Altered Mental Status
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Disclosures
• Grant Support
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Disclosures
• Off label uses
Outline
• Scope of Lecture
• Definition
• Challenges

Scope
• Acute and subacute changes in mental status

Definition
• Any change in a patient’s baseline mental status
  — A VERY broad definition
  — A difficult chief complaint in many ways
Challenges

• The scope is extremely broad
• Patient is poor historian
• Physical exam often not helpful

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• Patient is poor historian
• Physical exam often not helpful
• Labs and imaging often not helpful

• The scope is extremely broad
• Patient is poor historian
• Physical exam often not helpful
• Labs and imaging often not helpful
• May be nothing or life threatening!
• So many terms/scales
Definitions

- **Coma**: unresponsive to any stimuli

- **Stupor**: only arouse with vigorous and continuous stimuli

- **Delirium**: acute disturbance of consciousness accompanied by an acute loss of cognition (but not better explained by dementia)

**Delirium**

- **Hypoactive Delirium**
  - Appear drowsy or somnolent
  - Subtle and often missed!

- **Hyperactive Delirium**
  - Obvious presentation
Delirium

- **Hypoactive Delirium**
  - Appear drowsy or somnolent
  - Subtle and often missed!
- **Hyperactive Delirium**
  - Obvious presentation
- **Mixed-Type Delirium**
  - Presents with both features

Delirium

http://eddelirium.org

Dementia

- Gradual and associated with gradual loss of cognition
A Stepwise Approach

Stepwise Approach

• Severity
  – “ABCs and 5 S’s”
  – The 5 S’s:
    1. Sugar
    2. Stroke
    3. Sepsis
    4. Seizure
    5. Sonorous Respirations (Opiate Intoxication)

Stepwise Approach

• Severity
  – “ABCs and 5 S’s”
• Stabilize
  – Address vital signs and combativeness

Agitation

<table>
<thead>
<tr>
<th>Agent</th>
<th>Formulation</th>
<th>Dose (mg)</th>
<th>Onset of Action (min)</th>
<th>Max daily dose (mg)</th>
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<tbody>
<tr>
<td>Lorazepam</td>
<td>IV</td>
<td>2 - 4</td>
<td>2 - 3</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>2 - 4</td>
<td>3 - 6</td>
<td>12</td>
</tr>
<tr>
<td>Midazolam</td>
<td>IV</td>
<td>2 - 5</td>
<td>1 - 5</td>
<td>15</td>
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<tr>
<td></td>
<td>IM</td>
<td>5</td>
<td>5 - 10</td>
<td>15</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>IV</td>
<td>5 - 10</td>
<td>5 - 10</td>
<td>20 - 30</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>5 - 10</td>
<td>15 - 20</td>
<td>20 - 30</td>
</tr>
<tr>
<td>Droperidol</td>
<td>IV</td>
<td>2.5 - 5</td>
<td>3 - 10</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>2.5 - 10</td>
<td>3 - 10</td>
<td>15</td>
</tr>
<tr>
<td>Olanzapine</td>
<td>IM</td>
<td>5 - 10</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>PO</td>
<td>5 - 10</td>
<td>30 - 60</td>
<td>30</td>
</tr>
<tr>
<td>Ketamine</td>
<td>IM</td>
<td>4 - 5/kg</td>
<td>3 - 4</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>0.5 - 1/kg</td>
<td>0.5</td>
<td>5/kg</td>
</tr>
</tbody>
</table>

Stepwise Approach

• Severity
  – “ABCs and 5 S’s”
• Stabilize
  – Address vital signs and combativeness
Stepwise Approach

- Severity
  - “ABCs and 5 S’s”
- Stabilize
  - Address vital signs and combativeness
- History and Physical
- Differential Diagnosis
- Labs/Imaging
- Disposition

Stepwise Approach

- History
  - Best obtained from someone else
  - Timing: Acute is worse, abrupt may suggest stroke

Stepwise Approach

- History
  - Best obtained from someone else
  - Associated Symptoms: Recent seizures, recent neurologic complaints, recent infectious symptoms
Stepwise Approach

- History
  - Best obtained from someone else
  - Timing
  - Associated Symptoms
  - Medications: Needs to be obtained first-hand, look for recent changes/additions/discontinuations

Stepwise Approach

- History
  - Best obtained from someone else
  - Timing
  - Associated Symptoms

- Medications:
  - Antibiomania? Clarithromycin/Fluroquinolones
  - Metronidazole encephalopathy

