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Assessment of Knowledge, Attitude and Practice Regarding Instrument Handling in Intraoperative Environment Among Operation Theatre Staff

Anam
Allied Health Science, The University of Lahore
Email: anamyaminshah@gmail.com
Muhammad Noman Rafique
Demonstrator, Allied Health Science, The University of Lahore
Email: muhammadnomanrafique1998@gmail.com
Aiman Ali
Allied Health Science, Khyber Medical University
Email: aimanaliaiman361@gmail.com
Syeda Sana
Allied Health Science, The University of Lahore
Email: sanasohail796@gmail.com
Alizay Rasheed
Allied Health Science, The University of Lahore
Email: alizaychaudhary293@gmail.com
Sidra Bibi
Lahore School of Nursing, The University of Lahore
Email: sidrachoudhry139@gmail.com

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Corresponding Author:
Muhammad Noman Rafique
Email:
muhammadnomanrafique1998@gmail.com

ABSTRACT

Background: Surgical instruments are critical tools during operations, and proper handling is essential for aseptic conditions, surgical efficiency, and patient safety. However, gaps in knowledge, attitude, and practice regarding instrument handling remain a concern in many healthcare settings. **Objective:** To assess the knowledge, attitude, and practice regarding instrument handling in the intraoperative environment among operating theatre staff. **Methodology:** A descriptive cross-sectional study was conducted over four months after approval from the Departmental Research Committee. Using non-random convenience sampling, 143 operating theatre personnel were enrolled. Data were collected with a pre-approved, self-administered questionnaire and analysed in SPSS version 27 using frequencies and percentages. **Results:** Most participants were aged 18–30 years (56.6%), female (67.8%), and had 2–5 years of experience (62.2%). While 88.1% considered proper handling extremely important, 83.2% always practised safe handling, and 84.6% would replace a contaminated instrument, only 60.8% held instruments by the sterile part, 65.0% inspected them after every use, and 51.7% received regular training. **Conclusion:** Attitudes and self-reported practices were generally positive, but gaps in specific technical practices and training highlight the need for mandatory, competency-based training, institutional policies, audits, and mentorship to reduce surgical site infections and improve patient outcomes.

Introduction

Surgical instruments are specially designed tools used to modify tissue or provide access during operative procedures. Common instruments include scalpels, forceps, scissors, needles, retractors, and specialised devices tailored to specific surgical disciplines. Handling of these instruments is critical not only to surgical efficiency and mobility but also to the prevention of tissue damage, instrument deterioration, and adverse patient outcomes (Khan et al., 2025). In the intraoperative environment, proper instrument handling is fundamental to maintaining surgical efficiency and ensuring patient safety. This responsibility rests heavily on operating theatre personnel, including surgeons, nurses, and technicians, whose knowledge, attitude, and practice regarding instrument handling shape aseptic conditions and surgical outcomes.

Surgical site infections (SSIs) remain among the most common and burdensome healthcare-associated infections globally, contributing significantly to patient morbidity, extended hospital stays, increased healthcare costs, and in severe cases, mortality. The World Health Organization (WHO) has identified SSI prevention as a global priority, emphasising that effective sterilization of medical instruments is fundamental to infection prevention (World Health Organization, 2018). However, implementation of sterilization protocols depends directly on the knowledge, attitudes, and practices of healthcare workers involved in instrument handling and reprocessing.

The importance of instrument handling extends beyond infection control to surgical safety, efficiency, and prevention of adverse events. Surgical patients face a high risk of adverse events in the hospital setting, many resulting from failures of non-technical skills in the operating room (Khan et al., 2025). Operating theatre personnel are also at increased risk of transmission of blood-borne pathogens when passing sharp instruments. The hands-free technique, whereby a tray or other means is used to eliminate simultaneous handling of sharp instruments, has been recommended to reduce percutaneous injuries among surgical team members (Stringer et al., 2002).

