Delirium in the PICU: A focus on the “liaison” component of C/L psychiatry

Psychiatry Grand Rounds, May 19, 2016

Lisa Hutchison, MD
Pediatric Consult-Liaison Psychiatry Service
Clinical associate, Departments of Psychiatry and Pediatrics
Duke University Hospital
Disclosures

• I have no relevant financial interests or potential conflicts of interest to disclose.

• Discussion will include both on-label and off-label use of medications.
Objectives

• Recognize pediatric delirium as an under-diagnosed and potentially harmful disorder

• Understand the complexities of targeting a disorder which has significant mind/body overlap

• Learn about techniques being used to improve cooperation and communication between psychiatry and other medical specialties
Outline

• Introduction to our pediatric psychiatry consult service
• Discussion of what delirium is, and why it’s important
• A breakdown of our approach to targeting delirium in the ICU through screening, education, and communication
Pediatric Consult-Liaison Psychiatry

Goals of a pediatric consult-liaison service:

1. To facilitate the **early recognition and treatment of psychiatric disorders** in physically ill children and adolescents
2. To help **differentiate psychological illnesses** presenting with physical symptoms
3. To help **avoid unnecessary diagnostic tests** and procedures
4. To **support** pediatric patients and the families in coping with their disease and its treatment
5. To **assist the medical team in understanding** the reactions and behaviors of physically ill children, adolescents, and their families

Duke Pediatric Psychiatry Consult-Liaison Service

As of August 1, 2014:

– Full time attending
– Child psychiatry fellow 4 mornings/week
– Additional trainees:
  • Med/psych residents
  • Pediatric residents
  • Child neurology fellows
  • Medical students
Pediatric Psychiatry Consult-Liaison Service

# of Consults from September to February
(6 month period)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Consults</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-2014</td>
<td>40</td>
</tr>
<tr>
<td>2014-2015</td>
<td>120</td>
</tr>
<tr>
<td>2015-2016</td>
<td>140</td>
</tr>
</tbody>
</table>
Pediatric Psychiatry Consult Service

Monthly Consults by Year (Sept-Feb)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>September</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>October</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pediatric Psychiatry Consult Service

Monthly Consults by Year (Sept-April)
Pediatric Psychiatry Consult Service Activity by Problem

- Mood disorders
- Anxiety
- Suicide attempt
- Behavior
- Eating disorders
- Psychosomatic disorders
- Autoimmune encephalitis
- Delirium
- Noncompliance
- Psychosis
- Misc

Percentage of consults

- 2015-2016
- 2014-2015
- 2013-2014
Why talk about delirium?

- High prevalence, under-recognized
- Associated with poor outcomes
- Complex overlap between psychiatry and medical/surgical specialties
Delirium

What is delirium?

“A disturbance of attention or awareness that is accompanied by a change in baseline cognition”

Delirium features:

• Disturbance of attention and awareness
• Develops over short period of time
• Fluctuates of the course of the day
• Disturbance in cognition (memory, language, perception, orientation)
• Changes in sleep/wake cycle
• Emotional disturbances (mood lability, dysphoria, irritability, anxiety, etc.)

Delirium

Delirium features:

• Disturbance of attention and awareness
• Develops over short period of time
• Fluctuates of the course of the day
• Disturbance in cognition (memory, language, perception, orientation)
• Changes in sleep/wake cycle
• Emotional disturbances (mood lability, dysphoria, irritability, anxiety, etc.)

Delirium

Delirium features:

• Disturbance of attention and awareness
• Develops over short period of time
• Fluctuates of the course of the day
• Disturbance in cognition (memory, language, perception, orientation)
• Changes in sleep/wake cycle
• Emotional disturbances (mood lability, dysphoria, irritability, anxiety, etc.)

Delirium

Delirium features:

- Disturbance of attention and awareness
- Develops over short period of time
- Fluctuates of the course of the day
- Disturbance in cognition (memory, language, perception, orientation)
- Changes in sleep/wake cycle
- Emotional disturbances (mood lability, dysphoria, irritability, anxiety, etc.)

