RESEARCH PAPER

Street Readiness of Chronic Medications in the Preoperative Room. An evidence based review.

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ABSTRACT

The administration of chronic medications in the perioperative period presents significant challenges due to the high prevalence of multimorbidity among surgical patients and the paucity of robust evidence guiding their management. This complexity is further compounded by the potential for drug-drug interactions and adverse effects, necessitating careful consideration of each medication's risk-benefit profile in the context of the surgical procedure and patient-specific factors. Effective preoperative medication management is thus crucial for optimizing patient outcomes, minimizing complications, and ensuring patient safety throughout the perioperative journey. Despite its critical importance, the nuanced decision-making process regarding the continuation or discontinuation of chronic medications during this period often lacks definitive clinical trial data, leading to varied clinical practices and potential risks. This review aims to synthesize current evidence and provide an updated perspective on the perioperative management of chronic medications, differentiating between essential and non-essential pharmacological agents to facilitate informed clinical decisions.

Keywords: Perioperative care, antidiabetic agents, thyroid drugs, cardiovascular drugs, antiplatelet drugs, surgical outcomes, polypharmacy.

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Introduction

The escalating prevalence of chronic diseases has led to a concomitant rise in the number of patients undergoing surgical procedures while concurrently receiving multiple chronic medications (1). This demographic trend necessitates a comprehensive approach to perioperative medication management, particularly given the intricate interplay between chronic pharmacotherapy, surgical stress, and anaesthetic agents (2). Effective perioperative medication management is paramount not only for mitigating potential drug interactions and adverse effects but also for preventing medication errors, which are a significant safety concern in hospitalized patients (3,4). Future advancements should focus on the widespread implementation of unified electronic medication systems to improve transparency and reduce the fragmentation of perioperative medication processes, thereby minimizing human errors and enhancing collaborative professional relationships. Recent guidelines from organizations such as the American College of Surgeons and the American Geriatrics Society emphasize the importance of a structured approach to perioperative medication

management, particularly for identifying potentially inappropriate medications in older patients (5-7). Furthermore, the European Society of Medicine underscores the necessity of a complete medication history and rigorous management of chronic medications to mitigate morbidity arising from medication errors during the perioperative period (7).

Methodology

This paper systematically reviews existing literature on the perioperative management of chronic medications, focusing on evidence-based guidelines and expert consensus to inform clinical practice. The review encompasses an analysis of both recent publications and established guidelines concerning the continuation or discontinuation of various chronic medication classes during the preoperative, intraoperative, and postoperative phases.

Data Extraction

Primary sources included randomized controlled trials, systematic reviews, meta-analyses, and clinical practice guidelines from reputable professional organizations, identified through a rigorous search of PubMed, Embase, and Scopus databases. The search strategy employed a combination of MeSH terms and keywords related to perioperative care, chronic medications, specific drug classes, and patient outcomes. This comprehensive approach enabled the synthesis of diverse perspectives on chronic medication management, addressing the variability in current practice that stems from a notable lack of outcome data concerning most perioperative medications.

Literature Review

DEFINITION OF STREET READINESS IN PERIOPERATIVE CONTEXT

In the context of perioperative care, "street readiness" refers to the patient's optimal physiological and pharmacological state, achieved through meticulous management of chronic medications, to safely undergo surgery and anaesthesia (7). This involves a proactive assessment and adjustment of drug regimens to prevent adverse drug events, mitigate drug-drug interactions, and ensure therapeutic efficacy throughout the surgical journey (8).

IMPORTANCE IN MODERN ANAESTHESIA PRACTICE

The increasing prevalence of polypharmacy among an aging surgical population further elevates the complexity of achieving "street readiness," as multiple concomitant medications heighten the risk of adverse drug events and suboptimal surgical outcomes (9). For instance, pre operative polypharmacy, defined as the concurrent use of five or more medications, is associated with increased adverse outcomes and higher rates of postoperative complications (10,11). This complexity necessitates a comprehensive understanding of how individual chronic medications impact surgical risk and recovery, extending beyond the immediate perioperative phase to encompass long-term patient well-being (4). This integrated approach is crucial for mitigating complications, such as medication discrepancies and adverse drug events, which are frequently observed during transitions of care (12). Moreover, poor adherence to chronic medications during the perioperative period, affecting 30% to 60% of surgical patients, has been identified as a significant factor contributing to adverse postoperative outcomes (13).

BURDEN OF CHRONIC DISEASES IN SURGICAL PATIENTS

Approximately half of all surgical patients regularly take chronic medications, underscoring the ubiquity of chronic disease management in the perioperative setting (7). This widespread use necessitates a thorough understanding of potential interactions with anesthetic agents and surgical stressors to optimize patient outcomes (7). This highlights the critical importance of a robust medication reconciliation process to ensure patient safety and prevent adverse drug events (14). This challenge is further amplified by the increasing complexity of patient comorbidities and the rise of polypharmacy, where patients often present with multiple chronic conditions requiring diverse pharmacological interventions (15).

