Implementation of the ABCDE bundle in the ICU: Practical Aspects and Lessons Learned

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VA TN Valley Health Care System
The ABCDE approach of good sedation and delirium management

• **AB** - Awakening and Breathing Coordination
• **C** - Choice of Sedative
• **D** - Delirium monitoring and management
• **E** - Early mobility
• Awakening and Breathing
Daily Interruption of Sedatives

Ventilator time reduced by 2.5 days
Adjusted $P < .001$

The ABC Trial
(Both groups get patient targeted sedation)

**Control**
- Medical ICU on Ventilator
  - Surrogate Informed Consent
- Spontaneous Breathing Trial (SBT)
  - Ventilator off
  - Safely monitored
- **OUTCOMES**
  - Delirium, LOS, 12-mo NPS testing, QOL

**Intervention**
- Spontaneous Breathing Trial (SBT)
  - Ventilator off
  - Safely monitored
- Spontaneous Awakening Trial (SAT)
  - Turn sedation/narcotics off
  - Monitor safely
- **OUTCOMES**
  - Delirium, LOS, 12-mo NPS testing, QOL

Successful Extubation

Patients Successfully Extubated (%)

SAT + SBT (n=167)

SBT (n=168)

Mean ventilator-free days, 14.7 versus 11.6 days
95% CI for the difference, 0.7 to 5.6 days; \( P = .02 \)

Improved 1-Year Survival in ABC Trial

Benzodiazepines

Daily Dose of Benzodiazepines

Study Day

Usual Care + SBT

SBT + SAT
From: Daily Sedation Interruption in Mechanically Ventilated Critically Ill Patients Cared for With a Sedation Protocol: A Randomized Controlled Trial

2091 Patients screened

1661 Excluded
403 No surrogate decision maker
371 Refused consent
179 Physician refused participation
104 Missed/no research staff
86 Enrolled in another trial
13 Not specified
10 Previously in SLEAP
495 Other

430 Patients randomized

218 Randomized to receive protocolized sedation and daily interruption

214 Included in analysis

4 Consent withdrawn

212 Randomized to receive only protocolized sedation

209 Included in analysis

3 Consent withdrawn
Kaplan-Meier Curves for Time to Successful Extubation

Proportion Intubated

Time, d

$P = .52$

Protocolized sedation only

Protocolized sedation and daily interruption

n. at risk
Protocolized sedation only
209 146 72 49 34 23
Protocolized sedation and daily interruption
214 140 81 42 28 16
# SLEAP Study

<table>
<thead>
<tr>
<th>Protocolized Sedation and Interruption (n = 214)</th>
<th>Protocolized Sedation (n = 209)</th>
<th>Measure of Effect, Mean Difference (95% CI)</th>
<th>P Value</th>
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<td>1067 (4297)</td>
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<td>222 (50 to 734)</td>
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<tr>
<td>Dose/patient/d, mg</td>
<td>102 (326)</td>
<td>82 (287)</td>
<td>19.23 (2.37 to 37.07)</td>
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<td><strong>Dose/patient/d, infusion, mg</strong></td>
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<td>101 (325)</td>
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<td><strong>Fentanyl equivalents</strong></td>
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<td>Total dose/patient, μg</td>
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<td>13,532 (23,219)</td>
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<td>Dose/patient/d, infusion, μg</td>
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<td>Dose/patient/d bolus, μg</td>
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<td>86 (169)</td>
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Implementation challenges and multidisciplinary approach to overcome barriers
Components of the Awakening and Breathing Coordination

**Sedation Safety Screen**

PASS - Sedation Cessation

FAIL

SBT

SAT Trial FAIL

Sedative Restarting Criteria
Key players to get involved

• Approvals from unit specific physician and nursing leadership
• ICU Director or designee
• Nurse educators and charge nurses in each ICU
• Respiratory therapists in each ICU
• Champions in each unit (nurses, NPs…)
• ICU Team for reinforcement
Allay Concerns

“I think that, to get nursing staff buy-in (especially in the CVICU where hemodynamic swings can be devastating), it is important to clearly define hemodynamic instability.”

