Creating a Paradigm Shift

ABCDEF 2016

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A paradigm shift (or revolutionary science) is, a change in the basic assumptions, or paradigms, within the ruling theory of science.
“

A paradigm is what members of a scientific community, and they alone, share"

The Structure of Scientific Revolutions (1962)
(*The Essential Tension*, 1977).

The Problem

- 4 million ICU admissions / year in USA
- 80-90% survive ICU
- 50% unable to return to previous work > 1 year
  - Cognitive, psychological & physically disabling side effects
- 78% ICU survivors cognitive impairment
  - Hopkins & Jackson, Neurorehabilitation 2012;31
- PTSD at discharge (44%), 5 (25%) and 8 (24%) years later
  - Psychosom Med 2008;70

Problem Identification

- Increased length of stay on the ventilator, ICU, hospital
- Associated with aspiration, VAP, hospital acquired pressure ulcers, DVT (Seeling, Heymann & Spies, 2009)
- Increased mortality at six months and one year (Lat et al. 2009)
- Increased healthcare costs (Leslie et al. 2008)
- Acute brain dysfunction that has lasting effects on cognitive abilities (Balas et al. 2012)

The Problem

- **Survivors suffer as a result of processes acquired or accelerated by ICU stay.**

- **These symptoms typically arise from two common and often unrecognized conditions that have a significant impact on the quality and quantity of life following critical illness: ICU delirium and ICU-acquired weakness and their chronic sequelae**

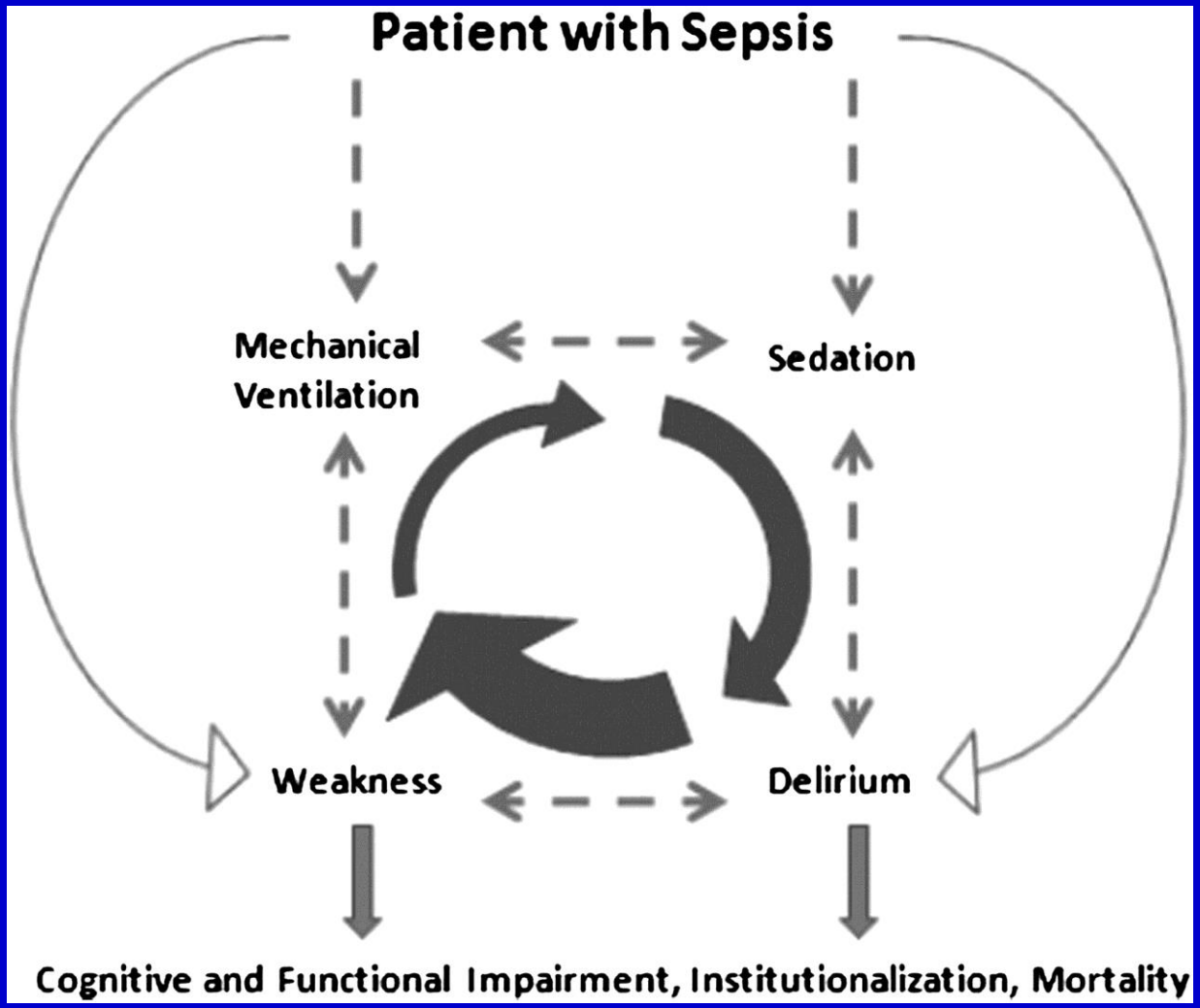
The Problem

- **“Health care today harms too frequently and routinely fails to deliver potential benefits”**
  - **Crossing the Quality Chasm: A New Health System for 21st Century-2001**

Risk Factors: ICUAD & ICUAW

- Severity of Illness
- Sepsis
- Dementia
- Time on Vent
- Sedation /NM blockade
- Immobility

Relationship between ICU-acquired delirium and weakness in a patient with sepsis.



Vasilevskis E E et al. Chest 2010;138:1224-1233

The Answer = ABCDEF

- **ABCDEF implementation independently reduces:**
  - **HLOS & Delirium incidence**
  - **Increase return to independent functioning**

- Needham DM,. Arch Phys Med Rehabil. 2010;914:536-542.
- Schweickert WD,. Lancet. 2009;3739678:1874-1882

ABCDEF

- ABCDEF is a multicomponent process that is intentionally interdependent and designed to:
- (1) improve collaboration among clinical team members
- (2) standardize care processes
- (3) break the cycle of over sedation and prolonged ventilation, which appear causative to delirium and weakness

ABCDEF BUNDLE

- **Minimal Expense**
- **Interdisciplinary** **(not multidisciplinary)**
- **Complex Bundle Difficult to Implement and Therefore:**
  - **Poorly Executed**

ABCDEF

- **A**ssess and Manage Pain
- **Both Spontaneous Awakening and Breathing Trial**- Coordinated
- Careful Selection of Analgesic and Sedative
- **D**elirium Assessment, Prevention and Management
- **E**arly Mobility
- Family Engagement/Involvement

Barr et al. 2013. Critical Care Medicine 41(1), 263-306

The Problem = ICU Providers !!

- 40% use SAT (60% don't)
- 31-42% use SBT (58% don't)
- 33% use delirium assessment tool (67% don't)
- 50% use sedation monitoring scale (50% don't)

- Patel RPS, Gambrell MB, Speroff TP, et al. Crit Care Med. 2009;373:825-832

OUTCOMES 2000

- Extubation
- Survival

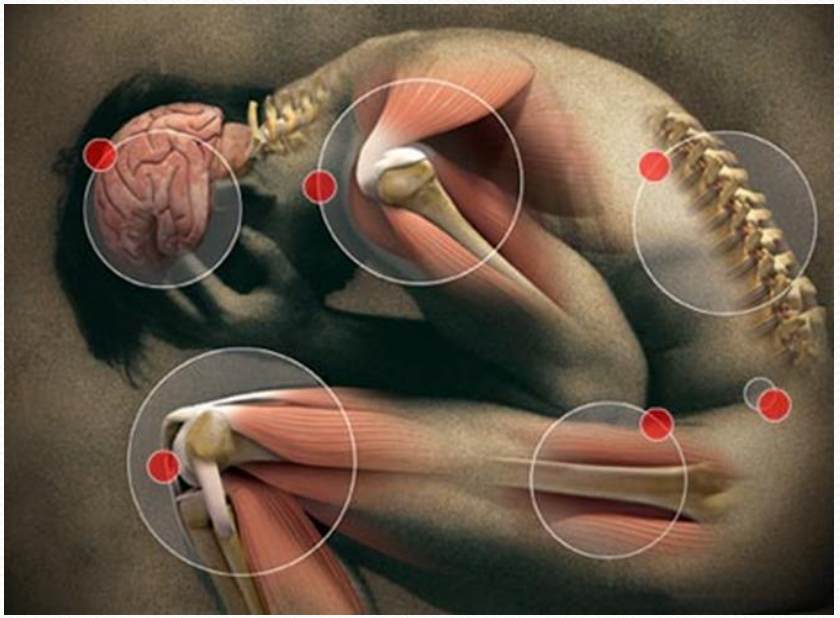
OUTCOMES 2014

- Extubation
- Survival
- Functionality
  Cognitive
  Mobility

ABCDEF –Analgesia First Approach

Definition of Pain

The International Association for the Study of Pain defines pain as an: “unpleasant *sensory* and *emotional* experience associated with actual or potential tissue damage, or described in terms of such damage”.



