

## M04: Pediatrics - Neurological Emergencies

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### Introduction

An altered level of consciousness is an abnormal neurological state where a child is less alert or responsive than would be appropriate for their baseline neurological state. Establishing what the child is usually capable of with regards to any preexisting neurological impairments is of utmost importance.

Signs of an altered level of consciousness range from unresponsive or unconscious (GCS 3), to severely agitated and heightened (RASS +4). There are numerous causes behind altered LOC, some being life threatening and others less concerning. Distinguishing the variances and causes can be challenging in the prehospital setting.

When assessing and providing care for these patients, paramedics and EMRs/FRs should prioritize overarching objectives. These include ensuring an open airway, offering support for adequate oxygenation, ventilation, and circulation. It's crucial to remain vigilant for any potential reversible causes of altered consciousness throughout the evaluation and treatments. These situations may be inherently stressful for parents or caregivers of the child.

Common causes of pediatric altered level of consciousness may include but is not limited to: Syncopal episodes, Seizures due to fever (febrile), Hypoglycemia secondary to juvenile diabetes, and head injuries.

### Essentials

Regardless of the underlying cause, patients with altered levels of consciousness are at high risk of functional airway obstruction and hypoxia. Management of oxygenation and ventilation must take priority over a search for potentially reversible causes.

The search for reversible causes should be conducted systematically. A number of mnemonics exist to guide paramedics and EMRs/FRs in their investigations. Regardless of which tool is used, paramedics and EMRs/FRs should consider, at a minimum **AEIOUTIPS**:

- Alcohol and intoxicants
- Epilepsy, endocrine (hypoglycemia), electrolytes
- Insulin
- Overdoses, accidental or intentional
- Underdosing of medication or uremia
- Trauma
- Infection
- Psychosis
- Sepsis, shock, stroke
- Hypotension
- Hypoxia
- Hypo or hyperthermia
- If a potentially reversible cause is found, refer to the appropriate CPG for management details.

Syncope should be considered a diagnosis of exclusion. Paramedics and EMRs/FRs must look for reversible or life-threatening causes of unconsciousness and rule these out prior to considering syncope as the cause of the altered level of consciousness.

### Additional Treatment Information

- As with adults, assessments of patients with an altered level of consciousness should focus on airway protection, oxygenation, ventilation, and an evaluation of blood glucose.
- Febrile seizures are generally benign and do not require treatment if of short duration. Treating a fever does not prevent recurrence of seizures.

- Assessment and treatment priorities of stroke are primarily maintaining ABCs and attaining vascular access if it does not interfere with rapid conveyance to a tertiary facility.
- If not associated with a primary cause that requires intervention (such as trauma), headaches can be treated with support, position of comfort, and a calm dark environment.
- Treatment in spinal emergencies is supportive and prioritization of conveyance to a tertiary facility.
- Syncope is frequently benign, but should not necessarily prompt a decision to avoid conveyance. In cases where a patient has a cardiovascular history, careful monitoring of an ECG and vital signs are important.

## Referral Information

All patients exhibiting signs and symptoms of an altered LOC and neurological disorder require evaluation in hospital, even if transient.

## General Information

### Syncope

Syncope is a clinical syndrome in which a transient loss of consciousness is caused by a period of diminished cerebral blood flow. By definition, the duration of the event is usually brief with a spontaneous to normal baseline consciousness. Recovery from syncope is usually rapid and complete with episodes rarely lasting more than a minute or two. Syncope can also be a sign of a potentially serious and life-threatening condition. Some patients experience syncope without warning. They lack pre-syncope signs or symptoms and experience a sudden collapse followed immediately by a return to normal mental status.

- Vasovagal syncope is a common and benign cause of syncope. It occurs due to an inappropriate response by the autonomic nervous system, typically to triggers such as changes in posture, pain, the sight of blood, or extreme emotional distress. Prodromal symptoms are common and can include a feeling of lightheadedness or dizziness, weakness, nausea, blurred vision, and a general sensation of unwellness or unease. Patients may be pale and diaphoretic. Vasovagal syncope is a diagnosis of exclusion.
- Patients who experience syncope (and caregivers of) are often inclined to refuse service. The diagnostic tests required to safely include or exclude potential causes of syncope or transient loss of consciousness are not available in the out-of-hospital environment. This may include ECG monitoring, lab work, or imaging. Paramedics and EMRs are expected to follow the appropriate guidelines with respect to these refusals which may include CliniCall consultation and having refusal of care signed on the ePCR.