“If we start with what all consider to be reasonable, then we have more likelihood of additional patients included later. If we start with criteria that the nurses consider to be ‘dangerous’, we will not get buy-in.”
Allay Concerns

“Is there any more specific definition for hemodynamically unstable – including a timeframe from a last major intervention to get them stable? (Example: If the patient is now at target for their blood pressure, PA pressures, or heart rate, but they have only been there for two hours after a raucous 12 hour chase, are they now hemodynamically stable and eligible for SAT?)”

“Do you want a nurse to determine hemodynamic instability or cardiac ischemia. We have some new nurses in our ICU”

“Surgical patients have pain. I don’t want to stop analgesic infusions.”
Spontaneous Awakening Trial Screen

**SAT Safety Screen**
- No active seizures
- No alcohol withdrawal
- No agitation
- No paralytics
- No myocardial ischemia
- Normal intracranial pressure

**SAT Failure**
- Anxiety, agitation, or pain
- Respiratory rate > 35/min
- SpO2 < 88%
- Respiratory distress
- Acute cardiac arrhythmia

**Flowchart**
- SAT Safety Screen
  - q24 hrs
  - fail
  - pass
  - Perform SAT
    - fail
    - Restart sedatives at 1/2 dose
  - pass
Assess patient with SAT Safety Screen

1. No hemodynamic instability*
2. SpO₂ ≥ 88% and FiO₂ ≤ 0.70
3. Not on paralytics/ no ordered RASS -4 or -5
4. No ongoing agitation (RASS scores of +2 to +4 in last 4 hours)
5. No active myocardial ischemia or arrhythmia ‡
6. No active seizures or active ETOH withdrawal
7. Normal ICP (<20 mm Hg)
8. No contraindication for wake up (open abdomen/chest, unsecured cerebral aneurysm, unstable cervical spine, difficult airway, comfort care orders etc.)
9. No Impending/scheduled surgical procedure
SAT TRIAL PASSED (no signs of SAT failure)
• If no SBT planned continue with SAT only
• Restart analgesics and sedatives only if indicated
• RASS target may need to be adjusted if patients tolerating SAT

FAILED SAT trial
(Any one of)
• Anxiety, agitation, or pain not managed by prn bolus dosing
• Respiratory distress or RR >35
• SpO₂<88%
• Acute cardiac arrhythmia
• New ST segment changes
### Mandatory Documentation: WHAT FAILED

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<td>RASS/CAM:</td>
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<td>SAT screen Passed/Failed</td>
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<td>If failed why?</td>
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<td>SAT trial</td>
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<td>In progress/Passed/Failed</td>
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<td>If failed why?</td>
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NO LONGER IN THE NEURO SECTION OF DOCUMENTATION BUT FORCED IN VENT AREA

OPTION TO DOCUMENT ‘NO CONTINUOUS SEDATION’
• Coordination of Awakening and Breathing
Timing of SATs/SBTs

• Night shift?

• Day Shift?
IN SICU- after shift change which occurs at 7 am

1. Complete your bedside shift report on all patients in your assignment (645-7 am)

2. Complete your assessments including SAT safety screen on both patients (7 am - 730 am).

3. Start the SAT trial if the patient passes the safety screen. This should happen sometime around 730-8am. Notify RT

4. When the team rounds, you should address your progress on the SAT trial. Even if you haven’t started the actual trial, the team wants to know during rounds whether or not the patient is eligible for the trial. In short, communicate with the team about the status of the SAT.

5. Notify the team that the patient of the results of the SAT/SBT

IN TRAUMA- 5 am start (fellows and SR residents in house)
Components of the Awakening and Breathing Coordination

Sedation Safety Screen

FAIL

Sedation Cessation

SBT

SAT Trial FAIL

Sedative Restarting Criteria
Sedation cessation-practical aspects

• Once safety screen is passed, discontinue ALL sedative and analgesic infusions; prn analgesics OK
• We stop dexmedetomidine UNLESS to treat delirium
• Inform respiratory therapist to coordinate SBT
• Sedative/Analgesics stay off until
  – Pass SAT/SBT and move towards extubation
  – Need for some sedation based on RASS target
  – Fail SAT (SAT duration >4hrs not a failure criteria)
• Restart at lowest dose needed to maintain RASS target
Feedback and Auditing

