

## Acute Neurological Deficit Bypass/Protocol Education

By: C. LeSage-EMT-P I/C  
Joint Education Alger, Delta,  
Dickinson, Iron, and Marquette  
Counties

### Purpose: Education of EMS with regard to the protocol

- Assessment
- Management
- Transport
- Destination Decisions

### Purpose: Continued

- Patients exhibiting signs & symptoms of spontaneous acute neurological deficit in an effort to expedite patient arrival to definitive care and intervention, thus minimizing additional damage whenever possible!

### Patient Assessment-

- Medical vs. Traumatic Event  
is there a difference?
- History of sudden onset of disorientation
- Trauma with altered mental status
- Traumatic Paralysis

### Patient Assessment

- History of sudden onset confusion with no known cause
- Sudden onset ↓ Level of consciousness
- Non-traumatic acute blindness

### Patient Assessment

- Onset of hemi or quadriplegia (one half or all sides affected with paralysis)
- Aphasia (inability to produce or comprehend language)

[ Patient Management- ]

Nearest Facility if any of the following exist-(protocol will not apply)

- Immediate airway stabilization due to arrest or airway obstruction
- Immediate circulatory stabilization (B/P of  $\downarrow$  80mmHg with no improvement post intervention of fluid, positioning, or medication)

[ Patient Management- ]

- Patient is a minor or incompetent, or where a parent or guardian makes an alternate choice of location!

[ Patient Management- ]

Appropriate assessment-needs to occur prior to calling online medical control physician, to provide the physician with an adequate picture of the patient's presentation

[ Patient Management- ]

- If none of the noted problems exists the patient should be managed symptomatically
- Request to transport to definitive care should be requested from the closest Medical Control Facility
- Advise the online Medical Control Physician of Neurological assessment/findings, time of onset and progression

**GUIDELINES FOR  
PREHOSPITAL MANAGEMENT  
OF TRAUMATIC  
BRAIN INJURY**

**PROVIDER COURSE**

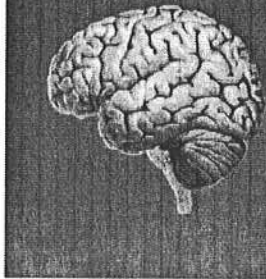
Brain Trauma Foundation

[ Prehospital TBI Guidelines ]

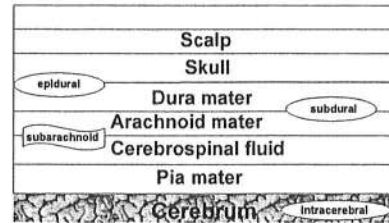
A wide variety of EMS roles (EMTs, Medics, etc.), scope of practice and protocols exists throughout the United States.

**It is the responsibility of all pre-hospital personnel to know their own local EMS protocols and specific scope of practice.**

## Brain Anatomy and Physiology Overview



## Meningeal Layers



## What is Cerebral Herniation?

### Simple Physiology

When the pressure inside the skull increases and the brain is forced across the tentorium cerebelli into the brain stem, the 3<sup>rd</sup> cranial nerve (III) will be affected.

## Indicator of Brain Herniation

### What to look for...

- As brain herniation begins the only initial sign may be extensor (decerebrate) posturing
- As herniation progresses, the patient may present with extensor (decerebrate) posturing or no motor response AND bilateral dilated unresponsive pupil or asymmetric pupils.

## Resuscitation of the TBI Patient

- Following ABCDE in order is essential.
- A - Airway
- B - Breathing
- C - Circulation
- D - Disability
- E - Exposure

## Airway

- Maintain C-spine precautions
- Determine that airway is open, and will remain open.
- Assess the need for artificial airway
- Assess every 5 minutes and as needed

## Breathing

- Assess rate, depth, quality, and effectiveness of ventilation every 5 minutes and as needed
- Hypoxia occurs in 40% of severe TBI
- Assess for hypoxia
- Important indicators of hypoxia:
  - SpO<sub>2</sub> < 90%
  - Central cyanosis

## Circulation for hypotension

- Look for visible signs of **“shock”**
- Assess SBP every 5 minutes & as needed
  - **Adult critical threshold level < 90 mm Hg**
  - Child and infant levels are lower
  - Use age/size appropriate BP cuff

## Pediatric Hypotension

- Signs that indicate the need for fluid resuscitation include:
  - Hypotension
  - Tachycardia
  - Loss of central pulses
  - Prolonged capillary refill time (> 3 seconds)
- Hypotension is a LATE sign of shock in children.