Delirium

Potential causes of delirium:
• "I WATCH DEATH"
  – Infection
  – Withdrawal
  – Acute metabolic
  – CNS pathology
  – Hypoxia
  – Deficiencies (vitamin)
  – Endocrinopathies
  – Acute vascular
  – Toxins/drugs
  – Heavy metals

Benzodiazepines
Opioids
Anticholinergics
Corticosteroids
Delirium

• Outcomes
  – Increased mortality
  – Prolonged hospital stay
  – Longer duration of mechanical ventilation
  – Longer ICU stay
  – Prolonged neuropsychological dysfunction
  – Increased risk for PTSD

Delirium

- Rates of delirium in adult ICUs range as high as 70-87%
- Hypoactive delirium is more likely to be missed

The Duke PICU delirium story...

• Identified problems:
  – Pediatric delirium is poorly recognized
  – Untreated delirium is potentially harmful
  – Improved recognition and treatment of delirium may improve patient outcomes

• But how to go about making change when it’s primarily in the medical setting?
The Duke PICU delirium story...

- Pediatric Delirium Task Force
  - Representatives from:
    - Pediatric Critical Care
    - Nursing
    - Child and adolescent psychiatry
    - Pediatric neurology
    - Pharmacy
  - Quarterly meetings
The Duke PICU delirium story...

What to do?
The Duke PICU delirium story...

- How to improve recognition and treatment of delirium?
  1. Use of diagnostic scales
  2. Specific education about delirium
  3. Increased communication about delirium

Screening tools can be used to identify delirium sooner
  Pediatric Confusional Assessment Method – ICU (pCAM-ICU)
  Cornell Assessment of Pediatric Delirium (CAPD)

Part 1: Screening

• Universal Screening at Duke
  – PICU, PCICU
  – October 1, 2014
  – All patients 2 months – 18 years
  – CAPD
    • 6am, 6pm
Part 1: Screening

- Cornell Assessment of Pediatric Delirium (CAPD)
  - 8 questions
  - Observational
  - Sensitivity = 95%
  - Specificity = 79%
    - 87% when developmentally delayed children excluded
  - Time to complete < 2 min

RASS Score ____ (if -4 or -5 do not proceed)

Please answer the following questions based on your interactions with the patient over the course of your shift:

<table>
<thead>
<tr>
<th>Question</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the child make eye contact with the caregiver?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Are the child's actions purposeful?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Is the child aware of his/her surroundings?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Does the child communicate needs and wants?</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Always</td>
<td>Score</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5. Is the child restless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Is the child inconsolable?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Is the child underactive—very little movement while awake?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Does it take the child a long time to respond to interactions?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**
Withdrawal Assessment Tool Version 1 (WAT-1)

<table>
<thead>
<tr>
<th>Any Loose or Watery Stools?</th>
<th>Any Vomiting/Wretching/Gagging</th>
<th>Temperature &gt; 37.8°C</th>
<th>State</th>
<th>Tremor</th>
<th>Any Sweating</th>
<th>Uncoordinated/Repetitive</th>
<th>Yawning or Sneezing</th>
<th>Startle to Touch</th>
<th>Muscle Tone</th>
<th>Time to Gain Calm State (SBS)</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Pediatric Delirium Tool

<table>
<thead>
<tr>
<th>Delirium Preventive Measures</th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Cluster 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the child make eye contact</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Are the child’s actions</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Is the child aware of his/her</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Does the child communicate</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Is the child restless?</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Is the child incoisible?</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Is the child underactive- very little</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Does it take the child a long time</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pediatric Delirium Calculated</td>
<td>8</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>
Part 1: Screening
Part 1: Screening

Screening compliance - PICU
Part 1: Screening

Number of patients screening positive

![Bar chart showing the number of patients screening positive over months from October to April, with separate data for PCICU and PICU.](image)
Part 1: Screening

Consults for delirium:

- Jul 13- Feb 14
- Oct 14-May 14
Part 1: Screening

Number of patients screening positive who had a psych consult

[Bar chart showing the number of patients screening positive who had a psych consult by month (October, November, December, January). The chart compares the number of patients with no consult (red bars) and those who had a consultation (blue bars).]
The Duke PICU delirium story...

