

BLS-2013-Altered Mental States

Print Version

For web based training module

2013

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ALTERED MENTAL STATES

Introduction

Trying to figure out what is going on is indeed the greatest challenge in altered level of consciousness alarms. Welcome to the curriculum for Altered Level of Consciousness. The EMS provider is responsible for the quick and accurate recognition of a patient's altered mental state. Once this is completed, the critical thinking skills of the EMT will be challenged as she/he considers the vast array of causes of this emergency.

This curriculum will review the following components:

1. Rescuer safety
2. Nervous system anatomy & physiology
3. Classification of level of consciousness
4. Quantifying the level of consciousness (Glasgow Coma Scale)
5. Standard initial physical exam
6. Utilizing the AEIOU-TIPS mnemonic to determine possible causes
7. Identifying proper emergency care based on cause

+Before You Begin

This is a continuing education and recertification course for EMTs. It covers fundamental EMT-Basic concepts and terminology as well as advanced material. We highly recommend completing the case studies and practice exam before completing the exam.

We also recommend that you review an EMT textbook chapter covering altered mental level of consciousness emergencies as a refresher before taking the exam.

+Practical Skills and Course Objectives

To receive OTEP credit for this course a trained skills evaluator must evaluate your ability to perform the following hands-on practical skills.

- Check pupil response
- Emergency care for a seizure, stroke, overdose or poisoning

BLS-2013-Altered Mental States is an EMT continuing education and recertification course. After completing this course you will be able to identify:

- Components of the central nervous system and peripheral nervous system.
- Four things the brain needs to be conscious and alert.
- Major causes of altered mentation.
- Major safety concern associated with overdose patients.
- Most important element in the assessment of a patient with altered mentation.
- Essential components of a physical exam required for a patient with an altered LOC.
- Purpose of checking pupil response.
- Proper emergency care for a patient with an altered mental status.
- Proper use of stroke guidelines.

Key Points

1. Always check and document glucose in someone with altered LOC.
2. Always check for drug alert bracelets, ankles or necklaces.
3. Seizure activity may be the first manifestation of a cardiac arrest.
4. On scene time for stroke patients should be less than 15 minutes.
5. Always notify and document local hospital of possible stroke patient.
6. Confusion with infection suggests sepsis.

+Acknowledgements

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Jim Duren; Professional Standards Manager, King County EMS /Paramedic

David Knight EMS Instructor King County, Paramedic

Image Credits: All images (photos, illustrations and animations) used for this course were produced by Seattle/King County EMS, with the exceptions of those listed below:

Video Credits

All video, unless otherwise noted, is original video produced by Seattle/King County EMS.

iStock photos were used for the following sections

- Encephalopathies
- Scene Safety
- GCS
- AEIOU Alcohol, Acidosis, Arrhythmia, Anoxia, Alzheimers
- AEIOU Overdose

Wikipedia photos or graphics were used for the following section

- Somatic Nervous System
- AEIOU Epilepsy
- AEIOU Infection
- AEIOU Underdose
- TIPS Stroke

Life Art

- Autonomic Nervous System

Microsoft image gallery images were used for the following sections

- Interrupting Consciousness
- AEIOU Alcohol, Acidosis, Arrhythmia, Alzheimers
- TIPS Psychosis & Poisons

Other

- Baseline LOC
 - a. Image: Senior Male leaning on cane.jpg From Department of Public health website <http://publichealth.metrokc.gov/graphics/imagebank/>

Terminology

Test your knowledge of the following terms

+Terms that ALL EMS Providers Should Know (same as 2010)

brainstem — An area of the brain between the spinal cord and cerebellum. The brainstem controls basic functions that do not require conscious attention such as breathing, digestion and heart activity.

central nervous system (CNS) — A division of the nervous system that includes the cerebrum, cerebellum, brainstem and spinal cord.

cerebrum — Largest part of the brain. It controls thought, movement, hearing, vision, speech, emotions and personality.

cerebellum — A part of the brain located below the cerebrum it coordinates involuntary and “primitive” functions such as balance.

coma — A state of deep, often prolonged unconsciousness, usually the result of injury or disease, in which a person cannot sense or respond to external stimuli and internal needs.

neuron — A specialized type of cell whose main role is to process and transmit information.

peripheral nervous system — A division of the nervous system that includes sensory and motor nerves. These nerves originate in the spinal cord and brainstem and run to the body’s organs, skin and muscles.

postictal state — The period following a seizure or convulsion characterized by motor weakness, lethargy, confusion and nausea.

tonic-clonic seizure — A type of seizure involving the entire body, usually characterized by violent rhythmic muscle contractions and loss of consciousness.

New Terms

acidosis — A condition where there is excessive acid in the blood caused by either a respiratory or a metabolic problem.

lethargy — Pertaining to or resembling drowsiness.

miosis — Constriction of the pupil of the eye, resulting from a normal response to increased light or caused by certain drugs or pathological conditions.

reticular activating system (RAS) — An area of nerves in the brainstem, thalamus and hypothalamus that controls consciousness.

toxidrome — A listing of specific signs and symptoms caused by exposure to types of poisons or toxins.

uremia — A condition resulting from advanced stages of kidney failure in which high concentrations of urea and other waste products are found in the blood.

encephalopathies: A syndrome that results in total brain dysfunction. Encephalopathies are caused by different illnesses.

Epidemiology

An altered level of consciousness (ALOC) does not discriminate. It can occur at any age from infancy to old age, in either sex, and without regard to ethnicity. ALOC secondary to trauma does have an affinity for susceptible groups. For example, traumatic brain injury (TBI) is the leading cause of death and disability under the age of 45 in the United States with motor vehicle accidents being responsible for most head injuries.



