



Dazed and Confused in the Intensive Care Unit: Managing Delirium Is More Than Just a State of Mind

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Disclosure

The program chair and presenters for this continuing education activity have reported no relevant financial relationships

Objectives

- Describe potential mechanisms of benzodiazepine (BZD)-induced ICU delirium
- Review published clinical trials evaluating ICU delirium outcomes with BZD exposure
- Evaluate the strength of evidence associating ICU delirium with BZD use

Patient Case

- 65 y.o. male MSSA sepsis with developing PNA 5 days previously on mechanical ventilation w propofol / fentanyl
- PMHx: heroin IVDA (methadone), MSSA IE
- Transferred from OSH for possible ECMO 2/2 worsening ARDS
- Broad spectrum abx (cefepime, vancomycin and tobramycin)
- Propofol titrated to 75 mcg/kg/min and fentanyl @ 400mcg/hr => RASS -3 to -2
- Vent settings optimized -> dysynchrony without gas exchange improvement
- Cisatracurium considered

Patient Case

FAST FORWARD 7 DAYS

- Midazolam and cisatracurium ordered -> no improvement
- ECMO -> decannulated after ~5 days
- Sedation has been titrated down – propofol and fentanyl
- CAM-ICU assessment now positive (RASS -3)

How confident are you that midazolam is the sole and primary cause of ICU delirium?

- A** YES – midazolam is the cause
- B** NO – midazolam is NOT the source
- C** MAYBE – midazolam could be playing a role, but not clear

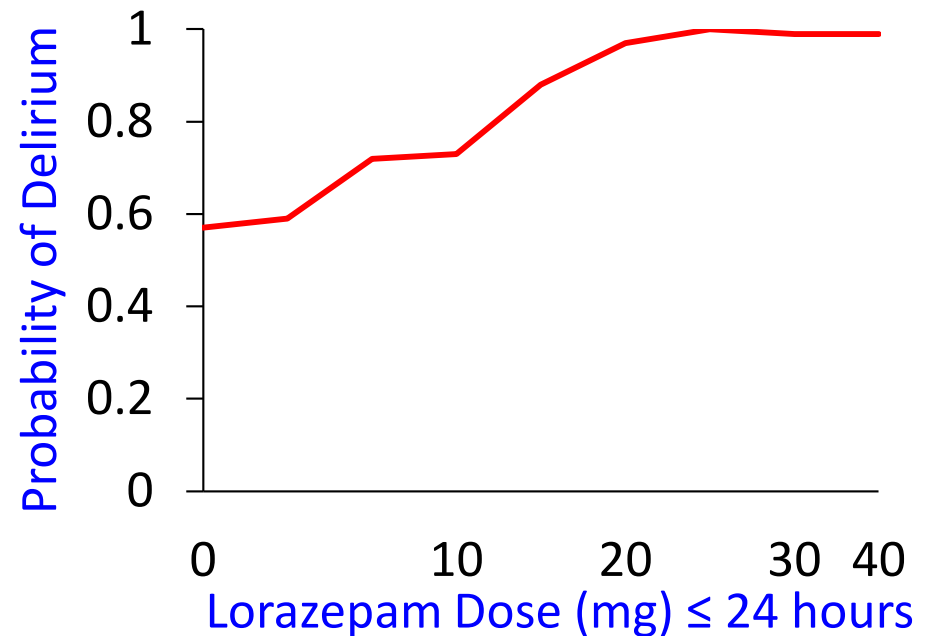
Independent Risk Factors

Lorazepam: Independent Risk Factor

Multivariable Analysis for Transitioning to Delirium/Coma or Delirium Only

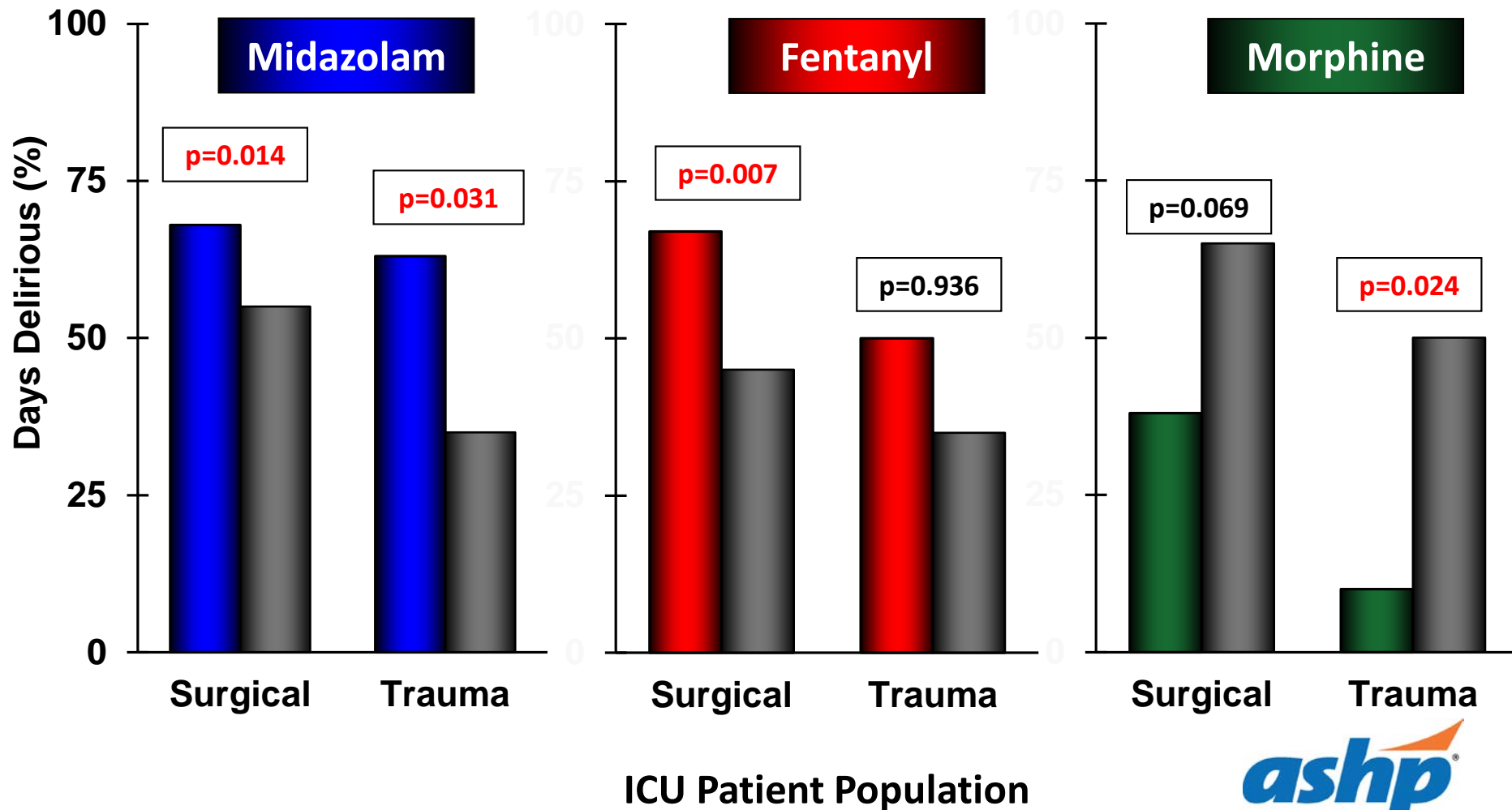
Medication	Odds Ratio (95% CI)	p value
Lorazepam	1.2 (1.1 – 1.4)	0.003
Midazolam	1.7 (0.9 – 3.2)	0.09
Fentanyl	1.2 (1.0 – 1.5)	0.09
Morphine	1.1 (0.9 – 1.2)	0.24
Propofol	1.2 (0.9 – 1.7)	0.18

