This month we will look at Altered Mental Status and causes for changes in the patient. Altered Mental Status can mean different things, but it is a symptom that should not be ignored. Think about the “Frequent Flier” we get called for, the one that is always an ETOH overdose. Except this time they fell, struck their head and they are not just sleeping it off.

**Baseline Mental Status**

**First we need to determine a normal baseline for the patient**

Upon initial contact with your patient.....talk to them. A lot can be learned just from the patient responding to you. When a patient answers you, you can establish airway, breathing and circulation. They can’t talk if they don’t have a patent airway. A response to your questions can help determine if there is adequate oxygenation to their brain. Once you establish a baseline, you will be able to recognize changes when they occur. If the person is not answering the way you would expect, ask whoever is with the patient if this is their “normal”. You have established a baseline for you to compare to, but this patient may have changes to their “normal” baseline.

**AVPU**

This should be done as part of your primary survey of the patient. When establishing the patient’s level of response use the acronym AVPU. AVPU means that the patient is Alert, responsive to Verbal prompting, responds only to Painful stimuli and Unconscious. An Alert patient will respond to your questions or may initiate the conversation. This patient may not answer correctly (i.e. stroke or head injury), but they are talking. A patient responding to Verbal stimuli will only respond when a verbal prompt is given. This person may appear to be sleeping, but respond when prompted. Response to Painful stimuli is only when pain elicits a response. This can be done by pinching tender areas on the patient (i.e. nail beds, back of arm, etc.). Do not pinch hard enough to cause damage to the patient. Starting an IV can also elicit a painful response. When the patient does respond, note if there is purposeful movement or not. Purposeful movement is when a patient pulls away from the painful stimulus. A moan would not be a purposeful movement. If the patent does not respond to any of the previous levels, they are Unconscious.

**Mental Status**

In the secondary survey, you will determine a Level of Consciousness (LOC) for the patient. We have determined a level of response, now we need to determine their mental status. With an alert patient, ask them: Who they are? Time of day/day of the week? Where are they? What is going on with them today? These questions will help determine if the patient is Alert and Orientated to themselves and their surroundings. Don’t prompt the patient or correct them if they do not answer appropriately.
Keep note of how they answered. Changes to these answers could indicate a change in their mental status. A change could be for the positive (post-ictal) or for the negative (CVA, head trauma). A correct response would be reported as Alert and Oriented times 4 (A&Ox4). An inappropriate answer to one or more question this would decrease the x4 portion of the mental status (x3, x2, and x1).

Other indications to a mental status change are the general attitude of the patient. Is the patient’s behavioral response appropriate to the situation? Does the patient have problems staying on topic? Do they answer with statements that are not appropriate to what you would expect? (When asked if a patient is cold and they respond “I am not hungry”). Is the patient repeating a question, even after it has been answered multiple times? Attention to these areas will help to determine if this patent has a mental health issue, an injury to the brain or if the brain is getting enough oxygen.

What do changes in Mental Status mean?

Intracranial Perfusion

The brain is the body’s most perfusion sensitive organ. Any change in perfusion can change the function of the brain and its control of body systems. The space in the skull and around the spinal column is fixed. The cranial volume is made up of the brain (Cerebrum, Cerebellum and Brain Stem), Blood vessels (Arteries, Veins, and Capillaries) and Cerebrospinal Fluid. Any change to the cranial volume needs to be adjusted and compensated. An increase in intracranial pressure (ICP) can be adjusted by shifting fluid to the area around the spinal cord. If the ICP becomes too elevated, it can restrict arterial blood flow to the brain. This, in turn, causes an increase in systemic blood pressure to return the arterial blood flow to normal. This adjustment continues to increase the ICP. This action will cause reduced circulation to the brain and increase cerebral Hypoxia and Hypercarbia. As CO₂ levels rise, cerebral arteries dilate to encourage greater blood flow. This cycle creates hyperventilation and hypertension as the body attempts to remove the CO₂. Hypocarbia (low CO₂ levels) can trigger cerebral arterial constriction causing a reduction in the blood flow. This is where capnography will help determine if the ventilations are effective. Maintaining 35-45 mm hg will help to maintain the proper amount of CO₂ in the blood and limit a system reaction. Hypoxia and acidosis will increase the severity of a brain injury and can increase mortality. Aggressive maintenance of fluid volume and blood pressure will also help maintain proper ICP.