Knowledge alone does not guarantee appropriate practice, and the relationship between knowledge, attitude, and behaviour in surgical instrument handling is complex. Studies in related domains have shown that while healthcare workers may possess adequate knowledge and express positive attitudes toward infection control, actual practice often falls short of recommended standards. For instance, research on sterile techniques among nurses in operating rooms has shown that despite 58.1% demonstrating good knowledge and 56.1% reporting good practice, significant gaps remain in specific areas of sterile technique application (Habtewold et al., 2024). Factors associated with better practice include availability of guidelines, presence of supervision, and training.

The attitudes of operating theatre staff toward instrument handling and infection control represent an important dimension that influences behaviour. Research has consistently shown that attitudes toward sterilization and infection control tend to be highly positive among healthcare workers, with studies reporting that 78.5% demonstrated highly positive attitudes, particularly regarding patient safety and personal responsibility (Surabhi & Singh, 2025). However, translation of positive attitudes into consistent practice is mediated by multiple factors, including perceived barriers such as insufficient resources and time constraints.

The intraoperative environment presents unique challenges to maintaining optimal instrument handling. Personnel must navigate the demands of surgical procedures while adhering to strict sterile technique requirements and managing the physical and cognitive demands of instrument preparation, handling, and exchange. Research on ergonomic aspects has highlighted that traditional instrument table configurations can impose high physical and cognitive demands on nurses due to repetitive manual material handling (Aljuaid et al., 2022). The safety implications extend to both patients and healthcare workers: suture needle and scalpel injuries are among the most common staff injuries in the perioperative setting, occurring when items are passed between team members within the sterile environment (Association of periOperative Registered Nurses, 2023).

The reprocessing of surgical instruments between procedures represents a critical phase during which sterility must be maintained and contamination prevented. Operating theatre staff are responsible for following reprocessing of reusable medical devices from point-of-use through pretreatment, decontamination, cleaning, inspection, packaging, sterilization, and storage (Infection Control Today, 2026). The use of checklists and standardised protocols has also been promoted to improve surgical safety. The WHO surgical safety checklist was developed in recognition of the global problem of surgical complications and deaths and has been shown to reduce surgical complications and deaths related to surgery (Khan et al., 2025). However, effectiveness depends on consistent and correct use by all members of the surgical team.

The present study is situated within this broader context. While previous studies have examined various aspects of infection control and sterile technique among operating theatre staff, few have focused specifically on the comprehensive assessment of knowledge, attitude, and practice regarding instrument handling as a distinct competency. Furthermore, many existing studies have been conducted in high-income countries with well-resourced healthcare systems, and the extent to which their findings

apply to other settings remains uncertain. By conducting a systematic assessment among operating theatre staff, this study aims to identify specific deficits and inform evidence-based strategies to enhance practice.

Rationale

The knowledge, attitude, and practice (KAP) of operation theatre staff regarding instrument handling directly influence infection control and surgical quality. Assessing KAP helps identify gaps that may compromise patient safety, reveal barriers to protocol adherence, and highlight areas where training is inadequate. The findings of this study can guide targeted educational programmes, inform policy development, and support continuous professional training to improve compliance with standard operating procedures. Ultimately, enhancing instrument handling practices contributes to better surgical outcomes, reduced healthcare-associated infections, and improved quality of perioperative care.

Objective

To assess the knowledge, attitudes, and practices of operating theatre personnel related to the management of instruments during intraoperative care.

Literature Review

Khan et al. (2025) studied assessment of knowledge, attitude, and practice regarding instrument handling in the intraoperative environment among operation theatre staff. A descriptive cross-sectional design was used among operating theatre staff, and data were collected through a self-administered questionnaire. The study reported that 113 (78%) participants had a decent theoretical understanding of instrument handling, while 80% were aware of their responsibility in preventing surgical site infection. Despite relatively high knowledge and awareness, only 60% were adherent to proper handling protocols. Workload, time constraints, and limited resources were identified as the main obstacles to compliance, revealing a significant knowledge–practice gap despite positive attitudes.

Habtewold et al. (2024) studied nurses' knowledge, perceived practice, and associated factors toward sterile techniques in major operation rooms at public hospitals in Addis Ababa, Ethiopia. A cross-sectional study was conducted among nurses working in major operation rooms. The study found that 58.3% had good knowledge of sterile techniques, with important practice-related gaps. Nurses who used sterile technique guidelines were 1.9 times more likely to have good practice, while presence of supervision was associated with a 4.7-fold increase in the likelihood of good practice.

