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Review article

BRIDGING PRIMARY CARE AND SURGERY: THE ROLE OF GENERAL PHYSICIANS AND ANESTHESIOLOGISTS IN PERIOPERATIVE OPTIMIZATION

Domi Rudin, Kaci Myzafer

University of Medicine, Faculty of Medicine, Department of Surgery, Tirana, Albania

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Abstract: The transition of a patient from primary or internal medicine care to the operating room represents a critical juncture in perioperative management. Surgical patients requiring anesthesia must undergo thorough, multidisciplinary preparation involving family physicians, internists, hospitalists, anesthesiologists, surgeons, and physiotherapists. This multidimensional approach helps ensure a safe and seamless transition to anesthesia and surgery, thereby optimizing procedural outcomes. Key challenges during this phase include accurate assessment of physical status, risk stratification, optimization of comorbidities, and management of chronic medications. Adequate preoperative preparation minimizes the risk of surgical delays and enhances patient safety. This paper aims to highlight critical issues that can be addressed collaboratively by general physicians and anesthesiologists, fostering improved communication, shared knowledge, and clinical expertise.

Key words: perioperative medicine, anesthesia, surgery, chronic medications, comorbidities, perioperative risk stratification.

INTRODUCTION

The transition of patients from primary care or internal medicine services to the operating room represents a pivotal and complex stage in perioperative management. This phase is not merely a logistical handover; it is a critical period during which careful assessment, optimization, and planning directly influence patient safety and surgical outcomes. Patients scheduled for surgery and requiring anesthesia must undergo comprehensive, multidisciplinary preparation. This involves collaboration among family physicians, internists, hospitalists, anesthesiologists, surgeons, and physiotherapists, each contributing unique expertise to ensure that the patient is optimally prepared for the operative procedure. Such a coordinated, team-based approach facilitates a smooth and safe transition to anesthesia and surgery, ultimately reducing perioperative risks and improving clinical outcomes.

Several key challenges arise during this transition. Accurate assessment of the patient's physical status is essential to identify potential perioperative risks. Risk stratification allows clinicians to anticipate complications and tailor interventions accordingly. Optimization of comorbidities, including cardiovascular, respiratory, metabolic, and renal conditions, is critical, as poorly controlled diseases can increase the likelihood of intraoperative and postoperative complications. Additionally, careful management of chronic medications, including anticoagulants, antiplatelets, antihypertensives, and other long-term therapies, is necessary to prevent adverse interactions and minimize surgical delays (1).

In real-world practice, several pitfalls commonly occur during preoperative preparation. For example, undiagnosed or poorly controlled hypertension can increase the risk of intraoperative hemodynamic instability, while unrecognized anemia may lead to unnecessary transfusions or delayed surgery. Inadequate patient counseling about perioperative fasting, medication adjustments, or postoperative expectations often results in confusion, anxiety, and last-minute cancellations. Furthermore, communication gaps between primary physicians and anesthesiologists can result in incomplete medical histories or missed risk factors (2).

Practical interventions to address these issues include structured preoperative assessment clinics, standardized checklists, and multidisciplinary team meetings. Family physicians and internists play a crucial role in optimizing chronic conditions before sur-

gery, while anesthesiologists focus on risk stratification and perioperative planning (3). Clear protocols for medication management, including bridging strategies for anticoagulation and antihypertensive adjustments, can prevent complications. Patient education initiatives, including preoperative counseling and written instructions, improve compliance and reduce anxiety. Adequate preoperative preparation not only enhances patient safety and minimizes perioperative complications but also improves operational efficiency by reducing the likelihood of last-minute cancellations or postponements due to incomplete or inadequate evaluation. Furthermore, this phase represents an opportunity for knowledge sharing and skills development between general physicians and anesthesiologists, strengthening interdisciplinary collaboration. This review aims to highlight essential aspects of preoperative care that can be effectively addressed through joint efforts of general physicians and anesthesiologists. By fostering greater collaboration, communication, and expertise, healthcare teams can optimize perioperative management, ensuring safer surgical journeys and better overall patient outcomes.