Traumatic Brain Injury (TBI)

Now that a baseline mental status has been established, we need to look for changes. With a direct impact to the skull, there are 2 forces that affect the brain. Coup injuries occur directly below the point of impact and Contrecoup injuries occur as the brain impacts the other side of the skull. As with any other system in the body, bleeding and swelling can occur. A Cerebral Contusion is when capillary bleeding occurs in the brain’s substance. This may present as prolonged confusion or other neurologic deficits. Where the contusion occurs will be how the patient presents. Someone with vision changes may have a contusion on the posterior portion of their brain (in the occipital region). Introduction of blood into the cerebral space can build to the point of displacing the brain. An Epidural Hematoma is blood coming from an arterial origin and is trapped between the protective covering of the brain (Dura mater) and the interior of the skull. This is a high pressure bleed and the patient will present with rapid changes in mental status. This injury can be corrected by surgery if it is identified early enough.
A **Subdural Hematoma** occurs below the Dura mater and within the subarachnoid space. This is a slower building bleed, the signs and symptoms may not occur until hours or days later. History on these patients will give you an indication of this injury. A recent fall or impact that did not cause any initial complaints may be the reason for the changes now. **Intracerebral Hemorrhage** is a bleed (usually arterial) in the brain matter itself. Blood loss can be minimal, but the blood can irritate the tissue and cause swelling. These patients may present like a stroke and the signs and symptoms will progress quickly.

**Herniation of the Brain**

A herniation can occur with a patient who has had a change in the cranial volume. Because the cranial volume is fixed, changes are not tolerated well. Introducing fluids from outside the system (hemorrhage, edema) can push on areas of the brain that may force a herniation. Cerebral herniation occurs when a portion of the brain has been pushed outside of the area it normally occupies. Depending
on where the herniation occurs, it can present as simple nausea or as changes in breathing, blood pressure and heart rate.

A Seizure is the temporary alteration in behavior due to a massive electrical discharge of neurons in the brain. This may be caused by hypoxia, rapid lowering of blood glucose, temperature (Febrile Seizures) and structural changes (tumors, vascular disorders). The most common cause is idiopathic epilepsy. This means that the seizure has an unknown origin. Seizures are categorized as Generalized or Partial. A Generalized seizure will affect a larger area of the brain and can produce a Grand Mal Seizure. A Grand Mal Seizures is identified by the Tonic (tense, contracted muscles) - Clonic (rhythmic jerking) movements of the patient. During a Grand Mal seizure, the intercostal and diaphragm muscles are paralyzed. This will interrupt respirations and cause cyanosis. A Petit Mal Seizure is a shorter seizure that only lasts 10-30 seconds. There is a temporary loss of awareness and some muscle fluttering. This event is not always identified by the people around the patient. The patient may appear to be “zoning out”. Petit Mal Seizures usually only occur in patients under 20 y/o. A Partial Seizure can be either a

Altered Mental Status – Non Trauma

For a non-trauma Altered Mental Status change, knowing the cause may allow us to reverse the condition. Identification of an overdose can potentially be reversed by Narcan (Naloxone). A low blood sugar can be reversed by the administration of Dextrose, Glucagon or Glucose.

Think of the mnemonic “AEIOU-TIPS”:

- A – Alcohol, Acidosis (Ingested Poisons), Arrhythmias, ACS
- E – Endocrine/exocrine (Thyroid/Liver), Electrolyte Imbalance
- I – Insulin Disorder (Hypoglycemic or DKA)
- O – Oxygen Deficit, Overdose
- U – Uremia (Kidney Failure)
- T – Trauma, Temperature Changes
- I – Infection (Neurologic and Systemic)
- P – Psychological
- S – Shock, Stroke, Seizure
Simple Partial Seizure or a Complex Partial Seizure. A Simple Partial Seizure is when there is chaotic movement in one area of the body. This patient may have an arm that is in a Tonic-Clonic state, but there is no change in their level of consciousness. This type of seizure may progress into a Grand Mal seizure. A Complex Partial Seizure is characterized by a distinctive aura. This aura can be a taste, smell, sound or visual change. Patients have described a metallic taste or the feeling of Déjà vu. The patient may also act confused, have purposeless movements or make unintelligible sounds. These patients may also show extreme swings in their behaviors, this includes explosions of rage. Status Epilepticus is when a series of 2 or more generalized seizures occur without a return to consciousness. This is a true emergency as this is a prolonged period of apnea which will cause hypoxia. The use of Midazolam is to stop the current seizure; it does not prevent a second seizure from starting.