## Hypotension and TBI

- Any episode of hypotension can worsen outcome from TBI.
- A decrease in mean arterial pressure (MAP) can decrease cerebral blood flow and cerebral perfusion pressure.
- Systolic BP is used as an indicator of MAP in prehospital care

## Disability - Level of Consciousness

- Level of consciousness is an important predictor of TBI
  - Glasgow
  - Coma
  - Scale
  - GCS

## GCS Reliability

- Most widely employed method for reporting serial neurologic evaluations
- Indicator of level of consciousness & head injury severity
- Moderately reliable by prehospital emergency medical care providers<sup>1</sup>
- A single field measurement of the GCS cannot predict outcome

## Assessment

- Define primary and secondary causes of brain injury and understand the differences.
- pediatric TBI patient.
- Describe the signs and symptoms of hypoxia in pediatric TBI.
- Approximate the SaO<sub>2</sub> by pulse-oximetry and assessment of clinical signs.
- Discuss the effects of hypotension on the Pediatric TBI patient

## Assessment Objectives

- Calculate an accurate GCS score
- Name a GCS score that indicates severe TBI
- Differentiate between flexor/decorticate and extensor/decerebrate posturing
- Perform an accurate pupil exam
- Identify signs of herniation

## Definitions

- **Oxygenation:** delivery of oxygen to tissues from red blood cell hemoglobin
- **Hypoxia:** inadequate level of oxygen available to tissues
- **Oxygen Saturation:** percent of hemoglobin that is saturated with oxygen; measured by oximetry
- **Ventilation:** movement of air in and out of the lungs

## Primary vs. Secondary Injury

### Primary Brain Injury

- Definition – Damage to the brain from the biomechanical effects of the trauma, causing:
  - Ischemia
  - Anoxia/hypoxia or
  - Shear injury

## [ Primary vs. Secondary Injury ]

### Secondary Brain Injury

- Definition – The result of one or more of the following:
  - Hypoxia
  - Hypotension (decreased cerebral blood flow)
  - Increased intracranial pressure (ICP)
  - Hyper- or hypoglycemia
  - Metabolic disturbances
  - Seizures

## [ Resuscitation of the TBI Patient ]

- Following ABCDE in order is essential.
- A - Airway
- B - Breathing
- C - Circulation
- D - Disability
- E - Exposure

## [ Assess Respiratory Rate ]

- **Consider tachypnea at or above the following rates a sign of neurological deterioration:**

- Infant: 40 bpm
- Children: 30 bpm
- Adults: 20 bpm

## [ GCS Reliability ]

- Most widely employed method for reporting serial neurologic evaluations
- Indicator of level of consciousness & head injury severity
- Moderately reliable by prehospital emergency medical care providers<sup>1</sup>
- A single field measurement of the GCS cannot predict outcome

## [ Glasgow Coma Scale ]

- The GCS is a reproducible measure of LOC, which can be properly assessed in a matter of seconds.
- Assess GCS every 5 minutes or as needed (i.e. if the patient's status is rapidly changing).
- Deterioration by 2 or more points in the GCS is important and should be reported

## [ Use It Right!!! ]

- After initial assessment
- After airway, breathing and circulation
- If possible, assess GCS prior to intubation but do not delay airway management to do so.
- Measure GCS prior to administration of sedatives, analgesics and muscle relaxant medications.

GCS – Adult & Child > 4 years old

- **Eye Opening**
- 4 spontaneous
- 3 to speech/sound
- 2 to pain
- 1 no response

GCS – Adult & Child > 4 years old

- **Verbal Response**
- 5 oriented
- 4 confused
- 3 inappropriate
- 2 incomprehensible
- 1 none

GCS – Adult & Child > 4 years old

- **Motor Response**
- 6 obeys
- 5 localizes
- 4 withdraws from pain
- 3 abnormal flexion
- 2 abnormal extension
- 1 no response

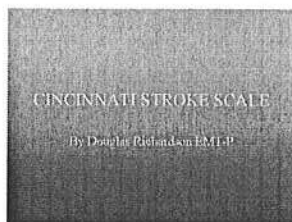
Patient Management-Tools

- Glasgow Coma Scale-

Fig. 2  
Glasgow Coma Scale for Head Injury

Glasgow Coma Scale	
Eye opening	4
Spontaneous	3
To speech/sound	2
To pain	1
None	0
Verbal response	
Oriented	5
Confused, disoriented	4
Inappropriate words	3
Incomprehensible sounds	2
None	1
Best motor response	
Obeys	6
Localizes	5
Withdraws (flexion)	4
Abnormal flexion/extension	3
Extension posturing	2
None	1

