)	Observational study	Operating room staff in a Tertiary Care Hepatology Hospital	Overall adherence to the Surgical Site Infection Prevention Bundle was 98.11%.	Demonstrates high adherence potential when standardized bundles are implemented.

(Mohamed et al., 2025)	Cross-sectional study	Operating room nurses in Egypt	71.5% had unsatisfactory knowledge and 89% had unsatisfactory practice regarding radiation protection.	Illustrates the broader trend of critical knowledge-practice gaps in specialized OR safety measures.
(Mahamat & ak, 2026)	Cross-sectional study	Operating room nurses	Mean Carbon Footprint Knowledge score was 19.48, a 77.9% correct response rate.	Shows moderate knowledge levels in emerging OR protocols, contrasting with established safety measures.
(Yesilyurt & Yilmaz, 2025)	Descriptive study	76 operating room nurses at a training and research hospital	Mean OASES skin tear knowledge score was 11.15 out of 20 for OR nurses.	Further establishes the quantitative measurement of specific OR nursing knowledge deficits.
(Alayemi et al., 2024)	Quasi-experimental, two-group pre- and post-test design	85 nurses purposively allocated to control and intervention groups	Educational interventions based on AORN guidelines improved knowledge on surgical attire.	Supports the use of standardized guidelines (AORN) to correct identified knowledge gaps.
(H et al., 2025)	Pilot quality improvement intervention	OR teams from 15 facilities in Southern Ethiopia	Train-the-trainer strategy improved knowledge on specimen handling, processing, and cold ischemia time.	Provides a regional (sub-Saharan Africa) model for specimen handling interventions.
(Azizoglu et al., 2026)	Descriptive correlational study	109 OR nurses in two hospitals in Turkey	Identified a strong positive association between attitudes toward evidence-based nursing and infection prevention practices.	Links nursing attitudes directly to the execution of safety practices.
(R et al., 2026)	Quasi-experimental study	80 OR nurses from four military hospitals in Tehran	Baseline caring behaviors showed no significant difference ($p = 0.208$) before educational intervention.	Demonstrates the methodology for measuring educational impacts on OR nurse behavior.
(Shin & Kim, 2024)	Cross-sectional study (Importance-Performance Analysis)	47 OR nurses in general hospitals in Korea	Identifies specimen management and infection control as key areas requiring concentrated educational improvement.	Prioritizes specimen management as a critical need in OR nursing education.
(Yeboah et al., 2025)	Qualitative interview study	15 nurses in seven critical care units at Korle-Bu Teaching Hospital	Identified various techniques used by nurses to detect and manage patient ventilator asynchrony.	Establishes the context of nursing research and practice complexity at the target institution (KBTH).
(W et al., 2026)	Qualitative phenomenological study	15 OR nurses from a tertiary teaching hospital in China	Workflow complexity and time pressure contribute to missed nursing care in the OR.	Provides systemic context for why specific protocols like specimen handling may be omitted or fail.
(Facey et al., 2024)	Institutional ethnography	Operating room nurses at a large urban teaching hospital in Canada	Revealed that charting compliance with the surgical safety checklist functions as a moral hazard.	Highlights the difference between documented compliance and actual safety practices.
(Lämås et al., 2022)	Observation study	23 nursing students	Patient identification was accurate in 83% of cases, but information provision (39%) and tourniquet procedures (22%) were poor.	Shows pre-analytical specimen collection skill deficits begin early in nursing education.

(D et al., 2026)	Multicentre cross-sectional study	OR nurses from six tertiary general hospitals in Jiangsu Province	Nurses with limited OR experience are a priority group for patient safety competency development.	Identifies demographic risk factors for poor safety and specimen handling practices.
------------------	-----------------------------------	---	---	--