Shaheen et al. (2023) evaluated knowledge, attitude, and practice of sterile techniques among operating room personnel at Khyber Teaching Hospital, Peshawar. A quantitative design was used. The study highlighted the central role of operating room personnel in maintaining patient safety and preventing surgical site infections and emphasised that deficiencies in sterile technique can contribute to contamination and postoperative infection.

Nsekambabaye (2017) investigated knowledge, attitude, and practice of sterile techniques among operating room nurses in referral hospitals in Rwanda. The study addressed the importance of maintaining aseptic conditions during surgery and considered operating room personnel an important component of infection prevention. Instruments that are improperly handled, placed, transferred, or exposed may become contaminated and subsequently compromise the sterile field.

Minhas et al. (2017) assessed safety levels in operating rooms at two major tertiary care public hospitals in Karachi, Pakistan, with the objective of determining knowledge and attitude toward surgical safety among healthcare professionals. A pilot cross-sectional study was conducted among 543 healthcare providers working in operating rooms and surgical intensive care units. The study demonstrated the importance of assessing knowledge and attitudes toward surgical safety, as safe surgery requires coordinated behaviour.

Khan et al. (2025) also reported awareness and knowledge regarding handling of sharp instruments in an operation theatre at a tertiary care hospital in Peshawar. A cross-sectional survey of 168 participants used a structured questionnaire covering training, awareness, personal protective equipment, instrument inspection, sterile field practices, and safe transport of sharp instruments. The study reported that 70.2% had received training, while 29.8% had not. Awareness of personal protective equipment was high at 88.7%, and 75.6% regularly inspected instruments.

Ashley et al. (2022) examined competency assessment of operating room staff and related factors through a multi-centre cross-sectional study among 227 operating room staff from nine academic hospitals. The overall competence score was reported as optimal, but the lowest score was observed in general practical skills. This finding is important because instrument handling is a core practical skill.

Horgan et al. (2023) conducted a narrative systematic review of healthcare professionals' knowledge and attitudes toward surgical site infection and surveillance. The review reported that healthcare personnel often had limited understanding of surgical site infection and its prevention, although attitudes were generally favourable, particularly toward their involvement in prevention.

Allegranzi et al. (2016) presented an evidence-based worldwide view of the WHO guidelines for preoperative surgical site infection prevention. The guidelines were developed because of the worldwide occurrence of surgical site infections, gaps in evidence-based recommendations, and the need for standardisation. Leaper and Edmiston (2017) discussed the WHO Global Guidelines and emphasised standardised evidence-based approaches; within the operating theatre, healthcare workers must consistently apply infection prevention principles and maintain a controlled sterile environment. Seidelman et al. (2023) reviewed surgical site infection prevention and described SSI as a major patient-safety concern requiring multiple coordinated preventive measures, including instrument integrity, appropriate sterilization, sterile storage, correct transfer, and avoidance of contamination during surgery.

Rothrock (2022) in Alexander's Care of the Patient in Surgery provides comprehensive guidance on perioperative care, including principles of sterile technique, surgical instrumentation, patient safety, and coordination. Phillips (2020) in Berry & Kohn's Operating Room Technique emphasises technical and professional responsibilities, including appropriate preparation, handling, passing, counting, cleaning, and processing of instruments. Yadav et al. (2024) assessed nursing officers' knowledge and awareness of surgical site infection at SGT Hospital, Gurugram, and found a modest level of knowledge, with particular shortcomings in identifying signs and symptoms and applying nursing care practices.

Overall, the reviewed literature indicates that safe instrument handling is an important part of patient safety, infection prevention, and efficient surgical care. Evidence shows that staff may have adequate knowledge and positive attitudes while practical compliance is weaker. Training, workload, time pressure, resources, supervision, guidelines, and competency influence performance. However, limited research directly evaluates knowledge, attitude, and practice of instrument handling among theatre staff in local hospital settings. This gap supports the present study and may guide targeted staff training and quality-improvement educational interventions.

