

Recent Advances in Surgical Nursing

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ABSTRACT

Recent advances in surgical nursing are fundamentally transforming the delivery of care by integrating cutting-edge technology, standardizing evidence-based protocols, and expanding the scope of the nurse's role. Driven by the need to enhance patient safety and improve outcomes, surgical nurses are evolving into proficient technology managers, patient advocates, and data interpreters. Technological innovations like artificial intelligence (AI), robotics, and wearable health monitors are at the forefront of this evolution. AI assists in risk prediction and clinical decision support, while robotic-assisted surgery demands nurses with specialised technical skills for equipment management. Pre and postoperative telehealth and remote monitoring have expanded the continuum of care beyond the clinical settings. Simultaneously, the widespread adoption of evidence-based practices, such as Enhanced Recovery After Surgery (ERAS) protocols and infection prevention care bundles, is standardising high-quality care. These advances ultimately allow for more personalised, efficient, and compassionate care, reshaping the surgical experience for the benefit of both patients and healthcare systems. In the current trend, surgical nurses are involving multiple roles in coordinating pre-optimisation and providing intraoperative support to manage complex technology, and interpreting postoperative data towards Patient safety and Positive outcomes.

KEYWORDS

• Surgical Nursing • Advanced Technology • Early Recovery • Infection Control and Quality Care

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INTRODUCTION

Surgical nursing, a specialised field focused on the care of patients before, during, and after surgery, has undergone continuous evolution since the early days of antiseptic techniques introduced by pioneers of Nursing, Florence Nightingale. Initially focused on maintaining sterility and assisting surgeons, the field has transformed dramatically through medical revolutions, technological innovation, and a growing emphasis on evidence-based practice and patient-centred care.¹ Recent advances in surgical nursing are defined by a paradigm shift from traditional, protocol-driven assistance to an integrated, proactive, and technology-enabled approach to patient management. These advances are not just about new tools; they represent fundamental changes in how care is delivered, with the primary goals of improving patient outcomes, reducing complications, shortening recovery times, and enhancing overall patient experience. In the 21st century, the core of modern nursing is the ability to integrate complex technological data with compassionate, holistic care, ensuring patient safety and well-being at every step of the surgical journey.^{2,3}

Background

The evolution of surgical nursing has been driven by the following key factors,

- **Shifting Healthcare Landscape:** The need for cost-effective care and shorter hospital stays urged a move to efficient recovery pathways like Enhanced Recovery After Surgery (ERAS), where nurses play a critical role in facilitating faster discharge while maintaining high-quality care.
- **Patient Safety Imperatives:** Global movements to reduce healthcare associated infections (HAIs) and surgical errors have mandated rigorous safety protocols, continuous monitoring, and meticulous documentation, placing nurses at the centre of patient safety efforts.
- **Technological Innovation:** Miniaturisation and digitisation of medical equipment have revolutionized surgical procedures themselves (e.g., minimally invasive surgery, robotics), demanding a corresponding evolution in nursing skills to manage these sophisticated tools.

- **Evidence-Based Practice (EBP):** A strong drive in healthcare to base decisions on the best available scientific evidence has led to standardised, high-efficacy protocols. The development of initiatives like care bundles for infection prevention and the ERAS is a direct result of EBP.^{4,5,6}

Advancements in Surgical Nursing⁷

In this dynamic environment, the role of the surgical nurse is expanding beyond the operating room to include proactive preoperative optimisation and extensive postoperative remote monitoring, making them essential navigators of the entire surgical experience. Current advances in surgical nursing are necessary to directly address critical challenges in modern healthcare and to improve essential outcomes for patients. The key drivers for these advancements include:

1. Enhancing Patient Safety and Clinical Outcomes

The primary need for advances is to provide safer, higher-quality care and minimise Healthcare-Associated Infections (HAI) and adverse events.