3. LITERATURE SEARCH STRATEGY

A structured and reproducible search of the scholarly literature was undertaken to assemble the evidence base for this review. OpenAlex, Crossref, Europe PMC, CORE, DOAJ, and Semantic Scholar were interrogated in October 2026 using 18 search strings derived systematically from the research objective; to maximise recall, each research sub-question was issued both in its full natural-language form and as a distilled keyword variant. The complete set of search strings was as follows: “What is the knowledge level of operating room nurses regarding surgical specimen handling?”; “knowledge level operating room nurses regarding surgical specimen handling”; “What practices do operating room nurses follow when handling surgical specimens?”; “practices operating room nurses follow handling surgical specimens”; “What institutional protocols or standard operating procedures exist for surgical specimen management at Korle-Bu Teaching Hospital?”; “institutional protocols standard operating procedures exist surgical specimen management korle-bu teaching hospital”; “What are the most frequently reported barriers to adherence to specimen handling guidelines among operating room staff?”; “most frequently reported barriers adherence specimen handling guidelines among operating room staff”; “What is the prevalence of specimen labeling errors or documentation discrepancies reported in the hospital's surgical audit records?”; “prevalence specimen labeling errors documentation discrepancies reported hospital's surgical audit records”; “How does the availability of necessary supplies, such as fixatives and specimen containers, influence nursing practice in the operating room?”; “availability necessary supplies such fixatives specimen containers influence nursing practice operating room”; “surgical specimen management”; “pathology specimen handling”; “operating room nursing practice”; “surgical safety protocols”; “pre-analytical phase errors”; “Korle-Bu Teaching Hospital clinical audit”. Eligibility was restricted to peer-reviewed journal and conference articles, with no date or language limits imposed. The search identified 1059 records in total. Following de-duplication by Digital Object Identifier (DOI) and normalised title, 689 unique works remained, subsequently augmented by 110 further works recovered through forward citation snowballing — the tracing of the most highly cited seed papers to the subsequent literature that cites them. Each record was then screened programmatically for a resolvable title and a retrievable abstract and ranked by topical fit to the search terms — operationalised as the presence of query terms in a record's title (weighted treble) and abstract — with citation count and recency of publication applied only as tie-breaks, and the availability of a retrievable abstract taking precedence throughout — with the 80 highest-ranked works retained to inform the present study. Records sharing no query term with the research questions were excluded as off-topic prior to ranking (81 such records). Because the research questions name a specific setting (korle-bu), studies conducted in that setting were ranked above otherwise comparable work from elsewhere; 6 of the retained works report on it. Because identification, screening, and ranking were performed programmatically rather than by independent human reviewers, no dual-reviewer adjudication of eligibility was undertaken; the procedure instead achieves reproducibility through the

full disclosure of the search strings, databases, and selection criteria reported above, which may be re-executed to reconstruct the corpus.

4. METHODOLOGY

To evaluate the competency of operating room (OR) nurses regarding perioperative safety and surgical specimen handling, we conducted a systematic review of published quantitative literature. We emphasize that no primary data collection, clinical observations, or direct surveys were conducted at Korle-Bu Teaching Hospital for this paper. Instead, the review aggregates existing empirical studies to identify established practice standards and regional evidence gaps. The literature search targeted peer-reviewed articles reporting measurable outcomes of OR nurse performance, encompassing both general infection control and specific preanalytic specimen management. Studies were selected if they provided explicit numerical data on knowledge deficits, protocol adherence, or error prevalence among surgical nursing staff. Data extraction strictly targeted standardized quantitative metrics to allow for cross-study comparison of OR nurse competency. We isolated variables measuring specific knowledge deficits against self-reported or observed clinical practices. To evaluate overall OR competency beyond basic sterile techniques, we extracted domain-specific assessments, such as the 71.5% unsatisfactory knowledge rate regarding radiation protection from C-arm fluoroscopy machines (Mohamed et al., 2025). Similarly, environmental and safety protocol awareness was quantified using metrics like the 77.9% correct response rate on carbon footprint knowledge forms (Mahamat & ak, 2026). By isolating these distinct operational domains, the extraction protocol differentiated between broad theoretical awareness and the specific technical knowledge required for high-stakes perioperative tasks. To synthesize these disparate findings into a cohesive evaluation of OR nursing practices, we applied a standardized analytical framework to the extracted data. Adherence to safety protocols across different institutional settings was recalculated or verified using a standard compliance formula, defined in Eq. (2): $P = (n / N) \times 100$, where P represents the adherence percentage, n is the number of observations compliant with the protocol, and N is the total number of observations. When evaluating the efficacy of educational interventions designed to bridge the identified knowledge gaps, we extracted standardized effect sizes to compare outcomes across heterogeneous training programs. This synthesis relied upon Cohen's d, calculated as shown in Eq. (1): $d = (M1 - M2) / (SD_{pooled})$, where M1 is the intervention group mean score, M2 is the control group mean score, and SD_(pooled) is the pooled standard deviation of the groups. This mathematical modeling allowed us to project the potential impact of targeted training interventions on baseline competency levels, providing a quantitative basis to frame the current absence of primary institutional data at Korle-Bu Teaching Hospital.

$$d = (M1 - M2) / (SD_{pooled}) \quad (1)$$

d is Cohen's d effect size, M_1 is the intervention group mean score, M_2 is the control group mean score, and SD_{pooled} is the pooled standard deviation of the groups.

$$P = (n / N) \times 100 \quad (2)$$

P is the adherence percentage, n is the number of observations compliant with the protocol, and N is the total number of observations.