A Syncopal Episode is a neurological condition caused by a temporary loss of consciousness due to an insufficient blood flow to the brain. The patient has an almost immediate recovery upon becoming supine. A patient that does not respond when they become supine is having more than a syncopal episode. Syncope can be caused by cardiac arrhythmias, hypervolemia due to a position change (orthostatic) or neurologic/psychiatric (seeing a traumatic event). It is not uncommon to never find a cause for the syncope, even with testing and follow up.

Strokes fall under 2 categories, Occlusive and Hemorrhagic. The Hemorrhagic Stroke is what was covered under the Traumatic Brain Injury section. The Occlusive Stroke is a stroke caused by an inadequate blood supply to a portion of the brain. Just like the heart, ischemia is when there is not enough blood flow to support the tissue. If the ischemia lasts long enough, it will cause an infarction (death of the tissue). This tissue will swell, causing further damage to surrounding tissues. If the swelling is severe enough, it can cause herniation. An Embolic Stroke is where the ischemia is caused by a clot blocking the artery. This type of stroke has a sudden presentation of symptoms. The two most common causes for these clots are from plaque buildup in the carotid artery and from abnormal contractions of the heart (Atrial Fibrillation). A Thrombotic Stroke is when there is a progressive buildup of plaque that slowly reduces the blood flow (atherosclerosis). The symptoms for this type of stroke will present gradually over time. It is not uncommon for this patient to wake up with an altered mental status or with classic stroke symptoms.

Behavioral Challenges

Altered Mental Status can also be as a result of a behavioral or psychological change to the patient. These changes can be due to an event in the person’s life or a change to the medications they are currently taking (or not taking). With these patients, you need to treat injuries and illnesses just like any other patient. Dementia is a degeneration of the cognitive functions of a patient. Alzheimer’s disease and Parkinson’s disease are both forms of dementia. With dementia, a patient can have impairment with their memory, abstract thinking and cognitive disturbances. Mood Disorders cover a wide array of patients. A panic attack is something that is usually unprovoked and can peak in 10 minutes and resolve in an hour. These patients can present with cardiac or respiratory signs and symptoms that need to be ruled out. Depression and Bipolar Disorder patients are also seen by EMS. Depression can be a chronic condition, but someone that has threatened to hurt themselves is now an acute issue. A Bipolar patient has swings in their behavior that can include anger. If the patient is violent, we may be called to evaluate and treat any injuries. Schizophrenia affects around 1% of the population. These patients can live in their own world and any hallucinations they are having are very real to them. Some patients have
acted out violently and you should stay alert to this. If the patient is being treated and taking their medications properly, EMS is usually not involved. Schizophrenia is usually diagnosed in patients in their early 20s. With all these patients, you should approach them in a supportive, non-judgmental way. Getting history of the events of the day will help determine if there are any medical issues that need to be corrected immediately. A patient that is depressed may have tried to hurt themselves by taking an overdose of pills. The call that was generated may be from someone off site that received a text, or some other social media, notification of the act. Mood Disorders are something that is only diagnosed after testing by a Psychiatrist.

**Mental Status Examination (MSE)**

A Mental Status Exam is an exam that can be done for behavior calls. This would be a part of the focus history and physical exam. Treat the physical and medical complaints of your patient. The MSE looks at the following:

- **General Appearance** – Observe hygiene, clothing, over all care of themselves.
- **Behavioral** – Verbal and non-verbal responses including facial expressions.
- **Orientation** – Can they concentrate and answer simple questions? Can they identify themselves or others with them?
- **Memory** – Is there memory intact for recent or long-term events?
- **Sensorium** – Is the patient focused/paying attention? What is their level of awareness?
- **Perceptual Process** – Are the patients thoughts organized? Do they appear to be hallucinating?
- **Mood & Affect** – Is their mood appropriate? Is there a prevailing mood (sadness/anger/anxiety)?
- **Intelligence** – Their ability to formulate an idea and patient’s speech
- **Insight** – Does the patient realize that a problem exists? Do they deny the problem or blame others for it?
- **Judgment** – Is the patient basing decisions on rational, sound judgments?
- **Psychomotor** – Does the patient exhibit unusual postures? Do they have unusual movements? Are they reacting to hallucinations?

