Management of Alcohol Withdrawal

Alcohol withdrawal is a potentially life-threatening condition that occurs in hospitalized patients with a history of chronic alcohol use upon cessation or reduction of alcohol intake. This pamphlet provides students with a guide to manage alcohol withdrawal, including complications, ICU admission criteria, Wernicke's encephalopathy, addiction management, and clinical scenarios to apply the knowledge.

Clinical Presentation

• Overview:

- Alcohol withdrawal occurs 6-48 hours after the last drink (peak at 24-48h), due to cessation of alcohol's GABAergic effects and unopposed glutamate-mediated excitatory activity, leading to autonomic hyperactivity.
- Severity ranges from mild (anxiety, tremors) to severe (seizures, delirium tremens).

• Stages of Withdrawal:

- **Mild Withdrawal (6-12h after last drink):** Anxiety, irritability, insomnia, tremors, diaphoresis, nausea, headache, tachycardia (HR 100-120 bpm).
- **Moderate Withdrawal (12-24h):** Worsening tremors, hypertension (SBP 140-160 mmHg), fever (Temp 38-38.5°C), hallucinations (visual, auditory, tactile).
- **Severe Withdrawal (24-72h):**
  - **Seizures:** Generalized tonic-clonic, usually within 12-48h, often multiple.
  - **Delirium Tremens (DTs):** Onset 48-96h, severe confusion, agitation, hallucinations, fever, diaphoresis, tachycardia (HR >120 bpm), hypertension.

• Vital Signs/Exams:

o HR: Tachycardia (HR 100-140 bpm), relative bradycardia (if on beta-blockers).

o BP: Hypertension (early), hypotension (late, if shock or DTs).

o RR: Tachypnea (anxiety, hypoxia), hypoxia (if aspiration, pneumonia).

o Temp: Fever (infection, DTs), hypothermia (late, if shock).

o Neuro: Tremors, agitation, confusion (DTs), hallucinations (visual, tactile), ataxia (Wernicke's).

o Skin: Diaphoresis, flushed (early), pale/cool (late, hypoperfusion).

o Eyes: Nystagmus, ophthalmoplegia (Wernicke's).

Causes and Differential Diagnosis

• Causes of Alcohol Withdrawal:

o Chronic Alcohol Use: Heavy, prolonged alcohol consumption (>6 drinks/day for months-years) leads to neuroadaptation (upregulated glutamate, downregulated GABA receptors).

o Abrupt Cessation/Reduction: Hospitalization (NPO status, surgery), incarceration, or voluntary cessation triggers withdrawal.

o Risk Factors: Prior withdrawal seizures/DTs, high daily alcohol intake, older age, concurrent illness (infection, trauma), electrolyte imbalances, or malnutrition (thiamine deficiency).

• Differential Diagnosis:

- **Other Withdrawal Syndromes:**
  - **Benzodiazepine Withdrawal:** Similar (tremors, seizures, agitation), but history of benzo use, longer onset (days-weeks for long-acting agents).
  - **Opioid Withdrawal:** Diaphoresis, anxiety, myalgias, but no seizures/DTs, often with yawning, lacrimation.
- **Neurologic:**
  - **Seizures (Non-Withdrawal):** Epilepsy, stroke, or mass lesion; EEG, brain imaging (CT/MRI) to differentiate.
  - **Delirium (Non-DTs):** Sepsis, hypoglycemia, hepatic encephalopathy; check glucose, ammonia, infection workup.
- **Endocrine/Metabolic:**
  - **Thyrotoxicosis:** Tachycardia, tremors, but with weight loss, heat intolerance, suppressed TSH.
  - **Hypoglycemia:** Diaphoresis, confusion, but glucose <70 mg/dL, resolves with D50.
- **Electrolyte Imbalance:** Hypokalemia, hypomagnesemia can mimic withdrawal (tremors, seizures); check CMP.
- **Infectious:**
  - **Sepsis:** Fever, tachycardia, but with leukocytosis, positive cultures, lactate >2 mmol/L.

    - **Meningitis/Encephalitis:** Fever, confusion, seizures, but with neck stiffness, CSF abnormalities.
- **Psychiatric:**
    - **Psychosis:** Hallucinations, agitation, but chronic history, no autonomic hyperactivity, normal vitals.