“Each year in the United States, approximately two million people receive medical care for head injuries, 75,000 people die from head injury and 100,000 head-injured individuals are permanently disabled. The national cost of head injury is more than \$39 billion a year.”(1)



Encephalopathies

Metabolic encephalopathies are the most common causes of ALOC in many large hospitals and account for more than one half of patients with coma of undetermined etiology.

Metabolic encephalopathies, such as are seen with diabetic emergencies and in kidney and hepatic failure, occur more frequently in middle and older age groups whose underlying disorders have had time to progress to the point of organ failure.

ALOC due to alcohol excess is seen more commonly in men, but other substance abuse, such as with cocaine and opiates, is seen without gender preference, and unfortunately the incidence in adolescents and young adults has risen dramatically in the past four decades. (1)



SAFETY

Scene Safety

As EMS providers our primary goal is to return home in the same physical & mental condition we came to work in. It is our responsibility to ensure not only patient safety, but also our own safety. "BSI / Scene Safe" is the common phrase used by EMT students in their initial training. Fortunately, this has been a relatively rare incident locally. However, it is important to know it does occur and a reminder about our due diligence on scene.

A 2002 study in a southern California metropolitan area concluded that 184 out of 4,102 patient encounters (4.5%) had some sort of violence directed at an EMS care provider. (2)



+Signs of possible danger

This same study made some conclusions based on analysis of the data. Violence against EMS providers was more likely to occur when the following factors were involved: police presence (OR 2.8; 95% CI 1.8-4.4), apparent presence of gang members (OR 2.9; 95% CI 1.6-5.3), perceived psychiatric disorder (OR 5.9; 95% CI 3.5-9.9), and perceived presence of alcohol or drug use (OR 7.0; 95% CI 4.4-11.2). (2)

Noting that 50% of the factors are related to patients that would be calling with altered level of consciousness (ALC), it is imperative prior to entering the scene to ensure your personal safety.

This article provides good information on scene / personal safety:

<http://www.emsworld.com/article/10320352/a-tactical-approach-to-scene-safety>.

Beyond the basics of scene safety: <http://www.emsworld.com/article/10322834/beyond-the-basics-scene-safety>

Preparation

Before you leave your rig make sure you are prepared.

- Do you have your safety equipment with you?
- Do you have anything around your neck? stethoscope? ties for officers? These items can be used as a leash for patients to lead you around with. It sounds unlikely, but more than one EMT or paramedic has been flung about the room by their stethoscope.
- Do you have a communication device?
- Have you decided on safety roles?



The approach

As you arrive on a call make sure to assimilate dispatch information. When violence is part of the call avoid approaching or standing in front of doorways.

Be wary of:

- Alcohol and Drugs
- Weapons
- Distraught family and friends
- Gathering bystanders
- Pets



Three R's

Take home message. Always keep three R's of scene safety in mind:

Re-evaluate

Radio

Retreat

+Difference between cover & concealment:

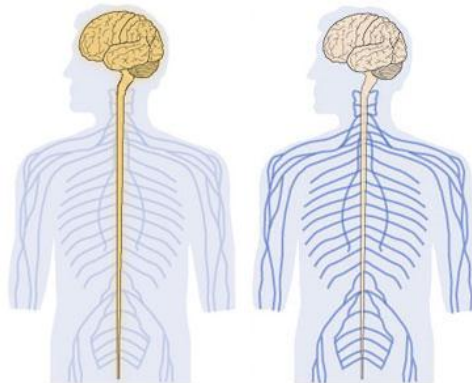
- Cover is an obstacle that an adversary cannot shoot through.
- Concealment is an obstacle that an adversary could shoot through but hides our exact location.

Cover is usually concealment but not always. The bulletproof glass (at a bank or police station for example) is cover and will stop bullets, but you can clearly see through them. The sheetrock walls in most residences prevent vision but have little effect on gunfire.

ANATOMY & PHYSIOLOGY

The Nervous System

Let's start with a simple division: The nervous system is divided into the central nervous system and peripheral nervous system.



Central Nervous System

Peripheral Nervous System

Neuroanatomy: The nervous system can be divided into several connected systems that function together

Central Nervous System

The central nervous system is divided into two parts: the brain and spinal cord.

The average adult human brain weighs 1.3 to 1.4 kg (approximately 3 pounds).

The brain contains about 100 billion nerve cells (neurons) and trillions of "support cells" called glia

The spinal cord is about 43 cm long in adult women and 45 cm long in adult men and weighs about 35-40 grams.

The vertebral column, the collection of bones (back bone) that houses the spinal cord, is about 70 cm long. Therefore, the spinal cord is much shorter than the vertebral column. (no audio needed)

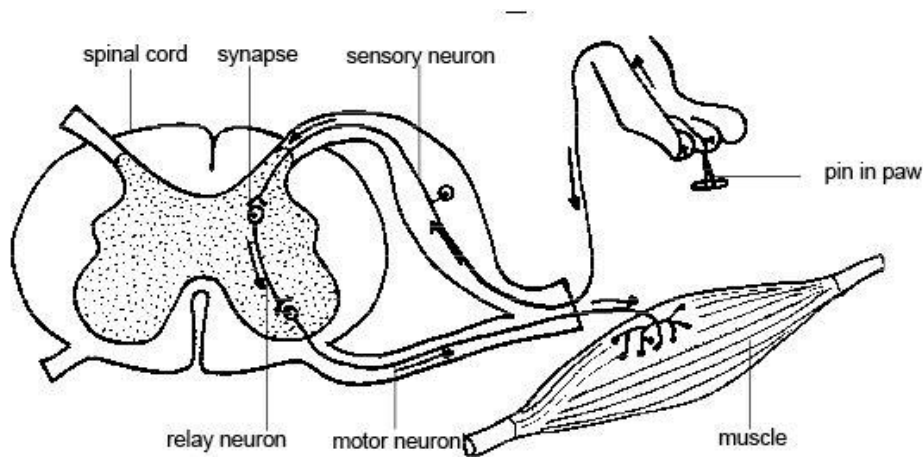
Peripheral Nervous System

The peripheral nervous system is divided into two major parts: the somatic nervous system and the autonomic nervous system.