Material And Methods

Study Design

It was a descriptive cross-sectional study design.

Setting

Data were collected from private hospitals.

Study Duration

The duration of this study was 4 months after approval from the Departmental Research Committee.

Sample Size and Sampling Technique

The sample size was 143. A non-random convenience sampling technique was used.

Sample Selection

Inclusion criteria: operating theatre personnel aged 18 years and above; both male and female staff; OT nurses, OT technicians, surgeons, and OT technologists working in the operating theatre; and staff with more than six months of experience. Exclusion criteria: staff who were not willing to give data, and staff not directly involved in instrument handling.

Operational Definitions

Knowledge: The theoretical understanding of operating theatre personnel regarding instrument handling, including sterilization methods, identification of contaminated instruments, and safe passing techniques, as measured by the study questionnaire. Attitude: The beliefs, feelings, and perceptions of operating theatre personnel toward the importance of proper instrument handling in the intraoperative environment, as measured by the study questionnaire. Practice: The self-reported actions and behaviours of operating theatre personnel regarding instrument handling during surgical procedures, including holding, inspecting, passing, and responding to contaminated instruments, as measured by the study questionnaire. Instrument Handling: The process of managing surgical instruments during intraoperative care, including holding, inspecting, passing, and responding to contamination, to maintain sterility and prevent surgical site infections. Operating Theatre Personnel: Healthcare

workers who work in the operating theatre, including OT nurses, OT technicians, surgeons, and OT technologists, who are directly involved in instrument handling during surgical procedures. Intraoperative Environment: The period during which a surgical procedure is being performed, from the start of the operation until the patient is transferred out of the operating theatre.

Data Collection and Analysis

A pre-approved, self-administered questionnaire was used. Following approval of the synopsis, data collection commenced at the private hospitals. Information was obtained through the questionnaire focusing on knowledge, attitude, and practice regarding instrument handling in the intraoperative environment among operating theatre staff. Data analysis was carried out through SPSS version 27, and results were presented as frequencies and percentages.

Ethical Considerations

The rules and regulations set by the ethical committee of the University of Lahore were followed while conducting the research, and the rights of research participants were respected. Ethical approval was obtained from the Institutional Review Board (IRB) of the University of Lahore before commencement of the study. Written informed consent was taken from all participants before data collection. All information and data collection were kept confidential, participants remained anonymous throughout the study, and no personal identifiers were collected. Participants were informed that there were no disadvantages or risks, that they were free to withdraw at any time without penalty, and that responses would not affect employment or professional evaluation. Permission was obtained from the administration of the private hospitals. Data were kept under key and lock, and in the laptop under password.

Results

A total of 143 operating theatre personnel participated. The majority were aged 18–30 years (56.6%), followed by 31–40 years (21.0%), 41–50 years (17.5%), and 51–60 years (4.9%). Most participants were female (67.8%), while 32.2% were male. By professional category, OT nurses were the largest group (34.3%), followed by OT technicians (30.8%), surgeons (17.5%), and OT technologists (17.5%). Most participants (62.2%) had 2–5 years of experience, while 25.9% had 6–10 years, 8.4% had 6 months to 1 year, and 3.5% had more than 10 years of experience.

Table 1: Demographic Characteristics of Participants (n = 143)

Variable / Category	Frequency	Percent (%)
Age 18–30	81	56.6
Age 31–40	30	21.0
Age 41–50	25	17.5
Age 51–60	7	4.9
Gender: Male	46	32.2
Gender: Female	97	67.8
Surgeon	25	17.5
OT Nurse	49	34.3
OT Technician	44	30.8
OT Technologist	25	17.5
Experience 6 months–1 year	12	8.4
Experience 2–5 years	89	62.2
Experience 6–10 years	37	25.9
Experience >10 years	5	3.5

Regarding knowledge and handling, 60.8% reported holding instruments by the sterile part only, while 32.2% held them by any clean part and 6.3% were not sure. Most participants (65.0%) reported inspecting instruments after every use, whereas 21.7% inspected once daily and 13.3% occasionally. The majority (79.7%) identified autoclaving as the appropriate sterilization method, while 11.2% selected alcohol swabs and 9.1% selected dry heat/other methods. Most participants (84.6%) reported that they would replace the instrument with a sterile instrument if contamination occurred; 9.1% would continue using it and 6.3% were unsure.

