Multidisciplinary Implementation of the ABCDE Bundle: Reducing Harm

Kathleen Vollman MSN, RN, CCNS, FCCM, FAAN
Clinical Nurse Specialist/Educator/Consultant
ADANCING NURSING LLC
kvollman@comcast.net
www.vollman.com

Disclosures

• Eloquest Healthcare Speaker Bureau & Consultant
• Hill-Rom Speaker Bureau & Consultant
• Sage Products Speaker Bureau & Consultant
Learning Objectives
At the completion of this activity, the participant will be able to:

• Overview of the body of evidence that demonstrate the need for full integration of the ABCDE bundle for maximizing patient outcomes.
• Outline a few practical strategies for implementing a mobility protocol and influencing a shift in unit practice.
• Describe one or two major challenges to implementation and pinpoint workable solutions

ABCDE
Goal: To Address Delirium And ICU Acquired Weakness

• Spontaneous Awakening Trials
• Spontaneous Breathing Trials
• Coordination of Awakening and Breathing Trials/Choice of Sedative
• Daily Delirium screening
• Exercise/Early Mobility
The Effects of Bedrest/Immobility on Neurological Function

- **Delirium**
  - Acute, fluctuating change in consciousness and cognition
  - Develops over a brief time period
  - Often an ICU and hospital complication
- **Psychological effects**
  - Depressed mood
  - Poor appetite or overeating
  - Insomnia or hypersomnia
  - Low energy or fatigue


Neurological Dysfunction

- 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
- 3 months: 40% had global cognition scores 1.5 SD below population mean, 26% had scores 2 SD below pop mean
- 12 months: 34%, 24% global cognition scores below the mean

Facts About Neurocognitive Impairments

Up to 78% of ICU survivors experience neurocognitive impairments

46% neurocognitive impairment prevalence at 1 year

25% neurocognitive impairment prevalence at 6 years

Hopkins RO, et al. CHEST. 2006;130:869-878.

Outcomes of A 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 2006;36:1119-1124
Winkelman C et al, CCN,2010;30:36-60
“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 ABCDE Bundle for the ICU
Goal: To Address Delirium And ICU Acquired Weakness

- Spontaneous **Awakening** Trials
- Spontaneous **Breathing** Trials
- Coordination of Awakening and Breathing Trials/Choice of Sedative

A: Spontaneous Awakening Trials

- Around the clock sedation administered via a protocol based on evaluation of sedative levels with a reliable and valid tool shortened time on vent, ICU & hospital length of stay, need for a trach
- Daily interruption of sedative drug infusions decreases the duration of mechanical ventilation and LOS in the ICU. In the group that had daily interruption, the duration of mechanical ventilation was reduced by 33% (2.4 days) and ICU LOS was reduced by 35% (3.5 days) and lower impact on PTSD.
- Wake up and breathe protocol resulted in ↓ time on ventilator, ↓ ICU & hospital stay and reduced 1 year mortality (NNT=7)
- When dexmedetomidine was compared to midazolam in long term sedation, it showed ↓ time to extubation, ↓ ICU stay, ↓ delirium prevalence and ↑ delirium free days, problems with Bradycardia

Riker RR, et al. JAMA, 2009;301:489-499
B: Spontaneous Breathing Trials

An automatic weaning protocol should be in place and mechanically ventilated patients should undergo assessment of readiness to wean & spontaneous breathing trial when they satisfy the 2-step process:

- **Readiness to Wean**: Arousable, Low ventilatory and end expiratory pressure requirements, No new potentially serious conditions, Hemodynamically stable without vasopressors, Requiring levels of FiO2 that could be delivered with a face mask or nasal cannula
- **Perform a Spontaneous Breathing Trial**: 30 to 120 minutes with assessment of vent pattern, gas exchange, hemodynamics & comfort

C: Choice of Sedation

- **PAD Guidelines (Evidence Based Guidelines)**
  - Pain (Non-pharm & Pharmacological-Remifentanil or Fentanyl)
    - BPS (Behavioral Pain Scale)
    - CPOT (The Critical Care Pain Observation Tool)
  - Agitation (non-benzodiazepine, Dexmedetomidine or Propofol) light sedation & interruption
    - RASS
    - SAS

