

Supplemental Tables:

Supplemental Table 1: Psychosocial Interventions in Substance Use Disorders

Psychosocial Intervention	Description/Role in Substance Use Disorder Care
Cognitive-behavioral therapy	Challenge dysfunctional thoughts about substance use, assist with craving coping and promotion of non-drug related activities.
Motivational interviewing and enhancement therapy	Allow patient to self-enunciate negative effects of substance use upon their lives and provide impetus for change.
Brief interventions	Done to intervene in preliminary, risky behavior scenarios rather than moderate or severe substance use disorders.
Contingency management	Provide vouchers (monetary or otherwise) to patients for appropriate/concordant urine drug screens and provide positive reinforcement for abstinence.
Therapeutic communities	Provide residential rehabilitation program (1-24 months) for patients to live and work with other patients who use drugs, those who formerly used drugs, and professional staff.
Relapse prevention models	Helps to identify situations or states where patients or most vulnerable to drug use and how to avoid high-risk situations.

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Supplemental Tables (cont.):

Supplemental Tables 2: Organ System Based Clinical Concerns and Considerations

Nervous	<ul style="list-style-type: none">Excessive alcohol intake can result in neurological complications, with many secondary to nutritional deficiencies. Electrolyte and metabolic derangements should quickly be corrected to prevent permanent brain or nerve damage.Wernicke Encephalopathy (WE), an acute neuropsychiatric condition, can arise due to thiamine deficiency. WE can also be precipitated if IV dextrose-containing solutions is administered in a patient with thiamine deficiency. Thiamine deficiency can impair brain energy utilization.^{1,2}Chronic alcohol use can lead to alcohol-related cerebellar degeneration, alcohol-related dementia as well as hepatic encephalopathy.Chronic alcohol use can lead to alcoholic neuropathy and may result in sensory, motor and autonomic dysfunction.³ Direct toxic effects of alcohol and chronic malnutrition affect the nervous system.⁴Skeletal muscle weakness and atrophy is seen in patients with alcoholic myopathy and may lead to hyperkalemia, myoglobinuria and subsequent kidney dysfunction.^{5,6}	<ul style="list-style-type: none">Assess decision making capacity and postpone case if elective.Document pre-existing neurologic or musculoskeletal abnormalities.Avoid use of succinylcholine in patients with myopathy or profound muscle weakness.Assess need to emergently secure airway.Weigh risks and benefits of regional anesthesia in patients with peripheral neuropathy or if patient cooperation is a concern.Careful intraoperative positioning and padding given increased risk for peripheral nerve injury.Consider intraoperative electroencephalogram (EEG) monitoring to detect seizure activity if concern for withdrawal.After surgery, transfer to ICU if needed. Employ CIWA-Ar to manage withdrawal symptoms.Multimodal analgesia for pain. Consult acute pain service.
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Circulatory	<ul style="list-style-type: none">Alcohol and its toxic metabolites, particularly acetaldehyde, can damage the cardiovascular system. It increases the risk of diseases such as coronary heart disease, stroke, hypertension and cardiomyopathy; the dose and pattern of use heavily influences these risks.⁷Binge drinking and chronic alcohol consumption is associated with increased cardiovascular risk and mortality. While moderate alcohol consumption is associated with a decrease in coronary heart disease (CHD) and stroke.⁷⁻⁹Acute intoxication results in a negative inotropic effect and increases the chances of arrhythmias. New onset atrial fibrillation has been linked to binge drinking and it increases cardiovascular complications including stroke and sudden cardiac death.¹⁰Chronic alcohol consumption remains a leading cause for alcoholic cardiomyopathy (ACM), a cardiac disease that is characterized by left ventricular (LV) dilatation, increased LV mass, reduced or normal LV wall thickness, systolic and diastolic heart failure.