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# Long-Term Cognitive Impairment, Delirium, and the ABCDEs

**E. Wesley Ely, MD, MPH**
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**Vanderbilt University, Nashville, TN**
**VA TN Valley Health Care System GRECC**

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# Disclosures: ICU Physician Vanderbilt

- Abbott, Hospira, Orion
- NIH and VA U.S. Federal Funding
- Author of PAD Guidelines of SCCM 2013
- Chair of SCCM Delirium section for PAD
- Co-Chair of SCCM ICU Liberation project to aid world-wide implementation

# Quote of the Day #1

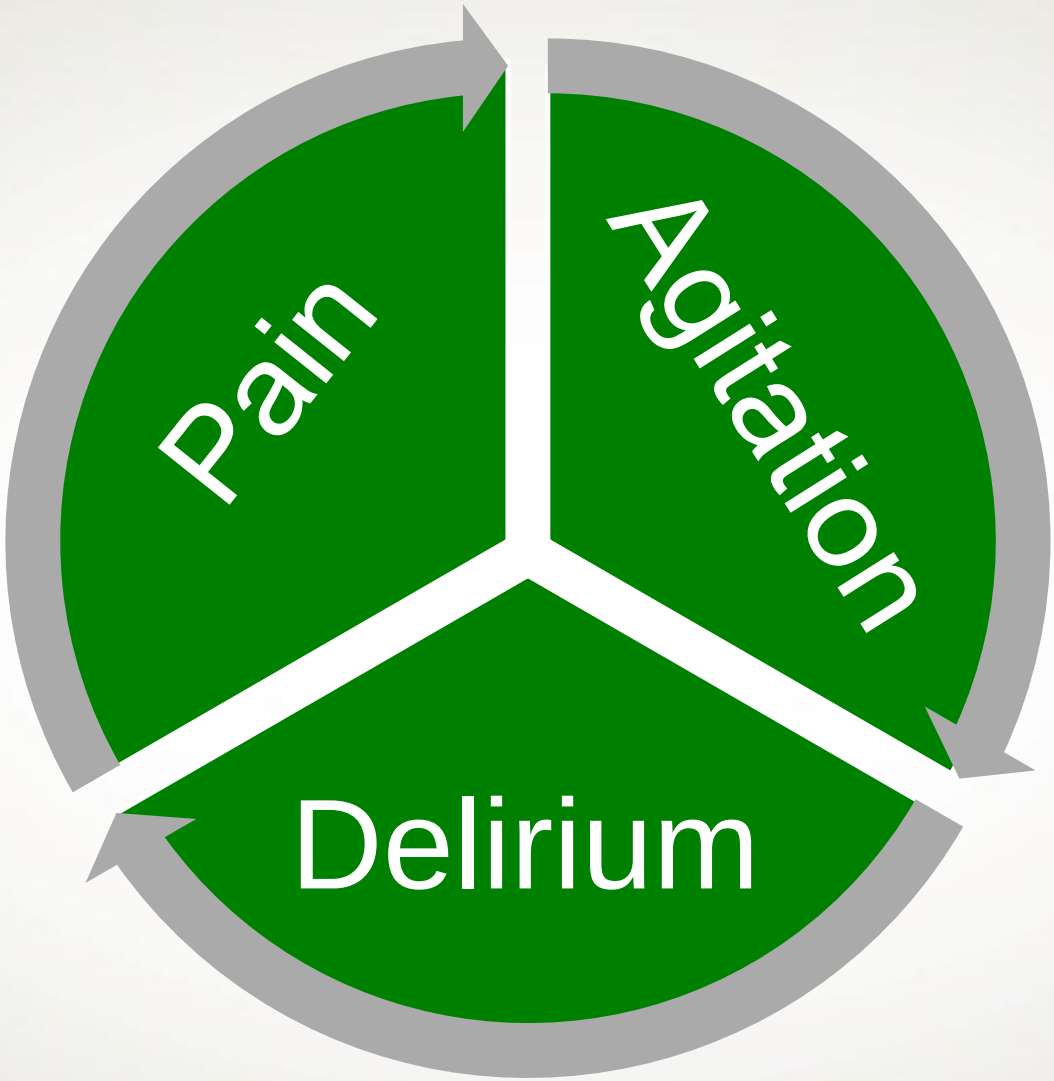
Dr. Swenson explained, "I'll tell you the truth. What I have discovered…is not what I expected. It is something greater, much more ambitious than anything we had hoped for…**in science: Never be so focused on what you are looking for that you overlook the thing you actually find."**

Ann Patchett - 2011, ***State of Wonder***

# Quote of the Day #2

"I came awake on the fifth day. My first memory is that of **floating up from the ocean bottom**, my eyes still waterlogged and **with what felt like scuba gear stuffed in my mouth and throat**. I couldn't speak. As I broke to the surface, I understood that I was still in the ICU at Our Lady, but I **heard nothing of what anybody said**.

Abraham Verghese - 2009, ***Cutting for Stone***




Barr J, et al. *Crit Care Med.* 2013;41:263-306.

Special Article

# Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the Intensive Care Unit

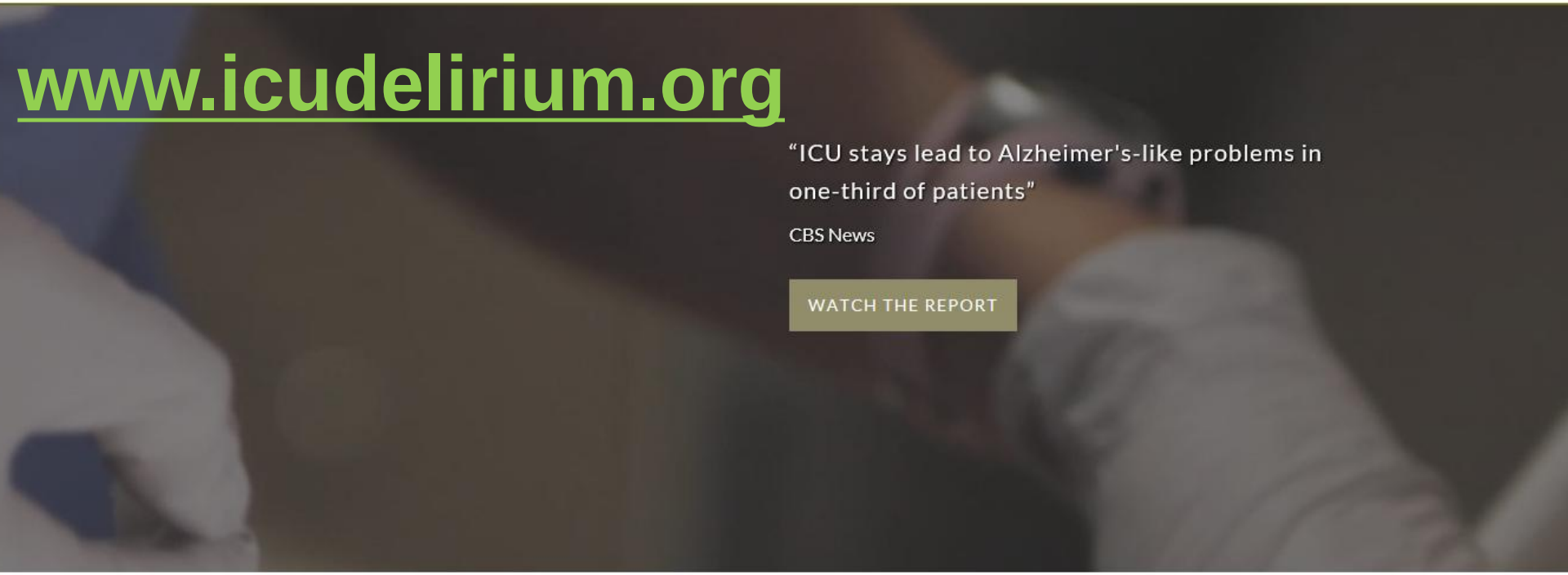
Juliana Barr, MD, FCCM[1]; Gilles L. Fraser, PharmD, FCCM[2]; Kathleen Puntillo, RN, PhD, FAAN, FCCM[3]; E. Wesley Ely, MD, MPH, FACP, FCCM[4]; Céline Gélinas, RN, PhD[5]; Joseph F. Dasta, MSc, FCCM, FCCP[6]; Judy E. Davidson, DNP, RN[7]; John W. Devlin, PharmD, FCCM, FCCP[8]; John P. Kress, MD[9]; Aaron M. Joffe, DO[10]; Douglas B. Coursin, MD[11]; Daniel L. Herr, MD, MS, FCCM[12]; Avery Tung, MD[13]; Bryce R. H. Robinson, MD, FACS[14]; Dorrie K. Fontaine, PhD, RN, FAAN[15]; Michael A. Ramsay, MD[16]; Richard R. Riker, MD, FCCM[17]; Curtis N. Sessler, MD, FCCP, FCCM[18]; Brenda Pun, MSN, RN, ACNP[19]; Yoanna Skrobik, MD, FRCP[20]; Roman Jaeschke, MD[21]

Barr J et al, CCM 2013;41:263-306

ICU Delirium
*and* Cognitive Impairment Study Group

Vanderbilt University Medical Center | Monroe Carell Jr. Children's Hospital at Vanderbilt | United States Department of Veterans Affairs

# www.icudelirium.org





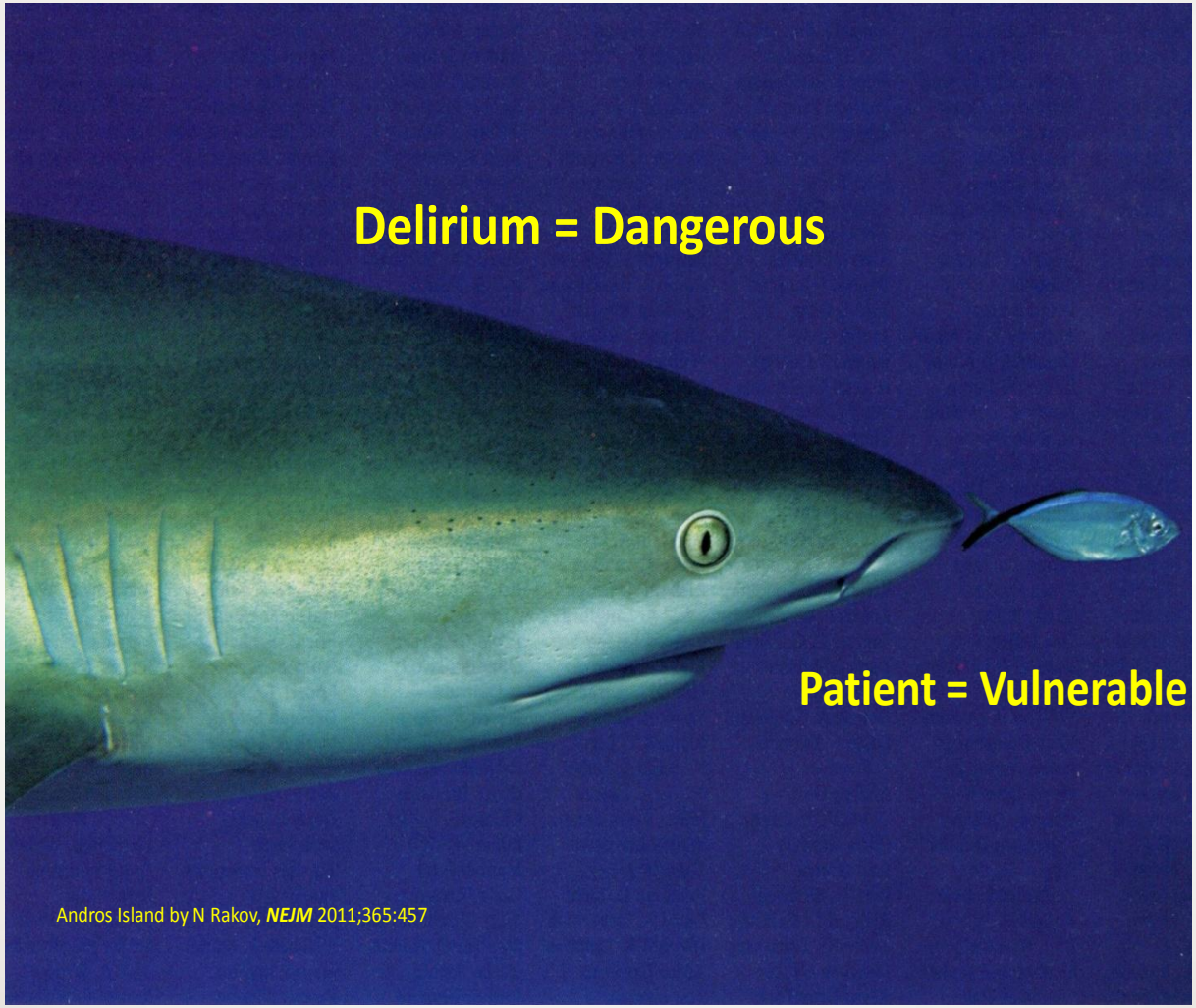

## ABCDEs *of* Prevention and Safety

ABCDE is a standard bundle of ICU measures that includes spontaneous **A**wakening and **B**reathing coordination, attention to the **C**hoice of sedation, **D**elirium monitoring, and **E**arly mobility and exercise. All individual components of this bundle are evidence based and can help standardize communication, improve interdisciplinary patient care, reduce mortality, and improve long-term cognitive and functional outcomes.

## *what is* Delirium?

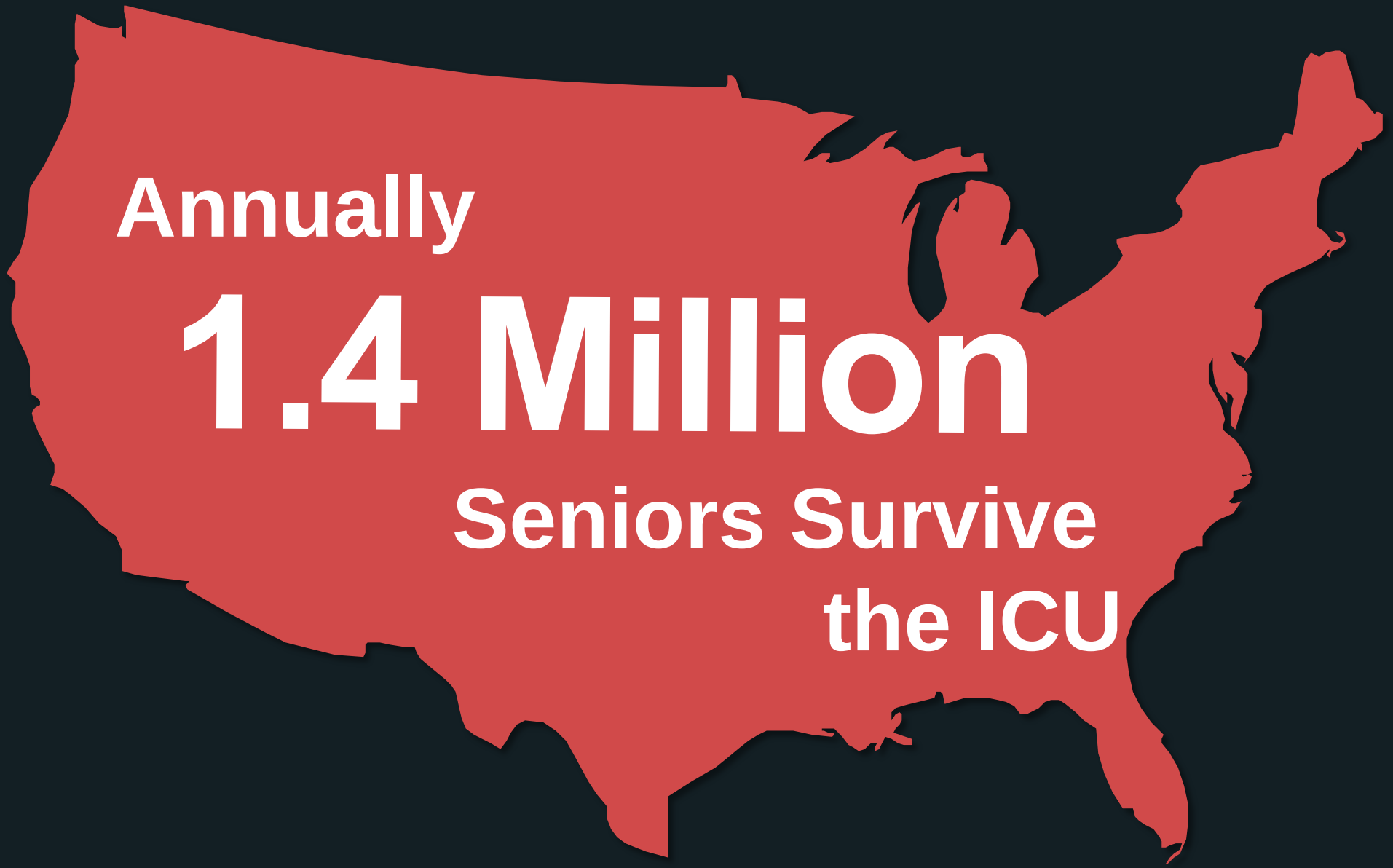
Delirium is basically inattention and confusion that represents the brain temporarily failing. A person who is delirious is unable to think clearly and can't make sense of what is going on around him