Barr et al. 2013. Critical Care Medicine 41(1), 263-306

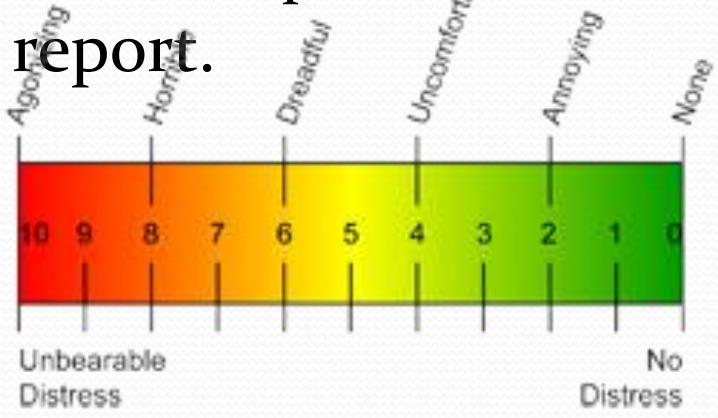
Pain in the Critically Ill

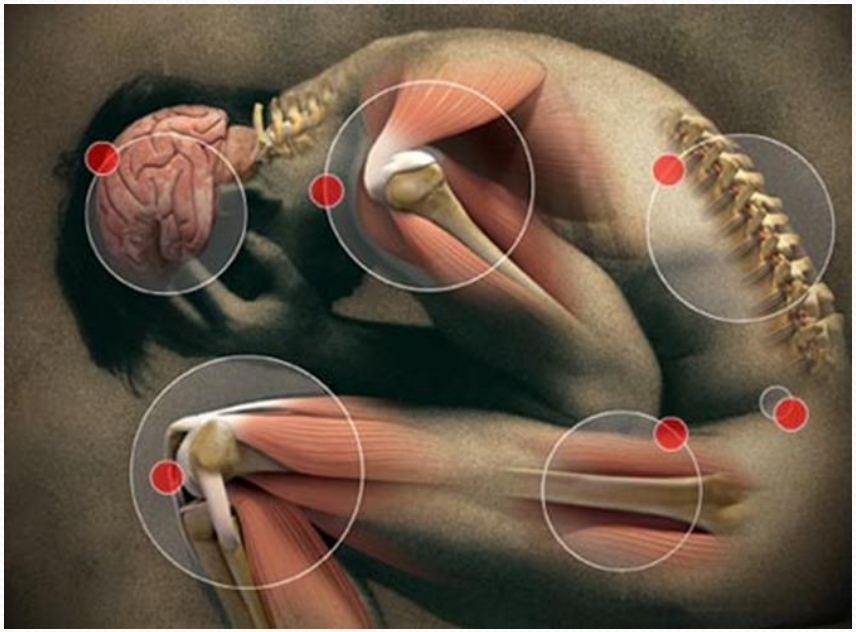
- Many critically ill patients experience pain during hospitalization in the critical care unit.
- More than 30% have significant pain at rest.
- More than 50% have significant pain during routine care such as turning, endotracheal suctioning and wound care.
- Untreated pain can result in negative consequences including multisystem complications.

Chanques et al. 2007. Anesthesiology 107(5): 858-860.
Puntillo et al. 2001. Am J Crit Care. 10 (4): 238-251.

Pain Assessment

- The patient's self report is the "gold standard" for pain assessment. This self report can be given by speaking, nodding, or pointing.
- The 0-10 numerical rating scale is the most valid tool when the patient can self report.

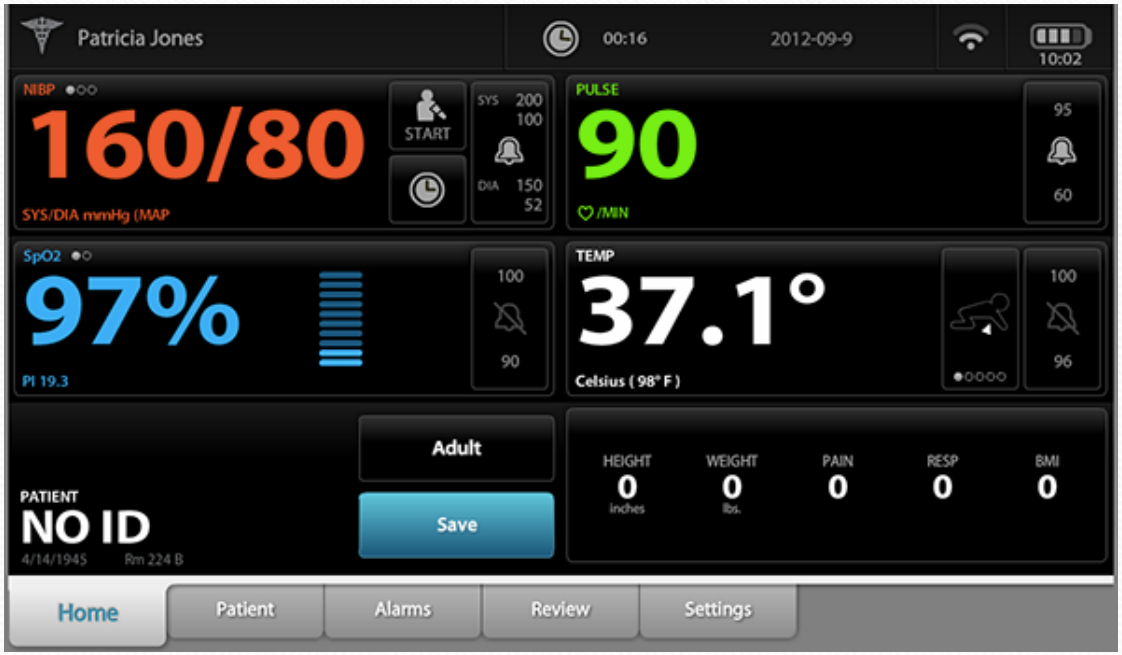




Barr et al. 2013. Critical Care Medicine 41(1), 263-306

Avoid the use of Vital Signs as primary assessment for pain

- Vital signs should be considered *cues* to begin further pain assessment; but should never be used as the sole indicator of pain.



Barr et al. 2013. Critical Care Medicine 41(1), 263-306

CPOT

- Measures presence or absence of pain
- Does not measure severity or intensity

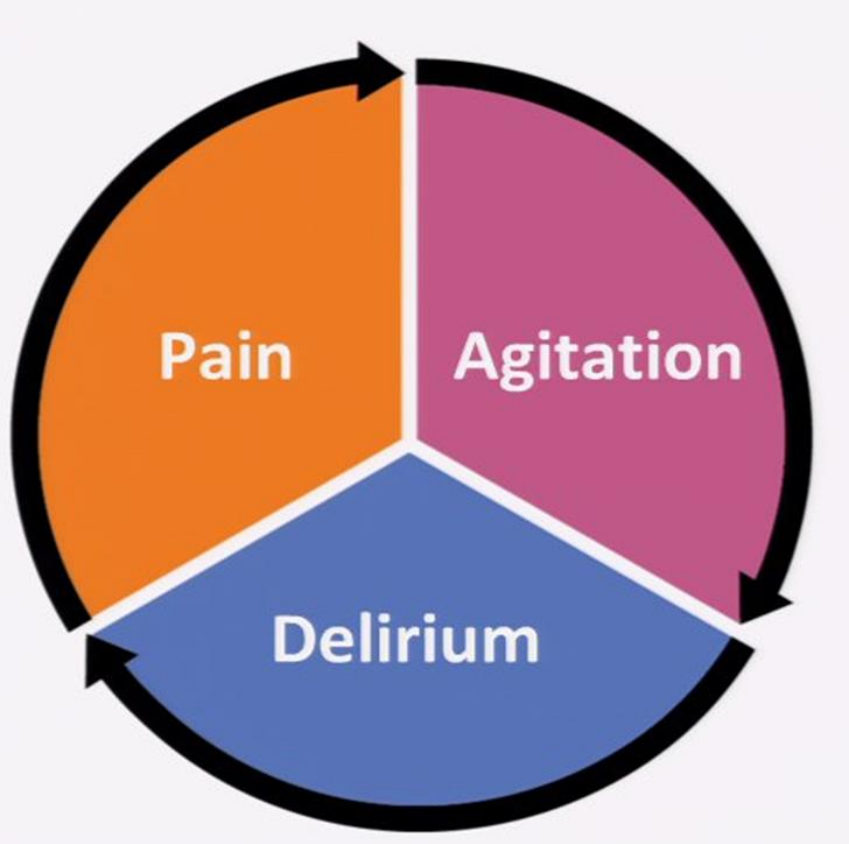
- CPOT of *2 or greater indicates presence of pain*
- Measurement of CPOT after intervention for pain decreases by at least 2 = "may be associated with effectiveness of pain management interventions"

Critical Care Pain Observation Tool (CPOT)

Medscape® www.medscape.com

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

Analgesia First!