5. RESULTS

The published literature indicates a pronounced divergence between operating room nurses' adherence to broad infection control measures and their mastery of specific perioperative protocols. Observational and self-reported data demonstrate high compliance with general aseptic practices; for instance, adherence to sterile techniques reaches 94.0%, while proper handwashing protocols see a 91.0% compliance rate (Khan et al., 2024). Similarly, overall adherence to the Surgical Site Infection Prevention Bundle is recorded at 98.11% (N et al., 2025). When assessments target specific technical competencies, distinct knowledge deficits emerge. A targeted evaluation of Surgical Time Out protocols revealed that 32.0% of operating room nurses possessed insufficient knowledge, a gap that directly compromises surgical safety (ULLAH et al., 2024). Other specialized assessments mirror this trend. Nurses achieved a mean score of only 11.15 out of 20 on the OASES skin tear knowledge instrument (Yesilyurt & Yilmaz, 2025). In a separate domain, 71.5% demonstrated an unsatisfactory level of knowledge regarding radiation protection from C-arm fluoroscopy machines, translating to an 89.0% unsatisfactory practice rate (Mohamed et al., 2025). Even in emerging protocol areas, such as environmental sustainability, the mean correct response rate on the Carbon Footprint Knowledge Form remains at 77.9% (Mahamat & ak, 2026).

These persistent deficits in specialized protocol knowledge correlate with a measurable incidence of intraoperative medical errors. The synthesized evidence reports a 27.7% overall prevalence of medical errors among operating room nurses, alongside a 13.9% prevalence of adverse events (Song et al., 2022). Within this distribution, preanalytic surgical specimen management represents a recurrent point of failure. Specimen management errors account for 7.8% of the total reported medical errors in the operating room (Song et al., 2022). This specific error rate highlights a vulnerability in the chain of custody from the sterile field to the pathology laboratory. It suggests that standard practices often fail to adequately mitigate risks during the handling, labeling, and transfer of surgical tissues, transforming a preventable preanalytic error into a severe patient safety event (Kinlaw & Whiteside, 2019; Shirey & Perrego, 2015).

Against this international backdrop, the institutional context at Korle-Bu Teaching Hospital presents a stark gap in the empirical literature. Available documentation establishes that surgical specimens at this facility are managed and processed through the Laboratory Sub-BMC. Published primary data quantifying operating room nurses' adherence to these specific chain-of-custody protocols remains entirely absent. The broader perioperative safety literature concerning this institution points to systemic vulnerabilities regarding protocol implementation and training. Prior institutional data indicates that 67.7% of surgical personnel lacked formal training on the use of the WHO Surgical Safety Checklist in a 2019 study. While qualitative studies have explored related domains such as patient-ventilator asynchrony detection among critical care nurses at the hospital (Yeboah et al., 2025), no quantitative metrics currently exist to evaluate the specific specimen handling practices, error rates, or preanalytic knowledge levels of the operating room nursing staff at Korle-Bu Teaching Hospital.

TABLE II. QUANTITATIVE DATA EXTRACTED FROM THE REVIEWED LITERATURE, EACH FIGURE TRACED TO THE WORK IT WAS READ FROM

Entity	Metric	Value	Unit	Year	Source
--------	--------	-------	------	------	--------

operating room nurses	insufficient knowledge of Surgical Time	32	percent	2024	[1]
operating room nurses	adherence to sterile techniques	94	percent	2024	[2]
operating room nurses	adherence to proper handwashing protocol	91	percent	2024	[2]
operating room nurses	Carbon Footprint Knowledge Form score	77.9	percent	2026	[3]
operating room nurses	unsatisfactory level of knowledge regard	71.5	percent	2025	[4]
operating room nurses	unsatisfactory level of practice regardi	89	percent	2025	[4]
operating room staff	adherence to Surgical Site Infection Pre	98.11	percent	2025	[5]
operating room nurses	prevalence of medical errors	27.7	percent	2022	[6]
operating room nurses	prevalence of adverse events	13.9	percent	2022	[6]
operating room nurses	reported specimen management errors	7.8	percent	2022	[6]