# Take Home Message



# 6 out of 10 ICU patients are ≥ 65

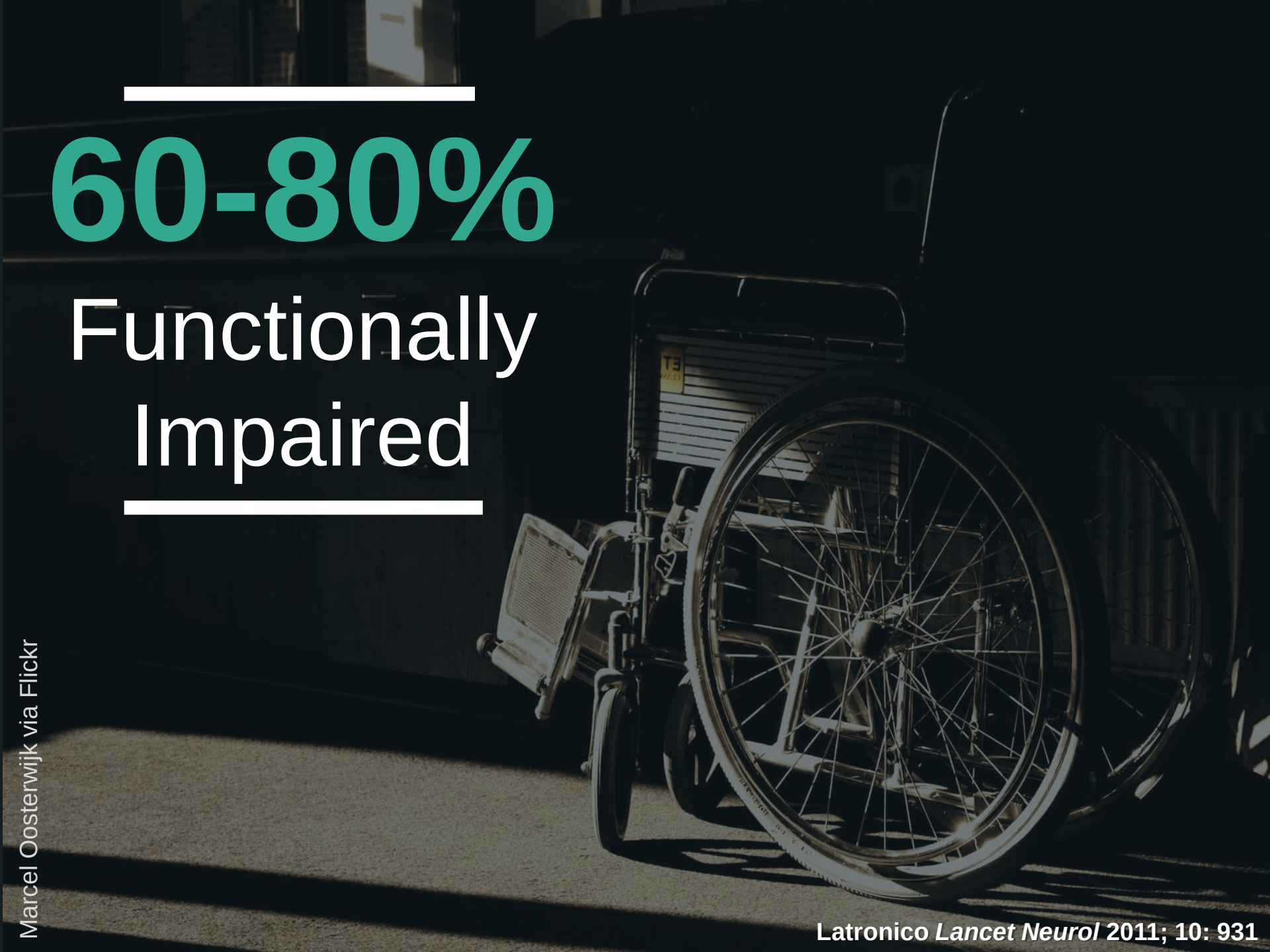
Angus *Crit Care Med* 2006; 34: 1016-1024
Angus *JAMA* 2000; 284: 2762-2770
Society of Critical Care Medicine, Critical Care Statistics in the United States, 2012



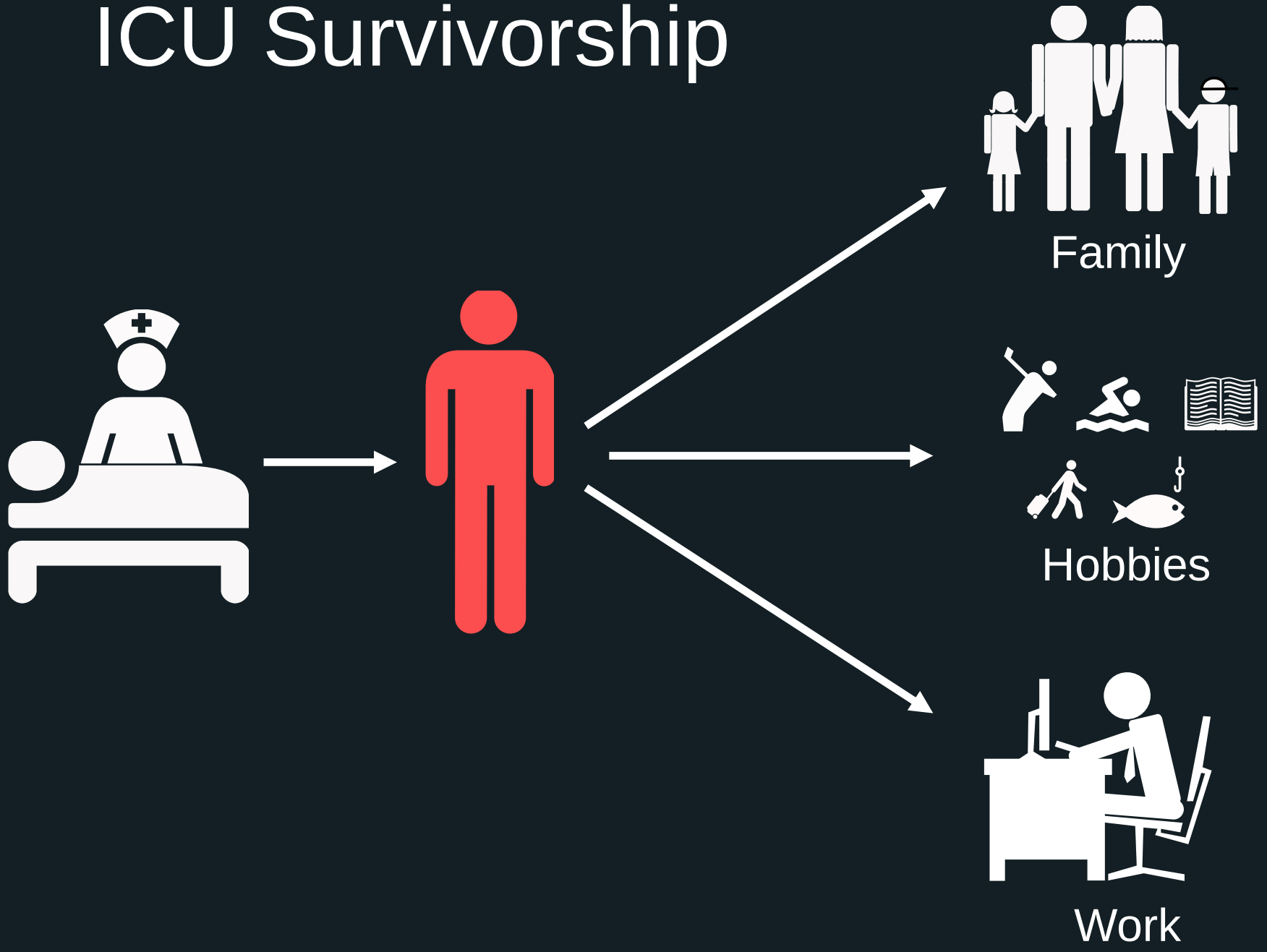

Wunsch *JAMA* 2010; 303: 849-856
Society of Critical Care Medicine, Critical Care Statistics in the United States, 2012



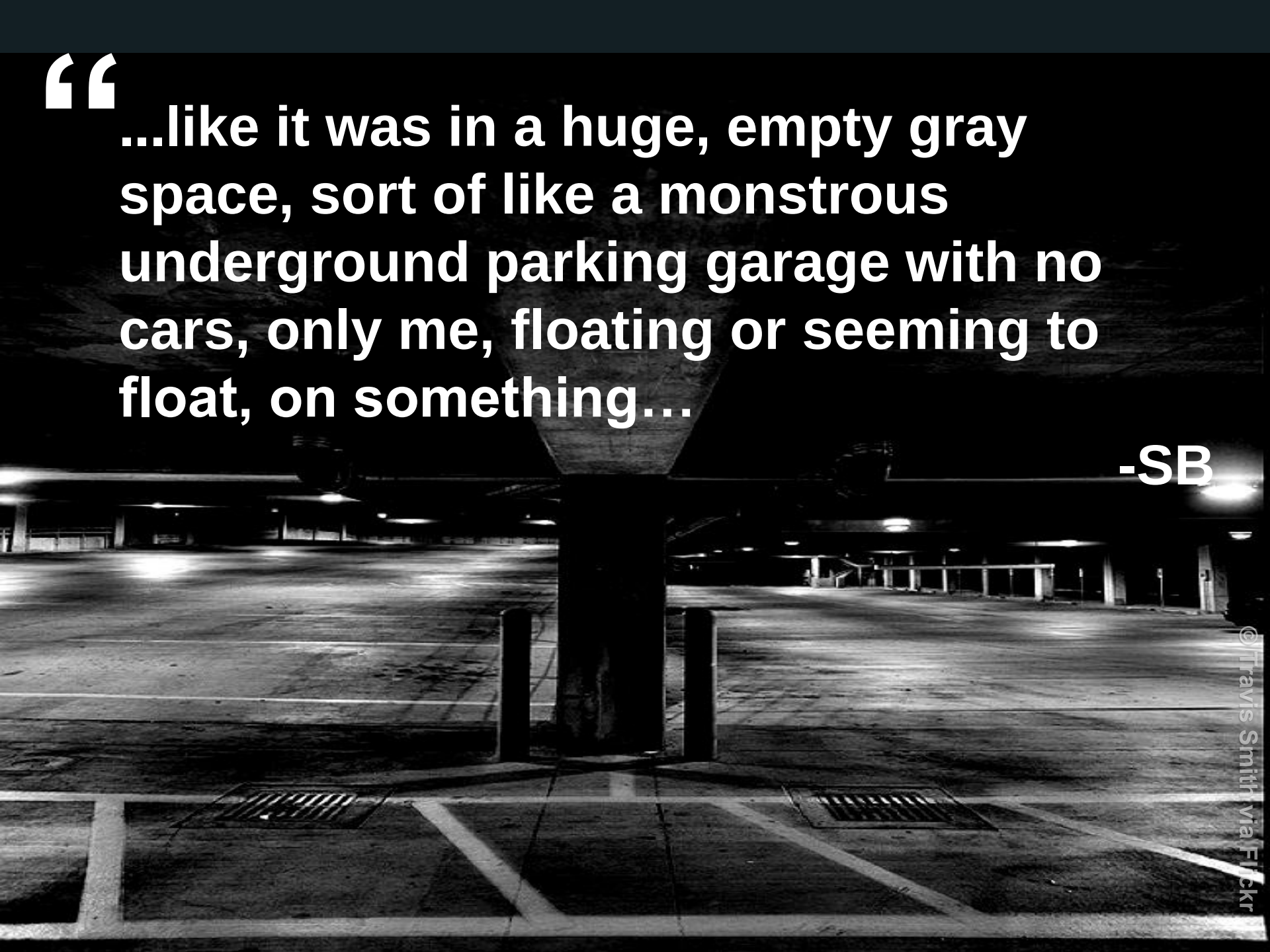

Wolters *Intensive Care Med* 2013; 39: 376
Jackson *AJRCCM* 2010; 182: 183
Girard *Crit Care Med* 2010; 38: 1513


60-80%
Functionally Impaired
Marcel Oosterwijk via Flickr
Latronico *Lancet Neurol* 2011; 10: 931

# ICU Survivorship




Iwashyna *Annals of Int Med* 2010; 153:204-5


“...like it was in a huge, empty gray space, sort of like a monstrous underground parking garage with no cars, only me, floating or seeming to float, on something…
-SB
©Travis Smith via Flickr

JAM

The Journal of the Americ

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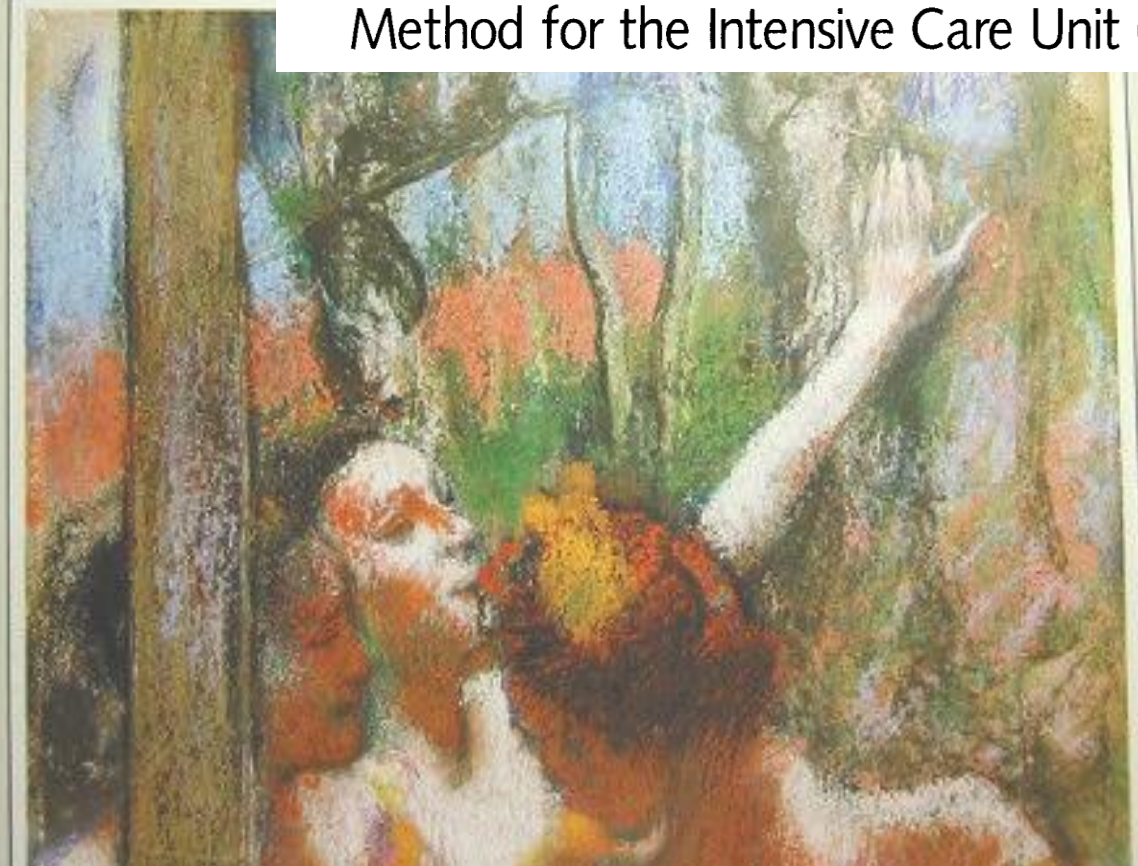
CRITICALLY ILL PATIENT

**Ely EW, JAMA 2001;286:2703-10**

# Delirium in Mechanically Ventilated Patients

## Validity and Reliability of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)



JAMA®
The Journal of the American Medical Association

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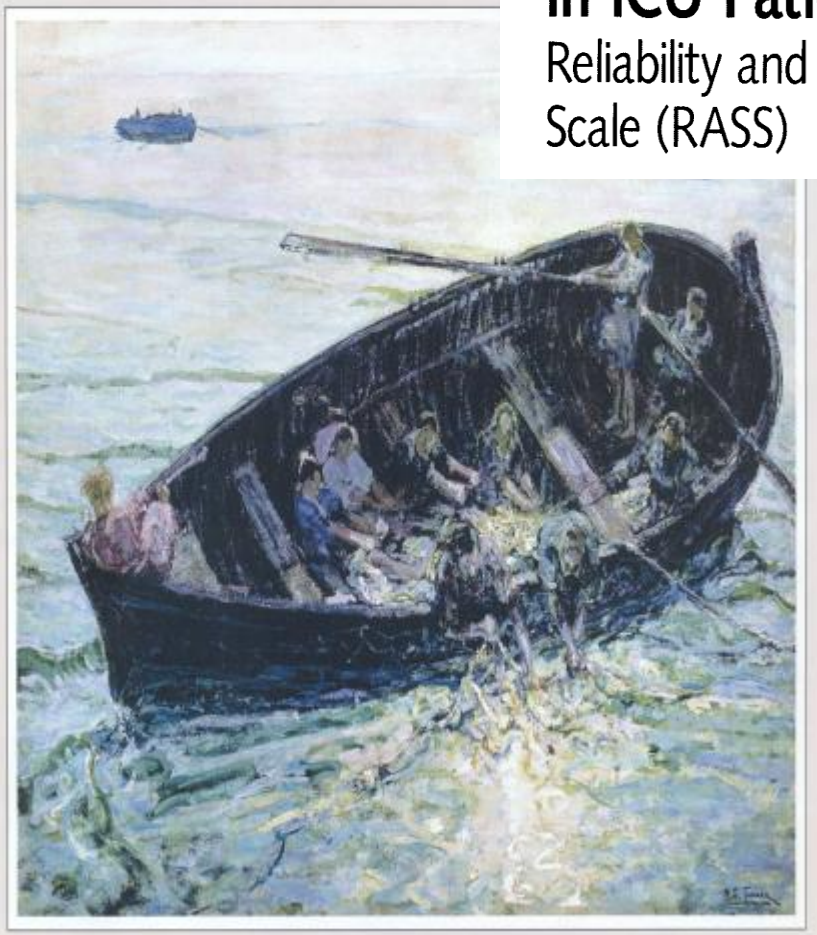
**Ely EW, JAMA 2003;289:2983-91**

