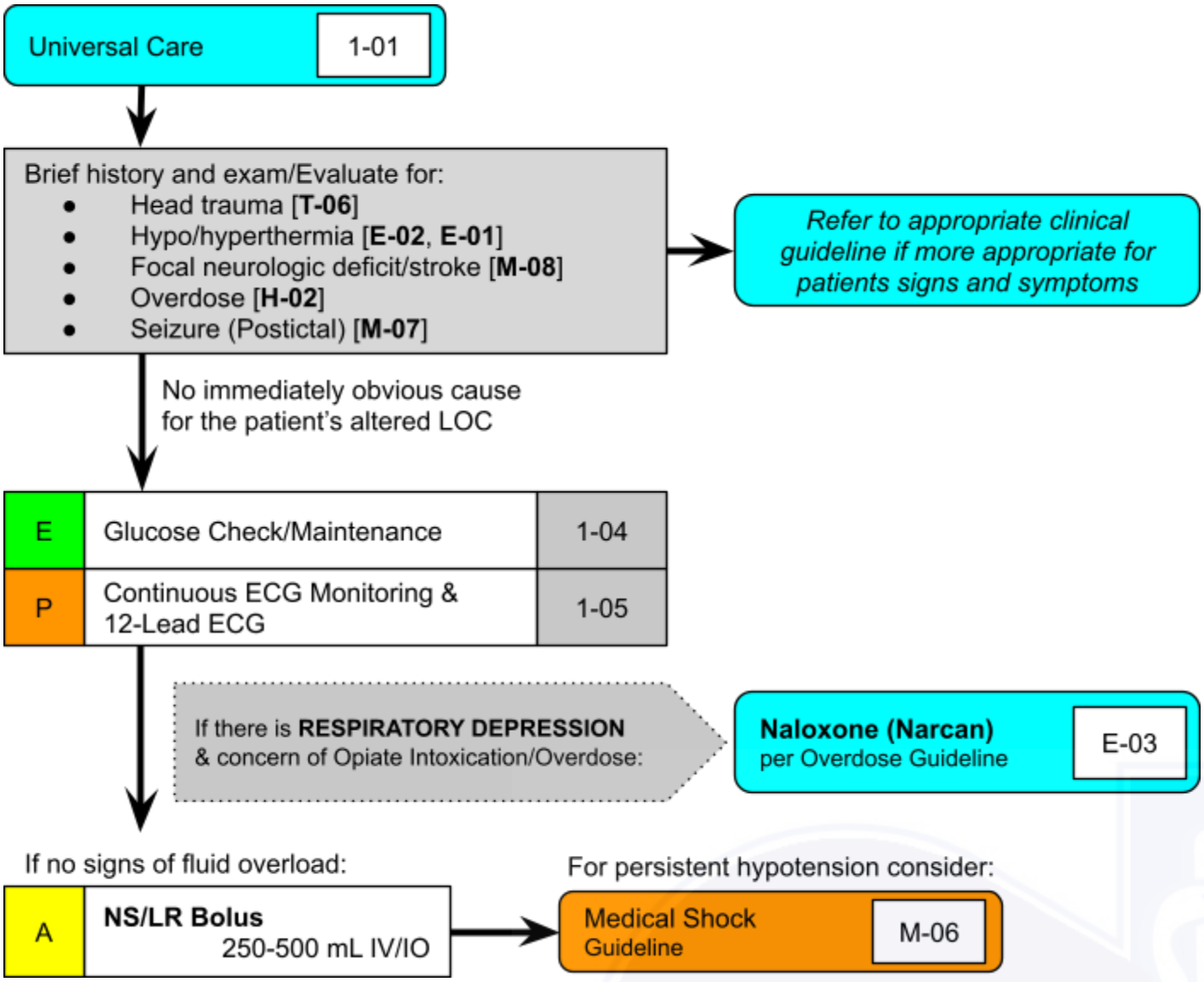
M-03 ALTERED MENTAL STATUS	Includes/Incorporates: **Syncope**	First Responder EMT AEMT Paramedic

- This guideline is for any patient who is unconscious/unresponsive or altered level of consciousness/mental status WITH vital signs.
- It *also* includes patients who were altered/unresponsive, but have since resumed a normal or near normal level of consciousness--i.e. “syncope”.



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ALTERED MENTAL STATUS CAUSES:

- There are various mnemonics used to help remember the causes for altered mental status. The *next page* uses a version of **"TIPS-AEIOU"**, but others may work as well.
- Never assume that there is only one cause of a patient's altered LOC, look for and reevaluate for other causes.
- There are basically two general "mechanisms" with AMS. Problems directly involving the neurons/brain and general "metabolic" problems leading to neuron dysfunction.