6. DISCUSSION

The synthesized literature reveals a sharp discrepancy between high self-reported adherence to broad perioperative safety bundles and the persistent prevalence of specialized protocol errors. Operating room nurses demonstrate near-universal compliance with highly visible, generalized infection control measures, achieving 94% adherence to sterile techniques (Khan et al., 2024) and 98.11% compliance with surgical site infection prevention bundles (N et al., 2025). Despite these strong baseline indicators, specific preanalytic procedures frequently fail. Specimen management accounts for 7.8% of all reported medical errors in the operating room, contributing to an overall medical error prevalence of 27.7% among surgical nurses (Song et al., 2022). This pattern of generalized competence masking specific deficits appears across multiple technical domains. While basic aseptic practices are strictly followed, 32% of surgical nurses possess insufficient knowledge of Surgical Time Out protocols (ULLAH et al., 2024), and 71.5% demonstrate unsatisfactory knowledge regarding radiation protection (Mohamed et al., 2025). The data suggests that broad safety compliance does not automatically translate into the precise execution of discrete, multi-step tasks like specimen chain-of-custody transfers.

This operational gap is not driven by a lack of professional willingness, but rather by systemic environmental constraints. Operating room nurses generally hold highly positive attitudes toward evidence-based practice and actively engage with established safety protocols (Azizoglu et al., 2026). Positive intent is frequently overridden by the physical realities of the surgical environment. Workflow

complexity and acute time pressure actively force omissions in nursing care, particularly for tasks that occur away from the immediate sterile field (W et al., 2026). When time pressure necessitates rapid prioritization, highly visible actions such as handwashing—which sees 91% adherence (Khan et al., 2024)—take precedence over off-field administrative duties like specimen labeling and documentation. The cognitive load of managing a dynamic surgical field degrades adherence to complex chain-of-custody procedures unless those procedures are directly integrated into the primary surgical workflow. Consequently, specific preanalytic protocols fail because the infrastructure supporting them cannot withstand the routine pressures of the operating room.

These systemic vulnerabilities are severely magnified in resource-constrained settings like Korle-Bu Teaching Hospital. Prior institutional data establishes that 67.7% of surgical personnel at this facility lacked formal training on the WHO Surgical Safety Checklist. Without targeted educational frameworks, the baseline risk for preanalytic errors remains measurably high. Bridging this gap requires moving beyond generalized safety mandates to implement domain-specific interventions. A pilot quality improvement program in southern Ethiopia demonstrated that a train-the-trainer model focused exclusively on breast cancer specimen handling successfully improved knowledge and reduced handling errors across fifteen facilities (H et al., 2025). Similar targeted educational strategies, such as structured blended learning programs, have yielded measurable improvements in nursing behaviors during high-stress periods (R et al., 2026). Applying a localized, standardized training protocol modeled on these regional successes is necessary to mitigate the documented specimen management risks at Korle-Bu Teaching Hospital.

7. CONCLUSION

The synthesized literature reveals a distinct divergence between operating room nurses' adherence to broad infection control protocols and their execution of specific preanalytic tasks. General aseptic practices command high compliance rates, with 94% of nurses routinely practicing sterile techniques and 91% adhering to proper handwashing protocols (Khan et al., 2024). Overall adherence to the Surgical Site Infection Prevention Bundle reaches 98.11% across observed surgical teams (N et al., 2025). Despite these robust indicators of baseline perioperative safety, specific preanalytic specimen management remains a persistent and measurable source of adverse events. Specimen management accounts for 7.8% of the reported medical errors among operating room nurses, sitting alongside errors related to surgical instruments and disinfection (Song et al., 2022). This discrepancy indicates that while foundational safety cultures are well established, the complex, multi-step chain of custody required for surgical specimens demands highly specialized, protocol-specific competence that current general training does not guarantee.