Lorazepam & Delirium Transition Probability



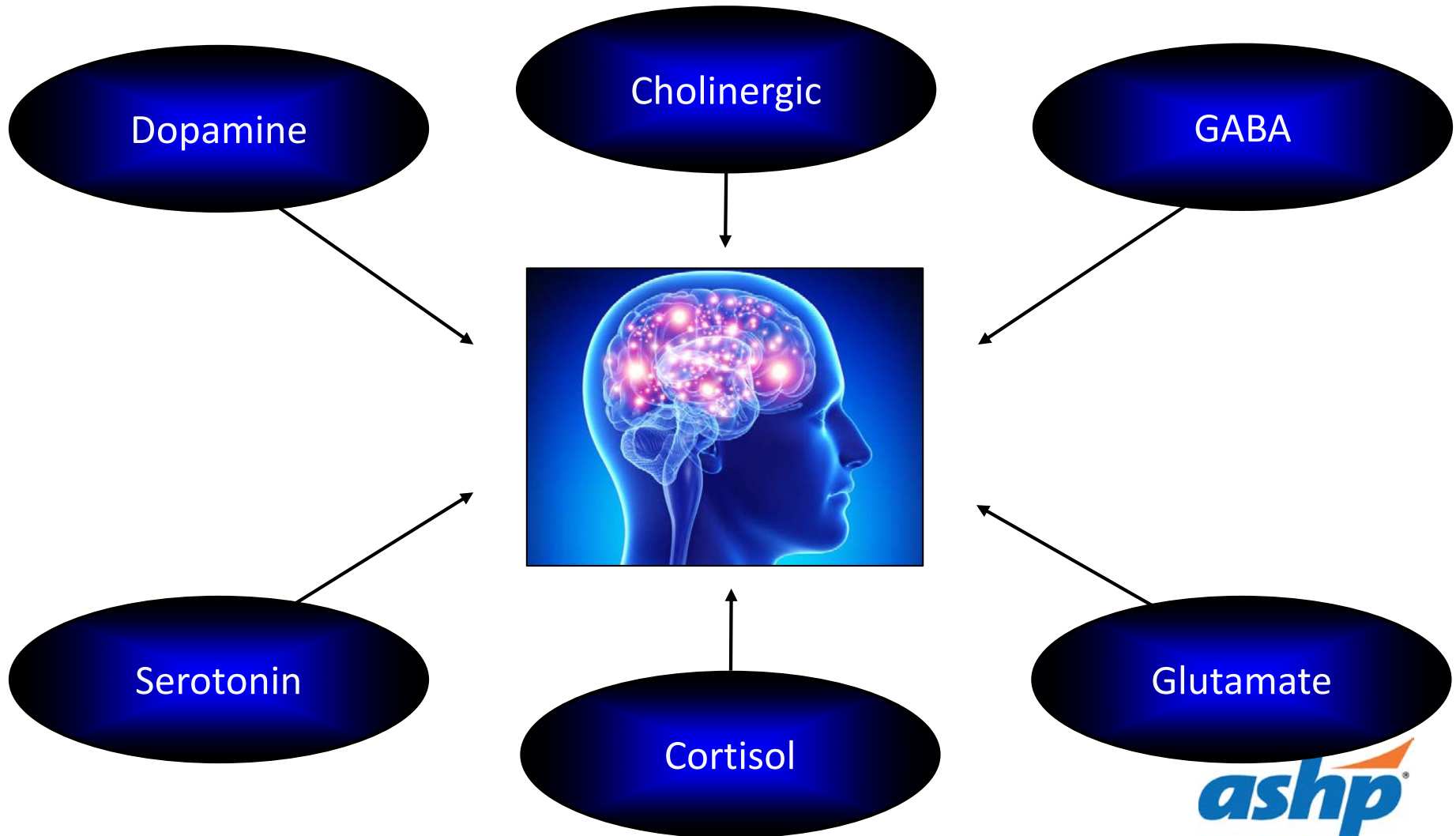
Drug-induced Risk Factors

Non-users of analgesia/sedation

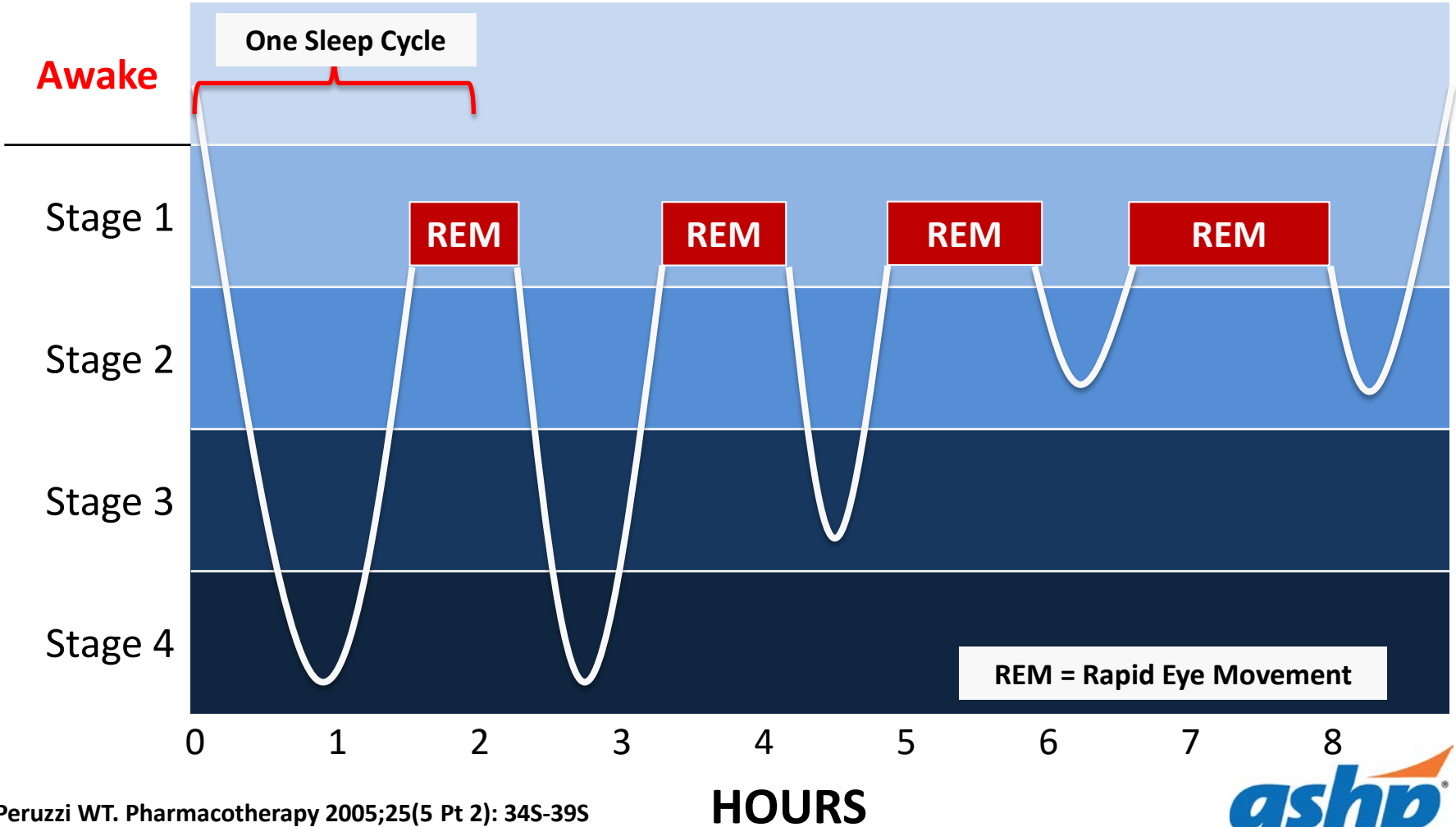


Pharmacologic-based Mechanism

Delirium Pathophysiology



8-Hour Sleep Cycle



Peruzzi WT. Pharmacotherapy 2005;25(5 Pt 2): 34S-39S
Weinhouse GL. Sleep 2006;29:707-16
Weinhouse GL. Anesthesiology Clin 2011;29:675-685

Sedation & Analgesia Impact on Sleep

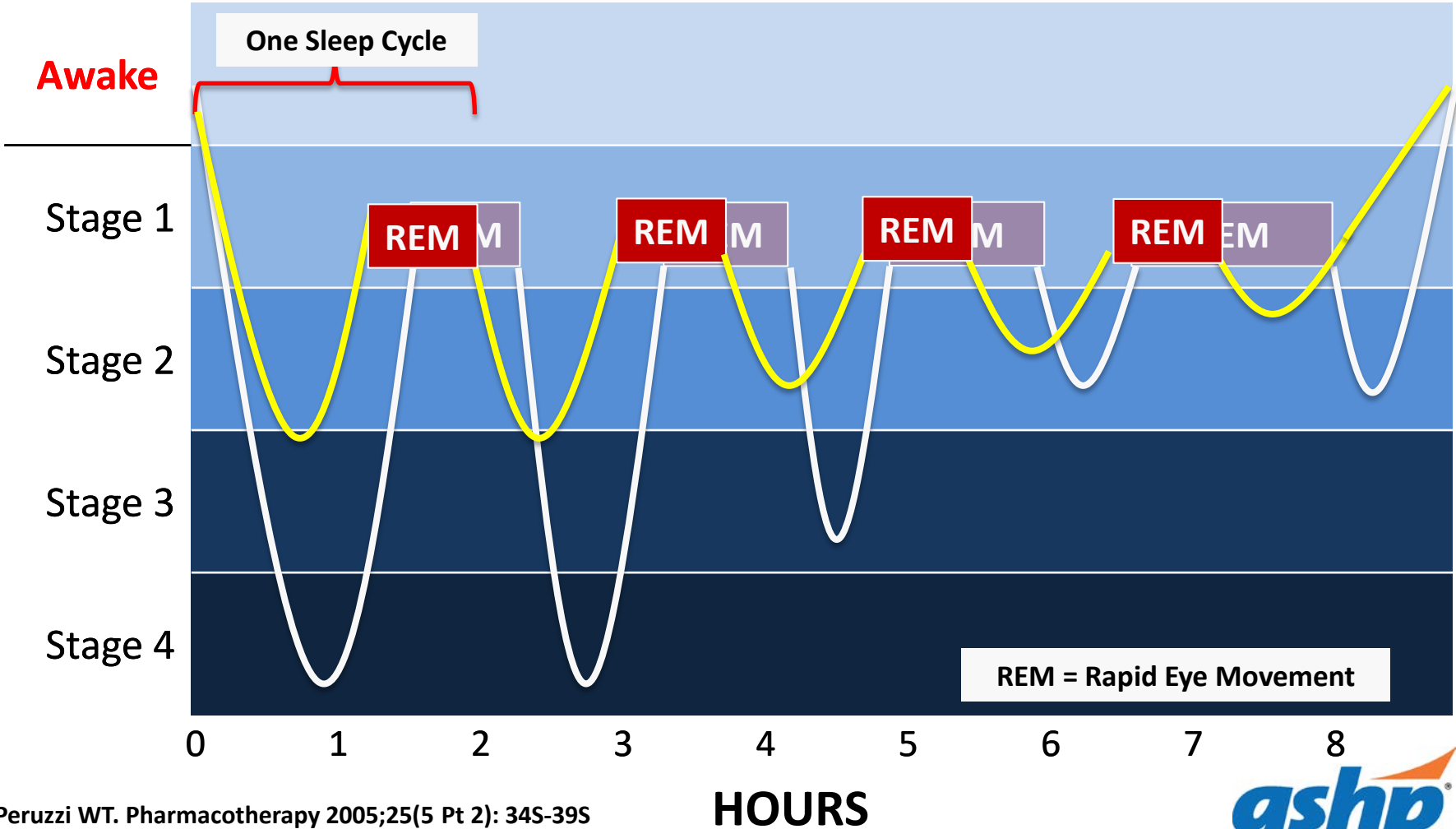
Agents	Effects on Sleep
Opiates	<ul style="list-style-type: none">• ↓ REM• ↓ Stage 3 & 4
Benzodiazepines	<ul style="list-style-type: none">• ↓ REM• ↓ Stage 3 & 4 (elimination with continued use)
Propofol	<ul style="list-style-type: none">• ↑ Sleep latency• ↓ Stage 3 & 4?• No interference with “restorative effects” of natural sleep
Dexmedetomidine	<ul style="list-style-type: none">• Similar to natural sleep• EEG activity suggest similar to Stage 2• Enhance deep sleep (Stage 3 & 4?)