Perioperative optimization and postoperative mortality and morbidity

Preoperative optimization demonstrates the strongest mortality benefit in high-risk surgical patients, particularly through hemodynamic optimization and correction of anemia or malnutrition. Prehabilitation improves recovery and complication rates, although most trials are underpowered for mortality endpoints. Smoking cessation and restrictive transfusion thresholds are also associated with improved overall outcomes. A multidisciplinary, patient-tailored approach remains essential for achieving maximal benefit.

Preoperative optimization aims to identify and modify risk factors before surgery in order to reduce postoperative complications and mortality. Among the most studied interventions, goal-directed hemodynamic therapy (GDHT) has shown the most consistent mortality benefit. In pooled analyses of randomized controlled trials, GDHT significantly reduced short-term mortality (risk ratio 0.75; 95% CI 0.61–0.91), particularly in high-risk abdominal surgical populations (4).

In contrast, prehabilitation programs—including exercise training, inspiratory muscle exercises, nutritional support, and smoking cessation—demonstrate clear improvements in postoperative recovery but have not consistently reduced 30-day mortality. Although large systematic reviews confirm reductions in complications and hospital length of stay (LOS) by approximately one to two days, most trials remain underpowered for mortality outcomes (5).

Nutritional optimization, particularly through preoperative oral nutritional supplementation, has been associated with lower all-cause postoperative mortality in malnourished or frail patients, such as those undergoing gastrointestinal cancer or hip fracture surgery (6, 7). These interventions also reduce infections and improve nutritional biomarkers, supporting their role in high-risk populations.

Anemia remains an independent risk factor for postoperative death. Meta-analyses report approximately a 2.8-fold increase in the odds of mortality in anemic patients undergoing major or orthopedic surgery. Consensus guidelines therefore recommend identification and correction of anemia—using iron supplementation or erythropoietin when indicated—to reduce perioperative transfusion requirements and improve outcomes (8, 9).

Smoking cessation has an indirect yet clinically meaningful impact on postoperative survival through a reduction in severe complications. Studies demonstrate significant decreases in pulmonary and wound complications when cessation occurs at least two to four weeks preoperatively, particularly when combined with behavioral and pharmacologic support (10).

Finally, restrictive transfusion strategies during the perioperative period have been shown to be safe and non-inferior to liberal transfusion approaches with regard to short-term mortality. Restrictive thresholds reduce transfusion exposure without increasing death rates, although findings vary in specific subgroups, such as cardiac surgery and massive hemorrhage (11).

Overall, current evidence indicates that preoperative optimization enhances surgical safety, with the most pronounced mortality benefits observed in targeted, high-risk interventions—particularly hemodynamic optimization, correction of anemia, and nutritional support. Broader prehabilitation and behavioral interventions further improve recovery, reduce perioperative complications, and enhance physiological resilience, even when direct mortality reductions are not statistically significant. Moreover, collaboration between general or family physicians and perioperative specialists plays a pivotal role in preparing patients for elective surgery. This partnership facilitates early interventions such as smoking cessation, nutritional optimization, treatment of preoperative anemia, and structured rehabilitation, thereby ensuring a more comprehensive and effective preoperative preparation process. Table 1 summarizes quantitative evidence from systematic reviews and meta-analyses regarding the relationship between various preoperative optimization strategies and postoperative mortality.

