Clinical Pathways

Delirium Clinical Pathway
Emergency Department and Inpatient Care

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Objectives of the Pathway

- Define delirium and understand the causes of delirium in pediatric patients
- Describe strategies to prevent delirium
- Demonstrate how to use and interpret the Cornell Assessment of Pediatric Delirium (CAPD) to screen for delirium
- Review important components of the new ED Delirium Clinical Pathway and order set
- Review important components of the new Inpatient Delirium Evaluation, Workup and Management Clinical Pathway and order sets
What is Delirium?

- Acute-onset neuropsychiatric syndrome characterized by disturbances of cognition, attention, consciousness or perception that is potentially life-threatening
  - Secondary to a medical etiology (not an isolated psychiatric condition)
  - Can occur as a result of underlying illness, hospitalization, medications or trauma

- Treatment requires inter-professional collaboration between primary physicians, specialists, nursing, and family
  - Early recognition and treatment may prevent adverse outcomes
Why do we care?

• Delirium is a high risk diagnosis, serving as a sign of acute brain dysfunction and a marker for potential significant clinical decompensation
• **All** hospitalized patients are at risk of developing delirium
• Often under-recognized in children:
  o Affects 10-44% of hospitalized children and up to 30% of PICU patients (Bettencourt 2017, Traube 2014, Traube 2017, Smith 2013)
  o Signs may be very subtle
Clinical Presentation of Delirium

• Acute onset (hours-days)
• Waxing/waning course with lucid intervals
• Sleep/wake cycle disruption (often reversed)
• Disturbed consciousness
• Neurocognitive deficits
• Perception, hyper/hypoactivity, mood/affect
• Direct physiological consequence of medical/organic etiology
Clinical Presentation of Psychiatric Illness

- **Psychosis:**
  - Presence of hallucinations, delusional thoughts

- **Mania:**
  - Elated mood, increased energy, rapid speech, grandiosity, decreased need for sleep, impulsivity, flight of ideas, distractibility

- **Depression:**
  - Depressed mood, anhedonia, change in sleep/energy/concentration, guilt, suicidal ideation

Some symptoms overlap with delirium, but....
Delirium vs. Psychiatric Illness

Primary psychiatric illness does **not** have…

- Acute onset
- Fluctuating course
- Disorientation
- Disturbed consciousness
- Memory/Language/Visuospatial impairment
- Confusion, Inattention
Types of Delirium

Delirium in children can present as hypoactive, hyperactive or mixed type

<table>
<thead>
<tr>
<th>Type</th>
<th>Signs</th>
<th>Patient example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoactive</td>
<td>Child looks apathetic and seems uninterested&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Toddler who lies quietly in the bed and does not make eye contact or reach for toys or family members</td>
</tr>
<tr>
<td>Hyperactive</td>
<td>Child is irritable despite adequate pain medication and may be thrashing&lt;sup&gt;2&lt;/sup&gt;</td>
<td>School-aged child receiving mechanical ventilation who is constantly moving around in bed despite adequate pain medication. Patient is difficult to sedate.</td>
</tr>
<tr>
<td>Mixed</td>
<td>Child fluctuates between a hypoactive and a hyperactive state&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Teenager who vacillates between yelling at staff and thrashing in the bed to being calm and staring off into the distance with no interactions with staff at different times of the day.</td>
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</tbody>
</table>
Potential Causes of Delirium

• Infection (intracranial or systemic)
  o Fever
  o Sepsis

• Drug intoxication

• Drug withdrawal

• Medications
  o Opioids, Benzodiazepines
  o Anti-histamines
  o Corticosteroids

• Metabolic/Endocrine disturbance
  o Electrolyte abnormality
  o Hypoglycemia

• Traumatic Brain Injury

• Seizures

• Hypoxia

• Neoplasm

• Cerebrovascular event

• Autoimmune encephalitis

• Organ dysfunction/Insufficiency

• Hospitalization (Environment)
  o Sleep/wake cycle disruption
  o Prolonged immobilization
  o Unfamiliar surroundings, sensory loss
  o Unmanaged painful stimuli
Independent Risk Factors for Developing Delirium