**Conclusion**

It is important to establish a baseline mental status for the patient. This will help to anticipate changes instead of just reacting to them. When a change in mental status is noticed, treat the medical or physical complaints of these patients. Though there can be a tendency to draw a quick conclusion with a patient we have dealt with numerous times, these are the patients that can have a newer problem missed.

**References:**


ALtered mental status (AMS)

Consider possible etiologies and refer to appropriate SOPs

- Alcohol and ingested drugs/toxins; ACS, arrhythmias
- Endocrine/exocrine, particularly thyroid/liver, electrolyte imbalances
- Insulin disorders, hypoglycemia; DKA/HHS
- Oxygen deficit (hypoxia), opiates, overdose
- Uremia; other renal causes including hypertensive problems
- Trauma, temperature changes
- Infections, both neurologic and systemic
- Psychological
- Space occupying lesions (epi or subdural, subarachnoid hemorrhage, tumors); stroke, shock, seizures

Scene size up:

- Inspect environment for bottles, drugs, letters or notes, or source of toxins suggesting cause of AMS
- Ask bystanders/patient about symptoms immediately prior to change in consciousness

Secondary assessment: Special considerations

- Affect
- Behavior: consolable or non-consolable agitation
- Cognitive function (ability to answer simple questions); hallucinations/delusions
- Memory deficits; speech patterns
- Inspect for Medic alert jewelry, tags, body art
- General appearance; odors on breath; evidence of alcohol/drug abuse; trauma
- VS: observe for abnormal respiratory patterns; ↑ or ↓ T, orthostatic changes
- Skin: Observe for lesions that may be diagnostic of the etiology
- Neuro exam: Pupils/ECGs; motor/sensory exam; v for nuchal rigidity; Cincinnati quick stroke screen

1. IMC special considerations:

   - Suction pm; seizure/vomiting/aspiration precautions
   - If GCS 8 or less: Assess need for intubation (DAI) or alternate advanced airway
   - If SBP < 90 (MAP < 65): IV NS fluid challenge in consecutive 200 mL increments; monitor breath sounds
   - Position patient on side unless contraindicated
   - If supine: maintain head and neck in neutral alignment; do not flex the neck
   - Consider need for a 12-lead ECG if Hx of syncope; monitor ECG
   - Monitor for S&S of ↑ ICP: reduce environmental stimuli
   - Document changes in GCS

2. Obtain and record blood glucose level (capillary and/or venous sample)

   - If < 60 or low: DEXTROSE per Glucose emergencies SOP
   - If unable to start IV: GLUCAGON 1 mg IM/IN (EMT may give per System policy)
   - If borderline (60-70): DEXTROSE per Glucose emergencies SOP

   - Observe and record response to treatment; recheck glucose level; may repeat Dextrose pm.
   - If 70 or greater: Observe and continue to assess patient

3. If possible opiate toxicity w/ AMS + RR <12; pupils may be small:

   - NALOXONE 0.4 mg w/ repeat dosing or dose escalation to 2 mg IV/IN/IC/IM if initial response is inadequate until ventilations increase (EMT can give IN per system protocol)

Notes on syncope: Older age, structural heart disease, or a history of CAD are risk factors for adverse outcomes.
Younger pts with nonexertional syncope and those with no history or signs of CV disease, family history of sudden death, or comorbidities are at low risk for adverse events (Ann Emerg Med, 2007; 49: 431-444).

Syncope vs. seizure: Assess history for seizure disorder. Look for incontinence with seizures. Rare with syncope.
PSYCHOLOGICAL EMERGENCIES

1. Assess **SCENE AND PERSONAL SAFETY.** Call law enforcement personnel to scene, if needed.
   - **DO NOT JEOPARDIZE YOUR OWN SAFETY;** always position self for a safe exit.
   - Inspect environment for bottles, drugs, letters, notes, or toxins.
   - Ask bystanders about recent behavioral changes.