Peruzzi WT. Pharmacotherapy 2005;25(5 Pt 2): 34S-39S

Weinhouse GL. Sleep 2006;29:707-16

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8-Hour Sleep Cycle

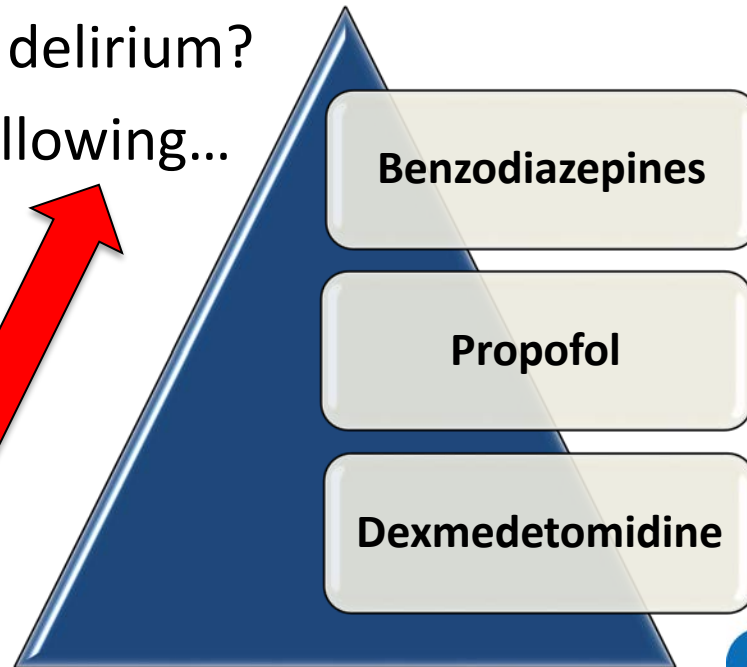


Peruzzi WT. Pharmacotherapy 2005;25(5 Pt 2): 34S-39S
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Connecting the Dots...

- Sedation ≠ sleep
- Experimental models of sleep fragmentation and deprivation may lead similar clinical manifestations as total sleep deprivation (i.e. delirium)
- Sleep deprivation → ICU delirium?
- So can we assume the following...

Delirium Risk



Peruzzi WT. *Pharmacotherapy* 2005;25(5 Pt 2): 34S-39S

Weinhouse GL. *Sleep* 2006;29:707-16

Weinhouse GL. *Anesthesiology Clin* 2011;29:675-685

Do you consider benzodiazepines more delirigenic than propofol or dexmedetomidine?

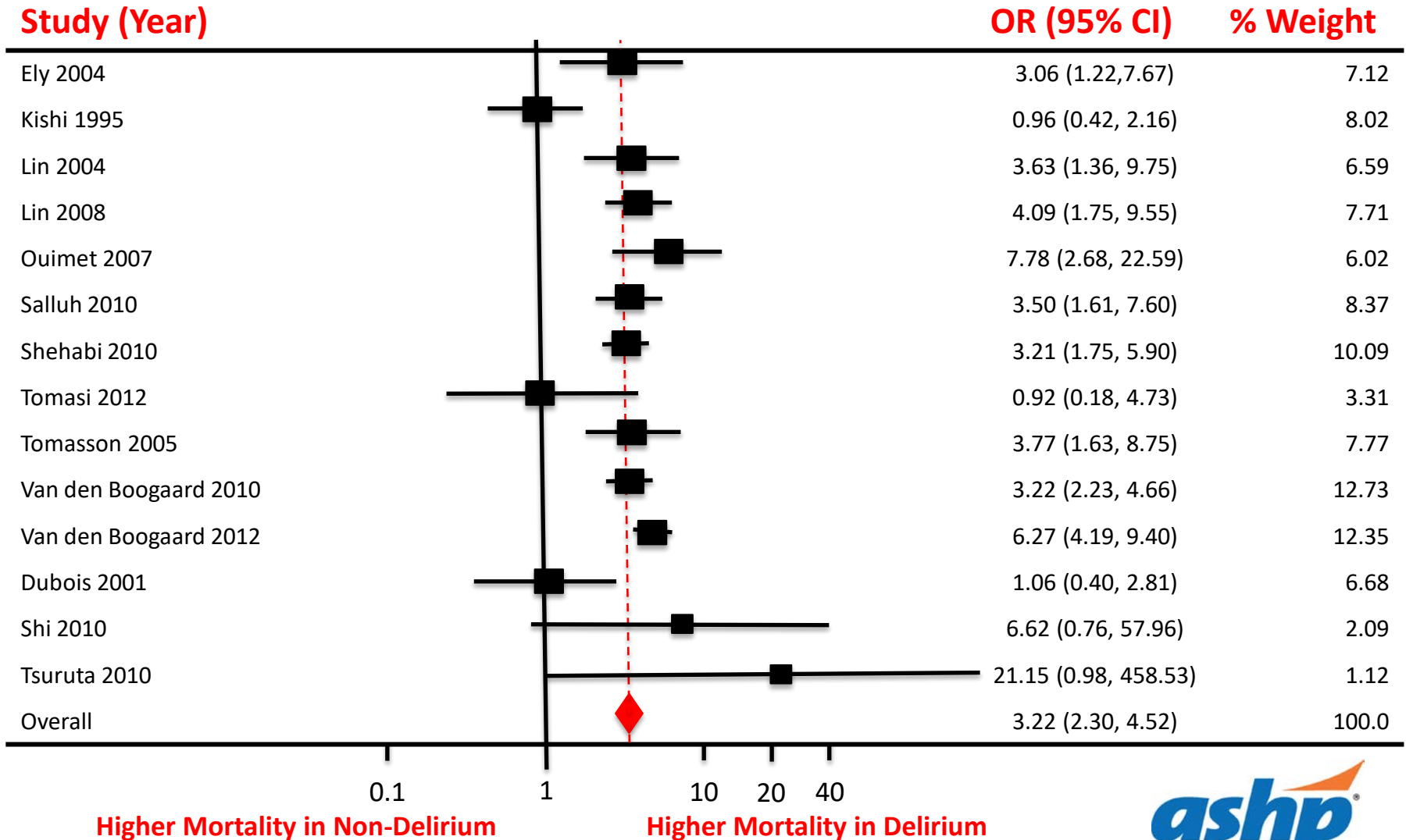
A YES

B NO

C MAYBE

Impact of ICU Delirium on Clinical Outcomes

Mortality

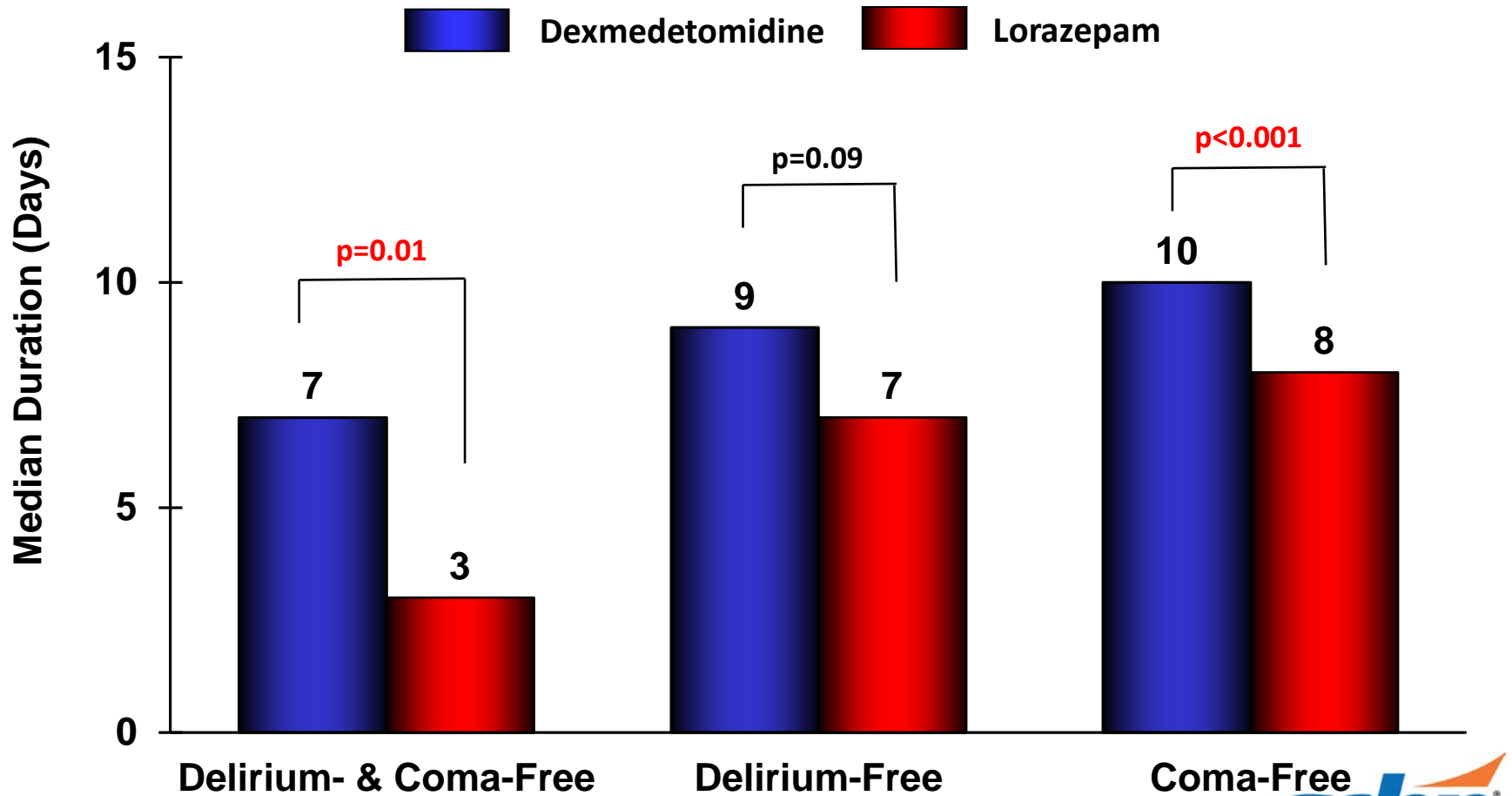


Length of Stay & Mechanical Ventilation Duration

- ICU Length of Stay
 - 10 studies
 - 7.32 (4.65-10.01) days longer if delirium (+)
- Hospital Length of Stay
 - 8 studies
 - 6.53 (3.03-10.03) days longer if delirium (+)
- Mechanical Ventilation Duration
 - 4 studies
 - 7.22 (5.15-9.29) days longer if delirium (+)