Somatic Nervous System

The somatic nervous system controls voluntary functions such as walking, talking, and writing. It consists of peripheral nerve fibers that send sensory information to the central nervous system AND motor nerve fibers that project to skeletal muscle.

The picture above shows the somatic motor system. The cell body is located in either the brain or spinal cord and projects directly to a skeletal muscle.

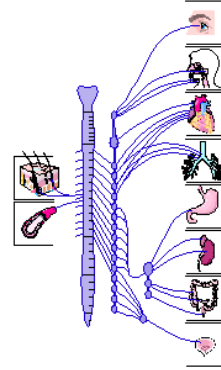


Autonomic Nervous System

The autonomic nervous system controls involuntary functions that are needed for basic body functions such as digestion, dilation and constriction of blood vessels, or sweating. It is divided into two major parts:

1. Sympathetic nervous system ("Fight or Flight")
2. Parasympathetic nervous system ("Rest or Digest")

The autonomic nervous system is shown via its connections to the central nervous system. It is important to note that parasympathetic control is dominated by the Vagus nerve. Due to its extensive innervations of various organs and muscles, when it is activated we can expect a number of effects. For example; a reduction in heart rate, which can be profound enough to drop blood pressure.



We are most familiar with manifestations of disorder in both sympathetic nervous system ("Fight or Flight" response, stimulant street drug ODs, etc.) and parasympathetic nervous system ("Rest or Digest" response, vasovagal reactions or near syncope events while voiding urine or feces).

The Brain

The brain controls the body systems and it is also known as the center of consciousness.

Cerebrum

Functions: Thought; Voluntary movement; Language; Reasoning; Perception

Cerebellum

Functions: Movement; Balance; Posture

Brain stem

Functions: Breathing; Heart Rate; Blood Pressure

The brain stem is a general term for the area of the brain between the thalamus and spinal cord. Structures within the brain stem include the medulla, pons, tectum, reticular formation and tegmentum. Some of these areas are responsible for the most basic functions of life such as breathing, heart rate and blood pressure.

Reticular Activating System (RAS)

Functions: Control of consciousness; Sleep; Walking; Sex; Eliminating; Eating

The functions of the reticular activating system are many and varied. Perhaps the most important function of the RAS is its control of consciousness; it is believed to control sleep, wakefulness, and the ability to consciously focus attention on something.

Interrupting Consciousness

To maintain the appropriate level of consciousness your body must perform four vital functions:

1. Regulate blood flow to the brain
2. Provide oxygen to the brain
3. Provide glucose to the brain
4. Keep neural pathways intact



The critical thinking challenge for EMS workers is to determine what medical condition is interrupting the above four functions and rectify or mitigate it.

+Oxygen & Blood Glucose Requirement:

Oxygen and blood glucose are the primary needs of the body to create energy. If either is not sufficient for the body's needs, we will see corresponding changes in the patient's capacity for normal physiologic reactions. This includes, but is not limited to, presentations of altered LOC. Blood glucose could be secondary to inadequate intake or excessive insulin production/administration. Oxygenation can be impaired by a number of processes: mechanical obstructions, respiratory arrest, respiratory difficulty due to CHF, COPD, asthma or pneumonia or pulmonary embolism.

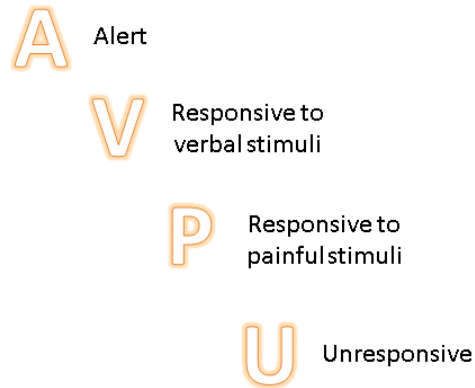
+Intact neural pathways:

The capacity for the brain to exchange information via neural pathways is imperative to our consciousness. As discussed earlier, the reticular activating system (RAS) largely controls our state of consciousness. Insults to these pathways can lead to an altered level of consciousness. Examples of insults can include, but are not limited to: rising intracranial pressure, growths / masses / tumors, presence of toxins introduced to the body (recreational drugs or environmental toxins) or built up toxic waste products in the body (acidosis, liver failure, renal failure).

CLASSIFICATION

AVPU

EMS uses AVPU as a simple descriptor of the subjective state of the patient. This mnemonic is helpful primarily for reminding ourselves when it is appropriate to provide noxious stimuli (pain) once the patient is not responding to verbal questions.