- **Reduced Complications:** Evidence-based protocols like ERAS significantly reduce postoperative complications, infection rates (such as Surgical Site infections (SSIs), Catheter-Associated Urinary Tract Infection (CAUTI), Central Line-Associated Bloodstream Infection (CLABSI) and opioid consumption for pain management.
- **Preventing Errors:** Technological aids, like Artificial Intelligence (AI) for risk prediction and 3D printing for patient-specific implants, provide crucial “human firewall” safeguards against potential errors, particularly in complex procedures.
- **Improved Recovery:** Advances facilitate quicker, safer patient recovery, leading to reduced lengths of hospital stay and better overall patient satisfaction and experience.⁸

2. Adapting to Technological Complexity

The rapid evolution of surgical technology demands that nursing practice keep pace.

- **Managing Advanced Equipment:** The widespread use of robotic surgical

systems, augmented reality (AR) in the OR, and sophisticated monitoring devices requires nurses to acquire new, specialised technical skills to ensure effective and safe implementation.

- **Data Integration:** Nurses must be able to interpret and integrate data from multiple digital sources (EHRs, wearables, AI platforms, Blockchain) to provide personalized and proactive care, moving from reactive to predictive care models.⁹

3. Improving Operational Efficiency and Resource Management

Healthcare systems face challenges such as staff shortages, high demand for surgeries, and the need to manage resources effectively.

- **Optimising Workflows:** Advances like AI for Operating Room (OR) scheduling and automated inventory management streamline operations, ensuring the right resources are available and reducing costly delays.
- **Addressing Staff Shortages:** Training initiatives, including virtual simulation and just-in-time training with QR codes, help upskill existing staff quickly and efficiently to meet rising demands, especially during crises like a pandemic.
- **Expanding Access to Care:** Telehealth and remote monitoring expand access to essential surgical services, especially in rural or underserved areas, and help to manage growing surgical backlogs.^{3,10}

4. Meeting Ethical and Professional Demands

Meeting ethical and professional demands address the need for a more human-centered and ethical approach to modern medicine.

- **Patient-Centered Care:** The focus is on understanding patients' needs, providing emotional support, and engaging them in their care plans, which has been shown to reduce anxiety, promote patient communication and speed up recovery.
- **Ethical Oversight:** As AI and other technologies become more prevalent in decision-making, nurses are needed to provide essential ethical oversight and patient advocacy to question biases in technology and ensure patient privacy and autonomy are maintained.¹¹

Ultimately, continuous advancement in surgical nursing is essential to ensure that healthcare professionals can navigate the complexities of modern surgical practice and continue to provide high-quality, safe, and effective care in an ever-changing environment. Recent advances have profoundly transformed surgical nursing, repositioning the nurse's role as a sophisticated blend of technological expertise, data interpretation, and holistic patient advocacy.⁷

Evolving Role of the Nurse

The current trend, nurses' role requires a blend of advanced technical skills to manage new equipment and essential human skills such as compassion, empathy, and critical thinking that machines cannot replicate. Nurses are also taking on more specialized roles, such as ERAS coordinators, and engaging in continuous education to keep pace with rapid innovations. The current role of nurses in pre-, peri-, and post-operative nursing is expanding significantly, driven by the implementation of evidence-based practices such as ERAS protocols and the integration of advanced technology. In the current decade, nurses have moved beyond traditional care to become integral coordinators, educators, technology managers, and patient advocates, with a strong focus on patient safety, outcomes, and holistic well-being.¹²⁻¹⁵

CONCLUSIONS

Current updates in surgical nursing are focused on the integration of advanced technology, emphasizing minimally invasive procedures and enhanced recovery protocols, and patient-centred, holistic care. Nurses are key coordinators, managing the patient journey from preoperative optimisation and education to postoperative remote monitoring and discharge planning. They ensure continuity and consistency of care across the entire surgical experience, aiming to provide the highest standard of safe, efficient, and compassionate care to every patient, directly influencing the benefits of health care outcomes and society.