RISK OF INAPPROPRIATE DRUG CONTINUATION/WITHHOLDING

Inappropriate continuation or abrupt withdrawal of chronic medications can lead to significant morbidity and mortality, thereby underscoring the necessity for individualized pharmacotherapeutic support guided by the "Rule of the five R" to ensure optimal patient management (4). This individualized approach is paramount given the rapid commercialization of new drugs, which often precedes a full understanding of the implications of their abrupt cessation (5).

Medication reconciliation, a structured process of obtaining and maintaining an accurate list of all medications a patient is taking, is a critical intervention for reducing medication errors at care transitions, particularly in the perioperative phase (16). This process is considered essential for achieving medication safety and minimizing adverse drug events,

which can incur substantial financial burdens on healthcare systems (17). The heightened complexity of drug management in surgical departments, with multiple prescribers and frequent transitions of care, further amplifies the risk of medication errors, notably the omission of home medications in scheduled surgeries. This emphasizes the need for comprehensive medication review and reconciliation practices to ensure all necessary medications are continued and unnecessary ones are discontinued, thereby minimizing perioperative risks (18). A systematic approach to perioperative medication management can significantly reduce the incidence of drug-related problems, which are frequently identified as contributing factors to adverse outcomes in surgical patients (19).

RATIONALE FOR MEDICATION OPTIMIZATION

Optimizing medication regimens preoperatively can mitigate these risks by ensuring that patients are in the best possible physiological state for surgery, thereby improving recovery trajectories and reducing hospital readmissions.

PHYSIOLOGICAL STRESS RESPONSE TO SURGERY

The physiological stress response elicited by surgery, encompassing neuroendocrine and inflammatory changes, can significantly alter drug pharmacokinetics and pharmacodynamics, necessitating a nuanced approach to chronic medication management during the perioperative period (20).

DRUG-ANAESTHETIC INTERACTION

Concomitant administration of chronic medications with anaesthetic agents can lead to critical interactions, including altered anaesthetic depth, prolonged emergence, or exacerbated hemodynamic instability, underscoring the imperative for a meticulous assessment of all prescribed drugs (6). Such an assessment, ideally conducted through a best possible medication history by a pharmacist during preoperative evaluation, is crucial for identifying potential drug-drug interactions and optimizing patient safety.

RISK

Risk of medication discrepancies and errors during the perioperative period remains substantial, despite the recognized benefits of comprehensive medication reconciliation, leading to potentially serious adverse events (21).

HEMODYNAMIC INSTABILITY

The interplay between chronic cardiovascular medications and anaesthetic agents, for instance, can critically influence intraoperative hemodynamic stability, potentially leading to profound hypo- or hypertension, arrhythmias, or myocardial ischemia (22). Therefore, a thorough understanding of each patient's medication regimen and its potential physiological impact during surgical stress is paramount for preventing adverse perioperative events (4). This proactive management strategy extends to agents like antidiabetic medications, thyroid hormones, and antiplatelet drugs, where inappropriate perioperative adjustments can precipitate metabolic dysregulation, thyroid storm, or excessive bleeding (23).

BLEEDING COMPLICATION

Given that up to 13% of patients experience at least one Unintended Medication Discrepancy, and that 50% of surgical patients are on regular non-surgery related medications, careful management is critical to prevent complications such as haemorrhagic events, particularly in those on antiplatelet or anticoagulant therapies (Chirivella et al., 2018; Renaudin et al., 2020).

Given the high prevalence of medication errors in surgical settings, a collaborative approach involving pharmacists and anaesthesiologist’s can significantly enhance the safety of perioperative medication management (17).

METABOLIC DERAGEMENTS

Poorly managed chronic conditions such as diabetes can lead to significant metabolic derangements during surgery, including hyperglycaemia or hypoglycaemia, which are associated with increased infection rates and compromised wound healing. Such complications necessitate rigorous glycaemic control and an individualized approach to antidiabetic medication management throughout the perioperative continuum (5). Perioperative malnutrition, often exacerbated by chronic disease, further complicates recovery by impairing immune function and wound healing, making nutritional assessment and intervention critical components of comprehensive patient care (24).

CONCEPT OF RISK -BENEFIT STRATIFICATION

The determination of whether to continue or discontinue chronic medications in the perioperative period involves a careful risk-benefit stratification, balancing the potential for adverse drug withdrawal effects against the risk of drug-drug or drug-anaesthesia interactions and surgical complications (23). This nuanced decision-making process requires a comprehensive evaluation of the patient's comorbidities, the nature of the surgical procedure, and the specific pharmacological properties of each medication (Roig et al., 2004; Zaki et al., 2024). This includes considering the potential for rebound effects

upon withdrawal, such as increased platelet adhesiveness with antiplatelet agents, which can elevate thrombotic risk in the highly procoagulant perioperative state (25). Moreover, the decision-making process must also account for polypharmacy, a common issue in elderly and frail patients, which further complicates perioperative medication management due to increased potential for adverse drug interactions and side effects (8).

