The Glasgow Coma Scales

The Glasgow Coma Scale (GCS) is the most widely used scoring system used in quantifying the level of consciousness following traumatic brain injury. It is used because it is simple, has a relatively high degree of reliability and correlates well with outcomes following severe brain injury. One of the components of the scale is the “verbal response,” which cannot be assessed when children are very young. A modified version of the scale — the Pediatric Glasgow Coma Scale (PGCS) — was created for children too young to talk.

According to a study published in 2005, using the PGCS for children under 2 years of age compared favorably to using the standard GCS for older kids. It was especially accurate for babies and toddlers who needed acute intervention. The authors of this study (James F. Homes MD, MPH and colleagues from the University of California Davis School of Medicine) investigated the accuracy of the pediatric scale by studying children with TBIs from infancy through 18 years. The children were divided into two groups: (1) those 2 years and younger, and (2) those older than 2.

The authors assigned the PGCS score to the younger group and the standard GCS to the older kids. The GCS is based on a 15-point scale for estimating and categorizing the outcomes of brain injury on the basis of overall social capability or dependence on others. Patients with scores of 3 to 8 are considered to have a severe brain injury. Following is a breakdown of the scale.

The GCS defined

When applying the GCS, the final score is determined by adding the values of E + V + M (eye opening score + verbal response score + motor response score.) This number helps medical practitioners categorize the possible levels for survival, with a lower number indicating a more severe injury and a poorer prognosis. Following is a breakdown of the scoring:

• mild brain injury — a score of 13 to 15
• moderate brain injury — a score of 9 to 12 (this usually suggests that there was a loss of consciousness greater than 30 minutes.)
• severe brain injury is a score of 3 to 8

Eight is considered a critical score with 90 percent of patients in a coma at this level or below. A coma is defined as:
(1) not opening eyes,
(2) not obeying commands, and
(3) not uttering understandable words.

Motor Response Definitions

When an individual scores below four points on motor response, the scale identifies a decorticate or decerebrate posture/response. Following are descriptions of those terms.

Decorticate posture is an abnormal posturing that involves rigidity, flexion of the arms, clenched fists and extended legs. The arms are bent inward toward the body with the wrists and fingers bent and held on the chest. This type of posturing implies severe damage to the brain with immediate need for medical attention.

Decorticate posture indicates damage to the corticospinal tract, the pathway between the brain and spinal cord. Although a serious sign, it is usually more favorable than decerebrate posture.

What causes decorticate posture? An intracranial hemorrhage (bleeding in the brain), brain abscess, head injury, increased intracranial pressure, a primary or secondary brain tumor, and/or stroke.

Decerebrate posture is an abnormal body posture that involves rigid extension of the arms and legs, downward pointing of the toes and backward arching of the head. A severe injury to the brainstem is the usual cause of this condition.

What causes decerebrate posture? A stroke, intracranial hemorrhage, primary or secondary brain tumor, encephalopathy or hepatic encephalopathy, head injury, increased intracranial pressure, and/or a brain stem tumor.
Decerebrate posture can occur on one or both sides of the body or in just the arms. It may alternate with decorticate posture, or a person can have decorticate posture on one side and decerebrate posture on the other.

### The Glasgow Coma Scale (pediatric & adult)

#### Eye Opening Response

**Adults, children over 2 years**

<table>
<thead>
<tr>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous — opens with blinking at baseline</td>
<td>4</td>
</tr>
<tr>
<td>Opens to verbal command, speech or shout</td>
<td>3</td>
</tr>
<tr>
<td>Opens to pain</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
</tr>
</tbody>
</table>

**Under 2 years**

- Eye opening spontaneously
- Eye opening to speech
- Eye opening to pain
- No eye opening

#### Verbal Response

**Adults, children over 2 years**

<table>
<thead>
<tr>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oriented and converses</td>
<td>5</td>
</tr>
<tr>
<td>Confused, but able to answer questions</td>
<td>4</td>
</tr>
<tr>
<td>Inappropriate responses, words are discernible</td>
<td>3</td>
</tr>
<tr>
<td>Incomprehensible speech / sounds</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
</tr>
</tbody>
</table>

**Under 2 years**

- Infant coos or babbles (normal activity)
- Infant is irritable and continually cries
- Infant cries to pain
- Infant moans to pain
- No verbal response

#### Motor Response

**Adults, children over 2 years**

<table>
<thead>
<tr>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obeys commands for movement</td>
<td>6</td>
</tr>
<tr>
<td>Purposeful movement to painful stimulus</td>
<td>5</td>
</tr>
<tr>
<td>Withdraws from pain</td>
<td>4</td>
</tr>
<tr>
<td>Abnormal (spastic) flexion, decorticate posture</td>
<td>3</td>
</tr>
<tr>
<td>Extensor (rigid) response, decerebrate posture</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
</tr>
</tbody>
</table>

**Under 2 years**

- Infant moves spontaneously or purposefully
- Infant withdraws from touch
- Infant withdraws from pain
- Abnormal flexion to pain for an infant (decorticate response)
- Extension to pain (decerebrate response)
- No motor response