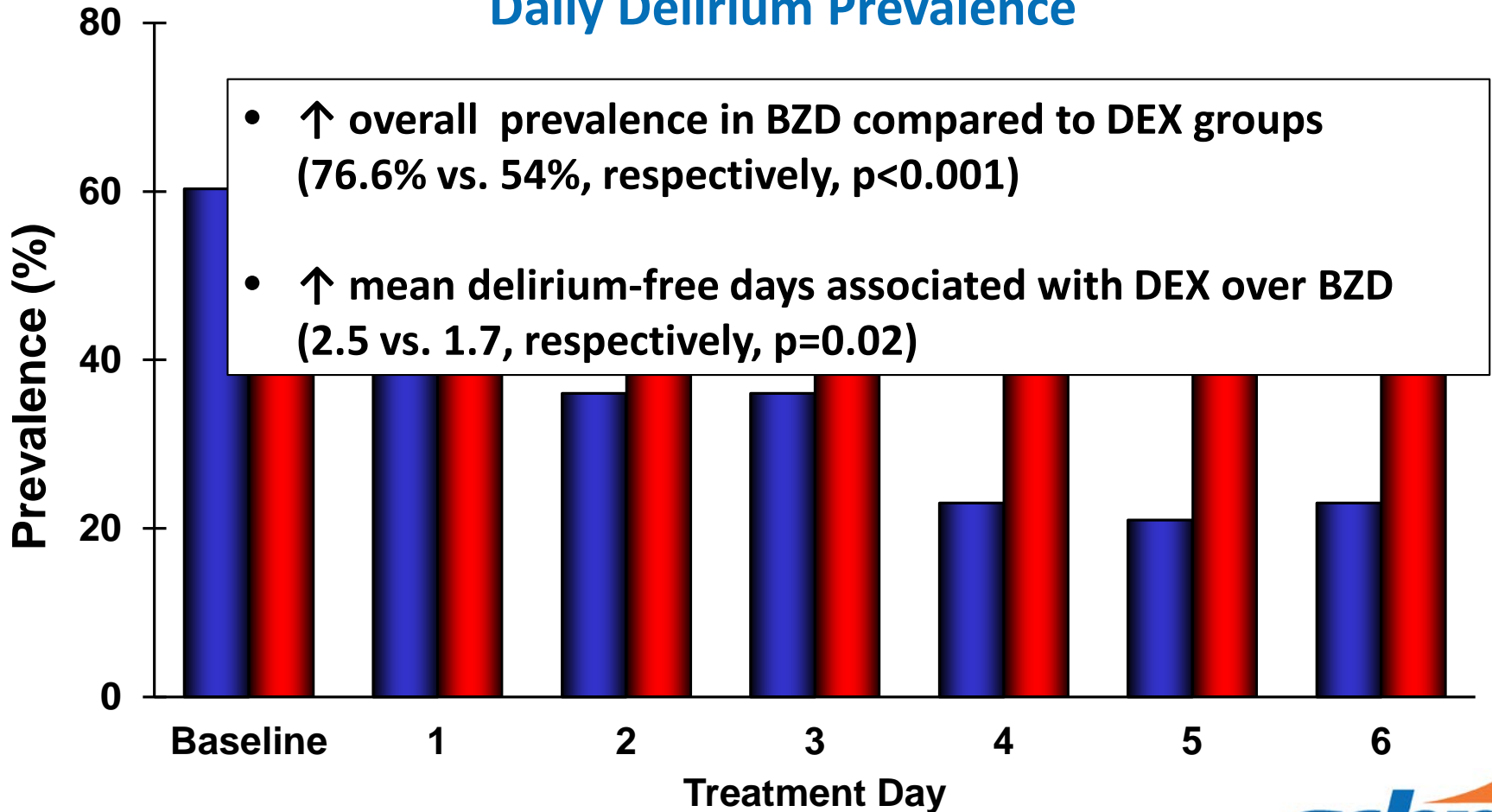
BZD vs. Non-BZD Clinical Data: Delirium Outcomes

MENDS Trial

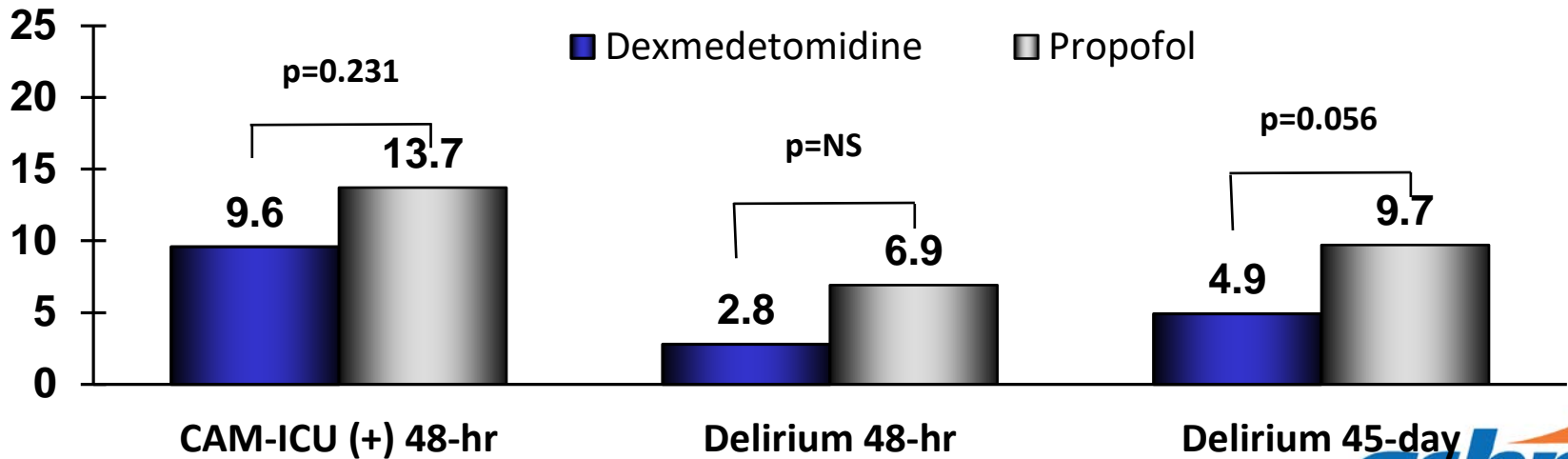
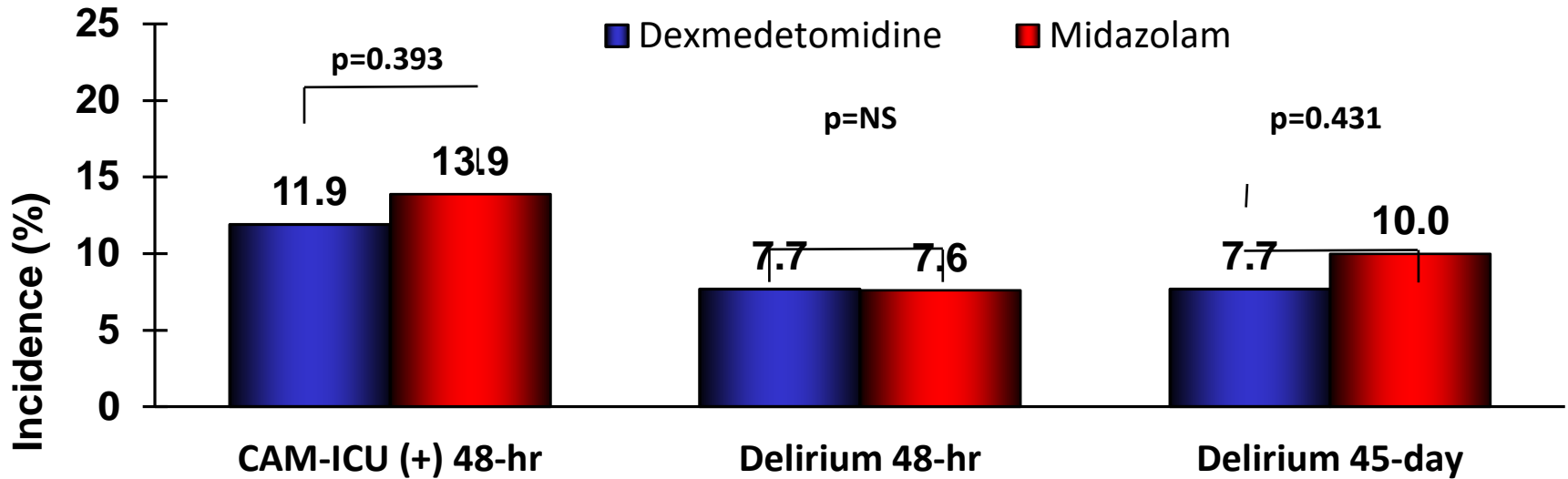