+ Classification of Altered Levels of Consciousness

Confusion

Confusion is a state in which the patient cannot take into account all elements of his/her immediate environment, implying an element of sensorial clouding. Apathy and drowsiness are often prominent and accompanied by disorientation primarily for time, less often for place, and rarely for self. A severely confused person is usually unable to carry out more than a few simple commands. Speech may be limited to a few words or phrases or occasionally the patient may be quite talkative. The confused patient will react to both verbal and noxious stimuli although the response may be sluggish and slower than normal

Delirium

Delirium is a common and difficult problem especially in elderly patients. It is characterized by a fluctuating disturbance in consciousness and change in cognition that usually develops over a short period of time. The signs and symptoms of delirium include disorientation which is sometimes total and inclusive of absence of self-recognition. Other characteristic findings are irritability, perceptual delusions, visual hallucinations and usually intermittent impairment of arousal, but there may be sustained insomnia. The delusional patient will respond to both verbal and noxious stimuli.

Obtundation

Obtundation is primarily characterized by reduced alertness and hypersomnia. When awakened from an obtunded state, the patient remains drowsy and confused and wakefulness can only be maintained by continuous verbal and painful stimuli. The patient can accurately locate the source of noxious stimulus and fights forcibly, sometimes accompanying the response with vocalization and grimacing.

Stupor

Stupor is unresponsiveness from which the patient can only be aroused by vigorous repeated noxious stimuli. There is no response to verbal stimuli, and the response to noxious stimulus becomes progressively less as the level of stupor deepens. The patient is unable to localize the site of the noxious stimuli and, at best, the response is slow. Mental and physical activity is reduced to a minimum. Although unresponsive to many stimuli, the patient can open his/her eyes, look at the examiner and does not appear to be unconscious.

Coma

The patient who appears to be asleep and is at the same time incapable of responding adequately to either external stimuli or internal needs is in a state of coma. Coma may vary in degree from light to medium to deep. At its deepest stages, no reaction of any type is obtainable from the patient. Corneal, pupillary, pharyngeal, tendon and plantar reflexes are all absent. Respirations can be slow or Cheynes-Stokes in character. In lighter stages of coma (sometimes referred to as semicoma), most of the above mentioned reflexes can be elicited. Highly noxious stimuli may cause the patient to stir or moan.

GCS

The Glasgow Coma Scale (GCS) is the most widely accepted method for the evaluation and classification of altered mental status. The GCS grades three neurologic parameters: eye opening, verbal response and motor response.

Motor Response



Evaluate motor response the following way:

If the patient:

- Obeys commands - 6
- Localizes pain - 5
- Withdraw (pain) - 4
- Flexion (pain) - 3
- Extension (pain) - 2
- No Response - 1

Verbal Response



Evaluate verbal response the following way:

If the patient is :

- Oriented - 5
- Confused - 4
- Inappropriate Words - 3
- Incomprehensible Words - 2
- No Verbal - 1

Eye Response



Evaluate eye response the following way:

If the eye opening is:

- Spontaneous - 4
- To Voice - 3
- To Pain - 2
- None - 1

GCS

Eye Response		Best Verbal Response		Best motor Response	
Spontaneously Opens	4	Oriented and talking	5	Obeys Commands	6
Opens to voice	3	Disoriented and confused	4	Locates pain	5
Opens to pain	2	Inappropriate words	3	Withdraws from pain	4
No response	1	Incomprehensible	2	Flexes to pain	3
		No response	1	Extends to pain	2
				No response	1

A patient that opens their eyes spontaneously, obeys commands and are verbally oriented score a total of 15 points, the best possible score, whereas a flaccid patient, who neither open their eyes or verbalize, score the minimum of 3 points.

Those with a GCS of 8 or less are classified as severely altered, while those with a GCS score of 9 to 12 are categorized as moderate altered and those with a GCS score of 13 to 14 are mild altered.

GCS scores of 3 to 5 indicate potentially fatal damage, especially if accompanied by fixed pupils. Conversely, scores of 9 and above correlate with good recovery.

ASSESSMENT

Altered LOC

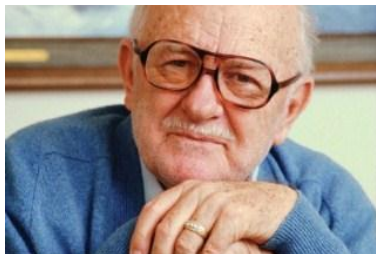
The challenge in altered LOC patients is frequently they are unable to communicate with you. You are left to communicate with either bystanders, family or care providers to help you better understand the patient's condition. In many instances, this can add even more confusion to the situation. If no one is there to assist, you are left with only your physical exam and state of the environment surrounding the patient to determine the cause.

Scene Size-up

While we considered our safety earlier, it is now time to appreciate the environment that the patient is found in. Your observations of temperature of the room, state of the patient's dress, smells present, patient's body position, blood or emesis found nearby, empty alcohol bottles, empty prescription drug containers or evidence of recreational drug abuse will all help you in understanding the cause of the patient's altered level of consciousness.

Baseline LOC

While it is imperative to determine the patient's current level of consciousness, it is equally as important to know their "baseline" or day-to-day level of consciousness. With more and more Alzheimer's & dementia patients presenting to EMS, it is important to know how they are different from normal. This is often quite difficult in that you cannot ask the patient, but rather hope that the care providers or family can tell you what's the patient's "normal" level of consciousness.



Glucometry

Glucometry is an approved protocol but optional by individual departments

Indications for use

- Anytime an EMT encounters a patient with an altered level of consciousness. This may include patients with the following:
 - a. Unconsciousness
 - b. Suspected diabetic-related problem
 - c. Signs and symptoms of stroke
 - d. Suspicion of drug and alcohol intoxication
- Any time EMT's feel that the blood sugar level may assist patient care.