• How to improve recognition and treatment of delirium?
  1. Use of diagnostic scales
  2. Specific education about delirium
  3. Increased communication about delirium

The Duke PICU delirium story...

- How to improve recognition and treatment of delirium?
  1. Use of diagnostic scales ✔️
  2. Specific education about delirium
  3. Increased communication about delirium

Part 2: Addressing positive screens

- How to improve recognition and treatment of delirium?
  1. Use of diagnostic scales
  2. Specific education about delirium
  3. Increased communication about delirium

Pediatric ICU Delirium Decision Tree

**CAPD score > 8 or concern for delirium**

Ensure that "delirium precautions" are in place and determine cause of elevated CAPD/delirium

- Developmental delay/autism
- Underlying neurological pathology (encephalitis, stroke, bleed, etc.)
- Prolonged or heavy sedation
- Metabolic derangement (liver failure, DKA, uremia, etc.)

- At baseline?
  - Yes: Consult neurology +/- psychiatry
  - No: No further intervention

- Consult psychiatry

- Can sedation be safely weaned?
  - Yes
    - Wean sedation
  - No
    - Agitated?
      - Yes: Manage underlying disease
      - No: Consult psychiatry

*Consult psychiatry when starting antipsychotics on any patient under 5-years-old*

Updated 12.21.15

"Delirium Precautions"
- Lights on during day and off at night
- Minimize nighttime awakenings
- Up and out of bed when possible
- Minimize catheters/lines when able
- Provide glasses/hearing aids if appropriate
- Keep accurate date on wall
- Pictures of loved ones in view of patient
- Sitter or family member at bedside
Quick Guide to Antipsychotic Medications for Delirium

Remember:
- When using antipsychotics in children, always use the lowest possible effective dose for the shortest possible duration.
- Children under 3-years-old must have a psychiatry consult before starting antipsychotics. Children 3-5 years old also require a psychiatry consult, but antipsychotics can be initiated before the patient is seen by psychiatry.
- Please discuss with neurology and psychiatry before starting psychotics in any patient with a primary neurologic disorder (stroke, bleed, meningitis, encephalitis, etc.)

Choosing the appropriate antipsychotic...

1. **Does the patient require IV medication?**
   - Yes, Consider haloperidol
   - No

2. **Does the patient have prolonged (> 480ms) QTc?**
   - Yes, Consider aripiprazole* (or gabapentin)
   - No

3. **Is the patient particularly anxious?**
   - Yes, Consider quetiapine
   - No

4. **Is the patient having trouble sleeping at night?**
   - Yes, Consider olanzapine
   - No, Consider risperidone

* Aripiprazole has the lowest risk for QTc prolongation, but it also has the least data for treatment of delirium. If QTc is not significantly prolonged, recommend trying one of the other antipsychotics first.
## Dosing:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Starting dose</th>
<th>PRNs</th>
<th>Titration</th>
<th>Max dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haloperidol (Haldol)</td>
<td>IV/PO</td>
<td>0.02mg/kg/dose q8hrs</td>
<td>Can use up to 2 0.02mg/kg PRNs per day</td>
<td>Can increase each dose in 0.02mg/kg increments</td>
<td>0.15mg/kg/24hrs or 10mg/24hrs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 2mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risperidone (Risperdal)</td>
<td>PO</td>
<td>0.01mg/kg/dose q12hrs</td>
<td>Can use 1 0.01mg/kg PRN per day</td>
<td>Can one dose per day in 0.01mg/kg increments</td>
<td>0.06mg/kg/24hrs or 3mg/24hrs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 0.5mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olanzapine (Zyprexa or Zydos ODT)</td>
<td>PO</td>
<td>3-6y: 1.25mg qHS</td>
<td>Can use 1 PRN per day (usually ½ nighttime dose)</td>
<td>Can increase each day in increments of starting dose</td>
<td>3-6y: 5mg/24hrs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7-12y: 2.5mg qHS</td>
<td></td>
<td></td>
<td>7-12y: 10mg/24hrs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 12y: 5mg qHS</td>
<td></td>
<td></td>
<td>&gt; 12y: 15mg/25hrs</td>
</tr>
<tr>
<td>Quetiapine (Seroquel)</td>
<td>PO</td>
<td>0.5mg/kg/dose q8hrs</td>
<td>Can use up to 2 0.25-0.5mg/kg PRNs per day</td>
<td>Can increase each dose in 0.5mg/kg increments</td>
<td>3mg/kg/24hrs or 300mg/24hrs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 50mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aripiprazole (Abilify)</td>
<td>PO</td>
<td>3-6y: 0.5mg QDay</td>
<td>Can use 1 PRN of equal dose per day</td>
<td>3-6y: to 1mg then 2mg</td>
<td>3-6y: 2mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7-12y: 1mg QDay</td>
<td></td>
<td>7-12y: to 2mg then 5mg</td>
<td>7-12y: 5mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 12y: 2mg QDay</td>
<td></td>
<td>&gt; 12y: to 5mg then 10mg</td>
<td>&gt; 12y: 10mg</td>
</tr>
</tbody>
</table>