# Monitoring Sedation Status Over Time in ICU Patients

## Reliability and Validity of the Richmond Agitation-Sedation Scale (RASS)



JAMA®
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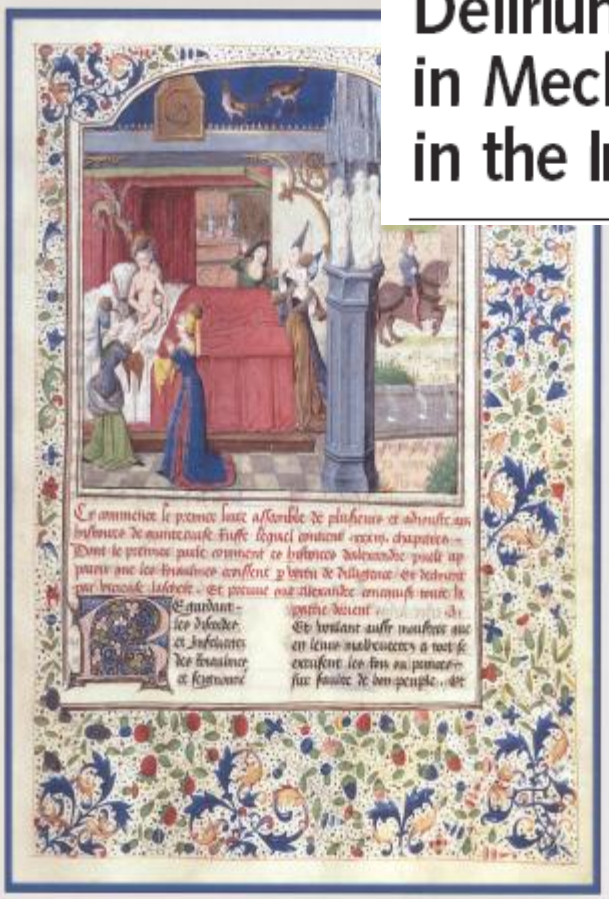
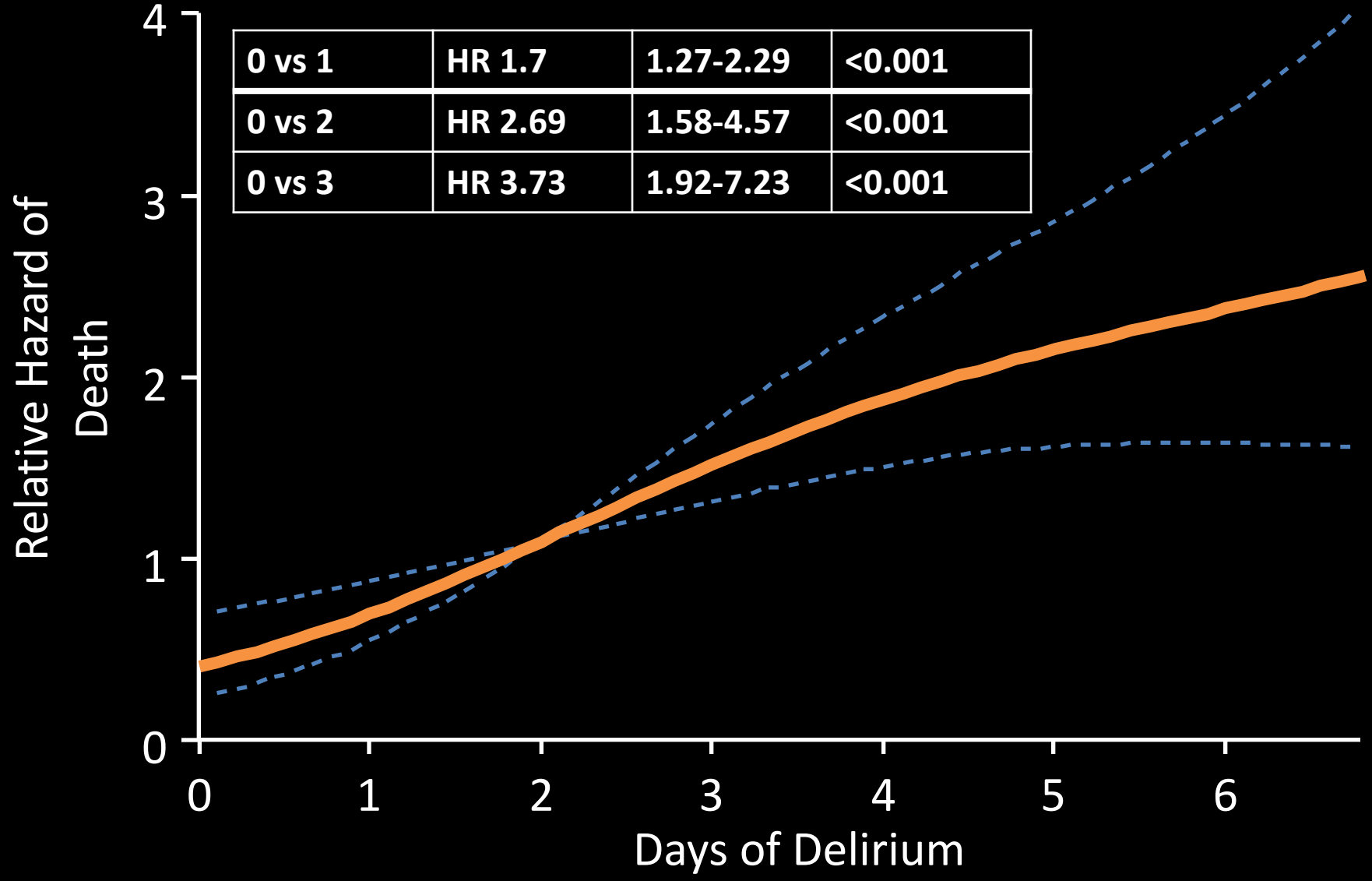


CARING FOR THE
CRITICALLY ILL PATIENT

Ely EW, JAMA 2004;291:1753-62

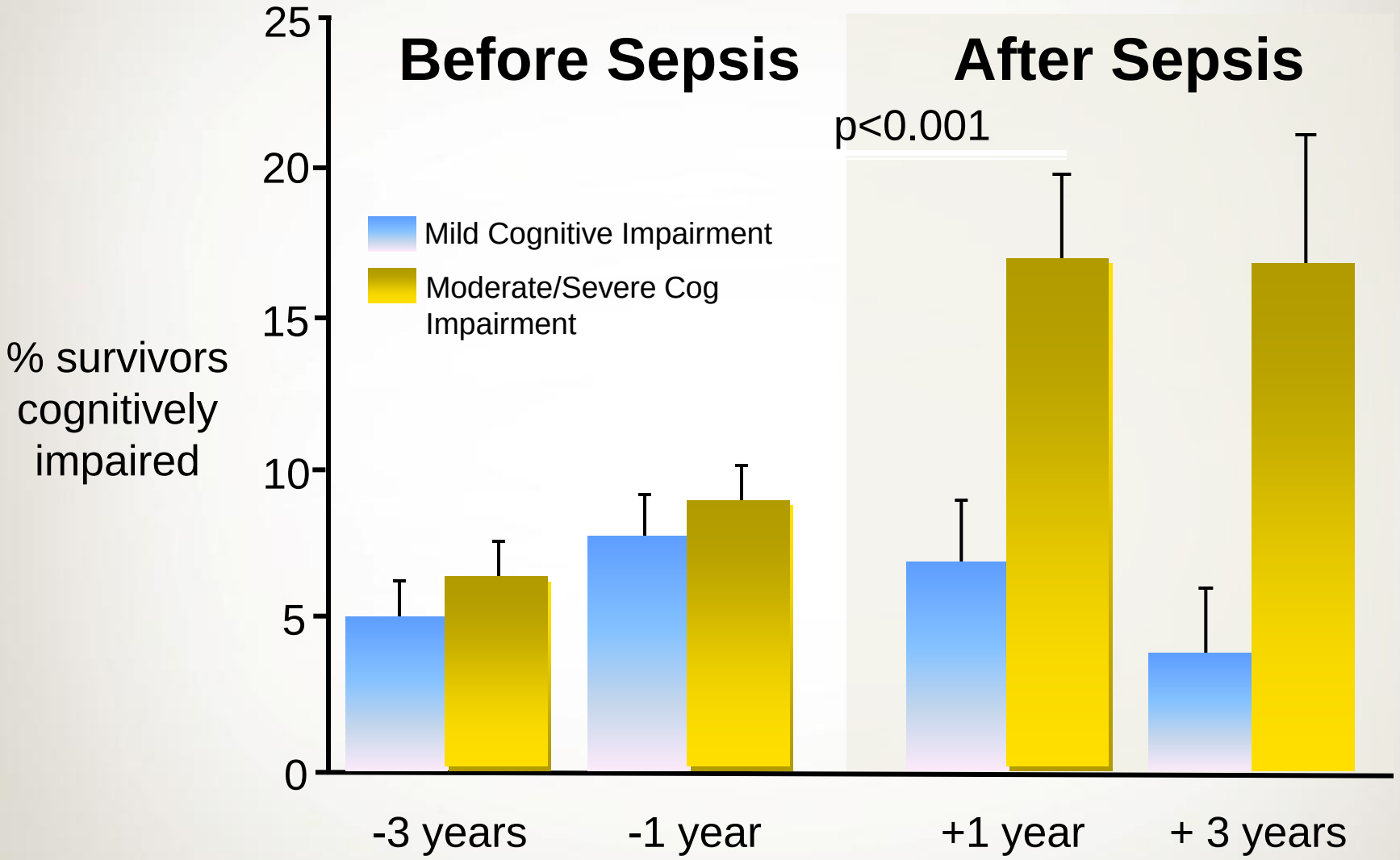
# Delirium as a Predictor of Mortality in Mechanically Ventilated Patients in the Intensive Care Unit

# Delirium Duration & Mortality




Shehabi Y, et al. CCM 2010; 38:2311–2318

# Cognitive Impairment: Sepsis

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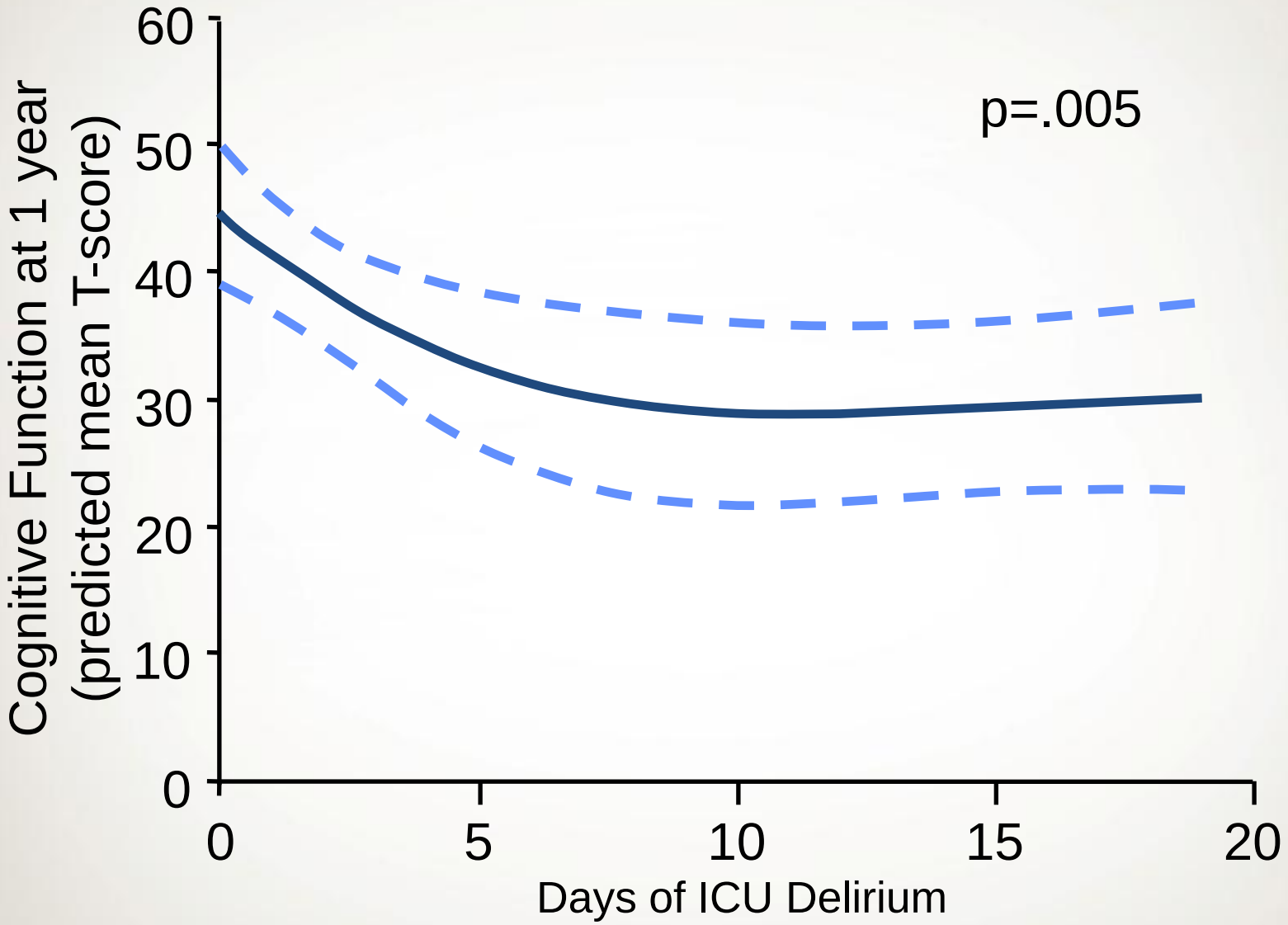
Iwashyna T, JAMA 2010;304:1787-1794

# Delirium and Long-Term Cognitive Outcomes

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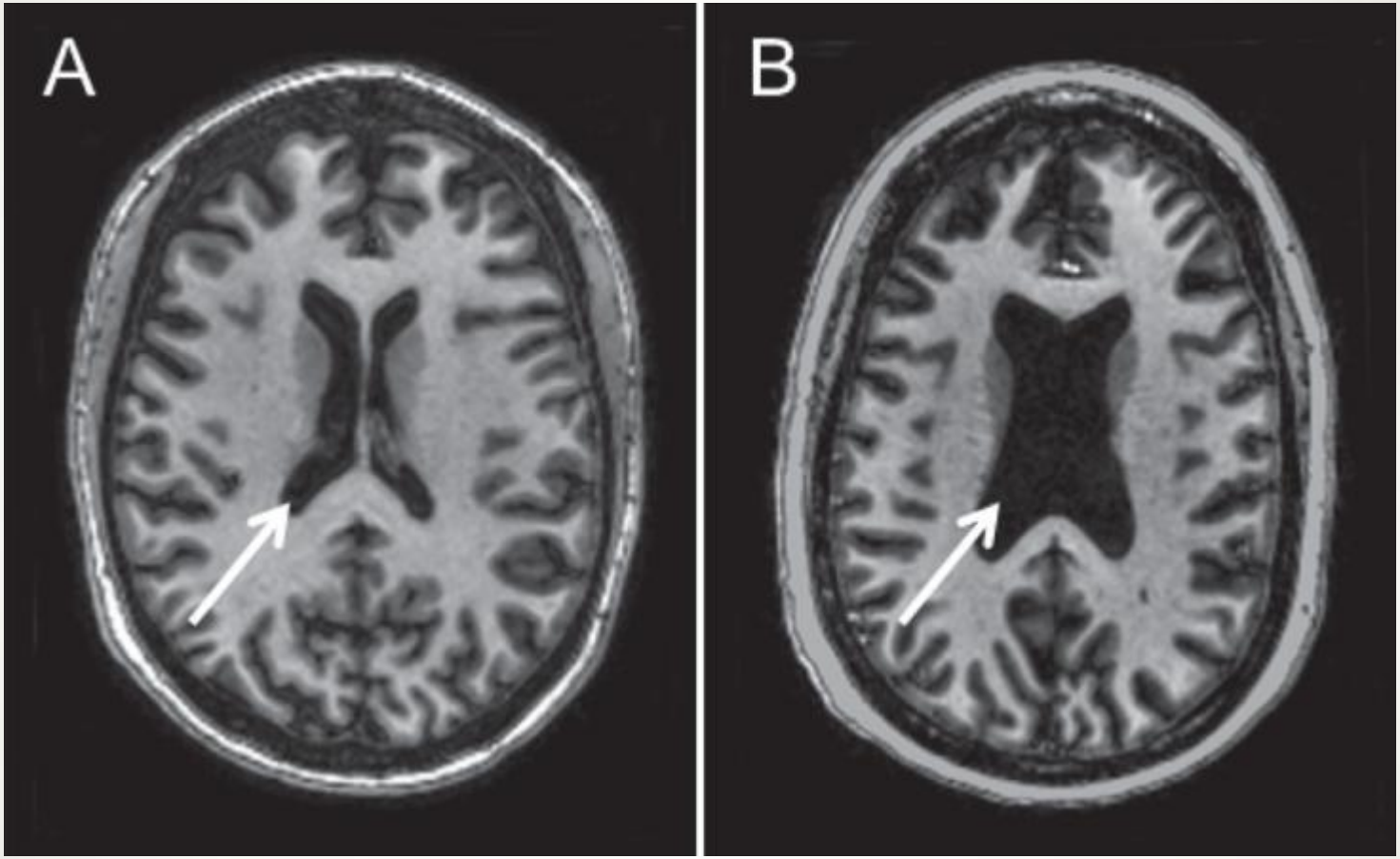
Girard T et al CCM 2010; 38:1513–1520

