PfP NJ 2.0 Critical Care Webinar Series– Post ICU Syndrome: Impacting Long Term Cognitive & Physical Function through Evidence Based Care

July 19, 2016
Hosted by New Jersey Hospital Association

Lauren Rava, MPP

Collaborative Faculty

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Advanced Nursing LLC
Agenda

• Brief Partnership for Patients-NJ 2.0 updates
• Critical Care Webinar Series – Post ICU Syndrome: Impacting Long Term Cognitive & Physical Function through Evidence Based Care
• Q&A
• Next steps
Goals

• Reduce HACs 40% from 2010 baseline
• Reduce preventable readmissions 20% from 2010 baseline

*It is important to note a data anomaly for the fall and falls with injury rates for first quarter 2015. The data shows a dramatic increase in rates. There are a couple of possibilities. One, 2015 was a particularly harsh winter and this could have possibly led to increase in falls due the effect with the elderly population. Or two, the data is misrepresented. We are currently investigating the issue and will update with our findings.
CAUTI Rate
Catheter-Associated Urinary Tract Infections per 1,000 Catheter Days
(NHSN measure)

y = -0.0965x + 2.2856
R² = 0.5061
### Project Updates

#### CAUTI SIR

**Standardized Infection Ratio (NHSN measure)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td></td>
<td>0.98</td>
<td>(n=65)</td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td>0.98</td>
<td>(n=64)</td>
</tr>
<tr>
<td>2012</td>
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<tr>
<td>2013</td>
<td></td>
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<td>2014</td>
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<td>1.24</td>
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<tr>
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<td>0.83</td>
<td>(n=66)</td>
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<tr>
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<td>(n=66)</td>
</tr>
<tr>
<td>2015Q3</td>
<td></td>
<td>0.85</td>
<td>(n=66)</td>
</tr>
<tr>
<td>2015Q4</td>
<td></td>
<td>0.66</td>
<td>(n=64)</td>
</tr>
<tr>
<td>2016Q1</td>
<td></td>
<td>0.65</td>
<td>(n=64)</td>
</tr>
<tr>
<td>2016Q2</td>
<td></td>
<td>0.42</td>
<td>(n=61)</td>
</tr>
</tbody>
</table>

**Equation:**

\[ y = -0.0482x + 1.149 \]

**R\(^2\) = 0.5021**

**Targets:**

- **NJHEN Baseline (0.98)**
- **National Benchmark (0.63)**
- **NJHEN 40% Target (0.59)**

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![Graph showing CAUTI SIR trends from 2010 to 2016 with annotations for benchmarks and targets.](image_url)
Project Updates

Catheter Utilization Rate
Catheter Days per 1,000 Patient Days
(NHSN measure)
Project Updates

CLABSI Rate
Central Line-Associated Bloodstream Infections per 1,000 Central Line Days (NHSN measure)

y = -0.0666x + 1.5201
R² = 0.5385
Project Updates

CLABSI SIR
Standardized Infection Ratio (NHSN measure)

y = -0.0454x + 0.7998
R² = 0.4772

NJHEN Baseline (0.73)
NJHEN 40% Target (0.44)
National Benchmark (0.32)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
<th>Sample Size</th>
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<tbody>
<tr>
<td>2010</td>
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<td>2011</td>
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<tr>
<td>2012</td>
<td>0.71</td>
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<td>2013</td>
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<td>2014</td>
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<td>66</td>
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<td>66</td>
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<tr>
<td>2015Q3</td>
<td>0.78</td>
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<tr>
<td>2015Q4</td>
<td>0.05</td>
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<tr>
<td>2016Q1</td>
<td>0.32</td>
<td>65</td>
</tr>
<tr>
<td>2016Q2</td>
<td>0.32</td>
<td>49</td>
</tr>
</tbody>
</table>
Project Updates

Central Line Utilization Rate
Central Line Days per 1,000 Patient Days
(NHSN measure)
Project Updates

SSI Rate for Colon Surgery
Surgical Site Infections per 100 Procedures
(NHSN measure)

\[ y = -0.0131x + 2.4137 \]
\[ R^2 = 0.0109 \]

NJHEN Baseline (1.87)
NJHEN 40% Target (1.12)
National Benchmark (0.504)
Project Updates

SSI-COLO SIR
Standardized Infection Ratio
(NHSN measure)

\[ y = -0.0101x + 0.8189 \]
\[ R^2 = 0.0556 \]

NJHEN Baseline (0.63)
NJHEN 40% Target (0.38)
Project Updates

SSI Rate for Hysterectomy
Surgical Site Infections per 100 Procedures
(NHSN measure)

y = -0.024x + 0.7556
R² = 0.1309

2010 (n=57)
2011 (n=55)
2012 (n=55)
2013 (n=52)
2014 (n=55)
2015Q1 (n=65)
2015Q2 (n=65)
2015Q3 (n=65)
2015Q4 (n=57)
2016Q1 (n=43)
2016Q2 (n=18)

NJHEN 40% Target (0.38)
NJHEN Baseline (0.63)
National Benchmark (0.6)
Project Updates

SSI Rate for Total Knee Replacement
Surgical Site Infections per 100 Procedures
(NHSN measure)

\[ y = -0.0182x + 0.5888 \]
\[ R^2 = 0.17 \]

NJHEN 40% Target (0.37)
NJHEN Baseline (0.62)
Project Updates

SSI-KPRO SIR
Standardized Infection Ratio
(NHSN measure)

y = -0.0236x + 0.8848
R² = 0.1248

NJHEN 40% Target (0.59)
NJHEN Baseline (0.98)
Project Updates

VAC Rate
Ventilator-Associated Conditions per 1,000 Ventilator Days
(NHSN measure)

y = -0.0229x + 3.7065
R² = 0.0134

- NJHEN Baseline (3.25)
- NJHEN 40% Target (1.95)

<table>
<thead>
<tr>
<th>Year</th>
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<th>n</th>
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<td>2015Q2</td>
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<td>2015Q4</td>
<td>3.95</td>
<td>n=39</td>
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<td>2016Q1</td>
<td>3.02</td>
<td>n=41</td>
</tr>
<tr>
<td>2016Q2</td>
<td>3.16</td>
<td>n=30</td>
</tr>
</tbody>
</table>
Project Updates

IVAC Rate
Infection-related Ventilator-Associated Complications per 1,000 Ventilator Days
(NHSN measure)

y = -0.0041x + 1.1721
R² = 0.0032

NJHEN Baseline (1.37)
NJHEN 40% Target (0.82)

2013 (n=36)  2014 (n=40)  2015Q1 (n=42)  2015Q2 (n=42)  2015Q3 (n=41)  2015Q4 (n=39)  2016Q1 (n=41)  2016Q2 (n=30)
Project Updates

PVAP Rate
Possible Ventilator-Associated Pneumonia per 1,000 Ventilator Days
(NHSN measure)

$y = -0.0481x + 0.6113$
$R^2 = 0.3133$

PVAP Rate Trends:
- 2015Q1 (n=42): 0.65
- 2015Q2 (n=42): 0.53
- 2015Q3 (n=41): 0.41
- 2015Q4 (n=39): 0.36
- 2016Q1 (n=41): 0.19
- 2016Q2 (n=30): 0.53

NJHEN 40% Target (0.39)
NJHEN Baseline (0.65)
Project Updates

Ventilator Utilization Rate
Ventilator Days per 1,000 Patient Days (NHSN measure)
Post ICU Syndrome (PICS): Impacting Long Term Cognitive & Physical Function Through Evidence Based Care

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Learning Objectives

At the completion of this activity, the participant will be able to:

• Define Post ICU Syndrome in the patient and family
• Identify current practice through performance of a gap analysis and begin to build the will to reduce cognitive and physical dysfunction harm that occurs during a patients ICU stay.
• Discussion current evidence based practice that can help reduce PICS & PICS-F
Post Intensive Care Syndrome

Family (PICS-F)
- Mental Health
  - Anxiety/ASD
  - PTSD
  - Depression
  - Complicated Grief