### Febrile Seizure

A febrile seizure is a type of convulsion or seizure that occurs in young children, typically between the ages of 6 months and 5 years, as a result of a sudden spike in body temperature, often associated with a fever secondary to respiratory or gastrointestinal viruses. The fever itself, rather than the underlying illness, is what triggers the seizure. This is the body's way of trying to reset the system back into normal physiological parameters to maintain homeostasis. These seizures can be quite frightening for parents or caregivers to witness but are usually not harmful and do not indicate underlying epilepsy or a serious medical condition. Febrile seizures can vary in duration and severity but typically involve the child losing consciousness and experiencing rhythmic jerking or twitching movements, often involving both arms and legs. The child may also become unresponsive during the seizure. Most febrile seizures are brief and last for less than 5 minutes. If a seizure persists for longer than 5 minutes or if multiple seizures occur in a short period, it is considered a complex febrile seizure, which may require medical attention. After the seizure ends, the child may appear confused, drowsy, or irritable for a short time. This is called the postictal state and is a normal part of the seizure as the brain responds. Pediatric seizure management is the same as adults in the sense that proper airway management is the hallmark priority.

[→ F02: Seizure CPG](#)

### Assessment of the Altered LOC Patient

The Richmond Agitation-Sedation Scale (RASS) is a numerical scale used to assess a patient's level of sedation or agitation. This is particularly useful in patients that have previously been sedated either in or prehospital by a healthcare professional, or if they have ingested recreational illicit substances. It is also useful in excited delirium situations either from psychological or illicit substance use causes.

**The Glasgow Coma Scale/Score** is a numerical scale used to evaluate a patient's neurological state or level of

consciousness after head injury or trauma that caused an altered level of consciousness. This is useful in trauma patients, stroke patients, or other causes of altered LOC that are not related to sedative substances.

### Richmond Agitation and Sedation Score

### Glasgow Coma Scale/Score

There is a pediatric Glasgow coma scale available for use in patients under 2 years old that do not yet communicate verbally or follow simple commands.

[Pediatric Glasgow Coma Scale](#)

[Pediatric Altered Level of Consciousness Podcast](#)

## Interventions

### First Responder

- Position of comfort for the patient. If symptoms suggest hypotension, lay the patient flat provided this does not exacerbate other symptoms.
- Provide supplemental oxygen as required to maintain saturation  $\geq 97\%$ .
  - [→ A07: Oxygen Administration](#)
- Provide positive pressure ventilation if respirations are inadequate
  - [→ B01: Airway Management](#)
- Obtain capillary blood sample and correct as appropriate as per license level
  - [→ E01: Hypoglycemia and Hyperglycemia](#)
  - [Oral 40% Glucose Gel](#)
- Correct suspected narcotic intoxication
  - [→ J12: Opioids](#) (do not administer naloxone to neonates)

### Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO<sub>2</sub>  $\geq 97\%$ 
  - [→ A07: Oxygen Administration](#)
- Convey urgently
- Consider intercept with additional resources

### Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider use of nasopharyngeal airway if unsuitable for oropharyngeal airway
  - [→ PR07: Nasopharyngeal Airway](#)
- Consider use of supraglottic airway in obtunded patients
  - [→ PR08: Supraglottic Airway](#)
- Consider vascular access and fluid administration (in patients  $\geq 12$  years of age)
  - [→ D03: Vascular Access](#)
- Consider need for analgesia:
  - [→ E08: Pain Management](#)
- Consider [Glucagon](#)

### Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Advanced airway management as required
  - [→ PR18: Anesthesia Induction](#)
- Monitor for cardiac dysrhythmia
- Control seizures where required.
  - [→ F02: Seizures](#)
  - [MIDAZOLam](#)
- Analgesia

- [FentaNYL](#)
- [KetAMINE](#)
- [OniCall consultation required](#) if additional analgesia necessary.
- Unlike with adults, pre-treatment with ondansetron significantly decreases ketamine induced vomiting; consider [ondansetron](#) whenever using ketamine in children aged 12-18
- **Sedation, Seizure, Analgesia:**
  - - [3 month old \(Broselow Pink\)](#)
  - [6 month old \(Broselow Red\)](#)
  - [1 year old \(Broselow Purple\)](#)
  - [2 year old \(Broselow Yellow\)](#)
  - [3 year old \(Broselow White\)](#)
  - [4 year old \(Broselow White\)](#)
  - [6 year old \(Broselow Blue\)](#)
  - [10 year old \(Broselow Blue\)](#)
  - [12 year old](#)

## Evidence Based Practice

Pediatric Altered Mental Status (NYD)

Supportive

Neutral

Against

## References

1. Conicella E, et al. The child with headache in a pediatric emergency department. 2008. [\[Link\]](#)
2. Konstantinidis T. Febrile seizures: Don't Forget the Bubbles. 2014. [\[Link\]](#)
3. Müller MJ, et al. Syncope in children and adolescents. 2018. [\[Link\]](#)
4. Raab CP, et al. ALTE and BRUE (Brief Resolved Unexplained Event). In Merck Manual Professional Version. 2019. [\[Link\]](#)

