

# Anesthetic Management: Navigating Substance Use Challenges

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## Introduction

Managing anesthesia in patients with substance use disorders (SUDs) presents a multifaceted clinical challenge, demanding a comprehensive approach that extends beyond routine anesthetic care. This intricate landscape requires anesthesiologists to possess a profound understanding of the physiological and psychological impacts of various substances on patient health and anesthetic response. The initial step in this process involves a thorough pre-anesthetic assessment, meticulously examining the specific substance used, its historical duration and pattern of consumption, and any co-existing medical or psychiatric comorbidities that could influence perioperative outcomes [1].

Furthermore, the pharmacokinetic and pharmacodynamic alterations induced by different substances are critical considerations, directly impacting the selection and precise dosing of anesthetic agents. These alterations can significantly modify how the body absorbs, distributes, metabolizes, and excretes drugs, as well as how these drugs exert their effects on the patient's systems. Understanding these nuances is paramount to avoiding adverse events and ensuring patient safety throughout the perioperative period [1].

Intraoperative management necessitates heightened vigilance regarding potential withdrawal symptoms, which can manifest unpredictably and complicate the anesthetic course. Patients may exhibit altered responses to standard anesthetic agents, requiring tailored administration and close monitoring. Additionally, the inherent risks of cardiovascular and respiratory complications are often amplified in this population, necessitating proactive strategies to mitigate these dangers [1].

Opioid use disorder (OUD) is a particularly prevalent and concerning issue within the surgical patient population, profoundly affecting perioperative care and pain management strategies. The core challenge lies in effectively alleviating surgical pain while simultaneously avoiding the exacerbation of the existing disorder or precipitating the distressing symptoms of opioid withdrawal [2].

To address OUD in surgical patients, a range of strategies have been explored, including the implementation of opioid-sparing analgesia techniques, the adoption of multimodal pain management approaches, and the strategic incorporation of non-opioid analgesics and regional anesthesia modalities. These methods aim to reduce reliance on opioids, thereby minimizing risks associated with tolerance, dependence, and withdrawal [2].

Stimulant use disorders, particularly those involving cocaine or methamphetamine, introduce a distinct set of anesthetic challenges, primarily centered on significant cardiovascular risks. These substances can induce profound sympathomimetic effects, leading to a heightened risk of hypertension, tachycardia, arrhythmias, and myocardial ischemia, all of which demand careful perioperative management [3].

Anesthetic strategies for patients with stimulant use disorders must be meticulously designed to minimize these sympathomimetic effects, effectively manage intraoperative hemodynamic instability, and proactively prevent perioperative cardiovascular events. This often involves careful selection of anesthetic agents and close, continuous monitoring of cardiovascular parameters [3].

The increasing prevalence of cannabis use globally necessitates a thorough understanding of its anesthetic implications. Cannabis can alter patient responses to anesthetic agents, potentially increase the risk of intraoperative nausea and vomiting, and interact with other medications used during the perioperative period. Open communication with patients about their cannabis use is vital for safe anesthetic planning [4].

Managing patients with alcohol use disorder (AUD) undergoing surgery requires meticulous attention to the potential for withdrawal syndromes and the management of associated organ damage resulting from chronic alcohol abuse. These patients often present with a higher risk of aspiration, hepatic dysfunction, pancreatitis, and cardiovascular complications, all of which can complicate anesthetic management [5].

In managing patients with AUD, the prevention and treatment of alcohol withdrawal are paramount. This involves the judicious use of benzodiazepines for withdrawal prophylaxis and management, often in conjunction with other tailored anesthetic strategies to ensure patient stability and comfort throughout the perioperative journey [5].

Patients with a history of poly-substance use present a particularly complex anesthetic scenario due to the potential for synergistic or antagonistic effects between different substances of abuse. These interactions can unpredictably influence physiological systems and the patient's response to anesthetic drugs, demanding increased vigilance and adaptability in anesthetic planning [7].

The presence of poly-substance use, which may include a combination of opioids and stimulants, further complicates pain management. This necessitates the exploration of multimodal analgesia strategies and the judicious use of non-opioid pharmacotherapies and regional anesthesia techniques. The ultimate goal is to minimize opioid exposure while effectively controlling pain and reducing the risk of adverse events [9].

Perioperative management of patients with benzodiazepine use disorder requires careful consideration of anxiety, agitation, and potential withdrawal symptoms. Strategies often involve continuing benzodiazepine therapy or utilizing alternative anxiolytics to prevent severe withdrawal, alongside tailored approaches for intraoperative sedation and postoperative pain control, given the altered sensitivity to sedatives [8].

Anesthetic management for patients with a history of intravenous drug use (IVDU) often involves considerations related to infections such as HIV and Hepatitis C, and the increased risk of endocarditis and sepsis. This can impact airway management, venous access, and the pharmacokinetics and pharmacodynamics of anesthetic drugs, underscoring the need for proactive infection screening and management [10].

Chronic opioid exposure, often a precursor to opioid use disorder, significantly impacts postoperative pain management and opioid requirements in surgical patients. Standard opioid dosing may be insufficient for opioid-tolerant individuals, potentially leading to undermedication and patient dissatisfaction, highlighting the critical need for individualized pain management plans [6].

## Description

The anesthetic management of patients with substance use disorders (SUDs) is a complex and evolving area of clinical practice, demanding a thorough and individualized approach. A comprehensive pre-anesthetic assessment is foundational, requiring detailed inquiry into the specific substance used, its duration and pattern of use, and any co-existing medical or psychiatric conditions that could influence perioperative care. This detailed history allows the anesthesiologist to anticipate potential complications and tailor the anesthetic plan accordingly [1].