Table 2: Knowledge and Handling of Surgical Instruments (n = 143)

Item	Frequency	Percent (%)
Hold by sterile part only	87	60.8
Hold by any clean part	46	32.2
Not sure	9	6.3
Inspect after every use	93	65.0
Inspect once daily	31	21.7
Inspect occasionally	19	13.3
Sterilization: Autoclaving	114	79.7
Sterilization: Alcohol swabs	16	11.2
Sterilization: Dry heat/other	13	9.1
Contamination: Replace with sterile instrument	121	84.6
Contamination: Continue using	13	9.1
Contamination: Unsure	9	6.3

Regarding passing and attitudes, 47.6% reported passing instruments without touching the sterile part, while 33.6% passed instruments by the handle and 18.9% used other methods. A very high proportion (88.1%) considered proper instrument handling extremely important, while 10.5% considered it moderately important and 1.4% slightly important. Most participants (74.1%) considered themselves adequately trained, while 23.8% felt they needed more training and 2.1% were unsure. About half (51.0%) reported being very confident in handling surgical instruments, while 39.9% were somewhat confident and 9.1% were not confident. The majority (85.3%) reported that instrument-handling protocols were strictly followed, while 14.0% reported they were flexible and 0.7% considered them not necessary. Most participants (82.5%) affirmed the importance of proper sterilization, while 10.5% responded no and 7.0% were uncertain.

Table 3: Passing Technique, Attitude, Training and Confidence (n = 143)

Item	Frequency	Percent (%)
Pass without touching sterile part	68	47.6
Pass by handle	48	33.6
Pass: Other	27	18.9
Handling extremely important	126	88.1
Handling moderately important	15	10.5
Handling slightly important	2	1.4
Adequately trained	106	74.1
Need more training	34	23.8
Unsure about training	3	2.1
Very confident	73	51.0
Somewhat confident	57	39.9
Not confident	13	9.1
Protocols strictly followed	122	85.3
Protocols flexible	20	14.0
Protocols not necessary	1	0.7
Proper sterilization important: Yes	118	82.5
Proper sterilization important: No	15	10.5
Proper sterilization important: Maybe	10	7.0

Regarding self-reported practice, 83.2% reported always practising safe instrument handling, while 12.6% did so sometimes and 3.5% rarely or never. Most participants (72.0%) reported that they would discard and replace an instrument when it was uncertain/unsafe, while 20.3% would ask a colleague, 4.2% would check personally, and 3.5% would use it without asking. Just over half (51.7%) reported receiving training regularly, while 35.7% received training occasionally and 12.6% reported never receiving training. Most participants (77.6%) reported always following recommended safety tools/practice, while 16.8% did so sometimes and 5.6% never did. The majority (85.3%) reported always maintaining a clean operating environment, while 10.5% did so most of the time and 4.2% rarely did.

Table 4: Self-Reported Practice, Refresher Training and Safety Practices (n = 143)

Item	Frequency	Percent (%)
Always practise safe handling	119	83.2
Sometimes practise safe handling	18	12.6
Rarely/never practise safe handling	5	3.5
Uncertain instrument: Discard and replace	103	72.0
Uncertain instrument: Ask a colleague	29	20.3
Uncertain instrument: Check personally	6	4.2
Uncertain instrument: Use without asking	5	3.5
Training: Regularly	74	51.7
Training: Occasionally	51	35.7
Training: Never	18	12.6
Safety tools/practice: Always	111	77.6
Safety tools/practice: Sometimes	24	16.8
Safety tools/practice: Never	8	5.6
Clean environment: Always	122	85.3
Clean environment: Most of the time	15	10.5
Clean environment: Rarely	6	4.2

Discussion

The present study provides a comprehensive cross-sectional assessment of instrument-handling knowledge, attitudes, and practices among 143 operating theatre personnel, comprising OT nurses (34.3%), OT technicians (30.8%), surgeons, and OT technologists. The findings reveal a workforce that is predominantly young (56.6% aged 18–30 years), female (67.8%), and relatively early in their careers, with 62.2% reporting 2–5 years of experience. While these demographic characteristics contextualise the results, the more substantive findings concern the coexistence of strong self-reported knowledge, positive attitudes, and generally high adherence to safe practices, alongside notable gaps in specific technical domains.

