Assessment and Management of Acute Confusion in Early Recovery from Traumatic Brain Injury

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Recovery from TBI
Levin, 1993

![Diagram of Recovery from TBI](image)
• A period of anterograde amnesia in which new memories cannot be consistently made and recalled that follows recovery of consciousness in head injury or other neurological trauma. The duration of PTA is often used as a predictor of the degree of recovery.
Post-traumatic Amnesia

- Defines mild and moderate traumatic brain injury (TBI)
- Present in essentially all patients with severe TBI who recover to a responsive state
- Quantified as duration, not severity
- Duration is predictive of outcome after TBI
• Thus the patient may be drowsy or talkative, docile or aggressive, impudent or irritable. He is never reserved; he may tell you his secrets, may be boastful or affectionate, and may even attempt to bribe his attendants to let him out of bed.
Description of PTA – 2
Symond, 1937

• There is profound disorientation in space and time, with a tendency to interpret the surroundings in terms of past experience. There is defect of perception and inability to synthesize perceptual data. Memory and judgment are grossly impaired. Thought is constantly impeded by perseveration. Disturbance of the speech function is conspicuous. The mood is often elated and there is sometimes a push of talk resembling that seen in hypomanic states.
Other Early Terms Used for PTA

- Clouding of consciousness
- Loss of full consciousness
- After effects of concussion
- Impaired consciousness
- Stage of cerebral irritation
- Acute traumatic psychosis
- Confusion
Then, comparatively suddenly, he looks round and asks where he is. He has now recovered full consciousness and returns to his normal behavior and treats those who are looking after him with the customary civility.
After the tendency to confabulate has disappeared, there is usually a period during which euphoria persists, with defective insight and judgment, and with a variable but sometime gross deficit of retention. Noticeable is the patient’s refusal at this stage to admit that there is anything wrong with him and the lighthearted way in which he may refer to the accident, even though it may have involved the death or a relative or friend.
**Assessing PTA, the GOAT**

Levin et al., 1979

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<table>
<thead>
<tr>
<th>Name</th>
<th>Date of Test</th>
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<tbody>
<tr>
<td>Age</td>
<td>Sex M F</td>
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<tr>
<td>Date of Birth</td>
<td>mo day yr</td>
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<td>Diagnosis</td>
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**GALVESTON ORIENTATION & AMNESIA TEST (GOAT)**

1. What is your name? (2) __________________________ When were you born? (4) __________________________
2. Where do you live? (4) __________________________ (5) hospital __________________________
3. Where are you now? (5) city __________________________
   (unnecessary to state name of hospital)
4. On what date were you admitted to this hospital? (5) __________________________
   How did you get here? (5) __________________________
5. What is the first event you can remember after the injury? (5) __________________________
   Can you describe in detail (e.g., date, time, companions) the first event you can recall after injury? (5) __________________________
6. Can you describe the last event you recall before the accident? (5) __________________________
   the first event you can recall before the injury? (5) __________________________
7. What time is it now? ______ (1 for each ½ hour removed from correct time to maximum of 5)
8. What day of the week is it? ______ (1 for each day removed from correct one)
9. What day of the month is it? ______ (1 for each day removed from correct date to maximum of 5)
10. What is the month? __________________________ (5 for each month removed from correct one to maximum of 15)
11. What is the year? ______ (10 for each year removed from correct one to maximum of 30)

**Total Error Points**

**Total Goat Score (100-total error points)**
### Assessing PTA, the O-Log

Jackson, Novack, Dowler, 1998

#### UAB Spain Rehabilitation Center: The Orientation Log (O-Log)

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<td>7:10</td>
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<tr>
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<td>Month</td>
<td>3</td>
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<td>1</td>
<td>3</td>
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<tr>
<td>Day of Week</td>
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<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Clock Time</td>
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<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>3</td>
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<td>Etiology/Event</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>3</td>
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<tr>
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<td>1</td>
<td>2</td>
<td>3</td>
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Our second conclusion is that PA is in essence a posttraumatic confusional state (PCS). A confusional state can be defined as a transient organic mental syndrome with acute onset characterized by a global impairment of cognitive functions with a concurrent disturbance of consciousness, attentional abnormalities, reduced or increased psychomotor activity, and a disrupted sleep/wake cycle.
Phenomenology of Delirium