¹¹	<ul style="list-style-type: none">Employ 12-lead electrocardiogram (EKG) to evaluate for arrhythmia and myocardial infarction(MI).Consider chest x-ray (CXR) to rule out cardiomegaly and pulmonary congestion.Consider arterial line given propensity for hemodynamic instability.Induction agents: In hemodynamically stable patients, propofol is tolerated. Consider etomidate (minimal cardio-depressant effect) or ketamine (sympathomimetic) if unstable and adrenergic depletion is not a concern.Consider modified rapid sequence intubation (RSI) in patients with significant alterations in cardiac function or volume status.Replenish thiamine to avoid rapid depletion if glucose containing solution used, as this may lead to circulatory collapse.Determine the need for advanced hemodynamic monitoring (pulmonary artery catheter (PAC), esophageal doppler, TEE to monitor fluid optimization), particularly if ACM is a concernAssess hemodynamic stability in the context of neuraxial anesthesia as it pertains to volume status and cardiac function
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Respiratory	<ul style="list-style-type: none">• Comorbid tobacco use is common in heavy drinkers, and the extent of lung pathology in smokers should be assessed with history, clinical exam, and pulmonary function tests if indicated.¹²• Acute alcohol use alters mental status, blunts the gag and cough reflex, and increases aspiration risk.¹³• Chronic alcohol use impairs the host’s immune defense by altering oropharyngeal flora, response of innate immune cells, alveolar macrophages, neutrophils and lymphocytes; predisposing the host to bacterial pneumonia, tuberculosis (TB), respiratory syncytial virus (RSV) and acute respiratory distress syndrome (ARDS).^{13–15}• Alcohol is thought to decrease hemoglobin’s affinity for oxygen, lead to a greater degree of desaturation during periods of hypoxic stress and affects the oxygen-hemoglobin dissociation curve.^{16,17}	<ul style="list-style-type: none">• Consider baseline CXR.• Continue home medications (including nebulizers) if history of chronic obstructive pulmonary disease (COPD) or asthma.• Elevate head of bed throughout perioperative period given increased risk of aspiration• Adequate preoxygenation due to increased risk of desaturation• Consider rapid sequence intubation (RSI) with cuffed endotracheal tube (ETT)• Individualize lung protective ventilation strategy to include low tidal volume + positive end-expiratory pressure (PEEP) + recruitment maneuvers
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Gastrointestinal	<ul style="list-style-type: none">Alcohol consumption affects all parts of the gastrointestinal system (GI). AUD patients are prone to mucosal inflammation (glossitis, stomatitis etc), as well as dental caries, tooth decay, loss of tooth and gum disease.¹⁸AUD patients are prone to peptic ulcer bleeding, gastroesophageal reflux disease (GERD), reflux esophagitis, delayed gastric emptying, acute and chronic pancreatitis and decreased bowel motility which increases the risk of aspiration. They are malnourished (particularly in vitamins B1, B6, and B9), and experience acid-base disturbances, hyperuricemia, and electrolyte derangements (hypokalemia, hypomagnesemia, and hyponatremia).^{19–21}Damage to the liver can lead to impaired detoxification, reduced protein synthesis and binding, all of which can cause increased bioavailability and drug distribution.²² Chronic alcohol consumption induces the cytochrome p450 system (CYP2E1), increasing its activity while acute intoxication can decrease its activity and prolong effects of these drugs, as detailed in Table 4.²³ About 5–15% of patients with liver cirrhosis will have esophageal variceal hemorrhage (VH).²⁴Most Medications used perioperatively have no manufacturer-suggested dosing guides for AUD and in vivo studies for this clinical setting either do not exist or have limited clinical value.	<ul style="list-style-type: none">Consider proton pump inhibitor, H2 antagonist, non-particulate antacid.Obtain complete metabolic panel (CMP).Evaluate for electrolyte abnormalities and hypoglycemia.Consider RSI with a cuffed ETT. Minimize abdominal insufflation.Nasogastric/Orogastric (NG/OG) tube to suction after intubation and prior to extubation.Acute intoxication (lower anesthetic requirements): Anticipate lower MAC, Bispectral index (BIS) readings and intravenous and inhaled anesthetic agents.Chronic alcohol use (higher anesthetic requirements): Higher doses of intravenous (IV) (propofol and opioids) and inhalation anesthetic agents.Larger doses of neuromuscular blocking (NMB) agents due to increased volume of distribution and duration of action may be longer.Prolonged duration of action of succinylcholine due to decrease in plasma cholinesterase in severe liver disease.Consider cisatracurium or atracurium for NMB due to Hoffman elimination