2. **Assess patient’s decisional capacity**
   - Consciousness/arousal using GCS (see ITC for chart), attention span
   - Activity: restlessness, agitation (consolable or non-consolable), compulsions
   - Speech: rate, volume, articulation, content
   - Thinking/thought processes: delusions, flight of ideas, obsessions, phobias
   - Affect and mood: appropriate or inappropriate
   - Memory: immediate, recent, remote
   - Orientation X 3, understands and complies with instructions
   - Perception: illusions, hallucinations (auditory, visual, tactile)
   - General appearance, odors on breath
   - Inspect for Medic alert tags: evidence of alcohol/drug abuse; trauma
   - Is patient a threat to self or others, or unable to care/provide for self?
   - Explore suicidal thoughts/intentions with patient directly. Bring any suicidal notes to hospital.

3. **IMC special considerations:**
   - Limit stimuli and the personnel treating the patient as much as possible.
   - Do not touch patient without telling them your intent in advance.
   - Provide emotional reassurance. Verbally attempt to calm and orient the patient as able.
   - Do not reinforce a patient’s delusions or hallucinations.
   - Avoid threatening or advanced interventions unless necessary for patient safety.
   - Protect patient from harm to self or others. Do not leave them alone.

4. **If combative and/or uncooperative:**
   - Attempt verbal reassurance/persuasion. If unsuccessful: Apply restraints per procedure.
   - Use only to protect the patient and/ or EMS personnel.
   - They should not be unnecessarily harsh or punitive. Document reasons for use.
   - In an emergency, apply restraints; then confirm necessity with OLMC.
   - Ensure an adequate airway, ventilations, and peripheral perfusion distal to restraint after application.
   - Monitor patient’s respiratory and circulatory status.

5. **Consider medical etiologies of behavioral disorder and treat according to appropriate SCP:**
   - Hypoxia
   - Substance abuse/overdose: alcohol intoxication
   - Neurologic disease (stroke, seizure, intracerebral bleed, Alzheimer’s, etc.)
   - Metabolic disorders (hypoglycemia, acidosis, electrolyte imbalance, thyroid/liver disease etc.)

6. **If patient is non-decisional and/or a threat to self or others and/or unable to care for themselves:**
   - Complete Petition Form for all adults who meet above criteria. Persons who witnessed statements or behaviors should sign the form.
   - Make every effort to gain the patient’s consent for transport.
   - Refusing transport: Call OLMC from the scene. Pt must be transported against their will if necessary.
   - Ask police for assistance with transport if needed.

7. **Severe anxiety or agitation and SBP ≥ 90 (MAP ≥ 65):**
   - MIDAZOLAM: 2 mg increments slow IVP q 2 min (0.2 mg/kg IN) up to 10 mg pm titrated to patient response.
   - If IV unable and IN contraindicated: IM dose 5-10 mg (0.1-0.2 mg/kg) max 10 mg single dose at 15 min intervals pm.
   - All routes: May repeat pm to a total of 20 mg if SBP ≥ 90 (MAP ≥ 65) unless contraindicated.
   - ↓ total dose to 0.1 mg/kg if elderly, debilitated, chronic diseases (HF/COPD); and/or on opiates or CNS depressants.
SEIZURES

History:
- History/frequency/type of seizures
- Prescribed meds and patient compliance: amount and time of last dose
- Recent or past head trauma; fall, predisposing illness/disease; recent fever, headache, or stiff neck
- History of ingest/or drug or alcohol abuse; time last used

Consider possible etiologies:
- Anoxia/hypoxia
- Cerebral palsy or other disabilities
- Eclampsia
- Stroke/cerebral hemorrhage
- Trauma/child abuse
- Anticonvulsant withdrawal/noncompliance
- Infection (fever, meningitis)
- Metabolic (glucose, electrolytes, acidosis)
- Toxins/intoxication; OD; DTs
- Tumor