GENERAL CONSIDERATION FOR PERIOPERATIVE MEDICATION MANAGEMENT.

The optimal management of these agents necessitates an interprofessional approach, leveraging the expertise of various healthcare providers to determine the appropriate duration and extent of temporary interruption or continuation of therapy (26).

The variability in established guidelines for managing chronic medications during the perioperative period necessitates an individualized approach, often guided by institutional protocols and expert consensus, given the limited outcome data for many commonly used drugs (7). This often translates into a multidisciplinary team approach, integrating the expertise of anaesthesiologists, surgeons, pharmacists, and internal medicine specialists to tailor medication plans to individual patient needs and surgical demands. Such a collaborative framework is particularly crucial for patients with complex comorbidities or those receiving polypharmacy, where the risk of drug-related complications is substantially elevated (15). Geriatric patients, in particular, present unique challenges due to multimorbidity, frailty, and polypharmacy, necessitating a comprehensive geriatric assessment to optimize perioperative outcomes and predict potential postoperative complications (27). This comprehensive assessment should include rapid screening tools for cognition, functional status, and frailty to identify high-risk individuals (28). Furthermore, the altered pharmacokinetics and pharmacodynamics in older adults increase their susceptibility to adverse drug events, making a meticulous review of their medication regimen paramount (29). The identification of potentially inappropriate medications is particularly critical in this population, as their use is associated with higher hospitalization rates, increased morbidity, and poorer outcomes. Polypharmacy, defined as the use of five or more medications, is a significant predictor of 30-day postoperative major complications, especially in geriatric patients (30). The prevalence of polypharmacy is substantial, with some studies indicating that over 80% of elderly perioperative patients use five or more medications, further underscoring the need for careful medication reconciliation (31). This emphasizes the imperative for meticulous perioperative medication review and adjustment to mitigate the heightened risks associated with complex pharmacological regimens in an aging surgical population. This comprehensive approach aids in reducing postoperative complications, shortening hospital stays, and decreasing readmission rates (30).

CARDIOVASCULAR MEDICATIONS

NITRATES

The management of nitrates in the perioperative period, particularly given their vasodilatory effects and potential for interaction with anaesthetic agents, requires careful consideration to prevent hemodynamic instability. This often involves meticulously titrating doses and monitoring blood pressure to maintain cardiovascular stability during surgical procedures (7). For instance, some practitioners advocate for the continuation of nitrates to mitigate myocardial ischemia, while others recommend temporary cessation or dose reduction, depending on the patient's cardiac status and the invasiveness of the surgical procedure. However, the lack of robust evidence supporting specific protocols for nitrate management during the perioperative phase contributes to wide variations in practice (23).

BETA-BLOCKERS

The perioperative management of beta-blockers presents a complex clinical scenario, balancing the risks of withdrawal syndrome against the potential for exacerbated bradycardia and hypotension in the presence of anaesthetic agents (18). Clinical guidelines often recommend continuing beta-blockers in patients already on therapy to avoid adverse cardiac events (4), though careful titration may be necessary, particularly in patients with borderline hemodynamic or those undergoing procedures associated with significant fluid shifts. However, in cases where patients are newly initiated on beta-blockers preoperatively, the timing and dosage require careful consideration to prevent potential complications (23).

The continuation of beta-blocker therapy through the perioperative period is generally recommended for patients on chronic regimens to prevent rebound hypertension, arrhythmias, and myocardial ischemia, though careful titration may be necessary to avoid excessive bradycardia or hypotension in conjunction with anaesthetic agents (23). However, decisions regarding their perioperative management often exhibit considerable variability among clinicians due to the

lack of definitive evidence-based guidelines. This variability underscores the critical need for personalized approaches, taking into account individual patient risk factors and the specific surgical context to optimize cardiovascular stability (4). This necessitates a nuanced understanding of beta-blocker pharmacology in the context of anaesthetic interactions and surgical stress response to prevent adverse cardiovascular events.

CALCIUM CHANAL BLOCKERS

Calcium channel blockers, while often continued in the perioperative period for patients on chronic therapy, require judicious management due to their potential to exacerbate hypotension when combined with anaesthetic agents, particularly in patients with compromised left ventricular function (32). Nonetheless, continuing these medications is generally recommended to maintain blood pressure control and mitigate myocardial ischemia, especially with dihydropyridines, provided vigilant hemodynamic monitoring is employed (33). Moreover, their use in specific populations, such as those with unstable angina, warrants careful consideration of concomitant beta-blockade to prevent reflex tachycardia (34). Conversely, the withdrawal of calcium channel blockers preoperatively has been linked to adverse cardiovascular events, further complicating their perioperative management. Despite these considerations, calcium channel blockers are typically well-tolerated perioperatively and can reduce the incidence of myocardial ischemia and supraventricular tachycardia, particularly diltiazem (35).