SEDCOM Study

Daily Delirium Prevalence

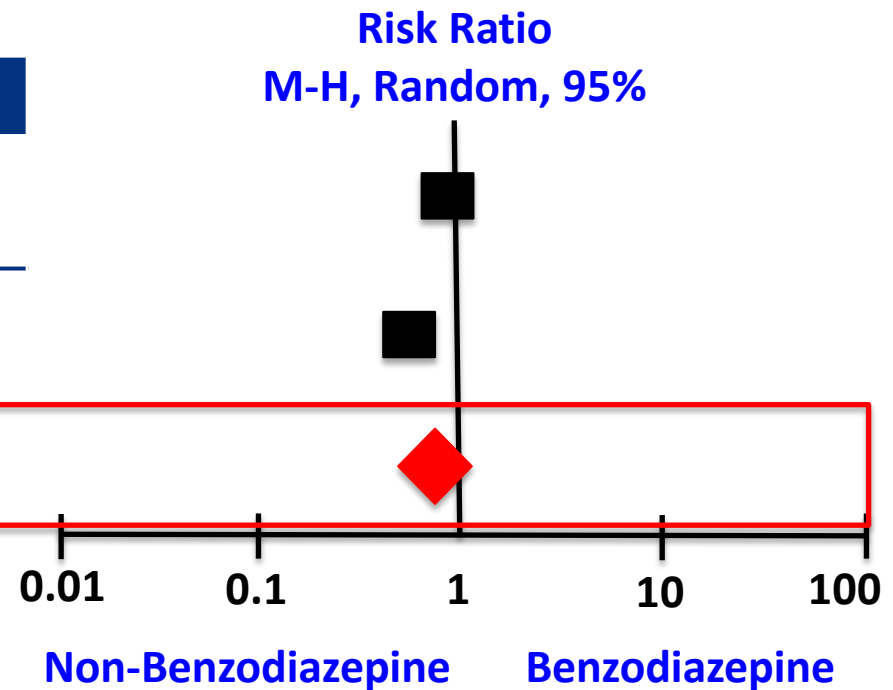


MIDEX and PRODEX Trials



Delirium Prevalence: Meta-Analysis

Study	Weight	RR (95%)
Pandharipande 2007	48.2%	0.96 (0.79-1.16)
Riker 2009	51.8%	0.71 (0.61-0.83)
Total	100.0%	0.82 (0.61-1.11)



Corticosteroids & Delirium Risk

- Prospective cohort study
- n=330 ICU patients with acute lung injury
- Primary outcome: evaluate systemic corticosteroids and other known risk factors for developing ICU delirium

Variable	Odds Ratio (95% CI)*	p value
Age 40-60 years	1.81 (1.26 – 2.62)	0.002
Age >60 years	2.52 (1.65 – 3.87)	<0.001
Corticosteroid administration	1.52 (1.05 – 2.21)	0.03
Benzodiazepine administration	1.32 (0.93 – 1.89)	0.12

*Multivariable analysis

BZD-associated Delirium in ICU

- Observational, single-center, cohort study
- n=1112 (mixed med-surg ICU)
- Outcome = awake, no delirium → delirium

Variable	Adjusted Odds Ratio* (95% CI)	p value
BZD Exposure	1.04 (1.02 – 1.05)	<0.001
BZD Exposure – Bolus	0.97 (0.88 – 1.05)	0.44
BZD Exposure – Continuous Infusion	1.04 (1.03 – 1.06)	<0.001

*Data represents odds ratio for every midazolam 5mg equivalent

- Outcome = Coma → delirium
- No significant difference on BZD exposure or route of administration

Putting It All Together

Systematic Review of ICU Delirium Risk Factors

Variable	Multivariable Analysis				Univariable Analysis	Level of Evidence
	High Quality	Positive	Negative	None	None	
Analgo-sedatives	-	2	-	-	-	Inconclusive
Benzodiazepines	7	-	1	4	2	Inconclusive
Epidural analgesia	1	-	1	1	2	Inconclusive
Opiates	3	1	2	1	2	Inconclusive
Propofol	1	1	-	2	-	Inconclusive

*Data represents # of studies published for each category

So What's The Verdict??

- What we know...
 - Trials suggesting association vs. no association are balanced
 - Delirium assessment may not capture all episodes
 - Benzodiazepine agent and regimens varied
- What we don't know...
 - Why lower ICU delirium rates in individual trials have not resulted in improved outcomes?
 - Lack of overall understanding?
 - Are we looking at all variables?



Patient Case Revisited: Midazolam the primary ICU delirium Cause?

- 65 y.o. male
- MSSA sepsis with PNA 5
- PMHx: heroin IVDA
- ARDS
- ECMO
- CAM-ICU (+) w RASS -3
- Sedation/Analgesics exposure
 - Propofol
 - Fentanyl
 - Midazolam

A YES – midazolam is the cause

B NO – midazolam is NOT the source

C MAYBE – midazolam could be playing a role, but not clear

Key Takeaways

- Key Takeaway #1
 - Conclusive evidence associating BZDs with increased risk of ICU delirium remains controversial
- Key Takeaway #2
 - Avoidance of BZD should be based on pharmacokinetic parameters impact on MV duration and ICU length of stay
- Key Takeaway #3
 - Be vigilant of all potential modifiable risk factors rather than “tunnel vision” on BZDs



Do Positive CAM-ICU Assessments Identify Delirium in Sedated Patients?

Gil Fraser, PharmD, MCCM

Professor of Medicine, Tufts

Clinical Pharmacist in Critical Care, Maine Medical Center

Objectives

- To provide a balanced view of the limitations of delirium assessment
- To accurately describe the influence of sedation on delirium assessments and associated outcomes
- To identify potential areas for further research

Start With What Is Indisputable

- The brain is a vital organ!
- PAD guidelines recommend non-benzo-based sedation
 - Benzodiazepines prolong time on mechanical ventilation (~2 days) and in the ICU (~1.6 days).
Fraser CCM 2013; 41:S30
- Sedation-related delirium was the most contentious topic
 - Page 287. “the benzodiazepines MAY BE a risk factor for the development of delirium.” *Barr. CCM 2013; 41:263*

Start With What Is Indisputable

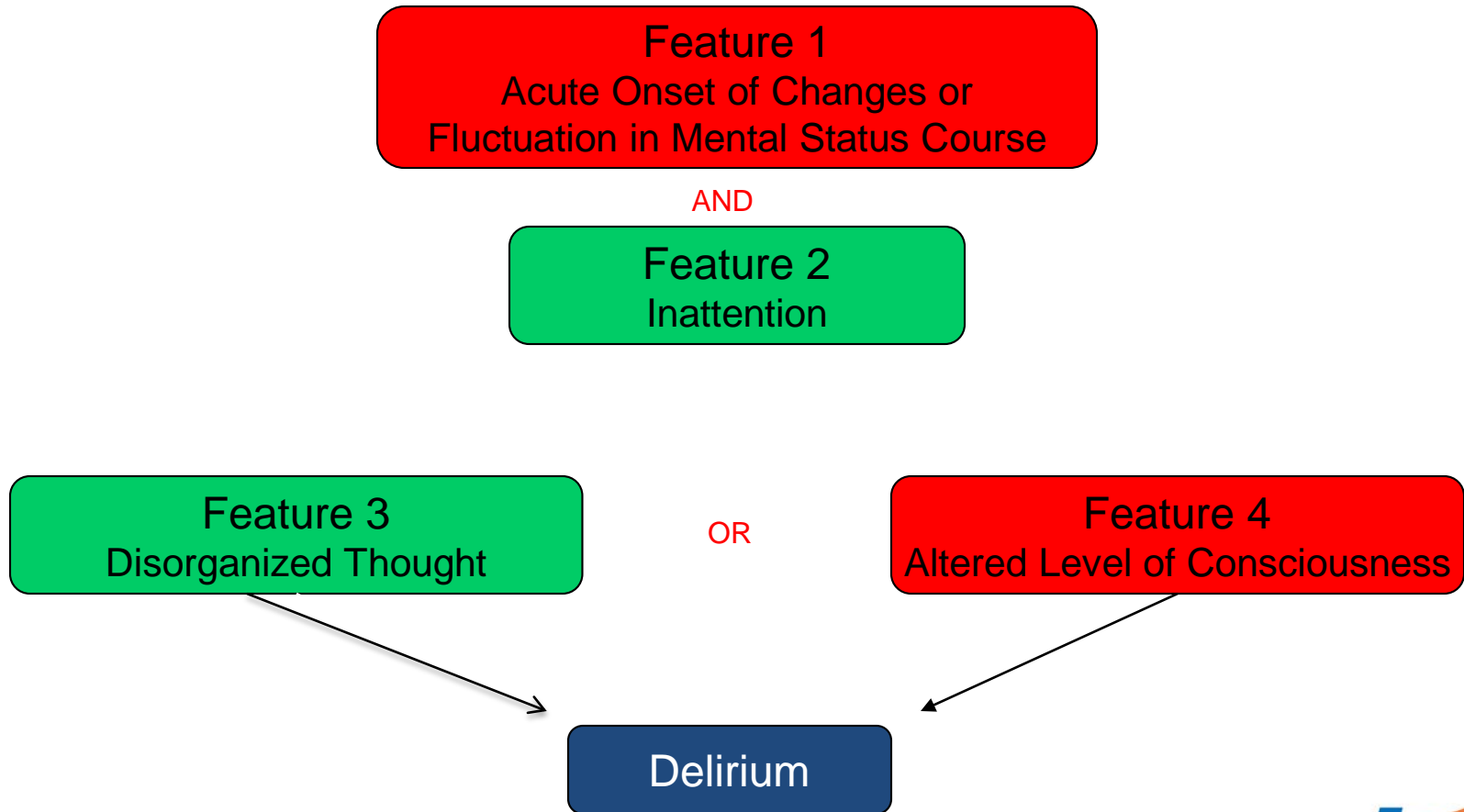
- Let me administer (in a virtual fashion of course) 5 mg midazolam IV to each of you!!!

Will Almost All of You Be Assessed as CAM-ICU Positive?