Contraindications

Children less than 1 (one) year of age.

Use and application

Perform the testing procedure as outlined in the instructions for your specific device. All readings should be recorded on the incident response form.

Under no circumstances should the presence of a blood glucose monitor detract from basic patient care.

Perform blood glucose evaluation after the ABCs and initial assessment have been completed.

*If a patient is treated with oral glucose you must perform a second glucose level check.

Patients on oral hypoglycemic agents who are initially found to be hypoglycemic should be strongly advised to seek further evaluation by a physician due to the high likelihood of repeated hypoglycemia secondary to long medication half-life.

Patients on insulin may be safely left at home when ALL THREE of the following conditions are met:

1. Patient is able to eat and drink normally.
2. Patient responds completely as evidence by BOTH:
 - a. Blood glucose reaches greater than 60 mg/dl, AND
 - b. Patient is conscious and alert with appropriate behavior.
3. A responsible person can remain with the patient.

These patients must receive after-care instructions if they are not being transported to the hospital. You must document pre and post treatment glucose and after-care instructions were given to patient.

SAMPLE

The SAMPLE mnemonic provides a place to begin questioning bystanders, family or care providers. As always, this comes with a mixed bag of results. However, patient's medicine lists and medical history are generally good sources of information about the patient and their present condition.

S = Signs and Symptoms

A = Allergies

M = Medications

P = Pertinent past medical history

L = Last oral intake

E = Events leading up to the injury or illness

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PHYSICAL EXAM

Physical Examination

A complete physical exam for a patient with an altered LOC should include:

- Assess LOC
- Check vital signs
- Check pupils for size, symmetry and reactivity to light
- Auscultate breath sounds
- Check blood glucose
- Check oxygen saturation with pulse oximetry

Consider checking an unconscious patient's clothing for clues, but watch for needles! Don't plunge your hands blindly into pockets without feeling the outside first.

Pupil Response

The pupils of the eyes normally constrict when exposed to light. They normally dilate when light diminishes. Pupils should respond briskly and equally to a penlight. An abnormal pupil response can indicate depressed brain function or central nervous system depression or injury.

Shade the eyes with your hand when doing this test in bright light. Record the results of this test — even if it is negative.

+Pupil Size, Symmetry, and Reactivity Chart

Pupils			Potential Conditions
size	symmetry	reactivity	
dilated	equal	reactive	Hypoxia Alcohol Stimulants (cocaine, meth)
dilated	equal	unreactive	Anoxia (cardiac arrest) Profound alcohol intoxication Seizures Drugs (psychedelics, LSD)
dilated	unequal	unreactive	Stroke (hemorrhagic) Head injury
constricted	equal	unreactive	Opiates (heroin) Barbituates Brainstem injury

Oculomotor Nerve

The pupils are controlled by the third cranial nerve called the *oculomotor nerve*. This nerve travels a long path to the brain and is easily compressed by swelling of the brain.

Note that unequal pupil size may be the result of a birth defect, a previous eye injury, medication or prosthesis (e.g., glass eye). The pupil of a glass eye will not react to light.

ABCs

You must closely monitor airway, breathing and circulation (the ABCs) in someone with an altered LOC—particularly airway and breathing. You may need to manually hold the airway open, remove obstructions or breathe for a patient using a BVM and high-flow oxygen. Consider the use of an airway adjunct if you cannot maintain the airway.

A Airway

B Breathing

C Circulation

Oxygen Therapy

Oxygen is vital to sustaining normal brain function and maintaining consciousness. Below are some guidelines for administering oxygen in cases of altered mentation.

Remember that unresponsive patients can lose their gag and cough reflexes. Keep the airway clear and open and monitor the airway closely.

CAUSES

AEIOU

Determining the cause of Altered LOC

Based on our assessment and physical examination, it is time to critically think about the cause of the patient's altered LOC. At least one of these four criteria is impaired. Our goal is to determine the cause and, more importantly, what we can do to reverse the situation

1. Ensure adequate blood volume to the brain (maintain cerebral perfusion pressures)
2. Ensure adequate blood glucose levels (sugar/energy sources)
3. Ensure adequate oxygenation/ventilation
4. Keeping the neural pathways of the CNS intact



A common mnemonic used in the care of altered LOC patient's is: AEIOU-TIPS. Let's look at each letter and determine how it relates to our four criteria to maintain consciousness.

AEIOU Alcohol, Anoxia, Arrhythmia, Alzheimers



The "A" in AEIOU-TIPS stands for the following possible causes.

- Alcohol
- Alzheimer's
- Arrhythmia
- Anoxia

Alcohol can be a powerful agent in altering your level of consciousness.



Alzheimer's disease is one form of dementia that gradually gets worse over time. It affects memory, thinking, and behavior. Alzheimer's disease is the most common cause of dementia. It is an organic pathology that is still poorly understood as to its exact cause. Recent research supports the possibility of prions being a causative agent (Link for more information: http://www.prioncentre.ca/folding_diseases/)

+ **Acidosis** is a condition in which there is too much acid in the body fluids.

4 most commonly seen acidotic patients:

- Lactic Acidosis
- Diabetic Ketoacidosis
- Renal Failure
- Ingestion of Toxins

There is no specific BLS treatment to be offered to these patients. (no audio needed)

Arrhythmia

Arrhythmias may produce a relative drop in the efficiency of cardiac contractions and may result in a corresponding drop in blood pressure. If blood pressure were to drop low enough, we can see concurrent changes in level of consciousness. For an EMT, the specific care should be early recognition of arrhythmia via measure of pulse rate, regularity and quality.



