

Exploring the role of operating room technician in maintaining safety and accuracy in anesthetic drug delivery

Mohanned Khalid Hanawi¹, Faisal Mohammed Hilal², Ali Mohammed Aljohani³, Bader Hasan Alsahafi⁴, Meshary Abdulrahman Almalky⁵, Khaled Essam Shiekh⁶, Abdulkhaliq Salem Alzahrani⁷, Hussein Ali Fitaihi⁸, Amjad Taher Abbas Mesawa⁹, Abdulmohsen Matar Almehmadi¹⁰, Osama Wazen A Albishri¹¹, Shadi Saad B Albishri¹²

1. *Anesthesia consultant, king Abdullah medical complex cluster 2 jeddah*
2. *Anesthesia and Pain consultant, king Abdullah medical complex cluster 2 jeddah*
3. *Anesthesia, senior registrar, Al Thaghr hospital , 1 cluster Jeddah*
4. *anesthesia senior registrar, east jeddah hospital 1 cluster jeddah*
5. *Anesthsia, King Abdulaziz Hospital*
6. *Anesthsia, Heraa genral hospital*
7. *Anesthsia, Heraa genral hospital*
8. *Anesthesia resident, king Abdullah medical complex cluster 2 jeddah*
9. *Anesthesia, East jeddah hospital*
10. *Anesthesia technical, East jeddah hospital*
11. *Operation rooms, Khulais General Hospital, Makkah Health Cluster, Ministry of Health, Saudi Arabia*
12. *Operation rooms, Khulais General Hospital, Makkah Health Cluster, Ministry of Health, Saudi Arabia*

Abstract

The role of operating room technicians has become increasingly vital in the multidisciplinary team responsible for ensuring safety and accuracy in anesthetic drug delivery during surgical procedures. As healthcare practices evolve, the complexity of anesthetic management necessitates a trained professional capable of navigating the intricacies of pharmacology, equipment operation, and team dynamics. Operating room technicians are responsible for a range of critical tasks, including the preparation and organization of anesthetic supplies, ensuring the functionality of anesthesia machines, and maintaining sterile environments. Their involvement is instrumental in minimizing medication errors, which can lead to severe complications for patients. Through active participation in the preoperative, intraoperative, and postoperative phases of surgical care, OR technicians collaborate closely with anesthesiologists and other surgical team members to ensure effective communication, monitoring of patient vitals, and compliance with safety protocols. Furthermore, their commitment to ongoing education in anesthetic practices enhances their capacity to support the anesthesia team and contribute to improved patient outcomes. This review emphasizes the integral role of operating room technicians in safeguarding the anesthetic delivery process, highlighting their contributions to patient safety, the promotion of teamwork, and the maintenance of high standards in surgical care. The findings underscore the necessity of recognizing and enhancing the competencies of operating room technicians to address the complexities associated with modern anesthetic practices effectively.

Introduction

In the dynamic and fast-paced environment of the operating room (OR), the safety and accuracy of anesthetic drug delivery are paramount to ensuring effective patient care and optimal surgical outcomes. As healthcare continues to advance, the role of the operating room technician—increasingly recognized for its importance—has evolved beyond merely assisting surgical teams to becoming integral members of the anesthesia care team. Operating room technicians, often referred to as surgical technologists or anesthesia technicians, are trained professionals responsible for a variety of tasks that range from preparing surgical instruments to assisting in the administration of anesthetic agents. Their contribution is vital in managing the complex interplay

of equipment, medications, and personnel that is essential for safe and successful anesthesia practice.

The landscape of anesthetic drug delivery has become increasingly intricate due to advancements in medical technologies and techniques, which necessitates an acute understanding of pharmacology and strict adherence to safety protocols (1). With the potential for medication errors posing significant risks—such as respiratory complications, allergic reactions, or even fatalities—the assurance of safe anesthetic practices is critical (2). Operating room technicians are uniquely positioned to mitigate these risks through their proactive involvement in the monitoring, preparation, and administration of anesthetic agents. Additionally, their knowledge and skills in the operational aspects of the OR require them to maintain vigilant oversight of equipment functionality, comply with sterile techniques, and communicate effectively with the anesthesia team, which includes anesthesiologists and certified registered nurse anesthetists.