Diagnosis and Labs

• Initial Assessment:

- **History:** Alcohol use history (quantity, duration, last drink), prior withdrawal episodes, seizures, DTs, recent trauma, infections, or medications.
- **Physical Exam:** Assess for autonomic hyperactivity (tachycardia, hypertension, fever), neurologic signs (tremors, hallucinations, confusion), signs of malnutrition (cachexia, jaundice).
- **CIWA-Ar Score:** Clinical Institute Withdrawal Assessment for Alcohol (Revised):
    - **Score 0-67:** Assesses 10 symptoms (nausea, tremors, sweats, anxiety, agitation, hallucinations, headache, orientation).
    - Mild (<10), Moderate (10-20), Severe (>20); guides benzodiazepine dosing.
- **SEWs (Symptom-Triggered Ethanol Withdrawal Scale):**
    - Alternative to CIWA-Ar, focuses on vital signs (HR, BP, Temp) and objective signs (tremors, agitation, seizures).
    - **Score 0-24:** Mild (<8), Moderate (8-15), Severe (>15); often used with phenobarbital protocol.
- **MINDS (Minnesota Detoxification Scale):**
    - **Simplified symptom-triggered protocol:** Assesses HR, BP, Temp, tremors, sweats, agitation, hallucinations, orientation, seizures.
    - **Score 0-44:** Mild (<12), Moderate (12-24), Severe (>24); guides benzodiazepine dosing, often in settings with limited resources.

• Labs:

- **CBC:** Anemia (chronic alcohol use, GI bleed), leukocytosis (infection, stress response), thrombocytopenia (alcohol suppresses bone marrow).
- **CMP:**
- **Electrolytes:** Hypokalemia (K <3.5 mEq/L), hypomagnesemia (Mg <1.5 mEq/L), hypophosphatemia (common in malnutrition).
- **Liver Function Tests:** Elevated AST/ALT (AST:ALT >2 in alcohol liver disease), low albumin (malnutrition, cirrhosis).
- **Glucose:** Hypoglycemia (malnutrition, liver dysfunction).
- **Lactate:** Elevated (>2 mmol/L) in seizures, DTs, or shock (sepsis, hypovolemia).

- **Blood Alcohol Level:** Often low/undetectable in withdrawal; high levels may mask early symptoms.
- **Urine Drug Screen:** Rule out other substances (e.g., benzos, opioids, stimulants).
- **Serum Osmolality:** Elevated in alcohol intoxication, normal in withdrawal.
- **Thiamine Level:** Low in Wernicke's (not routinely checked; empiric treatment preferred).

• Imaging/Diagnostic Tests:

- **EKG:** Tachycardia (withdrawal), prolonged QT (electrolyte imbalances, risk of torsades), arrhythmias (AF, VT in severe withdrawal).
- **Chest X-ray:** Pneumonia (aspiration risk), pneumothorax (trauma), cardiomegaly (heart failure).
- **Head CT/MRI:** If seizures or confusion, to rule out stroke, hemorrhage, or mass lesion (especially if atypical presentation).
- **EEG:** If seizures persist, to differentiate withdrawal seizures from epilepsy.

Clinical Features and Management Table

Stage	Clinical Features	Scoring Tool	Management Protocol
Mild Withdrawal	Anxiety, tremors, nausea, insomnia	CIWA-Ar <10 SEWs <8 MINDS <12	CIWA-Ar: Lorazepam 1-2 mg PO/IV PRN, thiamine 100 mg IV. -SEWs: Phenobarbital 65 mg IV PRN (if score 4-7), thiamine 100 mg IV. -MINDS: Lorazepam 1-2 mg IV PRN, thiamine 100 mg IV.
Moderate Withdrawal	Worsening tremors, HTN, fever, hallucinations	CIWA-Ar 10-20 SEWs 8-15 MINDS 12-24	CIWA-Ar: Lorazepam 2-4 mg IV q1-2h (CIWA-Ar guided), IV fluids. -SEWs: Phenobarbital 130 mg IV q30min (if score 8-15), max 10 mg/kg, thiamine 100 mg IV. -MINDS: Lorazepam 2-4 mg IV q1-2h (MINDS guided), IV fluids.
Severe Withdrawal	Seizures, delirium tremens, severe agitation	CIWA-Ar >20 SEWs >15 MINDS >24	CIWA-Ar: Lorazepam 4 mg IV q15-30min, ICU admission, thiamine 500 mg IV. -SEWs: Phenobarbital 260 mg IV load, then 130 mg IV q30min (max 15 mg/kg/day), ICU admission, thiamine 500 mg IV. -MINDS: Lorazepam 4 mg IV q15-30min, ICU admission, thiamine 500 mg IV.
Wernicke's Encephalopathy	Confusion, ataxia, ophthalmoplegia	N/A	Thiamine 500 mg IV TID x 3 days, then 250 mg IV daily; avoid glucose until thiamine given.