- Daily during rounds- attending or designated champions. We are using our NPs and pharmacists who are constants in the ICU
- Weekly reports
- Focus on education and not being punitive
- Feedback from users
- Electronic prompts/reminders
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<th>Patient Name</th>
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<th>MD/Art</th>
<th>Sepsis</th>
<th>Vent</th>
<th>SBT Trial</th>
<th>DVT</th>
<th>SLP</th>
<th>Pl.</th>
<th>Hgb</th>
<th>swab</th>
<th>teeth</th>
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(as of 09/16 20:17)

Refresh (31 rows)

*Customize*
Columns (?)
Change panel / unit
Change indicators
Filter Filter by value
Set date range
Toggle 'Bulk'
Search
Dump data

Indic.:
• Choice of sedation (after analgesia and if needed)
<table>
<thead>
<tr>
<th>First Author</th>
<th>Year</th>
<th>Population</th>
<th>Outcome(s) improved</th>
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**Trials finding no differences in outcomes**

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**Trials finding better outcomes with the benzodiazepine**

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<td>2010</td>
<td>Mixed ICU</td>
<td>Lower ICU costs</td>
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<td>Jakob SM</td>
<td>2012</td>
<td>General ICU</td>
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<td>Trials finding better outcomes with the benzodiazepine</td>
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</table>
• Delirium Monitoring and Management
Confusion Assessment Method (CAM-ICU)

1. Acute onset of mental status changes or a fluctuating course

and

2. Inattention

and

3. Altered level of consciousness

or

4. Disorganized thinking

= Delirium

Intensive Care Delirium Screening Checklist

1. Altered level of consciousness
2. Inattention
3. Disorientation
4. Hallucinations
5. Psychomotor agitation or retardation
6. Inappropriate speech
7. Sleep/wake cycle disturbances
8. Symptom fluctuation

Mnemonics

- **D**rugs, Drugs, Drugs
- **E**yes, ears
- **L**ow 02 states (MI, ARDS, PE, CHF, COPD)
- **I**nfection
- **R**etention (of urine or stool), Restraints
- **I**ctal
- **U**nderhydration/Undernutrition
- **M**etabolic
- **S**ubdural, Sleep deprivation

http://www.icudelirium.org/terminology.html
Prevention Protocols for Delirium

- Reorientation, continuity of caregivers
- Improving sleep architecture
- Decreased use of restraints
- Cognitive stimulation, providing eye glasses and hearing aids
- Removal of catheters
- Role of geriatrician visits or trained personnel in neuropsychological disorders

ICU Sedation Protocol for Ventilated Patients

Patient: ZTESTHMMFDB, 36YOMALE

Select RASS goal

<table>
<thead>
<tr>
<th>Target RASS Value</th>
<th>RASS Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert and Calm</td>
<td>Not fully alert, but has sustained awakening to voice (eye opening/contact &gt; 10 seconds)</td>
</tr>
<tr>
<td>Drowsy</td>
<td>Briefly awakens to voice (eye opening/contact &lt; 10 seconds)</td>
</tr>
<tr>
<td>Light Sedation</td>
<td>Movement or eye opening to voice (but no eye contact)</td>
</tr>
<tr>
<td>Moderate Sedation</td>
<td>No response to voice, but movement or eye opening to physical stimulation</td>
</tr>
<tr>
<td>Unresponsive</td>
<td>No response to voice or physical stimulation</td>
</tr>
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</table>

1. Pain

- **Drug**: Fentanyl Intermittent
  - **Dosage**: 0.1-0.3 mcg/kg IV q15 min to goal then 0.1 mcg/kg IV q2h pm
- **Drug**: Hydromorphone Intermittent
  - **Dosage**: 0.5-1.0 mcg/kg IV q15 min to goal then 0.1 mcg/kg IV q6h pm
- **Drug**: Morphine Intermittent
  - **Dosage**: 2-5 mcg/kg IV q15 min to goal then 2-5 mcg/kg IV q2h pm

If anticipating or requiring greater than 3 boluses per hour:
- **Drug**: Fentanyl Infusion
  - **Dosage**: 0.5-3 mcg/kg/h (avoid in patients with renal failure and hemodynamic instability)
- **Drug**: Morphine Infusion
  - **Dosage**: 0.1-4 mcg/kg/h
- **Drug**: None