- Direct neurologic (brain/neuron) problems: cause a direct loss of neuron function in the brain tissue.
  - Direct damage to the brain tissue (i.e. head trauma)
  - Focal ischemia/hypoperfusion (i.e. stroke)
  - Direct depletion of neuron metabolic resources (e.g. seizure).
- Indirect ("metabolic") problems causing neuron dysfunction: cause a general lack of perfusion/nutrients or some global substance which is inhibiting the neuron's ability to function properly.
  - *Lack of perfusion* is generally indicated by hypotension and/or signs of decreased peripheral perfusion (i.e. cool, mottled extremities). This can be caused by multiple entities as discussed in the Medical Shock [M-06] Guideline, but commonly is due to hypovolemia or septic shock.
  - *Lack of needed nutrients* is commonly due to hypoxia or hypoglycemia, although other metabolic derangements are occasionally involved.
  - *Intrinsic "poisons"* (made within the body) include things like carbon dioxide (CO2), ammonia, or metabolic acidosis (e.g. DKA or sepsis).
  - *Extrinsic poisons* (put into the body) are drugs or illicit substances affecting nutrient delivery (i.e. hypoxia with opiates) or utilization (e.g. cyanide), or directly affecting the nerves ability to conduct impulses (many illicit substances).

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"**TIPS-AEIOU**" Mnemonic for Altered Mental Status:

T	Trauma (Head Injury [**T-05**]) Temperature (Hypothermia [**E-06**] or Hyperthermia [**E-05**])
I	Insulin (hypo/hyperglycemia, see Glucose Management [**1-04**])
P	Psychosis
S	Seizure [**M-09**] Stroke [**M-08**] Space-occupying lesion (brain tumor, hydrocephalus, head bleed, etc.)
A	Acidosis (respiratory or metabolic) Ammonia (hepatic encephalopathy)
E	Endocrine (hypothyroidism/myxedema coma) Electrolytes (low sodium)
I	Infection (i.e. sepsis)
O	Oxygen (hypoxia, see Airway/O2 Management [**A-01**]) Overdose [**E-03**]
U	Uremia (renal failure)

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AMS Causes

Trauma (Head Injury):

- AMS can be due to bleeding (i.e subdural hematoma) or non-bleeding (i.e. concussion) causes. Generally history and/or physical exam will generally suggest the diagnosis.
- Loss of consciousness or recollection of event may or may not be present.
- Repetitive questioning (i.e. short term memory loss or amnesia to event) is very common and should not be regarded the same as confusion.
- Brief seizure activity or myoclonic jerks are common with a loss of consciousness.
- But, **NEVER assume that a head injury (bleed) is the primary cause of AMS in patients who fell from standing** (equal or less than body height) and have persistently altered LOC. Always evaluate for other causes (CVA, STEMI, sepsis, overdose, etc.).

Temperature:

- Hypo or hyperthermia may present with decreased or altered LOC.
- History of exposure to extreme ambient temperatures may or may not be present.
- Profound hypothermia can occur in temperatures that seem warm to bystanders (e.g. indoors at 75 degrees) if the patient's body loses the ability to regulate temperature.
- Stimulant medications/drugs can increase metabolism and elevate temperature.
- Certain substances also inhibit the body's ability to regulate temperature (e.g. OTC antihistamines).

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Insulin (Hypo or Hyperglycemia):

- Blood glucose should **always be checked as soon as possible** with any AMS.
- If any doubt (i.e. the glucometer will not work), it is safer to assume hypoglycemia than hyperglycemia and give oral or IV glucose.
- Hypoglycemia most commonly presents with a decreased level of consciousness rather than an alter/confused state.
    - **Alcoholics** frequently develop hypoglycemia.
    - *Never assume AMS is just intoxication*.
    - If hypoglycemic patients have returned to baseline and wish to refuse care, make certain that they eat and there is someone to observe them.
- Hyperglycemia alone does not cause an alteration in mental status. AMS is caused by volume depletion/dehydration and ultimately due to the development of a **metabolic acidosis** (diabetic ketoacidosis, DKA).
- Non-DKA hyperglycemia is primarily treated with fluids. These patients are volume depleted, glucose will begin to clear with adequate hydration.

Psychosis:

- Psychiatric disease can present with a wide variety of alterations in mental status and/or level of consciousness.
- The diagnosis of psychosis is only made after excluding all other possibilities.

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Stroke/CVA:

- Maintenance of consciousness is a brainstem function, and brainstem strokes are rare.
- Almost all strokes only affect one side of the brain and should not affect the *level of consciousness*.
- With stroke, confusion or apparent decreased LOC is often really misinterpreted **aphasia** (trouble finding words or getting words into organized sentences) or unrecognized **hemi-neglect** (where the patient does not respond to the provider on the affected side of the stroke).

Seizures/Postictal State:

- History and/or physical exam (e.g. tongue biting or incontinence) should generally provide evidence of the diagnosis.
- Unless there are repetitive seizures, there should be a gradual increase in the LOC.
- Treat as per Protocol [**M-09**].

Space-Occupying Lesion:

- With the exception of acute head trauma (epidural or subdural), most space occupying lesions are chronic processes with gradual worsening over time.
- Most pathologies like tumors, subacute/chronic SDH, and hydrocephalus (i.e VP shunt malfunction) cause AMS from increased intracranial pressure (ICP).
- Generally these patients present with signs of increasing ICP: headache, nausea/vomiting, decreasing level of consciousness.
- Signs of herniation include: hypertension, bradycardia and agonal respirations.