- Inter-related
- Assess using validated tools
- Lack of treatment of pain can result in many complications including delirium
- Treat pain first
- Preemptive

Preemptive Analgesia

- Patients undergoing painful procedures should have *preemptive analgesia* (analgesia given before the procedure begins)
- Non-pharmacologic interventions should also be used to help alleviate pain (such as positioning, heat/cold, relaxation or music)

Barr et al. 2013. Critical Care Medicine 41(1), 263-306

ABCDEF

- Awakening-SAT

Vent Wean / Liberation

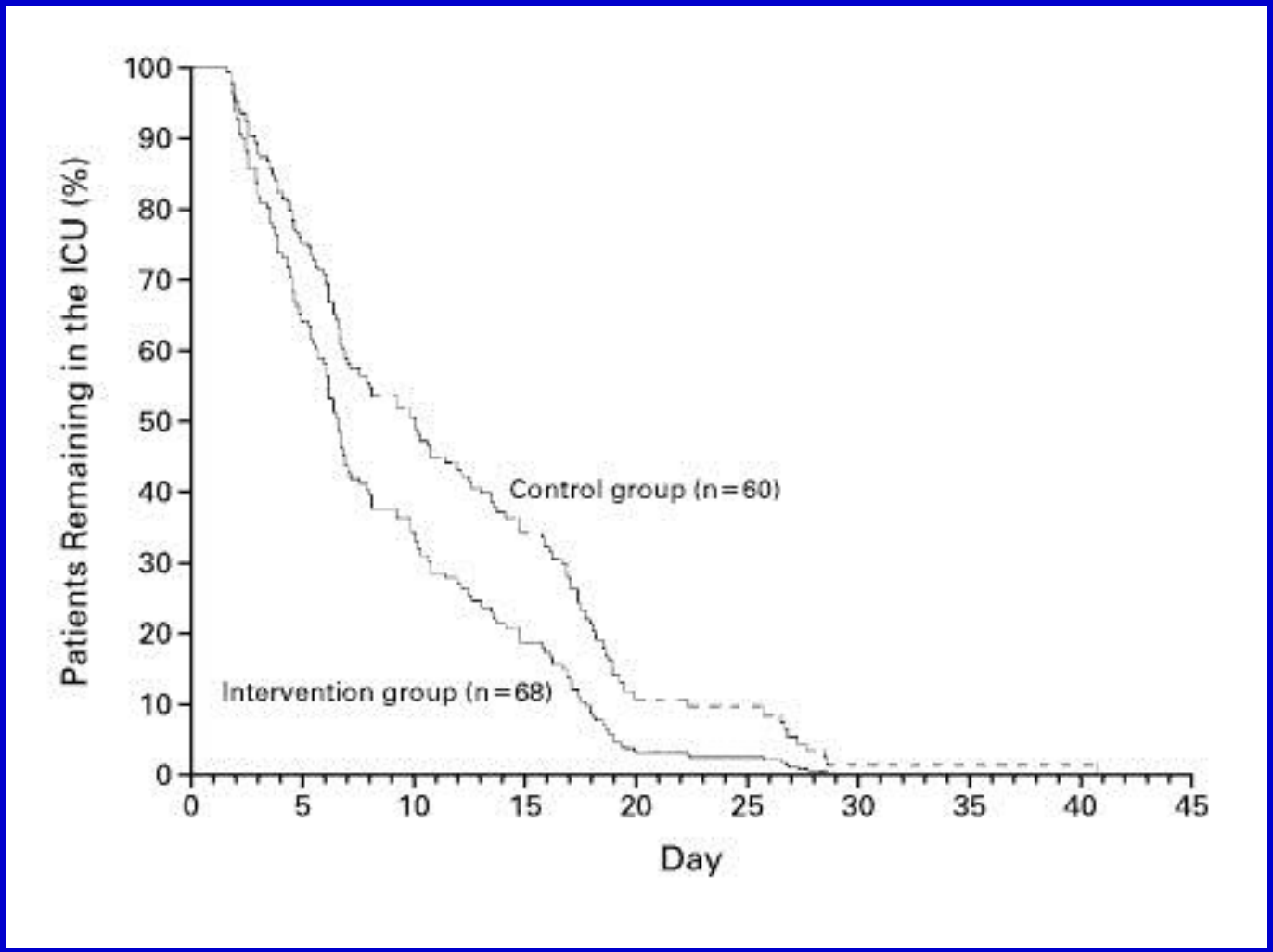
- 70% Simple Weaning OK on 1st attempt
  - When is the first attempt
- 20% Difficult Weaning: 7-14 days
- 10% Prolonged Weaning

Daily Interruption of Sedatives

- 128 patients
- Intervention group = Sedatives interrupted until awake
- Control group = Sedatives interrupted at discretion of the clinicians

Kress JP et al. N Engl J Med 2000;342:1471-1477

Kaplan–Meier Analysis of the Length of Stay in the Intensive Care Unit (ICU), According to Study Group.



Kress JP et al. N Engl J Med 2000;342:1471-1477.

The NEW ENGLAND JOURNAL of MEDICINE

Continuous infusions of sedative drugs in the intensive care unit may:

- **prolong duration of mechanical ventilation,**
- **prolong the ICULOS and the HLOS**
- **Impede daily neurologic examinations**
- **increase the need for tests to assess alterations in mental status**
  - N Engl J Med. 2000 May 18;342(20):1471-7.

Daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation

- **Days Mechanical Ventilation**
  - **4.9 (I) vs. 7.3 (C) P=0.004**
- **ICULOS (days)**
  - **6.4 (I) vs. 9.9 (C) P= 0.02**
- **CONCLUSIONS: In patients who are receiving mechanical ventilation, daily interruption of sedative-drug infusions decreases the duration of mechanical ventilation and the length of stay in the intensive care unit.**
  - N Engl J Med. 2000 May 18;342(20):1471-7

SAT Not Used Around World

- **Canada –40% get SATs (273 physicians in 2005)**
- **•U.S. –40% get SATs (2004-05)**
- **•Germany–34% get SATs (214 ICUs in 2006)**
- **•France –40-50% deeply sedated with 90% on continuous infusion (44 ICUs in 2005)**
- **•UK –28% use sedation breaks, 82% use midazolam when on > 24 hours**
- **•Brazil –32% get SATs (1,015 MDs in 2008)**

- Mehta S, CCM 2006;34:374-80.
- Devlin J, CCM 2006;34:556-57.
- Payen JF, Anesthes 2007;106:687-95.Tanios M, Proc Am Thorac Soc 2005;2:A793.Martin J and Spies C, Crit Care 2007;11:R124Ramaswamy S, Intens Care Med (ESICM 2009)Salluh J, J Crit Care 2009

JAMA 2007 MENDS

Precedex vs. Ativan

Precedex

- 4 days Less Coma & Delirium

- Better 28 day Survival
  - (83% vs. 73%)

JAMA 2009 SEDCOM

Precedex vs. Versed

Precedex

- 23% Less delirium
- 3 days less mechanical ventilation

Sedation Assessment

- **RASS**
  - **Richmond Agitation-Sedation Scale**
- **SAS**
  - **Riker Sedation Assessment Scale**
- **Both SAS and RASS led to similar rates of delirium assessment using the CAM-ICU.**

Chest. Jul 2012; 142(1): 48–54.