- Age < 2yo
- Developmental delay
- Illness severity
- Prior coma
- Mechanical ventilation
- Receiving benzodiazepines or anticholinergics

Traube 2017, Silver 2015
Complications from Delirium

- Increased:
  - Length of stay
  - Safety events (i.e. pulling lines, falls)
  - Morbidity and mortality
  - Cost of hospitalization
  - Use of restraints and sedatives
    (Traube 2017, Traube 2016, Turkel 2017)

- Reported long term neuro-developmental and behavioral consequences, including development of PTSD following hospitalization (Brummel 2014)
Delirium Clinical Pathways

• Pathway can help guide appropriate medical evaluation and management for patients with recognized delirium
  o There is a high clinical suspicion for delirium if a patient has any one of the following features:
    ▪ Acute mental status change
    ▪ Acute onset hallucinations/delusions
    ▪ Confusion or impaired memory
    ▪ Alteration in attention or arousal
    ▪ New catatonic features
There are 2 Delirium Clinical Pathways:

1. Delirium Emergency Department Care
   - This pathway is focused on identifying delirium and initiating work-up prior to admission

2. Delirium Inpatient Care
   - This pathway has three main aims:
     - Prevent and identify delirium in the inpatient setting
     - Guide work-up
     - Manage symptoms
The first page is a general overview of the ED and inpatient pathway.

Note that phases of care and scoring tools are easily accessible.

Note that all patients admitted to the med/surg floors are screened for delirium, in order to identify patients early.
Etiologies to consider:
- CNS infection, fever, sepsis/end organ dysfunction (see Sepsis Pathway), Multi-system Inflammatory Syndrome in Children (see MIS-C Pathway), hypoxemia, hyperglycemia, electrolyte abnormality, CNS abnormality, intoxication, autoimmune encephalitis, SLE, vasculitis, drug withdrawal, metabolic disease, neoplasm

Initial Workup:
- Labs:
  - iStat chem 10, CBC, CRP, ESR, ammonia, PT/PTT/NR, TSH, free T4, VBG or CBG, AST, ALT, EtOH level, ANA
- Urine:
  - toxicology screen
- Imaging:
  - STAT head CT without contrast

If febrile:
- Blood and urine cultures
- Strongly consider LP: cell count with differential, protein, glucose, gram stain and culture, HSV PCR, enterovirus PCR, opening pressure. Ask lab to hold 3 mL CSF for further studies.
- Begin all empiric IV antimicrobials listed below:
  - Ceftriaxone IV 100 mg/kg/day q12hr (max 2,000 mg/dose) x48 hours AND
  - Vancomycin IV x48 hours:
    - <52 weeks PMA\(^1\)/<3 months old: 15 mg/kg/q8hr or as determined by pharmacy based on estimated AUC
    - ≥52 weeks PMA\(^1\)/≥3 months old – 11 years old: 70 mg/kg/q6hr
    - ≥12 yrs old: 60 mg/kg/day q8hr \(\neq\) Acyclovir 30 mg/kg/dose IV q8hr until HSV studies negative

\(^1\)PMA (Post-Menstrual Age) = gestational age + postnatal age

It is important to identify potential etiologies of delirium first, and disease specific management should occur.

If a specific etiology for delirium is not identified on initial assessment, further lab and imaging studies are recommended.

Emergency Room Care:
1. Evaluation and Work Up
2. Management
Emergency Room Care:
1. Evaluation and Work Up
2. Management

If patient is **febrile**, blood and urine cultures should be obtained, and an LP is strongly recommended.

When performing the LP, please send as much CSF possible to the lab to be saved for potential future studies.