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Acidosis: Respiratory, Metabolic, or both (a.k.a. "Mixed acidosis")

- Respiratory acidosis = CO2 retention in the lungs (elevated EtCO2), usually from hypoventilation (most commonly seen with COPD)
  - Also called "CO2 narcosis", generally presents with gradually decreasing LOC.
  - Treatment is to improve ventilation (CPAP or intubation/ventilation).
- Metabolic acidosis = increased acid production abnormal cellular metabolism.
  - Most commonly this is a **lactic acidosis** due to anaerobic metabolism--usually this is due to a state of hypoperfusion, commonly seen with **sepsis**.
  - **Diabetic Ketoacidosis (DKA)** - cells do not have enough or cannot use insulin. This causes them to start metabolize fatty acids instead of glucose.
  - **Carbon Monoxide (CO)** or **Cyanide** - direct inhibitors of cellular metabolism. Most commonly seen with fires/combustion in enclosed spaces.

Alcohol: Never assume that alcohol is the only problem with a patient.

- Look for evidence of non-ethanol alcohol intoxication: **Isopropyl alcoho**l (rubbing alcohol, hand sanitizer, etc.), **Methanol** (washer fluid), or **Etylene Glycol** (antifreeze).
- Alcohol withdrawal can lead to seizures (generally in the first 24 hours) as well as delirium tremens (hemodynamic instability with erratic or psychotic behavior.

Ammonia:

- Known as *Hepatic Encephalopathy*, the liver's inability to metabolize ammonia due to acute or chronic liver failure (cirrhosis, hepatitis, etc.) leads to the accumulation of ammonia and other waste byproducts.
- Confusion usually presents gradually over several days to weeks. Often the patient has a fairly normal LOC, but has confusion, unusual affect or even bizarre behavior.

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Endocrine:

- Not usually diagnosed prehospital unless prior history of similar events is known.
- Presentation of these problems is generally gradual and most often nonspecific.
- *Myxedema Coma* (hypothyroidism) and ***Acute Adrenal Insufficiency*** (Addisonian Crisis) are the most common.
    - Prehospital treatment is generally supportive.
    - If Acute Adrenal Insufficiency is known or suspected and patient has hypotension refractory to standard care, consider giving a corticosteroid (**Solu-Medrol** or **Decadron**) if available.
    - Preferred treatment is *hydrocortisone (Solu-Cortef) 100 mg IV*.

Electrolytes:

- Most electrolyte issues (such as sodium, potassium, calcium, and/or magnesium) present with general weakness and vague/nonspecific complaints (dizziness, balance issues, etc.)
- Most are treated with normal saline (increases sodium and “flushes out” calcium).
- Hyperkalemia should be suspected with spiked T-waves or wide and flat QRS (“sine wave”), and should be treated with Bicarb and Calcium if available.

Infection:

- While direct infection of the central nervous system (meningitis or encephalitis) should always be considered with AMS and fever, it is rare.
- Fever with AMS is generally due to substances released by the infective organisms causing direct CNS suppression or by the chemotoxins causing a state of vasodilation and/or cardiac dysfunction leading to a state of hypoperfusion.
- Treatment is supportive with fluid resuscitation and pressors as needed.

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Oxygen:

- 'Nuff said…..
- If any doubt in SpO2, always err on giving extra O2.

Overdose:

- Wide variety of presentations depending on substance and amount ingested.
- See Overdose Guideline [**E-03**] for more specific presentations, evaluations and treatments.

Uremia:

- Failure of the kidneys to clear intrinsic products of metabolism can lead to accumulation of substances that will cause alterations in mental status.
- Exact mechanisms are unknown, although drugs or medications normally cleared by the kidneys can accumulate over time ("relative overdose").
- Prehospital treatment is supportive.

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SYNCOPE:

- Definition: *Transient loss of consciousness accompanied by loss of postural tone.*
- Episodes are generally very brief with a rapid recovery and no postictal confusion.
- Convulsive movements called **myoclonic jerks are common with syncope**. This is often confused with seizures, but should not be accompanied by a post-ictal phase, incontinence or tongue biting.
- Elderly syncope has a high risk of morbidity and mortality, and cardiac dysrhythmias (especially ventricular dysrhythmias) should be ruled out (i.e. ECG) as soon as possible.

PEDIATRIC Considerations:

- Life-threatening causes of pediatric syncope are usually cardiac in etiology (arrhythmia, cardiomyopathy, myocarditis, or previously unrecognized structural lesions)
- In addition, consider the following in the pediatric patient:
  - Seizure
  - Breath holding spells
  - BRUE (Brief Resolved Unexplained Events/formerly ALTE)
  - Toxins (marijuana, opioids, cocaine, CO, etc.)
  - Child abuse (head trauma)
- Important historical features of pediatric syncope include: color change, seizure activity, incontinence, post-ictal state, and events immediately prior to syncope event.

QI Review Parameters:

1. {PENDING}