6210.02 ALTERED LEVEL OF CONSCIOUSNESS

INTRODUCTION

An altered level of consciousness (LOC) refers to a change in a patient's state of awareness (ability to relate to self and the environment) and arousal (alertness) – ranging from a state of unconsciousness to hyperarousal. An altered LOC is a sign of a central nervous system illness or injury and is often due to an organic cause. Organic causes can be categorized as having either a structural or toxic-metabolic basis. Another common cause of an altered LOC is psychiatric-based. Refer to the Behavioural Emergencies Clinical Practice Guideline for further information.

Structural lesions cause alterations in LOC by destroying brain tissue or occupying space that is normally occupied by the brain. Examples include:

- Trauma
- Tumors
- Degenerative disease
- Parasites
- Intracranial hemorrhage

Toxic-metabolic states cause alterations in LOC due to a lack of metabolic substrates or circulating toxins or metabolites. Examples include:

- Toxic exposure
- Drug or alcohol ingestion/withdrawal
- Anoxia/hypoxia or hyper/hypocapnea
- Hypo- or hyper-glycemia
- Renal or liver failure
- Thiamine deficiency
- Electrolyte imbalance
- Infection

Conditions such as cardiac arrest, stroke, arrhythmia, COPD, anaphylaxis, environmental emergencies (e.g. electrocution, near-drowning, hypo- or hyper-thermia), and shock can all lead to one of the above causes of an altered LOC. As there is a wide variety of causes, the list of differentials can be long, and sometimes choosing a treatment strategy can be difficult.

SAFETY

Patients with an altered mental status may be unpredictable or may behave in an aggressive manner. Clinicians should be aware of the patient's behaviour and ensure appropriate positioning when providing care (e.g. maintain a safe distance if a patient shows signs of possible aggression).

ASSESSMENT

Assessment of a patient's LOC begins during your scene survey. Look at their appearance, watch their behavior, and note any indications of trauma or toxic exposure. If there are no concerns with the ABCs, observe the patient's posture, gait, and motor activity (pace, range, character, and appropriateness of movement).

All patients should be assessed as to obtain a baseline measure of their level of consciousness. This should be evaluated against their normal state as defined by any friends, co-workers or family members that are aware of the patient's normal state.

The AVPU (Alert, Verbal, Painful, Unresponsive) scale and/or the Glasgow Coma Score (GCS) can both be used to determine the current LOC.

A common mnemonic used to help clinicians generate a differential diagnosis and treatment plan for a patient with an altered LOC is AEIOU-TIPS.

A = Alcohol, **A**cidosis
E = Epilepsy, **E**ndocrine, **E**lectrolytes, **E**nvironment
I = Insulin (i.e. hypo- or hyper-glycemia)
O = Overdose, **O**xygen depravation
U = Underdose, **U**remia
T = Trauma, **T**umor, **T**oxin
I = Infection
P = Psychiatric, **P**oison
S = Stroke, **S**epsis, **S**hock, **S**eizure

This list does not include all the causes of altered LOC, but does contain most of the common ones.

Obtaining a history for a patient with an altered LOC should include gathering the following information:

- Is there any history of trauma?
- When was the patient last seen normal?
- What is the patient's normal state?
- Was there a gradual or abrupt change in LOC?
- Has the condition changed since it was first recognized?
- Did the patient have any preceding symptoms (e.g. headache, seizure-like activity, aura, depression)?
- Are there any relevant environmental factors (e.g. extreme heat or cold or sources of toxins)?

6210.02 ALTERED LEVEL OF CONSCIOUSNESS

- Is there any evidence of drug use (illegal, over the counter, or prescription)?
- Is there any evidence of alcohol use?
- Is there any history of recent illness or pre-existing conditions (e.g. diabetes, seizure-disorder)?
- Does the patient have a history of mental illness?
- What are the patient's current medications?

If the patient is unable to provide information and there are no friends/family members aware of the patient's history, assess for a MedicAlert medical identification product or Vial of Life in the patient's home. These products may be able to provide valuable information regarding the patient's past history, medications, and next-of-kin contact.

Remember that an acute condition may be an exacerbation of a more chronic condition, or a 'new' illness superimposed on a pre-existing problem (e.g. development of delirium in a patient with dementia).