Understanding the pharmacokinetic and pharmacodynamic alterations associated with various substances is crucial for selecting appropriate anesthetic agents and dosages. These alterations can significantly affect drug metabolism, receptor binding, and overall physiological response, necessitating careful titration and vigilant monitoring. Deviations from standard protocols may be required to ensure patient safety and optimize anesthetic delivery [1].

During the intraoperative period, anesthesiologists must be prepared for potential withdrawal symptoms, which can arise from abrupt cessation or altered metabolism of substances. Furthermore, patients with SUDs may exhibit atypical responses to anesthetic drugs, requiring a flexible and adaptive approach to anesthesia delivery. The increased risk of cardiovascular and respiratory complications necessitates continuous monitoring and prompt intervention when indicated [1].

Opioid use disorder (OUD) presents a significant challenge in the perioperative setting, particularly concerning pain management. The imperative is to provide adequate analgesia for surgical pain while simultaneously safeguarding against the precipitation of withdrawal symptoms or the exacerbation of the underlying OUD. This delicate balance requires sophisticated pain management strategies [2].

Strategies for managing pain in patients with OUD focus on minimizing opioid requirements through opioid-sparing analgesia and multimodal approaches. The incorporation of non-opioid analgesics, such as non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen, alongside regional anesthesia techniques, can significantly reduce the need for systemic opioids and improve pain control while mitigating the risks associated with opioid therapy [2].

Patients with stimulant use disorders, such as those using cocaine or methamphetamine, pose significant cardiovascular risks that must be meticulously managed. These substances can trigger profound sympathomimetic effects, leading to hypertension, tachycardia, arrhythmias, and myocardial ischemia, all of which can have severe perioperative consequences [3].

Anesthetic considerations for stimulant users emphasize minimizing sympathomimetic effects through careful drug selection and administration. Intraoperative hemodynamic instability is a common concern, requiring close monitoring and prompt management. Prophylactic measures to prevent perioperative cardiovas-

cular events are essential, often involving a combination of pharmacological and physiological interventions [3].

The increasing use of cannabis and its psychoactive component, THC, has implications for anesthetic management. Cannabis can alter the patient's response to anesthetic agents, potentially necessitating adjustments in dosage or type of agents used. Additionally, there may be an increased risk of intraoperative nausea and vomiting, as well as potential drug interactions that require careful consideration during anesthetic planning [4].

Alcohol use disorder (AUD) complicates perioperative care due to the potential for withdrawal syndromes and the presence of chronic organ damage. Patients with AUD may exhibit withdrawal symptoms such as tremors, anxiety, and seizures, requiring proactive management. Associated organ damage, particularly in the liver and cardiovascular system, can further complicate anesthetic management and increase perioperative risks [5].

Anesthetic management for patients with AUD focuses on preventing and treating alcohol withdrawal. This often involves the judicious use of benzodiazepines for prophylaxis and management of withdrawal symptoms. Other anesthetic strategies are employed to mitigate risks such as aspiration, hepatic dysfunction, pancreatitis, and cardiovascular instability, ensuring a safer perioperative experience [5].

The presence of polysubstance use, where patients abuse multiple drugs, adds a layer of complexity to anesthetic management. The combined effects of different substances can be unpredictable, leading to synergistic or antagonistic interactions that influence physiological responses and drug efficacy. A thorough understanding of all substances used is critical for safe anesthetic planning [7].

Managing pain in patients with a history of polysubstance use requires a comprehensive and multidisciplinary approach. This often involves multimodal analgesia strategies that combine pharmacologic and non-pharmacologic interventions. Emphasis is placed on minimizing opioid exposure through the use of non-opioid medications and regional anesthesia techniques to optimize pain control and reduce the risk of adverse outcomes [9].

Perioperative management of patients with benzodiazepine use disorder requires careful attention to anxiety and agitation, as well as the prevention of withdrawal symptoms. Strategies may include continuing benzodiazepine therapy or using alternative anxiolytics. Altered sensitivity to sedatives is a consideration for intraoperative sedation and postoperative pain control, necessitating individualized approaches [8].

Anesthetic management of patients with intravenous drug use (IVDU) necessitates consideration of associated infections like HIV and Hepatitis C, and risks such as endocarditis and sepsis. This can affect airway management, venous access, and the pharmacokinetics and pharmacodynamics of anesthetic drugs. Proactive infection screening and management are critical for this patient population [10].

Preoperative opioid exposure significantly impacts postoperative pain management and opioid requirements. Opioid-tolerant patients may require higher doses of analgesics to achieve adequate pain relief, and standard dosing protocols may be insufficient, leading to undermedication and dissatisfaction. Individualized pain management plans are essential for these patients [6].

## Conclusion

Anesthetic management of patients with substance use disorders presents significant challenges due to physiological and psychological alterations caused by various substances. A comprehensive pre-anesthetic assessment, understand-

ing drug interactions, and managing withdrawal symptoms are crucial. Specific disorders like opioid use disorder, stimulant use disorder, alcohol use disorder, cannabis use, benzodiazepine use disorder, and intravenous drug use require tailored anesthetic strategies. These strategies focus on minimizing cardiovascular and respiratory risks, preventing withdrawal, optimizing pain management with multimodal and opioid-sparing approaches, and addressing potential infections. Polysubstance use adds further complexity, necessitating careful drug selection and vigilant monitoring. Individualized pain management plans are essential, particularly for opioid-tolerant patients. Effective perioperative care relies on a multidisciplinary approach and open communication with patients.

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## Conflict of Interest

None.

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