Symptom targeted pharmacological & non-pharmacological management
Summarize the Evidence

- New PAD guidelines published
- Performed gap analysis between current practices and new guidelines
- Identified gaps-for example
  - No standardized method to assess pain in patients who were unable to self report
  - Not always treating pain first
  - Still using some benzo IV drips for sedation
  - Not following current sleep protocol
  - Not consistently mobilizing patients beyond getting up in chair

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
Gap in Current Practice

No Standardized Tool for Patients who cannot self report

• Lack of standardization leads to…
  – Variation in assessment
different nurse, different result
  – Variation in intervention
different nurse, different intervention

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 Presence of frowning, brow lowering, orbit tightening, and levator contraction All of the above facial movements plus eyelid tightly closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relaxed, neutral</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Tense</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Grimacing</td>
<td>2</td>
</tr>
<tr>
<td>Body movements</td>
<td>Does not move at all (does not necessarily mean absence of pain) Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements Pulling tube, attempting to sit up, moving limbs/ thrusting, not following commands, striking at staff, trying to climb out of bed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absence of movements</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Protection</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Restlessness</td>
<td>2</td>
</tr>
<tr>
<td>Muscle tension</td>
<td>No resistance to passive movements Protection to passive movements Strong resistance to passive movements, inability to complete them</td>
<td></td>
</tr>
<tr>
<td>Evaluation by passive flexion and extension of upper extremities</td>
<td>Relaxed</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Tense, rigid</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Very tense or rigid</td>
<td>2</td>
</tr>
<tr>
<td>Compliance with the ventilator (intubated patients)</td>
<td>Alarms not activated, easy ventilation Coughing but tolerating Tolerating ventilator or movement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alarms stop spontaneously</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Any synchrony: blocking ventilation, alarams frequently activated</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td>Talking in normal tone or no sound</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sighing, moaning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crying out, sobbing</td>
<td></td>
</tr>
<tr>
<td>Vocalization (intubated patients)</td>
<td>Talking in normal tone or no sound</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sighing, moaning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crying out, sobbing</td>
<td></td>
</tr>
<tr>
<td>Total, range</td>
<td></td>
<td>0-8</td>
</tr>
</tbody>
</table>
Agitation

- Assess q2 hrs
- Maintenance of patient comfort
- Provision of adequate analgesia first
- Frequent reorientation
- Optimization of the environment to maintain normal sleep patterns
- Use non-benzodiazepines for sedation

### 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>Comatose</td>
<td>Overly combative or violent; immediate danger to self</td>
</tr>
<tr>
<td>+3</td>
<td>Very agitated</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 dysynchrony</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,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with eye contact, to voice</td>
</tr>
<tr>
<td>-1</td>
<td>Drowsy</td>
<td>Briefly (less than 10 seconds) awake 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>Unresponsive</td>
<td>No response to voice or physical stimulation</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 ‘vigilance’)?
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).
   - Patient does not respond to voice, physically stimulates patient by shaking shoulder and then rubbing sternum if there is no response to shaking shoulder.
   - Patient has any movement in physical stimulation (score +4).
   - Patient has no response to voice or physical stimulation (score +5).

www.iculiberation.org

### ABCDE

Goal: To Address Delirium And ICU Acquired Weakness

- Spontaneous Awakening Trials
- Spontaneous Breathing Trials
- Coordination of Awakening and Breathing Trials / Choice of Sedative
- Delirium assessment and management
- Early mobility
D: Delirium Assessment & Management

- Delirium (use atypical antipsychotics - Olanzapine/Quetiapine)
- ICU-CAM
- ICU Delirium Screening Checklist

www.ICUliberation.org

E: Early Exercise & Mobility

The Why:

- Skeletal muscle strength reduces 4-5% every week of bed rest (1-1.5% per day)
- Without activity the muscles loses protein
- Healthy individuals on 5 days of strict bed rest develop insulin resistance and microvascular dysfunction
- 2 types of muscle atrophy
  - Primary: bed rest, space flight, limb casting
  - Secondary: pathology


