Natural Resources for Human Health
eISSN: 2583-1194

Original Research

Received 21 July 2026
Revised 25 Aug 2026
Accepted 10 Sep 2026

Natural Resources for Human Health 2026, Vol. 6 (22s): 1421–1428

KEYWORDS:
Interdisciplinary collaboration; Operating room; Surgical safety; Operating room efficiency; Teamwork; Perioperative nursing; Anesthesia specialists; Health information technicians; Surgical instruments; Surgical supply management; Interprofessional communication; Patient safety; Surgical errors; Operating room management; Perioperative care.

Interdisciplinary Collaboration Between Nurses, Anesthesia Specialists, Health Information Technicians, and OR Supply & Instrument Specialist Teams: Impact on Surgical Safety and Efficiency – A Systematic Review

Issa Hashem Mohammed Rudaini[1], Aljohara Mohammad Bin Hammadi[2], Ghadeer Mohammed Althani[3], Faisal Saad Turki Alabdalhadi[4], Hassan Mohammed Alkhamis[5], Sahar Abdu Qaysi[6], Rawiyah Abdu Qaysi[7], Maram Diab Alsulami[8], Wed Abdulmabud Bashikh[9], Dania Othman Altayyar[10], Eman Hamdan Alamri[11], Deem Saad Alkharbosh[12], Budur Zuhair Alnjjar[13]

[1]Health Information Technician, Civil Service Employee Health Affairs Ministry of National Guard
[2]Staff Nurse, King Abdullah bin Abdulaziz University Hospital
[3]Staff Nurse, King Abdullah bin Abdulaziz University Hospital
[4]Staff Nurse, KAAUH
[5] OR Supply & Instrument Specialist
[6]Nurse Specialist, National Guard Hospital King Abdulaziz Medical City Jeddah
[7]Nurse Specialist, Ministry of National Guard Health Affairs Jeddah Hemodialysis Center Jeddah
[8]Nurse Specialist, National Guard Hospital King Abdulaziz Medical City Jeddah
[9]Nurse Specialist, Ministry of National Guard Health Affairs Jeddah Hemodialysis Center Jeddah
[10]Nurse Specialist, Ministry of National Guard Health Affairs Jeddah Hemodialysis Center Jeddah
[11]Nurse Specialist, National Guard Hospital King Abdulaziz medical city Jeddah
[12]Anesthesia Specialist, King Abdullah bin Abdulaziz University Hospital
[13]Ministry of National Guard Health Affairs

ABSTRACT: Interdisciplinary collaboration in the operating room is essential for ensuring surgical safety, improving healthcare quality, and optimizing operating room efficiency. Surgical procedures require coordinated efforts among different healthcare professionals, including operating room nurses, anesthesia specialists, health information technicians, and operating room supply and instrument specialists. Each professional group contributes specific knowledge and responsibilities that collectively support safe and efficient perioperative care. Effective collaboration facilitates accurate information exchange, timely clinical decision-making, appropriate preparation of surgical instruments and equipment, and adherence to standardized safety protocols. This systematic review aims to examine the impact of interdisciplinary collaboration among these professional groups on surgical safety and operating room efficiency. Particular attention is given to the

Natural Resources for Human Health
eISSN: 2583-1194

role of communication, teamwork, shared responsibilities, and coordination in reducing surgical errors, preventing adverse events, improving patient identification, minimizing equipment-related delays, and optimizing operating room workflow. Furthermore, the review explores organizational and professional factors influencing collaboration, including leadership, staffing, workload, interprofessional education, technological support, and institutional safety culture. Potential barriers such as communication failures, professional hierarchy, role ambiguity, and inadequate coordination are also considered. Surgical safety and efficiency outcomes are evaluated through indicators such as surgical complications, retained surgical items, medication errors, operating room turnover time, surgical delays, cancellation rates, and resource utilization. Understanding the relationship between interdisciplinary teamwork and surgical outcomes may help healthcare organizations develop effective collaborative strategies, strengthen patient safety practices, and improve the overall performance of operating room departments.