# Delirium and Brain Atrophy




(A) 46 year old, no delirium

(B) 42 year old, 12 days of delirium

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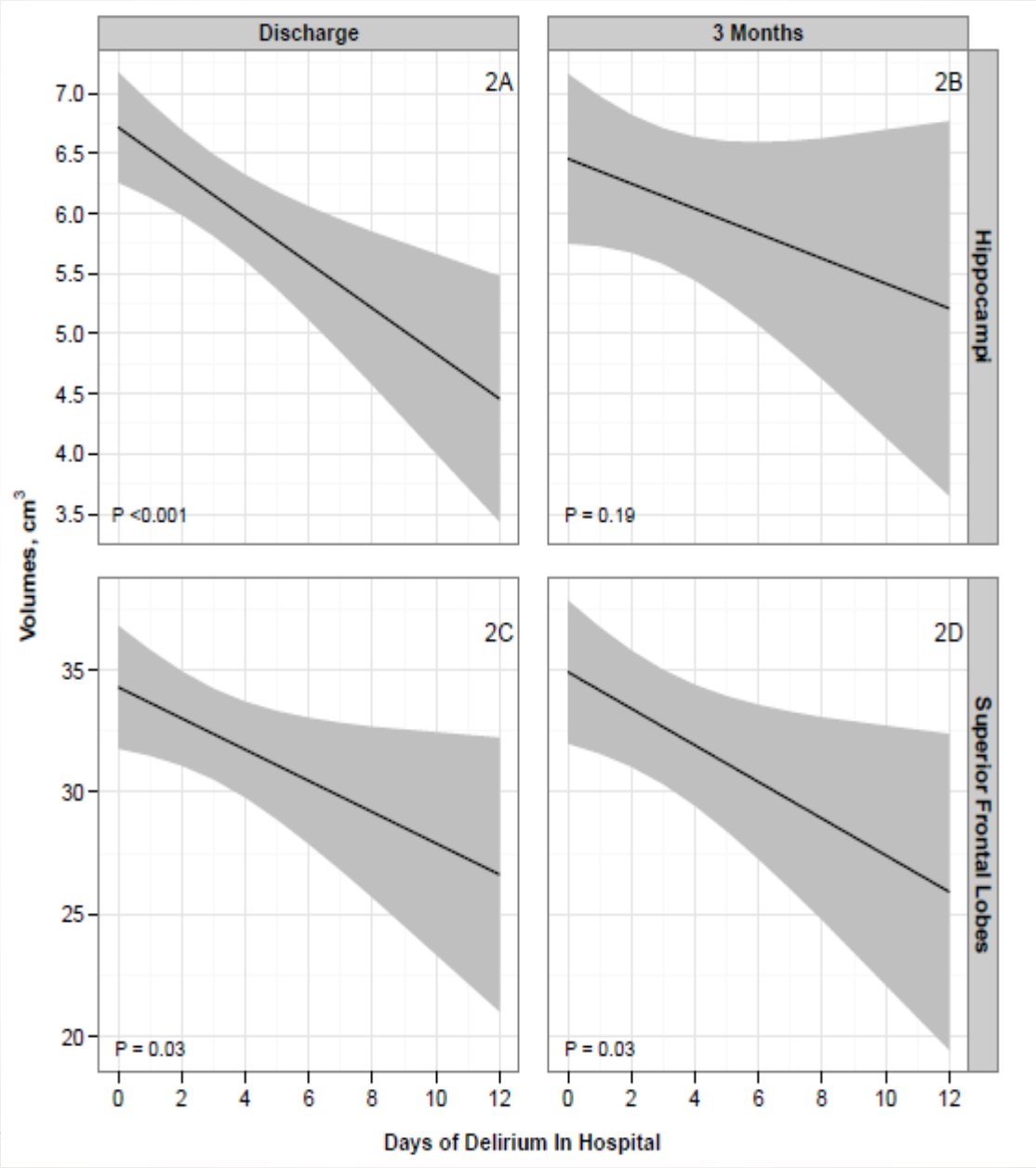
Gunther M et al. CCM 2012;40:2022-32

# The VISIONS MRI Studies




Gunther M et al. CCM 2012;40:2022-32

RESEARCH PAPER

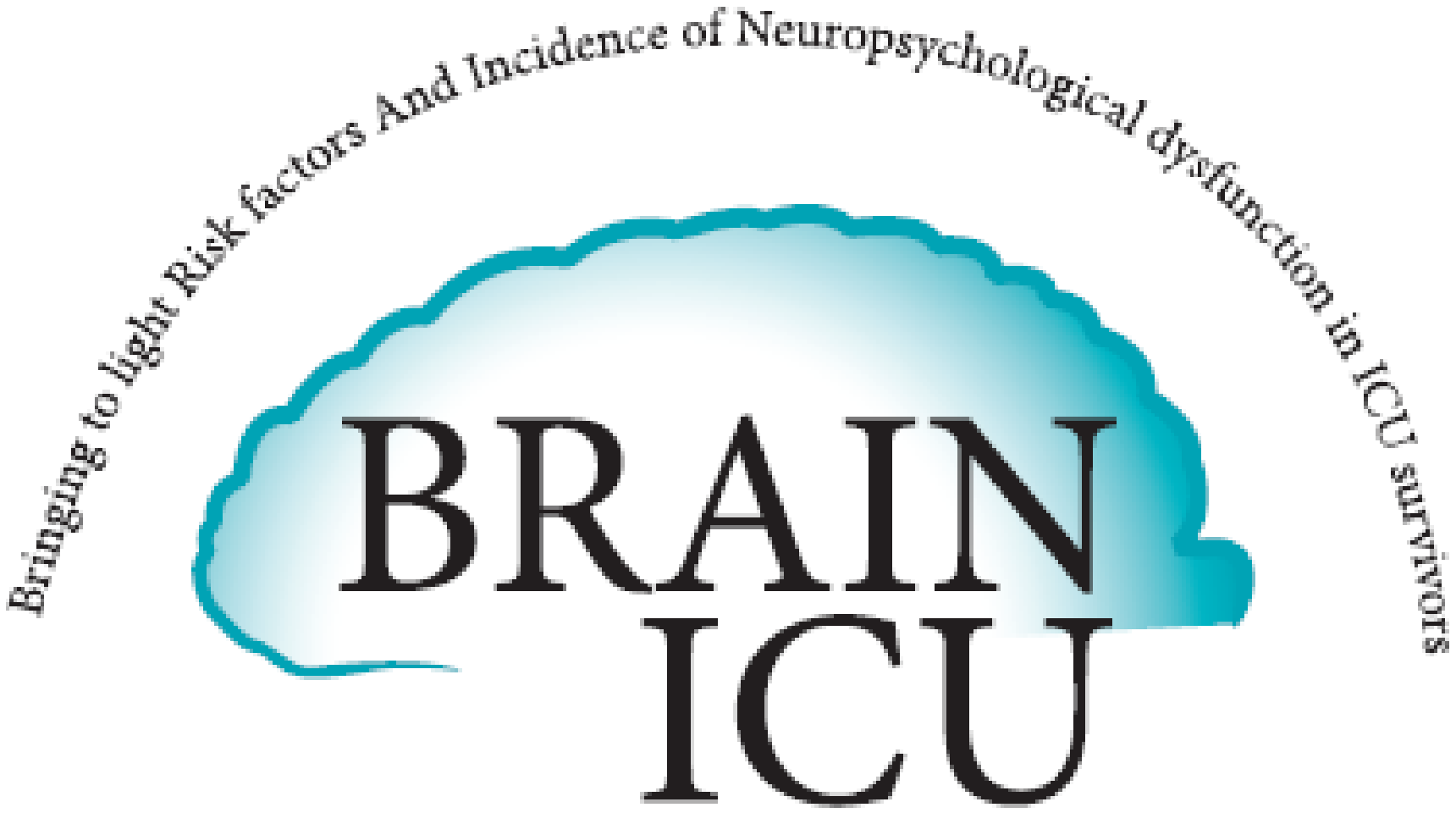
# Persistent cognitive impairment, hippocampal atrophy and EEG changes in sepsis survivors

Alexander Semmler,[1,6] Catherine Nichols Widmann,[1] Thorsten Okulla,[1] Horst Urbach,[2] Markus Kaiser,[3,7] Guido Widman,[4] Florian Mormann,[4,8] Julia Weide,[1] Klaus Fliessbach,[4] Andreas Hoeft,[3] Frank Jessen,[5] Christian Putensen,[3] Michael T Heneka[1]

- Bonn Germany, 2 center 6-24 month follow-up of 25 septic and 19 non-septic ICU survivors
- Sepsis survivors showed cognitive deficits in verbal learning and memory
- Significant reductions of hippocampal volume vs. controls
- More low frequency EEG activity indicating brain dysfunction



Semmler A, J Neurol Neurosurg Psych 2013;84:62-70

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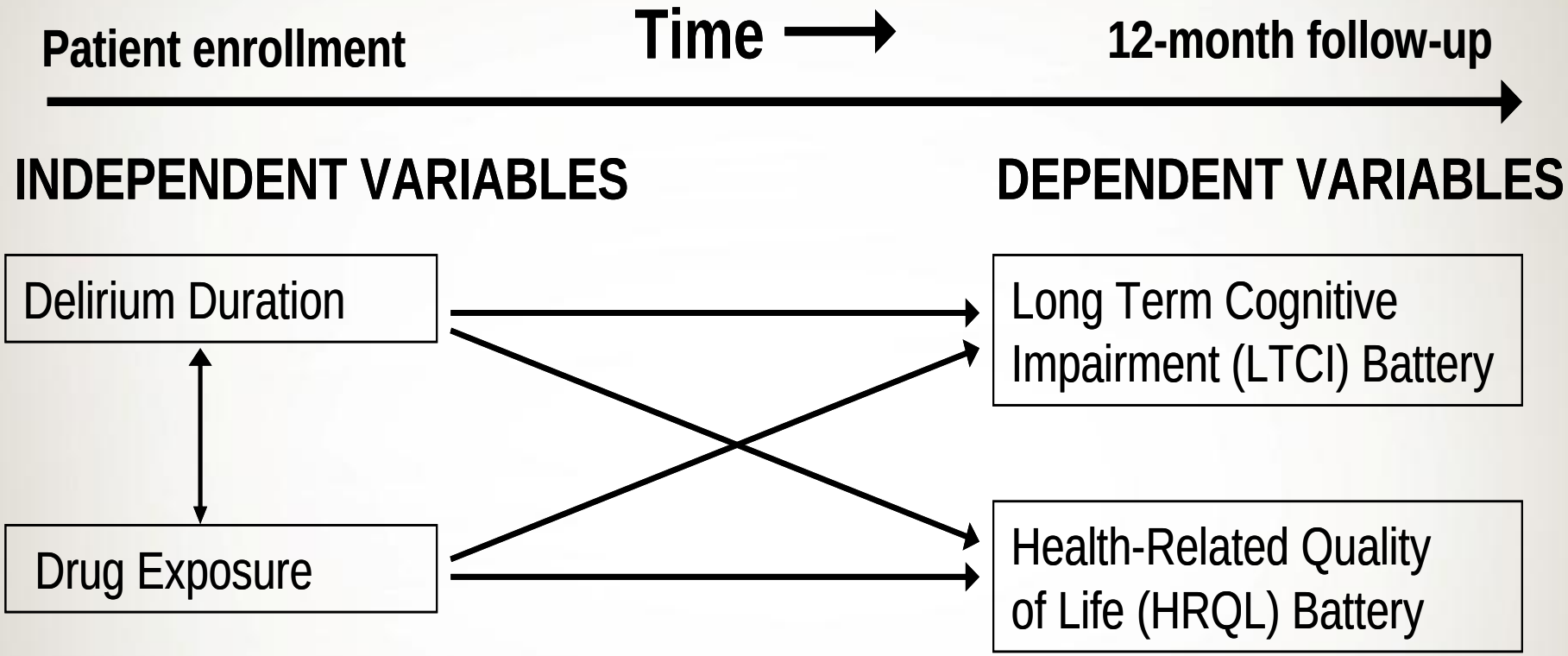

Patient enrollment
Time
12-month follow-up
INDEPENDENT VARIABLES
DEPENDENT VARIABLES
Delirium Duration
Drug Exposure
Long Term Cognitive Impairment (LTCI) Battery
Health-Related Quality of Life (HRQL) Battery

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

# Long-Term Cognitive Impairment after Critical Illness

P.P. Pandharipande, T.D. Girard, J.C. Jackson, A. Morandi, J.L. Thompson, B.T. Pun, N.E. Brummel, C.G. Hughes, E.E. Vasilevskis, A.K. Shintani, K.G. Moons, S.K. Geevarghese, A. Canonico, R.O. Hopkins, G.R. Bernard, R.S. Dittus, and E.W. Ely, for the BRAIN-ICU Study Investigators*

## ABSTRACT

**BACKGROUND**

Survivors of critical illness often have a prolonged and disabling form of cognitive impairment that remains inadequately characterized.



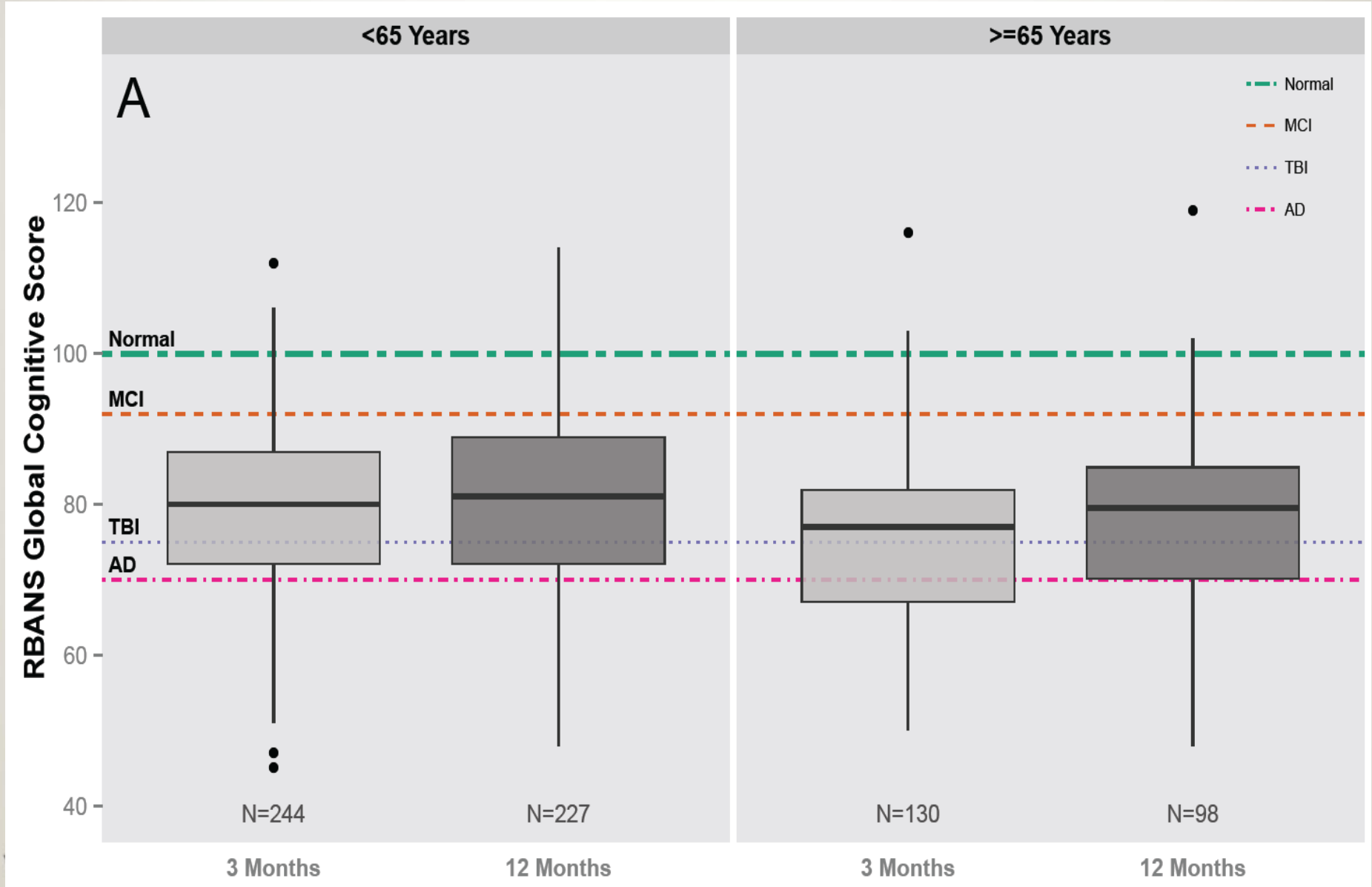
**NEJM 2013;369:1306-16**
**Editorial by M. Herridge**