Table 1. *Preoperative optimization and postoperative mortality: evidence summary*

Intervention (Target)	Effect on Mortality	Other Relevant Effects	Key Findings / Pooled Estimate	Reference (Vancouver)
Goal-directed hemodynamic therapy (GDHT)	Reduced short-term mortality (RR 0.75, 95% CI 0.61–0.91)	Reduced complications and LOS; benefit strongest in major/high-risk abdominal surgery.	Modern GDT protocols show mortality benefit.	Sun et al. (4)
Prehabilitation (exercise, nutrition, smoking cessation)	No consistent reduction in 30-day mortality; trials underpowered for this outcome.	Reduced complications, shorter LOS (~1–2 days), improved recovery.	Large systematic reviews/meta-analyses confirm benefits for complications and LOS.	Li N et al. (5)
Preoperative oral nutritional supplementation	Reduced all-cause postoperative mortality in malnourished or frail subgroups.	Reduced infections and complication rates; improved nutritional markers.	Effect clearer in malnourished or elderly surgical cohorts.	Knight et al., (6); Lai et al., (7).
Preoperative anemia correction	Anemia associated with increased mortality (OR ~2.78); treatment recommended.	Anemic patients need more transfusions; correction improves outcomes.	Consensus supports iron ± erythropoietin when indicated.	Fowler et al. (8); Buhl et al. (9)
Preoperative smoking cessation	No consistent mortality data; reduces severe postoperative complications.	Decreases pulmonary and wound complications when ≥4 weeks preop.	Combining behavioral and pharmacotherapy yields best results.	Mills et al. (10)
Restrictive vs liberal transfusion thresholds	No increase in short-term mortality; non-inferior to liberal strategy.	Reduces transfusion exposure; mixed findings in cardiac/massive hemorrhage.	Restrictive strategy safe across most surgical contexts.	Lenet et al. (11)

Consequences of postponing surgery

Inadequate preoperative preparation significantly contributes to adverse surgical outcomes. Poor optimization of comorbidities—such as anemia, malnutrition, diabetes, or cardiopulmonary disease—elevates the risk of intraoperative instability, postoperative complications, and mortality. Patients entering surgery in suboptimal condition are more susceptible to stress-induced decompensation, impaired wound healing, and infections. Additionally, uncontrolled metabolic status, inadequate nutrition, or untreated anemia can compromise oxygen delivery, tissue perfusion, and immune function (12).

Neglecting modifiable risk factors—including smoking, alcohol use, obesity, poor nutrition, or inappropriate medication management—further increases morbidity. These issues often arise from time constraints, fragmented communication, or insufficient pre-assessment pathways, leading to delayed recovery, prolonged hospitalization, higher readmission rates, and long-term morbidity. Beyond patient safety, these deficiencies undermine efficiency and quality within the surgical system (13).

Unplanned surgical delays pose additional risks. Postponements due to incomplete optimization or late detection of medical issues can worsen the underlying disease, deteriorate physiological status, and heighten patient anxiety. Even short delays may negatively impact prognosis in oncological, infectious, or cardiovascular conditions. Repeated cancellations also impose logistical burdens, wasting operating room time, increasing administrative workload, and disrupting hospital workflow—reflecting gaps in coordination, resource allocation, and interdisciplinary communication (14).

Structured preoperative assessment and timely optimization are therefore essential. Multidisciplinary preoperative clinics—including anesthesiologists, surgeons, internists, and family physicians—allow early identification and management of modifiable risk factors. Standardized protocols, early screening for anemia and malnutrition, and lifestyle interventions such as smoking cessation and physical conditioning improve postoperative outcomes, reduce cancellations, and enhance system efficiency (15).

Family physicians play a pivotal role in preoperative preparation, coordinating with surgeons, anesthesiologists, and perioperative teams to ensure patients achieve optimal medical and physical status before surgery. Multidisciplinary programs combining medical optimization, lifestyle guidance, and rehabilitation strengthen patient resilience and facilitate a safer and more efficient surgical pathway.

The internist's role in preoperative assessment and optimization

Preoperative evaluation by the internist is a critical determinant of perioperative outcomes in patients undergoing surgical procedures. Rather than serving as a simple clearance process, preoperative assessment aims to identify and optimize medical comorbidities, stratify perioperative risk, and facilitate coordinated, multidisciplinary perioperative care. Effective internist involvement has been associated with reduced perioperative morbidity and mortality, particularly in medically complex patients.