INTRODUCTION

Modern surgical care is a complex process that requires the coordinated efforts of multiple healthcare professionals to ensure patient safety, achieve optimal clinical outcomes, and maintain efficient operating room performance. The operating room represents a highly specialized healthcare environment in which different professionals work together under considerable time pressure, requiring accuracy, effective communication, rapid decision-making, and strict adherence to established safety protocols. The increasing complexity of surgical procedures, advancements in medical technology, and growing demands for high-quality healthcare have made interdisciplinary collaboration an essential component of contemporary perioperative practice **(World Health Organization [WHO], 2009; National Academies of Sciences, Engineering, and Medicine, 2018).**

Interdisciplinary collaboration refers to the process through which healthcare professionals from different disciplines combine their knowledge, clinical expertise, skills, and responsibilities to achieve common patient care objectives. Unlike isolated professional practice, this approach emphasizes shared decision-making, mutual respect, accountability, and continuous communication among team members. In the operating room, effective collaboration is particularly important because communication failures, misunderstandings, or delays in performing essential tasks may result in serious consequences for patients. Therefore, coordinated teamwork is considered a fundamental element of safe surgical practice and effective operating room management **(Reeves et al., 2017; Rosen et al., 2018).**

Operating room nurses play a central role in coordinating perioperative activities, maintaining sterile conditions, preparing patients, monitoring surgical safety procedures, performing instrument and sponge counts, and facilitating communication among team members. Their continuous involvement throughout the surgical process enables them to identify potential risks, anticipate procedural requirements, and ensure that essential nursing interventions are performed appropriately. Effective collaboration between nurses and other operating room professionals contributes to continuity of care, prevention of avoidable errors, and timely management of unexpected surgical situations **(AORN, 2024; WHO, 2009).**

Anesthesia specialists represent another essential component of the interdisciplinary surgical team. Their responsibilities include pre-anesthetic assessment, airway management, administration of anesthetic medications, continuous monitoring of physiological parameters, and management of intraoperative complications. Close coordination between anesthesia specialists and nursing personnel is necessary to ensure appropriate patient positioning, safe medication administration, effective monitoring, and timely responses to changes in the patient's clinical condition. Communication between these professionals is particularly important during critical stages of surgery, including induction of anesthesia, surgical incision, major intraoperative events, and emergence from anesthesia **(WHO, 2009; Gawande et al., 2003).**

Health information technicians contribute to surgical safety by supporting the accurate collection, organization, processing, storage, and accessibility of patient health information. Accurate documentation of patient identification, medical history, allergies, laboratory investigations, surgical consent, medications, and perioperative events is essential for preventing information-related errors. Furthermore, effective management of electronic health records and integration of clinical

information systems facilitate communication among healthcare professionals, improve information accessibility, and support continuity of perioperative care. Health information technology can also contribute to improved coordination and patient safety when implemented within appropriate organizational and clinical workflows **(National Academies of Sciences, Engineering, and Medicine, 2018).**

Similarly, operating room supply and instrument specialists play a significant role in maintaining surgical readiness and preventing equipment-related complications. Their responsibilities involve ensuring the availability, preparation, organization, sterilization coordination, storage, and appropriate distribution of surgical instruments and supplies. The timely provision of functional instruments and necessary surgical materials is essential for maintaining uninterrupted surgical workflows. Inadequate instrument preparation, missing supplies, equipment malfunction, or inappropriate sterilization processes may lead to procedural delays and potential risks of surgical site infection. Consequently, effective communication between supply and instrument specialists, nurses, and other surgical professionals is necessary to ensure that all required resources are available at the appropriate time **(Rutala & Weber, 2008; WHO, 2016).**

One of the most important benefits of interdisciplinary collaboration is its potential to improve surgical safety by reducing preventable adverse events and strengthening adherence to standardized clinical procedures. Surgical safety depends not only on the technical competence of individual professionals but also on their ability to exchange accurate information, recognize potential hazards, coordinate responsibilities, and respond collectively to unexpected events. Effective teamwork can support the prevention of wrong-patient and wrong-site surgery, medication errors, retained surgical items, communication-related incidents, and equipment-associated complications. The WHO Surgical Safety Checklist provides a structured framework for improving communication and ensuring that essential safety measures are addressed before, during, and after surgical procedures **(WHO, 2009; Haynes et al., 2009).**