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Hematology	<ul style="list-style-type: none">Alterations in coagulation are common in AUD patients with a risk of both bleeding and thrombosis due to thrombocytopenia, platelet dysfunction, and alterations in procoagulant and anticoagulant factors.^{25,26}International normalized ratio (INR) may not account for the degree of liver disease and tests like thromboelastography (TEG) and rotational thromboelastometry (ROTEM) do not have defined clinical parameters.²⁶Alcohol can interact with both prescription and over the counter (OTC) medications. Patients who routinely use aspirin or NSAIDs should be counseled about an increased bleeding time, especially when alcohol (about 4 drinks) is consumed at the same time as these medication; as this can result in gastrointestinal bleeding.²⁷	<ul style="list-style-type: none">Obtain complete blood count, coagulation studies, such as prothrombin(PT) and INR.Correct anemia, thrombocytopenia, coagulopathies, and other hematologic deficiencies prior to surgery.Regional techniques may be contraindicated in patient with coagulopathy.Monitor with TEG if availableIf TEG is not available, fresh frozen plasma (FFP) is an option to correct factor deficiencies or INR > 1.5Cryoprecipitate or desmopressin (DDAVP) may be used for additional correction of coagulopathy if neededUse of tranexamic acid or aminocaproic acid can be considered, but do carry risk of thrombotic complications and have not been shown to reduce variceal bleeding
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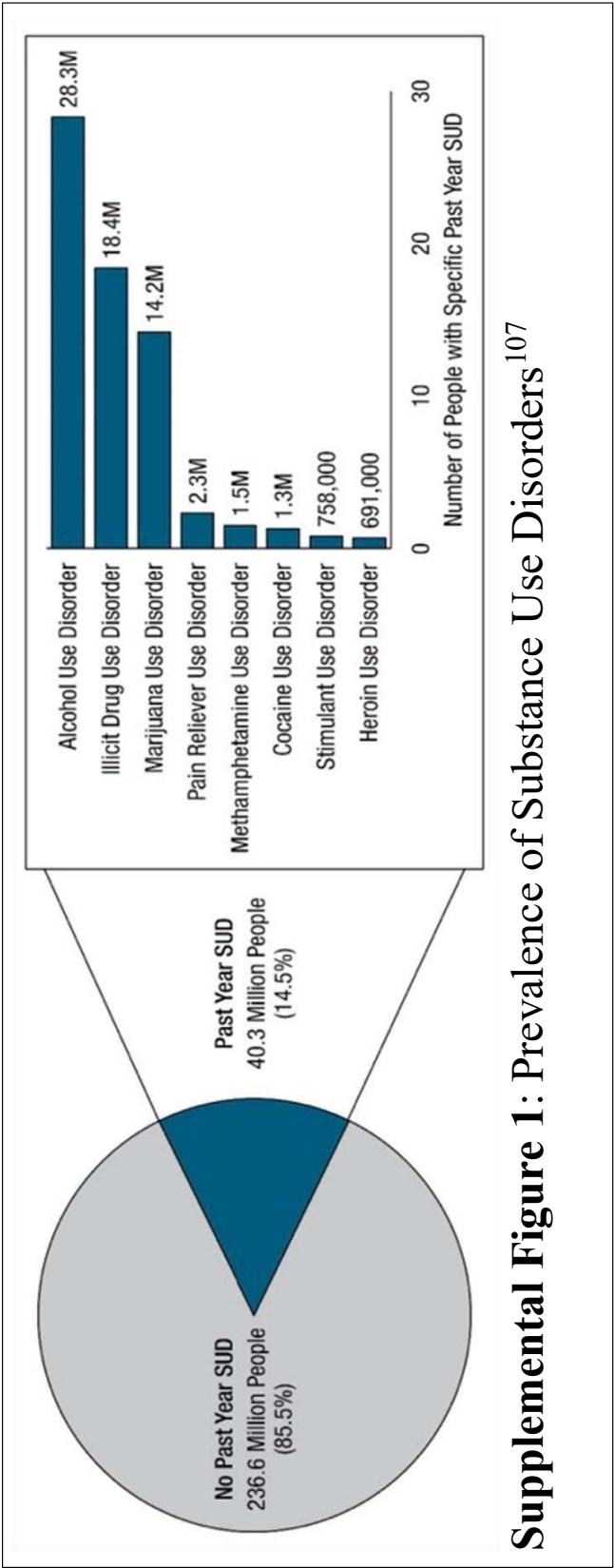
Immune	<ul style="list-style-type: none">• The immune system, both innate and adaptive, is adversely affected by alcohol consumption, resulting in abnormal function of neutrophils and macrophages. An imbalance in proinflammatory and anti-inflammatory cytokines is thought to be a primary factor in the increased incidence of nosocomial infection and sepsis.²⁸• Alcohol has a dose dependent effect on the immune system. Chronic heavy drinking leads to an increased susceptibility to both bacterial and viral infection, while light to moderate drinking results in less inflammation and better response to vaccination.²⁹	<ul style="list-style-type: none">• Strict adhere to anti-infective practice guidelines with invasive lines such as epidurals. Pre-incision antibiotic prophylaxis for surgery type and specialty and redosing guidelines.• Adhere to strategies to minimize central line associated bloodstream infections, ventilator and catheter associated infections.
Endocrine & Oncology	<ul style="list-style-type: none">• The effects of alcohol on the endocrine system results in many downstream effects and affects many aspects of the body. Its effects can lead to psychological and behavior disturbances, thyroid abnormalities, reproductive issues, bone disease, cancers, growth deficits and abnormal responses to stress.^{30,31}• All alcoholic drinks (wine, beer, and liquor) have been linked to the development of cancer. While chronic alcohol consumption and binge drinking carry a greater risk, even one drink per day can contribute to this risk. The increased risk is due to an acetaldehyde induced DNA damage with inhibited or incorrect repair. Cancer types include breast, liver, head and neck, and GI cancers.^{32,33}	<ul style="list-style-type: none">• Monitor blood glucose levels as chronic alcohol consumption can lead to hypoglycemia.• Educate patients on the carcinogenic risk of alcohol and counsel on a reduction in amount consumed or encourage abstinence if possible.