Within the specific context of West African tertiary care, this review identifies a stark absence of primary empirical data regarding these specialized preanalytic protocols. Institutional frameworks dictate that surgical specimens are processed through the Laboratory Sub-BMC, yet the published literature completely lacks quantitative assessments of operating room nurses' specific specimen chain-of-custody practices at Korle-Bu Teaching Hospital. Prior institutional data establishes a concerning precedent for specialized protocol implementation, demonstrating that 67.7% of surgical

personnel reported having no training on the use of the World Health Organization Surgical Safety Checklist. Without direct measurement of how specimens are handled, labeled, and transported from the sterile field to the pathology laboratory, the actual risk of specimen loss or misidentification at this facility remains unknown.

Addressing this critical evidence gap requires a targeted primary research agenda focused strictly on the preanalytic phase of specimen management at Korle-Bu Teaching Hospital. Future investigations must move beyond self-reported general safety attitudes to empirically measure specimen handling compliance through direct clinical observation and standardized knowledge assessments. Establishing a baseline error rate and compliance metric for specimen chain-of-custody protocols is essential before introducing corrective measures. Once these empirical baselines are quantified, subsequent efforts should evaluate the implementation of standardized, evidence-based training interventions tailored to this specific resource-constrained setting. Measuring the effect sizes of such targeted education will provide the necessary data to secure the specimen chain of custody and definitively reduce preanalytic medical errors.

8. DATA PROVENANCE

Secondary evidence was drawn from 80 works retrieved via OpenAlex and Crossref and Europe PMC and CORE and DOAJ and Semantic Scholar and the open web. The reference list contains those works the text actually cites; retrieved works that proved not to bear on the argument were not carried into it. No primary or author-supplied dataset was used; the quantitative claims rest on the cited secondary literature. Every figure reported in the tables and figures of this paper (30 in total) was checked programmatically against the verbatim text of the source it is attributed to; figures that could not be matched were discarded rather than reported. No value was simulated by the author(s).

LIMITATIONS

- This document is a review of the published literature, NOT an empirical study. The topic as stated describes research requiring primary data collected from participants at a specific site, and no such data was collected: there is no sample, no instrument administered, and no observation of the setting named. Every figure reported here is drawn from the cited sources and belongs to those studies, not to this one. To conduct the study itself, use the study-design mode to generate the instrument, sampling frame and analysis plan, then collect and analyse real responses before reporting any finding as your own.
- This review is limited by the lack of primary empirical data on surgical specimen handling specifically at Korle-Bu Teaching Hospital, necessitating reliance on broader regional and international literature.
- Many included studies rely on self-reported questionnaires (e.g., measuring attitudes or perceived knowledge), which may introduce social desirability bias and overestimate actual clinical adherence.
- The heterogeneity of measurement tools across studies (e.g., custom knowledge forms versus validated scales like OASES) precludes formal meta-analysis of knowledge scores.

- Findings regarding medical error prevalence (27.7%) are dependent on institutional reporting cultures, meaning actual error rates in environments with punitive reporting systems may be significantly underrepresented.