A TRUE

B FALSE

Confusion-Assessment Method for ICU (CAM-ICU)

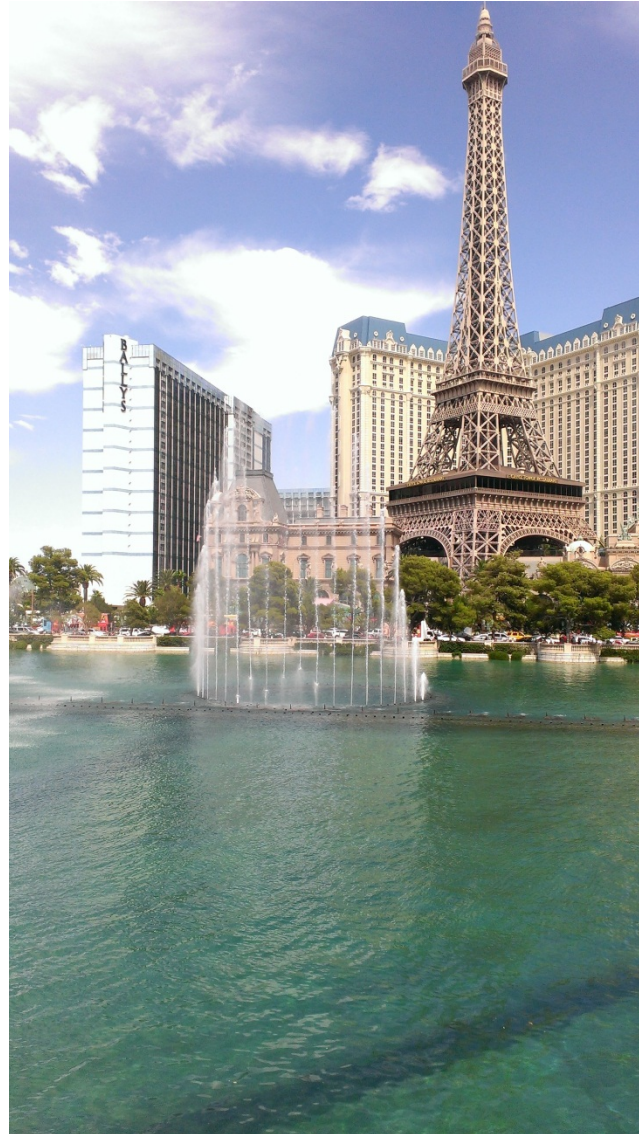


The CAM-ICU Can Discriminate Between Pharmacology and Physiology (Delirium)

A TRUE

B FALSE

Fake or Real?



Fake or Real?



ICU Delirium

- Frequency: ~50% of ICU patients
- Three-fold increase in 6-month mortality
- An extra 5 days on mechanical ventilation
- An extra 8-10 d of hospitalization costing an average of \$15,000/pt
- 50% have cognitive impairment at hospital discharge
 - Long-term in 1/3
- Is sedation use a modifiable risk factor?

Ely JAMA 2004;291-1753-1762

Milbrandt CCM 2004;32:955-962

Dubois ICM 2001; 27:1297

Jones. ICU 2007; 33:978

Finished product

Rock Walls vs Delirium Assessment with CAM-ICU



To Fully Understand, You Need to Dissect



Which of the Following Combinations Are True

- A** Benzodiazepine use causes delirium and increases ICU LOS
- B** Delirium causes an increase in mortality and is distressing to patients and families
- C** Assessing delirium improves outcomes and is easy to do
- D** ICU delirium is common but limiting its burden has not been shown to affect outcomes

Delirium and Death

- Delirium experts use words like predict, portend, harbinger of poor outcomes, prognostic indicator, independent risk factor
 - They never use the term “cause”
- If death was causally related to delirium...
 - Limiting its burden would influence survival
 - But it doesn't!
 - 17 interventional trials with 2800 patients
 - Interventions decreased delirium duration by 64%
 - No effect on short-term mortality; $p = .11$
- Recent prospective cohort trials could not establish a relationship between delirium and death
 - 1110 patients followed prospectively
 - Delirium prolonged ICU stay, with a 0.9% attributable mortality

Deconstructing and Reconstructing: Some Delirium Questions

- What are the direct consequences of delirium? Death, LTCl, PTSD, distress?
- Does assessing delirium matter? Def, maybe, not one bit!
 - Andrews. AJCC 2015; 24:48, Bigatello. J Trauma Acute Care Surg 2013; 74:876, Reade. Crit Care Resusc 2011; 13:217
- How good are our delirium assessment tools? Good, bad, or indifferent? Is there artifact in EVERY measurement we take?
- *Is delirium really a homogeneous dichotomous condition (unlike every other organ failure condition)?*
- *Have we oversimplified a very complex issue?*
Fraser CCM 2015; 43:703

Richmond Agitation-Sedation Scale (RASS)

TABLE 1. RICHMOND AGITATION-SEDATION SCALE

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

Does RASS -3 Actually Represent Moderate Sedation? Per Vanderbilt Authors and Others

Coma Andresen. CCM 2014; 42:2244, Page Lancet Respir 2013; Sep; 1:515

Severe brain dysfunction Vasilevskis. CCM 2016; 44:138

Deep sedation Barr. CCM 2013; 41:S99, Shehabi. ICM 2013; 39:910

■ And why is this important?

- Coma = ~30-50% increase in time on mechanical ventilation and in the ICU and a 67% increase in neurodiagnostic testing
- Implications for DELIRIUM assessment are huge
 - RASS -3 as a threshold for delirium screening with CAM-ICU either
 - Introduces quite a bit of artifact....OR....
 - Yields a high proportion (91%) of patients who are unable to assess (UTA); Svenningsen 2013; 57:288 (personal communication)

Prevalence of Delirium is a Function of Wakefulness

Prevalence CAM-ICU positive (%)	Sedated	Wakeful	Absolute Difference
Riker	45-75	12	30
Ely	83	40	43
Haenggi	53	31	22
Poston	73	49	24
Gusmao-Flores	89	32	57
Svenningsen	66	22	44
Patel	77	22	55

22-57% of delirium disappears when patients are wakeful

Riker. CCM 2012; 40:1092

Ely. JAMA 2001; 286:2703

Haenggi. ICM 2013; 39:2171

Svenningsen. Acta Anaesthesiol 2013; 57:288

Poston. AJRCCM 2010:A6701

Gusmao-Flores ICM 2014; 41:137

Patel. AJRCCM 2014; 189:658

RASS and CAM-ICU ASSESSMENTS

N = 12,875

Study	RASS -2 to -3			RASS 0 to -1		
	# Assessments	# CAM ICU pos	Frequency (%)	# Assessments	# CAM ICU pos	Frequency (%)
1	588	387	66	9441	2065	22
2	92	90	98	71	22	31
3	50	40	80	896	146	16
4	218	212	97	1019	259	25
Total	948	729	77	11427	2492	22

1. Svenningsen 2013, 2. Haenggi 2013, 3. Gusmao-Flores 2013 ,4. Patel 2014

Timing of CAM-ICU vs Sedation Depth

Should I do a CAM-ICU assessment before, during, or after a Spontaneous Awakening Trial (SAT)?

“The best picture of the patient’s mental status will come from assessing delirium serially throughout the day. Thus, we recommend that you assess patients for delirium both before and after daily sedative interruption (SAT).”

icudelirium.org accessed 8.15.16

“Drug induced sedation does not, in our opinion, constitute delirium” Quimet ICM 2007; 33:66

Rapidly Reversible, Sedation-Related Delirium

Patel. AJRCCM 2014; 189:658

N = 102 pts: Blinded paired CAM-ICU results before and after daily sedation interruption with one year follow-up

Sedation-related delirium = CAM POS → CAM NEG within 2h sedation interruption

10 = no delirium; 12 rapid reversible delirium; 51 persistent delirium; 24 mixed

Outcomes: No Delirium (ND), Rapidly Reversible Delirium (RRD), Persistent Delirium (PD)

	ND	RRD	PD
ICU LOS (d)	4	4.5 →	13.1
Hosp LOS (d)	8.1	6.7 →	25.4
MV time (d)	2.4	2.5 →	6.2
D/C home (%)	80	100 →	27
Mortality % (1yr)	20	25 →	66

Sedation-related delirium may portend no long-term consequences other than those directly related to their pharmacology (time on the ventilator and in the ICU)

Sedation-Related Delirium

These results clearly demonstrate that the impact of sedation on assessment of delirium cannot be ignored. It may even be questioned whether “rapidly reversible, sedation-related delirium” is delirium at all.

Takala AJRCCM 2014; 189: 622

Unfortunately, almost all ICU delirium research has been done without considering the role of sedation at all and therefore appears to be seriously flawed. Takala AJRCCM 2014; 189:1444

This degree of confounding of delirium prevalence with sedation depth should be acknowledged and included as an identified covariate in future studies of cognitive outcomes in ICU patients.

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Madison, WI

NEJM 2014; 370:184

Wakefulness and Delirium Assessment

- Delirium assessments AND outcomes are influenced by depth of sedation

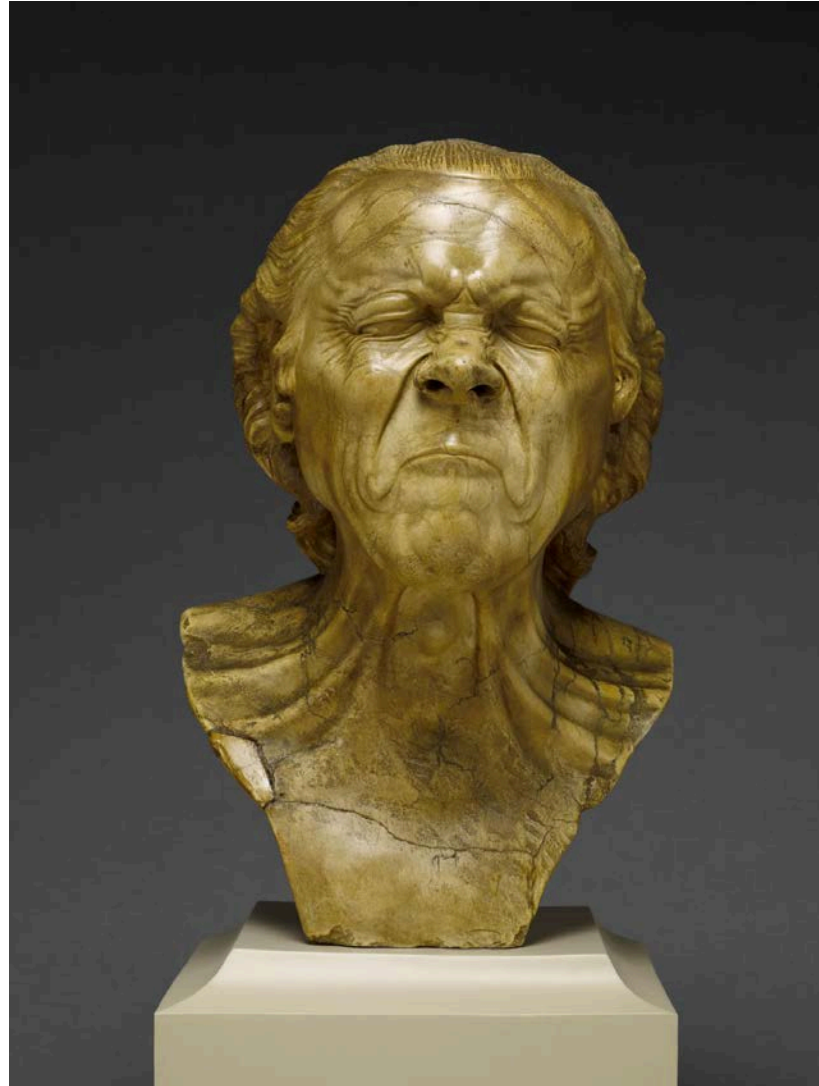
Implication

- Assess sedated patients after they have exhibited wakefulness (SAS 3-4 or RASS 0 to -2 with additional commands)