## Potential for side effects:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Anxiolysis</th>
<th>Sedation</th>
<th>QTc Prolongation</th>
<th>EPS</th>
<th>Dry mouth</th>
<th>Hypotension (orthostatic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haloperidol</td>
<td>+</td>
<td>+</td>
<td>++++</td>
<td>+++</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Risperidone</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Olanzapine</td>
<td>++</td>
<td>+++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td></td>
</tr>
<tr>
<td>Quetiapine</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Aripiprazole</td>
<td></td>
<td>(minimal)</td>
<td>+ (akathisia)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part 2: Addressing positive screens

• “Brain rounds”
  – ICU team and Psychiatry & Neurology
  – Every Thursday
    • 11am – Pediatric cardiac ICU
    • 11:30am – Pediatric ICU
  – Discuss sedation/delirium concerns
  – Check in on anxiety, mood, coping
  – Review MRIs and EEGs
Part 2: Addressing positive screens

• Improving education
  – Didactics:
    • Pediatric noon conference
    • Critical care fellows’ academic half day
  – Real time education:
    • Consult discussions
    • Participating in rounds
The Duke PICU delirium story...

• How to improve recognition and treatment of delirium?

1. Use of diagnostic scales ✔
2. Specific education about delirium
3. Increased communication about delirium

The Duke PICU delirium story...

- How to improve recognition and treatment of delirium?
  1. Use of diagnostic scales ✔
  2. Specific education about delirium ✔
  3. Increased communication about delirium

Case of “Emma”

- 7-year-old girl with no past psychiatric or medical history admitted to the PICU with ARDS secondary to necrotizing MRSA pneumonia
- Sedated, on ventilator, on ECMO
- Child psychiatry consulted due to concern for delirium
Case of “Emma”

• Symptoms:
  – Disorientation
  – Purposeless movements (head shaking)
  – Inability to recognize family members
  – Unfocused gaze
  – Loss of sleep cycles
Case of “Emma”

• Sedation medications:
  – Dexmedetomidine (Precedex) continuous infusion
  – Hydromorphone (Dilaudid) continuous infusion and as needed
  – Lorazepam (Ativan) scheduled and as needed
Case of “Emma”

PRN = “pro re nata” or “as the situation demands” (as needed)
Case of “Emma”

Frequency of head shaking behaviors over time, with Ativan given at various points: 1st, 2nd, 3rd, 4th, 5th, 6th.
Cobra Effect

When the apparent solution to a problem actually makes the problem worse.