* Minimum of 3 ml of CSF should be saved, but as much as 6 ml may be needed for some panels.
* Please call the lab to confirm CSF is being held.
Emergency Room Care:
1. Evaluation and Work Up
2. Management

If the patient is febrile with delirium, empiric broad spectrum antimicrobial coverage should be initiated.

Note: the pharmacy’s vancomycin protocol was updated in Feb 2021.
- All patients who have vancomycin IV ordered will be followed by the clinical pharmacist to help determine appropriate dosing parameters.
- Providers will order initial doses per pathway/order set and provide indication within the order.
- IV vancomycin dosing and recommended labs will be managed by pharmacy in conjunction with primary teams.
Emergency Room Care:
1. Evaluation and Work Up
2. Management

Based on initial testing and continual evaluation, disposition can be determined.

Specific criteria warrant inpatient admission, including ongoing delirium, or ongoing symptoms with need of further interventions.

Considerations for additional consults are outlined.
Emergency Room Care:
1. Evaluation and Work Up
2. Management

Appendix A: The Vanderbilt Assessment for Delirium in Infants and Children (VADIC)
Emergency Room Care:
1. Evaluation and Work Up
2. Management

Appendix A: The Vanderbilt Assessment for Delirium in Infants and Children (VADIC)

This is tool provides a comprehensive framework to standardize pediatric delirium assessment by psychiatrists.
Management of Delirium in the Inpatient or Zone C setting encompasses 4 key categories:

- Treat the suspected etiology
- Medications & Assessment
- Nursing Care
- Optimize Environment

We will discuss these strategies more in depth in later slides.
Inpatient and Zone C:

1. Management

It is always important to assess for the most likely etiology of delirium.

Be sure to involve any consulting teams as appropriate.
Inpatient and Zone C: 1. Management

Because certain medications can contribute to delirium, it is important to re-evaluate medications, and minimize any deliriogenic medications the patient is on.

Clicking on “deliriogenic meds” will bring you to a list of medications listed in the Inpatient Prevention portion.

Psychiatry may assist with treatment of agitation.

Physical therapy and Child life should become involved as early as it is safe to do so.

Child life is helpful for creating a functional plan to help normalize day time and night time routines.
Inpatient and Zone C:  
1. Management

Continued and regular assessment of delirium is very important to assess for improvement or worsening.

Modified nursing care and safety monitoring are a vital part of the management plan.
Inpatient and Zone C:
1. Management

Optimizing the environment to help re-orient the child to their surroundings can help improve delirium.

Having a daily schedule, providing clocks, and decreasing potential stressors are all examples.
If symptoms are not improving, the differential should be broadened to further assess for a potential etiology.

Optimization of the environment and the patient’s medication should be ongoing during this time.
Inpatient and Zone C: 1. Management

If symptoms of delirium are improving, management strategies to continue while planning towards discharge.

Depending on the circumstance, a multidisciplinary family meeting may be necessary.

The patient must have specific criteria met in order to be discharged – specifically, delirium should have resolved (or a treatment plan is in place for etiologies that have been determined).
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

The Delirium – Inpatient Prevention and Screening algorithm is meant for all patients admitted on the Med/Surg units at CT Children’s, not just for those with suspected or known delirium.

Of note:
PICU patients should be excluded from this pathway. They are being screened with the CAPD score, but providers and nurses should follow the specific protocols for screening, prevention and treatment for PICU patients.
Inpatient and Zone C:
1. **Prevention and Identification**
2. **Evaluation and Work up**

Prevention is key!

Proactive measures to prevent delirium include both environmental and medication considerations.
Inpatient and Zone C:
1. **Prevention and Identification**
2. **Evaluation and Work up**

Deliriogenic medications are listed and should be reviewed for every patient presenting with delirium.
Inpatient and Zone C:

1. **Prevention and Identification**
2. **Evaluation and Work up**

All med/surg patients will be screened with the CAPD tool.