Key Takeaways

- Delirium assessment with CAM-ICU is best performed when patients are wakeful
- It is not likely that sedative-associated positive CAM-ICU assessments have any impact beyond pharmacologic interference with ventilator weaning and ICU discharge
- We need to
 - Develop accurate definitions of ICU delirium
 - Discover meaningful aspects of ICU delirium
 - Find modifiable risk factors that are real and relevant

Skeptics



“It doesn't take a chef to know the milk is spoiled.” G Fraser 2013



Easy as 123: ABCDEF Bundle Implementation and Performance Assessment

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Tampa General Hospital

Objective

- Recommend implementation strategies for sedation, delirium, and mobility for best practices in ICU patients.

Key Concept: ABCDEF Bundle

A

- Assess, Prevent, and Manage Pain

B

- Both Spontaneous Awakening (SATs) & Spontaneous Breathing Trials (SBTs)

C

- Choice of Analgesia & Sedatives

D

- Delirium Reduction, Assessment, and Management

E

- Early Mobility & Exercise

F

- Family Engagement and Empowerment

Audience Survey:

Do you feel your institution has robust ABCDEF bundle processes in place?

A YES

B NO

Basic Approach: ABCDEF Bundle

- Assess, prevent, and manage pain
 - Pain assessment is key to adequate pain control
 - Pain before sedation
- Both spontaneous awakening and breathing trials
 - Daily sedation interruption or light sedation levels
- Choice of sedation and analgesia
 - Non-benzodiazepine sedative agents recommended (propofol or dexmedetomidine) in mechanically ventilated patients

Barr J, Fraser GL, Puntillo K, et al. *Crit Care Med*. 2013;41(1):263-306.

Pandaharipande, et. al. *JAMA*. 2007;298(22):2644-2653.

Riker, et al. *JAMA* 2009; 301:489–499.

Balas, et al. *Crit Care Med*. 2014;42(5):1024-36.

Basic Approach: ABCDEF Bundle

- Delirium assessment, prevention, and management
 - Daily screening tools to assess for delirium
 - Address modifiable risk factors and non-pharmacological interventions
 - Discontinue potential deliriogenic medications
 - Haloperidol or atypical antipsychotics may be used
- Early mobility and exercise
 - Early mobilization helps with muscle strength, delirium, and functional status
- Family Communication
 - Ongoing dialogue with family about care and involving family in the decision making

Summary of Benefits: ABCDEF Bundle

- Decreased ventilator time
- Decreased ICU length of stay
- Improved return to normal mental status
- Increased independent functional status
- Improved patient and family satisfaction
- Improved mortality

Barr J, Fraser GL, Puntillo K, et al. *Crit Care Med.* 2013;41(1):263-306.

Balas, et al. *Crit Care Med.* 2014;42(5):1024-36.

Tools & Resources

- Society of Critical Care Medicine's (SCCM) ICU Liberation Campaign
 - <http://www.iculiberation.org/Bundles/Pages/default.aspx>
- American Association of Critical Care Nurses (AACN) Implementing ABCDE Bundle at the Bedside
 - <http://www.aacn.org/wd/practice/content/actionpak/withlinks-abcde-toolkit.pcms?menu=practice>

Tools & Resources

- Baylor Research Institute and the Society of Hospital Medicine
 - http://www.hospitalmedicine.org/Web/Quality_Innovation/Implementation_Toolkit/Delirium/delirium.aspx%20
- Vanderbilt University Medical Center, Center for Health Services Research
 - <http://www.icudelirium.org/medicalprofessionals.html>

Step-by-Step

- STEP 1: Identify ICU champion(s)
 - Nurse, physician, pharmacist or quality specialist
- STEP 2: Create the committee to develop and guide processes
- STEP 3: Highlight current practices and perform gap analysis
 - What are we doing well?
 - What are the opportunities for improvement?



Step-by-Step

- STEP 4: Develop and implement bundle processes
 - Toolkits, scripts, flowsheets
 - Encourage and enable staff contributions
- STEP 5: Deploy interventions and educate staff
 - Integrated within daily workflow
- STEP 6: Collect data and report on specific measures
 - Disseminate findings among staff
- STEP 7: Celebrate the successes and continue to evolve

Inter-disciplinary Effort

Patient & Family

Pharmacists

Nurses

Physicians

Respiratory Therapy

Physical Therapy/ Rehab

Role of Pharmacists & Team Members

Bundle Element		Primary Accountability	Additional Team Member Responsibility
A	Assess, Manage and Treat Pain	RN	MD, Pharm
B	Both Awakening and Breathing	RN, RT	RN, MD, Pharm
C	Choice of Analgesia and Sedation	RN	RT, MD, Pharm
D	Delirium Assessment, Prevention, Management	RN	RT, Pharm, MD, PT
E	Early Mobility and Exercise	RN, PT	RT
(F)	Family Engagement	RN	All

Key Concept: ABCDEF Bundle

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- Both Spontaneous Awakening (SATs) & Spontaneous Breathing Trials (SBTs)

C

- Choice of Analgesia & Sedatives

D

- Delirium Reduction, Assessment, and Management

E

- Early Mobility & Exercise

F

- Family Engagement and Empowerment

Assess, Manage and Treat Pain

- Use Behavioral Pain Scale (BPS) or Critical-Care Pain Observance Tool (CPOT)
- Routinely monitored
- Potential goals:
 - Assess pain four or more times per shift
 - Treat pain within 30 minutes of detecting significant pain, then reassess
- Preemptive analgesia for potentially painful procedures
- Treat pain first, then sedate



TGH Experience: Pain

- Gap Analysis:
 - Pain scoring well integrated into practice in all ICUs
 - HCAHPs score focus & education
 - Routine engagement and direct feedback
 - The next frontier = analgosedation!
 - Focus on analgesics for pain and sedation → reduction in sedative usage other potential benefits
 - Despite potential advantages, analgosedation practiced inconsistently throughout ICUs
 - Opportunities for further adoption

TGH Experience: Analgosedation

- Ongoing study: mechanically ventilated Medical ICU patients
 - Prospective, randomized, single center
 - Patients randomized in a 1:1 fashion to one of two groups:
 - Group 1: new analgosedation protocol
 - Nurse driven
 - Fentanyl infusion + midazolam bolus dosing PRN
 - Group 2: standard of care
 - Provider driven without protocol
 - ❖ Continuous infusion sedative usage common practice

Key Concept: ABCDEF Bundle

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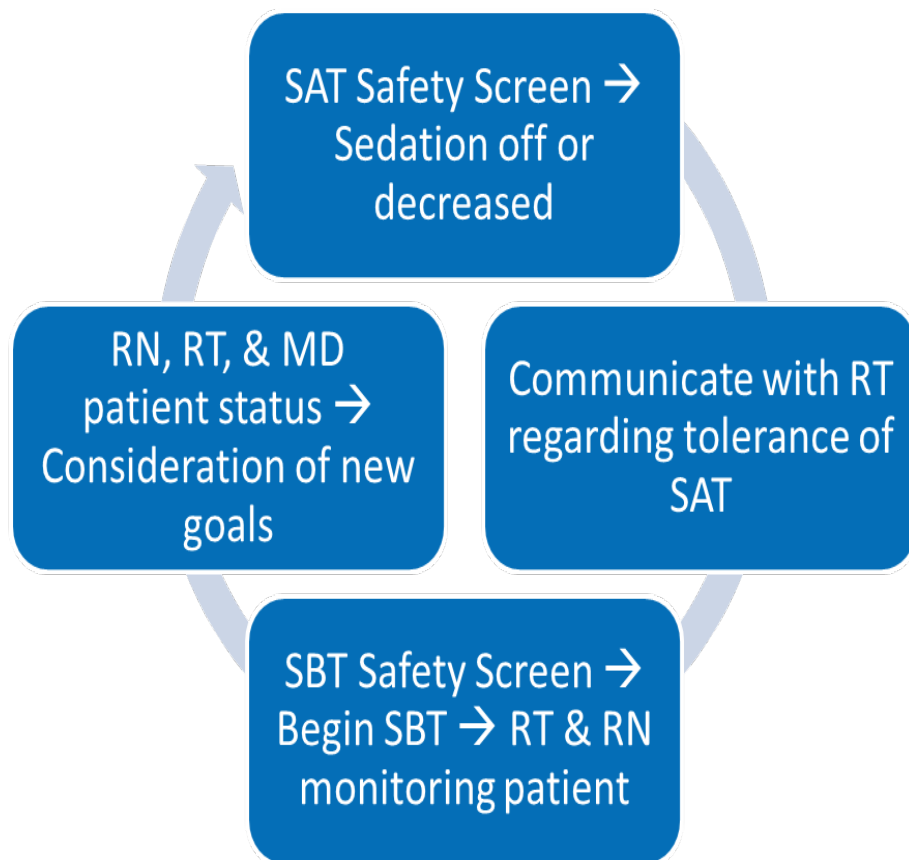
- Early Mobility & Exercise