Survivor (PICS)
- Mental Health
  - Anxiety/ASD
  - PTSD
  - Depression
- Cognitive Impairments
  - Executive Function
  - Memory
  - Attention
  - Visuo-spatial
  - Mental Processing Speed
- Physical Impairments
  - Pulmonary
  - Neuromuscular
  - Physical Function

Focus on safe transitions and handoffs

Critical care is the whole episode of care---not just the ICU

Family-centered care

PICS is defined as new or worsening impairment in physical, cognitive, or mental health status arising and persisting after hospitalization for critical illness.

http://www.icudelirium.org/testimonials.html
PICS-Physical Dysfunction

• Less than 10% of patients on mechanical ventilation for > 4 d are alive and fully independent 1 yr later
• Caregiver assistance ranging from assistance with activities of daily living to full care is required by patients 1 yr later
• Half of patients with adult respiratory distress syndrome have not returned to work 1 yr later
• ICU-acquired weakness that can persist for years can develop in 25–80% of those with sepsis or on mechanical ventilation for > 4 d

PICS: Cognition & Mental Illness

- Cognitive impairment that can persist for years develops in 30–80% of patients
- Symptoms of depression occur 1/3 of patient and persist for a year
- Symptoms of anxiety occur in 23–48% have symptoms of anxiety
- Symptoms of posttraumatic distress syndrome occur in 10–50% of patients and may persist for years

Epidemiology of ICU Delirium

- 20 - 80% of ICU patients have delirium during ICU
- Frequently unrecognized or misdiagnosed by clinicians
- **Subtypes:**
  - Hyperactive (agitated, increased motor activity) 1%
  - Hypoactive (sleepy, inattentive, decreased motor activity) 44%
  - Mixed 55%
- Onset: ICU Day 2 (+/- 2)
- Duration: 4 (+/- 2) days
- 50% of ARDS pts delirious in the ICU

Ely, EW, et al. *JAMA* 2001; 286, 2703-2710
McNicoll L, *JAGS* 2003;51:591-98;
Brain-ICU Study

- Multicenter RCT- medical-surgical ICU’s
- 821 patients with ARF or Shock
- Evaluated in-hospital delirium and cognitive impact 3-12 months post d/c

Results

- 74% of patients developed delirium during hospital stay
- 1/3 & 1/4 had cognitive scores at 1 year follow-up c/w moderate TBI & mild Alzheimers, respectively
- Affected both older and younger

Lived Experience of ICU in Patients with Delirium

“I can’t remember”

“fear & safety concerns”

“trying to get it straight”

“wanting to make a connection”

Delirium and Patient Outcomes

- Independently associated with increased risk of death
- Duration assoc. with short & long term cognitive impairment
- Increased Mech Vent duration
- Increased ICU & Hospital Length of Stay
- Estimated national costs $4 to $16 Billion
- Post-d/c anxiety/PTSD symptom from delirious memory
- Type of PTSD-avoidance and re-experiencing

Patient Risk Factors

- Immobility
- Number of days on mechanical ventilation
- Length of stay in the ICU
- Heavy sedation
- Delirium
- Hypoglycemia
- Hypoxia
- Sepsis
- ARDS

PICS-F: Psychosocial Challenges

- Anxiety is present in 10–75% of family
- Symptoms of posttraumatic distress syndrome occur in 8–42% of family
- Medication for anxiety or depression are required by 33% of family
- The above can persist for years
- Family members may develop prolonged or complicated grief
- Family members may have exacerbation of chronic health conditions
- Family dynamics may be challenged
- Family financial security may be at risk
  - A total of 50% of patients require caregiver assistance 1 year later.

The Cost of Surviving ICU Care

- 50% ICU survivors require long term care
- 31% depleted savings
- 20% reported family had to leave gainful employment
- Caregiver support-17.4 hours per week
- Higher 5 year mortality (32.2% vs 22.7%)
- Greater hospital resource use defined as mean hospital readmission rate (4.8 vs. 3.3/person/five years)
- Comorbidities/pre-ICU hospitalizations stronger predictor of hospital resource use than acute illness
- 51% higher mean 5 year hospital cost ($23,608 vs 16,913/patient)
- After adjustment for co-founders-resource use persisted

Prevention is Key

Minimizing Risk Factors
Reduction of Risk Factors for PICS-F

- Family center care programs
- Frequent and understandable communication about the patient’s care and condition
- Shared decision-making
- Early psychologic intervention and support
- Family presence and participation in care programs
- Caseworker and social worker involvement in care and planning
- ICU diaries an education on how to use them
- Information on PICS and resources

Reduction of Risk Factors for PICS

- ABCDEFGH bundle
  - Follow up referrals
  - Functional reconciliation checklist
  - Good Handoff communication
  - Handout materials on PICS & PICS-F
- Early psychologic intervention
- ICU diaries
- Healing environments of care
- Post-discharge follow-up programs

ASSESS, PREVENT & MANAGE PAIN

BOTH SAT & SBT

CHOICE OF SEDATION

DELIRIUM

EARLY MOBILITY

FAMILY ENGAGEMENT & EMPOWERMENT/FOLLOW UP REFERRALS/ FUNCTIONAL CHECKLIST

GOOD HANDOFF COMMUNICATION

HANDOUT MATERIALS FOR PICS & PICS-F

www.iculiberation.org
"Four Cornerstones for Success"

- Evidence Based Practice
- Inter-Professional Teams
- Reduction of Practice Variation
- System Collaboration
Blending Priorities

Clinical Implementation of PAD guidelines

Inter-professional Team Development

The ABCDEFGH Bundle for the ICU
ASSESS, PREVENT & MANAGE PAIN

BOTH SAT & SBT

CHOICE OF SEDATION

DELIRIUM

EARLY MOBILITY

FAMILY ENGAGEMENT & EMPOWERMENT/FOLLOW UP REFERRALS/ FUNCTIONAL CHECKLIST

GOOD HANDOFF COMMUNICATION

HANDOUT MATERIALS FOR PICS & PICS-F

www.iculiberation.org
ASSESS, PREVENT & MANAGE PAIN
Recommendations/Guidelines

Society of Critical Care Medicine
January 2013
- Pain in ICUs is common, under treated
- Vital Signs and behaviors are flags to investigate.

The American Society of Pain Management Nursing
July 2011
- Inability to self report = lack of recognition
- Poor pain control
- Vital signs are not “sensitive”

CPOT and BPS most valid and reliable
CPOT is acceptable for the critically ill/unconscious

## Critical Care Pain Observation Tool (CPOT)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial expression</td>
<td>No muscular tension observed</td>
<td>Relaxed, neutral</td>
</tr>
<tr>
<td></td>
<td>Presence of frowning, brow lowering, orbit tightening, and levator contraction</td>
<td>Tense</td>
</tr>
<tr>
<td></td>
<td>All of the above facial movements plus eyelid tightly closed</td>
<td>Grimacing</td>
</tr>
<tr>
<td>Body movements</td>
<td>Does not move at all (does not necessarily mean absence of pain)</td>
<td>Absence of movements</td>
</tr>
<tr>
<td></td>
<td>Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements</td>
<td>Protection</td>
</tr>
<tr>
<td></td>
<td>Pulling tube, attempting to sit up, moving limbs/thrashing, not following commands, striking at staff, trying to climb out of bed</td>
<td>Restlessness</td>
</tr>
<tr>
<td>Muscle tension</td>
<td>No resistance to passive movements</td>
<td>Relaxed</td>
</tr>
<tr>
<td>Evaluation by passive flexion and extension of upper extremities</td>
<td>Resistance to passive movements</td>
<td>Tense, rigid</td>
</tr>
<tr>
<td></td>
<td>Strong resistance to passive movements, inability to complete them</td>
<td>Very tense or rigid</td>
</tr>
<tr>
<td>Compliance with the ventilator (intubated patients)</td>
<td>Alarms not activated, easy ventilation</td>
<td>Tolerating ventilator or movement</td>
</tr>
<tr>
<td>OR</td>
<td>Alarms stop spontaneously</td>
<td>Coughing but tolerating</td>
</tr>
<tr>
<td>OR</td>
<td>Asynchrony: blocking ventilation, alarms frequently activated</td>
<td>Fighting ventilator</td>
</tr>
<tr>
<td>Vocalization (extubated patients)</td>
<td>Talking in normal tone or no sound</td>
<td>Talking in normal tone or no sound</td>
</tr>
<tr>
<td></td>
<td>Sighing, moaning</td>
<td>Sighing, moaning</td>
</tr>
<tr>
<td></td>
<td>Crying out, sobbing</td>
<td>Crying out, sobbing</td>
</tr>
<tr>
<td>Total, range</td>
<td></td>
<td>0-8</td>
</tr>
</tbody>
</table>
ICU Liberation Program