- Impaired consciousness – reduced awareness of the environment, impaired attention
- Generalized cognitive impairment
- Increased or reduced psychomotor activity
- Disturbed sleep/wake cycle
- Fluctuation in severity of symptoms
Rationale for Confusion Assessment Protocol (CAP)

- Current instruments used for assessing conscious patients in early recovery have focused almost exclusively on orientation and cognitive functioning. However, it is well known that these patients have a number of other symptoms such as agitation, emotional lability, perceptual disturbances, etc.
Rationale for CAP

• Previous research on early recovery after TBI (PTA) has focused exclusively on duration. While duration of PTA has been validated as an index of TBI severity and a prognostic indicator, no previous research has focused on severity of confusion. There has been only limited investigation of patterns of symptoms in early recovery.
Rationale for CAP

• Serial monitoring of a wider range of symptoms of confusion may permit more sensitive assessment of improvement or regression. Clinical trials for improvement of acute confusion may be more likely to influence symptoms other than orientation and cognition. Failure to assess other symptoms may result inability to detect effects of therapeutic interventions.
Target Population

- Traumatic brain injury, aneurysm rupture, intracerebral hemorrhage
- Responsive as determined by CRS-R or clinical examination
- Behavioral evidence of confusion such as disorientation, severe distractibility, agitation, etc.
7 Symptoms of Post-traumatic Confusion

- Disorientation
- Cognitive impairment
- Fluctuation of presentation
- Restlessness
- Nighttime sleep disturbance
- Decreased daytime arousal
- Psychotic-type symptoms
CAP Administration

• Review chart
• Quiet environment
• Consider excluding family members
• Establish rapport
• Interview therapists, nurses, and family
CAP Administration – Schedule

• Research protocol – 3 days a week at variable times of day
• Discontinue when 3 consecutive non-confused CAP’s are obtained within a 5 day period
• Clinical evaluation – depends on clinical status and time since injury
• Less than 3 months post-injury, start with 3 days a week
• For slowly evolving patients decrease frequency to 1 day per week
• Discontinue when 3 consecutive non-confused CAP’s are obtained within a 5 day period or no change in number of symptoms is detected over 4 weeks
CAP Components

• Cognitive impairment – CTD Visual Memory, TOTART Attentional Subtest, CTD Vigilance, CTD Comprehension
• Galveston Orientation and Amnesia Test
• Agitated Behavior Scale
• Clinician Rated Items
Phenomenology of Confusion
Sherer et al., 2008

Participants with Confusion Symptoms (%)

- Disorient
- Cog imp
- Fluct
- Agitation
- Sleep dist
- Arouse
- Psychotic

Legend:
- All
- Non-confused
- Confused
## Confusion Severity and Productivity Outcome (n = 132)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Comparison</th>
<th>Odds Ratio</th>
<th>p-value</th>
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<tr>
<td>Age</td>
<td>20.0, 43.9</td>
<td>0.39</td>
<td>0.02</td>
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<tr>
<td>Education</td>
<td>10.0, 13.0</td>
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<td>0.09</td>
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<td>GCS</td>
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<td>TFC</td>
<td>1.0, 11.5</td>
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<tr>
<td>CAPtotal</td>
<td>2.0, 5.0</td>
<td>0.50</td>
<td>0.03</td>
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## Confusion Symptoms Findings and Employment Outcome