F

- Family Engagement and Empowerment

SATs & SBTs

- Wake Up & Breathe Protocol
 - Vanderbilt University
 - Performed daily
 - Patients who fail screening or trial, returned to targeted sedation protocol and/or ventilator support
- Requires true collaboration



TGH Experience: SATs & SBTs

- Gap Analysis:
 - Evolving practice
 - Shifting to patient-centered versus “protecting our territories”
 - CTICU leading effort
 - Other ICUs following suit
 - Protocol in place
- Stage 1: Screen criteria for initiation of protocol
- Stage 2: Assess for exclusions
- Stage 3: Wean FIO₂
- Stage 4: Wean PEEP
- Stage 5: Wean respiratory rate
- Stage 6: Change mode to pressure support ventilation
- Stage 7: Weaning parameters
- Stage 8: Extubation

Fraction Inspired Oxygen (FIO₂); Positive End Expiration Pressure (PEEP)

Key Concept: ABCDEF Bundle

A

- Assess, Prevent, and Manage Pain

B

- Both Spontaneous Awakening (SATs) & Spontaneous Breathing Trials (SBTs)

C

- Choice of Analgesia & Sedatives

D

- Delirium Reduction, Assessment, and Management

E

- Early Mobility & Exercise

F

- Family Engagement and Empowerment

Choice of Sedation

- Targeted Sedation Protocols
 - Non-benzodiazepine sedatives preferred
- Targeting sedation goals
 - Maintain light rather than deep sedation
 - Riker Sedation Agitation Scale (SAS)
 - Richmond Agitation Sedation Scale (RASS)
- Minimizes drug exposure and accumulation
- Optimizes patient alertness

TGH Experience: Choice of Sedation

- Gap Analysis
 - Guidelines in place
 - Previous challenges with lack of sedation assessment (<20% compliance with RASS pre-intervention)
 - Extensive nursing education performed & electronic medical record (EMR) documentation pathway optimized
 - >95% compliance with RASS post-intervention!!
 - “Sedation Stewardship” encouraged (similar to Antimicrobial Stewardship)
 - Indication
 - Drug choice
 - Duration/de-escalation
 - Outcomes/reactions
 - Delirium

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TGH Experience: Delirium

- Gap Analysis:
 - Over a decade of effort
 - Making progress

March 2006
Delirium Task
Force Formed:
CAM-ICU
instituted

Aug 2010
ICDSC &
Delirium
Protocol
Paper Process
trialed

Oct 2011 EPIC
EMR Go-Live

Aug 2012
Early Mobility
Protocol
instituted

Confusion Assessment Method-ICU (CAM-ICU); Intensive Care Delirium Screening Checklist (ICDSC)

TGH Experience: Making Progress

Apr 2013
ICDSC, &
RASS
Flowsheet
rows in
EPIC

May 2013
Pharmacy
Delirium
Assess:
workbench
report

Nov 2014
Delirium
Committee
formed:
Nursing
Quality

May 2016
Delirium
Screen in
EPIC
Patient
Scoring

Sept 2016
ICU
Liberation
Team
Coaching
in ICU

TGH Experience: Role of ICU Pharmacists

- Patients identified with ICDSC score ≥ 4 in EMR (i.e., EPIC)
 - Report run daily (i.e., EPIC workbench report) → Evolved to automatic flag in patient list (i.e., EPIC scoring)
- Delirium treatment guidelines
- Review medication list for deliriogenic medications
- Ensure non-pharmacologic delirium prevention utilized
- Call provider if necessary
- Document recommendations/interventions in a progress note
 - Use smart phrase template: **.RPHDELIRIUM**

**>95% Compliance with
pharmacy delirium
assessments**

**Additional outcome
measures being
considered**

Key Concept: ABCDEF Bundle

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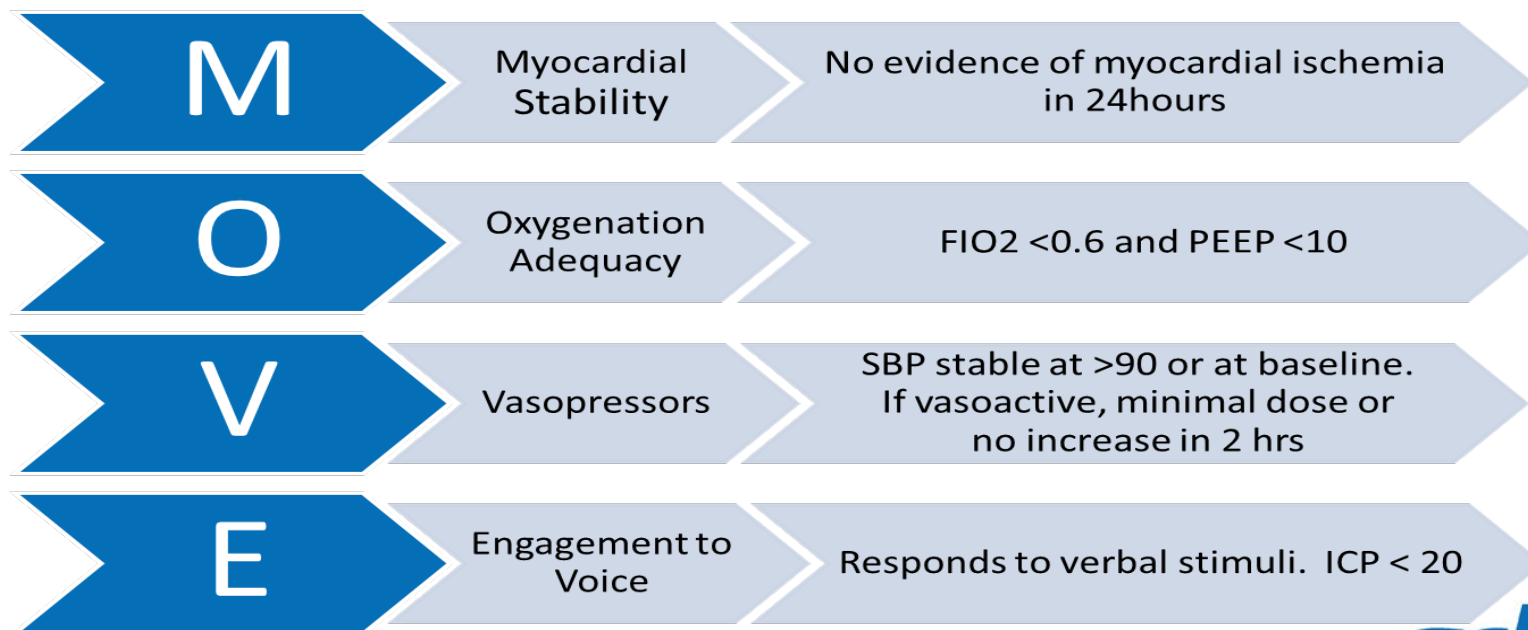
Early Mobility

- Preventative physical and cognitive rehabilitation
- Engages the critically ill
- Activities help in recovery
- Prevents muscle deterioration and joint contractures
- Requires a proactive approach



TGH Experience: Early Mobility

- Gap Analysis:
 - Prior leaders (e.g., Surgery/Trauma ICU, Neuro ICU)
 - Recently expanded nurse protocol for all ICUs
- Not on bedrest, RN screens (using the MOVE criteria):



Intracranial Pressure (ICP)

Key Concept: ABCDEF Bundle

A

- Assess, Prevent, and Manage Pain

B

- Both Spontaneous Awakening (SATs) & Spontaneous Breathing Trials (SBTs)

C

- Choice of Analgesia & Sedatives

D

- Delirium Reduction, Assessment, and Management

E

- Early Mobility & Exercise

F

- Family Engagement and Empowerment

Family

- Keep ICU patients and families informed
- Encourage active patient and family involvement in decision making
 - Help provide physical comfort and emotional support
- Rounding
 - ICU Liberation videos

TGH Experience: Family

- Gap Analysis:
 - Family engaged during rounding by physicians primarily, and as needed
 - Opportunities for additional family engagement from the larger interdisciplinary team
 - Lack of clear and consistent roles for family interactions
- ICU Liberation project underway
 - Evaluating options for optimizing rounding
 - Pharmacist/Team script being evaluated for feasibility
 - Pain
 - Sedation
 - Delirium

Challenges

- Awareness: What is ABCDEF Bundle?
- Buy-in: How does this benefit our department/discipline/institution?
- Practice area differences: How do we align practices across ICU settings?
- Process: How do we (department/discipline/institution) implement?
 - Should this be unit-specific or housewide?
- Sustainability/scalability: Will we be able to maintain progress, or make further gains?
- Impact: Are we truly making an impact?

Metrics to Consider: Process Measures

- Pain score compliance
 - % of patients assessed for pain (BPS, CPOT)
- Sedation score compliance
 - % of patients assessed for sedation (RASS or SAS)
- Delirium score compliance
 - % of patients screened for delirium (CAM-ICU or ICDSC)
- SAT & SBT compliance
 - % of patients contraindicated for SAT
 - % of patients received SBT
- Early mobility compliance
 - % of patients early mobilized (active or passive?)
- Delirium assessment compliance
 - % delirium assessments completed

Metrics to Consider: Outcome Measures

- Mechanical ventilator days
- ICU length of stay
- Delirium diagnosis rates
- Delirium response
 - % delirious patient response within encounter?

Question:

Which of the following is a potential benefit of ABCDEF bundle implementation?

- A** Decreased ICU length of stay
- B** Improved return to normal mental status
- C** Decreased ventilator time
- D** All of the above

Key Takeaways

- Key Takeaway #1
 - Implementation of ABCDEF bundle processes require initial staff awareness of benefits to patients, followed by identification of ICU champion(s).
- Key Takeaway #2
 - A gap analysis should be performed for A-B-C-D-E-F, in order to understand current state and opportunities.
- Key Takeaway #3
 - SCCM ICU Liberation Campaign, and AACN ABCDE Bundle at the Bedside provide excellent resources (e.g. toolkits, scripts, videos, flowsheets, etc) to aid in implementation.