General principles of preoperative assessment

A comprehensive clinical assessment forms the foundation of preoperative evaluation. This includes a detailed medical history, assessment of functional capacity—commonly expressed in metabolic equivalents (METs)—a thorough review of current medications, and a focused physical examination. Current guidelines discourage routine preoperative testing in asymptomatic patients, emphasizing that laboratory and diagnostic investigations should be selectively ordered based on clinical findings, patient comorbidities, and the complexity and risk profile of the planned surgical procedure (16).

Cardiovascular risk stratification

Cardiovascular complications remain a leading cause of adverse perioperative events in non-cardiac surgery. Preoperative cardiac evaluation should integrate patient-specific clinical risk factors, validated risk prediction tools such as the Revised Cardiac Risk Index, the inherent risk of the surgical procedure, and the patient's functional capacity. Non-invasive cardiac testing should be reserved for selected patients in whom test results are likely to influence perioperative management or surgical decision-making. Optimization of heart failure, ischemic heart disease, hypertension, and cardiac arrhythmias is essential prior to elective surgery (17, 18).

Pulmonary risk assessment

Identification of patients at increased risk for postoperative pulmonary complications is a key component of preoperative preparation. Attention should be given to individuals with chronic obstructive pulmonary disease, asthma, obstructive sleep apnea, or a history of smoking. Evidence-based preventive strategies include preoperative smoking cessation, optimization of inhaled therapies, treatment of active respiratory infections, and implementation of lung expansion techniques to reduce postoperative pulmonary morbidity (19, 20).

Metabolic and endocrine considerations

Metabolic disorders, particularly diabetes mellitus, require structured perioperative planning. Poor preoperative glycemic control is associated with increased risks of surgical site infection, delayed wound healing, and adverse outcomes. The internist plays a central role in optimizing glycemic control and establishing individualized perioperative management plans for insulin and oral hypoglycemic agents, with the goal of avoiding both hypoglycemia and significant hyperglycemia (21).

Perioperative medication management

Medication management represents one of the most complex aspects of preoperative care. Decisions regarding the continuation or temporary discontinuation of anticoagulants, antiplatelet agents, antihypertensives, and chronic corticosteroid therapy must carefully balance bleeding risk, thromboembolic risk, and adrenal insufficiency. These decisions should be individualized and require close communication between the internist, anesthesiologist, and surgical team to ensure patient safety and continuity of care (22).

Frailty, nutrition, and anemia

There is growing recognition of frailty, malnutrition, and anemia as independent predictors of poor surgical outcomes. Preoperative identification of frailty allows for risk stratification and informed shared decision-making. Correction of anemia and nutritional optimization, particularly in elderly patients and those undergoing oncologic surgery, have been shown to improve postoperative recovery and reduce complication rates (23, 24).

Table 2. *Key components of preoperative assessment and optimization by the internist*

Domain	Key Elements	Internist's Role	Impact on Outcomes
Clinical evaluation	Medical history, functional capacity (METs), focused physical examination	Identify comorbidities, assess physiological reserve, guide need for further testing	Avoids unnecessary investigations; improves risk stratification (16)
Cardiovascular risk	RCRI, surgical risk, functional status	Optimize heart failure, ischemic heart disease, hypertension, arrhythmias; select patients for further testing	Reduces perioperative cardiac events (17, 18)
Pulmonary assessment	COPD, asthma, OSA, smoking status	Implement smoking cessation, optimize inhaled therapy, treat infections, plan lung expansion strategies	Lowers postoperative pulmonary complications (19, 20)
Metabolic/endocrine status	Diabetes mellitus, electrolyte disorders	Optimize glycemic control; plan perioperative insulin and oral agent management	Decreases infection risk and metabolic complications (21)
Medication management	Anticoagulants, antiplatelets, antihypertensives, steroids	Balance bleeding vs thrombotic risk; manage steroid stress dosing	Prevents hemorrhagic, thromboembolic, and adrenal complications (22)
Frailty and nutrition	Frailty scores, nutritional status	Identify vulnerable patients; initiate nutritional and functional optimization	Improves recovery and reduces postoperative morbidity (23, 24)
Anemia management	Hemoglobin levels, iron deficiency	Diagnose and treat anemia preoperatively	Reduces transfusion needs and adverse outcomes (23, 24)
Multidisciplinary coordination	Communication with surgery and anesthesia	Document risks, optimization strategies, and postoperative plans	Enhances continuity of care and patient safety