ACE INHIBITORS AND ANGIOTENSIN RECEPTOR BLOCKERS

ACE Inhibitors and Angiotensin Receptor Blockers present a more contentious issue regarding their perioperative management, with some guidelines recommending their suspension on the day of surgery due to concerns about refractory hypotension, while others support continuation (36). However, the on-going STOP or NOT and POISE-3 trials are investigating the impact of continuing versus discontinuing renin-angiotensin system inhibitors on postoperative outcomes, aiming to clarify optimal management strategies (37). Nevertheless, the American College of Cardiology and American Heart Association have provided updated guidelines suggesting that ACEIs/ARBs be withheld before high-risk noncardiac surgery in normotensive patients to limit hypotensive episodes, while continuation is advised for those with heart failure (38). In a large retrospective study, angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers were associated with a higher incidence of transient hypotension, although this was not linked to adverse outcomes (39).

DIURETICS

The perioperative use of diuretics, while commonly prescribed for chronic conditions such as hypertension and heart failure, necessitates careful evaluation due to the potential for hypovolemia, electrolyte disturbances, and renal dysfunction during surgical procedures (40). Consequently, many guidelines advocate for the temporary discontinuation of diuretics on the day of surgery to mitigate these risks (36). However, the decision to withhold diuretics should be balanced against the risk of fluid overload, particularly in patients with congestive heart failure (41). Nevertheless, in cases of severe heart failure or conditions necessitating strict fluid balance, clinicians might opt to continue diuretics with close monitoring of fluid status and electrolyte levels (40).

ANTIPLATELETS

The perioperative management of antiplatelet agents is a critical consideration due to the heightened risk of bleeding balanced against the thrombotic risk associated with their discontinuation, particularly in patients with a history of cardiovascular events or implanted stents. This complex balance necessitates a careful risk-benefit analysis, often guided by consensus guidelines that consider the type of surgery, the antiplatelet agent used, and the individual patient's thrombotic risk profile. For instance, dual antiplatelet therapy may contraindicate certain regional anaesthetic techniques and requires a multidisciplinary approach involving cardiologists, surgeons, and anaesthesiologists to devise a comprehensive management plan (42). In cases where the bleeding risk is deemed significant, the temporary cessation of antiplatelet therapy may be warranted, with short-acting intravenous glycoprotein IIb/IIIa inhibitors considered as a bridge to mitigate thrombotic events (43). However, the decision to discontinue antiplatelet agents, especially aspirin, prior to surgery must be weighed against the potential for rebound thrombotic events, particularly in high-risk patients (43). The optimal duration for antiplatelet cessation prior to surgery remains a subject of ongoing debate, with guidelines evolving to balance haemorrhagic and thrombotic risks, especially with newer stent technologies (44). The complexities of antiplatelet management are further compounded by the lack of

universally accepted recommendations for specific scenarios, leading to considerable variations in clinical practice (45).

P2Y12 INHIBITORS

The perioperative management of P2Y12 inhibitors, such as clopidogrel, prasugrel, and ticagrelor, necessitates a careful assessment of the balance between the risk of surgical bleeding and the risk of stent thrombosis, particularly given their potent and often irreversible antiplatelet effects (46). Consequently, P2Y12 inhibitors are typically discontinued prior to elective surgical procedures to minimize perioperative bleeding risk, with specific stopping intervals recommended based on the agent (e.g., 7 days for prasugrel, 5 days for clopidogrel, and 3 days for ticagrelor) (47).

ANTICOAGULANTS

The perioperative management of anticoagulants is highly complex, balancing the risk of thrombotic events if discontinued against the risk of surgical bleeding if continued, necessitating individualized patient assessments and a multidisciplinary approach (6). This typically involves assessing the type of anticoagulant, the indication for its use, the urgency and invasiveness of the surgery, and the patient's individual risk factors for both bleeding and thrombosis (18). Consequently, explicit guidelines, such as those from the American College of Cardiology/American Heart Association, often recommend specific protocols for bridging therapy with heparin or low molecular weight heparin in high-risk patients to minimize thrombotic risk during the temporary cessation of oral anticoagulants (48). However, the use of oral anticoagulants, NSAIDs, and aspirin derivatives is generally not recommended due to potential interactions with anaesthetics and the risk of hypokalaemia (4). For vitamin K antagonists, discontinuation 3 to 5 days before surgery with preoperative laboratory testing is recommended, while direct-acting oral anticoagulants require discontinuation intervals of 24 to 48 hours depending on bleeding risk (49).