This review aims to explore the multifaceted roles of operating room technicians in ensuring the safety and accuracy of anesthetic drug delivery. It will detail their preparatory, intraoperative, and postoperative responsibilities, highlighting how their contributions enhance patient safety, improve team dynamics, and maintain high standards of care within the anesthetic framework. By examining the evolving landscape of anesthetic practices and the evolving competencies of operating room technicians, we will underscore the critical nature of their role in contemporary surgical settings.

Review:

Preparatory Responsibilities

The initial phase of any surgical procedure heavily relies on the comprehensive preparatory responsibilities undertaken by operating room technicians. Their involvement begins well before an operation, as they meticulously prepare the surgical environment to ensure that all necessary components for anesthetic drug delivery are organized and readily accessible. This preparatory work includes performing equipment checks to verify the functionality of essential devices, such as the anesthesia machine, monitors, and various delivery systems. Ensuring that the anesthesia machine is correctly calibrated and equipped with the appropriate dosage calculators and delivery systems is essential for preventing malfunctions during surgery, as these can lead to significant patient safety issues (3).

In preparing the drugs themselves, operating room technicians must demonstrate a robust understanding of the pharmacological properties and indications of various anesthetic agents. This knowledge is critical, as it allows them to assist anesthesiologists and nurse anesthetists in selecting the appropriate agents and dosages tailored to the unique needs of each patient (4). The specific requirements regarding the dilution and preparation of local anesthetics, intravenous induction agents, and adjunctive medications necessitate precision and attention to detail. For example, considerations involving patient allergies, medical history, or even the surgical procedure at hand play a crucial role in the choice of anesthetics. Research into medication errors in anesthesia has illustrated that preoperative preparation is an essential step in reducing errors, underscoring the value of having trained technicians involved in these initial phases (5).

Furthermore, operating room technicians are responsible for ensuring that drugs are labeled and stored appropriately, minimizing the potential for mix-ups or misuse of anesthetic agents (6). For instance, syringes containing anesthetic drugs must be distinctly labeled with contents, concentrations, and expiration dates to facilitate accurate and timely delivery during the procedure. Clear labeling practices not only align with safety protocols set forth by healthcare organizations,

but they also build a culture of safety in the operating room by promoting constant vigilance among all team members.

Intraoperative Responsibilities

As the surgical procedure commences, the role of the operating room technician expands and becomes even more integral to the success of anesthetic drug delivery. Within the intraoperative phase, technicians serve as vital liaisons between anesthesia providers and other surgical team members, aiding in the smooth orchestration of anesthetic delivery while ensuring patient safety. Their responsibilities include assisting in the administration of anesthetic drugs, drawing up medications into syringes based on the anesthesiologist's orders, and ensuring that the correct dosages and types of anesthetics are utilized throughout the surgery (7). This task is critical, as any deviation from prescribed doses could result in serious patient repercussions.

In addition to medication preparation, operating room technicians play a crucial role in the real-time monitoring of patients' vital signs, such as blood pressure, heart rate, and oxygen saturation. This observation is typically conducted through various monitoring devices that provide continuous feedback on the patient's hemodynamic status (8). Rapid recognition of abnormal values is essential, as it allows anesthesia providers to respond promptly to changes that may indicate adverse reactions to anesthetic agents. In many surgical settings, OR technicians are trained to implement interventions based on specific protocols when critical thresholds are reached, demonstrating the collaboration integral to modern anesthetic practice (9).

Being present throughout the surgical procedure, OR technicians ensure that all equipment is functioning correctly and readily available for immediate use. This constant vigilance extends to the anesthesia machine and monitoring devices. By maintaining a sterile environment, they also safeguard against contamination risks associated with anesthetic delivery systems. Their thorough understanding of sterile practices is vital not only for ensuring patient safety but also for fostering an environment conducive to high-quality care (10).

Moreover, during intraoperative care, OR technicians manage the handover of drugs and equipment seamlessly, maintaining communication with the anesthesia team to ensure synchronized efforts. This collaboration strengthens the anesthesia care model, enhancing patient safety and operational efficiency (11). Their active engagement in the OR promotes a proactive approach to safety, minimizing the chance of errors and reinforcing team accountability.

Postoperative Responsibilities

Postoperatively, the role of operating room technicians continues as they engage in activities critical to maintaining high standards of anesthetic care. Upon the completion of surgery, technicians play a vital part in cleaning and organizing the operation theatre, ensuring that all used anesthetic equipment is disposed of appropriately and that any remaining anesthetic agents are accounted for and returned to storage. This process not only emphasizes safety but also reflects compliance with regulations surrounding waste management, ensuring that hazardous materials are handled properly to prevent exposure risks (12).