Conducting a thorough physical assessment can help rule in or out some of the causes, such as glycemic emergencies or arrhythmias, which can be treated right away. The physical assessment should include the following:

- Assess for a compromised airway – it should be assumed that any patient with an altered LOC may have or may develop a compromised airway
- Assess respirations – Alterations in respirations can provide clues to causes. Cheyne-Stokes respirations may present due to acidosis or from various brain lesions. Hyperventilation is common and may be a result of conditions such as hypoxia, pneumothorax, acidosis, drug toxicities, or midbrain lesions. Apneustic breathing can be associated with lesions of the pons resulting from a focal stroke, meningitis, hypoglycemia, or hypoxia. Ataxic breathing suggests damage to the medulla and lower pons. Bradypnea or hypoventilation may be caused by toxins or medication overdose.
- Assess pupils – are they equal and responsive to light? Dilated pupils can be indicative of certain toxidromes, as are pinpoint pupils. Increased ICP and brain herniation can also change pupil size and responsiveness.
- Apply a cardiac monitor – arrhythmia can lead to an altered LOC
- Conduct a full neurological assessment – look for changes in motor or sensory function as well as speech abnormalities
- Check a blood glucose level
- Look for incontinence
- Check the patient's temperature – fever can often be found with infectious disorders as well as after prolonged seizure. Environmental-related hypo- or hyperthermia may also present with a change in level of consciousness.
- Do a full head-to-toe assessment to look for signs of trauma and/or drug use (e.g. track marks)

MANAGEMENT

The initial management of patients with an altered LOC involves stabilizing ABCs, protecting the patient from further injury (e.g. immobilize C-spine if indicated), and promptly treating reversible causes. Possible reversible causes include hypoglycemia, hypo/hyperthermia, seizures, certain arrhythmias, opioid overdose, hypoxemia and some shock states. In the absence of a reversible cause, management should consist of cardiac monitoring, frequent reassessment and supportive care (e.g. oxygen, intravenous access, temperature control).

If the altered LOC is determined to be caused by arrhythmia, a compromised airway, respiratory distress, shock, stroke, sepsis, an environmental or behavioural emergency, toxic substances or trauma, it should be treated as per the respective Clinical Practice Guideline.

Syncope

Syncope is a sudden loss of consciousness followed by an almost immediate recovery of consciousness upon the patient becoming supine (which is one of the main differentiating features between syncope and seizure). It is important to look for the underlying cause, which could be arrhythmia, stroke, intoxication, hypoglycemia, vagal stimulation, or pulmonary embolism. If a cause is determined, treat it as per the appropriate Clinical Practice Guideline. A 12-lead ECG should be obtained on all patients with syncope.

Seizures

Patients who are actively seizing should be treated with benzodiazepines (**PEP 1 supportive**). Patients who have had a seizure should have their blood glucose level checked. If patient is hypoglycemic, dextrose should be administered. If no IV access is

available, administer glucagon. During and after a seizure, patients are often hypoxic and may require supplemental oxygen or ventilatory support. Remember that seizures can be caused by not only seizure disorders but also conditions such as stroke, trauma, toxins, withdrawal, infection and hypoxia. Treat these conditions as per the appropriate Clinical Practice Guideline. It is important to note that seizures caused by alcohol withdrawal can be life-threatening.

Patients with a seizure disorder who have a seizure consistent with their typical pattern (e.g. duration and frequency of seizures) may request to remain at home. If the patient has returned to their normal state, demonstrates capacity, has someone to stay with them, has access to medical follow-up, and does not have signs of underlying trauma or infection, they may remain at home if medical follow-up is available (e.g. family physician or neurologist). If the patient meets all the above criteria, they are at lower risk for complications and therefore may remain home if they wish. OLMC must be contacted for patients requesting to remain home who do not meet the above criteria.

Hypoglycemia

Hypoglycemia occurs with many conditions (e.g. sepsis, alcoholism, toxic exposure), and can mimic altered LOC of any other cause. Patients with hypoglycemia should be treated with **dextrose** (**PEP 2 supportive**), **glucagon** (**PEP 2 supportive**), or **oral glucose** (**PEP 3 supportive**) as appropriate. Patients with a history of diabetes who return to their normal state after receiving treatment for hypoglycemia may request to remain at home. It is appropriate for these patients to do so if they have the capacity to understand the risks associated with remaining home, and the hypoglycemia is caused by diet changes or insulin dosing that may be addressed at home (**PEP 2 supportive**). Higher risk patients include those that have had recent medication changes, including oral hypoglycemics, or have signs of infection, or are elderly. For high risk patients requesting to remain home, OLMC must be contacted. The clinical support desk should be contacted for hypoglycemic patients refusing transport to hospital who are at moderate risk, including those who are staying alone, have a co-morbid disease (e.g. heart, lung, kidney disease, or cancer), or are a repeat called within the last 48 hours.

Hyperglycemia

Patients in a state of hyperglycemia causing an altered LOC require the initiation of fluid, insulin, and possible vasopressors in the hospital. In the pre-hospital setting, aggressive fluid resuscitation should be initiated for patients displaying signs and symptoms of hyperglycemia (e.g. weakness, nausea, vomiting, abdominal pain, tachypnea, tachycardia, hypotension, signs of dehydration, and/or altered mental status). High flow oxygen should also be administered to obtain an SpO_2 greater than 92%.