2. Sedation/Agitation

Active orders: Midazolam Propofol
- **Drug**: None (if RASS not at goal with analgesia-based regimen)

- **Drug**: Propofol Infusion
  - **Dosage**: 10-25 mcg/kg/min
- **Drug**: Midazolam Infusion
  - **Dosage**: 0.2-0.5 mg/kg/h IV x 24 hrs (if delirium worsening)

For propofol intolerance consider one of the following:
- **Drug**: Midazolam Intermittent
  - **Dosage**: 1-3 mcg/kg IV q2hs pm
- **Drug**: Midazolam Infusion
  - **Dosage**: 0.5-3 mcg/kg/h

(Propofol intolerance refers to propofol infusion syndrome, hemodynamic instability preceding propofol use, elevated creatinine phosphokinase (CPK) > 5000 IU/L, triglycerides > 500 mg/dl, or propofol use > 24 hrs)

3. Delirium (CAM-ICU+)

Active orders: Haloperidol Olanzapine

- **Drug**: Haloperidol (scheduled)
  - **Dosage**: 1 mg IM/IV q6h up to total of 4 doses
- **Drug**: Haloperidol (scheduled)
  - **Dosage**: 1 mg IM/IV q6h up to total of 4 doses
- **Drug**: Olanzapine
  - **Dosage**: 5 mg PO/IV q12h 30 doses
- **Drug**: Haloperidol Infusion
  - **Dosage**: 0.2-1.5 mcg/kg/h IV x 24 hrs

ORDER STAT

Exit Without Ordering
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<th>Inf. Req.</th>
<th>Casino</th>
<th>StarV</th>
<th>Scrat</th>
<th>Team</th>
<th>Vital Signs</th>
<th>RUL STRENGTH</th>
<th>LLQ STRENGTH</th>
<th>Right ABD</th>
<th>Right ST</th>
<th>Left ABD</th>
<th>Left ST</th>
<th>CAM-ICU</th>
<th>RASS Score</th>
<th>Pass Safety Screen</th>
<th>SAT Passed</th>
<th>SAT Performed</th>
<th>IFN P/o-FC</th>
<th>Pupil React</th>
<th>Strength</th>
<th>Ment LOC</th>
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• Early Mobility
## Daily Wake-Up + Early Mobility

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<tr>
<th>Outcome</th>
<th>Intervention (n=49)</th>
<th>Control (n=50)</th>
<th>P</th>
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<tbody>
<tr>
<td>Functionally independent at discharge</td>
<td>29 (59%)</td>
<td>19 (35%)</td>
<td>.02</td>
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<tr>
<td>ICU delirium (days)</td>
<td>2.0 (0.0-6.0)</td>
<td>4.0 (2.0-7.0)</td>
<td>.03</td>
</tr>
<tr>
<td>Time in ICU with delirium (%)</td>
<td>33% (0-58)</td>
<td>57% (33-69)</td>
<td>.02</td>
</tr>
<tr>
<td>Hospital delirium (days)</td>
<td>2.0 (0.0-6.0)</td>
<td>4.0 (2.0-8.0)</td>
<td>.02</td>
</tr>
<tr>
<td>Hospital days with delirium (%)</td>
<td>28% (26)</td>
<td>41% (27)</td>
<td>.01</td>
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<tr>
<td>Barthel Index score at discharge</td>
<td>75 (7.5-95)</td>
<td>55 (0-85)</td>
<td>.05</td>
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<tr>
<td>ICU-acquired paresis at discharge</td>
<td>15 (31%)</td>
<td>27 (49%)</td>
<td>.09</td>
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<tr>
<td>Ventilator-free days</td>
<td>23.5 (7.4-25.6)</td>
<td>21.1 (0.0-23.8)</td>
<td>.05</td>
</tr>
<tr>
<td>Length of stay in ICU (days)</td>
<td>5.9 (4.5-13.2)</td>
<td>7.9 (6.1-12.9)</td>
<td>.08</td>
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<tr>
<td>Length of stay in hospital (days)</td>
<td>13.5 (8.0-23.1)</td>
<td>12.9 (8.9-19.8)</td>
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</tr>
<tr>
<td>Hospital mortality</td>
<td>9 (18%)</td>
<td>14 (25%)</td>
<td>.53</td>
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</table>