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Supplemental Figure Legends:

Supplemental Figure 1: Prevalence of Substance Use Disorders. Displays the prevalence of substance use disorders, stratified by substance, for the year 2020.

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Supplemental Figure Legends (cont.):

Supplemental Figure 2: Multidisciplinary team approach coupled with multimodal treatment options in managing patients with AUD

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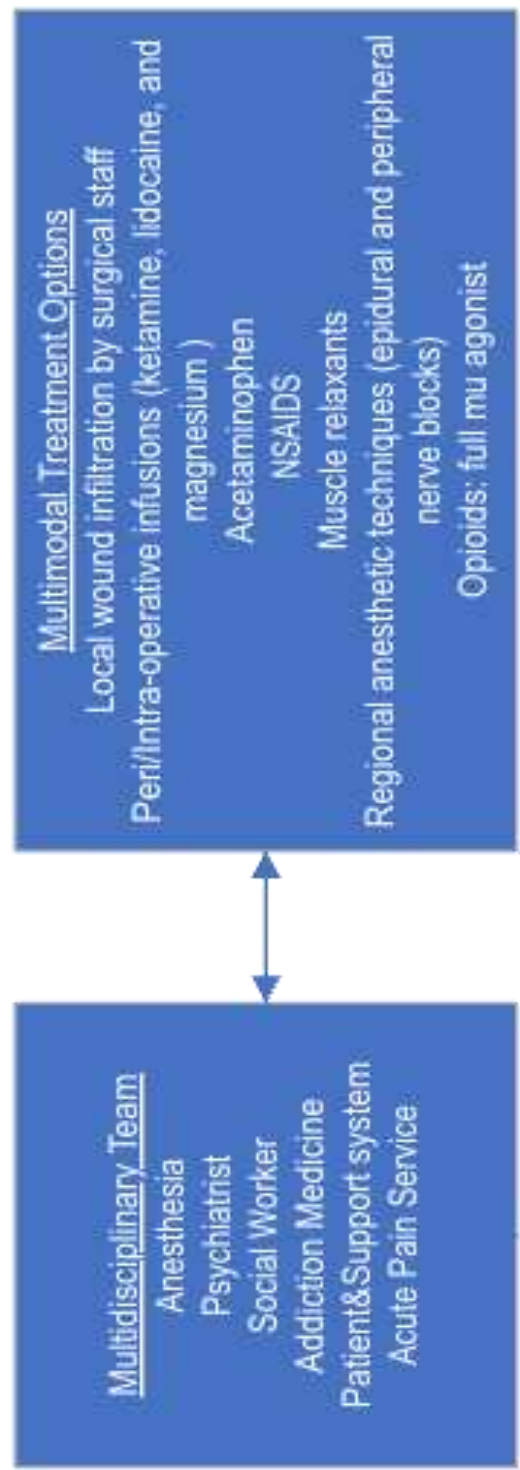


Figure 2. Multidisciplinary team approach coupled with multimodal treatment options in managing patients with AUD

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Supplemental Figure Legends (cont.):