Richmond Agitation Sedation Scale (RASS)

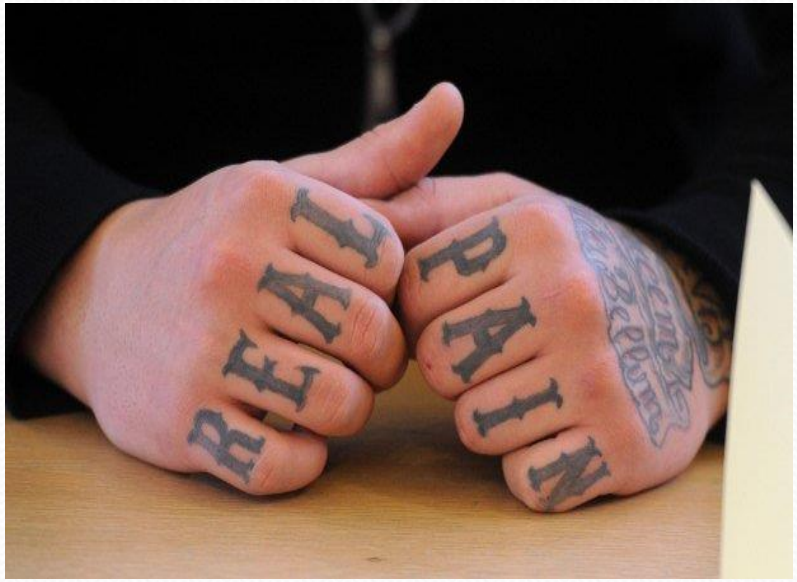
Score	Descriptor	Characteristics
+4	Combative	Combative, violent, immediate danger to staff
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent nonpurposeful movement, fights ventilator
+1	Restless	Anxious, apprehensive but movements not aggressive or vigorous
0	Alert and calm	
-1	Drowsy	Not fully alert, but has sustained awakening to voice (eye opening and contact >10 seconds)
-2	Light sedation	Briefly awakens to voice (eye opening and contact <10 seconds)
-3		
-4	Moderate sedation	Movement or eye opening to voice (but no eye contact)
	Deep sedation	No response to voice, but movement or eye opening to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

PAD Guidelines 2013

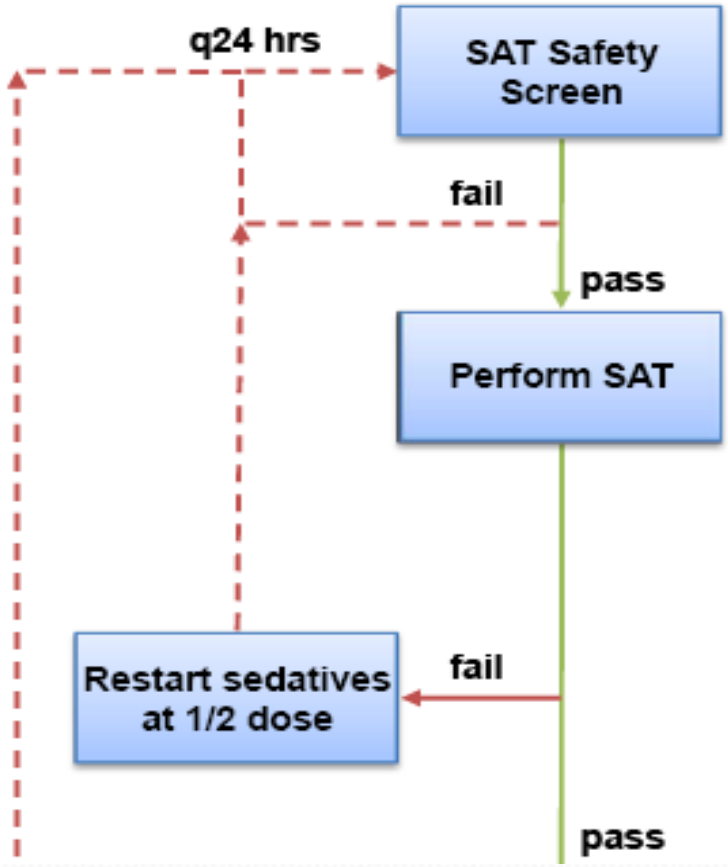
- Light Sedation vs. Deep Sedation
  - Earlier extubation (2.2 vs. 7.7 days)
  - Improved Hospital survival
  - Improved 180 day survival
  - Lower PTSD scores

Spontaneous awakening trial

- Collaboration between nursing and respiratory therapy when doing SAT and SBT
- Tough love
- Pain Controlled?
- Home meds reconciled?



Spontaneous Awakening Trial-BOTH groups getting patient targeted sedation



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

ABCDEF

- **B**reathing-SBT

Two Decades of Progress

1995 Esteban	Madrid	SBT vs. IMV, PSV
1996 Ely	WF	Daily Screen, SBT
2000 Kress	UC	SAT
2008 Girard	Vand	SAT, SBT
2009 Schweickert	UPa	Early Mobility

The Length of Time from Initiating Weaning to Extubation in the Four Groups.

Table 2. The Length of Time from the Initiation of Weaning to Successful Extubation in the Four Groups.

Weaning Technique	Median	First Quartile	Third Quartile
		days	
Intermittent mandatory ventilation	5	3	11
Pressure-support ventilation	4	2	12
Intermittent trials of spontaneous breathing	3	2	6
Once-daily trial of spontaneous breathing	3	1	6

Esteban A et al. N Engl J Med 1995;332:345-350.

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Successful 2 Hr SBT (Ely)

(Now 30 minutes)

RR < 35

SATS > 90

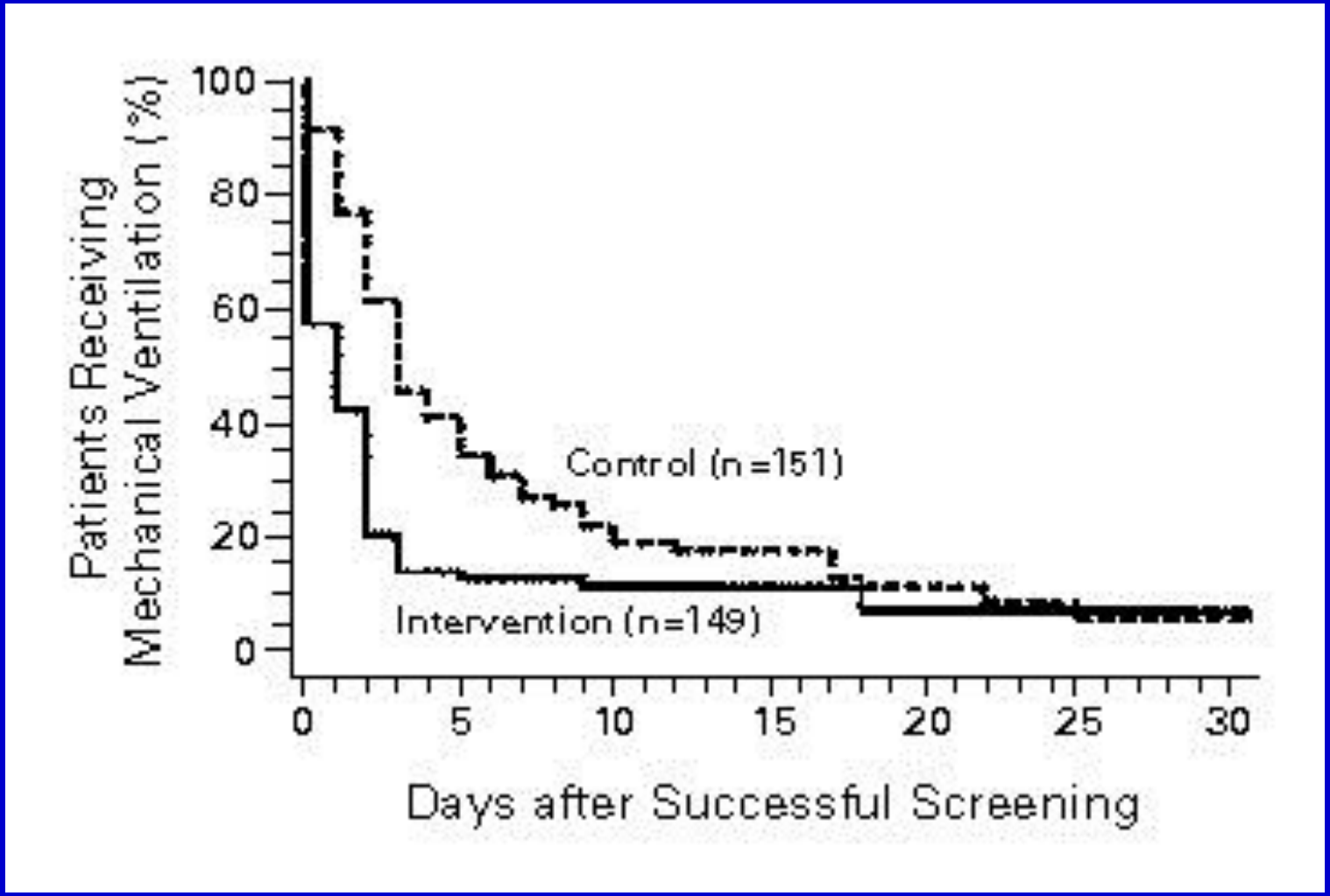
HR < 140

BP, HR Stability (<20% change)

No Anxiety, Diaphoresis

Ely EW et al. N Engl J Med 1996;335:1864-1869

Kaplan–Meier Analysis of the Duration of Mechanical Ventilation after a Successful Screening Test.