Pediatric Altered Mental Status

An alteration in the mental status of pediatric patients, particularly infants, is a significant concern.

An altered mental status in children can be as subtle as a change in their normal pattern of behavior. Irritability, lethargy, changes in feeding or sleeping habits as well as innumerable other changes in behavior can indicate impairment of the normal functioning of the CNS. Common causes of pediatric altered LOC are injury, shock, metabolic disorders, ingestions and CNS infections. **History from the child's caregiver is critical.**

The clinician should inquire about signs and symptoms such as fever, headache, weakness, vomiting, diarrhea, rash, palpitations, abdominal pain, and gait disturbances.

Watch for signs of abuse or neglect and remember that some injuries associated with an altered mental status, such as Shaken Baby Syndrome, can cause CNS trauma without external evidence of injury. These patients should be suspected to have a head and/or neck injury and should be treated as such.

Pediatric febrile seizures are the most common type of seizures in the pediatric population. They are associated with a significant rise in body temperature. Key questions to ask include:

- When was the last dose of antipyretics?
- Is there a history of febrile seizures?
- Is there a family or sibling history of febrile seizures?
- What are the associated symptoms over the past few days?
- What is the duration of the fever?
- Are they back to their normal temperament after the seizure?

These patients need to be passively cooled by removing excess clothing and blankets. Seizures can be stopped by administering a benzodiazepine. Seizures in the setting of fever can also be indicative of a serious infectious process such as meningitis.

6210.02 ALTERED LEVEL OF CONSCIOUSNESS

Pediatric patients with hypo- or hyper- glycemic related emergencies may not have a history of the same (i.e. not yet diagnosed with diabetes). Treat the glycemic concern and transport for further follow-up.

If hypovolemia (due to blood loss or dehydration) is suspected to be the cause of an altered LOC, administer a 20 mL/kg fluid bolus.

Syncope in the pediatric population is very common (especially in adolescence), however it can be a symptom of a serious underlying cardiac condition and can precede sudden cardiac death. Risk factors for serious cause of syncope include:

- Presence of chest pain or palpitations
- Physical exertion or sympathetic stimulation preceded the event
- Family history of sudden death or cardiac disease
- Prolonged loss of consciousness
- Recurrent episodes
- History of cardiac disease

Transport for any pediatric patient with an altered mental status is recommended and refusals are high-risk, therefore OLMC must be involved.

TRANSFER OF CARE

Early notification of staff at the receiving facility should be considered if additional resources are anticipated upon arrival at the ED. Verbal and written reports should include pertinent history, medications, precipitating factors, underlying cause (if known), any treatment provided, and if there have been any changes in level of consciousness since first medical contact.

CHARTING

In addition to the mandatory fields it is important to document the following in the ePCR text fields:

- ✓ Any environmental findings
- ✓ Alcohol/drug dependency/use
- ✓ Pertinent medical history
- ✓ Neurological exam findings
- ✓ Changes (improvements or decline) in LOC

Key Points – Altered LOC

Look for evidence of trauma or illness

Assess for airway compromise

Obtain a thorough history

Remember: AEIOU –TIPS

KNOWLEDGE GAPS

Any interest in research regarding altered level of consciousness can be directed to EHS via the following link: http://www.gov.ns.ca/health/ehs/

EDUCATION

Clinicians should maintain knowledge of the various potentially life-threatening causes of an altered level of consciousness.
The optimal management of these emergencies is under continual review for ongoing continual medical education. Any recommendations for content delivery can be directed to the EHS Performance and Development Department.

QUALITY IMPROVEMENT

Calls involving non-transport of a patient with an altered LOC will be reviewed in a prospective CQI program.

REFERENCES

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Massachusetts Department of Public Health – Office of Emergency Medical Services (2013). *Emergency Medical Services Pre-Hospital Treatment Protocols* (11th ed.). Retrieved from http://www.mass.gov/eohhs/provider/guidelines-resources/clinical-treatment/public-health-oems-treatment-protocols.html

https://emspep.cdha.nshealth.ca/

6210.02 ALTERED LEVEL OF CONSCIOUSNESS

PEP 3x3 TABLES for Altered Level of Consciousness

Throughout the EHS Guidelines, you will see notations after clinical interventions (e.g.: **PEP 2 neutral**). PEP stands for: the Canadian **P**rehospital **E**vidence-based **P**rotocols Project.

The number indicates the Strength of cumulative evidence for the intervention:
1 = strong evidence exists, usually from randomized controlled trials;
2 = fair evidence exists, usually from non-randomized studies with a comparison group; and
3 = weak evidence exists, usually from studies without a comparison group, or from simulation or animal studies.

