



Altered Mental Status - Part I - Basic Approach and Critical Initial Diagnoses

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Definition: Altered mental status has many definitions but fundamentally involves changes in a person's alertness, attention, memory, and/or awareness. Oftentimes, a patient is brought in with the chief complaint of "he/she is not acting at baseline, not acting 'right'." The patient's level of consciousness may be impaired (lethargy, stupor, coma) and/or the patient is not acting appropriately (hyperalert/agitated, impaired cognition, confused/disoriented).

Altered mental status has literally hundreds of potential causes. "AEIOU TIPS" is a classic mnemonic many use to systematically go through the differential diagnoses.

AEIOU TIPS

Alcohol/Acidosis

Endocrine/Epilepsy/Electrolyte/Encephalopathy

Infection

Opiates, Overdose

Uremia

Trauma

Insulin

Poisoning/Psychosis

Stroke/Seizure/Syncope

Whichever mnemonic you use, none is complete. If you want the full differential diagnostic list, Google it! Below is one conceptual tool to help you get through the first few minutes of the altered patient. **The KEY to evaluating the altered mental status patient, is being meticulous in history and physical examination!**

1. VITAL SIGNS

- Place patient on cardiac monitor and pulse oximetry and initiate IV access
- Obtain a stat blood glucose → administer 1 amp D50 IVP if <80mg/dL
- Obtain rectal temperature
 - Hyperthermia: Aggressive core temperature lowering is emergent and should begin in the primary survey in patients with severely elevated temperatures (e.g. >104° F). This is usually done using an evaporative technique - spraying warm water on patient and using fans) – the EP should aim to get the temperature down to 101° F in the first 30 minutes and then stop active cooling to avoid overshoot
 - Hypothermia: Warming measures should likewise be initiated immediately in the hypothermic patient – the aggressiveness of these measures are dictated by the degree of hypothermia and the patient’s cardiovascular stability, with invasive measures reserved for unstable and severely hypothermic patients

2. PRIMARY SURVEY

A - AIRWAY

- Maintain C-spine precautions if history unknown
- If apneic initiate bagging but → In the absence of other indications, hold intubation until hypoglycemia and narcotic overdose have been ruled out

B - BREATHING

- Administer supplemental O₂ to maintain O₂ saturation >90%
- Administer naloxone 0.4-10mg (0.4mg increments in non-“coding” patients) in patients with any question of narcotic overdose

C -CIRCULATION

- Address hypotension/hypoperfusion with volume resuscitation -IVF

D DISABILITY

- Neurologic exam FOCAL or NONFOCAL (start with pupils)
- Glasgow Coma Scale

Glasgow Coma Scale

GCS	1	2	3	4	5	6
Eye opening	None	To pain	To command	Spontaneous		

Verbal	None	Incomprehensible	Inappropriate words	Confused speech	Oriented	
Motor	None	Extension	Flexion	Withdraws to pain	Localizes pain	Follows commands

E- EXPOSURE

- Remove all clothing
- Look for occult injuries (e.g. trauma/stab wounds)

3. TESTS

BEDSIDE TESTS:

- Glucose
- Urine pregnancy
- Hemoglobin
- ECG

ROUTINE TESTS:

- **Imaging:** CT Head without contrast, CXR
- **Blood:** CBC, Chem7, Calcium, cultures (before antibiotics) if sepsis is a possibility
- **Urine:** Drugs of abuse screen, cultures

4. SPECIFIC DIAGNOSES

We go through **AEIOU TIPS** and uncover reversible causes along the way:

“A” Alcohol/ACIDOSIS - Withdrawal/Overdose

- **HISTORY:** History of substance abuse, underlying psychiatric conditions
- **EXAM:** Refer to toxidromes and withdrawal patterns table
- **NEXT STEP: ABCs, EKG,** consider co-ingestion (serum acetaminophen, serum salicylate, serum volatile alcohols, urine toxicologic screen, etc.), poison control or toxicology consultation as needed, antidotes if indicated; evaluate for psychiatric involuntary hold and underlying psychiatric disease. Rx: Aggressive pharmacologic control of psychotic and hyperactive symptoms. Airway management.

Supplemental vitamins, magnesium. Administer thiamine 100mg IVP if any question of nutritional deficiency (e.g. cancer, EtOH)

“E” Endocrine/Epilepsy/Electrolyte/Encephalopathy

GLUCOSE goes here but the other E's are actually quite uncommon and tricky so we will deal with them later

DM (Glucose)

Hyperglycemia (Diabetic Ketoacidosis and Hyperglycemic Hyperosmotic Syndrome)

- **HISTORY:** History of diabetes; nausea/vomiting
- **EXAM:** Neurologic deficit (stroke mimic), dehydration
- **NEXT STEP:** ABCs, bedside glucose check, blood gas (evaluate for diabetic ketoacidosis), IV fluid resuscitation, insulin; evaluate for inciting event (medication noncompliance, infection, ischemia, point-of-care pregnancy test)