Cobra Effect

Agitation → Give sedative → Patient sleeps
Cobra Effect

Agitation → Give sedative → Patient sleeps

Agitation
Cobra Effect

Agitation → Give sedative → Patient sleeps

Patient sleeps → Give sedative → Agitation

Agitation → Give sedative → Patient sleeps
Cobra Effect

- Agitation
- Sedation
- Delirium
Sedation & Delirium

Use of PRN medications for agitation over 24hrs

- 01:26 Versed
- 02:05 Ketamine and Dilaudid
- 02:09 Versed
- 03:10 Ketamine, Versed, and Dilaudid
- 04:15 Ketamine, Versed, and Dilaudid
- 04:45 Dilaudid
- 05:13 Ketamine, Versed, and Dilaudid
- 06:05 Ketamine, Versed, and Dilaudid
- 07:00 Ketamine, Versed, and Dilaudid
- 07:30 Versed
- 07:35 Dilaudid
- 07:45 Ketamine
- 08:45 Pentobarb
- 09:30 Versed and Dilaudid
- 09:50 Pentobarb
- 10:53 Ketamine
- 12:00 Pentobarb
- 12:30 Versed and Dilaudid
- 12:45 Ketamine
- 12:30 Dilaudid
- 14:00 Pentobarb
- 15:50 Pentobarb
- 16:24 Versed
- 16:30 Ketamine
- 17:15 Dilaudid
- 18:00 Versed and Dilaudid
- 18:10 Pentobarb
- 19:30 Versed and Dilaudid
- 20:00 Pentobarb
- 20:45 Versed and Dilaudid
- 22:05 Versed and Dilaudid
- 22:20 Pentobarb
- 22:40 Ketamine
Sedation & Delirium

“Occasionally, mechanically ventilated children remain anxious, agitated, or combative despite escalating doses of opioids and benzodiazepines. In some children, additional doses of these agents seem to exacerbate agitation and combative natureness, a paradoxical phenomenon similar to the delirium described in critically ill adults.”

Case of “Emma”

• Psychiatry service recommendations:
  – Wean hydromorphone
  – Decrease use of lorazepam
  – Start olanzapine
  – Focus on non-pharmacological interventions for head-shaking

• ICU response
  – “Patient is too unstable to decrease sedation”
  – Increased hydromorphone dose
The Duke PICU delirium story...

How to improve recognition and treatment of delirium?

1. Use of diagnostic scales ✔
2. Specific education about delirium ✔
3. Increased communication about delirium

Part 3: Improving communication

• How to improve recognition and treatment of delirium?

1. Use of diagnostic scales ✔
2. Specific education about delirium ✔
3. Increased communication about delirium ✔

Part 3: Improving communication

Areas of communication breakdown:

– Explanation for “agitation”
– What is meant by “delirium”
– Goals of care
– Expectations
Part 3: Improving communication
ECMO, pressors, antiarrhythmics

EEG, MRI, antiepileptics

Sedation, antipsychotics

Ventilator, bronchodilators, diuretics

Dialysis, electrolyte supplementation

Insulin supplementation

Laxatives, bowel rest

Foley catheter, antispasmsotics
Part 3: Improving communication
If the patient is too awake, they are undersedated.
If the patient is too awake, they are undersedated.

If the patient is too awake, they may be oversedated.
Undersedation vs. Oversedation
Comatose
Agitated, Restless
Calm, Sleepy, Sedated
Awake

Sedation medications
Comatose

Agitated, Restless

Calm, Sleepy, Sedated

Awake

Sedation medications (Alcohol)

More drinks

Less drinks

1-2 drinks

2-3 drinks

Less drinks
Comatose

Agitated, Restless

Calm, Sleepy, Sedated

Awake

Sedation medications
Agitated, Restless

Calm, Sleepy, Sedated

Awake

Sedation medications
Case of “Emma”

- Agitated, Restless
- Calm, Sleepy, Sedated
- Give less meds

Level:
- Sedation medications
- Awake
If the patient is too awake, they are undersedated.

If the patient is too awake, they may be oversedated.
If the patient is too awake, they are undersedated.