In addition to improving patient safety, interdisciplinary collaboration may substantially enhance operating room efficiency. Operating rooms are among the most resource-intensive areas within healthcare institutions, requiring effective management of staff, equipment, surgical supplies, and time. Poor coordination may contribute to delayed surgical starts, prolonged turnover times, unnecessary interruptions, equipment-related delays, and surgical cancellations. In contrast, effective collaboration facilitates better scheduling, appropriate preparation of instruments, timely patient transfer, coordinated anesthesia and nursing activities, and efficient management of surgical resources. These improvements may increase operating room utilization, reduce unnecessary expenditure, and improve institutional productivity without compromising the quality of patient care **(Rosen et al., 2018; Dexter & Epstein, 2005).**

Despite the recognized importance of teamwork, several barriers may interfere with effective interdisciplinary collaboration in surgical settings. These include professional hierarchy, unclear role distribution, inadequate staffing, excessive workload, communication difficulties, insufficient interprofessional training, technological limitations, and differences in professional priorities. Such challenges may result in fragmented workflows, reduced situational awareness, delayed interventions, and increased vulnerability to preventable errors. Addressing these barriers requires organizational commitment, supportive leadership, standardized communication systems, continuous professional education, and the development of a collaborative safety culture **(Rosen et al., 2018; Reeves et al., 2017).**

Although previous research has extensively examined teamwork and communication

Therefore, this systematic review aims to examine the impact of interdisciplinary collaboration between nurses, anesthesia specialists, health information technicians, and operating room supply and instrument specialist teams on surgical safety and efficiency. It will explore the individual and collective contributions of these professional groups, evaluate the influence of communication and coordination on surgical outcomes, identify factors and barriers affecting teamwork, and assess the effectiveness of collaborative strategies in improving perioperative processes. Ultimately, the review seeks to provide evidence-based insights that may support the development of integrated operating room practices, reduce preventable surgical risks, optimize resource utilization, and promote safer and more efficient surgical care.

Natural Resources for Human Health
eISSN: 2583-1194

Methodology

1. STUDY DESIGN

This study will be conducted as a systematic review to evaluate the impact of interdisciplinary collaboration between operating room nurses, anesthesia specialists, health information technicians, and operating room supply and instrument specialist teams on surgical safety and operating room efficiency. The review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines to ensure transparency, methodological rigor, and reproducibility throughout the review process (Page et al., 2021).

2. RESEARCH QUESTION

The review will address the following primary research question:

What is the impact of interdisciplinary collaboration between nurses, anesthesia specialists, health information technicians, and operating room supply and instrument specialists on surgical safety and operating room efficiency?

The review will also investigate the following secondary questions:

- How does interdisciplinary communication influence the prevention of surgical errors and adverse events?
- What is the contribution of each professional group to surgical safety?
- How does teamwork affect operating room turnover time, surgical delays, and resource utilization?
- What organizational and professional factors influence effective interdisciplinary collaboration?
- What are the main barriers to successful teamwork in the operating room?

3. SEARCH STRATEGY

A comprehensive literature search will be conducted using electronic databases to identify relevant studies addressing interdisciplinary collaboration in operating room settings. The following databases will be considered:

- PubMed/MEDLINE.
- Scopus.
- Web of Science.
- CINAHL.
- Cochrane Library.
- Embase.
- Google Scholar (for supplementary searching).

The search strategy will combine relevant keywords and Medical Subject Headings (MeSH) using Boolean operators (AND, OR, and NOT).

Proposed search terms include:

- "Interdisciplinary collaboration."
- "Interprofessional teamwork."
- "Operating room team."
- "Perioperative nursing."
- "Anesthesia specialists."

- "Health information technicians."
- "Surgical instrument specialists."
- "Surgical supply management."
- "Surgical safety."
- "Patient safety."
- "Operating room efficiency."
- "Operating room management."
- "Surgical errors."
- "Communication and coordination."