Nursing will complete the screening about every 12 hours. The screen will occur towards the end of the shift to capture the “overall assessment” or average behavior. This is NOT a “moment in time” assessment.
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

CAPD screening tool (Cornell Assessment of Pediatric Delirium)
- Validated for patients 0-21 yrs
- Easy to use
- Can trend over time
- Based on developmental anchor points for patients <2 years old or developmentally delayed
- Detects hypoactive and hyperactive forms of delirium

In developmentally normal children, CAPD sensitivity 92% and specificity 86.5%
In developmentally delayed children, CAPD sensitivity 96% and specificity 51%
Inpatient and Zone C:

1. **Prevention and Identification**
2. **Evaluation and Work up**

**CAPD uses Developmental Anchor Points**

- Anchor points are a reference for normative behaviors based on age/developmental level
- Used for patients < 2 years of age (and/or of that developmental level)

  - Observable behaviors as they would be seen in hospital setting
  - Adjusted for alterations by “sick behavior,” pain, anxiety, and developmental delay

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**CLINICAL PATHWAY:**
Delirium - Inpatient Prevention and Screening

<table>
<thead>
<tr>
<th>NB</th>
<th>4 weeks</th>
<th>6 weeks</th>
<th>8 weeks</th>
<th>28 weeks</th>
<th>1 year</th>
<th>2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the child make eye contact with the caregiver?</td>
<td>Fixates on face</td>
<td>Holds gaze briefly</td>
<td>Holds gaze</td>
<td>Follows moving object/play vignet</td>
<td>Holds gaze, prefers primary parent, looks at speaker</td>
<td>Holds gaze, prefers primary parent, looks at speaker</td>
</tr>
<tr>
<td>2. Are the child’s actions purposeful?</td>
<td>Moves head to side, dominated by primitive reflexes</td>
<td>Reaches (with some discoordination)</td>
<td>Reaches</td>
<td>Symmetrical movements, will passively grasp hands</td>
<td>Reaches with coordinated smooth movement</td>
<td>Reaches and manipulates objects, tries to change position, if mobile may try to get up, reaches and manipulates objects, tries to change position, if mobile may try to get up and walk</td>
</tr>
<tr>
<td>3. Is the child aware of his/her surroundings?</td>
<td>Calm awake time</td>
<td>Awake alert time</td>
<td>Increasing awake alert time</td>
<td>Facial brightening or smile in response to nodding head, frown to bell, coos</td>
<td>Facial brightening or smile in response to nodding head, frown to bell, coos</td>
<td>Facial brightening or smile in response to nodding head, frown to bell, coos</td>
</tr>
<tr>
<td>4. Does the child communicate needs and wants?</td>
<td>Cries when hungry or uncomfortable</td>
<td>Cries when hungry or uncomfortable</td>
<td>Cries when hungry or uncomfortable</td>
<td>VOCAL INDICATES ABOUT NEEDS, E.G., HUNGER, DISCOMFORT, CURIOUSITY IN OBJECTS, OR SURROUNDINGS</td>
<td>VOCAL INDICATES ABOUT NEEDS, E.G., HUNGER, DISCOMFORT, CURIOUSITY IN OBJECTS, OR SURROUNDINGS</td>
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</tr>
<tr>
<td>5. Is the child restless?</td>
<td>No sustained awake alert state</td>
<td>No sustained calm state</td>
<td>No sustained calm state</td>
<td>No sustained awake alert state</td>
<td>No sustained calm state</td>
<td>No sustained calm state</td>
</tr>
<tr>
<td>6. Is the child inconsolable?</td>
<td>Not soothed by parental rocking, singing, feeding, comforting actions</td>
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</tr>
<tr>
<td>7. Is the child underactive—very little movement while awake?</td>
<td>Little if any fixed and then relaxed state with primitive reflexes (child should be sleeping comfortably most of the time)</td>
<td>Little if any reaching, kicking, grasping (still may be somewhat disordinated)</td>
<td>Little if any reaching, kicking, grasping (may begin to be more coordinated)</td>
<td>Little if any purposeful grasping, control of head and arm movements, such as pushing things that are noxious away</td>
<td>Little if any purposeful grasping, control of head and arm movements, such as pushing things that are noxious away</td>
<td>Little if any purposeful grasping, control of head and arm movements, such as pushing things that are noxious away</td>
</tr>
<tr>
<td>8. Does it take the child a long time to respond to interactions?</td>
<td>Not making sounds or reflexes active as expected (grasp, suck, moan)</td>
<td>Not making sounds or reflexes active as expected (grasp, suck, moan)</td>
<td>Not kicking or crying with noxious stimuli / Not kicking or crying with noxious stimuli</td>
<td>Not kicking or crying with noxious stimuli / Not kicking or crying with noxious stimuli</td>
<td>Not kicking or crying with noxious stimuli / Not kicking or crying with noxious stimuli</td>
<td>Not kicking or crying with noxious stimuli / Not kicking or crying with noxious stimuli</td>
</tr>
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</table>