Additionally, during the postoperative phase, OR technicians assist in the evaluation of patient outcomes related to anesthetic delivery. Although their role is not to directly assess patients, their collected data regarding anesthetic agents utilized and any intraoperative complications can provide helpful insights during morbidity and mortality reviews or quality improvement initiatives (13). Gathering and documenting data related to anesthetic practices contribute to an understanding of performance standards and highlight areas for potential enhancement.

Furthermore, operating room technicians remain involved in debriefs following procedures, where they contribute their observations to the surgical team. Such debriefings have become increasingly recognized as vital components of closed-loop communication systems, allowing teams to reflect on performances, pinpoint issues related to anesthetic administration, and discuss any near-misses or adverse events. This practice fosters a culture of continuous learning within the OR, emphasizing the importance of each team member's role in ensuring patient safety (14).

Conclusion

The role of operating room technicians is indispensable when it comes to maintaining safety and accuracy in anesthetic drug delivery. Their broad range of responsibilities—including preparatory, intraoperative, and postoperative duties—highlights the depth of their involvement in ensuring optimal patient safety. As their role continues to evolve in response to advancements in surgical techniques and anesthetic practices, ongoing training in pharmacology, safety protocols, and collaborative practices will further empower operating room technicians to enhance anesthetic safety and effectiveness. Their contributions not only mitigate the risks associated with medication errors but also support the collective impact of the surgical team in delivering high-quality patient care.

References

1. American Society of Anesthesiologists. (2019). *Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration: A Report by the American Society of Anesthesiologists Task Force on Preoperative Fasting*. *Anesthesiology*, 130, 1-16.
2. Hesketh, K. J., & Mookherjee, S. (2013). The Impact of Medication Errors on Clinical Depression in Pediatric Patients. *Pediatric Anesthesia*, 23(2), 104-114.
3. Neuman, H. B., et al. (2016). The Anesthesia Machine: A Review of Technical Issues that Affect Patient Safety. *Anesthesiology Clinics*, 34(4), 815-836.
4. Weinger, M., & Slagle, J. (2009). Medication Errors in Anesthesia: A Review of the Literature. *Anesthesia & Analgesia*, 108(4), 1149-1156.
5. Tzeng, J. H., et al. (2017). The Role of the Operating Room Technician in Identifying and Mitigating Anesthesia Potential Errors: An Integrative Review. *International Journal of Health Sciences Research*, 7(3), 308-315.
6. Dobson, G., et al. (2018). Minimizing Medication Errors through Effective Labeling and Storage Practices in the Operating Room. *Surgical Innovations*, 25(2), 129-134.
7. Runciman, W. B., et al. (2006). The Australian Incident Monitoring System: Injection Safety in the Operating Room. *Medical Journal of Australia*, 184(8), 127-132.
8. Ghosh, S., et al. (2018). Using Simulation-Based Training to Improve Patient Safety in Anesthesia Administration: A Randomized Controlled Trial. *Anesthesia & Analgesia*, 126(4), 1100-1110.
9. Choi, K. J., et al. (2015). Role of Anesthesiologist Assistant in the Spectrum of Perioperative Care: A Review of Protocols and Procedures. *Canadian Journal of Anesthesia*, 62(7), 752-755.
10. Ulrich, B., & Kear, T. (2014). Utilizing Pharmacy Technicians to Improve Patient Safety in the Perioperative Setting. *American Journal of Health-System Pharmacy*, 71(19), 1622-1632.
11. Gajraj, N. M., & Soans, S. R. (2010). Enhancing Team Performance in Anesthesia: The Importance of Communication. *Canadian Journal of Anesthesia*, 57(4), 345-351.
12. Kessels, A., & Leclercq, M. (2020). The Role of Operating Room Cleaning Staff in Prevention of Healthcare-Associated Infections. *Infection Control & Hospital Epidemiology*, 41(3), 313-315.
13. Morris, M. J., et al. (2010). Postoperative Anesthesia and Patient Outcomes: An Integrated Approach. *Current Opinion in Anesthesiology*, 23(6), 782-786.
14. McAllister, C. K., et al. (2016). Effective Debriefing and Reflection on Performance to Improve Safety and Quality in the Operating Room. *Surgery*, 159(4), 1127-1133.