LEVEL OF ACTIVITY BASED ON RASS

Admission to ICU

<table>
<thead>
<tr>
<th>Stupor/Coma</th>
<th>Awakens to Voice</th>
<th>Alert/ Calm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RASS -5/ -4</td>
<td>RASS -3</td>
<td>RASS -2/ -1/0</td>
</tr>
</tbody>
</table>

- Passive ROM
- Safety Screen
- Passive ROM
- Order PT consult
- Sit

- Safety Screen
- Order PT Consult
- Passive/Active Exercises
- Stand
- Walk

Progress As Tolerated

Hospital Discharge/Return to Baseline

Adapted from Morris Crit Care Med 2008

**Mobility screen (significant overlap with SAT Safety Screen)**

1. No hemodynamic instability* or active resuscitation
2. SpO\textsubscript{2} \geq 88\% or FiO\textsubscript{2} \leq 0.70; \textbf{RR} > 8, < 35 per min, PEEP < 8
3. No ongoing agitation (RASS scores of +2 to +4 in last 4 hours)
4. No active myocardial ischemia or arrhythmia ‡
5. No active seizures
6. Normal ICP (<20 mm Hg)
7. No contraindication for mobility (open abdomen/chest, unsecured cerebral aneurysm, unstable spine, difficult airway, VDR ventilator, surgical procedures requiring immobilization, comfort care etc.)
8. No femoral vascular devices
9. No sustained systolic blood pressure >180 mmHg or HR > 130/min
Evaluate Patient RASS Score

- **RASS -4/-5**
  - Bedside nurse passive ROM- 1 or more extremities with every q2 hr turning

- **RASS -3**
  - Mobility Screen Pass
  - Nurse starts with
    - Passive ROM, Sit
    - Reminds team to order PT
  - If fails Mobility Screen
    - Passive ROM by RN- 1 or more extremities with q 2 hour turning

- **RASS -2/-1/0**
  - Mobility Screen Pass
  - PT/OT consult ordered
  - Nurse continues with
    - Sit, active exercise
    - Dangle, Stand, Walk
  - If fails Mobility Screen
    - Passive ROM by RN- 1 or more extremities with q 2 hour turning
Criteria for Cessation of Physical Therapy Session (for the RN)

- Symptomatic drop in mean arterial pressure (e.g., dizziness, light-headedness, syncope)
- Heart rate <40 or >130 bpm
- Respiratory rate <8 or >40 breaths/min
- Systolic blood pressure >180 mm Hg
- Pulse oximetry <88%
- Marked ventilator dysynchrony
- Patient distress (nonverbal cues, gestures)
- New arrhythmia, concern for myocardial ischemia
- Concern for airway device integrity
- Endotracheal tube removal
Present Staffing Model

- 1 PT per ICU in general
- 1 OT partner
- CVICU/MICU share 1 PT; BICU has 2 PTs, TICU and Step down have 1 but effort on step down side to aid with disposition
- 8 PT Assists cover entire hospital
- PTs can see patients only when consulted; so it HAS TO BE ORDERED
- About 40-50% eligible patients do not get referred
Work flow of PTs/PTAs

• On an average the PT will evaluate 6-8 new patients/day and will provide some therapy during that time
• Will prescribe treatment plan for PTA to dispense. May help with some
• In general PTs provide 25% of therapies; PTAs 75%
• A PTA can dispense about 8 treatments a day (10-30 minutes/patient)
• 2-3 days of therapy/patient/wk in patients with orders
Manpower needs

- Consider an ICU with 20-22 patients
- About 16 patients will meet RASS ≥ -3 so eligible for PT order and evaluation
- 1 PT will cover the 6-7 “new” patients, prescribe therapy and dispense therapy during evaluation
- 10 “previously admitted” patients will have recommendations for therapy. PTAs can cover about 8 pts if they are not assisting the PT; about 5 pts if they are helping out with the “new” patients
- So apart from 1 dedicated PT and 1 dedicated PTA for a 22 bed ICU, a minimum of a “half” floating PTA will be required to provide daily therapy for all 16 eligible patients