LOW MOLECULAR WEIGHT HEPARIN

The use of low molecular weight heparin in the perioperative setting is primarily for bridging therapy when oral anticoagulants are temporarily interrupted or for thromboprophylaxis in patients at high risk of venous thromboembolism. Its rapid onset and offset of action make it suitable for managing thrombotic risk during the periprocedural period, although careful dose adjustment and monitoring are essential to prevent bleeding complications (49). Nevertheless, the precise timing of low molecular weight heparin administration and cessation remains critical, with guidelines often recommending discontinuation approximately 12 to 24 hours prior to surgery to minimize intraoperative haemorrhage (50). Conversely, for patients with impaired renal function, the LMWH-free interval may need to be extended beyond 48 hours to prevent accumulation and associated bleeding risks.

However, the precise timing and necessity of discontinuing or bridging these agents remain subjects of ongoing debate within the surgical community, often dependent on the patient's individual thrombotic risk profile and the specific surgical procedure (49). Optimal perioperative management strategies for anticoagulants frequently involve a delicate equilibrium between preventing thromboembolic events and mitigating haemorrhage, often necessitating the consideration of bridging therapy with agents like low molecular weight heparin (51,52).

ENDOCRINE MEDICATIONS

The perioperative management of endocrine medications, particularly those affecting glucose metabolism and thyroid function, is crucial for maintaining physiological homeostasis and preventing adverse outcomes during surgery and anaesthesia. In diabetic patients, meticulous glycaemic control is paramount to minimize complications such as surgical site infections, delayed wound healing, and cardiovascular events.

The perioperative management of oral hypoglycaemic agents requires careful consideration to prevent both hypoglycemia and hyperglycemia, with specific protocols for discontinuation or dose adjustment often depending on the drug class and the patient's glycaemic control. Metformin, for example, is typically discontinued 24-48 hours preoperatively due to the risk of lactic acidosis, especially in patients with renal dysfunction (6). Sulfonylureas and glinides, due to their insulinotropic effects, necessitate careful timing of the last dose and often require reduction or omission on the day of surgery to mitigate the risk of hypoglycemia. The American Diabetes Association recommends metformin as the preferred initial pharmacological agent for type 2 diabetes, with the Society of Ambulatory Anaesthesia advising its continuation the day before surgery and resumption post-operatively once a regular diet is established (53).

However, in cases where contrast dye utilization is anticipated, metformin should be discontinued at the onset of the preoperative fast and reintroduced

postoperatively upon the resumption of a normal diet (53). Newer agents such as sodium-glucose cotransporter-2 inhibitors, while beneficial for glycemic control, require careful consideration due to their potential to induce euglycemic ketoacidosis and should typically be withheld for 3–4 days preoperatively, with some protocols suggesting a 24-hour hold for procedures with rapid oral intake resumption. Conversely, patients utilizing oral medications for glycemic control should generally withhold these immediately prior to and following surgery, as fasting and inflammatory responses during the perioperative period can render medication efficacy and blood glucose levels less predictable (54).

INSULIN

Perioperative insulin management necessitates a precise approach, particularly for patients on high basal insulin doses or with a total daily dose exceeding 80 units, requiring a 50% to 75% reduction to preempt hypoglycemia (55). For Type 2 Diabetes Mellitus patients, continuation of their normal treatment regimen for most non-insulin diabetic medications is recommended until the day before surgery, though some clinicians advocate for discontinuing sulfonylureas and metformin 24 to 48 hours prior to surgery due to their prolonged half-lives (56). Additionally, the American Diabetes Association suggests withholding all oral hypoglycemic agents on the morning of surgery, while advocating for a reduction in NPH insulin dosage by 50% or long-acting analogues/basal pump insulin by 60–80% (57). For patients with Type 1 Diabetes, insulin should be continued perioperatively, with 80% of the basal dose administered both the evening before and the morning after surgery to prevent dysglycemia, while those receiving twice-daily dosing may require a 0–50% reduction in insulin injection two days prior to surgery (58). For those requiring intravenous insulin, various protocols exist, although comparative efficacy and safety studies are limited (59). Dipeptidyl peptidase-4 inhibitors, however, appear to be safe to continue perioperatively and may contribute positively to postoperative glucose regulation (60). Furthermore, dipeptidyl peptidase-4 inhibitors have a low risk of hypoglycemia and do not appear to increase the risk of gastrointestinal motility disorders postoperatively, unlike some other antidiabetic agents (61).

THYROID HORMONE THERAPY

HYPOTHYROIDISM

The primary goal in managing hypothyroidism perioperatively is to ensure euthyroid status, as untreated or inadequately treated hypothyroidism can exacerbate cardiovascular instability and impair thermoregulation during surgery.

for hypothyroid patients, the continuation of thyroid hormone replacement therapy, such as levothyroxine, is generally recommended throughout the perioperative period to maintain euthyroid status and prevent cardiovascular instability. Conversely, patients with untreated or inadequately treated hypothyroidism are at heightened risk for perioperative complications including hypotension, bradycardia, and altered drug metabolism, underscoring the importance of optimizing thyroid function before elective surgical procedures. In instances where emergent surgery is necessary for a profoundly hypothyroid patient, careful consideration of intravenous thyroid hormone replacement is warranted, though specific guidelines for acute management remain less standardized.