Candow DG, Chilibeck P.D. J Gerontol, 2005;60A:148-155
Homburg NM., Arterioscler Thrombo Vasc Biol, 2007;27(12):2650-2656
Skeletal Muscle Deconditioning

- Muscle groups that lose strength most quickly related to immobilization are those that maintain posture, transferring positions & ambulation.
- > 1/3 of patients with ICU stays greater than two weeks had at least two functionally significant joint contractures.
- Muscle atrophy in mechanically ventilated patients contribute to fatigue of the diaphragm and challenges with weaning.
- Degradation within 6-8 days; continues as long as bedrest occurs.
- One day of bed rest requires two weeks of reconditioning to restore baseline muscle strength.

Facts About Functional Impairments

- Up to 25% of ICU patients on mechanical ventilation > 7 days experience ICU acquired weakness.
- Only 49% ARDS survivors return to work at 1 year.
- ICU pts. up to 5 Years experience severe weakness, deficits in self-care & ambulation, poor quality of life, hospital readmission and death.

WITHOUT EFFECTIVE AWAKENING, SEDATION & DELIRIUM MANAGEMENT MOBILITY PROGRAMS WILL LIKELY FAIL

Jackson JC. et al. Am J Respir Crit Care Med; 2010;182:183-191
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

Outcome Without ABCDE N=93 With ABCDE N=94 P Value

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Without ABCDE</th>
<th>With ABCDE</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received a spontaneous awakening trial</td>
<td>53%</td>
<td>71%</td>
<td>.0372</td>
</tr>
<tr>
<td>Received a spontaneous breathing trial</td>
<td>71%</td>
<td>84%</td>
<td>.0290</td>
</tr>
<tr>
<td>Got out of bed at least once</td>
<td>47%</td>
<td>61%</td>
<td>.0675</td>
</tr>
<tr>
<td>Days spent breathing without ventilator</td>
<td>21 days</td>
<td>24 days</td>
<td>.0371</td>
</tr>
<tr>
<td>Experienced delirium</td>
<td>75%</td>
<td>66%</td>
<td>.1623</td>
</tr>
<tr>
<td>Length of delirium</td>
<td>2 days</td>
<td>1 day</td>
<td>.00437</td>
</tr>
<tr>
<td>Died in the ICU</td>
<td>25.8%</td>
<td>14.9%</td>
<td>.0913</td>
</tr>
<tr>
<td>Self extubated</td>
<td>6.5%</td>
<td>5.3%</td>
<td>.7421</td>
</tr>
</tbody>
</table>

Balas M et al Crit Care Med, 2014; online

Balas M. Presented Jan 20, 2013 SCCM
### ABCDE Bundle Component Outcome

<table>
<thead>
<tr>
<th></th>
<th>Pre-ABCDE Bundle (n = 118)</th>
<th>Post-ABCDE Bundle (n = 159)</th>
<th>Unadjusted p</th>
<th>Adjusted Odds Ratio</th>
<th>Adjusted p</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>Ventilator-free days</td>
<td>15 (11.4)</td>
<td>18 (10.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (ae)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median (aQR)</td>
<td>21 (9–25)</td>
<td>24 (7–25)</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>Delirium anytime, n (%)</td>
<td>91 (62.3)</td>
<td>73 (48.7)</td>
<td>0.02</td>
<td>0.05 (0.33–0.93)</td>
<td>0.03</td>
</tr>
<tr>
<td>Duration of delirium, days, median (aQR)</td>
<td>3 (1–6)</td>
<td>2 (1–4)</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent ICU days spent delirious, median (aQR)</td>
<td>50 (30–64.3)</td>
<td>33.3 (18.9–60)</td>
<td>0.003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coma anytime, n (%)</td>
<td>41 (28.1)</td>
<td>43 (28.7)</td>
<td>0.91</td>
<td>1.00*</td>
<td>0.99</td>
</tr>
<tr>
<td>Coma days, median (aQR)</td>
<td>2 (1–4)</td>
<td>2 (1–5)</td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent ICU days spent in coma, median (aQR)</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>Richmond Agitation-Sedation Scale Score, mean (ae)</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>Mobilized out of bed anytime in ICU, n (%)</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>28-day mortality*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital mortality (ICU and post-ICU), n (%)</td>
<td>29 (19.9)</td>
<td>17 (11.3)</td>
<td>0.04</td>
<td>0.55 (0.38–1.10)</td>
<td>0.09</td>
</tr>
<tr>
<td>ICU mortality, n (%)</td>
<td>24 (16.4)</td>
<td>14 (9.3)</td>
<td>0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to discharge (d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From ICU, median (aQR)</td>
<td>5 (3.8)</td>
<td>4 (3.5)</td>
<td>0.21</td>
<td>1.19 (0.89–1.50)</td>
<td>0.27</td>
</tr>
<tr>
<td>From hospital, median (aQR)</td>
<td>13 (9, 15)</td>
<td>11 (9, 13)</td>
<td>0.99</td>
<td>1.01 (0.77–1.31)</td>
<td>0.96</td>
</tr>
</tbody>
</table>
Key to Success