# Global Cognitive Scores

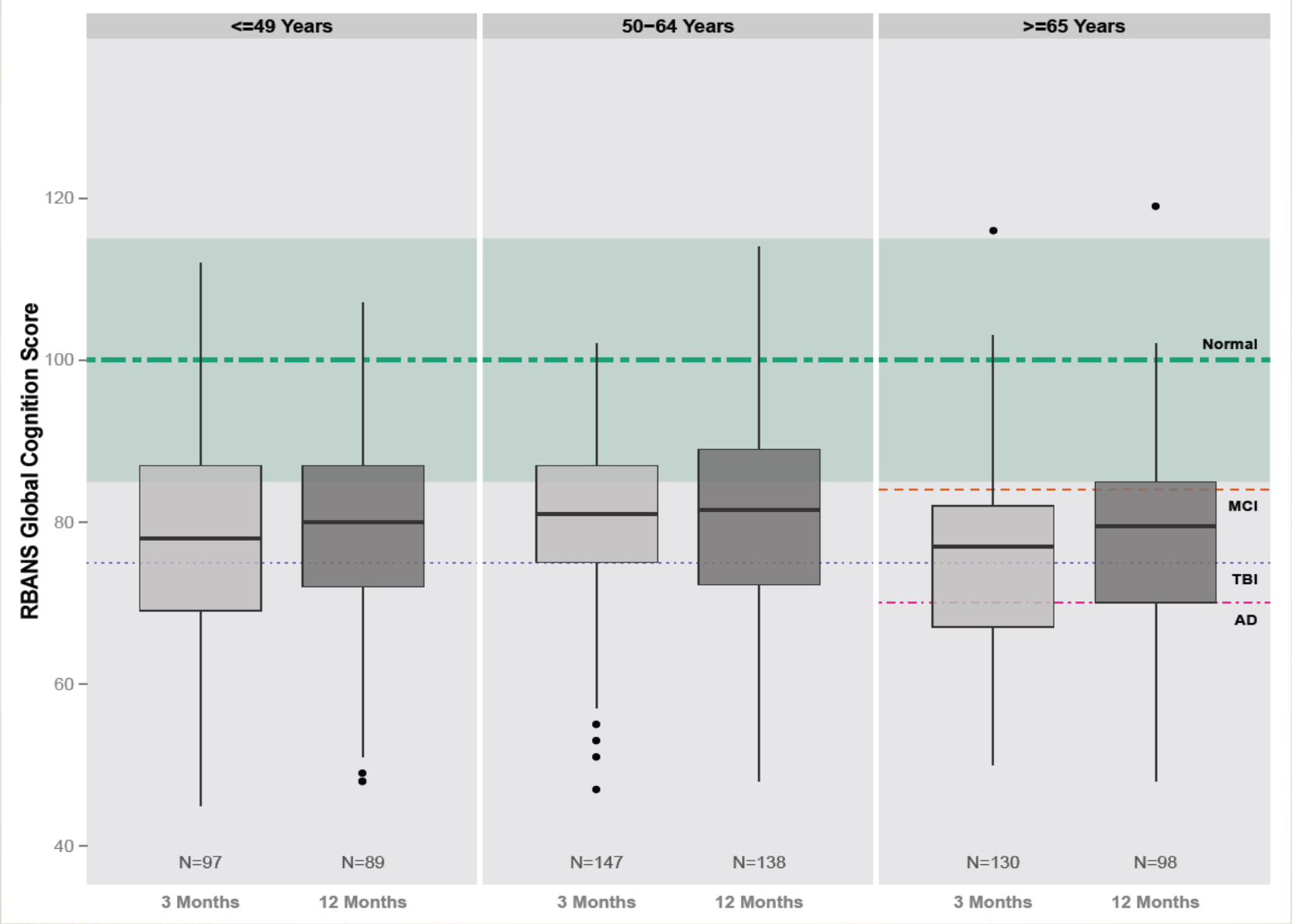
| RBANS SCORES | 3 months N (%) | 12 months N (%) |
|---|---|---|
| **Extremely low (≤ 69)** | **90 (24%)** | **68 (21%)** |
| **Borderline (70-79)** | **106 (28%)** | **85 (26%)** |
| **Low average (80-89)** | **105 (28%)** | **103 (32%)** |
| Average (90-109) | 70 (19%) | 67 (21%) |
| High Average (110-119) | 2 (1%) | 2 (1%) |
| Superior (120-129) | 0 (0%) | 0 (0%) |
| Very superior (≥130) | 0 (0%) | 0 (0%) |

Scores of <70 seen in patients with Alzheimer's disease; mild MCI have scores around 84. Dementias in 80s

# The Picture of Dementia Following ICU Care



# Global Cognitive Scores by Age

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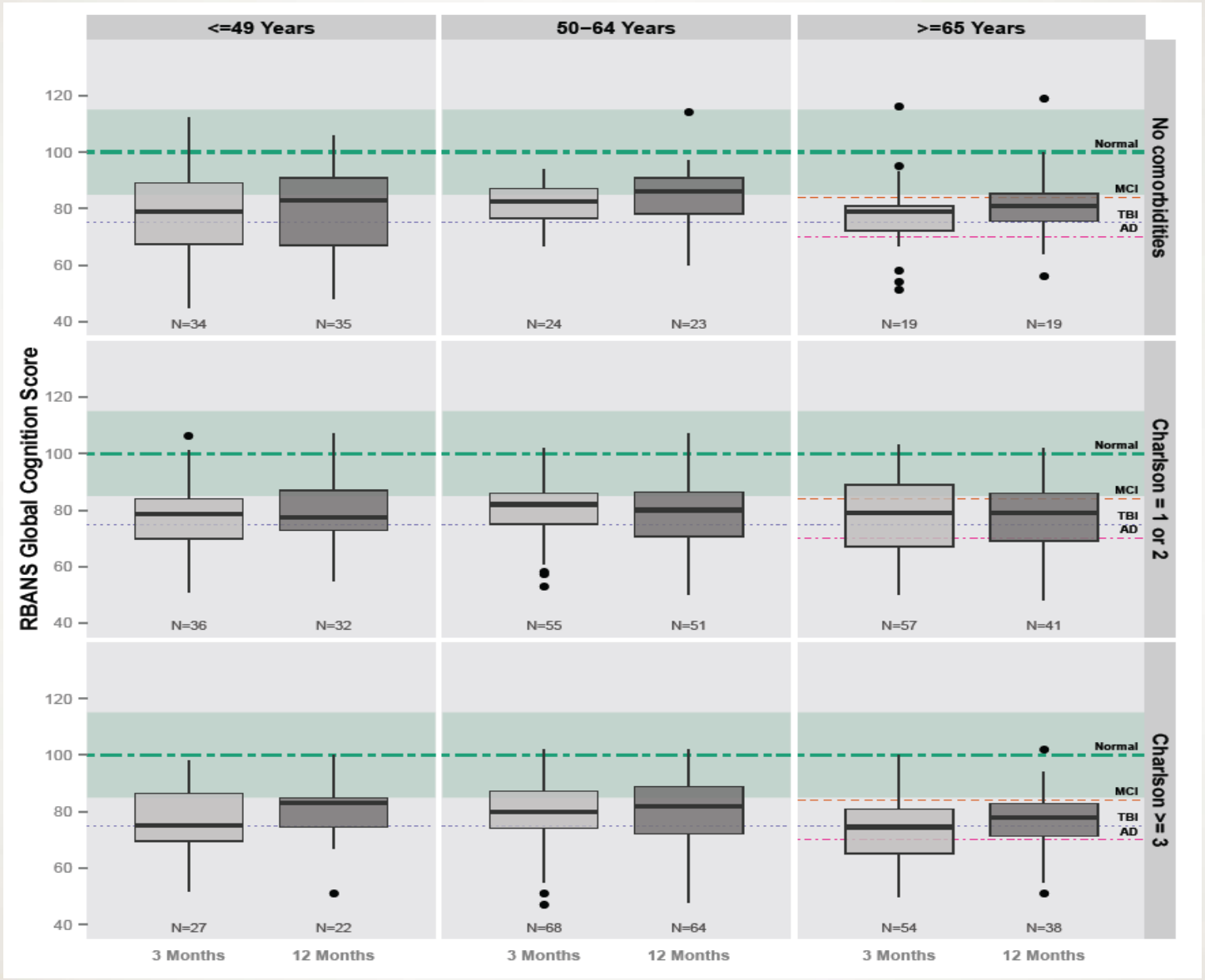
# Global Cognitive Scores by Age and Comorbidity

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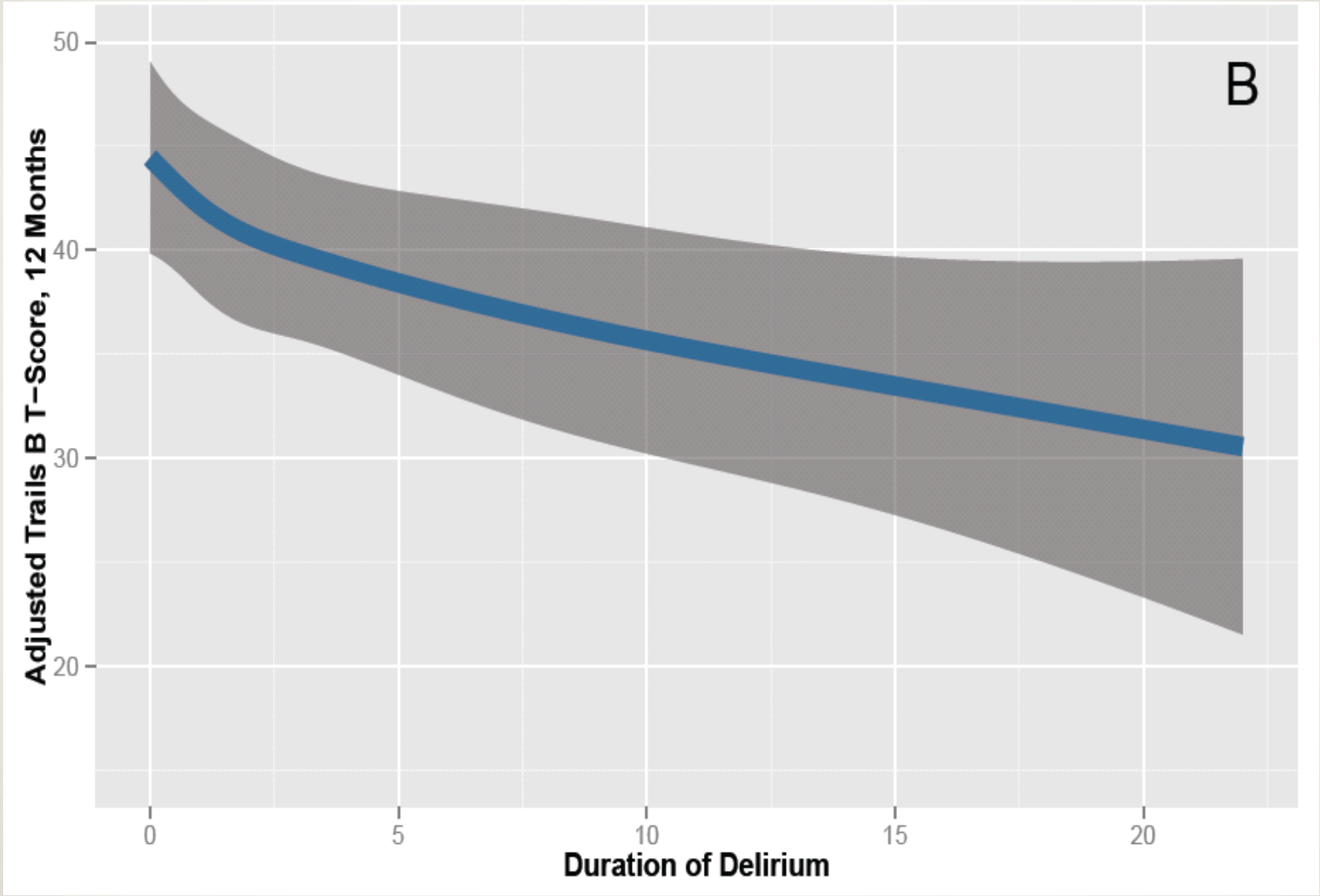
**supplement - NEJM 2013;369:1306-16**

# Delirium and Executive Function

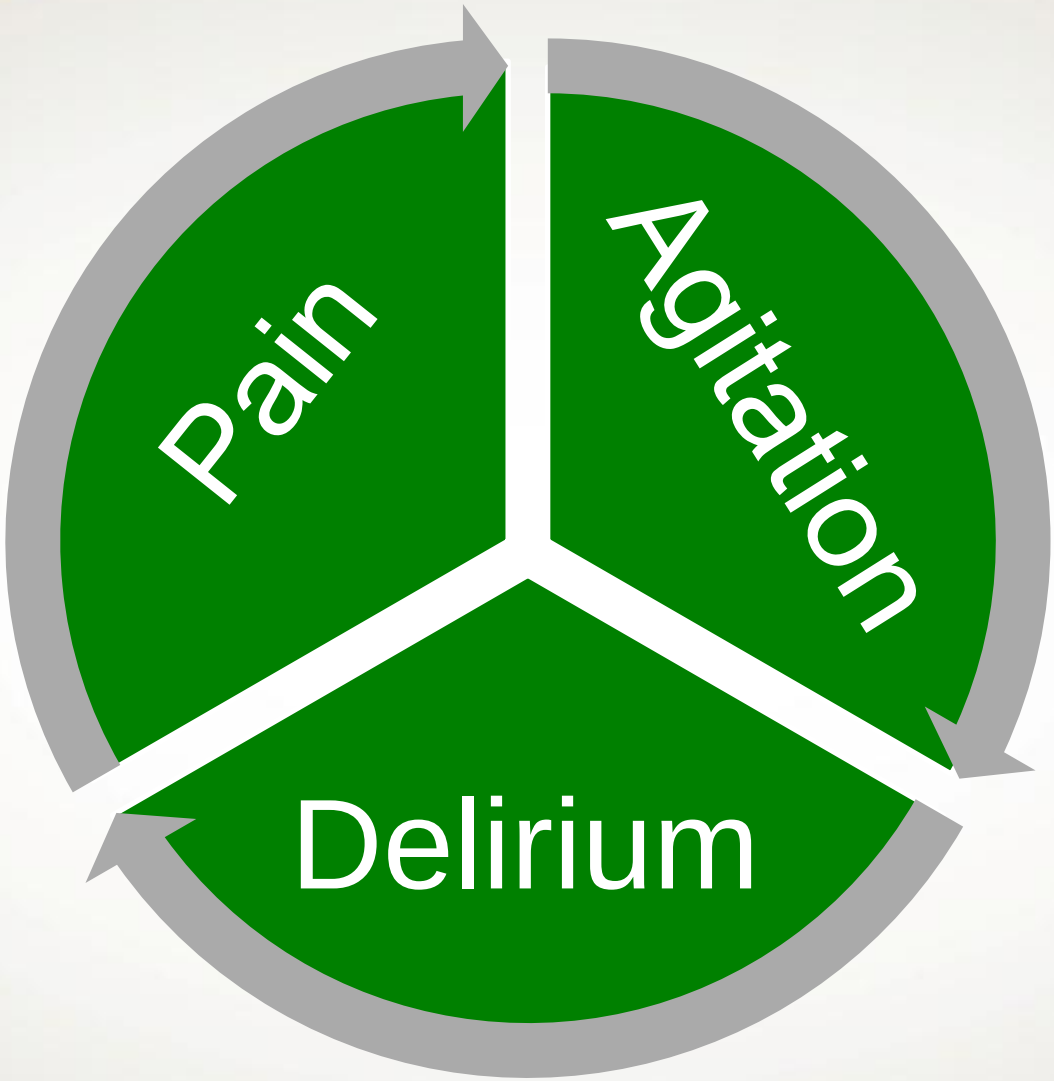


# THE LANCET

Volume 372 · Number 9634 · Pages 177–262 · July 19–25, 2008 www.thelancet.com


"Dementia is perhaps the cruellest manifestation of ageing, inexorably melting away all that which makes us individual and human."

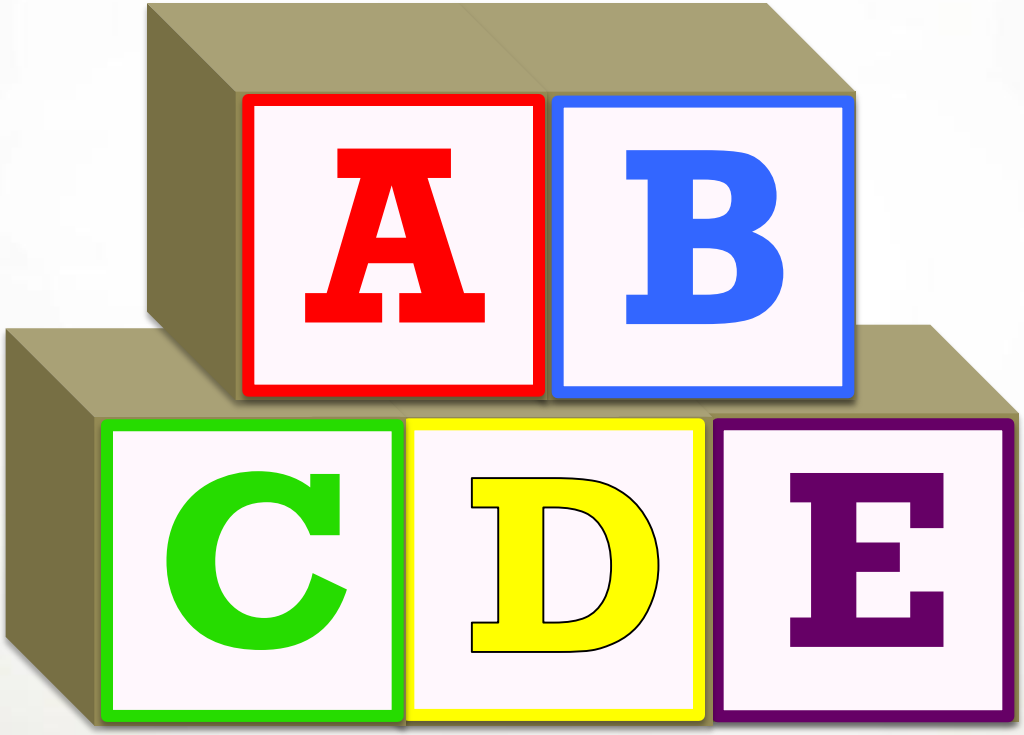
See **Editorial** page 177




Barr J, et al. *Crit Care Med.* 2013;41:263-306.