Patient Management-Tools



Patient Management-Tools

Objectives

On completion of the course the student shall be able to:

- Describe the three points evaluated in the Cincinnati Stroke Scale evaluation.
- Perform a Cincinnati Stroke Scale evaluation on a victim

### [ Patient Management-Tools ]

- Stroke in The Pre-hospital Setting
- Stroke must be suspected quickly by EMT's and paramedics in the field.
- In one study EMT's and Paramedics correctly identified stroke and TIA in 72% of the patients with either condition.
- Extensive neurological exams are impractical in the pre-hospital setting

### [ Patient Management-Tools ]

- CINCINNATI STROKE SCALE
- Identifies patients with strokes.
- It evaluates three major physical findings.
  - Facial droop
  - Motor arm weakness
  - Speech abnormalities

### [ Patient Management-Tools ]

- Facial Droop
- Have the patient show their teeth or smile.
- Normal – both sides of the face move equally well
- Abnormal – one side of the face does not move as well as the other side

### [ Patient Management-Tools ]



### [ Patient Management-Tools ]



### [ Patient Management-Tools ]



## [ Patient Management-Tools ]

- Arm Drift
- Have the patient close his/her eyes and hold both arms out.
- Normal – both arms move the same way, *or* both arms do not move at all.
- Abnormal – one arm does not move *or* one arm drifts down compared to the other arm.  
*Other findings such as pronator grip, may be helpful*

## [ Patient Management-Tools ]



## [ Patient Management-Tools ]



## [ Patient Management-Tools ]

- Speech
- Have the patient say "You can't teach an old dog new tricks."
- Normal – patient uses correct words with no slurring.
- Abnormal – patient slurs words, uses inappropriate words, *or* is unable to speak

## [ Patient Management-Tools ]



"You can't teach an old dog new tricks."

## [ Patient Management-Tools ]



### [ Patient Management-Tools ]

- Cincinnati Pre-hospital Stroke Scale
- Patients with 1 of these 3 findings **-as a new event** - have a 72% probability of an ischemic stroke.
- If all 3 findings are present the probability of an acute stroke is more than 85%
- Immediately contact medical control and the destination ED and provide pre-arrival notification.

### [ Patient Management-Tools ]

- Stroke
- Once the diagnosis of stroke is suspected, **time in the field must be minimized.**
- A more extensive examination or initiation of supportive therapies should be accomplished en route to the hospital.

### [ Patient Management-Tools ]

- Stroke
- One of the most important aspects of your history must be the time of onset of the symptoms.
- This time will have important implications for potential therapy.
- Early notification of the ED is essential.
- Careful assessment is a must, signs of stroke can be very subtle.

### [ Patient Management-Tools ]

- Evaluation
- Describe the importance of rapid detection CVA/TIA symptoms in the pre-hospital setting.
- Describe why extensive neurological examinations are inappropriate in the pre-hospital setting.

### [ Patient Management-Tools ]

- Evaluation
- Describe the three points evaluated in the Cincinnati Stroke Scale evaluation.
- Perform a Cincinnati Stroke Scale evaluation on a victim

### [ Patient Management-Tools ]

- Summary
- Early detection of CVA/TIA in the pre-hospital setting can have a dramatic effect of the mortality and morbidity of patients. In depth neurological exams are not only un-necessary in the pre-hospital settings but are in fact counter productive. Using the Cincinnati Stroke Scale an EMT or Paramedic can quickly and accurately assess the neurological status of a patient presenting with CVA/TIA Signs and symptoms.

## [ Patient Management-Tools ]

1. Secure adequate airway & administer supplemental oxygen
2. Assess hemodynamic status and correct when possible (fluids, medications, positioning)
3. Attempt (1) one minimum, but preferably (2) two, large bore IV's (do not delay transport for IV access on scene)
4. Monitor cardiac rhythm and rate
5. Obtain, monitor, and record V/Signs, GCS, and Cincinnati Stroke Screen initially, and every 15 minutes throughout transport
6. Manage any injuries as identified in the secondary survey (splinting, etc.)

## [ Transfer Approval/Diversion ]

- ED physician on duty is responsible for making decision to transport to "nearest appropriate medical facility"
- Contact the "nearest appropriate medical facility" you are diverting to and advise the physician on duty of your assessment findings

## [ Transport Management ]

- Repeat V/Signs every 15 minutes
- Repeat Neuro assessments every 15 minutes
- Document ALL findings, regardless of change or no change!

## [ Acute Neurological Deficit Bypass Protocol Education ]

- Questions?
- Comments?
- Concerns?