Concurrent implementation of preventive strategies and delirium screening as outlined below.
The CAPD: Documenting it in the chart

- CAPD Screening Tool is a screening tool based on these 8 questions, answered based on observed patient behaviors over the course of the shift and reflective of their current developmental level.

- Scoring will be completed by nursing twice daily, ideally towards the end of their shift.

- Providers may be asked by nursing to help answer some questions in the tool that they are having trouble evaluating (Can be completed in a team approach for a patient that is difficult to assess).

- Parents may also be a resource to help answer these questions based on parents observation, comparing to baseline behaviors.
The CAPD: Where is it in the Chart?

- On the patient’s Summary screen under “Assessment Scoring”
- On the Vital Signs screen listed under the vitals signs
- Under the flowsheet “Pedi A&I”

You can also add a column for the CAPD to “My List” for easy viewing when looking at your patient list.
The CAPD: Best Practice Alerts (BPA)

By selecting to open the order set or add the problem, you are saying that you are performing the appropriate actions. This means that you DO NOT have to select an acknowledgement reason below.

Elevated CAPD scores will automatically trigger a BPA for providers. On the BPA there are two sections.
- On the top you can Open the Order Set and Add Delirium as a Problem
- If you do neither you will need to chose a reason why on the bottom “Acknowledgement reason section”

The Acknowledge Reason section should be used when you do not want to perform one of the above two actions.
- Actively Managing Delirium could be used when you have already placed orders and added the problem but it has been 72 hours and the patient is still getting an elevated score.
- When you select one of the acknowledge reasons the top two actions will automatically change to “Do Not…”.
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

If there is a high clinical suspicion of delirium, proceed to the Inpatient Delirium Evaluation and Work Up.

If not, continual assessment, and optimization of environment/medications should occur.
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

Once a patient has been identified as having delirium due to clinical presentation and/or elevated CAPD score, the primary provider should perform a bedside assessment of the patient.

Notify the primary attending if a patient is confirmed to have delirium based on the bedside evaluation.

Inpatient delirium management should occur simultaneously as the work up. Management is the same as Zone C management – as previously discussed.
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

If etiology not clear, work up should follow a tiered evaluation including:
- Lab testing
- Imaging
- Consult services

Overall evaluation and escalation of work up should involve a **multidisciplinary team** approach

Non pharmacologic interventions should start as soon as delirium identified
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

Primary work up is intended to screen for easily identifiable sources of delirium.

As soon as an etiology is positively identified, it should be treated as appropriate, while continuing to manage delirium.
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

If febrile, further evaluation (including an LP) and empiric antimicrobials is warranted. Specialists may be consulted depending on specific concerns.

When performing the LP, please send as much CSF possible to the lab to be saved for potential future studies.

* Minimum of 3ml of CSF should be saved, but as much as 6ml may be needed for some panels.
* Please call the lab to confirm CSF is being held

**
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

The pharmacy’s vancomycin protocol was updated in Feb 2021.

