Foundations Frameworks

Approach to Altered Mental Status

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Start with the basics and remember the ABCs. Is the patient hemodynamically stable?

1. **Abnormal Vital Signs:**
    a. Respiratory (airway/breathing)
        i. Hypoxemic respiratory failure: check an oxygen saturation and chest XR
            1. Primary pulmonary disease: consider PNA, pulmonary edema, PE, pneumothorax, ARDS, inhalational injury
            2. Also consider systemic causes, e.g. methemoglobinemia
        ii. Hypercarbic respiratory failure: check a VBG, look for elevated CO2 (with respiratory acidosis)
            1. Pulmonary disease: COPD/asthma, CHF/pulmonary edema
            2. Mechanical: hypoventilation (e.g. from NM weakness, opioid overdose, intracranial bleed, etc.), respiratory fatigue
    b. Shock (circulation)
        i. Heart rate: tachycardia vs. bradycardia, consider cardioverting unstable tachydysrhythmias and pacing bradydysrhythmias
        ii. Blood pressure: think about the various causes of shock
            1. Pump: cardiogenic (cold/clammy, e.g. CHF/AMI, tachy/bradydysrhythmia, valvular insufficiency), obstructive (massive PE)
            2. Pipes: distributive (warm/well perfused, e.g. sepsis, anaphylaxis), endocrine (adrenal insufficiency, myxedema coma), vascular catastrophe (e.g. AAA)
            3. Tank: hypovolemia (cold/clammy, e.g. hemorrhage, dehydration), impaired venous return (e.g. tamponade, tension PTX, abdominal compartment syndrome)
        iii. Don't forget about hypertensive emergency/PRES
    c. Temperature
        i. Hyperthermia/fever usually points to an underlying problem, but can be a primary cause of AMS:
            1. Infectious
            2. Toxicologic: sympathomimetic toxidrome, EtOH/sedative withdrawal, NMS, serotonin syndrome, malignant hyperthermia (succinylcholine)
            3. Environmental exposure (heat stroke)
            4. Thyrotoxicosis
        ii. Hypothermia: usually environmental, but don't forget about myxedema coma

Are vital signs stable? If yes, move on to step 2.

2. **Toxicologic/Metabolic**:
    Consider using naloxone/glucose/thiamine in every AMS patient. Is there a toxidrome present on exam? History of meds/drug abuse? Run the medication list to evaluate for

possible toxicity. In undifferentiated patients consider: glucose, CBC, CMP, coagulation studies, TSH, NH3, CO/CN levels, UDS, ASA/Tylenol, antiepileptic levels, EtOH level, toxic alcohols, serum/urine osmolality.

a. Glucose: hypoglycemia, hyperglycemia (diabetic ketoacidosis, hyperosmolar hyperglycemic state)
b. CMP: Na, Ca, K, low bicarb (indicates acidosis), LFTs/coags/NH3 (hepatic encephalopathy), Cr/BUN (uremic encephalopathy)
c. CBC: HUS/TTP, severe anemia or acute hemorrhage
d. Endo: thyroid (hypothyroidism/myxedema coma, thyroid storm), adrenal crisis
e. Drugs/Toxins: opioids, benzodiazepines, sympathomimetics, anticholinergics, antidepressants, sedative/hypnotics, beta blocker/calcium channel blocker toxicity, carbon monoxide, cyanide, ethylene glycol, isopropyl alcohol, methanol, ethanol

Labs sent, no obvious toxidrome, naloxone/glucose/thiamine considered? Move on to step 3.

3. **Primary Neurologic:**
   Intracranial bleed, seizure, mass, stroke. Most AMS patients should be getting a head CT. Perform a focused neurologic exam: level of awareness (comatose vs. sedated vs. hyperactive vs. following commands), pupils, CN reflexes (corneal, doll's eyes, gag), extremity movements. Consider cervical collar in anyone with history of trauma.
   a. Intracranial bleed
   b. Seizure: epileptic, non-epileptic/subclinical status epilepticus
   c. Stroke/carotid dissection: look for signs of large vessel territory stroke: right sided neglect, aphasia, eye deviation, level of consciousness

Neuro exam non-focal? Head CT ordered/complete? Move on to step 4.

4. **Infectious:**
   Sepsis, bacteremia, meningitis, encephalitis, PNA, UTI, intra-abdominal infection, prostatitis, cellulitis/necrotizing fasciitis, osteomyelitis, endocarditis

Still no answer? Consider...

5. **Primary Psychiatric Diagnosis:**
   Diagnosis of exclusion. Catatonia can be peculiar and subtle. Note that this is a psychiatric emergency.

References:

- Slovis C. "The Five Causes of Altered Mental Status." Emergency Medicine Intern Curriculum. Vanderbilt University. Department of Emergency Medicine.
- Herbert M, Sacchetti A, Mattu A, Swaminathan A, Aguilera P, Swadron S, Orman R, Weingart S. "HippoReviews – Altered Mental Status I and II." EMRAP. October and November 2014.
- Adams, J et al. *Emergency Medicine: Clinical Essentials*, 2e. Altered Mental Status and Coma, pp. 811-817. 2013.