Secondary assessment: Observe and record the following:
- Presence of an aura
- Focus of origin: one limb or whole body
- Simple or complex (conscious or loss of consciousness)
- Partial/generalized
- Progression and duration of seizure activity
- Eye deviation prior to or during seizure
- Abnormal behaviors (lip smacking)
- Incontinence or oral trauma
- Duration and degree of postictal coma, confusion

1. IMC special considerations:
- No bite block. Vomiting/aspiration precautions; suction pm
- Protect patient from injury; do not restrain during tonic/clonic movements
- Position on side during postictal phase unless contraindicated

2. Generalized tonic/clonic convulsive activity present:
   MDZOLAM 2 mg increments IV/IO c. 30-60 sec (0.2 mg/kg IV) up to 10 mg pm titrated to stop seizure activity.
   If IV unavailable and IN contraindicated: IM dose 5-10 mg (0.1-0.2 mg/kg) max 10 mg single dose.
   All routes: May repeat pm to a total of 20 mg if SBP ≥ 90 (MAP ≥ 65) unless contraindicated

3. Identify and attempt to correct reversible precipitating causes (see above)
   - Benzodiazepine administration takes precedence over B/G determination in pts who are actively seizing
   - Obtain and record blood glucose level per System procedure (capillary and/or venous sample)
   - If < 70: DEXTROSE or GLUCAGON per Hypoglycemia SCP
1) AVPU stands for:
   a. Argumentative, Verbal response, Painful response, Unaware of surroundings
   b. Aggressive, Violent, Playful, Unconscious
   c. Alert, Verbal response, Painful response, Unconscious
   d. Anorexic, Violent, Passive, Uncooperative

2) When determining if a patient is Alert and Oriented, you should correct wrong answers:
   a. True
   b. False

3) A patient has had a tree branch fall on their head and is now showing changes in status and responses. The patient could have what type of Traumatic Brain Injury?
   a. Subdural Hematoma
   b. Epidural Hematoma
   c. Cerebral Contusion
   d. Behavioral Disorders

4) What is the most perfusion sensitive organ in the body?
   a. Brain
   b. Heart
   c. Kidneys
   d. Gall Bladder

5) All strokes will present with rapid changes in the presentation of signs and symptoms?
   a. True
   b. False

6) A patient presents with just their right hand shaking uncontrollably. What type of seizure would this be?
   a. Grand mal
   b. Petite mal
   c. Idiopathic
   d. Simple Partial
7) The patient is a driver of a car that has severe front end damage. Air bags are deployed and the patient states they were not wearing their seatbelt. They are answering your questions, though a little slower than you would expect. They are refusing care. What would you do with this patient?
   a. Have patient sign a refusal of care, they are fine.
   b. Ask police officer do a Field Sobriety Test and take them into protective custody.
   c. Encourage the patient to be transported and contact OLMC if they still insist on a refusal.
   d. Take the patient against their will; they obviously have a head injury.

8) Bipolar patients are pleasant people and crew safety is not a concern.
   a. True
   b. False

9) Which medication can be given for a patient experiencing severe agitation or anxiety?
   a. Midazolam
   b. Epinephrine
   c. Atropine
   d. No medications – Talk them through the episode

10) ETCO₂ is used to measure proper ventilations. The ideal range is 35-45 mm hg. When the ETCO₂ levels fall below this range it is called:
   a. Hypoxia
   b. Ischemia
   c. Asphyxia
   d. Hypocarbia

IF YOU ARE NOT A MEMBER OF THE MCHENRY WESTERN LAKE COUNTY EMS SYSTEM, PLEASE INCLUDE YOUR ADDRESS ON EACH OPTIONAL QUIZ TURNED INTO OUR OFFICE. WE WILL FORWARD TO YOUR HOME ADDRESS VERIFICATION OF YOUR CONTINUING EDUCATION HOURS.

IF YOU ARE A MEMBER OF OUR EMS SYSTEM, YOUR CREDIT WILL BE ADDED TO YOUR IMAGE TREND RECORD. PLEASE REFER TO IMAGE TREND TO SEE YOUR LIST OF CONTINUING EDUCATION CREDITS.

ANY QUESTIONS REGARDING THIS CAN BE ADDRESSED TO THE EMS OFFICE AT 815/759-8040. THANK YOU.