Treatment and Management

• General Principles:

- **Stabilize:** ABCs (airway, breathing, circulation), IV access, telemetry, oxygen if SpO2 <90%.
- **Prevent complications:** Seizures, DTs, Wernicke's, electrolyte imbalances.
- **Supportive care:** Fluids, nutrition, monitor for withdrawal progression.

• Initial Management:

- **Thiamine:** 100 mg IV before any glucose (prevents Wernicke's), then 100 mg IV daily x 3 days.
- **IV Fluids:** NS 1-2 L IV bolus (if hypovolemic, dehydrated), then maintenance (100 mL/h); monitor for fluid overload in cirrhosis.
- **Electrolyte Correction:**
  - **Hypokalemia:** Potassium (target K >4 mEq/L), 10-20 mEq IV over 1h (repeat as needed).
  - **Hypomagnesemia:** Magnesium sulfate 1-2 g IV over 1h (target Mg >2 mEq/L).
  - **Hypophosphatemia:** Sodium phosphate 15-30 mmol IV over 4-6h (target PO4 >2.5 mg/dL).

• Symptom Management Protocols:

- CIWA-Ar Protocol (Benzodiazepines):
  - **Mild Withdrawal (CIWA-Ar <10):**
    - Lorazepam 1-2 mg PO/IV q4-6h PRN (short half-life, safe in liver disease).
    - **Supportive care:** Quiet environment, hydration, nutrition.
  - **Moderate Withdrawal (CIWA-Ar 10-20):**
    - Lorazepam 2-4 mg IV q1-2h (CIWA-Ar guided, target score <10).
    - **Alternative:** Diazepam 5-10 mg IV q6-8h (longer half-life, faster onset).
  - **Severe Withdrawal (CIWA-Ar >20, Seizures, DTs):**
    - Lorazepam 4 mg IV q15-30min (titrate to symptom control, avoid over-sedation).
    - **If refractory:** Phenobarbital 130-260 mg IV (load), then 65-130 mg IV q30min (max 15 mg/kg/day), or propofol 5-80 mcg/kg/min IV (intubation often required).
- SEWs Protocol with Phenobarbital:

- **Overview:** Symptom-Triggered Ethanol Withdrawal Scale (SEWs) uses objective signs (HR, BP, Temp, tremors, agitation) to guide phenobarbital dosing, reducing benzodiazepine use and hospital stay.
    - **Mild Withdrawal (SEWs <8):**
        - Phenobarbital 65 mg IV PRN (if score 4-7), reassess q30min.
        - Thiamine 100 mg IV daily.
    - **Moderate Withdrawal (SEWs 8-15):**
        - Phenobarbital 130 mg IV q30min (if score 8-15), max 10 mg/kg total.
        - Thiamine 100 mg IV, IV fluids (NS 100 mL/h).
    - **Severe Withdrawal (SEWs >15, Seizures, DTs):**
        - Phenobarbital 260 mg IV load, then 130 mg IV q30min (max 15 mg/kg/day).
        - ICU admission, thiamine 500 mg IV TID x 3 days.
        - Monitor for respiratory depression (phenobarbital has long half-life).
- MINDS Protocol (Minnesota Detoxification Scale):
- **Overview:** Simplified symptom-triggered protocol, assesses 9 domains (HR, BP, Temp, tremors, sweats, agitation, hallucinations, orientation, seizures); often used in resource-limited settings or with non-English-speaking patients.
    - **Mild Withdrawal (MINDS <12):**
        - Lorazepam 1-2 mg IV q4-6h PRN (if score 8-11), reassess q1h.
        - Thiamine 100 mg IV daily.
    - **Moderate Withdrawal (MINDS 12-24):**
        - Lorazepam 2-4 mg IV q1-2h (MINDS guided, target score <12).
        - IV fluids (NS 100 mL/h), thiamine 100 mg IV.
    - **Severe Withdrawal (MINDS >24, Seizures, DTs):**
        - Lorazepam 4 mg IV q15-30min (titrate to symptom control).
        - ICU admission, thiamine 500 mg IV TID x 3 days.
        - **If refractory:** Consider phenobarbital or propofol (as above).

• Seizure Management:

- Lorazepam 4 mg IV (first-line, repeat q5min, max 8 mg), then load phenobarbital if refractory.
- Avoid phenytoin (ineffective for withdrawal seizures, risk of toxicity).
- **Prophylaxis:** Benzodiazepines (above), thiamine 100 mg IV daily.