# ABCDEs:

## *Building blocks of managing Pain, Agitation & Delirium*



# Birth of the ABCDEs

| | |
|---|---|
| Ely EW, et al. N Engl J Med 1996;335:1864-9 | SBT |
| Kress JP, et al. N Engl J Med 2000;342:1471-7 | SAT |
| Girard TD, et al. Lancet 2008;371:126-34 | Remove (A+B) |
| Strom T, et al. Lancet 2010;375:475-480 | Remove Sedation |
| Pandharipande PP, et al. JAMA 2007;298:2644-53 | Sedation choice |
| Riker R. et al, JAMA. 2009;301:489-499 | Sedation choice |
| Schweickert et al, Lancet 2009;373:1874-82 | Early Mobility |

…quick tour of the RCT literature…




## *for* Medical Professionals

ABCDE's of Prevention and Safety

- AWAKENING AND BREATHING COORDINATION
- CHOICE OF SEDATION
- DELIRIUM MONITORING
- EARLY MOBILITY AND EXERCISE

Additional Resources

- LONG-TERM OUTCOMES
- PEDIATRIC CARE
- TERMINOLOGY AND MNEMONICS
- HISTORICAL REFERENCES
- LINKS AND TIMELINE

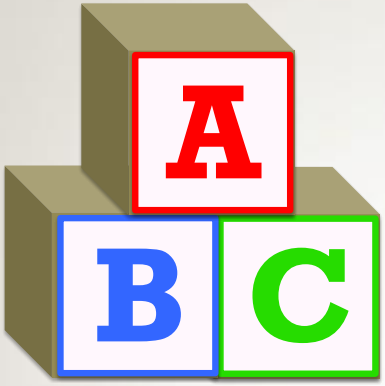
### Delirium Prevention and Safety: Starting with the ABCDE's

It is essential to consider delirium management in the broader picture of ICU patient care as a major piece of the current guidelines for Pain, Agitation, and Delirium (PAD) of the Society of Critical Care Medicine (SCCM). Advancements in research and technology are resulting in higher acuity and increased complexity of care, which is resulting in drastic increases in workload and demands on staff. More than ever, there is a great need to develop simpler ways of implementing safer and better care into practice for our sickest patients.

The ABCDE bundle is one way to align and coordinate care, which includes specific focus on delirium as a component of the overall care patients receive including sedation and pain medications, breathing machines, and mobilization. This bundle has multiple, evidenced based components, interdependent, and designed to:

- Improve collaboration and coordination among clinical team members
- Standardize care processes
- Decrease delirium
- Break the cycle of oversedation and prolonged ventilation

### What are the components of the ABCDE bundle?




## Awake and Breathing Coordination

- ↓ Duration of mechanical ventilation
- ↓ Duration of coma
- ↓ Mortality


## Choose light sedation & avoid benzos

- ↓ Duration of mechanical ventilation
- ↓ Mortality
- ↓ Delirium


## Delirium monitoring & management

- ↑ Delirium detection
- ↑ Delirium predictor of mortality and morbidity


## Early Mobility & Environment

- ↓ Duration of delirium
- ↓ Disability
- ↓ ICU Length of Stay
- ↓ Rehospitalization/Mortality

Morandi et al Curr Opin Crit Care 2011;17:43-9
Vasilevskis et al Crit Care Med 2010;38:S683-91
Vasilevskis et al Chest 2010;138:1224-1233
Zaal et al, ICM 2013;39:481-88
Colombo et al, Minerva Anest 1012;78:1026-33

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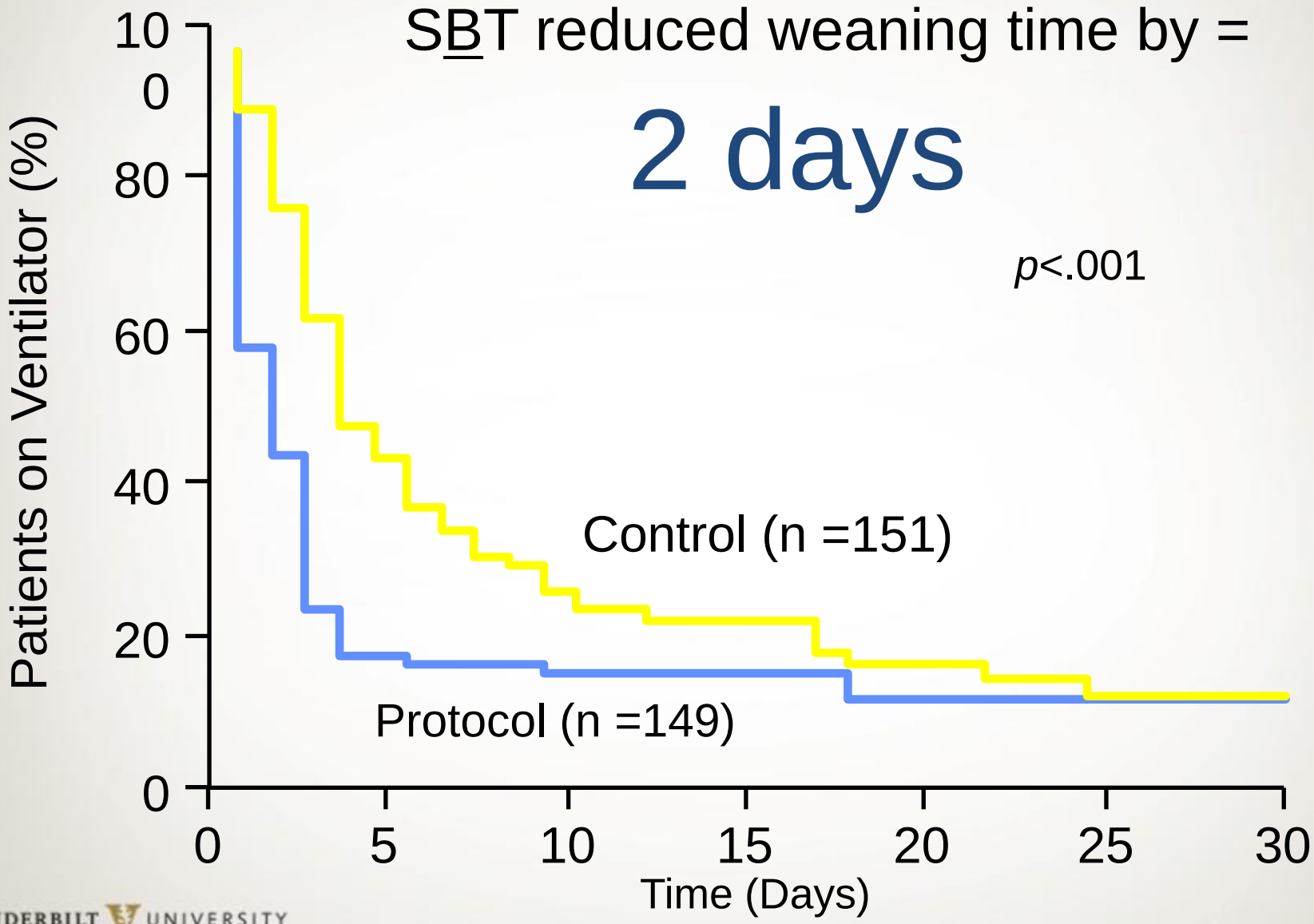
# Liberating from Ventilator

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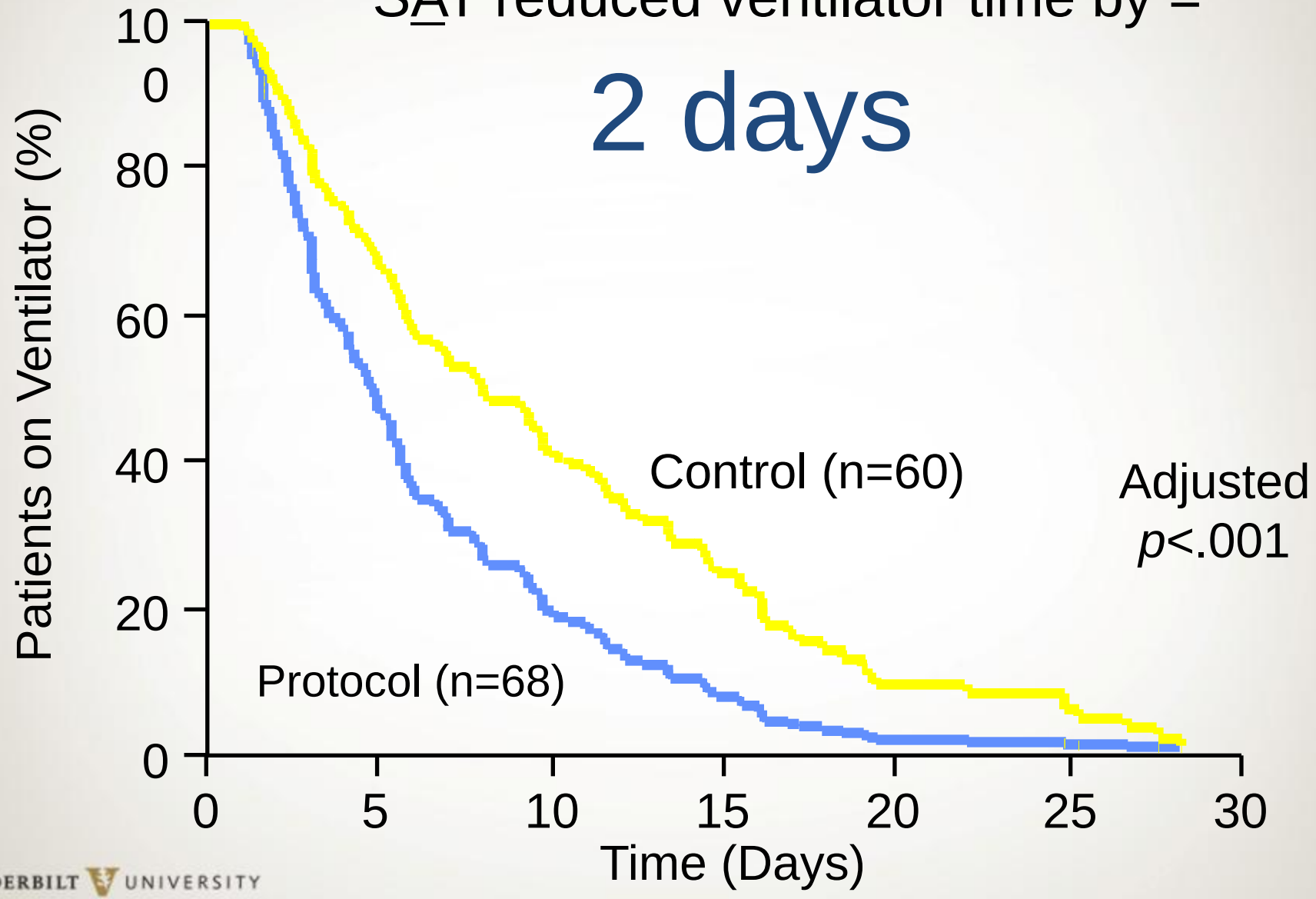
Ely EW, et al. N Engl J Med 1996;335:1864-9

# Liberating from Sedation

SAT reduced ventilator time by =

## 2 days

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Kress JP, et al. N Engl J Med 2000;342:1471-7

# SATs (Daily Interruption) Used in Minority Around World

- Canada – 40% get SATs (273 physicians in 2005)
- U.S. – 40% get SATs (2004-05)
- France – 10% get SATs (44 ICUs in 2005)
- Germany – 34% get SATs (214 ICUs in 2006)
- Brazil – 32% get SATs (1,015 MDs in 2008)
- UK – 28% get SATs, 82% use midazolam (2009)
- Belgium – 18% get SATs (587 nurses / 99 hospitals in 2012)


Mehta S, CCM 2006;34:374-80.
Tanios M, Proc Am Thorac Soc 2:A793, 2005
Devlin J, CCM 2006;34:556-57.
Payen JF, Anesthes 2007;106:687-95

Martin J and Spies C, Crit Care 2007;11:R124
Ramaswamy S, Intens Care Med (ESICM 2009)
Salluh J, Brazil, J Crit Care 2009
Sneyers B, Brussels, Abst #324 2012

THE LANCET

Volume 371 · Number 9607 · Pages 89-176 · January 12-18, 2008 www.thelancet.com

Articles

SAT + SBT = 4 day shorter ICU/hosp LOS

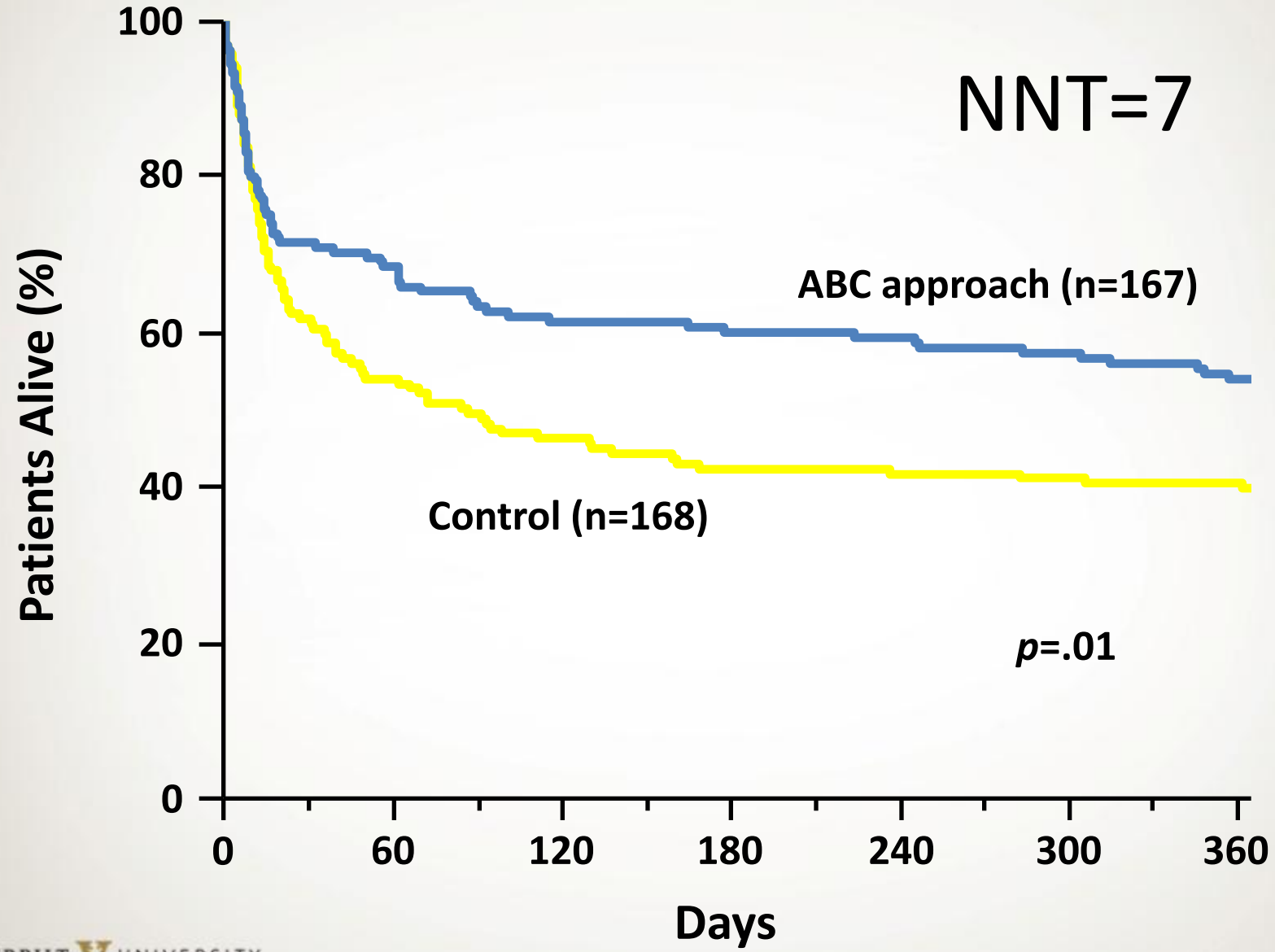
# Efficacy and safety of a paired sedation and ventilator weaning protocol for mechanically ventilated patients in intensive care (Awakening and Breathing Controlled trial): a randomised controlled trial

*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*

Lancet 2008; 371: 126–34

See Comment page 95

# ABC Trial: One-Year Survival

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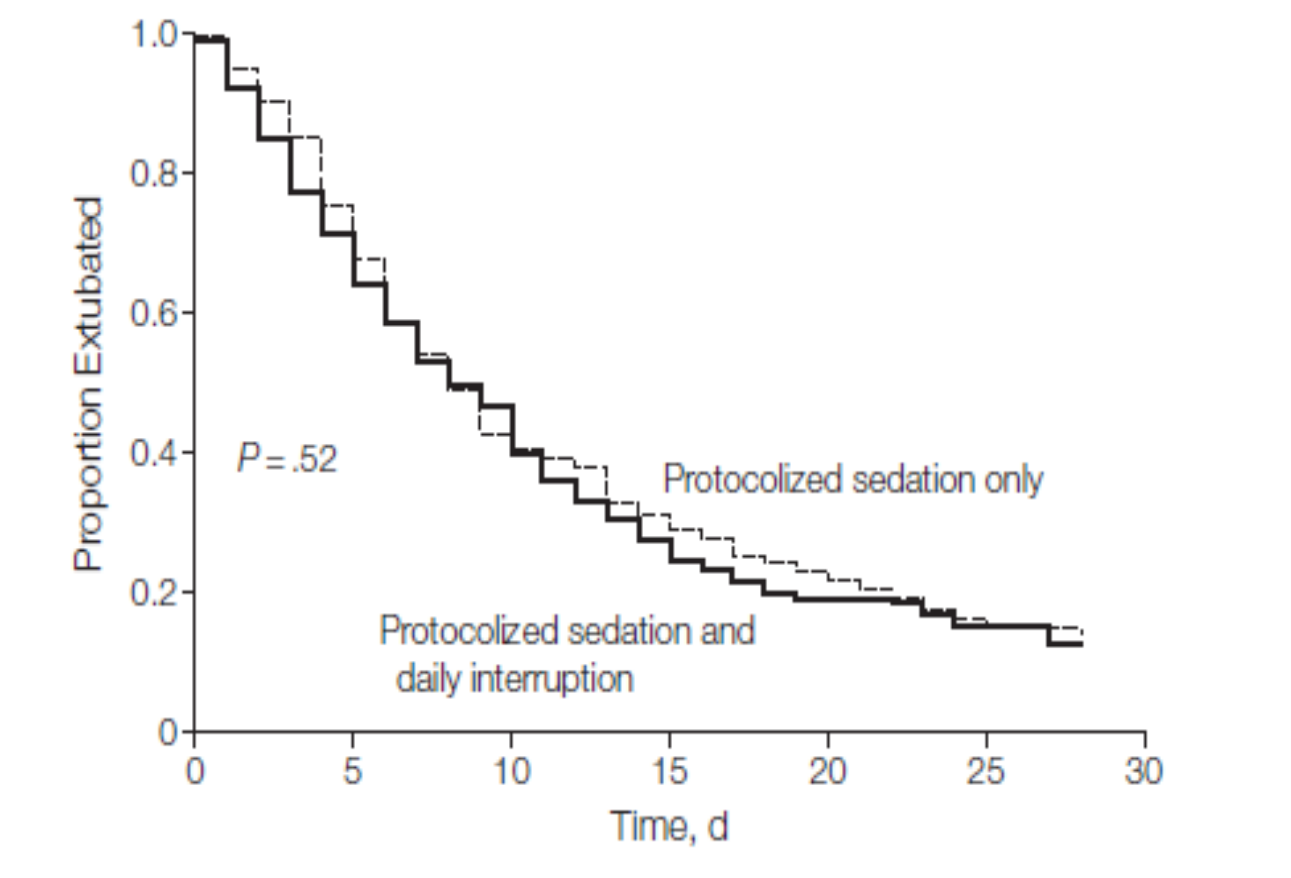
Girard TD, et al. Lancet 2008;371:126-34

