

# Acute Encephalopathy in a Hospitalized Patient

Acute encephalopathy is an altered mental status (AMS) due to diffuse brain dysfunction, often reversible with prompt evaluation and management.

## Definition and Epidemiology

- **Definition:** Acute encephalopathy is a rapid-onset (hours to days) change in mental status (confusion, delirium, coma) due to systemic or neurologic insult, often reversible.
- **Prevalence:** ~20% of hospitalized patients; 50-70% in ICU (delirium, sepsis).
- **Risk Factors:** Age >65, ICU stay, sepsis, polypharmacy, substance use (alcohol, opioids), prior neurologic or psychiatric disease.

## Pathophysiology

- **Mechanisms:** Diffuse brain dysfunction from metabolic, toxic, infectious, structural, autoimmune, or psychiatric causes → Impaired neuronal signaling.
- **Effects:** Altered consciousness (confusion to coma), cognitive decline, seizures.
- **Key Pathway:** Systemic inflammation (e.g., sepsis) or immune dysregulation (e.g., NMDA encephalitis) → Neuroinflammation → AMS.

## Causes of Acute Encephalopathy

Category	Causes	Notes
Metabolic	-Hypoglycemia (<40 mg/dL). -Hyponatremia (Na+ <120 mEq/L). -Hypercapnia (CO2 >60 mmHg). - Uremia (BUN >100 mg/dL).	Hypoglycemia: Rapid onset, reversible with glucose.
Infectious	-Sepsis (e.g., E. coli bacteremia). -Meningitis (bacterial, viral). -Encephalitis (HSV, West Nile).	Sepsis: Most common in ICU; 70% have AMS.
Toxic	-Alcohol withdrawal (delirium tremens). -Opioid overdose (respiratory depression). -Medications: Benzodiazepines, anticholinergics.	Alcohol: Onset 48-72h post-cessation.
Structural	-Stroke (ischemic/hemorrhagic). -Intracranial hemorrhage (ICH). -Mass lesion (tumor, abscess).	Stroke: Focal deficits + AMS.

Category	Causes	Notes
Autoimmune	-NMDA receptor encephalitis. -Limbic encephalitis (anti-LGI1).	NMDA: Psychiatric symptoms, seizures, young patients.
Psychiatric	-Catatonia (e.g., schizophrenia). -Acute psychosis (e.g., brief psychotic disorder).	Catatonia: Stupor, rigidity; mimics AMS.
Other	-Hepatic encephalopathy (HE; ↑ ammonia). -Hypoxic-ischemic (post-cardiac arrest). - Seizures (non-convulsive status).	HE: Common in cirrhosis; asterixis.
Rare	-Wernicke's encephalopathy (thiamine deficiency). - Posterior Reversible Encephalopathy Syndrome (PRES). -CJD (rapidly progressive).	Wernicke's: Triad (confusion, ataxia, ophthalmoplegia).

## Clinical Presentation

- **Symptoms:**

- Confusion, disorientation, agitation (delirium).
- Lethargy, stupor, coma (severe).
- Hallucinations (toxic, withdrawal, NMDA encephalitis).

- **Exam:**

- **Mental Status:** CAM-ICU (delirium), GCS (coma; <8 → Intubate).
- **Neurologic:** Asterixis (HE), focal deficits (stroke), nystagmus (Wernicke's), dyskinesias (NMDA).
- **Psychiatric:** Catatonia (rigidity, mutism), psychosis (delusions, disorganized behavior).
- **Systemic:** Fever (sepsis), jaundice (HE), respiratory depression (opioids).
- **Substance Use:** Alcohol withdrawal (tremors, seizures), opioid overdose (pinpoint pupils, bradypnea).
- **Red Flags:** GCS <8, unequal pupils (ICH), fever + neck stiffness (meningitis), dyskinesias + AMS (NMDA).