Anoxia

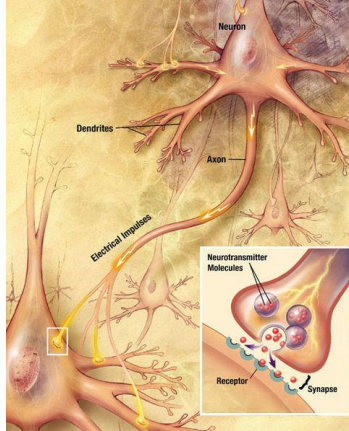
Anoxia occurs when oxygen is not available to cells.

In terms of altered LOC, we can see this occurring in three ways:

1. Environmental reason (no oxygen to be inhaled);
2. Airway or breathing problem (oxygen can not make it from the environment and into the blood stream)
3. Blood pressure issue (not enough pressure to get oxygenated blood to the brain).

It is thus important to ensure adequate oxygenation via clinical assessment (breathe sounds, respiratory rate / quality).

AEIOU Epilepsy



The “E” in AEIOU-TIPS stands for epilepsy. It is important to note that not all seizures are the result of epilepsy. Epilepsy is a common and diverse set of chronic neurological disorders characterized by recurrent and unprovoked seizures.

Seizures can be caused by a number of factors including.

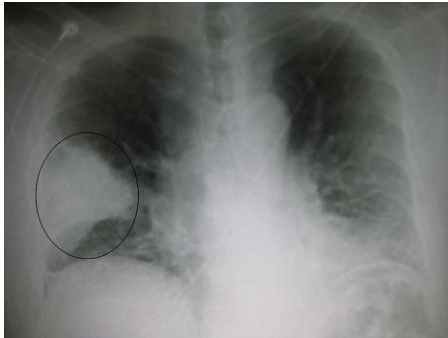
- Sugar
- Drugs
- Fever
- Eclampsia
- Trauma
- Idiopathic

We generally see patients in their postictal state (characterized by drowsiness, confusion, nausea, hypertension, headache or migraine and other disorienting symptoms). This is defined as a period of altered level of consciousness of a patient in varying degrees that can last from 5 to 30 minutes or longer depending upon a number of factors.

Emergence from this state will generally be associated with memory deficits to the event as the brain recovers from the trauma of the seizure.

Primary assessment in the postictal phase should be ensuring a pulse, maintaining an open airway and providing adequate ventilation if needed until the patient regains consciousness.

AEIOU Infection



The first “I” in AEIOU-TIPS stands for infection.

Infections in any part of the body cause an increase in metabolic rate in order to adequately fight them. Due to this increase, our body might build up waste products more quickly thus causing acidosis or other endogenous toxins. Additionally, the infection can directly affect the brain, as we know in the case of meningitis.

While we should involve the same approach to all patients, it is important to get the patient’s temperature and inspect the body for rashes or signs of infections.

- Sepsis
- MRSA
- Meningitis
- Encephalitis

If you suspect infection, but there are no outward signs, consider inspecting the patient’s back and buttocks for evidence of decubitus ulcers (bedsores). These are caused by unrelieved pressure on soft tissues overlying a bony prominence, which reduces or completely obstructs the blood flow to the superficial tissues. Bedsores occur most commonly on the sacrum or the hips. Attention should be given to these areas to rule out potential infection, especially in patients residing in institutional care facilities (e.g. adult family homes, skilled nursing facilities).

AEIOU Overdose



The "O" in AEIOU-TIPS stands for overdose.

Overdoses can be caused by many substances such as, ..." prescription medicines, street drugs, water, electrolytes, or homeopathic treatments

Alcohol is an interesting toxin as it can initially induce euphoric feelings but in continued excess can cause depression and stuporous coma.

The EMT's primary concern in a patient with excessive alcohol intake is airway, it must also be noted that alcohol withdrawal can cause profound seizures and obtunded states.

Opioids can alter mentation quickly through direct insult to the neural pathways of the brain and from the effect of on respiratory depression.

Opioids include:

- Heroin
- Commonly Rx medications
- Respiratory impairment
- Pupils Miotic

Ensuring patent airway and quality ventilation is paramount.

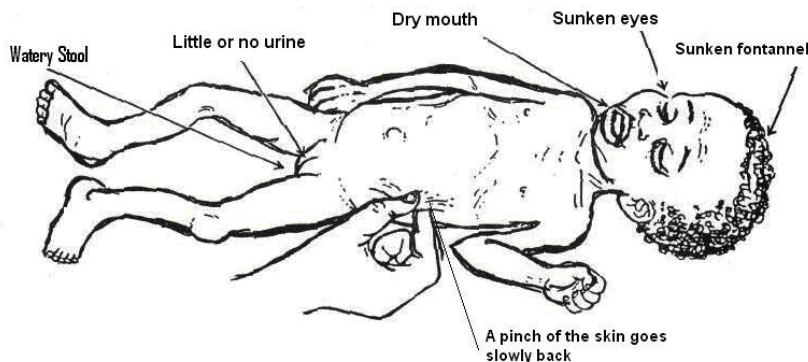
+ Specific prescription medicines for pain relief (Fentanyl) comes in both transdermal patches (Duragesic® patches) and lollipops (Actiq®). If you see the classic, altered LOC presentation with pinpoint pupils and respiratory depression / arrest with no obvious drug paraphernalia, inspect the body for these clear patches.



Stimulant drugs will increase the activity of the sympathetic nervous system (Fight or Flight).