Stepwise Approach

- History
  - Best obtained from someone else
  - Timing
  - Associated Symptoms

- Medications

- Social History:
  - Many elderly patients are abusers of sedative hypnotics
  - Also consider physical abuse

Stepwise Approach

- Physical Exam
  - Complete neurologic exam
    - Right parietal lobe infarcts can cause AMS without any focal findings
    - Aphasia can be confused with AMS
  - Gait: Wernicke’s?
    - If suspected, consider thiamine administration 500mg IV before glucose

Stepwise Approach

- Physical Exam
  - Complete neurologic exam
    - Right parietal lobe infarcts can cause AMS without any focal findings
    - Aphasia can be confused with AMS
    - Gait: Wernicke’s?
    - Tone: Serotonin syndrome, malignant hyperthermia, NMS
Stepwise Approach

- Physical Exam
  - Complete neurologic exam
  - Ocular Exam

- GU Exam
  - Fournier's Gangrene, Prostatitis, GI bleed

- Skin Exam
  - Findings of liver disease, infection, drug patches

Stepwise Approach

Differential Diagnosis

A SUICIDE ATTEMPT BY NAIL GUN

CASE REPORT

A 75-year-old female presented to our emergency department for emergency medical attention for a reported self-inflicted gun injury to the thorax that occurred 1 day prior to arrival. The patient sustained a single gunshot wound to the chest with a 9 mm caliber weapon. The mechanism of injury is consistent with suicide. The patient was taken to the operating room for a median sternotomy and repair of the lacerated aortic arch. The patient was taken to the intensive care unit for further management. She was discharged to home on the seventh postoperative day.

DISCUSSION

Nail guns, easily obtained from home improvement stores, can pose a significant risk to public safety. The patient's injury was consistent with a self-inflicted gunshot wound to the chest. The mechanism of injury suggests a deliberate act, given the absence of foreign body in the wound tract. The patient's medical history included hypertension, hyperlipidemia, and diabetes mellitus. She was treated with antibiotics and discharged to home on postoperative day 7.
Stepwise Approach

• Differential Diagnosis in 5 Categories
  1. Vital Sign Abnormalities
  2. Toxic/Metabolic
  3. Structural
  4. Infectious
  5. Psychiatric

Vital Sign Abnormalities
- Hypertension
- Hypotension
- Bradycardia
- Tachycardia
- Hypothermia
- Hyperthermia

Toxic
- Medications and medication changes
- Alcohol or drug use or withdrawal
- Seizures

Structural
- Cerebrovascular accident
- Intracranial hemorrhage
- Stroke
- Subdural/epidural hematoma
- Non-traumatic status epilepticus
- Brain mass or edema
- Hydrocephalus
- Locked-in Syndrome

Infectious
- Meningitis
- Encephalitis
- Encephalopathy

Psychiatric
- Mania
- Depression
- Anxiety
- Schizophrenia
- Cocaine

Table 2. Precipitating Factors for Altered Mental Status. Adapted from Pun et al., Finlay et al., and the American Psychiatric Association Delirium Guidelines.

Stepwise Approach

• Vital Sign Abnormalities
  – Should be considered life threatening as they are causing end organ dysfunction of the brain
Stepwise Approach

- **Vital Sign Abnormalities**
  - Should be considered life threatening as they are causing end organ dysfunction of the brain
  - Address before moving on

Stepwise Approach

- **Toxins**
  - Prescription AND OTC medications
  - Environmental Toxins (CO, Jimson weed, marijuana gummy bears)
  - Withdrawal

Stepwise Approach

- **Metabolic**
  - Glucose
    - Hypoglycemia can mimic anything
    - DKA/HHS
  - Sodium
    - The most common electrolyte disorder
    - Most common cause in outpatients is thiazide use
Stepwise Approach

• Metabolic
  – Sodium
    • The most common electrolyte disorder
    • Most common cause in outpatients is thiazide use
    • Usually not the cause unless < 120 mEq/L

• Metabolic
  – Calcium
    • Most common cause in outpatients is primary hyperparathyroidism
    • Most common cause in inpatients is malignancy

• Metabolic
  – BUN
    • When > 100mg/dL, mental status changes may develop and uremia is likely present

• Metabolic
  – Hyperthyroid
    • Tachycardia, mania, sweating
    • Thyroid Storm

• Metabolic
  – Hypothyroid
    • Lethargy, dry skin, enlarged thyroid, irritability, cold sensitivity, etc.
    • Myxedema coma: most severe complication-multiplesystem organ failure