RN Lead in each ICU

“One of us”
• Teaching
• Mentoring
• Auditing
• Participating
• Data Collecting

Engaging Physicians

Early MD Lead
• Initial Communication
• Administrative Buy-In

Moved to MD
Cohort Model 1 Lead per Hospital
• Engaging Others
• Testing Order Sets Review
• Testing Protocol
• Supporting Team
• EBP (Journal Review)
Driving Change

Structure
- Gap analysis
- Build the Will
- Protocol Development

Process
- Make it Prescriptive
- Overcoming barriers
- Daily Integration

Outcomes

Early Progressive Mobility

Progressive Mobility:
Planned movement in a sequential manner beginning at a patient's current mobility status and returning them to baseline & includes:

- Head elevation
- Manual turning
- Passive & Active ROM
- Continuous Lateral Rotation Therapy/Prone Positioning
- Movement against gravity
- Physiologic adaptation to an upright/leg down position (Tilt table, Bed Egress)
- Chair position
- Dangling
- Ambulation

©ADVANCING NURSING LLC 2009
The Mobility Initiative

- **Objective**
  - To create a progressive mobility initiative that will help ICU teams to address key cultural, process and resource opportunities in order to integrate early mobility into daily care practices.

- **Methods**
  - Multi-center implementation of key clinical interventions
  - An evidence-based, user-friendly progressive mobility continuum was developed, lead by the Clinical Nurse Specialist faculty
  - Implementation plan: process design, culture work & education
  - 130 patients/3120 prospectively collected hourly observations
  - Qualitative and quantitative data collected
    - 15 process and 5 outcome metrics
  - Results reported as cohort and unit specific data

**Progressive Mobility Continuum**

- **Start Here**
- Perform initial mobility screen w/in 8 hours of ICU admission
- Reassess mobility level at least every 24 hours
  (Recommended at shift change)

Refer to the following criteria to assess patient's readiness to progress to the appropriate level:

**LEVEL I**
- **RASS**: 0 & up
- **Activities**:
  - Level I Activities
  - Self or assisted
  - Q 2 hr turning
  - HOB > 30º
  - *Passive ROM 2X/d, performed by RN or UAP*

**LEVEL II**
- **RASS**: 0 & up
- **Activities**:
  - Tolerates Level II Activities
  - Self or assisted
  - Q 2 hr turning
  - HOB > 30º
  - *Passive ROM 3X/d*

**LEVEL III**
- **RASS**: 0 & up
- **Activities**:
  - Tolerates Level III Activities
  - Self or assisted
  - Q 2 hr turning
  - HOB > 30º
  - *Passive ROM 3X/d, performed by RN or UAP
  - *Passive / Active ROM 3X/d*

**LEVEL IV**
- **RASS**: 0 & up
- **Activities**:
  - Tolerates Level IV Activities
  - Self or assisted
  - Q 2 hr turning
  - HOB > 30º
  - *Passive ROM 3X/d, performed by RN or UAP

**LEVEL V**
- **RASS**: 0 & up
- **Activities**:
  - Tolerates Level V Activities
  - Self or assisted
  - Q 2 hr turning
  - HOB > 30º
  - *Passive ROM 3X/d, performed by RN or UAP

For each position/activity change allow 5-10 minutes for equilibration before determining the patient is intolerant.

