• I have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter
OBJECTIVES

• Compare and contrast the differences and challenges of pediatric delirium versus adult delirium
• Summarize current research on pediatric delirium
• Discuss the limitations of pediatric delirium scales
• Present current retrospective delirium assessment study
ADULTS VS PEDS

- Size/weight
- Development
- Drug response
- Communication
- Adverse events
- Pharmacokinetics
- Drug response
PEDIATRIC BRAIN

- Combination of resiliency and vulnerability
- Response to oxygen deprivation vary
- Different cytokine release

https://www.consejosfitness.com/entrenamiento/como-afecta-a-tu-mente-el-entrenamiento-con-pesas/

DELIRIUM IN PEDIATRICS

CHALLENGES

- Pediatric brain
- Recognition is difficult and many variables
- Variable frequency or incidence (5%-66%)
- No clear definition in PICU patients
- Risk factors
- No standardized, universally accepted screening tool
- Ability to interact or communicate with pediatric patients
- Benzodiazepine use

Schieveld JNM et al. Intensive Care Med 2007;33:1003
WHAT DOES DELIRIUM IN PICU DO?

• Increased length of PICU stay
• Post-traumatic symptoms eg) delusional memories
• Neurocognitive
• Residual perceptual motor and behavioral problems
• Morbidity and mortality
GUIDELINES

http://sansdosage.blogspot.com/2009_07_01_archive.html
CURRENT LITERATURE

• NO randomized, double blind controlled trials
• Retrospective reviews
• Case series or studies

Joyce et al. J Child Adolesc Psychopharmacol 2015;25(9):666
TREATMENT

https://www.estrategiadelaseduccion.com/2012/01/la-esencia-de-la-masculinidad-parte-1/
NONPHARMACOTHERAPY

- Always try nonpharmacotherapy first!!
- Optimizing sleep
  - sleep-wake cycle
  - Minimize noise
  - Lights on only daytime
- Cognitive stimulation
- Early mobilization or rehab
PHARMACOTHERAPY

- Benzodiazepine
- Dexmedetomidine
- Antipsychotics:
  - Quetiapine
  - Risperidone
  - Haloperidol
- Ketamine
- Melatonin
One thing we know for sure....
DELIRIUM IN PATIENTS IN THE PICU WHO RECEIVED QUETIAPINE

Melanie Whitmore, Pharm.D. Candidate 2019
Auburn University Harrison School of Pharmacy
DETECTING DELIRIUM

• The use of a screening tool could circumvent some of the negative outcomes associated with delirium if delirium is correctly identified and treated
  • Objectively describe the clinical improvement when treated with an antipsychotic
  • Provide accurate monitoring to warrant the discontinuation of the antipsychotic
• The five scales utilized in this study are:
  • Pediatric Confusion Assessment Method for the Intensive Care Unit (pCAM-ICU)
  • Preschool Confusion Assessment Method for the Intensive Care Unit (psCAM-ICU)
  • Pediatric Anesthesia Emergence Delirium Scale (PAED)
  • Cornell Assessment for Pediatric Delirium (CAPD)
  • Vanderbilt Assessment for Delirium in Infants and Children (VADIC)
• Each scale has been previously validated in the pediatric population
<table>
<thead>
<tr>
<th></th>
<th>pCAM-ICU</th>
<th>psCAM-ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assesses four</strong></td>
<td>- Core parameters of delirium as defined by the DSM-V</td>
<td>- Core parameters of delirium as defined by the DSM-V</td>
</tr>
<tr>
<td><strong>For verbal and</strong></td>
<td>- Non-verbal children</td>
<td>- Validated in children from 6 months – 5 years</td>
</tr>
<tr>
<td><strong>Validated in</strong></td>
<td>- Children &gt; 5 y/o</td>
<td>- Requires patient interaction</td>
</tr>
<tr>
<td><strong>Requires patient</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>interaction</strong></td>
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</tr>
</tbody>
</table>
Pediatric CAM-ICU (pCAM-ICU): **DELIRIUM** = Presence of FEATURES 1 + 2 + either 3 or 4

**FEATURE 1: Acute Change or Fluctuating Course of Mental Status**
1. Is there an acute change from mental status baseline? *(Y or N)*
2. Has the patient’s mental status fluctuated during the past 24 hours? *(Y or N)*
   ➔ If “YES” to EITHER question then **Feature 1 is PRESENT** ➔ move on to **FEATURE 2**