The coloured word indicates the direction of the evidence for the intervention:
Green = the evidence is supportive for the use of the intervention;
Yellow = the evidence is neutral;
Red = the evidence opposes use of the intervention;
White = there is no evidence available for the intervention, or located evidence is currently under review.

PEP Recommendations for Altered Level of Consciousness Interventions, as of 2013/10/01. PEP is continuously updated. See: http://emergency.medicine.dal.ca/ehsprotocols/protocols/toc.cfm for latest recommendations, and for individual appraised articles.

Altered Mental Status (NYD)

Recommendation		RECOMMENDATION FOR INTERVENTION			
		SUPPORTIVE (Green)	NEUTRAL (Yellow)	AGAINST (Red)	NOT YET GRADED (White)
STRENGTH OF RECOMMENDATION FOR INTERVENTION	1 (strong evidence exists)				• D50W
	2 (fair evidence exists)				
	3 (weak evidence exists)			• Naloxone	

Hypoglycemia

Recommendation		RECOMMENDATION FOR INTERVENTION			
		SUPPORTIVE (Green)	NEUTRAL (Yellow)	AGAINST (Red)	NOT YET GRADED (White)
STRENGTH OF RECOMMENDATION FOR INTERVENTION	1 (strong evidence exists)				• Thiamine
	2 (fair evidence exists)	• D50W • Glucagon • Option to treat and release • Point of Care Blood Glucose Monitoring			
	3 (weak evidence exists)	• Oral Glucose			

Seizure (Adult)

Recommendation		RECOMMENDATION FOR INTERVENTION			
		SUPPORTIVE (Green)	NEUTRAL (Yellow)	AGAINST (Red)	NOT YET GRADED (White)
STRENGTH OF RECOMMENDATION FOR INTERVENTION	1 (strong evidence exists)	• Benzodiazepines			
	2 (fair evidence exists)				
	3 (weak evidence exists)	• Propofol			

6210.02 ALTERED LEVEL OF CONSCIOUSNESS

Syncope

Recommendation		RECOMMENDATION FOR INTERVENTION			
		SUPPORTIVE (Green)	NEUTRAL (Yellow)	AGAINST (Red)	NOT YET GRADED (White)
STRENGTH OF RECOMMENDATION FOR INTERVENTION	1 (strong evidence exists)				• Oxygen
	2 (fair evidence exists)				
	3 (weak evidence exists)				

Pediatric Altered Mental Status (NYD)

Recommendation		RECOMMENDATION FOR INTERVENTION			
		SUPPORTIVE (Green)	NEUTRAL (Yellow)	AGAINST (Red)	NOT YET GRADED (White)
STRENGTH OF RECOMMENDATION FOR INTERVENTION	1 (strong evidence exists)				• D50W
	2 (fair evidence exists)				
	3 (weak evidence exists)				

Pediatric Hypoglycemia

Recommendation		RECOMMENDATION FOR INTERVENTION			
		SUPPORTIVE (Green)	NEUTRAL (Yellow)	AGAINST (Red)	NOT YET GRADED (White)
STRENGTH OF RECOMMENDATION FOR INTERVENTION	1 (strong evidence exists)				• D50W • Glucagon • Oral Glucose
	2 (fair evidence exists)	• Point of Care Blood Glucose Monitoring			
	3 (weak evidence exists)				

Pediatric Seizure

Recommendation		RECOMMENDATION FOR INTERVENTION			
		SUPPORTIVE (Green)	NEUTRAL (Yellow)	AGAINST (Red)	NOT YET GRADED (White)
STRENGTH OF RECOMMENDATION FOR INTERVENTION	1 (strong evidence exists)				• IV access • Point of Care Blood Glucose Monitoring
	2 (fair evidence exists)	• Benzodiazepines			
	3 (weak evidence exists)				

6210.02 ALTERED LEVEL OF CONSCIOUSNESS

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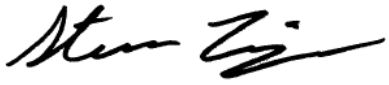
Signature of Program Director 	Signature of Program Document Coordinator 	

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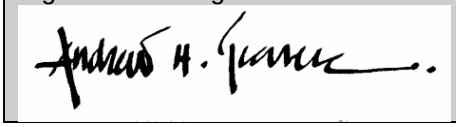
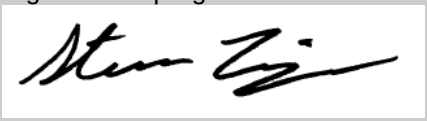
Signature of Program Director 	Signature of program Document Coordinator 	

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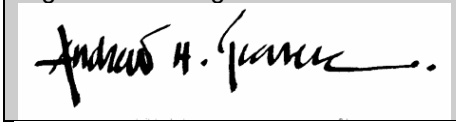
Signature of Program Director 	Signature of program Document Coordinator