If the patient is intolerant of current mobility level activities, reassess and place in appropriate mobility level.

*Mobility is the responsibility of the RN, with the assistance from the RT’s, Unlicensed Assistive Personnel and PT/OT. PT and OT may assist the team with placement to the appropriate mobility level of activity, always prioritizing patient and provider safety. Placement is based on clinical judgment.*
Mobility Assessment for Readiness

Perform Initial mobility screen w/in 8 hours of ICU admission & daily

- PaO2/FiO2 ≥ 250
- Peep < 10
- O2 Sat > 90%
- RR 10-30
- No new onset cardiac arrhythmias or ischemia
- HR > 60 < 120
- MAP > 55 < 140
- SBP > 90 < 180
- No new or increasing vasopressor infusion
- RASS ≥ -3

Yes

Patient Stable, Start at Level II & progress


No

Patient is unstable, start at Level I & progress
In-Bed Mobility

• HOB
• CLRT
• Prone Positioning
• Manual turning
• ROM
• Tilt Table
• Bed-chair

ROM Active & Passive

• When muscles are immobilized in shortened positions there is remodeling of muscle fibers
• Bed rest entails immobilization of limb extensor muscles in shortened positions
• Passive movement has been shown to enhance ventilation, prevent contractures in patients in high dependency units
• Low resistance multiple repetition muscle training can augment muscle mass & strength

Recommended 10 repetitions each extremity x2 daily

Continuous Lateral Rotation Therapy

Figure 4: Meta-analysis of pneumonia (with subgroups of prophylaxis and treatment for respiratory dysfunction): rotation versus control.
CLRT to Prevent VAP

Methodology

- Prospective randomized controlled trial, 3 medical ICUs at a single center
- Eligible if ventilated < 48 hours & free from pneumonia, ALI or in ARDS
- 150 patients with 75 in each group
- 35 CLRT patients allocated to undergo percussion before suctioning
- Measures to prevent VAP were standardized for both groups including HOB

Results: CLRT vs. Control

- VAP: 11% vs. 23% p = .048
- Ventilation duration: 8 ± 5 days vs. 14 ± 23 days, p = .02
- LOS: 25 ± 22 vs. 39 ± 45 days, p = .01
- Mortality: no difference


Systematic Method of Approaching Placement & Removal of Rotational Therapy
CLRT Practical Challenges

- CLRT is an advance therapeutic technique
- The therapy is driven by a protocol and changes in settings are nursing orders
- Yearly competency based education to ensure proper use of the therapy
- Monitor initial turn cycle to ensure one lung is above the other
- Automation of turning requires insertion of usual assessment practices
- Minimum of 18 hours per day & six cycles per hour

Manual Turning: Impact on Pneumonia

- **Effect of Post Op Immobilization** (Chulay MA et al, CCM, 1982)
  - RCT: 35 post op CABG patient
  - Compared q 2 turning to supine in first 24 hrs post op
  - Results:
    - no problems with Hemo or O2
    - Patient turned has less fever & 3 day ↓ in ICU LOS
- **Freq of Turning on Pneumonia** (Schallom et. al. 2005)
  - Observation: 284 ICU pts for 16hrs/day x3 days
    - Mean # of observed turns 9.64 vs. 23 possible turns/48 hrs)
  - Results: day 4 patients with pneumonia turned average 8.6x vs. 10.62 without pneumonia
The Beach Chair Position© in ICU

- Defined as having the patient’s Head of Bed elevated to 70 degree and their Foot of Bed at a negative 75 degree angle.
- Method of early mobilization
- Use with patients who are unable to walk or get out of bed to the chair due to:
  1. serious pathological and/or physiological conditions
  2. mechanical ventilation
  3. sedation
  4. hemodynamic instability

Design, Sample & Setting

- Non-randomized pilot study
- Single Academic Medical Center
- Aim: To decrease VAP rates, ICU and hospital LOS and vent days in STICU and NSICU
- Six month intervention began 06/06/2008, recruiting 200 pts meeting inclusion and exclusion criteria
- Intervention group: goal Beach Chair Position in 60 minute increments 4 times/day
- Comparison group: Six month retrospective ICU ventilated patient cohort
**Inclusion Criteria**