REFERENCES

1. Turkowski Y, Turkowski V. Florence Nightingale (1820-1910): The Founder of Modern Nursing. Cureus. 2024 Aug

- 5;16(8):e66192. doi: 10.7759/cureus.66192. PMID: 39233972; PMCID: PMC11373583.
2. Praveen B. Katti, Poonam, Rangappa.S. Ashi, (2024), Advancements in Patient Care and Safety: Integrating Nursing Innovations for Enhanced Healthcare Outcomes, Clinical Research and Clinical Trials, 10(3); DOI:10.31579/2693-4779/208.
3. Maleki Varnosfaderani, S., & Forouzanfar, M. (2024). The Role of AI in Hospitals and Clinics: Transforming Healthcare in the 21st Century. *Bioengineering*, 11(4), 337. <https://doi.org/10.3390/bioengineering11040337>.
4. Jamila Bibi.(2023)Transformative Impact of Technology on Nursing Practices: A Paradigm Shift toward Enhanced Patient Care. 2(1).
5. Wei Q, Pan S, Liu X, Hong M, Nong C, Zhang W. The integration of AI in nursing: addressing current applications, challenges, and future directions. *Front Med (Lausanne)*. 2025 Feb 11;12:1545420. doi: 10.3389/fmed.2025.1545420. PMID: 40007584; PMCID: PMC11850350.
6. Brunt BA, Morris MM. Nursing Professional Development Evidence-Based Practice. [Updated 2023 Mar 4]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK589676/>
7. Guo L, Zuo H, Sun Y, Qian C. Elevating surgical outcomes: a comprehensive analysis of innovative nursing practices in intraoperative care across diverse specialties. *Front Med (Lausanne)*. 2025 Oct 3;12:1665160. doi: 10.3389/fmed.2025.1665160. PMID: 41114010; PMCID: PMC12531267.
8. Sartelli, Massimo.^{1,2} Healthcare-Associated Infections in the Surgical Setting: How to Prevent and Treat Them. *Advances in Human Biology* 12(2):p 127-137, May–Aug 2022. | DOI: 10.4103/aihb.aihb_53_22.
9. Wah JNK. The rise of robotics and AI-assisted surgery in modern healthcare. *J Robot Surg*. 2025 Jun 20;19(1):311. doi: 10.1007/s11701-025-02485-0. PMID: 40540146; PMCID: PMC12181090.
10. Marcin Kapuściński, 2024 Improving Employee Training with AI Training for Employees<https://ttms.com/improving-employee-training-with-ai-powered-solutions/>
11. Ewuoso C, Hall S, Dierickx K. How do healthcare professionals respond to ethical challenges regarding information management? A review of empirical studies. *Glob Bioeth*. 2021 Apr 5;32(1):67-84. doi: 10.1080/11287462.2021.1909820. PMID: 33897255; PMCID: PMC8023626.
12. Mohanasundari SK, Kalpana M, Madhusudhan U, Vasanthkumar K, B R, Singh R, Vashishtha N, Bhatia V. Can Artificial Intelligence Replace the Unique Nursing Role? *Cureus*. 2023 Dec 27;15(12):e51150. doi: 10.7759/cureus.51150. PMID: 38283483.
13. Joseph 10/14/2025. How to Become a Surgical Nurse: Responsibilities and Career Pathways. <https://www.superprof.com/blog/surgical-nurse-guide/>
14. Sukanandam, Dinesh Kumar. Pre-Intra-Post-Operative Nursing Care Pathway: Fragments to Fusion, Isolation to Integration. *Indian Journal of Continuing Nursing Education* 20(2):p 87-91, Jul–Dec 2019. | DOI: 10.4103/IJCN.IJCN_12_20.
15. Salazar Maya ÁM. Nursing Care during the Perioperative within the Surgical Context. *Invest Educ Enferm*. 2022 Jun;40(2):e02. doi: 10.17533/udea.iee.v40n2e02. PMID: 36264690; PMCID: PMC9714984.