Assess
- Assess pain $\geq 4x$/shift & PRN
- Significant pain with NRS $>3$, BPS $>5$, or CPOT$>2$

Treat
- Treat pain within 30 minutes of detecting significant pain & REASSESS:
  - Non-pharmacological treatment (e.g. relaxation)
  - Pharmacological treatment

Prevent
- Administer pre-procedural analgesia and/or non-pharmacological interventions
- Treat pain first, then sedate
### Acute Pain Management Algorithm

#### Choosing Appropriate Opioid:
- If multiple oral or IV opioids in the same class are ordered, select opioid in order shown.

<table>
<thead>
<tr>
<th>Class</th>
<th>IV Morphine Equivalence</th>
<th>Route</th>
<th>Analgesic Potency Medication Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>1 – 2 mg</td>
<td>IV</td>
<td>Norco® (hydrocodeineacetaminophen) 5/325 mg, 1 tablet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tylenol® 3® (codeine-acetaminophen) 30/300 mg, 1 tablet</td>
</tr>
<tr>
<td>C</td>
<td>2.5 – 4 mg</td>
<td>IV</td>
<td>Hydromorphone 0.15 – 0.3 mg (0.25 mg dose)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Morphine 1–2 mg (2 mg dose)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO</td>
<td>Oxycodone 5 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Percocet® (oxycodone-acetaminophen) 5/325 mg, 1 tablet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Norco® (hydrocodeine-acetaminophen) 5/325 mg, 2 tablets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Norco® (hydrocodeine-acetaminophen) 7.5/5 mg, 1 tablet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Norco® (hydrocodeine-acetaminophen) 10/325 mg, 1 tablet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hydromorphone 2 mg, 1 tablet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tylenol® 3® (codeine-acetaminophen) 30/300 mg, 2 tablets</td>
</tr>
<tr>
<td>D</td>
<td>4.5 – 7 mg</td>
<td>IV</td>
<td>Hydromorphone 0.4 – 0.6 mg (0.5 mg dose)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Morphine 2.5 – 4 mg (4 mg dose)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fentanyl 75 – 100 mcg (25 mcg dose)</td>
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<td></td>
<td></td>
<td>PO</td>
<td>Oxycodone 10 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Percocet® (oxycodone-acetaminophen) 5/325 mg, 2 tablets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hydromorphone 4 mg, 1 tablet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Morphine 15 mg</td>
</tr>
</tbody>
</table>

#### First Dose is Effective:
1. Continue current medication and dose.
2. Continue to reassess pain and side effects.
3. Treat side effects, if serious, page clinician.

#### First Dose not Effective:
1. Give rescue dose within one hour. Select rescue dose in SAME CLASS or rescue within the range order.
   a. If there is a range order for oral medication and give one tablet may rescue with an additional one tablet. If no range order may rescue with an IV medication in same class. If a rescue dose is not ordered page clinician.
   b. If there is a range order for oral medication for 1 to 3 tablets and give two tablets, may rescue with an additional one tablet.
   c. If there is a range order for IV medication, may rescue with same IV dose. If no range order, page clinician.
2. After RESCUE dose is used, at next dosing interval, INCREASE BY ONE CLASS, page clinician if necessary.
3. Continue to reassess pain, medication effectiveness and side effects.

#### Important Additional Information:
- Page clinician for more potent oral medication dose if repeated IV rescue dose needed. Not recommended to repeatedly alternate oral and IV doses or two short acting oral opioid medications.
- May only rescue one time in a dosing interval. If additional rescue is needed, page clinician.
- Adding NSAIDS, Ultras or acetaminophen around the clock reduces the opioid dose needs and side effects.
- For pain management algorithms, go to MedUse Policy 201. Dose and Other Ranges Orders on Intermat.
Procedures Hurt More Than We Think

• Most Painful
  – Turning
  – Wound drain removal
  – Wound care
  – Chest tube removal
  – Arterial line insertion

• Others
  – ET suctioning
  – Tracheal suctioning
  – Femoral sheath removal
  – Mobilization
  – Peripheral blood draw & IV
  – Positioning
  – Respiratory exercises
  – Central line removal

Puntillo K AJCC 2001;10:238-251
Puntillo K AJRCCM, 2014;89:39-47
## Treating Acute Pain in the ICU

<table>
<thead>
<tr>
<th>Situation</th>
<th>Preferred Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute pain</td>
<td>Fentanyl IVP until pain resolves</td>
</tr>
<tr>
<td>Acute pain that persists/recurs</td>
<td>Fentanyl infusion plus fentanyl IVP for breakthrough</td>
</tr>
<tr>
<td>Acute pain in chronic opioid user?</td>
<td>Account for previous opioid use when using IV opioid (may consider ketamine)</td>
</tr>
<tr>
<td>Planned transition out of ICU and patient on IV opioid infusion</td>
<td>Start scheduled oral/enteral opioid therapy (e.g., oxycodone) plus intermittent IV opioid (e.g., IVP or PCA)</td>
</tr>
</tbody>
</table>
Agitation

• Avoid deep sedation/coma:
  – Sedative medications should be titrated to maintain lighter levels of sedation, unless clinically contraindicated. (+1B)
  – Use daily awakening or a titrated sedation strategy to maintain patient wakefulness. (1B)

• Choice of sedative:
  – Non-benzodiazepines may be preferred over benzodiazepines to improve clinical outcomes in mechanically ventilated ICU patients. (+2B)

• Reduction in sedation requirements:
  – Use of an analgesia-first (i.e., analog-sedation) strategy is recommended in mechanically ventilated patients. (+2B)
Daily Sedation Interruption Decreases Duration of Mechanical Ventilation

• Hold sedation infusion until patient awake, then restart at 50% of prior dose

• “Awake” defined as any 3 of the following:
  – Open eyes in response to voice
  – Use eyes to follow investigator on request
  – Squeeze hand on request
  – Stick out tongue on request

www.ICUliberation.org.

• Length of MV 4.9 vs. 7.3 days (P=0.004)
• ICU LOS 6.4 vs. 9.9 days (P=0.02)
• Fewer diagnostic tests to assess changes in mental status
• No increase in rate of agitated-related complications or episodes of patient-initiated device removal
• No increase in PTSD or cardiac ischemia
## Propofol vs. Benzodiazepines

<table>
<thead>
<tr>
<th>Randomized Trial</th>
<th>ICU</th>
<th>Comparator</th>
<th>Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ronan et al. 1995</td>
<td>Surgical</td>
<td>Midazolam</td>
<td>Propofol</td>
</tr>
<tr>
<td>Chamorro et al. 1996</td>
<td>General</td>
<td>Midazolam</td>
<td>Propofol</td>
</tr>
<tr>
<td>Hsiao et al. 1996</td>
<td>Surgical</td>
<td>Midazolam</td>
<td>Equivalent</td>
</tr>
<tr>
<td>Kress et al. 1996</td>
<td>Medical</td>
<td>Midazolam</td>
<td>Propofol</td>
</tr>
<tr>
<td>Barrientos-Vega et al. 1997</td>
<td>General</td>
<td>Midazolam</td>
<td>Propofol</td>
</tr>
<tr>
<td>Searle et al. 1997</td>
<td>Cardiac</td>
<td>Midazolam</td>
<td>Equivalent</td>
</tr>
<tr>
<td>Weinbroum et al. 1997</td>
<td>General</td>
<td>Midazolam</td>
<td>Both</td>
</tr>
<tr>
<td>Sanchez-Izquierdo-Riera JA, et al. 1998</td>
<td>Trauma</td>
<td>Midazolam</td>
<td>Propofol</td>
</tr>
<tr>
<td>Hall et al. 2001</td>
<td>Mixed</td>
<td>Midazolam</td>
<td>Propofol</td>
</tr>
<tr>
<td>Carson et al. 2006</td>
<td>Medical</td>
<td>Lorazepam</td>
<td>Propofol</td>
</tr>
</tbody>
</table>

