Disclosures

None
Objectives

- To understand the delirium screening initiative at MUSC
- To discuss the impact of proactively managing delirium in the non-ICU setting

Diagnosing Delirium

Delirium is a neurobehavioral syndrome caused by dysregulation of baseline neuronal activity secondary to systemic disturbances.


Diagnosis is clinical based on evidence of an acute fluctuation of mental status, specifically, disruption of attention and arousal (level of consciousness)

Many screening tools: (Confusion Assessment Method, 4A, NuDESC)

Diagnosing Delirium

Definition: Diagnostic Statistical Manual (DSM) V

A. Disturbance in attention (i.e., reduced ability to direct, focus, sustain, and shift attention) and awareness (reduced orientation to the environment).

B. The disturbance develops over a short period of time (usually hours to a few days), represents an acute change from baseline attention and awareness, and tends to fluctuate in severity during the course of a day.

C. An additional disturbance in cognition (e.g., memory deficit, disorientation, language, visuospatial ability, or perception).

D. The disturbances in Criteria A and C are not better explained by a pre-existing, established or evolving neurocognitive disorder and do not occur in the context of a severely reduced level of arousal such as coma.

E. There is evidence from the history, physical examination or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal (i.e. due to a drug of abuse or to a medication), or exposure to a toxin, or is due to multiple etiologies.


Epidemiology of Delirium

Delirium is common, particularly in the elderly

Systematic review of medical literature by Inouye et al. to accurately estimate the prevalence and incidence

- General Medical: prevalence of 18-35% with an incidence of 11-14%
- ICU: prevalence of 7-50% with an incidence of 19-82%

Likely underestimated given absence of modern screening and under-recognition of motor subtypes

10% of patients on 8E screened positive for delirium (Dec 2016-Feb 2017)

Patients >65yo make up 13% of the population, but 40% of hospital admissions

Patients >85yo make up 1.3% of the population, but 9.2% of hospital admissions

Impact of Delirium

Estimated to cost more than $164 billion per year in the US (2008)

Associated with increased mortality when controlling for severity of illness, comorbidities, etc.

In the ICU associated with 2-4x increased 1 year mortality
Non-ICU associated with 1.5x increased 1 year mortality

Impact of Delirium

Increased length of stay when controlling for severity of illness, age, presence of dementia, etc.

Even greater impact on LOS if delirium was not present at admission

Less likely to be discharged home, and thus more likely to be discharged to nursing or rehab facility

Cognitive Impact of Delirium

>50% of patients will experience up to a year of cognitive impairment

Increased rate of cognitive decline in patients with dementia

Marker of cognitive reserve in vulnerable patients

Long-Term Cognitive Impairment after Critical Illness


- 861 ICU patients, 74% had delirium
- 34% of patients <49 yo had cognitive function below baseline, consistent with severe TBI at 12 months
Delirium vs Dementia

Delirium is an acute phenomena: **Acute Brain Failure**

Dementia is a chronic underlying process: **Chronic Brain Failure**

Dementia is a major risk factor for delirium

Important to look for change from baseline: **Acute on Chronic Brain Failure**

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**Cause of Delirium**

Most often multifactorial

**Predisposing Factors:**
- Dementia/cognitive impairment
- Alcohol abuse
- Advanced age
- Severe comorbid illness
- Sensory/functional impairment

**Precipitating Factors:**
- Sedating or psychoactive medications
- Mechanical restraints
- Elevated serum urea
- Surgery
- Abnormal sodium
- Many, many more

Subtypes of Delirium

Similar impact on morbidity and mortality

**HYPERACTIVE:**

1.6%

Psychomotor agitation, hyperarousal
Psychosis/delusions
Often easier to diagnose

**HYPOACTIVE:**

54.9%

Psychomotor retardation, decreased arousal
Underappreciated occurrence of psychosis/delusions
Often mistaken for depression (42% of in hospital consults for "depression" were actually delirious)

A sleepy patient is a sick patient

**MIXED:**

43.5%

Combination or fluctuation between both

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What causes delirium?