Supplemental Figure 3: Perioperative management of approved medications for AUD

Management of Patients with AUD in the Perioperative Period

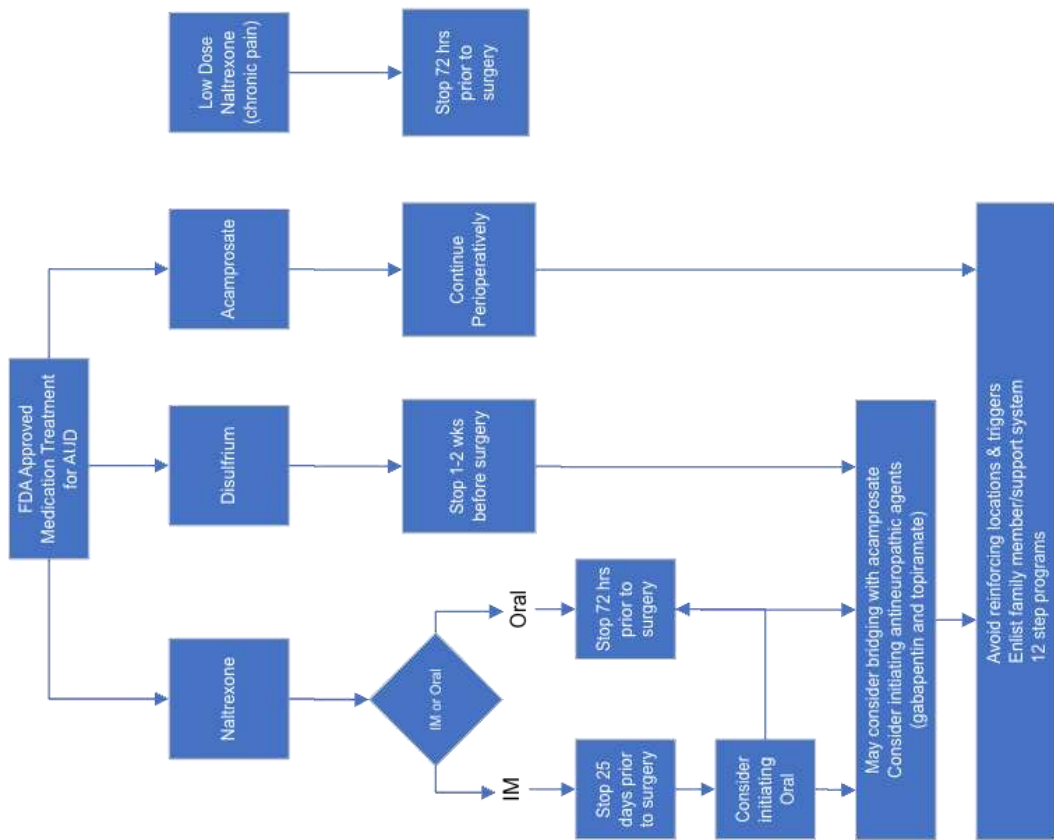


Figure 3. Perioperative management of approved medications for AUD

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Supplemental Figure Legends (cont.):

Supplemental Figure 4: Re-initiation of Naltrexone and LDN

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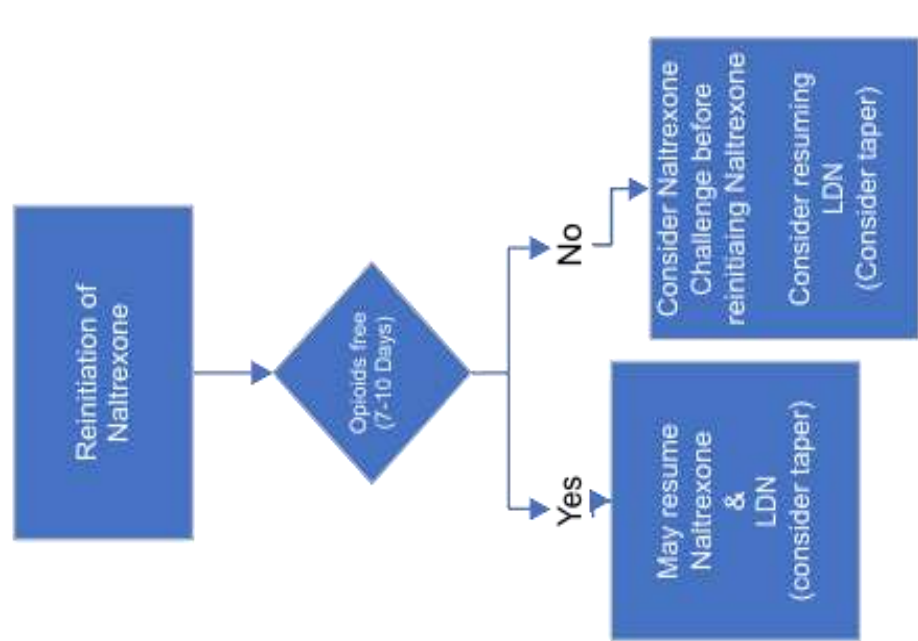


Figure 4. Reinitiation of Naltrexone and LDN

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