**FEATURE 2: Inattention**
Say: “Squeeze my hand when I say ‘A’. Let’s practice: A, B, Squeeze only on A.”
Read this letter sequence:  A B A D B A D A Y
   ➔ Did the patient make 3 or MORE ERRORS? *(Error = No squeeze with ‘A’ or Squeeze with other letters)*
   ➔ If “YES” then **Feature 2 is PRESENT** ➔ move on to **FEATURE 3**

**FEATURE 3: Altered Level of Consciousness (LOC)**
   ➔ Does the patient currently have an altered LOC? *(i.e., not alert and calm)*
   ➔ If “YES” then **STOP** ➔ DELIRIUM PRESENT
   ➔ If “NO” then Feature 3 is NOT present ➔ move on to **FEATURE 4**

**FEATURE 4: Disorganized Thinking**
Say: “I am going to ask you some questions.” *(Tell patient to answer yes/no by voice, head nod, etc.)*
Questions: 1. Is sugar sweet?  Alternate questions: - Is a rock hard?
(1 point each) 2. Is ice cream hot? - Do rabbits fly?
3. Do birds fly? - Is ice cream cold?
4. Is an ant bigger than an elephant? - Is a giraffe smaller than a mouse?
Command: 5. Two-step command: Say, “Hold up this many fingers.” Demonstrate by holding up 2 fingers.
   ➔ Did the patient make 2 or MORE ERRORS? *(Error = Answer question incorrectly, doesn’t follow command, etc.)*
   ➔ If “YES” then ➔ DELIRIUM PRESENT

**DELIRIUM PRESENT**

**DELIRIUM ABSENT**
PreSchool CAM-ICU (psCAM-ICU): **DELIRIUM** = Presence of FEATURES 1 + 2 + either 3 or 4

**FEATURE 1: Acute Change or Fluctuating Course of Mental Status**
1. Is there an acute change from mental status baseline? (Y or N)
2. Has the patient's mental status fluctuated during the past 24 hours? (Y or N)
   → If “YES” to EITHER question then Feature 1 is PRESENT → move on to FEATURE 2

**FEATURE 2: Inattention**
Show each picture by slowly moving it in front of the patient's face to one side while verbally prompting them to look at the picture, then switch to the next picture and repeat, total of 10 pictures.
1. Did the patient make 3 or MORE ERRORS? (Error = does not look at cards, even when eyes open)
2. Did the patient have difficulty keeping their eyes open during MOST of your picture assessment?
   (A patient should maintain eye opening for at least half of the assessment period. Even if they attend to 8 or more pictures, they are considered inattentive if they continually require your voice to stimulate eye opening.)
   → If “YES” to EITHER question then Feature 2 is PRESENT → move on to FEATURE 3

**FEATURE 3: Altered Level of Consciousness (LOC)**
→ Does the patient currently have an altered LOC? (i.e. not alert and calm)
→ If “YES” then STOP → DELIRIUM PRESENT
→ If “NO” then Feature 3 is NOT present → move on to FEATURE 4

**FEATURE 4: Disorganized Brain**
→ Does the patient have a sleep-wake cycle disturbance? (Presence of any ONE of the following)
   1. Sleeps mostly during the day
   2. Does not awaken easily to stimulation
   3. Has difficulty getting to sleep
   4. Sleeps only a little at night
→ If “YES” then → DELIRIUM PRESENT
### DELIRIUM RATING SCALES, CONTINUED

<table>
<thead>
<tr>
<th>CAPD</th>
<th>PAED</th>
<th>VADIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Observational</td>
<td>• Observational</td>
<td>• Observational and patient interaction</td>
</tr>
<tr>
<td>• Validated in children of all ages, including those with developmental delay</td>
<td>• Specific for emergence delirium associated with the use of anesthesia</td>
<td>• patient interaction elements</td>
</tr>
<tr>
<td>• Uses eight items that correlate with the DSM-V diagnostic criteria plus psychomotor symptoms</td>
<td>• Rating from “not at all” to “extremely” for behaviors, including eye contact, purposefulness of actions, awareness, restlessness, and consolability</td>
<td>• Highlights key features of delirium</td>
</tr>
<tr>
<td>• Designed to detect hypoactive delirium</td>
<td></td>
<td>• Encourages family involvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Can be modified for the age and developmental status of the child</td>
</tr>
</tbody>
</table>
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></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>
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<tr>
<td>2. Are the child's actions purposeful?</td>
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<td></td>
<td></td>
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<tr>
<td>3. Is the child aware of his/her surroundings?</td>
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<td></td>
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<tr>
<td>4. Does the child communicate needs and wants?</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>5. Is the child restless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6. Is the child inconsolable?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7. Is the child underactive—very little movement while awake?</td>
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<tr>
<td>8. Does it take the child a long time to respond to interactions?</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