• Wernicke's Encephalopathy:

o Diagnosis: Triad (confusion, ataxia, ophthalmoplegia/nystagmus); only 10% have all three; suspect in any alcoholic with altered mental status.

o Treatment: Thiamine 500 mg IV TID x 3 days, then 250 mg IV daily x 5 days, then 100 mg PO daily; give before glucose to prevent precipitation.

o Supportive: Magnesium 1-2 g IV (cofactor for thiamine), folate 1 mg IV/PO daily, nutrition.

• Addiction Management:

- **Acute Phase:** Focus on withdrawal; avoid initiating long-term meds until stable.
- **Post-Acute Phase:**
  - **Naltrexone:** 50 mg PO daily (reduces cravings, blocks opioid receptors); avoid in liver failure.
  - **Acamprosate:** 666 mg PO TID (stabilizes glutamate/GABA balance); safe in liver disease.
  - **Disulfiram: (rarely used)** 250 mg PO daily (aversive therapy, causes nausea with alcohol); avoid in severe cardiac disease.
  - **Supportive:** Counseling, 12-step programs (e.g., AA), social work consult for rehab placement.

• Monitoring:

o CIWA-Ar/SEWs/MINDS: Q1-4h until score <10/<8/<12 for 24h, then q8h.

o Telemetry: For arrhythmias (QT prolongation, torsades), especially with phenobarbital.

o Labs: Electrolytes q4-6h (K, Mg, PO4), glucose (hypoglycemia risk), lactate (if shock).

Complications and ICU Admission

• Complications:

- **Seizures:** 3-5% of patients, peak 12-48h, risk of status epilepticus (mortality 5-10% if untreated).
- **Delirium Tremens (DTs):** 5% of patients, onset 48-96h, mortality 5-15% (higher if untreated), due to arrhythmia, aspiration, or infection.
- **Wernicke's Encephalopathy:** 10-20% of chronic alcoholics, can progress to Korsakoff syndrome (irreversible amnesia, confabulation) if untreated.
- **Arrhythmias:** QT prolongation (electrolyte imbalances, benzos), torsades de pointes, AF (autonomic hyperactivity).
- **Infections:** Aspiration pneumonia (seizures, altered mental status), sepsis (immunosuppression).

- **Metabolic:**
  - **Alcoholic Ketoacidosis (AKA):** Anion gap acidosis, ketosis, normal/low glucose, often with vomiting.
  - **Hypoglycemia:** Malnutrition, liver dysfunction, risk of seizures.
  - **Cardiovascular:** Hypertension (early), hypotension (late, if shock), cardiomyopathy (chronic alcohol use).

• When to Admit to ICU:

- **Indications:**
  - **Severe Withdrawal:** CIWA-Ar >20, SEWs >15, MINDS >24, DTs, refractory seizures (status epilepticus).
  - **Hemodynamic Instability:** Hypotension (SBP <90 mmHg), severe tachycardia (HR >140 bpm), or arrhythmias (VT, torsades).
  - **Respiratory Failure:** Hypoxia (SpO2 <90%), hypoventilation (sedation, aspiration), need for intubation.
  - **Neurologic:** Persistent confusion (DTs, Wernicke's), status epilepticus, or coma.
  - **Metabolic:** Severe acidosis (AKA, lactate >4 mmol/L), refractory electrolyte imbalances (e.g., K <2.5 mEq/L).
- **Timing:** Immediate if above criteria met; goal is to prevent progression to multiorgan failure.

Complications and ICU Criteria Table

Complication	Features	ICU Criteria	Management
Delirium Tremens	Confusion, hallucinations, HTN	CIWA-Ar >20, SEWs >15, MINDS >24	Lorazepam 4 mg IV q15-30min, ICU.
Wernicke's Encephalopathy	Confusion, ataxia, nystagmus	Altered mental status, unresponsive	Thiamine 500 mg IV TID, neurology consult.
Seizures	Tonic-clonic, status epilepticus	Persistent seizures, respiratory failure	Lorazepam 4 mg IV, phenobarbital if refractory.
Arrhythmias	QT prolongation, torsades, AF	HR >140 bpm, hypotension, VT	Correct electrolytes, amiodarone 150 mg IV.

Key Pearls

• **Thiamine First:** Always give thiamine 100 mg IV before glucose to prevent Wernicke's encephalopathy.

• **Protocols:** CIWA-Ar (benzodiazepines), SEWs (phenobarbital), MINDS (simplified); choose based on patient severity and setting.