“I” INFECTION: Severe Sepsis//MeningoEncephalitis

- **HISTORY:** History of immunocompromised status (HIV, chemotherapy, diabetes, etc.), symptoms/signs suggestive of infection
- **EXAM:** SIRS criteria, decreased capillary refill, cool skin, oliguria/anuria.
- **NEXT STEP:** ABCs, sepsis protocol (empiric antibiotics, fluid resuscitation, possible vasopressor/corticosteroid administration, search for underlying cause).
- Pathophysiology is multifactorial and unclear, but treatment consists of controlling the underlying infection
 - Administer dexamethasone (10 mg IVPB) prior to antibiotics in suspected meningitis. Give empiric antibiotics (e.g. ceftriaxone 2g IVPB +/- vancomycin 1g IVPB). Perform non-contrast CT Head
 - Perform LP (if no mass effect or hydrocephalus on CT) and send for cell count, protein, glucose, bacterial, viral and fungal studies. Save a tube!
 - If LP is positive, ampicillin may also be necessary to cover Listeria
 - If LP is positive for cells but Gram stain is negative, empiric antivirals (e.g. acyclovir 10mg/kg IVPB) may be indicated

“O” Opiates/ Overdose *Critical Reversible**

- **HISTORY:** History of IV drug use or polysubstance abuse, lethargy, stupor, coma, seizure
- **EXAM:** Hypotension, bradycardia, respiratory depression/apnea, miosis, hypothermia

- **NEXT STEP:** ABCs, naloxone, IV fluids for hypotension, consider co-ingestions/drug use (e.g. acetaminophen levels for prescription oral opioids overdose, as opioids often combined with acetaminophen)

“U” Uremic Encephalopathy

- **HISTORY:** History of renal insufficiency or end stage renal disease
- Missed dialysis, increase in BUN/Creatinine, asterixis
- **EXAM:** AV fistula, dialysis catheter, oliguria/anuria; neurologic deficit, asterixis
- **NEXT STEP:** ABCs, EKG (hyperkalemia and dysrhythmia), serum electrolytes, emergent renal consultation for hemodialysis. Rx: Dialysis. May need prolonged or repeated dialysis – special attention to protocol required (by renal consult!)

“T” TRAUMA: Assume Trauma Until Proven Otherwise

“I” INSULIN & ISCHEMIA (CNS & CARDIAC)

INSULIN = Hypoglycemia ***Critical Reversible

- **HISTORY:** History of diabetes, comorbidities (sepsis, dehydration, malnutrition, liver/renal disease, polysubstance abuse), infant/elderly population; any focal or general neurologic change; seizure
- **EXAM:** Serum glucose <70mg/dL (3.9mmol/L), focal neurologic deficit (neuroglycopenia = stroke mimic), diaphoresis, tachycardia
- **NEXT STEP:** ABCs, dextrose IV/PO; search for underlying cause; consider glucagon IM if IV access delayed; consider IV octreotide in oral sulfonylureas

“I” - ISCHEMIA (CNS & CARDIAC)

CNS: Ischemic and hemorrhagic

- **HISTORY:** Majority of stroke patients do not have consciousness affected; however, specific stroke syndrome as well as increased intracranial pressure (secondary to large infarcts with edema, hemorrhage, herniation, vertebrobasilar stroke, bihemispheric involvement) may lead to altered levels of consciousness; headache and vomiting are more likely to be hemorrhagic rather than ischemic/embolic
- **EXAM:** Focal neurologic deficit especially those following vascular territories, cardiac murmurs, irregular cardiac rhythm
- **NEXT STEP:** ABCs, stroke protocol (CT head noncontrast, serum glucose, EKG, reverse coagulopathies, neurology/neurosurgery consultation, etc.)

Cardiac: ACS and Arrhythmia *Critical Reversible**

- **HISTORY:** Syncope, chest pain, unconsciousness, SOB
- **EXAM:** Unstable VS, poor perfusion
- **NEXT STEP:** EKG, cardiac monitor

Pulmonary: Hypoxia or Hypercarbia *Critical Reversible**

- **HISTORY:** History suggestive of inadequate oxygenation/ventilation, such as history of pulmonary disease (asthma, COPD, interstitial disease, pneumonia), anemia, carbon monoxide/cyanide poisoning.
- **EXAM:** Respiratory distress/failure, abnormal breath sounds, signs of cyanosis or clubbing.
- **NEXT STEP:** ABCs, oxygenation and ventilation (from supplementary oxygen to noninvasive positive pressure airway to intubation); search for underlying cause

“P” Poisoning

- **HISTORY:** EtOH is most common, millions of other possibilities, check clothing, collateral history for meds, family, pharmacy
- **EXAM:** Toxicologic physical examination (pupils, skin (dry/wet), bowel sounds, bladder fullness)
- **NEXT STEP:** ABCs, supportive care, toxin specific antidotes

“P” Psychosis

Dx of LAST resort!

“S” Stroke/Seizure (Status Epilepticus)

- **HISTORY:** Risk factors
- **EXAM:** Complete neurological examination
- **NEXT STEP:** ABCs, supportive care
- Remember: Strokes don't all show up on CT initially. Patients may show AMS in post-ictal phase after seizure. If they remain altered, must consider ongoing seizure (subtle status epilepticus without obvious convulsions)