HYPERTHYROIDISM

The perioperative management of hyperthyroidism requires meticulous control to mitigate the risk of thyroid storm, a life-threatening condition characterized by exaggerated physiological responses to circulating thyroid hormones. This typically involves optimizing antithyroid medications, such as propylthiouracil or methimazole, and sometimes incorporating beta-blockers to control adrenergic symptoms and prevent tachycardia and arrhythmias. For patients with severe hyperthyroidism, iodine preparations may be administered preoperatively to inhibit thyroid hormone release and reduce glandular vascularity, thereby facilitating safer surgical intervention. For instances of overt hyperthyroidism, definitive treatment options often include radioactive iodine therapy or surgical thyroidectomy, with the latter requiring careful preoperative preparation to achieve a euthyroid state. However, in cases of thyroid storm or severe hyperthyroidism where elective surgery cannot be postponed, pharmacological interventions targeting symptom control and thyroid hormone synthesis inhibition become paramount. Conversely, in cases of preoperative hyperthyroidism, clinicians must vigilantly exclude the possibility of thyroid crisis, which can be precipitated by surgical stress, trauma, or infection (62).

STEROIDS

steroid administration, particularly corticosteroids, is a common yet variable practice, often necessitated by pre-existing conditions or as prophylaxis for adrenal insufficiency, though guidelines for non-cardiac, non-transplant surgeries remain undefined (63).

For patients on chronic steroid therapy, continuation of their regular dose or administration of a stress dose may be necessary to prevent adrenal crisis, particularly in those undergoing significant surgical stress or with prolonged steroid use. This often involves administering a hydrocortisone equivalent to cover the adrenal suppression induced by exogenous corticosteroids (64). Similarly, in patients with cardiovascular conditions, medications such as beta-blockers should generally be continued up to the day of surgery, though new preoperative titration is not typically recommended unless sufficient time is available for accurate dose adjustment (32).

RESPIRATORY DRUGS

Bronchodilators, such as short-acting and long-acting beta-agonists and anticholinergics, should be continued as per the patient's usual regimen to optimize pulmonary function and reduce the risk of bronchospasm during induction and maintenance of anaesthesia. Inhaled corticosteroids should also be continued to manage underlying airway inflammation, while systemic corticosteroids may require stress-dose augmentation to prevent adrenal insufficiency in patients on chronic therapy. For patients undergoing ophthalmic or otolaryngologic procedures, topical vasoconstrictors or local anaesthetics might be incorporated into the pre-operative regimen to optimize surgical conditions. Similarly, other chronic medications such as antihypertensive drugs often require careful consideration regarding their continuation or temporary cessation.

CNS DRUGS

Psychoactive medications, including antidepressants and anxiolytics, generally should be continued to avert withdrawal syndromes or exacerbation of underlying psychiatric conditions, although certain agents may necessitate dosage adjustments or temporary cessation based on their pharmacokinetic profiles and potential interactions with anaesthetic agents. Antiepileptic drugs, critical for seizure prevention, must also be meticulously maintained throughout the perioperative period to avoid seizure recurrence, with intravenous alternatives available for patients unable to take oral formulations (50). Anticoagulants and antiplatelet agents, on the other hand, require highly individualized strategies due to their significant impact on bleeding risk versus thrombotic risk, necessitating careful assessment of the surgical procedure's invasiveness and the patient's underlying cardiovascular pathology (6). Therefore, the decision to continue or discontinue these agents perioperatively demands a careful risk-benefit analysis, often guided by institutional protocols and collaborative discussions between the surgeon, anaesthesiologist, and prescribing physician.

GASTROINTESTINAL MEDICATIONS

GERD Patients with gastroesophageal reflux disease typically continue their proton pump inhibitors or H2 receptor antagonists (H2RAs) preoperatively to reduce gastric acid production, thereby mitigating the risk of aspiration pneumonitis, particularly in procedures requiring general anaesthesia (23). Prophylactic administration of gastro-protective agents, such as proton pump inhibitors, is also crucial for patients on corticosteroid therapy due to the increased risk of gastrointestinal adverse effects exacerbated by surgical stress (4). The overall management of chronic medications in the perioperative period necessitates a comprehensive approach, distinguishing essential from non-essential drugs to mitigate potential complications and optimize patient outcomes.

ASPIRATION PROPHYLAXIS

For instance, in situations where aspiration risk is elevated, such as in emergency surgeries or in patients with known risk factors like obesity or delayed gastric emptying, specific pharmacological interventions—including prokinetic agents and H2 receptor antagonists—are often employed (23). Furthermore, the routine administration of non-particulate antacids may be considered to neutralize gastric acid, although their efficacy in preventing aspiration pneumonitis remains a subject of ongoing debate in clinical practice.