If the patient is too awake, they may be oversedated.
Hypotheses

• Hypothesis #1 – PRNs reflect need for more sedation
• Hypothesis #2 – PRNs reflect worsening delirium
• Hypothesis #3 – PRNs reflect tolerance to sedation

#4 - increased PRNs reflect withdrawal,
#5 - increased PRNs are related to acute medical changes,
#6 - increased PRNs are related to differences in nursing practices
Hypothesis #1 = PRNs reflect lack of sufficient sedation
Hypothesis #1 = PRNs reflect lack of sufficient sedation
Hypothesis #2 – PRNs reflect worsening delirium
Hypothesis #2 – PRNs reflect worsening delirium
Hypothesis #3 – PRNs reflect increased tolerance
Hypothesis #3 – PRNs reflect increased tolerance
Hypothesis #1 = Undersedation

Hypothesis #2 = Oversedation

Hypothesis #3 = Tolerance

Hypothesis #4 = Linear (Sedation)

Hypothesis #5 = Linear (PRNs)
Case of Emma

Basal sedation doses

Day 1 Day 2 Day 3 Day 4 Day 5 Day 6 Day 7 Day 8 Day 9 Day 10 Day 11 Day 12 Day 13 Day 14

Ketamine
Dilaudid
Rocuronium
Fentanyl
Precedex
Case of Emma

- Started antipsychotic
- Increased deliriogenic meds

- Ketamine
- Dilaudid
- Rocuronium
- Fentanyl
- Precedex

PRNs
Case of Emma

![Graph showing PRNs and Expon. (Sedation) with data points for Sedation and PRNs.]

- Sedation
- Expon. (Sedation)
- PRNs
- Linear (PRNs)
Case YB

PRNs

Day 1  Day 2  Day 3  Day 4  Day 5  Day 6  Day 7  Day 8  Day 9  Day 10  Day 11

Seroquel  Gabapentin  Methadone  Clonidine  Versed  Ketamine  Dilaudid  Fentanyl  Precedex

0 5 10 15 20 25 30 35 40 45
Case WA

Day 1

Day 2

Day 3

Day 4

Day 5

Day 6

Day 7

Day 8

Day 9

Day 10

Day 11

Propofol

Versed

Lorazepam

Methadone

Ketamine

Morphine

Dilaudid

Precedex

PRNs
Case WA

Sedation
Expon. (Sedation)

PRNs

0-Jan 2-Jan 4-Jan 6-Jan 8-Jan 10-Jan 12-Jan
Case MS

Graph showing linear relationships for PRNs and Sedation.
Case NA

Day 1
Day 2
Day 3
Day 4
Day 5
Day 6

Dilaudid
Rocuronium
Fentanyl
Precedex

PRNs

Case NA
Case NA

- **Sedation**
- **Linear (Sedation)**
- **PRNs**
- **Linear (PRNs)**

Graph showing data points and linear trends for different categories over the days from 0-Jan to 7-Jan.
Hypothesis #1 = Undersedation

Hypothesis #2 = Oversedation

Hypothesis #3 = Tolerance

Started antipsychotic

Increased delirioogenic meds

Case of "Emma"
“The Difficult to Sedate Patient”

Lisa Hutchison, MD
Pediatric Consult-Liaison Psychiatry
February 24, 2016
If the patient is too awake, they are undersedated.

If the patient is too awake, they may be oversedated.
The Duke PICU delirium story...

• How to improve recognition and treatment of delirium?
  1. Use of diagnostic scales ✔
  2. Specific education about delirium ✔
  3. Increased communication about delirium & Improved

The Duke PICU delirium story...

• How to improve recognition and treatment of delirium?
  1. Use of diagnostic scales ✔
  2. Specific education about delirium ✔
  3. Increased communication about delirium ✔

& Improved

Consult Activity by Problem

May '15 – Oct '15

- Delirium, 33
- Anxiety, 18
- Mood disorders, 27
- Psychosomatic disorders, 13
- Suicide attempt, 13
- Eating disorders, 3
- Misc, 5
- Behavior, 7
- Psychosis, 3
- Noncompliance, 2

27%

Nov '15 – Apr '16

- Delirium, 22
- Psychosomatic disorders, 28
- Anxiety, 28
- Mood disorders, 29
- Suicide attempt, 9
- Eating disorders, 4
- Misc, 5
- Behavior, 5
- Psychosis, 4
- Noncompliance, 4

16%
Conclusions

• Recognition, prevention, and management of delirium is an important task in pediatric medicine

• Collaboration between pediatricians and psychiatrists is essential

• Both education and improved communication are important when addressing diagnoses that require collaboration between specialties