- All patients who have vancomycin IV ordered will be followed by the clinical pharmacist to help determine appropriate dosing parameters.
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Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

Note that the VADIC assessment tool will again be used by Psychiatry to provide consistent standardized assessment of patients with concern for Delirium.
Inpatient and Zone C:
1. Prevention and Identification
2. Evaluation and Work up

- Consult Infectious Disease
- Infectious Encephalitis Panel:
  - Blood: Mycoplasma IgM/IgG, Bartonella IgM/IgG, Lyme IgM/IgG, West Nile IgM/IgG (June-Nov), Anaplasma Phagocytophilum IgM/IgG (June-Nov), Anaplasma (Ehrlichia) blood smear (June-Nov), Rickettsial Disease Panel (June-Nov), travel to endemic area
  - CSF: (add on to previously obtained CSF), Meningitis/Encephalitis PCR panel (If criteria for use met), EBV PCR, Adenovirus PCR, VDRL (at risk patients), Arbovirus Ab panel (June-Nov)
- Respiratory: Viral Respiratory Culture (Dec-May)
- Consider evaluation for Autoimmune Encephalitis
  - Blood: ANA, Anti-ENA, Anti-DNA, Anti-phospholipid antibodies, ANCA, Von Willibrand Factor antigen, ACE level, TPO
  - CSF: (add on to previously obtained CSF) Autoimmune Encephalitis Panel
There are two order sets for inpatient use:
1. Admit to MS – Delirium
2. Delirium Evaluation, Work up, and Management

Either can be used at any time, but the second is meant for patients already admitted.
Review of Key Points

- Pediatric delirium is an under-recognized and high-risk diagnosis in pediatric patients that can lead to several complications

- Delirium is a condition caused by a medical etiology, it is not a psychiatric illness

- Many factors contribute to the development of delirium, including underlying illness, medications and disruption of normal routine

- CAPD screening tool can help earlier identify patients with delirium in the inpatient and ICU setting

- New Clinical Pathways for Pediatric Delirium Evaluation, Work-up and Management provides a consistent approach to preventing, screening, evaluating, and managing delirium
Quality Metrics

- Percentage of patients on medical surgical units who were not screened with the CAPD
- Percent of patients who were screened with CAPD tool twice daily
- Percent of patients with CAPD score $\geq 9$ with delirium pathway order set usage
- Average time from CAPD score $\geq 9$ to the initiation of the delirium pathway order set
- Number of PICU transfers following CAPD score $\geq 9$
- Number of MET activations following CAPD score $\geq 9$
- Percent of patients with CAPD score $\geq 9$ who have delirium ICD-10 codes applied
- Percent of patients with CAPD score $\geq 9$ who have a psychiatry evaluation
- Percent of patients with CAPD score $\geq 9$ who have a CT scan
- ALOS for patients with a CAPD score $\geq 9$ (days)
Pathway Contacts

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• Hareem Park, MD
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• Eric Hoppa, MD
  o Pediatric Emergency Medicine

• Lisa Namerow, MD
  o Child Psychiatry
References

About Connecticut Children’s Clinical Pathways Program

The Clinical Pathways Program at Connecticut Children’s aims to improve the quality of care our patients receive, across both ambulatory and acute care settings. We have implemented a standardized process for clinical pathway development and maintenance to ensure meaningful improvements to patient care as well as systematic continual improvement. Development of a clinical pathway includes a multidisciplinary team, which may include doctors, advanced practitioners, nurses, pharmacists, other specialists, and even patients/families. Each clinical pathway has a flow algorithm, an educational module for end-user education, associated order set(s) in the electronic medical record, and quality metrics that are evaluated regularly to measure the pathway’s effectiveness. Additionally, clinical pathways are reviewed annually and updated to ensure alignment with the most up to date evidence. These pathways serve as a guide for providers and do not replace clinical judgment.