Ely EW et al. N Engl J Med1996;335:1864-1869.

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SBT Weaning Protocol

- a) **Improvement or resolution of the underlying disease** process that precipitated need for mechanical ventilation.
- b) **$PaO_2 \geq 60$ mm Hg** on **$PEEP/FiO_2$ Requirements of ≤ 8 cm H_2O and $FiO_2 \leq 0.50$.†**
- c) Stable oxygenation: **$PEEP/FiO_2$ requirements not increased in the past 24 hrs**
- d) **No use of neuromuscular blocking agents**; no evidence of persistent blockade.
- e) **pH > 7.30**
- f) **Consistent patient-triggered breaths at baseline A/C settings**. If not, ↓ minute ventilation by 50% and observe for 2 min

THE LANCET

Girard TD, et al. Lancet 2008;371:126-34

Articles

Efficacy and safety of a paired sedation and ventilator weaning protocol for mechanically ventilated patients in intensive care (Awakening and Breathing Controlled trial): a randomised controlled trial

Timothy D Girard, John P Kress, Barry D Fuchs, Jason W W Thomason, William D Schweickert, Brenda T Pun, Darren B Taichman, Jan G Dunn, Anne S Pohlman, Paul A Kinniry, James C Jackson, Angelo E Canonico, Richard W Light, Ayumi K Shintani, Jennifer L Thompson, Sharon M Gordon, Jesse B Hall, Robert S Dittus, Gordon R Bernard, E Wesley Ely

ABC Trial Objectives

- **To determine the efficacy and safety of a protocol combining daily interruption of sedatives and spontaneous breathing trials (SBTs)**
- **Measured Outcomes**
  - **Ventilator-free days**
  - **ICU and hospital length of stay**
  - **Survival**
  - **Duration of coma and delirium**
  - **Long-term neuropsychological outcomes**

- Girard TD, et al Lancet. 2008;371:126-134

Awakening and Breathing Controlled Trial (ABC)

- **2008 - Paired SAT with SBT**
- **336 MV patients, Randomly assigned**
- **Intervention - SAT + SBT (168 pts.)**
- **Control – Usual Sedation + daily SBT (167 pts.)**

- Girard TD, et al Lancet. 2008;371:126-134

Awakening and Breathing Controlled Trial

SAT + SBT

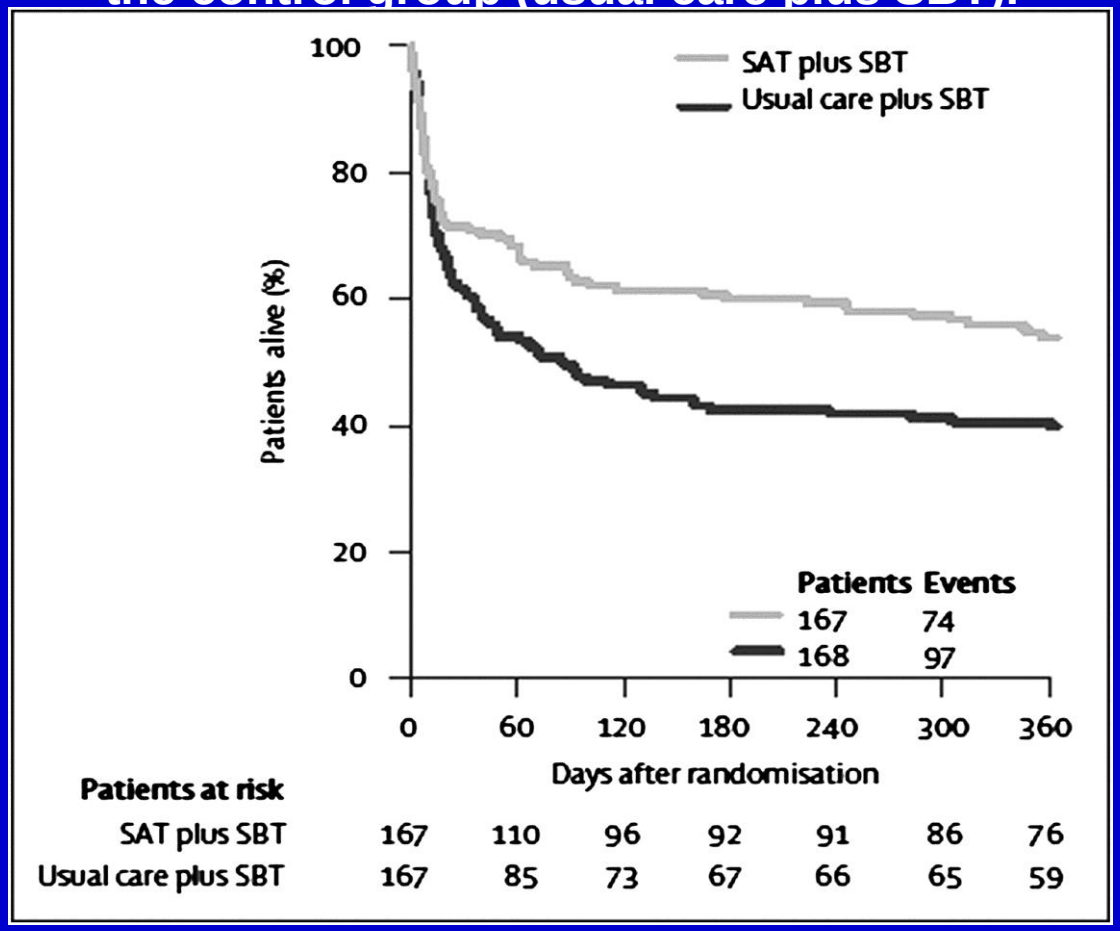
Reduced Hospital Stay by 4 days

Reduced Mortality by 14%

- Girard TD, et al Lancet. 2008;371:126-134

One-year survival analysis of the Awakening and Breathing Controlled Trial

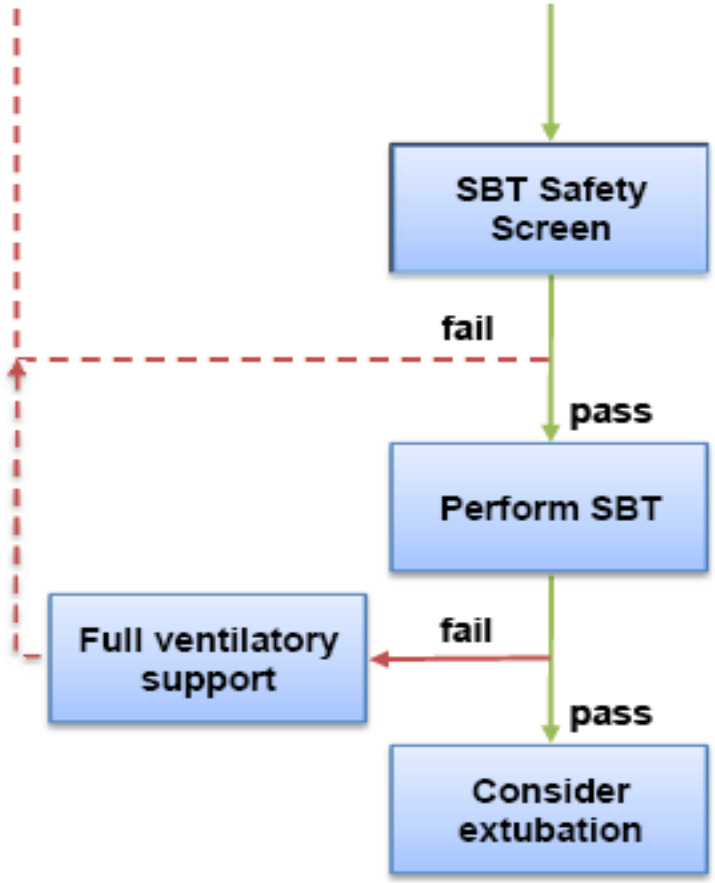
Survival was 14% higher at 1 year among the intervention group (SAT coordinated with SBT) vs. the control group (usual care plus SBT).