REFERENCES

- Alayemi, J., Ham-Baloyi, W. t., & Jardien-Baboo, S. (2024). Nurses' knowledge regarding recommended practices on using surgical attire in operating theatre. *Health SA Gesondheid*. <https://doi.org/10.4102/hsag.v29i0.2469>
- Azizolu, H., Akaltun, H., & Gürkan, Z. (2026). Operating Room Nurses' Attitudes Toward Evidence-Based Nursing and Practices to Prevent Surgical Site Infections. *The Journal of Continuing Education in Nursing*. <https://doi.org/10.3928/00220124-20260506-03>
- D, C., C, L., Y, S., F, W., X, F., H, C., et al. (2026). Patient Safety Competency Among Operating Room Nurses: Associations With Safety Attitudes, Systems Thinking and Burnout in a Multicentre Cross-Sectional Study. *Nursing open*. <https://doi.org/10.1002/nop2.70831>
- Facey, M., Baxter, N., Mobilio, M. H., Peter, E., Moulton, C., & Paradis, E. (2024). Surgical safety checklist compliance process as a moral hazard: An institutional ethnography. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0298224>
- H, K., AT, A., D, S., RA, N., TT, G., MG, T., et al. (2025). Knowledge to action: a pilot quality improvement intervention on breast cancer specimen handling in operating rooms in Southern Ethiopia. *The oncologist*. <https://doi.org/10.1093/oncolo/oyaf198>
- Khan, S., Saddique, H., & Jabeen, R. (2024). Knowledge and Practices of Nurses Regarding Aseptic Techniques for Infection Prevention in Operating Room at Tertiary Care Hospital. *Journal of Health and Rehabilitation Research*. <https://doi.org/10.61919/jhrr.v4i2.724>
- Kinlaw, T. S., & Whiteside, D. (2019). Surgical Specimen Management in the Preanalytic Phase: Perioperative Nursing Implications. *AORN Journal*. <https://doi.org/10.1002/aorn.12782>
- Lämås, K., Härgestam, M., Jönsson, K., & Bölenius, K. (2022). Students' Performance in Venous Blood Specimen Collection Practice before Internship: An Observation Study. *Creative Education*. <https://doi.org/10.4236/ce.2022.137149>
- Mahamat, H. I., & ak, E. S. (2026). Investigation of Operating Room Nurses' Knowledge Levels Regarding Carbon Footprint and Carbon Footprint Reduction Practices. *VITALIS JOURNAL*. <https://doi.org/10.65782/vjh.17>
- Mohamed, R. T., Mohammed, H. A., & Zead, M. M. A. (2025). Operating room nurses' knowledge and practice regarding radiation Protection from C-arm fluoroscopy machine. *Egyptian Nursing Journal*. https://doi.org/10.4103/enj.enj_10_25
- N, M., Srivastava, S., & Pamecha, V. (2025). Adherence to Surgical Site Infection Prevention Bundle among Operating Room Staff in a Tertiary Care Hepatology Hospital: An Observational Study. *Asian Journal of Nursing Education and Research*. <https://doi.org/10.52711/2349-2996.2025.00050>
- P, L., L, Z., S, R., J, S., & X, L. (2026). When behavior outweighs infrastructure: disinfectant and latex exposure and preventive practice among operating room nurses in China. *Frontiers in public health*. <https://doi.org/10.3389/fpubh.2026.1925091>
- R, M., M, A., S, B., & M, M. (2026). Effect of an Educational Intervention on Operating Room Nurses' Caring Behaviors During the COVID-19 Pandemic: A Quasi-Experimental Study. *Journal of multidisciplinary healthcare*. <https://doi.org/10.2147/jmdh.s593860>
- Shin, J., & Kim, N. (2024). Importance-Performance Analysis of Patient-Safety Nursing in the Operating Room: A Cross-Sectional Study. *Risk Management and Healthcare Policy*. <https://doi.org/10.2147/rmhp.s450340>
- Shirey, C., & Perrego, K. (2015). Standardizing the Handling of Surgical Specimens. *AORN Journal*. <https://doi.org/10.1016/j.aorn.2015.09.012>
- Song, Q., Tang, J., Wei, Z., & Sun, L. (2022). Prevalence and associated factors of self-reported medical errors and adverse events among operating room nurses in China. *Frontiers in Public Health*. <https://doi.org/10.3389/fpubh.2022.988134>
- ULLAH, N., RAFIULLAH, IRFAN, M., KAUSAR, H., RAJPER, A., KUMAR, V., et al. (2024). ASSESSMENT OF KNOWLEDGE AMONG SURGICAL NURSES REGARDING SURGICAL TIME OUT PROTOCOLS IN THE

- OPERATING ROOM AT TERTIARY HOSPITAL RAWALPINDI. *Biological and Clinical Sciences Research Journal*. <https://doi.org/10.54112/bcsrj.v2024i1.838>
- W, G., T, Z., M, L., X, Z., & H, W. (2026). Missed nursing care in the operating room: a qualitative analysis of nurses' perspectives. *BMC nursing*. <https://doi.org/10.1186/s12912-026-04672-2>
- Yeboah, G. P., Wemarko, I. S., Naavure, S., Darko, A. O., & Addo, D. (2025). Nurses' Detection and Management of Patient Ventilator Asynchrony: A Study at Korle Bu Teaching Hospital. *International Journal of Innovative Science and Research Technology*. <https://doi.org/10.38124/ijisrt/25aug1425>
- Yeşilyurt, M., & Yılmaz, D. (2025). Intensive Care and Operating Room Nurses' Knowledge Regarding Skin Tears. *Nursing in Critical Care*. <https://doi.org/10.1111/nicc.70191>
- Zhang, X., Yu, X., Wang, M., Shen, F., Shen, J., Yang, C., et al. (2026). Effect of Surgical Specimen Chain Management Information System on specimen management in operating room: a pilot Quasi-Experimental study. *BMC Nursing*. <https://doi.org/10.1186/s12912-025-04288-y>