RESULTS

The results of this systematic review will be presented in tables to summarize the characteristics of included studies, interdisciplinary collaboration, contributions of different professional groups, and the impact of teamwork on surgical safety and operating room efficiency.

Table 1. Characteristics of Included Studies

Author and year	Country	Study design	Sample size	Professional groups	Main outcomes
Study 1	—	Randomized controlled trial	—	Nurses and anesthesia specialists	Surgical safety
Study 2	—	Cross-sectional study	—	Operating room nurses	Teamwork and communication
Study 3	—	Observational study	—	Multidisciplinary OR teams	Operating room efficiency
Study 4	—	Qualitative study	—	Nurses and supply specialists	Instrument management
Study 5	—	Mixed-methods study	—	Multidisciplinary teams	Safety and workflow

Template: complete using the actual included studies.

Table 2. Main Domains of Interdisciplinary Collaboration

Collaboration domain	Main activities	Expected contribution
Communication	Information exchange and structured handover	Reduced communication errors
Coordination	Organization of perioperative activities	Improved workflow
Shared decision-making	Joint clinical decisions	Better risk management

Role clarification	Definition of responsibilities	Reduced duplication and omissions
Teamwork	Mutual support and accountability	Improved patient safety
Information management	Accurate documentation and record accessibility	Improved continuity of care
Resource management	Coordination of instruments and supplies	Reduced equipment-related delays

Table 3. Contribution of Each Professional Group to Surgical Safety

Professional group	Main responsibilities	Surgical safety outcomes
Operating room nurses	Patient identification, surgical counts, sterile field maintenance, safety checklist implementation	Prevention of surgical errors and retained surgical items
Anesthesia specialists	Airway management, medication administration, physiological monitoring	Prevention of anesthesia-related complications
Health information technicians	Accurate documentation, electronic records, patient information management	Reduction of documentation and information-related errors
OR supply and instrument specialists	Instrument preparation, sterilization coordination, equipment inspection	Reduction of contamination and equipment-related risks

Table 4. Impact of Interdisciplinary Collaboration on Surgical Safety

Safety outcome	Contribution of collaboration	Assessment indicators
Surgical errors	Improved verification and communication	Number of reported surgical errors
Medication errors	Coordination between nursing and anesthesia teams	Medication error incidence
Anesthesia complications	Timely communication and monitoring	Intraoperative anesthesia-related adverse events
Retained surgical items	Coordination of instrument and sponge counts	Incidence of retained surgical items
Surgical site infections	Improved sterilization and infection control	Surgical site infection rates
Patient identification errors	Accurate documentation and verification	Patient identification incidents
Intraoperative complications	Early recognition and coordinated response	Intraoperative adverse event rates

DISCUSSION

Interdisciplinary collaboration between operating room nurses, anesthesia specialists, health information technicians, and OR supply and instrument specialists plays an essential role in improving surgical safety and operating room efficiency. Effective teamwork promotes communication, coordination, and shared decision-making, reducing the risk of preventable surgical errors and adverse events (Rosen et al., 2018).

Operating room nurses and anesthesia specialists contribute to patient safety through continuous monitoring, medication management, surgical counts, and early recognition of complications. Meanwhile, health information technicians support accurate documentation and accessibility of patient records, whereas supply and instrument specialists ensure proper instrument preparation, sterilization coordination, and equipment availability.

The implementation of standardized communication protocols and surgical safety checklists can improve coordination and reduce surgical complications. Haynes et al. (2009) demonstrated that the WHO Surgical Safety Checklist was associated with reduced postoperative complications and mortality. Furthermore, effective collaboration may improve operating room efficiency by reducing surgical delays, turnover time, equipment-related interruptions, and unnecessary resource utilization.

However, professional hierarchy, unclear responsibilities, inadequate staffing, excessive workload, and communication failures remain important barriers to successful teamwork. Addressing these challenges requires multidisciplinary training, supportive leadership, clear role distribution, integrated information systems, and continuous quality improvement.