Outcomes improved by **propofol**: sedation quality, ventilator synchrony, time to awakening, variability of awakening, time to extubation from discontinuation of sedation, overall time to extubation, ventilator days, ICU LOS among survivors, costs of sedation

Slide courtesy of Brenda Pun
## Dexmedetomidine vs Benzodiazepines

<table>
<thead>
<tr>
<th>Trials with better outcomes with Dex</th>
<th>Population</th>
<th>Outcome Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pandharipande et al/2007</td>
<td>Mixed ICU</td>
<td>More accurate sedation, more delirium/coma-free days</td>
</tr>
<tr>
<td>Riker et al/2009</td>
<td>Mixed ICU</td>
<td>Lower prevalence of delirium, earlier extubation</td>
</tr>
<tr>
<td>Ruokonen et al/2009</td>
<td>Mixed ICU</td>
<td>Shorter duration of mechanical ventilation</td>
</tr>
<tr>
<td>Maldonado et al/2009</td>
<td>Cardiac surgery</td>
<td>Lower incidence and duration of delirium</td>
</tr>
<tr>
<td>Esmaoglu et al/2009</td>
<td>Eclampsia</td>
<td>Shorter ICU length of stay</td>
</tr>
<tr>
<td>Dasta et al/2010</td>
<td>Mixed ICU</td>
<td>Lower ICU costs</td>
</tr>
<tr>
<td>Jakob et al/2012</td>
<td>General ICU</td>
<td>Lighter sedation, fewer ventilation days</td>
</tr>
</tbody>
</table>

- Trials with better outcomes with Benzo’s = None

Non-Benzodiazepine Sedative Medications are Associated with Better ICU Outcomes

- Systematic review and meta-analysis of 6 RCTs comparing benzodiazepine vs. non-benzodiazepine ICU sedation regimens:
  - ↓ICU LOS (6 studies)
    - Difference of 1.6 days, \( P= 0.0007 \)
  - ↓ Duration of mechanical ventilation (4 studies)
    - Difference of 1.9 days, \( P< 0.00001 \)
  - Similar delirium prevalence and short-term mortality.

Fraser G. Crit Care Med. 2013; 41:S30-8
Association Between Different Sedatives & Vent Related Outcomes

- Single academic center, retrospective analysis of patients mechanically ventilated for greater \( \geq \) three days
- 9603 consecutive episodes of mechanical ventilation were evaluated over seven years
- Results
  - Benzodiazepines and propofol were associated with \( \uparrow \) VAE risk, dexmedetomidine was not
  - Propofol associated with less time to extubation compared with benzodiazepines.
  - Dexmedetomidine was associated with less time to extubation compared with benzodiazepines and propofol. (small number)
  - No difference in hospital discharge or mortality

Agitation

- Assess q 4hrs or prn with change in dose or patients condition
- Use validated tool (RASS or SAS)
- RASS target -1 to +1
- SAS target 3 to 4

### TABLE 1. RICHMOND AGITATION–SEDATION SCALE

<table>
<thead>
<tr>
<th>Score</th>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+4</td>
<td>Combative</td>
<td>Overtly combative or violent; immediate danger to staff</td>
</tr>
<tr>
<td>+3</td>
<td>Very agitation</td>
<td>Pulls on or removes tube(s) or catheter(s) or has aggressive behavior toward staff</td>
</tr>
<tr>
<td>+2</td>
<td>Agitated</td>
<td>Frequent nonpurposeful movement or patient-ventilator dyssynchrony</td>
</tr>
<tr>
<td>+1</td>
<td>Restless</td>
<td>Anxious or apprehensive but movements not aggressive or vigorous</td>
</tr>
<tr>
<td>0</td>
<td>Alert and calm</td>
<td>Not fully alert, but has sustained (more than 10 seconds) awakening, with eye contact, to voice</td>
</tr>
<tr>
<td>-1</td>
<td>Drowsy</td>
<td>Briefly (less than 10 seconds) awakens with eye contact to voice</td>
</tr>
<tr>
<td>-2</td>
<td>Light sedation</td>
<td>Any movement (but no eye contact) to voice</td>
</tr>
<tr>
<td>-3</td>
<td>Moderate sedation</td>
<td>No response to voice, but any movement to physical stimulation</td>
</tr>
<tr>
<td>-4</td>
<td>Deep sedation</td>
<td>No response to voice or physical stimulation</td>
</tr>
<tr>
<td>-5</td>
<td>Unarousable</td>
<td></td>
</tr>
</tbody>
</table>

Procedure

1. Observe patient. Is patient alert and calm (score 0)? Does patient have behavior that is consistent with restlessness or agitation (score +1 to +4 using the criteria listed above, under description)?
2. If patient is not alert, in a loud speaking voice state patient’s name and direct patient to open eyes and look at speaker. Repeat once if necessary. Can prompt patient to continue looking at speaker. Patient has eye opening and eye contact, which is sustained for more than 10 seconds (score –1). Patient has eye opening and eye contact, but this is not sustained for 10 seconds (score –2). Patient has any movement in response to voice, excluding eye contact (score –3).
3. If patient does not respond to voice, physically stimulate patient by shaking shoulder and then rubbing sternum if there is no response to shaking shoulder. Patient has any movement to physical stimulation (score –4). Patient has no response to voice or physical stimulation (score –5).
ASSESS, PREVENT & MANAGE PAIN

BOTH SAT & SBT

CHOICE OF SEDATION

DELIRIUM

EARLY MOBILITY

FAMILY ENGAGEMENT & EMPOWERMENT/FOLLOW UP REFERRALS/ FUNCTIONAL CHECKLIST

GOOD HANDOFF COMMUNICATION

HANDOUT MATERIALS FOR PICS & PICS-F

www.iculiberation.org
TRUST THE PROCESS
## ABC Trial (RCT Paired Sedation & Vent Weaning Protocols)

<table>
<thead>
<tr>
<th>Outcome*</th>
<th>SBT</th>
<th>SAT+SBT</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilator-free days</td>
<td>12</td>
<td>15</td>
<td>0.02</td>
</tr>
<tr>
<td>Time-to-event, days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successful extubation, days</td>
<td>7.0</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>ICU discharge, days</td>
<td>13</td>
<td>9</td>
<td>0.02</td>
</tr>
<tr>
<td>Hospital discharge, days</td>
<td>19</td>
<td>15</td>
<td>0.04</td>
</tr>
<tr>
<td>Death at 1 year, n (%)</td>
<td>97</td>
<td>74</td>
<td>0.01</td>
</tr>
<tr>
<td>Days of brain dysfunction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coma</td>
<td>3.0</td>
<td>2.0</td>
<td>0.002</td>
</tr>
<tr>
<td>Delirium</td>
<td>2.0</td>
<td>2.0</td>
<td>0.50</td>
</tr>
</tbody>
</table>

*Median, except as noted

ABC Trail: Mortality at 1 Year

Spontaneous Breathing Trials (SBTs) Protocol

If passes the SAT, assessed for the SBT safety screen

Passes the SBT screening if achieve:

• Adequate oxygenation (SpO₂ ≥ 88% or an FiO₂ of ≤ 50% and a PEEP ≤ 8 cm H₂O)
• Any spontaneous inspiratory effort in a 5-minute period
• No agitation
• No significant use of vasopressors or inotropes
• No evidence of increased intracranial pressure

CDC Prevention Epicenters
Wake Up and Breathe Collaborative

• Prospective quality improvement collaborative
• Goal: prevent VAEs through less sedation and earlier liberation from mechanical ventilation
• Mechanism: increase performance of paired daily spontaneous awakening trials and breathing trials (SATs and SBTs)
• 12 ICUs affiliated with 7 hospitals

CDC Prevention Epicenters’ Wake Up and Breathe Collaborative

SATs / SBTs

- 63% ↑ in SATs
- 16% ↑ in SBTs
- 81% ↑ in SBTs done with sedatives off

VAEs

- 37% ↓ in VACs
- 65% ↓ in IVACs

SAT & SBT Protocol

Is the patient responsive to verbal stimuli?

