HIT to Accelerate Implementation of a Bundle for ICU Delirium

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Baylor Scott & White Health (BSWH)

- More than 500 patient care sites including 43 hospitals in North and Central Texas
- 5.3 million patient encounters annually
- 34,000 employees
- 6,000 affiliated physicians
- Scott & White Health Plan
- $8.3 billion in total assets
- $5.8 billion in total net operating revenue
ICU Delirium (“Ever vs. Never”)

- Increased ICU length of stay (8 vs 5 days)
- Increased hospital length of stay (21 vs 11 days)
- Increased time on ventilator (9 vs 4 days)
- Higher ICU costs ($22,000 vs $13,000)
- Higher ICU mortality (19.7% vs 10.3%)
- Higher hospital mortality (26.7% vs 21.4%)
- 3-fold increased risk of death at 6 months
- Increasing evidence as a risk factor for long-term cognitive impairment

Ely, et al. ICM2001; 27, 1892-1900
Lin, SM CCM 2004; 32: 2254-2259
Synergy of the ABCDE Bundle

- **Awakening & Breathing Trial Coordination**
- **Choice of sedatives & analgesics**
- **D daily Delirium monitoring**
- **Early mobility Exercise**

↑ Liberation from ventilator
↑ Earlier ICU & Hospital discharge
↑ Return to normal brain function
↑ Independent functional status
↑ Survival

Delirium Bundle Implementation: Quasi-Experimental Study Design

Intervention Groups

- **Basic Implementation Program**
  - Access to EHR modifications
  - Access to standardized reports

- **Enhanced Implementation Program**
  - Access to EHR modifications
  - Access to standardized reports
  - Engagement of site champions
  - Participation in content development
  - Supplemental training

Design Characteristics

- 3 hospitals in each group
- Matched site traits wherever able
- Programs operated concurrently
- Randomization not feasible
- Outcomes analyses via time series
## ABCDE Bundle Implementation Tactics

<table>
<thead>
<tr>
<th>Adoption Program Component</th>
<th>Time to Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activate Nurse/ Physician Champions and secure clinical staff conceptual buy-in</td>
<td>1-3 months (based on hospital size)</td>
</tr>
<tr>
<td>Assess current state (workflow, performance)</td>
<td>1-month</td>
</tr>
<tr>
<td>Development of supportive EHR Documentation and order set with incorporation into production (live use) environment</td>
<td>months</td>
</tr>
<tr>
<td>Training Sessions (staged at hospitals with multiple ICUs):</td>
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<tr>
<td>a. “Train the trainer” (with outside consultants)</td>
<td>4-6 month cycle to launch each unit; multiple “reinforcement” sessions required.</td>
</tr>
<tr>
<td>b. Frontline staff training (2-hour session)</td>
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<tr>
<td>Use of daily rounding tool</td>
<td>9-12 months</td>
</tr>
<tr>
<td>Standardized Performance Reporting (hospital and unit levels)</td>
<td>4 months after completion of EHR workflow tools</td>
</tr>
<tr>
<td>Optimization/EHR refinement/standing meetings</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Accountability as a system critical care goal</td>
<td>3 months after standardized reporting</td>
</tr>
</tbody>
</table>
These practices will be applied to intensive care unit patients according to the criteria below. If indicated by clinical status, physicians may choose to “opt out” of specific patients receiving the bundle by ordering “Discontinue ABCDE Bundle.”

SEDATION MANAGEMENT (AWAKENING)
- Initiate Sedation Vacation: Hold analgesic / sedation for continuous infusion 2 times daily
- Exclude if patient meets one of the following criteria and document exclusion criteria that patient met in nursing focus notes each day:
  - FiO2 60 or above
  - PEEP greater than 7.5 cm
  - Neurosurgical patient
  - Increased intracranial pressure (greater than 10 cm H2O)
  - Heart rate greater than 140 bpm
  - Patient on neuromuscular blocker
  - Open surgical abdomen
  - Active seizures
  - Active alcohol withdrawal
  - Active agitation
  - Myocardial ischemia within the last 24 hours
- Do not resume infusion unless the following criteria are met:
  - Agitated or combative
  - O2 saturation falls below 90%
  - Respiratory Rate is 40 or above
  - Worsening dyspnea
- If patient meets any of the criteria (above), resume infusion at HALF of the previous rate
- If these symptoms persist, contact the physician

SPONTANEOUS BREATHING TRIAL
- Do a Spontaneous Breathing Trial with Continuous Positive Airway Pressure Support plus 5 cmH2O if patient is:
  - Hemodynamically stable on no vasopressors
  - Not actively agitated
  - FiO2 60% or less
  - PEEP 7.5 or less
  - Oxygen saturation greater than 88%
  - No active myocardial ischemia within the past 24 hours
  - Patient awake, and able to follow 3 out of the 4 following commands:
    - Opens eyes with verbal command
    - Points two fingers upon instructions
    - Follows caregiver’s voice using eyes
    - Sticks out tongue with verbal command
- Discontinue spontaneous breathing trial and resume prior ventilator settings for:
  - Respiratory rate greater than 35 or less than 8 for 5 minutes or longer
  - SPO2 less than 88% for greater than 5 minutes
  - Abrupt changes in mental status
  - Acute Cardiac Arrhythmia
  - Heart rate greater than 130 or less than 60
  - Accessory muscle use
  - Abdominal Paradoxical Breathing
  - Diaphoresis
  - Marked dyspnea
- If spontaneous breathing trial successful then measure:
  - Respiratory rate
  - Tidal volume
  - Call physician after 30 minutes with results of the trial
Critical Care Flowsheet