• **Seizures/DTs:** Peak 12-48h (seizures), 48-96h (DTs); lorazepam for seizures, ICU for DTs (mortality 5-15%).

• **Wernicke's:** Suspect in any alcoholic with confusion; treat with high-dose thiamine (500 mg IV TID) before glucose.

• **ICU Admission:** Severe withdrawal (CIWA-Ar >20, SEWs >15, MINDS >24), DTs, seizures, respiratory failure, or hemodynamic instability.

• **Addiction Management:** Naltrexone or acamprosate post-acute phase; involve social work for rehab and counseling.

• **Monitor Closely:** CIWA-Ar/SEWs/MINDS q1-4h, electrolytes q4-6h, telemetry for arrhythmias, lactate if shock.

References

• **UpToDate:** "Management of Alcohol Withdrawal in the Hospitalized Patient" (2025).

• **NEJM:** "Alcohol Withdrawal Syndrome: Diagnosis and Treatment" (2024).

• **Crit Care Med:** "Phenobarbital in Alcohol Withdrawal: SEWs Protocol" (2023).

• **Am J Psychiatry:** "Wernicke-Korsakoff Syndrome: A Review" (2024).

Clinical Scenarios

- Case 1: A 45-Year-Old Male with Tremors
- **Presentation:** A 45-year-old male with chronic alcohol use (12 beers/day) presents with tremors and anxiety 12 hours after his last drink (hospitalized for pneumonia). Exam: BP 150/90 mmHg, HR 110 bpm, Temp 38°C, coarse tremors, no hallucinations.
- **SEWs:** Score 10 (moderate withdrawal).
- **Labs:** Hgb 12 g/dL, Mg 1.4 mEq/L, K 3.2 mEq/L, glucose 80 mg/dL.
- **Diagnosis:** Moderate Alcohol Withdrawal → Tremors, tachycardia, SEWs 10, recent alcohol cessation.
- **Management:** Thiamine 100 mg IV daily x 3 days. Phenobarbital 130 mg IV q30min (SEWs guided, target score <8). Magnesium sulfate 2 g IV over 1h, potassium 20 mEq IV over 1h. Ceftriaxone 1 g IV daily + azithromycin 500 mg IV daily (pneumonia). Monitor SEWs q1h, telemetry for arrhythmias, and electrolytes q6h.

- Case 2: A 50-Year-Old Female with Confusion
- **Presentation:** A 50-year-old female with alcohol use disorder presents with confusion, ataxia, and nystagmus 3 days after her last drink (admitted for fall). Exam: BP 140/85 mmHg, HR 100 bpm, Temp 37.5°C, disoriented, horizontal nystagmus, unsteady gait.
- **Labs:** Hgb 11 g/dL, Mg 1.5 mEq/L, glucose 90 mg/dL.
- **Diagnosis:** Wernicke's Encephalopathy → Confusion, ataxia, nystagmus, chronic alcohol use.
- **Management:** Thiamine 500 mg IV TID x 3 days, then 250 mg IV daily x 5 days. Magnesium sulfate 2 g IV over 1h, folate 1 mg IV daily. Avoid glucose until thiamine given. Neurology consult for Wernicke's management. Monitor mental status, gait, and electrolytes. CIWA-Ar monitoring for withdrawal (lorazepam PRN if needed).

- Case 3: A 60-Year-Old Male with Seizures
- **Presentation:** A 60-year-old male with alcohol use disorder (15 drinks/day) presents with seizures 36 hours after his last drink (admitted for cellulitis). Exam: BP 90/60 mmHg, HR 130 bpm, Temp 39°C, confused, hallucinating, diaphoretic.
- **MINDS:** Score 30 (severe withdrawal, DTs).
- **Labs:** Hgb 10 g/dL, lactate 3.5 mmol/L, Mg 1.2 mEq/L, K 3.0 mEq/L.
- **Diagnosis:** Severe Alcohol Withdrawal (DTs, Seizures) → Seizures, DTs, hemodynamic instability, MINDS 30.
- **Management:** Thiamine 100 mg IV stat. Lorazepam 4 mg IV q15-30min (titrate to symptom control). NS 2 L IV bolus (hypotension). Magnesium sulfate 2 g IV, potassium 20 mEq IV. Ceftriaxone 1 g IV daily + vancomycin 15 mg/kg IV q12h (cellulitis). ICU admission for DTs (HR 130 bpm, confusion). Monitor MINDS q1h, telemetry, lactate q2-4h, and respiratory status (risk of aspiration).