SPECIAL SITUATIONS

EMERGENCY SURGERY

In emergency surgical scenarios, the abbreviated pre operative window often precludes comprehensive medication reconciliation and optimization, necessitating rapid clinical judgments regarding chronic pharmacotherapy continuation or cessation (65). This often Involving specific scenarios, such as geriatric patients, anaesthetic considerations must account for increased drug sensitivity and comorbidity burden, which often necessitate reduced dosages of sedo-analgesic agents to mitigate risks of hypoxemia and prolonged recovery . s prioritizing medications critical for immediate physiological stability while considering the potential for drug-drug interactions with emergent anaesthetic agents (6). (66)

DAY CARE SURGERY

For day-case surgery, patients are typically required to continue their routine chronic medications unless specific agents pose an unacceptable risk for outpatient management or interaction with anesthetic protocols.

This pragmatic approach balances the need to maintain chronic disease control with the logistical constraints of ambulatory surgery (4). The management of polypharmacy in these settings is particularly challenging, as patients often take more than five medications daily, which has been identified as a predictive factor for postoperative complications ((29)).

ELDERLY PATIENTS

Given their increased susceptibility to polypharmacy, altered pharmacokinetics, and diminished physiological reserves, elderly patients require a meticulously tailored perioperative medication plan to avert adverse drug reactions and maintain organ function (8). This is especially critical given that a significant proportion of surgical patients are elderly and often present with multiple comorbidities requiring ongoing pharmacological management (7). Therefore, a thorough pre operative assessment, including a comprehensive medication review, is imperative to identify potential drug interactions and adjust regimens to optimize surgical outcomes and minimize adverse events in this vulnerable population (67).

RENAL AND HEPATIC DYSFUNCTION

Patients with renal or hepatic impairment necessitate careful medication adjustments due to altered drug metabolism and excretion, which can lead to accumulation and increased toxicity of many commonly used perioperative drugs. This often involves dose reductions or selection of alternative agents primarily excreted via other pathways, alongside diligent monitoring of renal and hepatic function throughout the perioperative course. For instance, certain cardiovascular medications may require dose adjustments or discontinuation based on the degree of organ dysfunction to prevent untoward hemodynamic effects or prolonged drug elimination (4). A thorough understanding of individual patient pharmacokinetics, coupled with real-time therapeutic drug monitoring, is therefore essential to prevent drug accumulation and optimize therapeutic efficacy in these compromised physiological states (68).

ROLE OF THE PRE OPERATIVE ROOM(STREET READINESS ZONE)

The pre operative room serves as a critical nexus for the final review and reconciliation of chronic medications, ensuring that all necessary adjustments have been made and that the patient's pharmacological regimen is optimized for the impending surgical procedure. This includes verifying adherence to prescribed regimens and addressing any last-minute discrepancies to mitigate potential perioperative complications. This meticulous verification process is essential, especially given the rising prevalence of polypharmacy and its associated risks of adverse drug events and interactions, particularly in elderly and frail patients. Such rigorous scrutiny in the pre operative setting is vital for identifying and mitigating potential drug-related complications, especially as a substantial percentage of adult patients undergoing non-emergent surgery may have chronic medication non-compliance issues (22). CHECKLIST-BASED APPROACHES Implementation of standardized checklists and protocols for medication reconciliation in the pre operative room can significantly enhance patient safety by systematically identifying and resolving medication discrepancies before induction of anaesthesia (17).

COMMUNICATION WITH SURGICAL TEAM

Effective communication between the pre operative team and the surgical and anesthesia teams is paramount to ensure that all medication adjustments and patient-specific considerations are clearly understood and integrated into the intraoperative and postoperative care plans.

DOCUMENTATION PROTOCOL

Clear and comprehensive documentation of all medication changes, decisions, and rationales is paramount to ensure seamless communication among healthcare providers and to prevent medication errors throughout the perioperative continuum.

COMMON ERRORS AND PITFALLS

Despite rigorous protocols, common errors and pitfalls in perioperative medication management frequently arise from inadequate medication reconciliation, incomplete patient histories, and insufficient interprofessional communication (69,70). These deficiencies often lead to unintended medication discrepancies, which have been observed in a substantial percentage of patients, underscoring the critical need for enhanced systematic approaches (21). To address these challenges, advanced digital health technologies, such as electronic medication reconciliation systems and telepharmacy services, offer promising avenues for improving the accuracy and completeness of medication histories.