A key element in the care of the sympathomimetic overdose is to reduce stimulation to the patient (darken the room, avoid confrontation). Be cautious of arrhythmias and their effect on cardiac output and seizures from the excessive stimulation to the brain from direct insult on the neural pathways.

AEIOU Underdose



The "U" in AEIOU-TIPS stands for underdose.

- Decreased electrolytes
- Decreased water
- Inadequate insulin
- Decreased medication dosage

Inadequate water intake, dehydration is of particular important in assessing infants / toddlers. A smaller volume loss (blood or serum plasma) can result in an exaggerated effect on their cardiac output. It is important when gathering history to ask about oral intake and output (frequency of voiding and quality of stools).

+Patient Positioning

Position the patient with an altered LOC based on his or her physiologic needs and considering the suspected illness or injury.

Patient Positioning	
Condition	Recommended Position
Alcohol Intoxication/Withdrawal	Consider recovery position or supine (if airway can be closely monitored).
Coma (<i>no trauma</i>)	Consider recovery position or supine (if airway can be closely monitored).
Drug Overdose	If unconscious, consider positioning for airway protection (e.g., lateral recumbent)
Head Injury	Immobilize cervical spine and place supine with head of backboard tilted up 15 degrees.
Headache	Semi-Fowler's if tolerated
Hypoglycemia	If unconscious, consider positioning for airway protection
Seizure	If still convulsing, lay on floor and protect from injury. Do not restrain.
Stroke	If conscious, semi-Fowler's. If unconscious, recovery position.

TIPS

The "T" in AEIOU-TIPS standards for trauma, tumor and temperature.



TIPS Trauma, Tumor & Temperature



Decreased cardiac output can affect mentation.

Blood loss and cardiac dysfunction (arrhythmias due to trauma to the chest) will impair the cardiac output. If cardiac output is impaired, the patient's blood pressure can be impaired. Any trauma to the chest may decrease compliance of the chest thus effecting adequate ventilation.

In essence, breathing hurts or can't be done normally, we decrease our oxygen intake. In the face of other traumas, this degradation might be enough to alter the patient's level of consciousness.

Altered mentation can be caused by the following:

- Trauma
- Closed Head Injury
- Blood Loss
- Ventilation impingement
- Cardiac dysfunction
- Tumor
- Temperature

Tumors of the brain and temperature will cause direct insult to the neural pathways. Tumors in other parts of the body might release toxins that can cause problems with these same pathways. Remember that elevated temperature is not an emergency, but when the patient becomes altered due to the elevated temperature, the patient is exhibiting heat stroke, a life-threatening emergency.

Closed head injuries are caused by trauma to the head. In some of these instances, concussions can result.

Concussions occur through the impacts of your brain within your cranial vault and forces that cause it to rotate within. These are described as coup, contra coup and rotational forces. The most worrying feature to these events is if swelling persists at the site of the brains impact leading to stroke-like symptoms and even death typically within 24 hours of the initial injury.

Check all of the following that represent signs / symptoms seen with concussions.

- A) Anxiety / Combativeness / Altered LOC
- B) Headache
- C) Small rise in blood pressure
- D) Nausea / Vomiting

**Answer – all of the above

Sports medicine researchers have invested a great deal of time in studying the effects of concussions with regard to long-term prognosis. As seen here, these represent some of the problems to be expected in the long-term. For more information on this, explore this link:

<http://emedicine.medscape.com/article/251834-overview>

TIPS Insulin

Blood Sugar Level	Condition
0 to 60 mg/dL	Hypoglycemia
60 to 80 mg/dL	Relative Hypoglycemia
80 to 120 mg/dL	Normoglycemia
120 to 200 mg/dL	Relative Hyperglycemia
> 200 mg/dL	Hyperglycemia

Rule out the obvious and easily correctable first.

Patients can have an altered level of consciousness secondary to either high or low blood glucose. Blood sugar levels are generally affected by oral intake and patient's insulin production (or injection). Insulin acts as a carrier molecule for sugar. Think of it as unlocking the door of the cell to allow the glucose molecule in. So despite high levels of sugar in the blood stream, a patient with low or no insulin can't get that sugar into the cells to carry out metabolism. Likewise, too much insulin can deplete the patient's blood glucose quickly.

TIPS Psychosis & Poisons

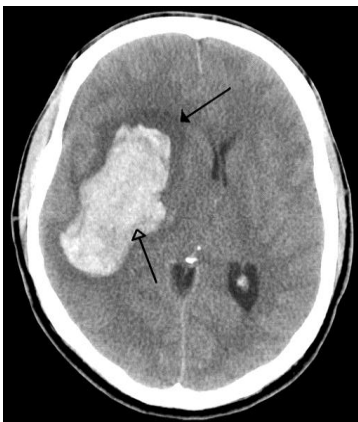


The "P" in AEIOU-TIPS stands for psychosis and poisons. Deranged or bizarre behavior can derive from psychiatric disorders. Above all else, ensure your own safety in dealing with patient's that have psychiatric disorders which renders them unpredictable. Question friends / family, to determine if this change in behavior is due to recent medication changes or compliance with their medications.

Anything can be a poison:

- Envenomations
- Bee stings
- Snake bites
- Foxglove
- Mushrooms
- Common household chemicals

TIPS Stroke



The "S" in AEIOU-TIPS stands for stroke. A stroke, or cerebrovascular accident (CVA), is the rapid loss of brain function(s) due to disturbance in the blood supply to the brain. This can be due to an ischemic (blockage) condition or hemorrhagic (blood vessel has burst and blood doesn't flow distally to the neurons in the brain that need it). Regardless, both represent catastrophic conditions that require immediate intervention.