SAT Safety Screen

SAT: Can patient go w/o sedation and complications for 4 hours?

Restart sedation at half dosage, then titrate for pain/sedation

Rescreen tomorrow

SBT Safety Screen

SBT: Does patient breathe w/o complications for 2 hours?

SBT: Does patient breathe w/o complications for 2 hours?

Notify physician to consider extubation

Rescreen tomorrow
Outcome of SAT/SBT

• Decreased days of mechanical ventilation
• Reduced weaning time
• Reduced reintubation rates
• Fewer days with delirium
• Decreased length of ICU stay
• Decreased length of hospital stay

Esteban A. Am J Respir Crit Care Med. 1999;159:512-8
www.ICUliberation.org
Making it Happen: Wake Up & Breathe

- Process Measure: Daily audit of SAT/SBT compliance or documentation of contraindication
  - Determine if they meet SAT criteria
  - Decrease or stop sedation per protocol
  - Determine if patient meets Readiness to Wean/Resp
  - Determine if meet SBT protocol criteria/Resp
  - Consider one time of day-coordinate between resp and nursing (white board-EMR-communication tool)
  - Discuss results in multidisciplinary rounds
  - Include in nurse to nurse handoff/other handoffs
  - Dedicated RRT in rounds speaking up
  - Ventilator LOS posted/Extubation rates posted
Additional Strategies for Success

- Implement non-physician staff driven protocols for daily SBT/SAT
- Protocols on order sets
- Include in both nursing & respiratory flow sheets
- Self extubation is slightly higher but re-intubation is not.

Ely W et al. Chest, 2001;120(6):454s-463s
Westwall S. Nursing in Critical Care, 2008;13(4):203-207
Abbott CA, et al. Worldviews on Evidence Based Practice, 2006:139-152
ASSESS, PREVENT & MANAGE PAIN

BOTH SAT & SBT

CHOICE OF SEDATION

DELIRIUM

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GOOD HANDOFF COMMUNICATION

HANDOUT MATERIALS FOR PICS & PICS-F

COORDINATION & COMPREHENSIVE ORAL CARE

www.iculiberation.org
Healthcare Acquired Pneumonia

• Risk Factor Categories
  – Factors that increase bacterial burden or colonization
  – Factors that increase risk of aspiration
ASSESS, PREVENT & MANAGE PAIN

BOTH SAT & SBT

CHOICE OF SEDATION

DELIRIUM

EARLY MOBILITY

FAMILY ENGAGEMENT & EMPOWERMENT/FOLLOW UP REFERRALS/FUNCTIONAL CHECKLIST

GOOD HANDOFF COMMUNICATION

HANDOUT MATERIALS FOR PICS & PICS-F

www.iculiberation.org
Delirium: First Focus on Prevention

- Pain and sedation scores
- Analgesia and Sedative Algorithm
  - Control pain first, then anxiety
  - Use intermittent meds first before continuous
- Target RASS + 1 to -1
- Daily SAT (spontaneous awakening trial)
- Daily SBT (spontaneous breathing trial)
- Implement non-pharmacological strategies
Delirium Assessment & Management

- Delirium Assessment:
  - ICU-CAM
  - ICU Delirium Screening Checklist

- Frequency:
  - Q shift & prn

Confusion Assessment Method in the ICU

Delirium Assessment (CAM-ICU): 1 AND 2 AND (Either 3 or 4)

1. Acute Onset or Fluctuating Course
   - An acute change from mental status baseline?
   - Or Patient's mental status fluctuating during the past 24 hours
   - NO
   - Stop
   - No delirium
   - Yes
   - Less than 3 Errors
   - Stop
   - No delirium

2. Inattention
   - Please read the following ten letters and ask the patient to squeeze when you say the letter: S A V E A H A R T
   - Scoring:
     - Error: when patient fails to squeeze on the letter “A”.
     - Error: when the patient squeezes on any letter other than “A”.
   - Greater than or equal to 3 Errors
   - If RASS is other than zero
   - Stop
   - Patient is Delirious

3. Altered Level of Consciousness (“actual” RASS)
   - If RASS is zero, or if still on sedation or sedation still lingering, proceed to next step
   - Reassess patient at later time

4. Disorganized Thinking
   - Greater than or equal to 2 Errors
   - Patient is Delirious
   - Less than 2 Errors
   - Stop
   - No delirium

4.1 Disorganized Thinking Items
1. Will a stone float on water? (Or: Will a leaf float on water?)
2. Are there fish in the sea? (Or: Are there elephants in the sea?)
3. Does one pound weigh more than two pounds? (Or: Do two pounds weigh more than one?)
4. Can you use a hammer to pound a nail? (Or: Can you use a hammer to cut wood?)
5. Command: Say to patient: “Hold up this many fingers” (Examiner holds two fingers in front of patient) “Now do the same thing with the other hand” (Not repeating the number of fingers). If patient is unable to move both arms for the second part, ask patient “add one more finger”
In Rounds When ICU-CAM is +

- When reporting the CAM ICU in rounds, if it is positive the following evaluation should occur.

- Dr. Dre
  - Dr: diseases; diseases that contributes to delirium (sepsis, hypoxia, COPD)
  - Dr: drug removal; benzodiazepines or any drug interactions that may contribute to delirium
  - E: environment; nonpharmacological interventions to reduce delirium. This may include reorientation sleep protocol, unrestrained, eyeglasses, hearing aids etc.

Courtesy of Dr Wes Ely
PAD Treatment of Delirium Recommendations

• There is no published evidence that treatment with haloperidol reduces the duration of delirium in adult ICU patients (No Evidence).

• Atypical antipsychotics may reduce the duration of delirium in adult ICU patients (C).

• We do not recommend administering rivastigmine to reduce the duration of delirium in ICU patients (–1B).

Non-Pharmacological Strategies

Sleep Promotion

- Appropriate Medications
- Bath during day
- Chair position
- Lighting
- Television
- Hearing/Vision Aids/Dentures
- Control Noise
- Ear plugs/eye mask
- Minimizing care related disruptions

Mobility Promotion

- Evaluate for Physical Therapy
- Range of Motion
- Sleep
- Work with PT
- Spontaneous Awakening Trial

Sedation Holidays

- Sleep Promotion
- Mobility

Pandharipande P et al. (Lorazepam) *Anesthesiology* 2006;104:21–26;
Oimet ICM 2007; 33:1007-1013;
Pandharipande P et al. (Midazolam) *J Trauma* 2008
Abraha I, et al. Plos One. 2015;DOI:10.1371/journal.pone.0123090
Perceptions and Practices Regarding Sleep in the ICU*1

• 1223 surveys of providers
  – 59% nurses
  – 39% physicians
• 24 countries
• 75% indicate ICU patients sleep poor or very poor
• 83% to 97% felt poor sleep was associated with negative ICU outcomes
• 32% had sleep promoting protocols

<table>
<thead>
<tr>
<th>Table 3. Perceived causes and consequences of sleep in the ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors disturbing sleep in the ICU, ranked from most important (1) to least important (11)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Measuring vital signs</td>
</tr>
<tr>
<td>Noise levels</td>
</tr>
<tr>
<td>Ventilator management / suctioning</td>
</tr>
<tr>
<td>Medication administration</td>
</tr>
<tr>
<td>Light levels</td>
</tr>
<tr>
<td>Patient repositioning</td>
</tr>
<tr>
<td>Physical examination by providers</td>
</tr>
<tr>
<td>Radiographic studies</td>
</tr>
<tr>
<td>Bathing</td>
</tr>
<tr>
<td>Wound care</td>
</tr>
<tr>
<td>Visitation from family and friends</td>
</tr>
</tbody>
</table>

*Average ranking for each factor by 1197 (of 1223 total) participants who completed the rank list. 1187 of 1206 participants who responded yes.