- Admitted to STICU/NSICU and on ventilator
- Hemodynamic stability defined by:
  - No active bleeding
  - HR 60-120
  - MAP ≥ 60
  - SpO2 ≥ 90
  - RR ≤ 30
  - PaO2 ≥ 60
- Patient appearance, pain, fatigue, SOB, emotional status acceptable, safe environment & lines maintained

**Exclusion Criteria**

- Temporary Pacemakers
- Intra-aortic Balloon Pump
- Sengstaken-Blakemore/Minnesota tubes
- Vasopressor requirement increase
- ICP >20
- ECMO
- Specialty beds/mattress (ex Rotoprone, Rotorest or KCI First step)
- Paralytics in use
- Ordered HOB flat/bedrest
- Clarify with physician as some are ok:
  - Recent SSG/flap to lower limbs or trunk
  - Recent Open Abdomen
  - Unstable C-spine
  - Pelvic or spine fractures
  - Unstable head bleeds/post craniotomy/deep coma patients
  - Require continuous lower extremity elevation

---

**Ventilator-Acquired Pneumonia**

<table>
<thead>
<tr>
<th>Rate</th>
<th>VAP Case Rate</th>
<th>VAP rate per 1000 VD</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCP Group</td>
<td>2.6</td>
<td>2</td>
</tr>
<tr>
<td>Historical Cohort</td>
<td>7.8</td>
<td>9.9</td>
</tr>
</tbody>
</table>

No difference in ICU or Hospital LOS, severity of illness higher in the Beach chair group

Caraviello KA, Presented AACN New Orleans NTI May 2009 NTI
Bed Chair vs. Out of Bed Chair

HOW DO YOU KNOW THE PATIENT IS ABLE TO DANGLING AND BEAR WEIGHT?
Grading Muscle Strength

- Grade 5: Muscle contracts normally against full resistance.
- Grade 4: Muscle strength is reduced but muscle contraction can still move joint against resistance.
- Grade 3: Muscle strength is further reduced such that the joint can be moved only against gravity with the examiner's resistance completely removed. As an example, the elbow can be moved from full extension to full flexion starting with the arm hanging down at the side.
- Grade 2: Muscle can move only if the resistance of gravity is removed. As an example, the elbow can be fully flexed only if the arm is maintained in a horizontal plane.
- Grade 1: Only a trace or flicker of movement is seen or felt in the muscle or fasciculations are observed in the muscle.
- Grade 0: No movement is observed.

Progressive Mobility: Use of Technology to In-Bed & Out of Bed Mobility

Journey to tolerating upright position, turning, tilt, sitting, standing and walking and out of bed chair sitting can occur quicker through the use of technology
THE HOW TO......
Changing Culture
Recognizing the Hard Work and Safety Issues
- Mobilizing critically ill patients is not without risk
  • Having a well-structured framework helps to reduce fear and improve safety... build the will
  • Having the knowledge that it is not as risky as first perceived
  • Acknowledgement that it can be time consuming/labor intensive
- Demands coordination of resources from multiple disciplines
- Ensure the right technology is available to facilitate the plan of care
- Displaying the Progressive Mobility Continuum at the bedside allowed for just-in-time coaching
- Developed formal exclusion criteria. If no exclusions then patient gets mobilized
- Create a reliable process for early mobility that includes measurement & feedback mechanisms

Mobility: Is it Safe? Can We Do It?
Challenges to Mobilizing Critically Ill Patients

- Human or Technological Resources
- Knowledge/Priority
- Safety
- Hemodynamic instability

Human & Technological Resources

- Work culture
- Personnel
- Aging personnel
- Use of Lift teams
- Fear
- Lines and tubes
- Patient size
Staff Perceived Barriers & Facilitators

- 33 nurses participated in 49 interviews (10 interviews before protocol & 39 after)
- Results/Interview
  - 41/49 in-bed activities
    - Unstable VS (59%) & low respiratory and energy reserves (46%) most common reasons for restricting activity
    - 34% stated safety issues/falling or tube/catheter integrity
    - 27% reported sedation
  - 9 out of Bed activities (7/9 after protocol launch
    - 100%- pt cooperative today
    - 44% - MD order &/or good O2 reserve

Technology & Process for In-Bed Mobility
Can We Safely Mobilize Intubated Patients?

