The Neurological Exam in the Intensive Care Unit

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DISCLOSURES

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• None

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Outline

Introduction

Tools you will need (and won’t)

The neurological examination as an investigation.

Parts

Pitfalls
An important exam

• A great deal of critically ill patients have neurological issues
  – Seizures
  – Strokes
  – Encephalopathy (delirium)

• Many patients are obtunded from their primary injury or medications used to treat them.

• Daily wake up???

• The physical examination is still the most cost-effective and best way to follow ICU patients.
  – Compared to EEG
  – CT
  – Other
An important exam

• It is challenging to do a "good" neurological assessment on all patients.
  —Disadvantage is that little of the exam is possible
  —Advantage is that you can follow the exam over time.

“Traditions and Assumptions”

• GCS is not a surrogate for a neurological exam.
• Delirium monitoring is also not as good neurological exam.
Tools you will need (and not need)

There are few tools from a neurologists bag that are necessary in the ICU.

1. A good light source
2. Access to fundoscopy
3. Disposable pins
4. A Maddox rod
5. Access to a reflex hammer
### Pupillometer

<table>
<thead>
<tr>
<th>ID: 0 [L]</th>
<th>2000/01/01 10:16:10</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPI: 4.1 [Right]</td>
<td>4.0 [Left]</td>
</tr>
<tr>
<td>MAX: 4.56</td>
<td>4.84</td>
</tr>
<tr>
<td>MIN: 3.06</td>
<td>3.25</td>
</tr>
<tr>
<td>%CH: 33%</td>
<td>33%</td>
</tr>
<tr>
<td>LAT: 0.27</td>
<td>0.27</td>
</tr>
<tr>
<td>CV: 2.20</td>
<td>2.27</td>
</tr>
<tr>
<td>MCV: 3.81</td>
<td>3.42</td>
</tr>
<tr>
<td>DV: 0.75</td>
<td>0.62</td>
</tr>
</tbody>
</table>

![Pupillometer Image]

< >: browse records
The Neurological Exam as an investigation

Inquisitiveness must lead the way
Parts that are grossly normal, leave
Parts where there are deficits, probe further.
Allow the expectations you have about the disease to focus the examination.
On to the exam
The general neurological exam

1. Mental status
2. Cranial Nerves
3. Motor exam
   1. Tone
   2. Strength
   3. Tremor
4. Sensory exam
   1. Multiple modalities
5. Coordination
6. Gait
7. Reflexes
What is mental status?

Level of consciousness

Content of consciousness
Orientation
Concentration

Encephalopathy vs. Delirium

Agitated vs. Withdrawn Delirium
The anatomy of mental status: Level of consciousness

• Level of consciousness
  – Reticular activating system (RAS)
  – Bilateral cerebral hemispheric lesions
  – Combination of RAS and cortex
  – Thalamic Lesions
Anatomy of mental status: Content of consciousness

Content of consciousness

Limbic (Circuit of Papez)
Temporal, Frontal or Parietal
Cranial nerves: The windows to the brain
Motor exam
The special case of Delirium in the ICU?

Two methods that have been tested:

CAM-ICU (Confusion Assessment Method for the Intensive Care Unit)

Intensive Care Delirium Screening Checklist

**PATIENT EVALUATION**

<table>
<thead>
<tr>
<th>Altered level of consciousness* (A-E)</th>
<th>DAY 1</th>
<th>DAY 2</th>
<th>DAY 3</th>
<th>DAY 4</th>
<th>DAY 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inattention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Disorientation</td>
<td></td>
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<td></td>
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<tr>
<td>Hallucination - delusion - psychosis</td>
<td></td>
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<tr>
<td>Psychomotor agitation or retardation</td>
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<tr>
<td>Inappropriate speech or mood</td>
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<tr>
<td>Sleep/wake cycle disturbance</td>
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<td></td>
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<tr>
<td>Symptom fluctuation</td>
<td></td>
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</tr>
</tbody>
</table>

**TOTAL SCORE (0-8)**

<table>
<thead>
<tr>
<th>Level of consciousness*</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: no response</td>
<td>none</td>
</tr>
<tr>
<td>B: response to intense and repeated stimulation (loud voice and pain)</td>
<td>none</td>
</tr>
<tr>
<td>C: response to mild or moderate stimulation</td>
<td>1</td>
</tr>
<tr>
<td>D: normal wakefulness</td>
<td>0</td>
</tr>
<tr>
<td>E: exaggerated response to normal stimulation</td>
<td>1</td>
</tr>
</tbody>
</table>

**SCORING SYSTEM:**

The scale is completed based on information collected from each entire 8-hour shift or from the previous 24 hours. Obvious manifestation of an item = 1 point. No manifestation of all items or no assessment possible = 0 point.

The score of each item entered in the corresponding empty box and is 0 or 1.

1. Altered level of consciousness:
   - A No response or B the need for vigorous stimulation in order to obtain a response signifies a severe alteration in the level of consciousness preceding evaluation. If there is coma (A) or stupor (B) most of the time period then a dash ( -) is entered and there is further evaluation during that period.
   - C Drowsiness or requirement of a mild to moderate stimulation for a response implies an altered level of consciousness and scores 1 point.
   - D Wakefulness or sleeping state that could easily be aroused is considered normal and scores no point.
   - E Hypervigilance is rated as an abnormal level of consciousness and scores 1 point.

2. Inattention: Difficulty in following a conversation or instructions. Easily distracted by external stimuli. Difficulty in shifting focus. Any of these scores 1 point.

3. Disorientation: Any obvious mistake in time, place or person scores 1 point.

4. Hallucinations, delusions or psychosis: The unequivocal clinical manifestation of hallucination or of behavior probably due to hallucination (e.g. trying to catch a non-existent object) or delusion. Gross impairment in reality testing. Any of these scores 1 point.

5. Psychomotor agitation or retardation: Hyperactivity requiring the use of additional sedative drugs or restraints in order to control potential dangerousness (e.g. pulling out iv lines, hitting staff). Hypoactivity or clinically noticeable psychomotor slowing. Any of these scores 1 point.

6. Inappropriate speech or mood: Inappropriate, disorganised or incoherent speech; Inappropriate display of emotion related to events or situation. Any of these scores 1 point.

7. Sleep/wake cycle disturbance: Sleeping less than 4 hours or waking frequently at night (do not consider wakefulness initiated by medical staff or loud environment). Sleeping during most of the day. Any of these scores 1 point.

8. Symptom Fluctuation: Fluctuation of the manifestation of any item or symptom over 24 hours (e.g. from one shift to another) scores 1 point.

Fig.1 The Intensive Care Delirium Screening Checklist
Thank You