ICU noise at 45dBA & ½ the time at 54 dBA2

The Sleep in the ICU Task Force
2. Presented at Euroanaesthesia 2016 accessed 07/14/2016
http://www.medicaldaily.com/noise-levels-icu-who-recommendations-388073
# Perceptions and Practices Regarding Sleep in the ICU

<table>
<thead>
<tr>
<th>Question</th>
<th>All Respondents&lt;br&gt;(%):[n = 1223]</th>
<th>Sleep Protocol in ICU&lt;br&gt;(%):[n = 386]</th>
<th>No or Unknown&lt;br&gt;(%):[n = 810]</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the one thing that you believe may improve your patients sleep in the ICU? (%)</td>
<td>590 (49%)</td>
<td>182 (47%)</td>
<td>404 (50%)</td>
<td>0.63</td>
</tr>
<tr>
<td>Allowing patients blocks of uninterrupted sleep time</td>
<td>225 (19%)</td>
<td>67 (17%)</td>
<td>157 (19%)</td>
<td></td>
</tr>
<tr>
<td>Noise control</td>
<td>128 (11%)</td>
<td>45 (12%)</td>
<td>82 (10%)</td>
<td></td>
</tr>
<tr>
<td>Keeping patients physically active during the day so they are more tired for sleep at night</td>
<td>113 (9%)</td>
<td>36 (9%)</td>
<td>75 (9%)</td>
<td></td>
</tr>
<tr>
<td>Keeping the ICU dark at night and bright during the day</td>
<td>66 (5%)</td>
<td>27 (7%)</td>
<td>39 (5%)</td>
<td></td>
</tr>
<tr>
<td>Keeping patients awake during the day so they are more tired for sleep at night</td>
<td>38 (3%)</td>
<td>14 (4%)</td>
<td>23 (3%)</td>
<td></td>
</tr>
<tr>
<td>Medication prescribed for sleep</td>
<td>45 (4%)</td>
<td>15 (4%)</td>
<td>30 (4%)</td>
<td></td>
</tr>
<tr>
<td>Other / Do not know</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What percent of your patients receive medications for sleep?</td>
<td>574 (48%)</td>
<td>182 (48%)</td>
<td>387 (48%)</td>
<td>0.98</td>
</tr>
<tr>
<td>0-25%</td>
<td>377 (32%)</td>
<td>124 (33%)</td>
<td>250 (31%)</td>
<td></td>
</tr>
<tr>
<td>26-50%</td>
<td>137 (11%)</td>
<td>41 (11%)</td>
<td>95 (12%)</td>
<td></td>
</tr>
<tr>
<td>51-75%</td>
<td>87 (7%)</td>
<td>28 (7%)</td>
<td>59 (7%)</td>
<td></td>
</tr>
<tr>
<td>76-100%</td>
<td>19 (2%)</td>
<td>6 (2%)</td>
<td>13 (2%)</td>
<td></td>
</tr>
<tr>
<td>Rate whether you can do the following, 1 = Never, 10 = Always, mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assess whether patients are sleeping enough</td>
<td>6.1 (2.4)</td>
<td>6.5 (2.4)</td>
<td>5.9 (2.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Control lighting conditions to allow patients to sleep</td>
<td>6.7 (2.6)</td>
<td>7.1 (2.2)</td>
<td>6.5 (2.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Control environmental noise levels to allow patients to sleep</td>
<td>5.7 (2.5)</td>
<td>6.0 (2.2)</td>
<td>5.5 (2.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Adjust the ventilator or bilevel PAP to allow patients to sleep</td>
<td>6 (2.6)</td>
<td>5.9 (2.5)</td>
<td>6.0 (2.4)</td>
<td>0.75</td>
</tr>
<tr>
<td>Delay non-emergency disturbances to allow patients to sleep</td>
<td>6.5 (2.5)</td>
<td>6.8 (2.2)</td>
<td>6.3 (2.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Adhere to a clustered sleep protocol designed for the ICU</td>
<td>6.6 (2.5)</td>
<td>7.2 (1.9)</td>
<td>6.4 (2.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Temporarily suspend visitation to allow for sleep</td>
<td>6.2 (2.9)</td>
<td>6.4 (2.7)</td>
<td>6.2 (2.7)</td>
<td>0.26</td>
</tr>
<tr>
<td>Create conditions for a dedicated sleeping time for stable patients</td>
<td>6.7 (2.4)</td>
<td>7.1 (2.0)</td>
<td>6.5 (2.2)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*aTotal responses do not total 1223 since all respondents did not answer the question. Percentages represent proportion of responses among completed.

The Sleep in the ICU Task Force
Healing Environments

- Lighting
- Color
- Art
- Noise reduction
- Room temperature
- Use of sensory aids
  - Glasses & hearing aids
- Promote family presence
- Sleep Protocols

↓ Delirium & anxiety which contribute to a ↓ in risk of cognitive impairment & PTSD post discharge

ASSESS, PREVENT & MANAGE PAIN
BOTH SAT & SBT
CHOICE OF SEDATION
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FAMILY ENGAGEMENT & EMPOWERMENT/FOLLOW UP REFERRALS/ FUNCTIONAL CHECKLIST
GOOD HANDOFF COMMUNICATION
HANDOUT MATERIALS FOR PICS & PICS-F

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Outcomes of Early Progressive Mobility Program

- ↓ incidence of skin injury
- ↓ time on the ventilator
- ↓ incidence of VAP
- ↓ days of sedation
- ↓ delirium
- ↑ ambulatory distance
- Improved function

Thomsen GE, et al. CCM 2008;36;1119-1124
Winkelman C et al, CCN,2010;30:36-60
Early Physical and Occupational Therapy in Mechanically Ventilated Patients

- Prospective randomized controlled trial from 2005-2007
- 1161 screen, 104 patients mechanically ventilated < 72hrs, functionally independent at baseline met criteria
- Randomized to:
  - early exercise of mobilization during periods of daily interruption of sedation (49 pts)
  - daily interruption of sedation with therapy as ordered by the primary care team (55 pts)
- Primary endpoint: number of patients returning to independent functional status at hospital discharge able to perform activities of daily living and walk (independently)

Early Physical and Occupational Therapy in Mechanically Ventilated Patients


### Table 4: Function and muscle strength outcomes according to study group

<table>
<thead>
<tr>
<th>Outcome Description</th>
<th>Intervention (n=49)</th>
<th>Control (n=55)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time from intubation to first PT/OT session (days)</td>
<td>1.5 (1.0-2.1)</td>
<td>7.4 (6.0-10.9)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Independent ADLs total at ICU discharge</td>
<td>3 (0-5)</td>
<td>0 (0-5)</td>
<td>0.15</td>
</tr>
<tr>
<td>Independent ADLs total at hospital discharge</td>
<td>6 (0-6)</td>
<td>4 (0-6)</td>
<td>0.06</td>
</tr>
<tr>
<td>MRC examination score at hospital discharge</td>
<td>52 (25-58)</td>
<td>48 (0-58)</td>
<td>0.38</td>
</tr>
<tr>
<td>Hand-grip strength at hospital discharge (kg-force)</td>
<td>39 (10-58)</td>
<td>35 (0-57)</td>
<td>0.57</td>
</tr>
<tr>
<td>Greatest walking distance at hospital discharge (m)</td>
<td>33.4 (0-91.4)</td>
<td>0 (0-30.4)</td>
<td>0.004</td>
</tr>
<tr>
<td>Time from intubation to milestones achieved (days)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Out of bed</td>
<td>1.7 (1.1-3.0)</td>
<td>6.6 (4.2-8.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Standing</td>
<td>3.2 (1.5-5.5)</td>
<td>6.0 (4.5-8.9)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Marching in place</td>
<td>3.3 (1.6-5.8)</td>
<td>6.2 (4.6-9.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Transferring to a chair</td>
<td>3.1 (1.8-4.5)</td>
<td>6.2 (4.5-9.4)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Walking</td>
<td>3.8 (1.9-5.8)</td>
<td>7.3 (4.9-9.6)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Data are median (IQR). ADLs=activities of daily living. ICU=intensive care unit. MRC=Medical Research Council. PT/OT=physical therapy and occupational therapy. MRC examination scale 0-60.
Early Physical and Occupational Therapy in Mechanically Ventilated Patients

- Safe
- Well tolerated
- ↓ duration of delirium
- ↑ VFD
- Functional independence at discharge 59% protocol group vs. 35% in control arm

Intensive Physical Therapy Program Impact for Patients with ARF

- RCT 120 patients with ARF from 5 hospitals
- Mechanical ventilation greater than or equal to four days eligible
- Randomized to receive PT for four weeks/intensive or standard of care manner
- Physical function performance assessed at 1, 3, & 6 months in survivors not currently in acute or long-term care.