Overall, interdisciplinary collaboration represents an important strategy for promoting patient safety, improving perioperative care, and optimizing operating room performance. Further research is needed to evaluate the specific contributions of health information technicians and OR supply and instrument specialists to measurable surgical outcomes.

Implications

Interdisciplinary collaboration between operating room nurses, anesthesia specialists, health information technicians, and OR supply and instrument specialists has important implications for surgical practice and healthcare management. Strengthening communication, teamwork, and shared responsibilities may improve patient safety, reduce preventable surgical errors, and facilitate early recognition of intraoperative complications. Integrating health information technicians into perioperative workflows can improve documentation accuracy and accessibility of patient records, while effective coordination with supply and instrument specialists can ensure equipment availability and reduce surgical delays. Healthcare institutions should therefore promote multidisciplinary training, standardized communication protocols, surgical safety checklists, integrated electronic health records, and effective resource management to improve surgical outcomes and operating room efficiency.

LIMITATIONS

This systematic review may have several limitations. Differences in study designs, healthcare settings, sample sizes, and methods of assessing interdisciplinary collaboration may limit comparisons between studies. The availability of published evidence specifically addressing health information technicians and OR supply and instrument specialists may be limited compared with evidence concerning nurses and anesthesia specialists. Variations in definitions of surgical safety and operating room efficiency may also affect the interpretation and synthesis of findings. Additionally, restricting the search to English-language publications may introduce language bias, while publication bias and differences in institutional resources may influence the generalizability of the findings. Finally, the heterogeneity of reported outcomes may prevent quantitative pooling of all included studies.

CONCLUSION

Interdisciplinary collaboration between operating room nurses, anesthesia specialists, health information technicians, and operating room supply and instrument specialists represents a fundamental component of safe, efficient, and high-quality surgical care. Each professional group contributes distinct knowledge, technical skills, and responsibilities that collectively support the successful delivery of perioperative services. Effective coordination among these professionals facilitates continuity of care, improves communication, strengthens clinical decision-making, and ensures that essential patient information, surgical instruments, equipment, and supplies are available throughout the surgical process.

REFERENCES

[1] Association of periOperative Registered Nurses (AORN). (2024). Guidelines for perioperative practice. AORN.

[2] Dexter, F., & Epstein, R. H. (2005). Operating room efficiency and scheduling. Current Opinion in Anaesthesiology, 18(2), 195–198.

[3] Gawande, A. A., Zinner, M. J., Studdert, D. M., & Brennan, T. A. (2003). Analysis of errors reported by surgeons at three teaching hospitals. Surgery, 133(6), 614–621.

[4] Haynes, A. B., Weiser, T. G., Berry, W. R., Lipsitz, S. R., Breizat, A. H. S., Dellinger, E. P., Herbosa, T., Joseph, S., Kibatala, P. L., Lapitan, M. C. M., Merry, A. F., Moorthy, K., Reznick, R. K., Taylor, B., & Gawande, A. A. (2009). A surgical safety checklist to reduce morbidity and mortality in a global population. The New England Journal of Medicine, 360(5), 491–499.

[5] National Academies of Sciences, Engineering, and Medicine. (2018). Crossing the global quality chasm: Improving health care worldwide. The National Academies Press.

[6] Reeves, S., Pelone, F., Harrison, R., Goldman, J., & Zwarenstein, M. (2017). Interprofessional collaboration to improve professional practice and healthcare outcomes. Cochrane Database of Systematic Reviews, 2017(6), CD000072.

[7] Rosen, M. A., DiazGranados, D., Dietz, A. S., Benishek, L. E., Thompson, D., Pronovost, P. J., & Weaver, S. J. (2018). Teamwork in healthcare: Key discoveries enabling safer, high-quality care. American Psychologist, 73(4), 433–450.

[8] Rutala, W. A., & Weber, D. J. (2024). Guideline for disinfection and sterilization in healthcare facilities, 2008 (Update: June 2024). Centers for Disease Control and Prevention.

[9] World Health Organization. (2009). Implementation manual: WHO surgical safety checklist 2009. WHO.

[10] World Health Organization. (2009). WHO guidelines for safe surgery 2009: Safe surgery saves lives. WHO.