Types of stroke

- Ischemic
- Embolus
- Thrombus
- Hemorrhagic

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Types of stroke

Ischemic

Embolus

Thrombus

Hemorrhagic

Strokes can cause altered mental states by disturbing the blood supply to the brain.

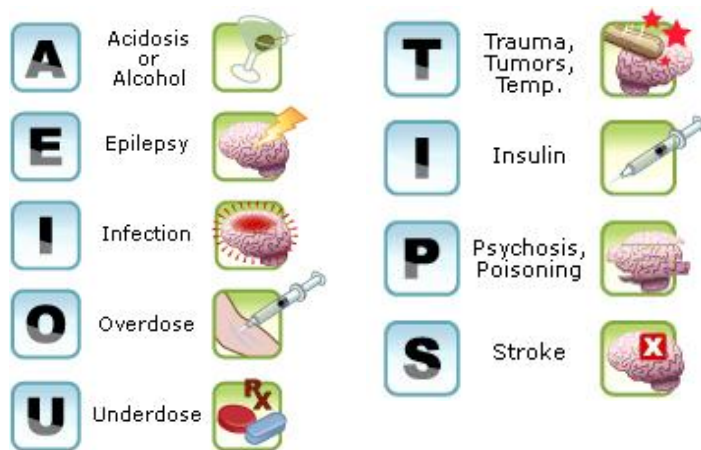
Time is crucial when dealing with stroke patients

EMT's should consider the following:

- Establish an early assessment of both level of consciousness and neurologic issues.
- Repeat during your on-going assessment.
- If care is passed to ALS or a private ambulance for transport, convey baseline presentation.
- Establish time of onset of neurologic symptoms.

Evidence supports that titrating oxygen to effect rather than routinely giving high-flow oxygen is of greater benefit to the patient. Thus any patient with no obvious respiratory difficulty and pulse oximetry > 94% wouldn't need routine oxygen therapy.

Conclusion



AEIOU-TIPS covers a number of causes of altered level of consciousness. However, there are many more issues that can be involved. Through the brief description of each, you will see that they are often interrelated. This connection can lead to difficulty for the health care provider in determining the actual cause. A standard approach as we learned earlier, will help us identify the most likely causes and provide appropriate therapy.

Which of the following causes is most likely to be responsible for this patient's abrupt change in level of consciousness?

1. Ensure adequate blood volume to the brain (maintain cerebral perfusion pressures)
2. Ensure adequate blood glucose levels (sugar/energy sources)
3. Ensure adequate oxygenation/ventilation
4. Keeping the neural pathways of the CNS intact

RESOURCES

Recommended reading

- 1) <http://nursinglink.monster.com/training/articles/291-altered-levels-of-consciousness>
- 2) Violence against emergency medical services personnel, Jeff T. Grange, MD, Stephen W. Corbett, MD; Prehospital Emergency Care, Volume 6, Issue 2, April–June 2002, Pages 186–190. Web link: <http://www.sciencedirect.com/science/article/pii/S1090312702700348>
- 3) <http://www.emsworld.com/article/10320352/a-tactical-approach-to-scene-safety>
- 4) <http://www.emsworld.com/article/10322834/beyond-the-basics-scene-safety>
- 5) http://en.wikipedia.org/wiki/Altered_level_of_consciousness
- 6) http://www.cdemcurriculum.org/ssm/approach_to/ams.php
- 7) <http://www.ncbi.nlm.nih.gov/books/NBK380/>
- 8) <http://faculty.washington.edu/chudler/neurok.html>
- 9) Fundamentals of Anatomy and Physiology, Fredric Martini, Judi Nath, June 2008, Benjamin Cummins, ISBN: 0321570294
- 10) http://en.wikipedia.org/wiki/Glasgow_Coma_Scale
- 11) http://en.wikipedia.org/wiki/Mean_artierial_pressure
- 12) <http://www.youtube.com/watch?v=E2XzBaOOX8g>
- 13) Essentials of Paramedic Care; Bryan Bledsoe, Robert Porter & Richard Cherry, 4th Edition, 2003, Pearson Education, Inc, ISBN: 0-13-098792-1
- 14) Emergency Care in the Streets, Nancy Caroline, 4th, Edition 1991, Little, Brown and Company, ISBN: 0-13612888-0

SUMMARY

The **central nervous system** includes the brain and spinal cord. The **peripheral nervous system** is made of all the nerves that project out of the brain and spinal cord

The four things the brain needs to be conscious and alert:

- Sugar
- Oxygen
- Intact neural pathways
- Intact reticular activating system

Major causes of altered mentation are **AEIOU-TIPS**:

- Acidosis, Alcohol
- Epilepsy/Seizures
- Infection
- Overdose
- Underdose, Uremia
- Trauma, Tumors, Temperature
- Insulin
- Psychosis, Poisoning
- Stroke

The major safety concern associated with overdose patients is **protecting you and your crew**.

The first step in the assessment of a patient with altered mentation is determining **baseline LOC**.

The essential **components of a physical exam** for a patient with an altered LOC:

- Assess LOC
- Check vital signs
- Check pupils for size, symmetry and reactivity to light
- Auscultate breath sounds
- Glucometry
- Pulse oximetry

Abnormal pupillary response may indicate depressed brain function or brain injury.

Proper emergency care for a patient with an altered mental status includes the **ABCs, oxygen therapy** to meet patient needs and **proper positioning**.