

Preoperative Optimization and Surgical Scheduling in ASA I–II Patients: A Contemporary Perioperative Framework for Safety and Operating Room Efficiency

Samer Al Tahiri, Abdullah Almalky, Talal Jamahi, Yahya Ali

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Abstract

Preoperative evaluation and surgical scheduling are critical determinants of perioperative safety, efficiency, and healthcare resource utilization. Although patients classified as American Society of Anesthesiologists (ASA) Physical Status I–II are traditionally regarded as low-risk surgical candidates, contemporary perioperative medicine emphasizes proactive optimization rather than minimal assessment. This review presents a comprehensive framework integrating functional assessment, risk stratification, selective investigations, medication management, fasting protocols, anesthetic planning, enhanced recovery principles, and evidence-based operating room scheduling. Emerging innovations including telemedicine-based preoperative clinics and artificial intelligence-assisted scheduling systems are also discussed. The proposed framework aims to improve perioperative outcomes while maximizing operating room performance and patient-centered care.

Keywords

ASA Classification; Preoperative Assessment; Surgical Scheduling; Perioperative Optimization; Enhanced Recovery; Anesthesia; Operating Room Efficiency

1. Introduction

Over the past two decades, perioperative medicine has evolved from a traditional screening model into a multidisciplinary system focused on risk prediction, optimization, and recovery enhancement. ASA I–II patients constitute the majority of elective surgical populations worldwide. Despite their favorable risk profile, preventable perioperative complications may still occur due to undetected physiological limitations, inappropriate testing, medication errors, prolonged fasting, or inefficient scheduling. Consequently, structured perioperative pathways have become increasingly important in modern surgical practice.

Enhanced Recovery After Surgery (ERAS) programs and value-based healthcare models have further emphasized the importance of individualized assessment and operational efficiency. This review proposes a contemporary framework that integrates clinical optimization with evidence-based surgical scheduling.

2. Methodology

This narrative review was developed through synthesis of contemporary perioperative literature, international guidelines, anesthesia references, and enhanced recovery recommendations published between 2023 and 2026. Key concepts were organized into clinical and operational domains relevant to low-risk surgical populations.

3. Preoperative Evaluation Framework

The primary objective of preoperative assessment is to identify modifiable risks, optimize physiological status, and facilitate informed perioperative planning. Evaluation should extend beyond disease diagnosis and incorporate functional and physiological reserve assessment.

3.1 Functional Capacity Assessment

Functional capacity remains one of the strongest predictors of perioperative tolerance. Assessment may include metabolic equivalents (METs), exercise tolerance, stair-climbing ability, daily activity performance, and cardiopulmonary reserve estimation. Patients capable of achieving greater than four METs generally demonstrate favorable perioperative outcomes.

3.2 Physiological Reserve Profiling

Contemporary perioperative medicine increasingly focuses on physiological resilience rather than isolated disease states. Important domains include cardiovascular adaptability, pulmonary gas exchange efficiency, autonomic stability, metabolic flexibility, and stress-response capacity.

3.3 Risk Stratification Beyond ASA Classification

Although the ASA classification remains widely used, it should not be considered a standalone predictor of perioperative outcomes. Additional assessment tools include the Revised Cardiac Risk Index (RCRI), STOP-Bang questionnaire for obstructive sleep apnea screening, frailty indices, and structured functional capacity measures.

3.4 Telemedicine and Digital Assessment

Digital preoperative assessment clinics have demonstrated benefits including reduced hospital visits, earlier identification of optimization needs, improved patient engagement, and streamlined scheduling workflows. Telemedicine is expected to play an increasingly important role in perioperative care delivery.

4. Diagnostic Investigations

Routine laboratory testing is not recommended for all ASA I–II patients. Current evidence supports a selective testing strategy guided by clinical history, physical examination findings, medication use, and planned surgical complexity.