Multidisciplinary coordination and continuity of care

Effective perioperative management relies on structured multidisciplinary collaboration. Clear documentation of preoperative risk assessment, optimization strategies, and postoperative medical management plans ensures seamless transitions of care and reduces the likelihood of perioperative complications related to communication failures.

Table 2 summarizes key concepts related to preoperative patient preparation.

CONCLUSION

Multidisciplinary preoperative preparation is essential to ensure safe and effective surgical care, particularly for patients with complex comorbidities. Optimization of risk factors—including anemia, malnutrition, cardiopulmonary disease, and lifestyle-related factors—reduces perioperative complications, improves recovery, and, in high-risk populations, decreases mortality. Inadequate preparation or delayed optimization increases surgical risk, prolongs hospitalization, and disrupts healthcare efficiency. Active collaboration between family physicians, anesthesiologists, and surgical teams enhances risk stratification, patient readiness, and continuity of care. Structured, standardized, and patient-centered preoperative pathways are therefore critical to improving surgical outcomes and overall perioperative safety.

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Note: Artificial intelligence is used to increase readability.

Sažetak

POVEZIVANJE PRIMARNE ZDRAVSTVENE ZAŠTITE I HIRURGIJE: ULOGA OPŠTIH LEKARA I ANESTEZIOLOGA U PERIOPERATIVNOJ OPTIMIZACIJI

Domi Rudin, Kaci Myzafer

Medicinski fakultet Univerziteta u Tirani, Katedra za hirurgiju, Tirana, Albanija

Prelazak pacijenta iz primarne zdravstvene zaštite ili iz internističkog sektora u operacionu salu predstavlja ključnu fazu u perioperativnom menadžmentu. Hirurški pacijenti kojima je potrebna anestezija moraju proći sveobuhvatnu, multidisciplinarnu pripremu koja uključuje porodične lekare, interniste, hospitaliste, anesteziologe, hirurge i fizioterapeute. Ovaj multidimenzionalni pristup pomaže da prelazak na anesteziju i hirurgiju bude siguran i neometan, čime se optimizuju ishodi procedura. Ključni izazovi u ovoj fazi uključuju preciznu procenu fizikalnog statusa pacijenta, stratifikaciju rizika, optimizaciju komorbiditeta i upravljanje hroničnim lekovima. Adekvatna preoperativna priprema smanjuje rizik od odlaganja operacije i povećava bezbednost pacijenta. Ovaj rad ima za cilj da istakne ključna pitanja koja se mogu rešavati u saradnji lekara opšte prakse i anesteziologa, podstičući bolju komunikaciju, deljenje znanja i kliničku stručnost.

Ključne reči: perioperativna medicina, anestezija, hirurgija, hronični lekovi, komorbiditeti, perioperativna stratifikacija rizika.

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Correspondence to/Autor za korespondenciju
Prof dr Rudin Domi
Department of Surgery, Faculty of Medicine, University of Medicine, Tirana, Albania
Email: rudin.domi@umed.edu.al
Mob: 00355682067003
ORCID: https://orcid.org/0000-0003-4594-7815

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