The demographic profile dominated by young, female OT nurses and technicians is consistent with the composition of the perioperative workforce in many settings. Studies from Ethiopia and Pakistan have similarly reported a predominantly female nursing workforce in operating rooms, with the majority holding diploma or bachelor's degrees and having fewer than ten years of experience (Hailu et al., 2024; Khan et al., 2025). The predominance of early-career staff is particularly significant because it suggests that observed practices reflect outcomes of relatively recent training programmes rather than entrenched habits acquired over decades. However, the finding that only 4.9% were aged 51–60 years raises questions about retention and mentorship of experienced staff.

The central finding that 60.8% reported holding instruments by the sterile part only, while 32.2% reported holding them by any clean part, reveals concerning variability in a fundamental aseptic practice. The 32.2% who held instruments by any clean part are potentially compromising sterility, as only the sterile portion should be handled during surgical procedures. This contrasts with higher levels of correct practice reported in the Ethiopian study, where 91% correctly identified that only sterile items should be used in the sterile field (Hailu et al., 2024). The discrepancy may reflect differences in question framing (knowledge versus self-reported practice) or genuine variation in practice.

Inspection of instruments is another critical infection-control practice, and the finding that 65.0% inspected instruments after every use is encouraging but leaves over one-third who inspected them only once daily (21.7%) or occasionally (13.3%). The AORN guidelines emphasise that instruments found to be contaminated with dried blood or body tissue must not be used, and if any instrument in a set is compromised, the entire set should be considered contaminated (AORN, 2026a). The relatively high proportion who did not inspect instruments before every use suggests that visual inspection is not consistently integrated into workflow.

Knowledge of sterilization methods was generally good, with 79.7% correctly identifying autoclaving. This is higher than the 50% who knew the standard autoclave temperature in a Pakistani study (Turkish Journal of Physiotherapy and Rehabilitation, 2025). However, 11.2% selected alcohol swabs and 9.1% selected dry heat or other methods, indicating that a minority hold misconceptions about sterilization that could have serious consequences if acted upon. Alcohol swabs are not an acceptable substitute for sterilization of surgical instruments (Turkish Journal of Physiotherapy and Rehabilitation, 2025).

Response to a contaminated instrument was one of the more reassuring findings: 84.6% reported they would replace the instrument with a sterile instrument if contamination occurred. This is consistent with best practice, as instruments found to

be contaminated must not be used (AORN, 2026a). However, the 9.1% who would continue using the instrument and 6.3% who were unsure represent a combined 15.4% who may not respond appropriately to contamination.

The finding that 47.6% passed instruments without touching the sterile part, while 33.6% passed them by the handle, is notable in light of the no-touch / hands-free technique recommended in the literature. The no-touch technique involves designating a neutral zone on the sterile field and placing sharp items within the zone for transfer between scrubbed personnel (AST, 2024). This technique has been shown to significantly decrease injuries and contaminations for scrub personnel and first assistants (AST, 2024). The fact that only about half reported using this technique suggests adoption is not yet universal.

The high proportion who considered proper handling extremely important (88.1%) and who reported always practising safe handling (83.2%) suggests a strong safety culture. This is consistent with Khan et al. (2025), who found 80% of OT staff were aware of their responsibility in preventing surgical site infection. However, the 10.5% who considered handling only moderately important and the 12.6% who practised safe handling only sometimes, plus 3.5% rarely or never, represent a group requiring targeted intervention.

The finding that 74.1% considered themselves adequately trained, while 23.8% felt they needed more training, is broadly consistent with the 71.4% of Ethiopian nurses who had received training on sterile techniques (Hailu et al., 2024). However, nearly one-quarter feeling inadequately trained is a significant concern, particularly given that training has been shown to independently predict higher knowledge levels (Turkish Journal of Physiotherapy and Rehabilitation, 2025). Confidence data reinforce this: while 51.0% were very confident, 39.9% were only somewhat confident and 9.1% were not confident.