- Results:
  - Intensive therapy group 12 sessions for a total of 408 minutes
  - Standard of care group 6 sessions for a total of 86 minutes
  - No difference in the continuous scale physical function performance test between groups at all three time points.

Primary outcome measured in only 39 patients due to death or other
Started therapy at a median ICU day 8

ASSESS, PREVENT & MANAGE PAIN

BOTH SAT & SBT

CHOICE OF SEDATION

DELIRIUM

EARLY MOBILITY

FAMILY ENGAGEMENT & EMPOWERMENT/FOLLOW UP REFERRALS/ FUNCTIONAL CHECKLIST

GOOD HANDOFF COMMUNICATION

HANDOUT MATERIALS FOR PICS & PICS-F

www.iculiberation.org
Good communication with the family is critical at every step of a patient’s clinical course, and empowering the family to be part of the team to ensure best care is adhered to diligently will improve many aspects of the patient’s experience. The F was recently added to help to keep patients and families as the center and focus of care.
Patients and Families Involved in the Design Process
for Perham Health's New Hospital

Patient Family Centered Care Core Concepts

- Dignity and respect
- Information sharing
- Participation in care decisions
- Collaboration
<table>
<thead>
<tr>
<th>Treatment as a human being</th>
<th>Treatment as a unique individual</th>
<th>Treatment as someone entitled to professional patient care</th>
<th>Treatment with sensitivity to the patient’s vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offering introductions and greetings</td>
<td>Treating patient as an important and valuable person</td>
<td>Responsiveness and rapport</td>
<td>Orienting patients and families to the environment (machines, alarms)</td>
</tr>
<tr>
<td>Attending to basic bodily concerns (modesty, toileting, pain and comfort)</td>
<td>Facilitating ability to control aspects of care and make choices</td>
<td>Caring/positive attitude, demeanor, body language</td>
<td>Updating patients on their status and care plan</td>
</tr>
<tr>
<td>Treating patient as an equal</td>
<td>Recognizing individual preferences</td>
<td>Information Exchange a. Orientation/telling b. Explaining / Educating c. d. Listening e. Inviting questions and feedback</td>
<td>Interacting properly with professionals and patients and families during rounds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refraining from judgmental remarks and Interacting considerately with</td>
<td></td>
</tr>
</tbody>
</table>
Meaningful Engagement to Positive Impact
Patient & Family Experience

- Empower patient/family representatives, facilitate their role, support them, help them communicate about and lead efforts
- They will provide you with the ‘ground truth’ and ask important questions that you would not think of.
- Create structures for ongoing engagement (e.g. PFACs at multiple levels); however, do not limit input to formal structures.
- Maintain engagement overtime (not a one time event)
- Families benefit when they can support themselves and the patient (flexible visitation, involvement in nursing care, participation in a diary)

Families are the heart of patient-centered care.

Welcome to the WICU

We believe that you know the person that we are caring for far better than we do.

We would like to invite you to participate in your loved one’s care.

Listed are options that you may choose.

If there is a particular care that you would like to assist with and it is not listed please speak with your nurse.

We will provide instruction as needed for each of the following according to your comfort level.

- Oral Care
- Incentive Spirometer
- Range of Motion
- Back Care
- Leg Care
- Assist with Ambulation
- Assist with Feeding
- Hand Care
- Shampoo
- Shave
- Pillow Repositioning
- Distraction- Music, TV, Reading
- Oscar Boot Repositioning

Thank you for your help, we are in this together!
Development of Menu

• Developed the Family Involvement Menu using results from nurse exercise and family survey.

• Educated nursing staff on the availability and intended uses of the Menu

• Displayed the Family Involvement Menu on a reusable white board in each patient room and encouraged its use.
“I have learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.”

Maya Angelou
Functional Reconciliation/ Follow Up Referrals

- Used to describe and keep track of progress in the patient’s physical, cognitive and mental status
- Helps to facilitate communication across the continuum of care
- Begins with an assessment of patient’s status prior to admission and follows them through the recovery
- Believed to be useful but has not been studied yet

ICU Diaries

- Used routinely in Europe
- Diaries are kept by families and staff to describe the patient's experience during the ICU stay
- Pictures are sometimes included
- When read post-discharge, diaries can fill in memory gaps, replace false memories and delusions

Outcomes of ICU Diaries:
- Decrease anxiety, depression and PTSD symptoms
- Decrease PTSD symptoms in families

Early Psychologic Intervention

- Psychologists as members of the critical care team
- Early patient & family support, counseling and education on stress management and coping skills
- Psychologist involvement has shown to cut the prevalence of anxiety, depression and PTSD in half

Good Handoff Communication

Major Theme: Survivors do not experience continuity of medical care during recovery after critical illness

- Informational needs change across the care continuum
- Fear and worry persist when families don’t know what to expect
- Survivors transition from dependence to independence

Each Phase Requires Different Levels of Support & Effective Handoff Communication

ASSESS, PREVENT & MANAGE PAIN

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Handout materials on PICS and PICS-F

Delirium: A Guide for Families

What is delirium?
Delirium is confusion that comes on quickly over a matter of hours. It may affect one’s thinking, attention, and behavior. Delirium is a serious problem that will often get better. Sometimes delirium does not get better. People with delirium are not crazy, and delirium is not the same as dementia.

What signs and symptoms may be present?
- Trouble paying attention or concentrating
- Not knowing who or where one is
- A change in behavior:
  - Agitation (hitting or pushing, resisting care, or not cooperating)
  - Restlessness (feeling a need to move around or feeling tense and “stirred up”)
  - Lethargy (lack of energy), slowed speech and/or movements
  - Change in sleep (for example, may be more awake at night and asleep during the day)
  - Any other change in behavior or personality that is not normal for your loved one
- A change in perception:
  - Seeing or hearing things that others do not
  - Paranoid beliefs (thinking people are trying to hurt them) and not feeling safe

Self help rehabilitation manual showed ↓ In PTSD symptoms

## Barriers to Post Hospital D/C Rehabilitation Programs

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Frequency reported overall, n (%)</th>
<th>Frequency reported as main barrier, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of funding</td>
<td>149 (90.9)</td>
<td>99 (63.5)</td>
</tr>
<tr>
<td>Lack of sufficient staff</td>
<td>128 (78.0)</td>
<td>17 (10.9)</td>
</tr>
<tr>
<td>Resources prioritised to other patient groups/clinical areas</td>
<td>71 (43.3)</td>
<td>4 (2.7)</td>
</tr>
<tr>
<td>Not considered relevant for this patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insufficient resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extracontacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of trained staff</td>
<td>13 (7.9)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>No evidence</td>
<td>4 (2.4)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Not sure what to include in a programme</td>
<td>2 (1.2)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Other (time constraints)</td>
<td>1 (0.6)</td>
<td>1 (0.6)</td>
</tr>
</tbody>
</table>

The early outcome research on these programs has not demonstrated significant benefit.