RECENT GUIDELINES AND EVIDENCE

These guidelines highlight the imperative for dedicated clinical pharmacy involvement, which has been shown to significantly reduce medication discrepancies and enhance patient safety by meticulously reviewing best possible medication histories. The integral role of clinical pharmacists within the multidisciplinary perioperative team, therefore, becomes critical in

optimizing pharmacotherapeutic regimens and minimizing adverse drug events, particularly in complex cases involving polypharmacy or specific patient populations. This interprofessional collaboration, encompassing shared responsibilities and communication, has been shown to reduce postoperative complications, shorten hospital stays, and decrease readmission rates. Such collaborative approaches are vital for addressing the inherent challenges in perioperative medication management, especially in light of the high prevalence of medication therapy problems among hospitalized perioperative patients (19).

FUTURE DIRECTION

. Further research should also explore the effectiveness of clinical pharmacist interventions across diverse surgical specialties and patient populations, extending beyond scheduled orthopaedic surgery, to comprehensively evaluate their impact on clinical outcomes such as mortality, readmission rates, and adverse drug events (17). Such studies would also benefit from considering patients from diverse ethnic groups, given the known variability in pharmacokinetics and pharmacodynamics across different populations, which can influence drug efficacy and safety (6). Moreover, pharmacogenomic considerations are increasingly relevant for optimizing peri surgical prescribing, warranting further investigation into the utility of integrating such information into routine perioperative care. Further exploration into the efficacy of artificial intelligence and machine learning algorithms in predicting patient-specific medication responses and potential adverse drug reactions could also revolutionize personalized perioperative pharmacotherapy.

CONCLUSION AND SUMMARY OF KEY PRINCIPLES

The preceding discussions underscore the multifaceted nature of perioperative medication management, highlighting the critical roles of meticulous reconciliation, effective interdisciplinary communication, and robust documentation protocols. These elements collectively contribute to minimizing medication errors and optimizing patient outcomes throughout the surgical journey (Wang et al., 2023). Furthermore, pharmacist-led interventions have been demonstrably effective in improving clinically important outcomes in the perioperative setting, including enhanced pain control and reduced hospital stays, albeit with a noted variability in methodological rigor across studies(72).

IMPORTANCE OF INDIVIDUALIZED CARE: Recognising the inherent variability in patient physiology and drug responses, an individualized approach to medication management, tailored to each patient's specific comorbidities, genetic profile, and pharmacotherapeutic history, is paramount for ensuring optimal outcomes and mitigating adverse events (73).

IMPACT ON PERIOPERATIVE OUT COME: Compromising perioperative medication management directly correlates with improved patient safety metrics, reduced incidence of adverse drug events, and enhanced recovery trajectories, thereby significantly impacting overall surgical outcomes and resource utilization. This comprehensive approach not only minimizes complications but also contributes to the economic efficiency of healthcare systems by decreasing readmission rates and shortening hospital stays. Consequently, integrating advanced computational tools like artificial intelligence and machine learning offers substantial potential for real-time decision support, predictive analytics for adverse events, and streamlined communication among healthcare professionals. These AI algorithms could analyse vast amounts of patient data to identify patterns and predict potential medication errors, enabling clinicians to proactively intervene.

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Summary of key findings: Basic Characteristics of Studies Included

Author	Year	Type	Country	Drugs/Focus	Therapy	Complications
García-Miguel & Castillo	2024	Review	Spain	Chronic meds	Pharmacological	Hypotension, interactions
Nahlawi et al.	2026	Review	USA	RAAS inhibitors	Pharmacological	Hypotension
Silva et al.	2023	Review	Portugal/Brazil	Drug interactions	Pharmacological	PK/PD changes
Paul et al.	2022	Observational	Canada	Compliance	Both	Adverse events
Chirivella et al.	2018	Validation	Spain	Medication protocols	Both	Errors
Chapuis et al.	2025	Quasi-experimental	France	Reconciliation	Non-pharmacological	Reduced adverse events
Renaudin et al.	2020	Prospective	France	Pharmacy intervention	Combined	Reduced errors
Dou et al.	2025	Meta-analysis	China	ACEI/ARB	Pharmacological	Hypotension
Boschitz et al.	2024	Review	Germany	Antiplatelets	Pharmacological	Bleeding
Deng et al.	2026	Review	China	SGLT2 inhibitors	Pharmacological	DKA
Levi	2024	Review	USA	GLP-1 agonists	Pharmacological	Aspiration risk
Ahmad et al.	2023	Clinical	USA	Antidiabetics	Pharmacological	Hypoglycemia
Greenberg et al.	2021	Guideline	Canada	Insulin	Pharmacological	Hypo/Hyperglycemia
Groleau et al.	2018	Systematic review	Canada	Steroids	Pharmacological	Adrenal suppression
Cheng et al.	2022	Observational	China	Medication issues	Both	Drug-related problems
Jónsdóttir et al.	2023	Cohort	Iceland	Polypharmacy	Both	Postop complications
Lee et al.	2025	Meta-analysis	Singapore	Polypharmacy	Both	Morbidity
Parrish et al.	2022	Review	USA	Pharmacist role	Combined	Improved outcomes

Figure 1: PRISMA 2026, FLOW CHART showing study selection