# Sedation Interruption in SLEAP




Mehta S, JAMA 2012;308:1985-92

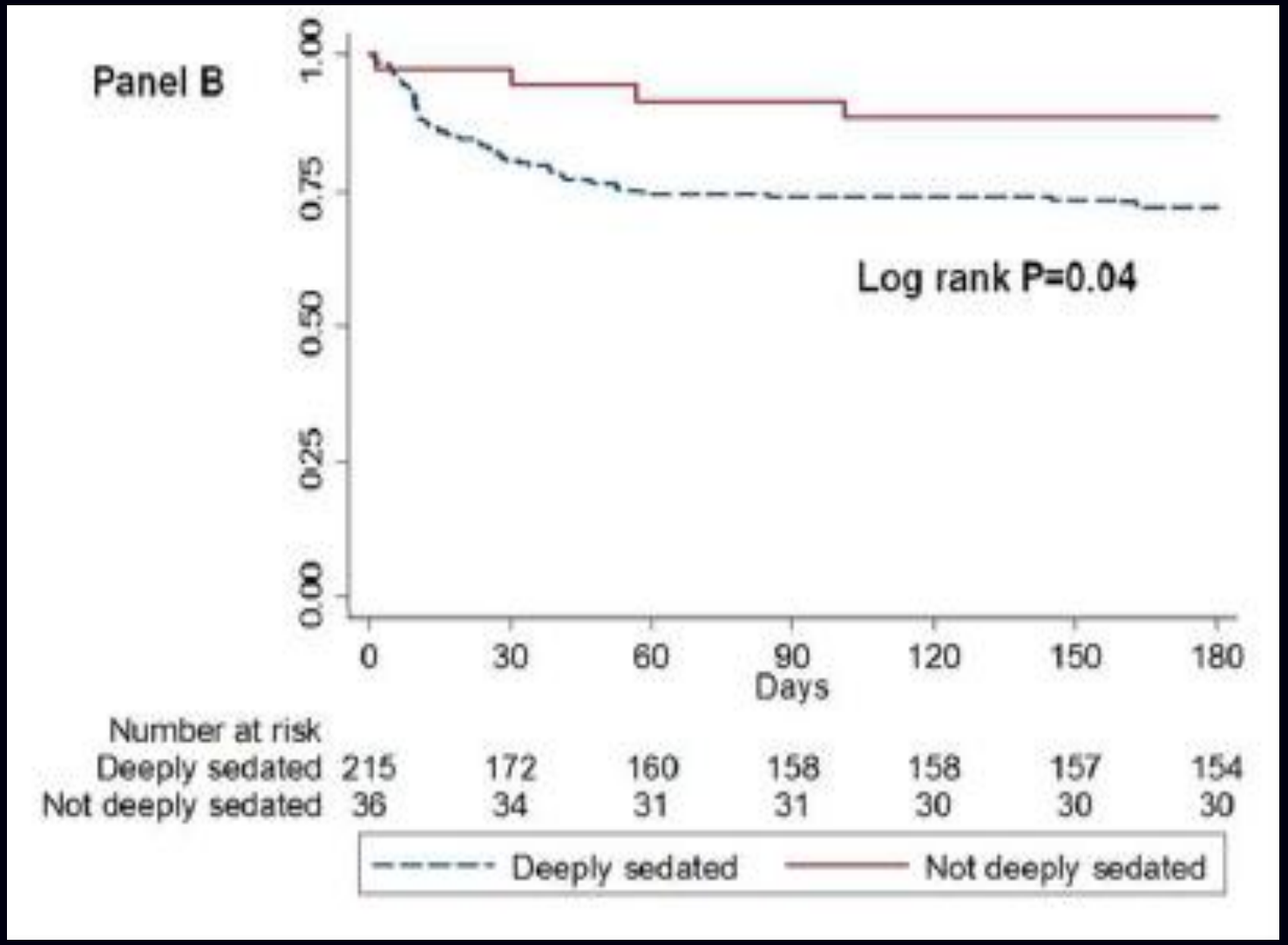
# Benzodiazepine Use in Trials *

| Study | Control | Treatment |
|---|---|---|
| Kress NEJM 2000 | 90 mg/day | 53 mg/day |
| Girard ABC Lancet 2007 | 84 mg/day | 54 mg/day |
| Mehta SLEAP JAMA 2012 | 82 mg/day | 102 mg/day |
| OSCILLATE NEJM 2013 | 141 mg/day | 199 mg/day |

* All values converted and expressed as mean midazolam dose per patient, median for ABC study were 8 mg and 5 mg, respectively

# SPICE Study – first 48 hours

mean 50 mg/d benzos




Shehabi AJRCCM 2012;186:724-31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Colombo et al, Minerva Anest 1012;78:1026-33

THE LANCET

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# A protocol of no sedation for critically ill patients receiving mechanical ventilation: a randomised trial

*Thomas Strøm, Torben Martinussen, Palle Toft*

## Summary

**Background** Standard treatment of critically ill patients undergoing mechanical ventilation is continuous sedation. Daily interruption of sedation has a beneficial effect, and in the general intesive care unit of Odense University Hospital, Denmark, standard practice is a protocol of no sedation. We aimed to establish whether duration of mechanical ventilation could be reduced with a protocol of no sedation versus daily interruption of sedation.

*Lancet* 2010; 375: 475–80

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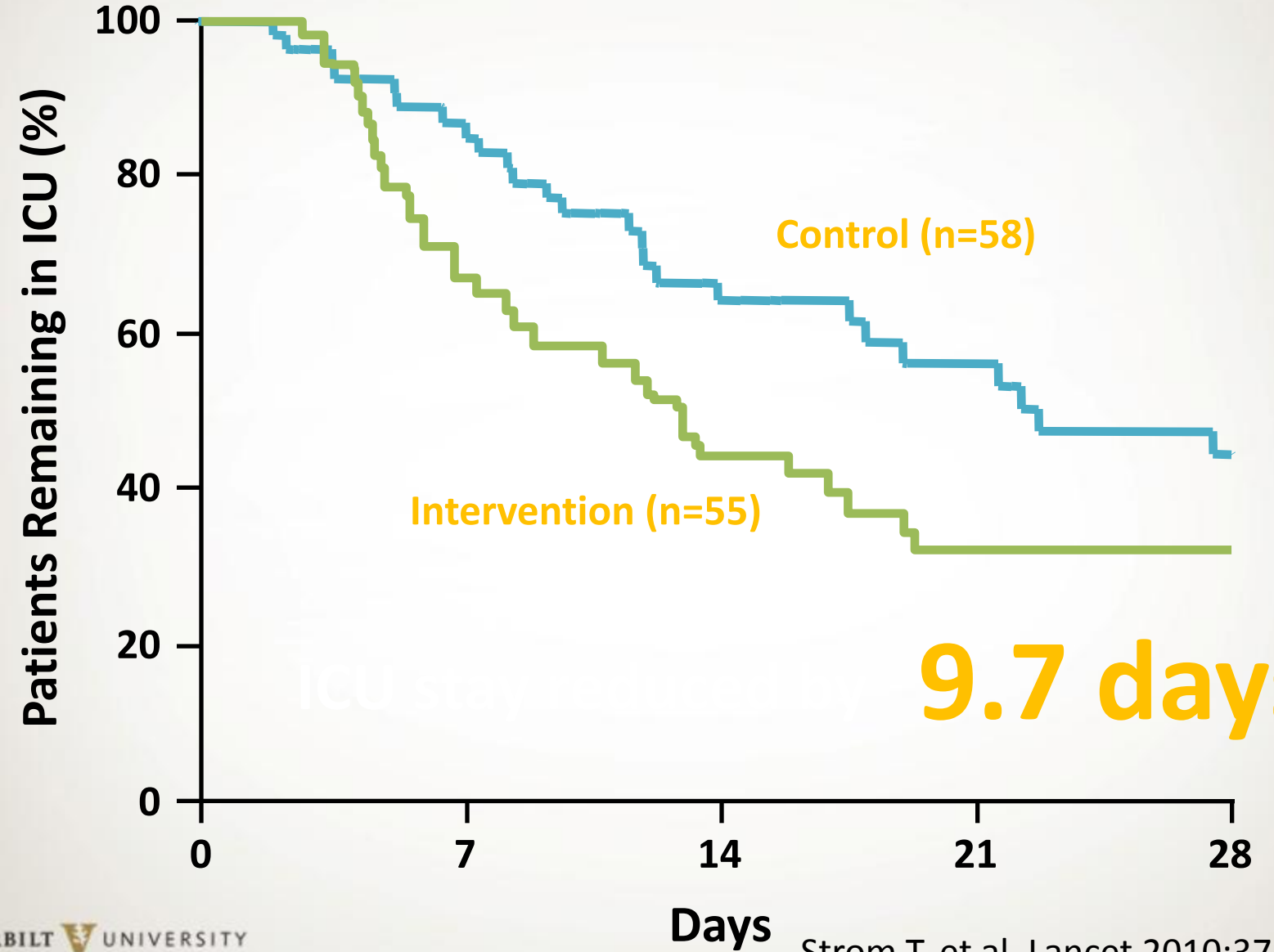
See Comment page 436

# No Sedation: ICU Length of Stay

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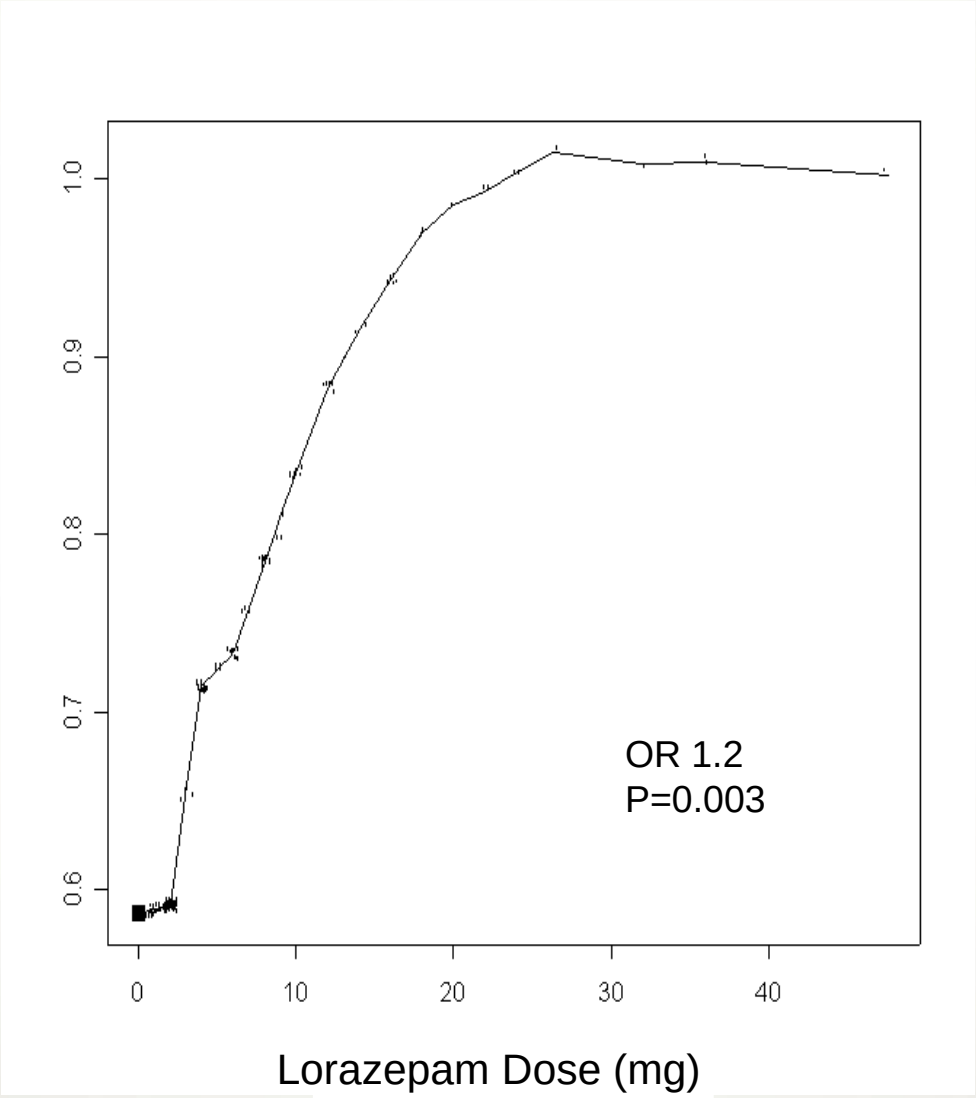
Strom T, et al. Lancet 2010;375:475-80

# Benzodiazepines and Delirium Risk

Delirium Risk




Pandharipande et al. Anesthesiology 2006: 124:21-6

# Buffalos to Beer to Brain Cells

Cliff the mailman and philosopher

Cliff: “Well you see, Norm, it's like this . . A herd of buffalo can only move as fast as the slowest buffalo. And when the herd is hunted, it is the slowest and weakest ones at the back that are killed first. This natural selection is good for the herd as a whole, because the general speed and health of the whole group keeps improving by the regular killing of the weakest members.”

sitcom **CHEERS**

# Buffalos to Beer to Brain Cells

"In much the same way, Norm, the human brain can only operate as fast as the slowest brain cells. Now, as we know, excessive intake of alcohol kills brain cells. But naturally, it attacks the slowest and weakest brain cells first. In this way, regular consumption of beer eliminates the weaker cells, making the brain a faster and more efficient machine. And that, Norm, is why you always feel smarter after a few beers."

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JAMA®
The Journal of the American Medical Association
December 12, 2007

CARING FOR THE CRITICALLY ILL PATIENT

# Effect of Sedation With Dexmedetomidine vs Lorazepam on Acute Brain Dysfunction in Mechanically Ventilated Patients

## The MENDS Randomized Controlled Trial

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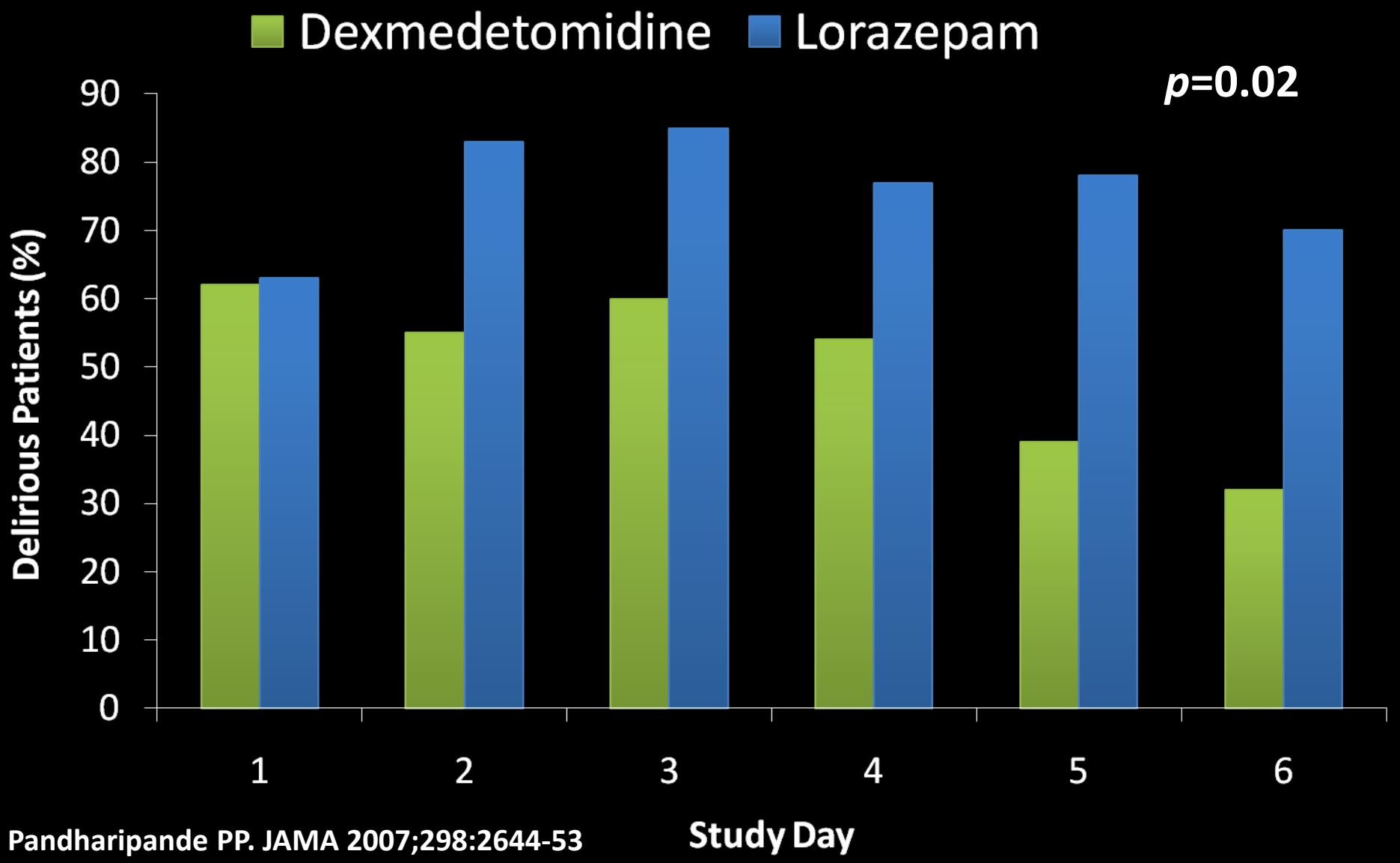
**Context** Lorazepam is currently recommended for sustained sedation of mechanically ventilated intensive care unit (ICU) patients, but this and other benzodiazepine drugs may contribute to acute brain dysfunction, ie, delirium and coma, associated with prolonged hospital stays, costs, and increased mortality. Dexmedetomidine induces sedation via different central nervous system receptors than the benzodiazepine drugs and may lower the risk of acute brain dysfunction.