Frequency of training reveals a particularly important gap: only 51.7% received training regularly, while 35.7% received it occasionally and 12.6% never received training. This is concerning in light of evidence that structured training programmes reduce handling damage by 60–80% and that the full pathway for independent handling of complex instruments requires 8–16 hours of training (Khan et al., 2025). The finding that 12.6% had never received training is difficult to justify in a modern surgical environment and suggests some staff may be handling instruments without having been assessed as competent.

High rates of self-reported protocol adherence — 85.3% reporting protocols strictly followed, 82.5% affirming importance of proper sterilization, and 77.6% always following relevant practice — stand in contrast to more variable practices in other domains. This discrepancy may reflect social desirability bias, a common limitation of self-reported data, or may indicate staff adhere to protocols when they are clear and well-communicated. The Saudi/UAE study found only 40.4% were confident in the current protocol, suggesting protocol clarity and perceived practicality are important determinants of adherence (Alhosani et al., 2024).

Action when an instrument is uncertain or unsafe is another critical indicator: 72.0% would discard and replace, but 20.3% would ask a colleague and 3.5% would use it without asking, a combined 23.8% who may not follow the safest course. Asking a colleague is not inherently unsafe, but it introduces delay and potential miscommunication, while using an uncertain instrument without asking is clearly dangerous. This echoes literature on communication barriers in OT settings, where communication issues during handover were identified as a concern by 38.5% in the Saudi/UAE study (Alhosani et al., 2024).

Limitations should be acknowledged. The cross-sectional design precludes causal inference, and reliance on self-reported data introduces possibility of social desirability bias and recall bias. The sample was drawn from a single setting, which limits generalisability, although demographic characteristics are broadly comparable to other studies (Hailu et al., 2024; Khan et al., 2025). Absence of observational data means actual practice may differ from reported practice, and future research should incorporate direct observation or audit to validate findings. Additionally, the questionnaire did not explore barriers to compliance in depth, and qualitative research would be valuable in understanding why gaps persist. The study area was limited, it was conducted in limited hospitals, and time duration was minimal.

Conclusion

The present study assessed instrument-handling knowledge, attitudes, and practices among 143 operating theatre personnel, most of whom were female, aged 18–30 years, and working as OT nurses or OT technicians, having 2–5 years of experience. This young, predominantly female, and early-career workforce reflects demographic composition reported in similar perioperative studies and suggests current practices are largely shaped by recent training rather than long-standing institutional habits. Overall, findings reveal a workforce with strong self-reported awareness of safe instrument handling and a generally positive safety culture, but also with important inconsistencies in specific technical practices that could compromise sterility and patient safety.

In conclusion, this study provides a detailed picture of instrument-handling knowledge, attitudes, and practices among OT personnel. Findings are largely positive: the majority hold instruments by the sterile part, inspect them regularly, know

autoclaving is the appropriate sterilization method, would replace contaminated instruments, consider proper handling extremely important, and report high protocol adherence. However, significant gaps remain — particularly handling by any clean part (32.2%), passing by the handle (33.6%), occasional or absent training (48.3% combined), and uncertainty about how to respond to contamination or uncertain instruments (15.4% and 23.8% respectively). These gaps are consistent with the wider literature and underline that positive attitudes alone do not ensure consistent safe practice.

Recommendations

Training in instrument handling, sterilization, and contamination response should be mandatory for all cadres, including nurses, technicians, surgeons, and technologists. It should be competency-based rather than attendance-based, with initial certification and annual refresher requirements. This would address the finding that 23.8% felt they needed more training and 48.3% received training only occasionally or never.

Institutional policies on instrument handling, sterile technique, and contamination response should be written, disseminated, and regularly audited. Observational audits, mentorship by experienced staff, and supervision should complement training to bridge the gap between positive attitudes and consistent practice. Future studies should use direct observation, larger and multi-centre samples, and qualitative methods to explore barriers to compliance and to evaluate interventions.

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