- Increase GABA release/availability
- Increase Glutamate release/availability
- Increase NE release/availability
- Increase Dopamine release/availability
- Decrease ACh release/availability

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Distinct Phenotypes of Delirium

Hepatic Encephalopathy: Increased GABA tone shown in animal models

Delirium tremens/alcohol withdrawal: hyper-excitability of the VTA

Septic encephalopathy: dysfunction of cerebral blood flow shown by PET. Inflammatory response and endothelial/BBB break down

Missed Diagnosis

Many factors contribute to missed diagnosis:
- Fluctuating nature of illness
- Subtle subtypes: hypoactive
- Communication barriers between staff
- Inadequate use of delirium assessment tools
- Lack of conceptual understanding
- Similarity to and often mistaken with dementia

Missed Diagnosis

Study of 303 elderly (median age 72yo) patients who presented to the ED, 25 (8.3%) had delirium.

- 1 in 4 were identified by the emergency room physician
- Of the 16 who were admitted to the hospital, only 1 recognized by admitting physician
- Majority of these patients had hypoactive delirium

Study of 710 elderly (mean age 83) patients admitted to medical unit. 110 (15.5%) had delirium by validated screening tool.

- 28% of these patients were identified by clinical team in acute hospital setting


Delirium Screening at MUSC (before 2016)

CAM-ICU and Richmond Agitation and Sedation Scale (RASS) are used in all ICUs

RASS was the only mental status screening tool used on the non-ICU floors

No routine screening conducted in ER

Exception would be Glasgow Coma Scale (GCS), which is not delirium screening
Richmond Agitation and Sedation Scale (RASS)

- Designed for use ICU to objectively measure sedation for the purpose of balancing medications
- High interrater reliability and validity to detect changes in level of sedation


RASS and Delirium

- Level of arousal (or sedation) is strongly associated with delirium
- Likely useful as a component of delirium screening
- Lacks assessment of attention, a hallmark of diagnosis


RASS and Delirium

Han et. Al compared RASS to psychiatrist assessment in ED patients

Found a RASS to be highly specific for scores >+1 or < -1

Diagnostic performances of the Richmond Agitation Sedation Scale (RASS).

<table>
<thead>
<tr>
<th>Score</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>+LR</th>
<th>-LR</th>
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<tbody>
<tr>
<td>Research assistant</td>
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<tr>
<td>RASS other than 0</td>
<td>84.0% (73.8-94.2)</td>
<td>87.6% (84.2-91.1)</td>
<td>6.8 (5.0-9.2)</td>
<td>0.2 (0.1 - 0.3)</td>
</tr>
<tr>
<td>RASS &gt; +1 or &lt; -1</td>
<td>22.0% (10.5-33.5)</td>
<td>98.9% (97.3-100.0)</td>
<td>19.6 (6.5-59.1)</td>
<td>0.8 (0.7 - 0.9)</td>
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<tr>
<td>Physician</td>
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<tr>
<td>RASS other than 0</td>
<td>82.0% (71.4-92.6)</td>
<td>85.1% (81.4-88.8)</td>
<td>5.5 (4.2-7.3)</td>
<td>0.2 (0.1 - 0.3)</td>
</tr>
<tr>
<td>RASS &gt; +1 or &lt; -1</td>
<td>16.0% (5.8-25.2)</td>
<td>99.7% (99.2-100.0)</td>
<td>37.0 (7.3-445.9)</td>
<td>0.8 (0.7 - 1.0)</td>
</tr>
</tbody>
</table>

But what about patients with normal RASS?

We can do better

Delirium is common problem in the hospital and carries significant impact to our patients, during and after hospitalization

We’re not great at diagnosing it

So here’s what we did…. 
Diagnosing Delirium in Older Emergency Department Patients: Validity and Reliability of the Delirium Triage Screen and the Brief Confusion Assessment Method

Jin H. Han, MD, MSc; Amanda Wilson, MD; Eduard E. Vasilevskis, MD, MPH; Ayumi Shintani, MPH, PhD; John F. Schinelle, PhD; Robert S. Dittus, MD; Amy J. Graves, SM, MPH; Alan B. Storrow, MD; John Shuster, MD; E. Wesley Ely, MD, MPH

Table 3. Validity and reliability data of DTS and ICAM in a subgroup of hospitalized patients.*

| Delirium Assessments | TP | FN | TN | FP | Sensitivity (95% CI), % | Specificity (95% CI), % | PLR (95% CI) | NLR (95% CI) | % Concordance between physician and RA=88.8% (95% CI 64.2%–95.7%).