Vasilevskis E E et al. Chest 2010;138:1224-1233

CHEST

Spontaneous Breathing Trial



SBT Safety Screen

No agitation
Oxygen saturation ≥ 88%
$FiO_2 \leq 50\%$
PEEP ≤ 7.5 cm H_2O
No myocardial ischemia
No vasopressor use
Inspiratory efforts

SBT Failure

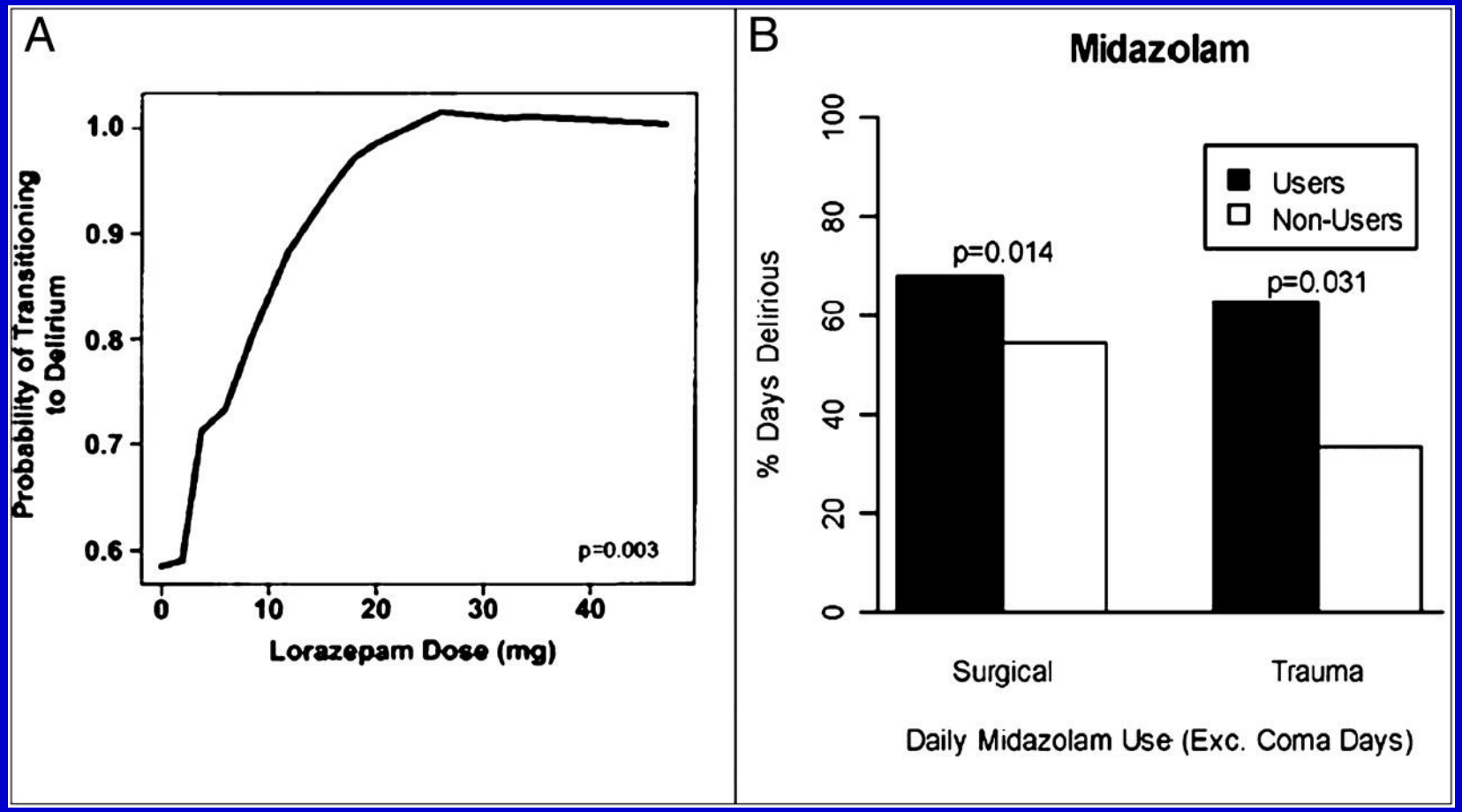
Respiratory rate > 35/min
Respiratory rate < 8/min
$SpO_2 < 88\%$
Respiratory distress
Mental status change
Acute cardiac arrhythmia

*Adapted from Girard TD et al. *Lancet* 2008;371:126-34

ABCDEF

- Careful Selection of Analgesics & Sedative

A, Data from Pandharipande et al10 indicate that lorazepam dose in the preceding 24 h is an independent predictor for transitioning to delirium in the ICU.



Vasilevskis E E et al. Chest 2010;138:1224-1233

2013 PAD Sedation Guidelines

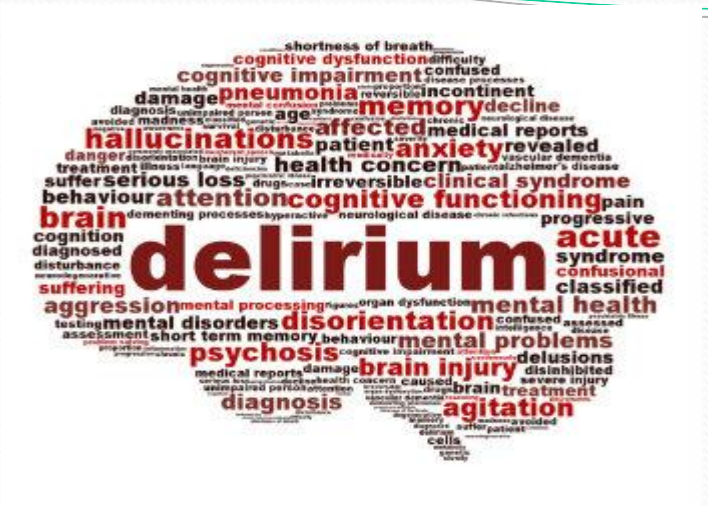
- **Benzodiazepines avoided**
  - Midazolam & Lorazepam

- **Analgesia first sedation** (Analgosedation)
  - More vent free days
  - Shorter ICU & Hospital days

  - More agitated delirium days

ABCDEF

- **D**elirium Monitoring



- **Temporary alteration in cognition** characterized by inattention and disorganized thinking

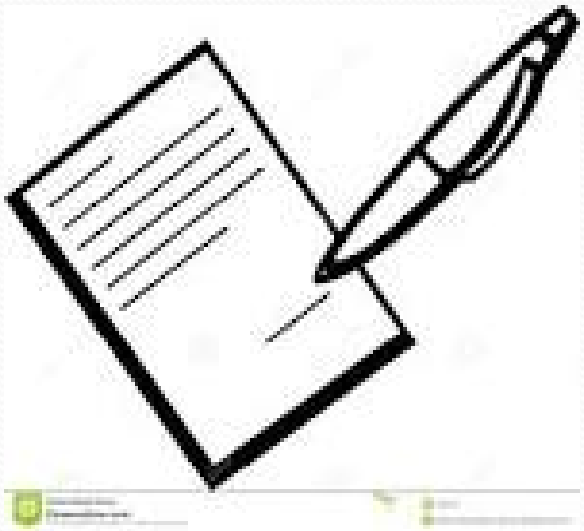
- **Hyperactive**
- **Hypoactive**
- **Mixed**

75% of ICU patients

- Morandi, Int Rev Psych 2009; 21

Question

- **How often do you or your ICU team document in the medical record the level of delirium or agitation?**
  - **Always**
  - **Sometimes**
  - **Never**



Delirium Assessment and Management

- Identifying patients at risk for developing delirium is the first step in prevention.
- Assessment for **delirium** should be done once a shift in all critically ill patients using the Confusion Assessment Method-ICU (CAM-ICU).