<table>
<thead>
<tr>
<th>Peak Airway Pressure Mean Airway Pressure (cm H2O)</th>
<th>11/19/2014</th>
<th>11/19/2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sigh Rate (breaths/hr) Sigh Volume (L)</td>
<td>7:00</td>
<td>7:05</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>31</td>
</tr>
</tbody>
</table>

**Ventilator-Associated Pneumonia**
- Oral care
- Head Of Bed Elevated 30 - 45 Degrees
- VTE
- brush foam swab all criteria met

**Stress Ulcer Prophylaxis**
- all criteria met

**Sedation Vacation/Daily Awakening Trial**
- Did the Patient Receive a Sedation Vacation Today
  - If Not, Why Not
- Was the Sedative Infusion Resumed
  - If So, Why
- no PEEP greater than 7.1

**Exercise/Mobility**
- Did the Patient Receive Exercise/Mobility Therapy Today
  - If Not, Why Not
- yes passive range of moti

**Sedation Scale**
- Richmond Agitation Sedation Scale (RASS)
  - Deep sedation (-4) Deep sedation (-4)

**Confusion Assessment Method - ICU**
- Confusion Assessment Method
  - RASS/Ramsay: step 1, if RASS -4 or -5 or Ramsay 5 or 6, STOP Reassess later
  - Feature 1: Acute Onset or Fluctuating Course
  - Feature 2: Inattention
  - Feature 3: Altered Level of Consciousness
  - Feature 4: Disorganized Thinking
  - CAM Overall Score
  - CAM-ICU assessmer CAM-ICU assessmer
Real-Time Reporting for “Measure-Vention”

<table>
<thead>
<tr>
<th>Patient Care</th>
<th>View</th>
<th>04. Patient Care View</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABCDE/VENT BUNDLE</strong></td>
<td><strong>&lt;All&gt;</strong></td>
<td><strong>Edit views...</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>ABCDE/VENT BUNDLE</th>
<th>11/19 03:57</th>
<th>11/19 04:00</th>
<th>11/19 04:15</th>
<th>11/19 04:30</th>
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<tbody>
<tr>
<td><strong>ABCDE Bundle</strong></td>
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<tr>
<td>Sedation Vacation/Daily Awakening Trial</td>
<td>no</td>
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<tr>
<td>Did the Patient Receive a Sedation Vacation/Daily Awakening Trial</td>
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<td></td>
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<td></td>
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<tr>
<td>If Not, Why Not</td>
<td>newly...</td>
<td></td>
<td></td>
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<tr>
<td>Spontaneous Breathing Trial (SBT)</td>
<td>no...</td>
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<tr>
<td>Did the Patient Receive a Breathing Trial</td>
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<td></td>
<td></td>
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<tr>
<td>If Not, Why Not</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Delirium (CAM-ICU)</td>
<td>CAM-I...</td>
<td>CAM-I...</td>
<td>CAM-I...</td>
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<tr>
<td>RASS/Ramsay: step 1, if RASS -4 or -5...</td>
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<td></td>
<td></td>
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<tr>
<td>Exercise/Mobility</td>
<td>CAM-I...</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Did the Patient Receive Exercise/Mobility</td>
<td>CAM-I...</td>
<td></td>
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<tr>
<td>What Level Was Achieved</td>
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<tr>
<td><strong>Vent Bundle</strong></td>
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<tr>
<td>Oral care</td>
<td>foam s...</td>
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<td>all crit...</td>
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Eligibility for Report:
- Vent ≥ 24 hours
- Vent ≤ 2 weeks
- Specific neuro. diagnoses excluded
- Based on admin. data
- Reports electronically derived
Delirium Bundle Uptake by Intervention Group
Bundle Impact on Patient Outcomes: Preliminary Data

Patients with Bundle Adherence Rate ≥ 60%

- Spent less time on the ventilator (-.32 days; 95%CI: -0.55, -0.08)
- No change in documented coma incidence (OR=0.97; 95%CI: 0.76-1.23)
- Had fewer days with coma or delirium (45%; 95%CI: 0.30-0.59)
- Were more likely to be mobilized out of bed (OR = 2.05, 95%CI: 1.67-2.53)
- Were more likely to be discharged home (OR = 1.22; 95%CI: 1.01-1.47)
- Had reduced risk of inpatient mortality (OR = 0.43; 95%CI: 0.32-0.57)
Key Lessons Learned

- Strong relationship between clinical workflow and EHR structured documentation/CDS; deploying the EHR modifications should be a 1st step in hardwiring a care process
- Focusing resources on EHR modification (placing this phase as early as possible in the implementation program sequence) appears to be a high-yield practice uptake approach
- Hospitals with a strong pre-existing QI acumen were able to leverage the EHR modifications with minimal support
- Even with HIT tools, “person-to-person” propagation and clear lines of accountability were still crucial to adoption