Early Activity is Safe & Feasible in ARF Patients

Methodology

- Prospective cohort study
- 103 patients/1449 activity events
- Mechanically ventilated patients for > 4 days
- Airway: Tracheotomy & endotracheal tube
- Measured recorded activity events & adverse events
- Activity events included:
  - Sit on bed, Sit in chair, Ambulate
- Adverse events defined as:
  - Fall to knees, tube removal, SBP > 200 mmHg, SBP < 90 mmHg, O2 desaturation < 80% & extubation

Early Activity is Safe & Feasible in ARF Patients

Results:

- Activity events included:
  - Sit on bed (233 or 16%)
  - Sit in chair (454 or 31%)
  - Ambulate (762 or 53%)

- With an ET in place:
  - Sit on bed, chair or ambulate (593)
  - Ambulate (249 or 42%)

- Adverse events
  - < 1% activity related adverse events (no extubations occurred)
  - 69% all to ambulate at > 100 feet at RICU discharge


Feasibility of PT & OT at Beginning of Mechanical Ventilation

- 49 mechanically ventilated patients
- Underwent daily sedation interruption followed by PT & OT daily until achieving physical function independence
- Started with ROM, ADL's, sitting, standing and walking as tolerated

Feasibility of PT & OT at Beginning of Mechanical Ventilation

- 55% of the 49 patients in the early PT OT group had acute lung injury (most with ARDS)
- 69% had steroids ever administered
- Patient had delirium on 53% of all therapy sessions
- 75% of therapy sessions, a central line was present. A dialysis catheter was present 18% of therapy sessions
- Safety events occurred in 16% of all sessions
  - Loss of 1 arterial line, 1 nasogastric tube, 1 rectal tube
- Therapy was stopped on 4% of all sessions for vent asynchrony, agitation, or both


Hemodynamic Instability

???

Is it a Barrier to Positioning?
Hemodynamic Status

- No differences noted in hemodynamic variables between supine & positions
- Lateral turn results in a 3-9% decrease in SVO2 which takes 5-10 minutes to return to baseline
- Appears the act of turning has the greatest impact on any instability seen
- Minimize factors which contribute to imbalances in oxygen supply & demand


Patients at Risk for Intolerance to Positioning

- Elderly
- Diabetes with neuropathy
- Prolonged bedrest
- Low Hb an cardiovascular reserve
- Prolonged gravitational equilibrium

Vollman KM. Crit Care Nurs Q. 2013 Jan;36(1):17-27
Decision Making Tree for Patients Who Are Hemodynamically Unstable with Movement

Volman KM. Crit Care Nurs Q. 2013 Jan;36(1):17-27

Building a Comprehensive ABCDE Protocol

How to Ensure Safety & A Culture Change in Your ICU
Ensuring Safety

- Use of the Evidence Based Tools
- Determining absolute contraindications for any protocol
- Coach/support and create champions
- Changing the culture
- Sufficient resources and equipment

What Do You Need to Start and Succeed?

It can be done!

- It is important to convey to the bedside staff and physicians the relationship between what they do and the short and long-term outcomes
- Show me the data – the change needs to be evidence-based and data driven
  - Need direct observational data
  - Need to share outcomes with all stakeholders
- Early recognition regarding current practice patterns and understand how they may interfere with ABCDE culture and practice change
What Do You Need to Start and Succeed?

- Early and continually employ strategies to improve teamwork and collaboration
- Streamline and simplify the process
  - Create nurse-driven trigger to launch the protocol
  - Allows for the patient to progress based on criteria
- Reduce fear (hemodynamic instability, over sedation, self harm) through education, evidence & technology
- Actively engage the whole team

“Even if you are on the right track, you will get run over if you just sit there.”

Will Rogers
We all are responsible for the safety of our patients and ourselves……Own the Issues

• “If not this, then what??”
• “If not now, then when?”
• “If not me, then who??”