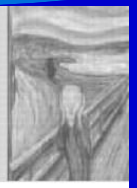
AACN Practice Alert: Delirium Assessment and Management. 2011

Delirium Measurement

- **Assess multiple times daily using:**
- **CAM-ICU**
  - **Confusion Assessment Method for ICU**
- **ICDSC**
  - ***Intensive Care Delirium Screening Checklist***

CAM-ICU

Confusion Assessment Method in the ICU



RASS is above - 4 (-3 through +4)

Proceed to next Step

If RASS is -4 or -5

Stop

Reassess patient at later time

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 24hrs

→ **No** → **Stop No delirium**

Yes

2 Inattention
Please read the following ten letters: **S A V E A H A 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."

→ **< 3 Errors** → **Stop No delirium**

≥3 Errrors

3 Altered Level of Consciousness ("actual" RASS)
If RASS is zero, Proceed to next step

→ **If RASS is other than zero** → **Stop Patient Is Delirious**

0 RASS

4 Disorganized Thinking
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*"

→ **≥ 2 Errors** → **Patient Is Delirious**

→ **< 2 Errors** → **Stop No delirium**

Vasilevskis E E et al. Chest 2010;138:1224-1233

CHEST The Cardiopulmonary and Critical Care Journal

ABCDEF

- Early Mobility

Mobility is Medicine!

The following are health benefits of physical activity:

- Improves blood sugar homeostasis
- Enhances cardiovascular function
- Decreases chronic inflammation
- Regulates hormone levels
- Preserves musculoskeletal and neuromuscular integrity
- Decreases depression and improves cognition

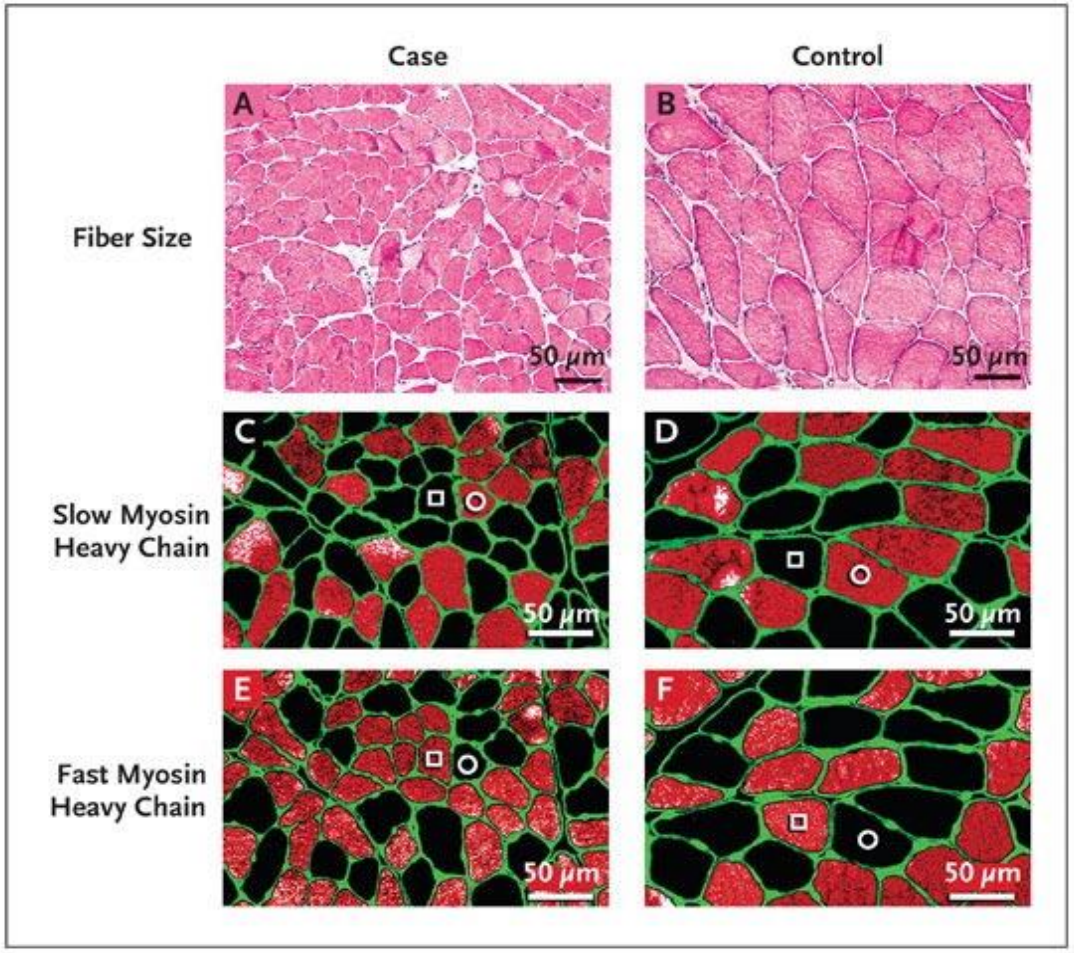
ICUAW

- **Disabling weakness 50% of ICU survivors of sepsis, MOF or prolonged mechanical ventilation due to:**
- **Inflammatory & metabolic changes**
- **Prolonged best rest**

ICUAW

- **Axonal Polyneuropathy/ Myopathy present in 65% of Patients in ICU for 7 days**

Comparison of Representative Case and Control Diaphragm-Biopsy Specimens with Respect to Fiber Size.



Levine S et al. N Engl J Med 2008;358:1327-1335.

The NEW ENGLAND JOURNAL of MEDICINE

Early PT & OT Ventilated Pts. Lancet 2009

	PT/OT	Control
Independent at discharge	59%	35%
Delirium Days	2.0	4.0
Vent Free Days (out of 28)	23.5	21.1

Early Mobilization Protocol in Mechanically Ventilated Patients

Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial

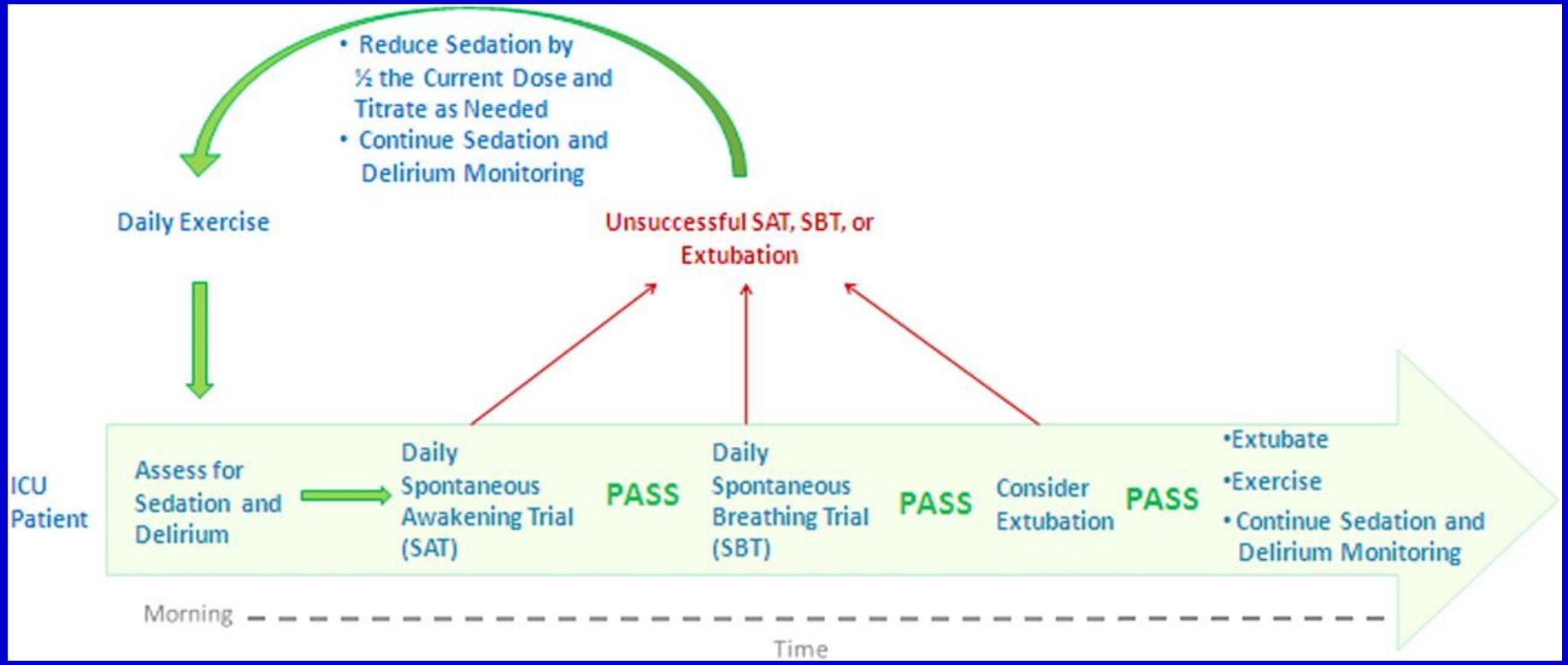
William D Schweickert, Mark C Pohlman, Anne S Pohlman, Celerina Nigos, Amy J Pawlik, Cheryl L Esbrook, Linda Spears, Megan Miller, Mietka Franczyk, Deanna Deprizio, Gregory A Schmidt, Amy Bowman, Rhonda Barr, Kathryn E McCallister, Jesse B Hall, John P Kress