TOTAL
<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Not at all</th>
<th>Just a little</th>
<th>Quite a bit</th>
<th>Very much</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes eye contact with caregiver</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Actions are purposeful</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Aware of surroundings</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Restless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Inconsolable</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Level of Consciousness</td>
<td>Mental Status</td>
<td>Perception</td>
<td>Attention and Cognition</td>
<td>Sleep-Wake Cycle</td>
<td>Affect</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------</td>
<td>------------</td>
<td>-------------------------</td>
<td>-----------------</td>
<td>--------</td>
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<tr>
<td>Comatose</td>
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<tr>
<td>Agitated</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Restless</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Alert and Calm</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Drowsy</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Lethargic</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Obtunded</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stupor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coma</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Mental Status**
- **State of Current Mental Status**
  - Check one option
  - At Baseline
  - Acute Change
  - Chronic Change
- **Pattern of Mental Status**
  - Past 24 hours
  - Stable
  - Fluctuating

**Perception**
- **Hallucinations**
  - Auditory
  - Visual
- **Hyperacusis Present?**
- **Atypical Response to Normal Stimuli?**
  - Stuffed animals, familiar toys

**Attention and Cognition**
- **Decreased Ability to:**
  - Focus attention
  - Sustain attention
  - Shift attention
- **Orientation:**
  - Person
  - Place
  - N/A

**Sleep-Wake Cycle**
- **Naps:** (Q2-4h infant, Q6h toddler, QD preschool)
- **Day-Night Reversal Present:**
  - More difficult to recognize in infants
- **Nocturnal Disturbance**
  - Consider initial, middle, terminal insomnia, phase shift

**Affect**
- Excessive energy for age and context/environment?
- Irritability or anger
- Inconsolability
- Inappropriate Affect
- Describe Affect:
  - Confounders present?
  - Anxiety
  - Pain
  - Volutitional
  - None
OBJECTIVES

• **Primary:** Describe the change in delirium from pre-treatment to post-treatment with quetiapine.

• **Secondary:** Compare and contrast the usability of the different rating scales in the PICU and their retrospective validity in determining delirium in patients who were already treated for delirium.
METHODS

• Retrospective analysis
• Patients identified using electronic medical record from USA Children and Women’s PICU and Le Bonheur Children’s Hospital
• Inclusion criteria:
  • Age 0 – 18
  • Received quetiapine in the last 5 years
  • Admitted to the PICU
• Evolving study:
  • Will likely expand retrospective search to include all antipsychotics
**METHODS**

**Data Collected and Evaluated Includes:**

<table>
<thead>
<tr>
<th>Data Collected and Evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quetiapine dose utilized</td>
</tr>
<tr>
<td>Pain scores/ FLACC Scores/ Glasgow Coma Scores</td>
</tr>
<tr>
<td>Disturbances in sleep</td>
</tr>
<tr>
<td>Presence of combativeness and/or agitation</td>
</tr>
<tr>
<td>Fluctuations in mental status</td>
</tr>
<tr>
<td>Agitation and combativeness</td>
</tr>
<tr>
<td>Inability to soothe or console</td>
</tr>
</tbody>
</table>
METHODS

• Subjective data will be evaluated based on presenting symptoms of delirium pre- and post-quetiapine use

• Objective data will be compared using various parameters pre- and post-quetiapine administration, including:
  • Blood pressure
  • Heart rate
  • Electrocardiogram results
  • Blood glucose
METHODS

- All applicable data collected will be utilized in each of the delirium scales.
- The results of each of the five delirium scales will be interpreted and compared.
- The ease of use of each of the scales will be evaluated and the differences between the scales will be assessed.
DATA COLLECTION PROGRESS

- Current data collection from USA Children and Women’s Hospital:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>10</td>
</tr>
<tr>
<td>Average Patient Age</td>
<td>2.3 years</td>
</tr>
<tr>
<td>Average Quetiapine Dose</td>
<td>14.7 mg</td>
</tr>
<tr>
<td>Average Duration of Quetiapine</td>
<td>29 days</td>
</tr>
</tbody>
</table>
END GOAL

• Increase awareness of pediatric delirium in the critically ill population
• Establish a delirium protocol to improve detection and treatment of delirium
REFERENCES