Recommended investigations when clinically indicated include:

- Complete blood count.
- Electrocardiography.
- Renal function and electrolyte testing.
- Blood glucose measurement.
- Coagulation studies.
- Chest imaging for suspected cardiopulmonary pathology.

Selective testing reduces healthcare costs and minimizes unnecessary interventions while maintaining patient safety.

5. Pharmacological Optimization

Medication management is an essential component of perioperative preparation. Beta-blockers and most antihypertensive agents are generally continued throughout the perioperative period. Diabetic medications require individualized adjustment to prevent hypoglycemia and hyperglycemia. Anticoagulant management should balance thrombotic and bleeding risks according to procedural requirements. Avoidance of unnecessary medication interruption minimizes physiological instability during surgical stress.

6. Fasting and Metabolic Preparation

Modern fasting protocols seek to reduce aspiration risk while preserving metabolic stability. Current recommendations generally include six hours for light meals, eight hours for fatty meals, and two hours for clear fluids. Excessive fasting has been associated with dehydration, insulin resistance, patient discomfort, and delayed recovery. Contemporary ERAS pathways advocate patient-centered fasting strategies and appropriate carbohydrate management when indicated.

7. Anesthetic Planning

ASA I–II patients are appropriate candidates for general anesthesia, regional anesthesia, monitored anesthesia care, and sedation-based techniques. Comprehensive airway evaluation remains mandatory regardless of perceived risk. Anesthetic planning should prioritize rapid recovery, hemodynamic stability, effective analgesia, and minimization of postoperative nausea and vomiting.

8. Surgical Scheduling Strategy

Surgical scheduling has evolved from a purely administrative function into a clinical process influencing perioperative outcomes. Scheduling decisions affect fasting duration, resource utilization, workflow efficiency, patient satisfaction, and recovery trajectories.

8.1 Timing Optimization

ASA I–II patients are often suitable for early operating list placement. Advantages include shorter fasting duration, improved metabolic stability, enhanced workflow predictability, and reduced cancellation risk.

8.2 Case Sequencing Principles

Routine low-complexity procedures are generally scheduled early within operating lists. Intermediate-complexity procedures may follow, while prolonged or resource-intensive procedures are strategically allocated according to institutional requirements.

8.3 Operating Room Efficiency

Because ASA I–II patients typically demonstrate predictable operative courses and rapid recovery, they are ideal candidates for high-throughput surgical pathways. Efficient scheduling contributes to improved operating room utilization, reduced turnover delays, and enhanced healthcare productivity.

8.4 Patient-Centered Scheduling

Scheduling decisions should also consider patient preferences, fasting tolerance, diabetic management requirements, transportation logistics, family support systems, and postoperative recovery plans.

9. Artificial Intelligence in Perioperative Scheduling

Artificial intelligence and machine learning technologies are increasingly being investigated for operating room management. Potential applications include prediction of procedure duration, cancellation risk assessment, staffing optimization, dynamic resource allocation, and real-time schedule adaptation. Future perioperative systems are expected to integrate AI-assisted decision support to improve efficiency and reduce operational waste.

10. Enhanced Recovery Integration

ERAS principles complement perioperative optimization through multimodal analgesia, early mobilization, nutritional support, fluid management optimization, and reduction of surgical stress responses. ASA I–II patients represent an ideal population for implementation of enhanced recovery pathways because of their relatively preserved physiological reserve.

11. Future Directions

Future perioperative models will likely incorporate digital health platforms, wearable physiological monitoring devices, predictive analytics, artificial intelligence systems, and personalized perioperative pathways. These innovations may enable more precise risk prediction and individualized scheduling strategies.

12. Conclusion

Although ASA I–II patients are traditionally considered low-risk surgical candidates, contemporary evidence supports structured preoperative optimization and strategic scheduling. Integrating physiological assessment, selective investigations, medication management, enhanced recovery principles, telemedicine, and efficiency-based scheduling can improve patient outcomes while maximizing healthcare resource utilization. Future perioperative pathways are expected to become increasingly data-driven and technologically integrated.

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