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<th>n=0.77 (95% CI 0.59–0.85)</th>
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<tbody>
<tr>
<td><strong>DTS</strong></td>
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<tr>
<td>Physician</td>
<td>37</td>
<td>1</td>
<td>136</td>
<td>102</td>
<td>97.4 (98.5–99.5)</td>
<td>56.7 (50.3–62.8)</td>
<td>2.23 (1.93–2.62)</td>
<td>0.05 (0.01–0.32)</td>
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<tr>
<td>RA</td>
<td>37</td>
<td>1</td>
<td>136</td>
<td>102</td>
<td>97.4 (98.5–99.5)</td>
<td>57.5 (51.2–63.6)</td>
<td>2.29 (1.96–2.66)</td>
<td>0.05 (0.01–0.32)</td>
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<tr>
<td>% Concordance</td>
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<tr>
<td><strong>ICAM</strong></td>
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<tr>
<td>Physician</td>
<td>31</td>
<td>7</td>
<td>128</td>
<td>12</td>
<td>81.0 (66.0–94.0)</td>
<td>95.0 (91.5–97.1)</td>
<td>15.32 (8.21–26.90)</td>
<td>0.19 (0.10–0.38)</td>
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<tr>
<td>RA</td>
<td>29</td>
<td>9</td>
<td>131</td>
<td>9</td>
<td>81.0 (66.0–94.0)</td>
<td>96.7 (93.6–98.8)</td>
<td>22.90 (11.32–46.29)</td>
<td>0.25 (0.14–0.43)</td>
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<tr>
<td>% Concordance</td>
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<tr>
<td><strong>Combined</strong></td>
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<tr>
<td>RA DTS + physician ICAM</td>
<td>31</td>
<td>7</td>
<td>123</td>
<td>12</td>
<td>80.3 (65.9–93.4)</td>
<td>95.0 (91.5–97.1)</td>
<td>16.32 (8.21–26.90)</td>
<td>0.19 (0.10–0.38)</td>
<td></td>
</tr>
<tr>
<td>RA DTS + RA ICAM</td>
<td>29</td>
<td>9</td>
<td>131</td>
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<td>80.3 (65.9–93.4)</td>
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<td>0.25 (0.14–0.43)</td>
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<tr>
<td>Physician DTS + ICAM</td>
<td>30</td>
<td>8</td>
<td>128</td>
<td>12</td>
<td>80.3 (66.0–94.0)</td>
<td>95.0 (91.5–97.1)</td>
<td>15.79 (8.88–28.07)</td>
<td>0.22 (0.12–0.41)</td>
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</tbody>
</table>

TP, True positive; FN, False negative; TN, True negative; FP, False positive; PLR, Positive likelihood ratio; NLR, negative likelihood ratio; RA, research assistant.

*This was a subgroup analysis of enrolled 278 older patients, who were admitted to non-ICUs. The DTS and ICAM were performed by the physician and RA. Sensitivities, specificities, PLRs, and NLRs are reported with their 95% CIs for the DTS, ICAM, and the combined approach. For the combined approach, it was assumed that a negative DTS ruled out delirium and no additional testing was needed. It was also assumed that the ICAM was only performed only in those with a positive DTS. The reference standard for delirium was a psychiatrist assessment using DSM-IV-TR criteria.

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**Brief Confusion Assessment Method (bCAM) Flow Sheet**

1. **Feature 1 - Altered Mental Status or Fluctuating Course**
   - No
   - Go to Feature 2

2. **Feature 2 - Inattention**
   - Can you name the months backwards from December to July?
   - Yes
   - Go to Feature 3
   - No or 1 errors
   - ICAM Negative No Delirium

3. **Feature 3 - Altered Level of Consciousness?**
   - Richmond Agitation Sedation Scale
   - No
   - Go to Feature 4
   - Yes
   - ICAM POSITIVE DELIRIUM PRESENT

4. **Feature 4 - Disorganized Thinking**
   - Is this patient able to follow a simple two-step command?
   - No
   - ICAM Negative No Delirium
   - Yes
   - ICAM POSITIVE DELIRIUM PRESENT

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**Delirium Screening in Non-ICU Patients**

December 2016 started pilot on 8E

All adult patients screened twice daily by nursing staff

Well received by staff, minimal impact on work flow

Positive screening opened ‘Acute Confusion Care Plan’
Acute Confusion Care Plan

Nursing care plan put in place to be used for all bCAM positive patients

<table>
<thead>
<tr>
<th>Problem Area</th>
<th>Intervention</th>
<th>Outcome</th>
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</table>