Summary

Background Long-term complications of critical illness include intensive care unit (ICU)-acquired weakness and neuropsychiatric disease. Immobilisation secondary to sedation might potentiate these problems. We assessed the efficacy of combining daily interruption of sedation with physical and occupational therapy on functional outcomes in patients receiving mechanical ventilation in intensive care.

24% improvement (1.7-fold better) return to independent functional status at discharge

ABCDEF is an ICU-acquired delirium and weakness mitigation strategy.



Vasilevskis E E et al. Chest 2010;138:1224-1233

ABCDEF

- Family Engagement and Empowerment

Family Involvement in Bedside Rounds

Implementation ABCDE 2011
Grant Medical Center Trauma Service
Columbus Ohio

- **Goals:**
- **↓Time on Vent by 0.5 to 1.0 days**
- **Decrease HLOS & ICULOS**
- **Improved Survival**

SAT/SBT Lessons Learned

- **Failures**
  - Not done at a consistent time
  - Staff did not understand SAT
  - Varied physician practice
  - Incorrect restart of medications
  - Poor documentation by RN
  - Poor communication at shift change

SAT/SBT Lessons Learned

- Communication with Respiratory therapy
- Physician understanding of SAT/SBT
- Sedation minimization not done appropriately prior to SAT/SBT

SAT/SBT Process Improvement

- Timing of SAT/SBT
- Communication
  - RT, Physician, Nurses
- Sedation Minimization
- Educations for all involved
- Ownership and daily oversight by ICU leadership

Daily Evaluation / Huddle

- SAT done? If not WHY not?
- SAT passed? If not WHY not?
- SBT done? If not WHY not?
- Pt. + SAT/SBT not extubated? WHY not?

Electronic Medical Record

- Include prompts or links to support critical thinking

Build medication orders with

appropriate

ranges and sedation targets

fentaNYL (SUBLIMAZE) 1,000 mcg in 0.9% sodium chloride 100 mL infusion

12.5-300 mcg/hr = 1.3-30 mL/hr, Intravenous, TITRATED, Starting Today at 1300, For 10 days

Start infusion at 12.5 mcg/hour. Titrate to keep patient comfortable. Weaning Instructions - Call physican regarding weaning - Recommend 10-25% taper per day to prevent withdrawal symptoms if greater than 7 day therapy and bolus fentanyl may help gain acute pain control.

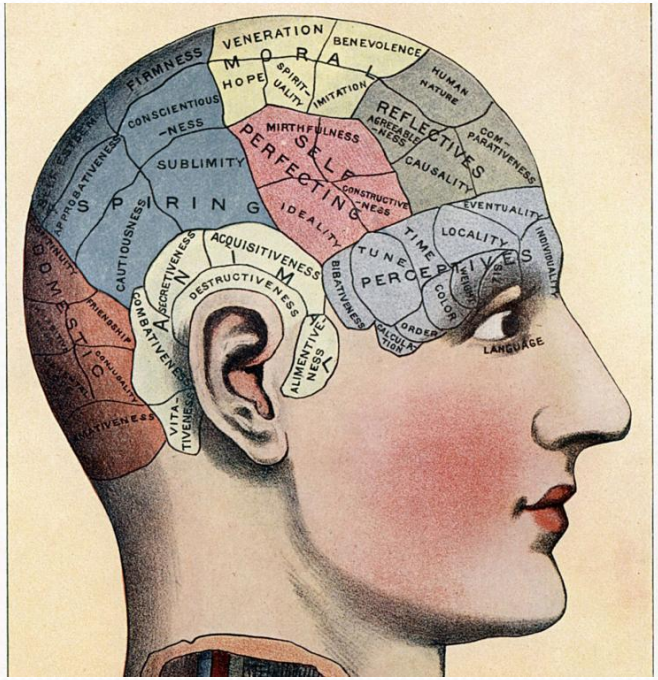
Electronic Medical Record

- Build reports that capture assessment and interventions so readily viewed by all team members

- Build assessments that limits errors
  - CAM- ICU build

Sustaining practice….

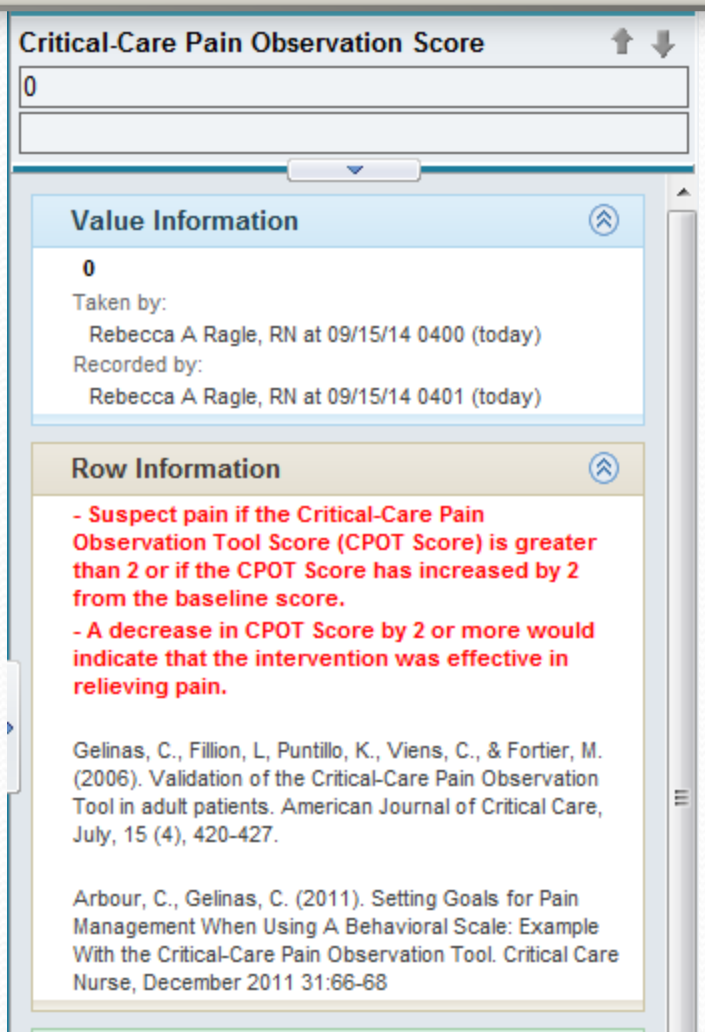
- Creating organization memory
- Knowledge reservoirs
- Create passion



Virani, Lemieux-Charles, Davis, & Berta. (2009).

Knowledge Reservoir

Include prompts or links to support critical thinking



Conclusions: ABCDEF Protocol

- **Reduces ICU and HLOS**
- **Reduces Ventilator days**
- **Improves In hospital and 128 day survival**
- **Improves cognitive and performance function status at 1 year**

The Problem = ICU Providers !!

- 40% use SAT **(60% don't)**
- 31-42% use SBT **(58% don't)**
- 33% use delirium assessment tool **(67% don't)**
- 50% use sedation monitoring scale **(50% don't)**

- Patel RPS, Gambrell MB, Speroff TP, et al. Delirium and sedation in the intensive care unit: survey of behaviors and attitudes of 1384 healthcare professionals. Crit Care Med. 2009;373:825-832

Don’t be a Problem - Be a Solver

- **Institute ABCDEF protocol**

- **Create a paradigm shift at your institution**

Thank You !!!!!

Questions???