• Metabolic
  – Adrenal Insufficiency
    • Often missed early
    • Dark Skin Pigmentation
    • Hyponatremia with Hyperkalemia
    • Cardiovascular Collapse
    • Sepsis not responding to treatment
Stepwise Approach

- Metabolic
  - Hepatic
    - Hepatic encephalopathy
    - Cerebral Edema
    - High risk of ICH

Stepwise Approach

- Infectious
  - Systemic
    - SOFA score has shown that AMS is an independent predictor of ICU stay and hospital mortality

Stepwise Approach

- Infectious
  - Systemic
    - SOFA score has shown that AMS is an independent predictor of ICU stay and hospital mortality

Stepwise Approach

- Neurologic
  - Intracranial hemorrhage
  - Traumatic hemorrhage
  - Locked-in Syndrome
  - Non-Convulsive Status Epilepticus

Stepwise Approach

- Psychiatric
  - A diagnosis of exclusion

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  - 20% have a medical problem causing or exacerbating their psychiatric condition
Stepwise Approach

- Psychiatric
  - A diagnosis of exclusion
  - 20% have a medical problem causing or exacerbating their psychiatric condition
  - Psychiatric patients have a high rate of medical comorbidities
    - Largely undiagnosed and untreated

Stepwise Approach

- Psychiatric
  - Atypical presentations of common medical problems are common
  - Changes in vision appear to be most predictive of a medical illness causing, or at least contributing to, their symptoms

Stepwise Approach

<table>
<thead>
<tr>
<th>Features Concerning for a Medical Cause of a Psychiatric Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Changes in Vision</strong> [47]</td>
</tr>
<tr>
<td>Abnormal ocular exam (miosis, mydriasis, nystagmus)</td>
</tr>
<tr>
<td>No prior psychiatric history</td>
</tr>
<tr>
<td>Vital sign abnormalities</td>
</tr>
<tr>
<td>Older age without previous psychiatric history</td>
</tr>
<tr>
<td>Altered level of arousal</td>
</tr>
<tr>
<td>Visual hallucinations [47]</td>
</tr>
<tr>
<td>Medical Comorbidities [47]</td>
</tr>
</tbody>
</table>

Stepwise Approach

- Labs
  - Most should have a CBC/BMP

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  - Urinalysis
    - Yes, but be careful
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    • Yes, but be careful
    • Asymptomatic bacteriuria is common and overtreated

Stepwise Approach

• Labs
  – Most should have a CBC/BMP
  – Urinalysis
    • Yes, but be careful
    • Asymptomatic bacteriuria is common and overtreated
    • Bacteria can be in the urine with a systemic infection

Stepwise Approach

• Labs
  – Toxicologic Screen
    • Serum ETOH/APAP/ASA levels

Stepwise Approach

• Labs
  – Toxicologic Screen
    • Serum ETOH/APAP/ASA levels
    • Consider serum osmolality too
    • Urine Drug Screen?
      – Prone to false positives, not particularly sensitive, and rely on multiple factors for detection

Stepwise Approach

• Labs
  – LP?
    • If you think about it, you should probably do it
    • Save CSF
Stepwise Approach

• Imaging
  – CXR
    • Hypoxia, fever, cough, respiratory symptoms
    • Free air?

Stepwise Approach

• Imaging
  – EEG
    1. No cause
    2. Any history of seizure or seizing before arrival

Stepwise Approach

• Imaging
  – Noncontrast Head CT
    • Routine in AMS?
      – Controversial, but if impaired level of consciousness, consider
      – Always if concerned or trauma, deficit, anticoagulants

Stepwise Approach

• Imaging
  – CT Angiography
    • Excellent for stenosis, aneurysms, dissections

Incidence in patients with AMS is 8-30%
Stepwise Approach

- **Imaging**
  - MRI
    - If no cause is found, MRI can be helpful, particularly for strokes and tumor.

Stepwise Approach

- **Disposition**
  - Stuporous/Comatose = ICU

Stepwise Approach

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  - Stuporous/Comatose = ICU
  - Stroke = Stroke unit (improved mortality and outcomes)
  - Poisoning = Discuss with toxicologist

Stepwise Approach

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Stepwise Approach

- **Disposition**
  - No cause, but resolved = observation vs discharge home (but great followup/supervision plan needed)
    - However, missed delirium in elderly patients carries a higher mortality rate

References


References