<table>
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<th></th>
<th>Contrast</th>
<th>Odds Ratio</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Cognition</td>
<td>No : Yes</td>
<td>4.54</td>
<td>0.001</td>
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<tr>
<td>Disorient</td>
<td>No : Yes</td>
<td>3.12</td>
<td>0.004</td>
</tr>
<tr>
<td>Agitation</td>
<td>No : Yes</td>
<td>3.12</td>
<td>0.004</td>
</tr>
<tr>
<td>Fluctuation</td>
<td>No : Yes</td>
<td>3.33</td>
<td>0.003</td>
</tr>
<tr>
<td>Sleep dist</td>
<td>No : Yes</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Arouse</td>
<td>No : Yes</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Psychotic</td>
<td>No : Yes</td>
<td>14.28</td>
<td>0.001</td>
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### Change in Confusion Severity Across Evaluations, Sherer et al., 2009

<table>
<thead>
<tr>
<th>Severity</th>
<th>CAP 1 to 2</th>
<th>CAP 2 to 3</th>
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<tr>
<td></td>
<td>49%</td>
<td>50%</td>
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<tr>
<td>Severe:</td>
<td>46%</td>
<td>38%</td>
</tr>
<tr>
<td>(n=41)</td>
<td>5%</td>
<td>12%</td>
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<tr>
<td></td>
<td>63%</td>
<td>56%</td>
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<tr>
<td>Moderate:</td>
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<td>36%</td>
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<tr>
<td>(n=28)</td>
<td>11%</td>
<td>8%</td>
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<tr>
<td></td>
<td>50%</td>
<td>25%</td>
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<tr>
<td>Mild:</td>
<td>36%</td>
<td>69%</td>
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<tr>
<td>(n=38)</td>
<td>14%</td>
<td>6%</td>
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</table>
Resolution of Symptoms of Confusion – Severe Confusion

[Bar chart showing resolution of symptoms for different categories including Cog, Disorient, Agit, Fluct, Sleep, Arouse, Psych for CAP 1, CAP 2, and CAP 3.]
Agitation – Why do we care?

• 35 to 96% of patients with moderate to severe traumatic brain injury
• 45% of patients in inpatient brain injury rehabilitation
• Associated with increased risk of injury to patient
• Associated with increased risk of injury to staff
• Upsetting to family and friends
• Increases cost of care
What is agitation?

- Physical aggression
- Explosive anger
- Increased psychomotor activity
- Impulsivity
- Verbal aggression
- Disorganized thinking
- Perceptual disturbances
- Impaired functioning of attention
What Factors Cause Agitation in Brain Injured Patients?

- Pain
- Medication effects (e.g., over-sedation)
- Over stimulation
- Fatigue
- Too little structure
- Difficult or psychologically meaningless tasks
- Suspiciousness, feeling threatened
- Anxiety
- Internal states
- Restraints
Overlapping Terms

- Agitation
- Aggression
- Irritability
- Impulsivity
Agitation

• Increased motor activity
• Associated with degree of confusion
• Often resolves when confusion resolves
• Behavior is often undirected and may be in response to external or internal cues
• May be perceived as aggression when it is not
• However, may increase risk for aggression
• Perceived as uncomfortable by the patient
Aggression

- Behavior intended to harm another
- By definition, behavior is directed and under some degree of control
- May occur in the absence of agitation, irritability, or impulsivity
- Undirected striking out is likely be perceived by staff as aggression
- Can an acutely confused patient be aggressive?
Irritability

- Increased sensitivity to stimulation
- Extremely common even after confusion resolves
- May lead to agitation or aggression
- Can be contributed to by internal states though is usually perceived as a response to external events
- Very common in non-injured persons
Impulsivity

- Acting without thinking
- Very common in confused patients
- Common after confusion resolves
- Often not associated with agitation, aggression, or irritability
- Common in non-injured persons
Assessing Agitation

• Direct observation
• Staff report
• Family report
• Patient report
• Obtain a behavioral description of what happened, what preceded the “agitation,” and what happened afterwards
Four Words to Avoid