(Harvey M, Davidson J. Crit Care Med, 2016;44(2):381-385

First US Post ICU Clinics - Indiana University & Vanderbilt

- Critical Care Recovery Center at Indiana University (2011)
- ICU recovery Center at Vanderbilt (2012)
  - Team consists of medical ICU nurse practitioner, a pharmacist, pulmonary intensivists, a case manager and neurocognitive psychologist
  - Any member of the ICU teams can make a referral for patients to the clinic
  - Screening for inclusion and exclusion criteria are performed
  - Exclusion criteria
    - Pre-existing dementia or cognitive defect, life limiting illness, manage primarily by different subspecialty service (eg. liver/renal transplant, already have specialty resources (eg. Stroke or cardiac rehab, long-term resident of a skilled nursing facility
    - Initial visit: completes spirometry & a 6 minute walk test
    - Nurse practitioner completes a detailed history and physical exam
    - Neuropsychologist meets with the patient to evaluate and screen for cognitive impairment and PTSD, anxiety and depression
  - Only anecdotal data to date
SCCM Program

Every year, millions of Americans survive critical illness; but despite the efforts of their ICU, many are left with ongoing problems. The current health care system often does not meet the needs of these survivors, or their families, during their weeks to years of recovery. SCCM seeks to improve patient and family support after critical illness through the THRIVE Initiative.
ABCD Bundle Reduces Ventilation, Delirium & ↑OOB

- Eighteen-month, prospective, cohort, before-after study
- 5 adult ICU’s, 1 step down, 1 oncology unit
- Compared 296 patients (146 pre-bundle) & 150 post bundle
- Intervention: ABCDE
- Measured:
  - For mechanical ventilation patients (187) examined ventilator free days
  - All patients examined incidence of delirium, mortality, time to discharge and compliance with the bundle

## ABCDE Bundle Reduces Ventilation & Delirium

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Without ABCDE N=93</th>
<th>With ABCDE N=94</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received a spontaneous awakening trial</td>
<td>53%</td>
<td>71%</td>
<td>0.0372</td>
</tr>
<tr>
<td>Received a spontaneous breathing trial</td>
<td>71%</td>
<td>84%</td>
<td>0.0290</td>
</tr>
<tr>
<td>Got out of bed at least once</td>
<td>47%</td>
<td>61%</td>
<td>0.0675</td>
</tr>
<tr>
<td>Days spent breathing without ventilator</td>
<td>21 days</td>
<td>24 days</td>
<td>0.0371</td>
</tr>
<tr>
<td>Experienced delirium</td>
<td>75%</td>
<td>66%</td>
<td>0.1623</td>
</tr>
<tr>
<td>Length of delirium</td>
<td>2 days</td>
<td>1 day</td>
<td>0.00437</td>
</tr>
<tr>
<td>Died in the ICU</td>
<td>25.8%</td>
<td>14.9%</td>
<td>0.0913</td>
</tr>
<tr>
<td>Self extubated</td>
<td>6.5%</td>
<td>5.3%</td>
<td>0.7421</td>
</tr>
</tbody>
</table>

Balas M. Presented Jan 20. 2013 SCCM
| ABCDE Bundle Component Outcome | Pre-ABCDE Bundle ($n = 146$) | Post-ABCDE Bundle ($n = 150$) | Unadjusted $p$ | Adjusted Odds Ratio | Adjusted $p$
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Awakening and breathing coordination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ventilator-free days</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ($\bar{x}$)</td>
<td>15 (11.4)</td>
<td>18 (10.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median (IQR)</td>
<td>21 (0–25)</td>
<td>24 (7–26)</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Delirium monitoring/management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Delirium anytime, n (%)</strong></td>
<td>91 (62.3)</td>
<td>73 (48.7)</td>
<td>0.02</td>
<td>0.55 ($0.33–0.93$)</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Duration of delirium, days, median (IQR)</strong></td>
<td>3 (1–6)</td>
<td>2 (1–4)</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Percent ICU days spent delirious, median (IQR)</strong></td>
<td>50 (30–64.3)</td>
<td>33.3 (18.8–50)</td>
<td>0.003</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coma anytime, n (%)</strong></td>
<td>41 (28.1)</td>
<td>43 (28.7)</td>
<td>0.91</td>
<td>1.00 ($1.00$)</td>
<td>0.99</td>
</tr>
<tr>
<td><strong>Coma days, median (IQR)</strong></td>
<td>2 (1–4)</td>
<td>2 (1–5)</td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Percent ICU days spent in coma, median (IQR)</strong></td>
<td>25 (18.2–44.4)</td>
<td>25 (12.5–42.9)</td>
<td>0.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Richmond Agitation-Sedation Scale Score, mean ($\bar{x}$)</strong></td>
<td>0.02 (1.4)</td>
<td>-1.03 (1.2)</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Early exercise/mobility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mobilized out of bed anytime in ICU, n (%)</strong></td>
<td>70 (48)</td>
<td>99 (66.0)</td>
<td>0.002</td>
<td>2.11 ($1.30–3.45$)</td>
<td>0.003</td>
</tr>
<tr>
<td><strong>28-day mortality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hospital mortality (ICU and post-ICU), n (%)</strong></td>
<td>29 (19.9)</td>
<td>17 (11.3)</td>
<td>0.04</td>
<td>0.56 ($0.28–1.10$)</td>
<td>0.09</td>
</tr>
<tr>
<td><strong>ICU mortality, n (%)</strong></td>
<td>24 (16.4)</td>
<td>14 (9.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time to discharge</strong> (d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From ICU, median (IQR)</td>
<td>5 (3, 8)</td>
<td>4 (3, 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From hospital, median (IQR)</td>
<td>13 (9, 15)</td>
<td>11 (9, 13)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Delirium risk ↓from 62.3% to 48.7% & 17% less time spent delirious.

Keystones ABCDE Bundle Implementation

- 51 hospitals in Michigan’s Keystone ICU initiative
- Those implementing SATs and delirium screening were 3.5 times more likely to exercise ventilated patients
- Incomplete or nonsequential bundle implementation yielded lower success rates
- Authors wrote, “Another layer of evidence that for the ABCDEs, the whole is greater than sum of the parts.”

ABCDE QI Contextual Study

Quality Improvement Project

• 4 ICUs
• Implemented nearly all elements of the ABCDE bundle w/in the 12-month time frame.

Results:

• SATs compliance increased (25% → 81%)
• SBTs compliance increased (30% → 67%)
• Delirium Assessmnt increased (0% → 65%)
• ¾ ICUs have implemented an early mobility program
• 82% received some form of mobility
• 49% getting out of bed at least once per day

Carrothers, K. Crit Care Med 2013; 41:
Integrating ABCDEFGH into ICU culture

• Talk about all the ABCDEFGH bundle as ONE.
• Utilize Change Champions in all aspects of integration
  – Demonstrate/Mentor staff
  – Ground Up
• Daily Rounds with Multidisciplinary Team
  • Expectation is for RN to speak the language
• Don’t start each intervention separate from the others
  – Group interventions together, demonstrate how they connect and evaluate together
Interdisciplinary Rounds:
Nursing Objective Card

Pain, Agitation and Delirium

Mobility

VAE

SEPSIS

CAUTI/CLABSI
“QUALITY IS NEVER AN ACCIDENT. IT REPRESENTS THE WISE CHOICE OF MANY ALTERNATIVES.”

Willa Foster
Unfinished Revolutions In Critical Care

• 1970s: The birth of SCCM and a AACN and the rise of resuscitation
  – A well organized approach can save the very sick

• 1990’s: Owning End-of-Life Care
  – A well organized approach can give a good death to those we cannot save

• 2000’s: Bundling Care to Reduce Harm
  – A well organized approach to medical and nursing care to address preventable harm

• 2010’s: Beyond Life-and-Death: Surviving and Thriving
  – A well organized approach can help those who survive critical illness live full new lives

Adapted from TJ Iwashya presented at SCCM Congress 2016 Orlando Fl
Questions?
Next Steps

• Please complete survey to receive your attendance certificate and CEUs

• Continue to submit data
  – Next webinar: August 24, 1pm: Walk This Way: Implementation of Progressive Mobility Program in our ICU