## Diagnostic Workup

- **Initial Steps:**

- **Vitals:** Hypoxia (SpO2 <90%), fever (>38°C), BP (PRES: >180/110 mmHg).
- **Fingerstick Glucose:** Hypoglycemia (<40 mg/dL) → D50W 50 mL IV.
- **Labs:**
  - **Metabolic:** CMP (Na<sup>+</sup>, BUN, glucose), ABG (CO<sub>2</sub>, pH), ammonia (HE).
  - **Infectious:** CBC, blood cultures, UA, CXR (sepsis).
  - **Toxic:** Urine drug screen (opioids, benzos), alcohol level, salicylate/acetaminophen levels.

- **Autoimmune:** CSF NMDA receptor antibodies, serum paraneoplastic panel (e.g., ovarian teratoma in NMDA).
- **Other:** TSH (hypothyroidism), B12, thiamine (Wernicke's).
- **Imaging:**
  - **CT Head (Non-contrast):** Stroke, ICH, mass lesion (1st step).
  - **MRI Brain:** Encephalitis (HSV: temporal lobe), PRES (posterior edema), NMDA (normal or nonspecific).
- **Other Tests:**
  - **Lumbar Puncture (LP):** If meningitis/encephalitis suspected (after CT); CSF: Cell count, glucose, protein, Gram stain, HSV PCR, NMDA antibodies.
  - **EEG:** Non-convulsive status epilepticus (NCSE; 20% of ICU AMS), NMDA (extreme delta brush pattern).
  - **EKG:** Arrhythmia (hypoxic-ischemic).
- **Psych Consult:** If catatonia or psychosis suspected (e.g., Bush-Francis Catatonia Scale).
- **Key Tip:** Consider NMDA encephalitis in young patients with psychiatric symptoms + seizures; psych consult for catatonia mimics.

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## Evaluation Flowsheet: Acute Encephalopathy

- **Step 1:** ABCs + Vitals: Hypoxia → O<sub>2</sub>; fever → Cultures; BP >180/110 → PRES.
- **Step 2:** Glucose: <40 mg/dL → D50W 50 mL IV.
- **Step 3:** History/Exam:
  - Focal deficits → CT (stroke).
  - Asterixis, jaundice → Ammonia (HE).
  - Tremors, seizures → Alcohol withdrawal.
  - Dyskinesias, hallucinations → NMDA encephalitis.
  - Rigidity, mutism → Psych consult (catatonia).
- **Step 4:** Labs/Imaging:
  - CMP, drug screen, cultures → Metabolic/toxic/infectious.
  - CT/MRI → Structural (stroke, ICH).
- **Step 5:** Advanced Testing:
  - LP → Meningitis (WBC >5/μL, ↓ glucose) or NMDA (anti-NMDA antibodies).
  - EEG → NCSE or NMDA (delta brush).
  - Psych consult → Catatonia (lorazepam challenge).
- **Step 6:** Treat underlying cause: Sepsis → Antibiotics; HE → Lactulose; NMDA → IVIG; catatonia → Lorazepam.

## Examples

- **Case 1:** Hepatic Encephalopathy (Cirrhosis)
  - **Presentation:** 60 y/o M, cirrhosis, confusion, asterixis, ammonia 90  $\mu\text{mol/L}$  (normal  $<30$ ), no fever, CT normal.
  - **Interpretation:** Acute encephalopathy (HE,  $\uparrow$  ammonia), West Haven Grade II.
  - **Workup:** Ammonia, CMP (bilirubin 4 mg/dL, INR 1.8), rule out infection (cultures, paracentesis).
  - **Next Steps:** Lactulose (30 mL q2-4h until 2-3 BM/day), rifaximin (550 mg BID), identify trigger (e.g., GI bleed).
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- **Case 2:** Septic Encephalopathy (UTI)
  - **Presentation:** 75 y/o F, ICU, fever 39°C, lethargy, UA: +LE, +nitrites, blood cultures: *E. coli*.
  - **Interpretation:** Acute encephalopathy (sepsis-related), CAM-ICU positive (delirium).
  - **Workup:** CBC (WBC 15K), CMP (normal), CT head (normal), EEG (diffuse slowing).
  - **Next Steps:** Antibiotics (ceftriaxone 2 g IV q24h), fluids (NS 30 mL/kg), monitor for NCSE.

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