- Agitation
- Aggression
- Irritability
- Impulsivity
Agitated Behavior Scale

- 1=absent, 2=present to a slight degree, 3=present to a moderate degree, 4=present to an extreme degree
- Short attention span, easy distractibility, inability to concentrate
- Impulsive, impatient, low tolerance for pain or frustration
- Uncooperative, resistant to care, demanding
ABS continued

- Violent and/or threatening violence toward people or property
- Explosive and/or unpredictable anger
- Rocking, rubbing, moaning or other self-stimulating behavior
- Pulling at tubes, restraints, etc.
- Wandering from treatment areas
ABS continued

- Restlessness, pacing, excessive movement
- Repetitive behaviors, motor and/or verbal
- Rapid, loud or excessive talking
- Sudden changes in mood
- Easily initiated or excessive crying and/or laughter
- Self-abusiveness, physical and/or verbal
What does the ABS measure?

- Disinhibition (attention, impulsive, uncooperative, pulling at tubes, wandering, restlessness, repetitive)
- Aggression (violent, explosive, rocking, self-abusiveness)
- Lability (rapid/loud, sudden changes, crying/laughter)
Management of Patients in Post-Traumatic Confusional State

• Behavioral techniques
• Staff education
• Family education
• Environmental management
• Restraints
• Medications
Behavior Management

- Frequent reorientation
- Manage level of stimulation
- Move
- Redirection
- Comforting stimuli (pictures, music, etc.)
- Alternate tasks and choice
- Time of day
- Positive stimuli
- For sleep facilitation, attempt to limit time in bed
- Establish routine with wake/sleep hours
Staff Education

- Physical management
- Redirection
- Tone of voice
- Physical posture
- Limiting number of responders
- Confident demeanor
- It is not personal
Family Education

- Consistency with the rehab team
- Reorient
- Avoid frequent questions
- Avoid inadvertent reinforcement
- Avoid over-stimulation
- Reassurance – “This will get better.”
- Education - “It is not his fault, this is just one phase of recovery.”
Environmental Management

• Quiet room or Private room
• One-on-one
• Video camera
• Bed alarm
• Secured unit
• Low bed position
• Conceal tubes
• Placement of orientation cues (calendar, clock)
• Normalizing light cues to simulate day-night
• Timing of nursing care during sleep hours
Restraints

• Immobilizes or reduces the ability of the patient to move his/her arms, legs, body, or head freely
  – Modular bed
  – Net bed
  – Padded abdominal belt
  – Ankle or wrist restraints
  – Enclosed bed
  – Seatbelt cover
  – Side rails

• Use of 1:1 monitoring is preferred when possible.
Medications: Physician Survey – Agitation

• Valproic acid (Depakote, Depakene)
• Carbamazepine (Tegretol)
• Lorazepam (Ativan)
• Propanolol (Inderal)
• Nadolol (Corgard)
• Risperidone (Risperdal)
• Trazodone (Desyrel)
Evidence-Based Practice: Medications for Treatment of Agitation

- **Beta Blockers:**
  - Propanolol (Inderal)
  - Pinodol (Visken, Betapindol, Blockin L, Cardilate)

- **Neuroleptics:**
  - Haloperidol (Haldol)
  - Droperidol (Droleptan, Dridol)
  - Methotrimeneprazine (Nosinan, Levoprome)
  - Clozapine (Clozaril)
  - Quetiapine (Seroquel)
  - Ziprasidone (Geodon)
Evidence-Based Practice: Medications for Treatment of Agitation

• Anti-Epileptics:
  – Valproic acid (Depakote, Depakene)
  – Carbamazepine (Tegretol)
  – Lamotrigine (Lamictal)

• Antidepressants:
  – Sertraline (Zoloft)
  – Buspirone (Buspar)

• Lithium

• Stimulants:
  – Methyphenidate (Ritalin)
  – Amantadine (Symmetrel)