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MODERN APPROACHES TO POSTOPERATIVE CARE, COMPLICATION PREVENTION, AND INTERNATIONAL COMPARATIVE ANALYSIS IN SURGICAL INTENSIVE CARE (2025-2026)

Choriyeva Oyxol O'ral qizi
Teacher, Sherabad Abu Ali Ibn Sino Public Health Technical College
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Abstract Background: The success of surgical interventions relies heavily on perioperative intensive care, real-time hemodynamic surveillance, and standardized nursing bundles. Preventing acute postoperative complications requires structured multidisciplinary protocols, bridging international gold standards with national healthcare practices.
Objective: This article provides a comparative analysis of surgical reanimation protocols between developed international healthcare systems and Uzbekistan (2025–2026), focusing on evidence-based prevention strategies for acute postoperative complications.
Methods: A systematic literature review was performed using databases including PubMed, Scopus, and Web of Science following PRISMA guidelines. Comparative clinical data on ERAS® implementation, automated ICU monitoring, and infection prevention bundles (CAUTI, CLABSI, VAP) were analyzed.
Results: International ICU settings utilize AI-driven predictive hemodynamic monitoring, early digital ERAS pathways, and nurse-led protocol autonomy, reducing hospital-acquired complications by up to 58%. In Uzbekistan, recent reforms (2025–2026) in public health technical colleges and clinical practice have significantly improved nursing-led sepsis bundles and catheter maintenance, resulting in a 40–45% decrease in nosocomial infection rates.
Conclusion: Aligning national clinical protocols in Uzbekistan with international ERAS and infection prevention standards optimizes postoperative patient outcomes, mitigates ICU readmissions, and enhances nursing autonomy in surgical reanimation.
Keywords: Surgical Intensive Care; International Comparison; Complication Prevention; ERAS Protocols (2025–2026); Postoperative Nursing; Uzbekistan Healthcare.

1. Introduction

The immediate postoperative period in the Intensive Care Unit (ICU) and Post-Anesthesia Care Unit (PACU) represents a high-risk phase where patients face potential multi-organ dysfunction, surgical site infections (SSI), acute respiratory failure, and thromboembolism.

Global surgical care (2025–2026) emphasizes prevention over reaction. While developed nations leverage advanced automated monitoring and autonomous nursing roles, developing healthcare frameworks, including Uzbekistan's expanding public health and medical education sectors, are actively integrating evidence-based international guidelines into localized clinical workflows.

2. Table 1.International Comparative Analysis: Global Standards vs. Uzbekistan

Aspect / Domain	International Practice (USA, EU, Japan)	Uzbekistan Practice (Current State & 2025–2026 Advances)

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Aspect / Domain	International Practice (USA, EU, Japan)	Uzbekistan Practice (Current State & 2025–2026 Advances)
Postoperative Monitoring	Real-time AI predictive algorithms (e.g., Hypotension Prediction Index), continuous invasive & non-invasive monitoring.	Standard continuous multi-parameter monitoring (SpO_2, ECG, NIBP, CVP) with growing digital integration in regional centers.
ERAS® Protocols	Fully standardized across 90%+ surgical subspecialties; routine opioid-sparing multimodal analgesia.	Active adoption in national and regional technical colleges; expanding implementation in major regional surgical centers.
Nursing Autonomy	Nurse Practitioners / Specialized ICU Nurses adjust fluid protocols and weaning autonomously via set directives.	Nurse-executed protocols under direct physician supervision; rapid expansion of higher-nursing education competencies.
Infection Prevention Bundles	Automated electronic checklist audits for central lines, Foley catheters, and ventilator-associated pneumonia.	Standardized manual and semi-digital checklist audits for aseptic catheter care, drain maintenance, and sterilizing routines.

3. Contemporary Clinical Practices, International Comparison, and Complication Prevention (2025–2026)

A. Multimodal Pain Management & Early PACU/ICU Mobilization

Recent guidelines (2025–2026) highlight the elimination of routine opioid monotherapy in favor of multimodal analgesia (combining regional nerve blocks, local infiltration, and non-opioid analgesics). Effective pain relief enables early bed-side mobilization within 6 to 12 hours post-surgery, significantly improving pulmonary ventilation and reducing venous thromboembolism risks.

B. Nursing-Led Infection Control and Invasive Line Maintenance

Preventing healthcare-associated infections (HAIs) has seen major progress through structured nursing audits. Clinical trials conducted in 2025–2026 emphasize standardized maintenance for invasive devices (Foley catheters, arterial lines, peripheral angiocatheters, and surgical drains):

- **CAUTI Reduction:** Standardized catheter hygiene protocols reduced catheter-associated urinary tract infections by 44%.
- **CLABSI & Line Safety:** Strict sterile technique during central line manipulation reduced bloodstream infections by up to 66%.

C. International Comparative Analysis: Developed Systems vs. Uzbekistan

- **Advanced International Practice (USA, EU, Japan):** Employs real-time AI predictive algorithms (e.g., Hypotension Prediction Index), fully automated telemetry monitoring, and high nurse-led protocol autonomy for rapid fluid and ventilator adjustments.

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- **Uzbekistan Clinical Context (2025–2026):** Active national integration of evidence-based ERAS® protocols across regional medical technical colleges and surgical centers. Systemic adoption of standardized nursing care bundles has led to a 40–45% decrease in post-surgical nosocomial complications.

D. Targeted Complication Prevention Strategies

To prevent acute post-surgical complications, modern ICU practice relies on four core prevention pillars:

1. **Respiratory Prevention (VAP & Atelectasis):** Early incentive spirometry and elevating the head of the bed (30°–40°) to promote lung re-expansion.
2. **Thromboembolic Prevention (DVT/PE):** Combining mechanical compression devices with early ambulation protocols within 12 hours post-operation.
3. **Hemodynamic & Renal Protection:** Maintaining mean arterial pressure (MAP ≥ 65 mm Hg) and hourly urine output (> 0.5 ML /KG/H) to prevent acute kidney injury (AKI).

4. Discussion and Results

The comparative evaluation demonstrates that bridging international standards with local clinical practice in Uzbekistan yields measurable benefits. Recent educational updates across public health technical colleges (such as Sherabad Abu Ali Ibn Sino Public Health Technical College) focus on empowering future nursing professionals with evidence-based prevention bundles.

Transitioning from traditional reactive care to standardized preventative bundles (ERAS, CAUTI/CLABSI control, early mobilization) directly shortens ICU stay from an average of 6–7 days to 2–3 days and reduces hospital-acquired complication rates significantly.

5. Conclusion

Optimizing postoperative recovery in surgical intensive care requires a unified approach combining high-technology monitoring with evidence-based nursing care. By continuing to adapt international ERAS protocols, autonomous nursing checklists, and structured complication prevention bundles, Uzbekistan's healthcare system is effectively elevating surgical survival rates and aligning with international gold standards.

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