- Acute Confusion Care Plan
  - bCAM positive patients

- Education Initiative in ICU
  - June 2017

- Screening and Acute Confusion Care Plan on BE
  - June 2017

- Silver Squares Feeding Program
  - November 2017

- Mobility Volunteer Program
  - April 2017

- Specific FOB on NR
  - August 2017

- Expand To remaining “High-risk units” (11 total)
  - May 2017

- Complete hospital wide implementation (10 total units)
  - August 2018

- Initiation of tools, metrics, care team and patient education

- Evaluating housestaff, facility and center health care teams

- MUSC.edu
MUSC Delirium Work Group Created

Interprofessional Team meeting monthly to improve delirium management at MUSC

Co-Lead: Kristine Harper, MSN, RN, NE-BC: Safe Patient Handling and Mobility Program Manager

- Mark Newbrough MD: Geriatrician
- David Comeau DPT, MHA: Physical Therapist
- Michelle Donnelly MSP-CCC-SLP: Speech Pathologist
- Kelley Martin MPH, RDH, LD: Dietician
- Katelyn Ferguson BS: Dietician Student
- Kelly Hedges CDVS: Director of Volunteer Services
- Sophie Robert, PharmD
- Nurse managers from all involved units

What were our goals?

- Improve the quality of care we provide our patients
- Reducing falls and use of restraints
- Providing template to build delirium research
Adding layers of intervention

Silver spoons: Patient feeding protocol

Patient mobility: Volunteer driven

Additional Education and Awareness

Delirium Is...
- Common
- Has serious complications
- Expensive
- Often unrecognized
- Preventable

Causes of Delirium
- Drugs (pain meds, benzos, sedating, steroids)
- Environmental factors (hearing aids, eye glasses, sleep/wake cycle)
- Lab abnormalities (Na, K, Ca, BUN/Cr)
- Infection
- Respiratory status (hypoxia)
- Immobility
- Organ failure
- Unrecognized dementia
- Shock (sepsis)

NURSING: Screen every adult patient twice daily

DIETITIAN and SLP: Silver Spoons feeding assistance program

PT and OT: Emphasis on early mobility and ambulation

NURSING: Intake Assessment
Confusion Care Plan, emphasizing non-pharmacologic strategy

PHYSICIANS: Modify medical and pharmacologic treatment; Education to all treatment teams

VOLUNTEERS: Assist with Silver Spoons feeding program and early mobility program and provide companionship
<table>
<thead>
<tr>
<th></th>
<th># of Patients Screened</th>
<th># bCAM Positive</th>
<th>% bCAM Positive</th>
<th>Delirium Dx in Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2017</strong></td>
<td>10200</td>
<td>1227</td>
<td>12.0</td>
<td>777</td>
</tr>
<tr>
<td><strong>2018</strong></td>
<td>11404</td>
<td>1606</td>
<td>14.1</td>
<td>888</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>21606</td>
<td>2833</td>
<td>13.1</td>
<td>1655</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Total Patients</th>
<th># CAM Positive</th>
<th>% CAM Positive</th>
<th>Delirium Dx in Chart</th>
<th>% Patients with Delirium Dx</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>36700</td>
<td>6998</td>
<td>20.1</td>
<td>3009</td>
<td>8.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Total Patients</th>
<th>Delirium Dx</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-screening</strong></td>
<td>170377</td>
<td>5165</td>
<td>3.03</td>
</tr>
<tr>
<td><strong>Screening</strong></td>
<td>21606</td>
<td>1655</td>
<td>7.17</td>
</tr>
</tbody>
</table>
Changing the culture around confused patients

Do you feel you were able to identify more patients suffering from delirium than before knowing how to perform the CAM assessment

Did you do anything different for your patients now knowing that they were suffering from delirium?

- Yes
- Sometimes
- No
Plans for the future

- Study our delirious patients through retrospective analysis
  - Create predictive model to target prevention
- Audit and improve our program
- Expand feeding and mobility interventions
- Expand screening to ED
- Enhance physician education
  - Create an up-to-date orderset
- Treatment/prevention trials

National Efforts with American Delirium Society

Working to create a consensus statement from American Delirium Society that screening should be standard of care in non-ICU adults

Working in collaboration with:
- Cleveland Clinic (Leo Pozuelo, MD, FACP)
- UCSF (Stephanie Rogers, MD and Vanja Douglas, MD)
- Kaiser Permanente (Kristen Brooks, MD and Clay Angel, MD)
- Hartford HealthCare (Cristine Waszynski, APRN)
- UAB (Emily Simmons, RN, MSN)
Questions?