**Objective** To determine whether dexmedetomidine reduces the duration of delirium and coma in mechanically ventilated ICU patients while providing adequate sedation as compared with lorazepam.

**Design, Setting, Patients, and Intervention** Double-blind, randomized controlled trial of 106 adult mechanically ventilated medical and surgical ICU patients at 2 tertiary care centers between August 2004 and April 2006. Patients were sedated with dexmedetomidine or lorazepam for as many as 120 hours. Study drugs were titrated to achieve the desired level of sedation, measured using the Richmond Agitation-Sedation Scale (RASS). Patients were monitored twice daily for delirium using the Confusion Assessment Method for the ICU (CAM-ICU).

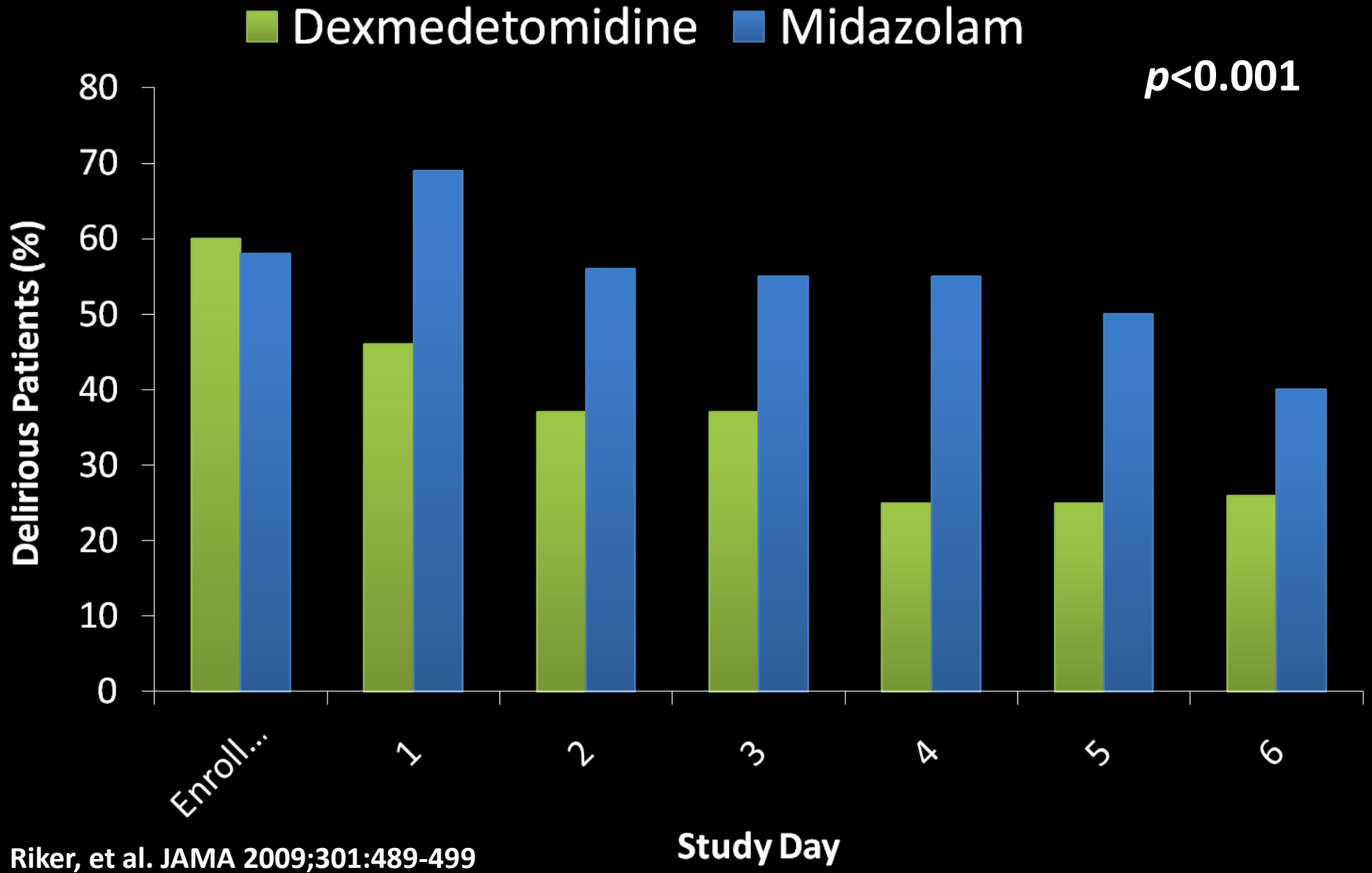
**Main Outcome Measures** Days alive without delirium or coma and percentage of days spent within 1 RASS point of the sedation goal.

# Daily Risk of Delirium in MENDS

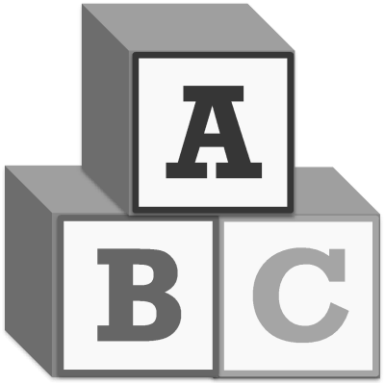



Pandharipande PP. JAMA 2007;298:2644-53
Pandharipande PP. Crit Care 2010;14:R38

# Daily Risk of Delirium in SEDCOM




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

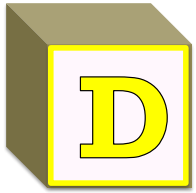



## Awake and Breathing Coordination

- ↓ Duration of mechanical ventilation
- ↓ Duration of coma
- ↓ Mortality


## Choose light sedation & avoid benzos

- ↓ Duration of mechanical ventilation
- ↓ Mortality
- ↓ Delirium




## Delirium monitoring & management

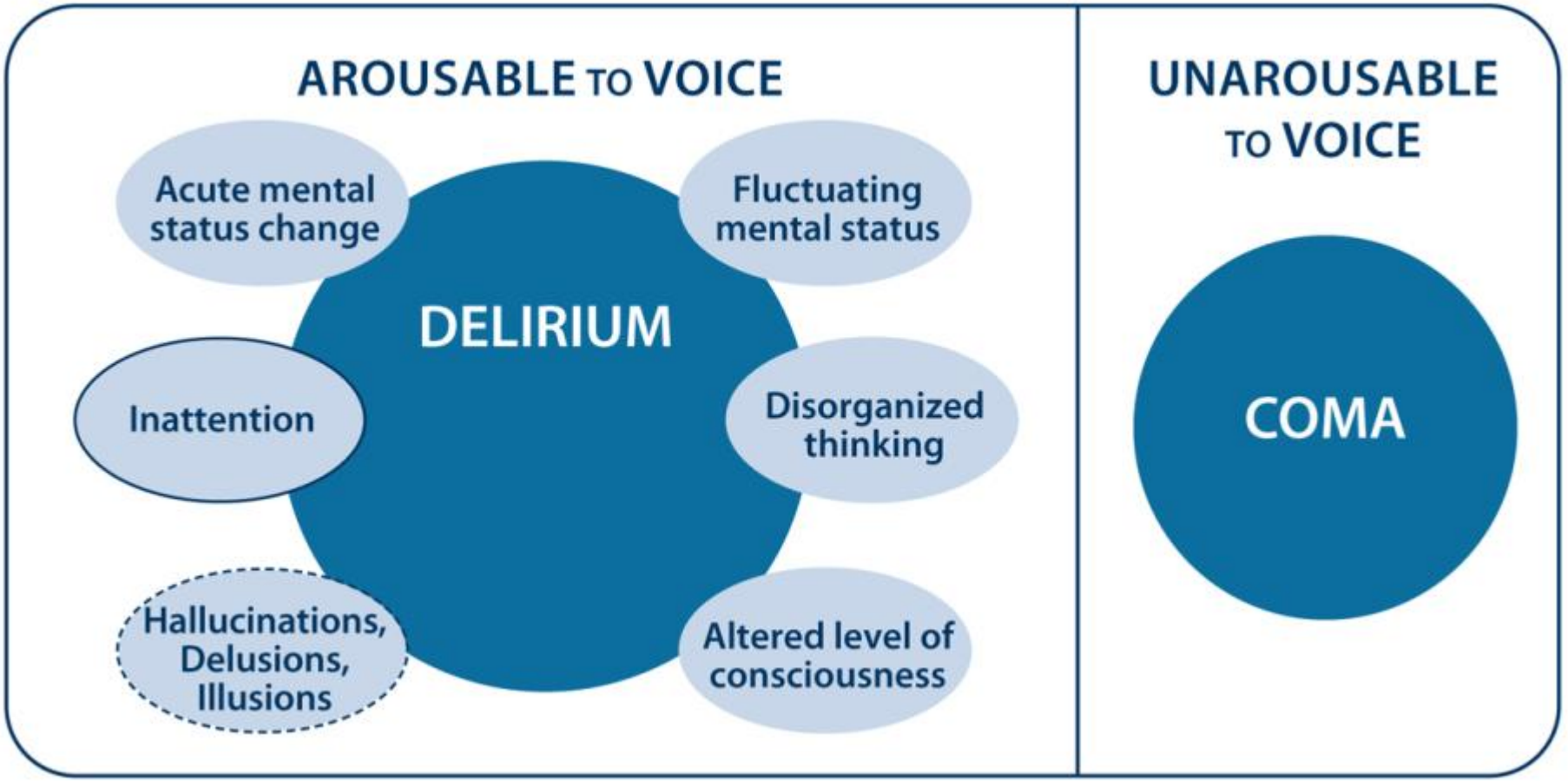
- ↑ Delirium detection
- ↑ Delirium predictor of mortality and morbidity


## Early Mobility & Environment

- ↓ Duration of delirium
- ↓ Disability
- ↓ ICU Length of Stay
- ↓ Rehospitalization/Mortality

Morandi et al Curr Opin Crit Care 2011;17:43-9
Vasilevskis et al Crit Care Med 2010;38:S683-91
Vasilevskis et al Chest 2010;138:1224-1233
Zaal et al, ICM 2013;39:481-88
Colombo et al, Minerva Anest 1012;78:1026-33

# Cardinal Symptoms of Delirium and Coma




Morandi A, et al. *Intensive Care Med*. 2008;34:1907-1915.

## 2013 PAD Guidelines:

"We recommend routine monitoring for delirium in adult ICU patients"

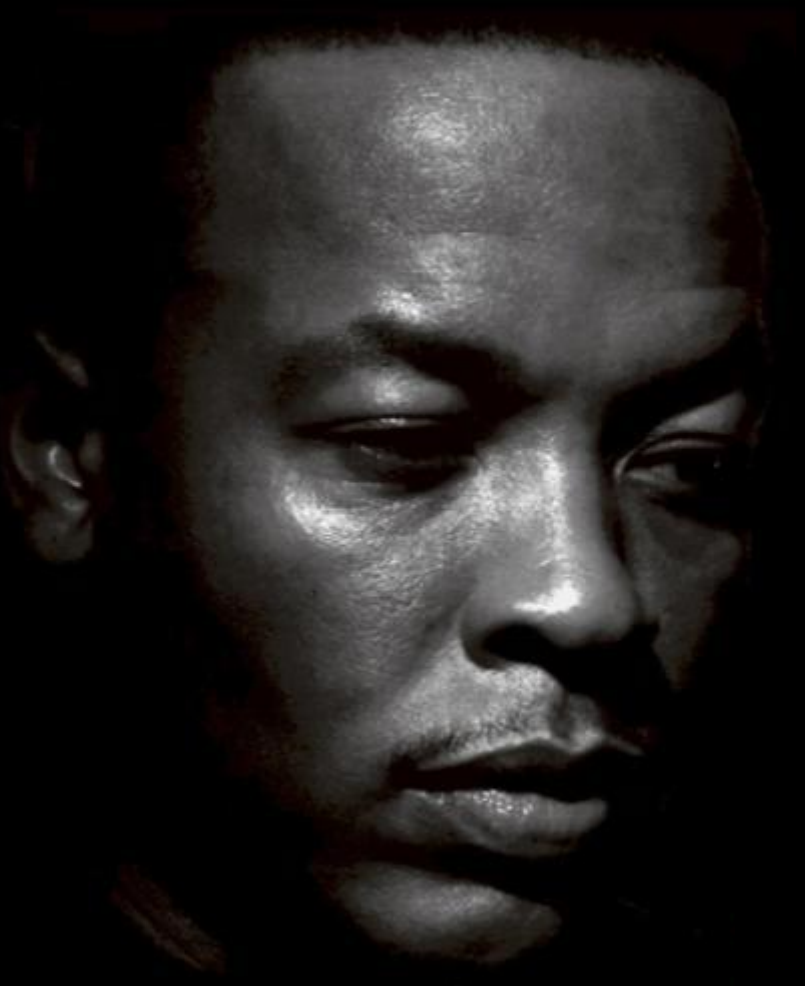
*Grade 1B Recommendation*

Crit Care Med. 2013;41:263-308

If delirium is not screened for using a validated delirium screening tool it is missed ~75% of time.

Inouye SK *Arch Intern Med.* 2001;161:2467-2473.
Devlin JW *Crit Care Med.* 2007;35:2721-2724.
Spronk PE *Intensive Care Med.* 2009;35:1276-1280.
van Eijk MM *Crit Care Med.* 2009;37:1881-1885.

# Don’t forget about Dr. DRE



**D**iseases

*Sepsis, COPD, CHF*

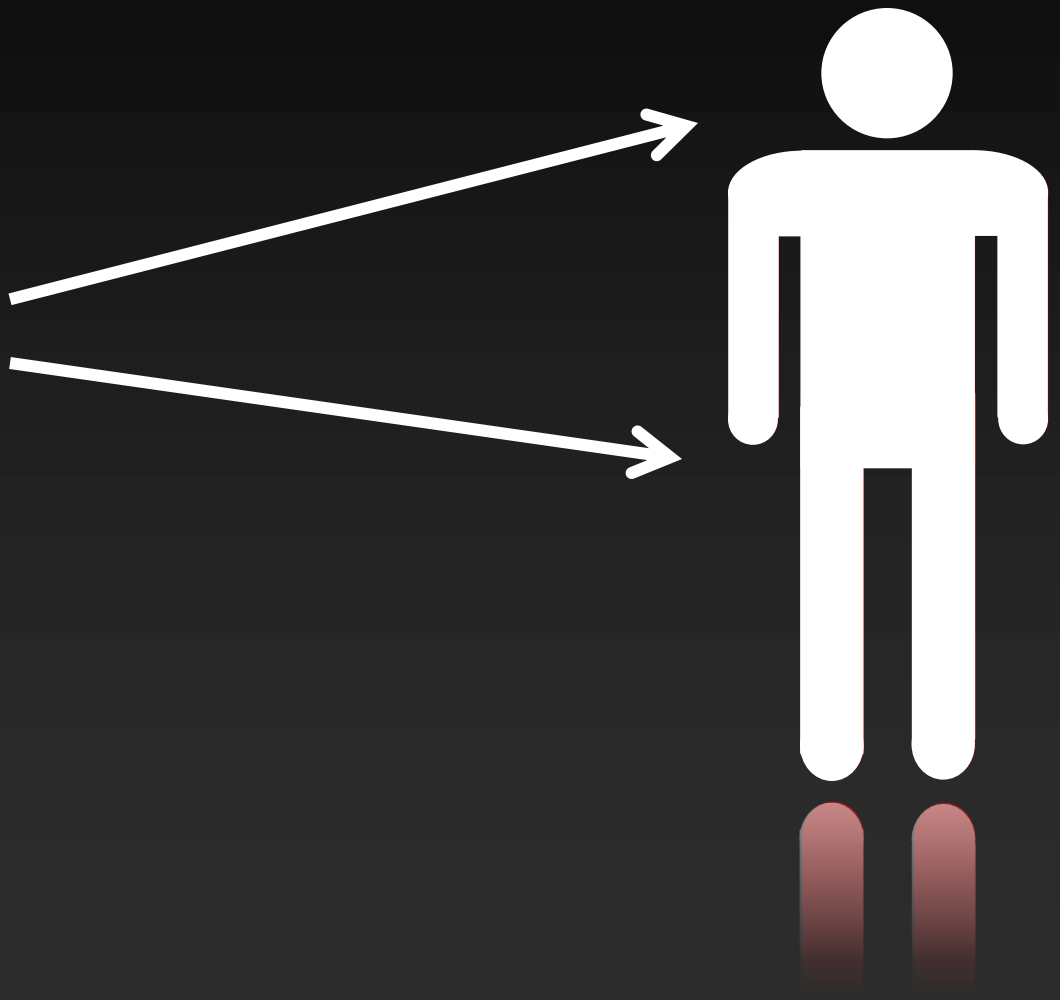
**D**rug **R**emoval

*SATs and stopping benzodiazepines/ narcotics*

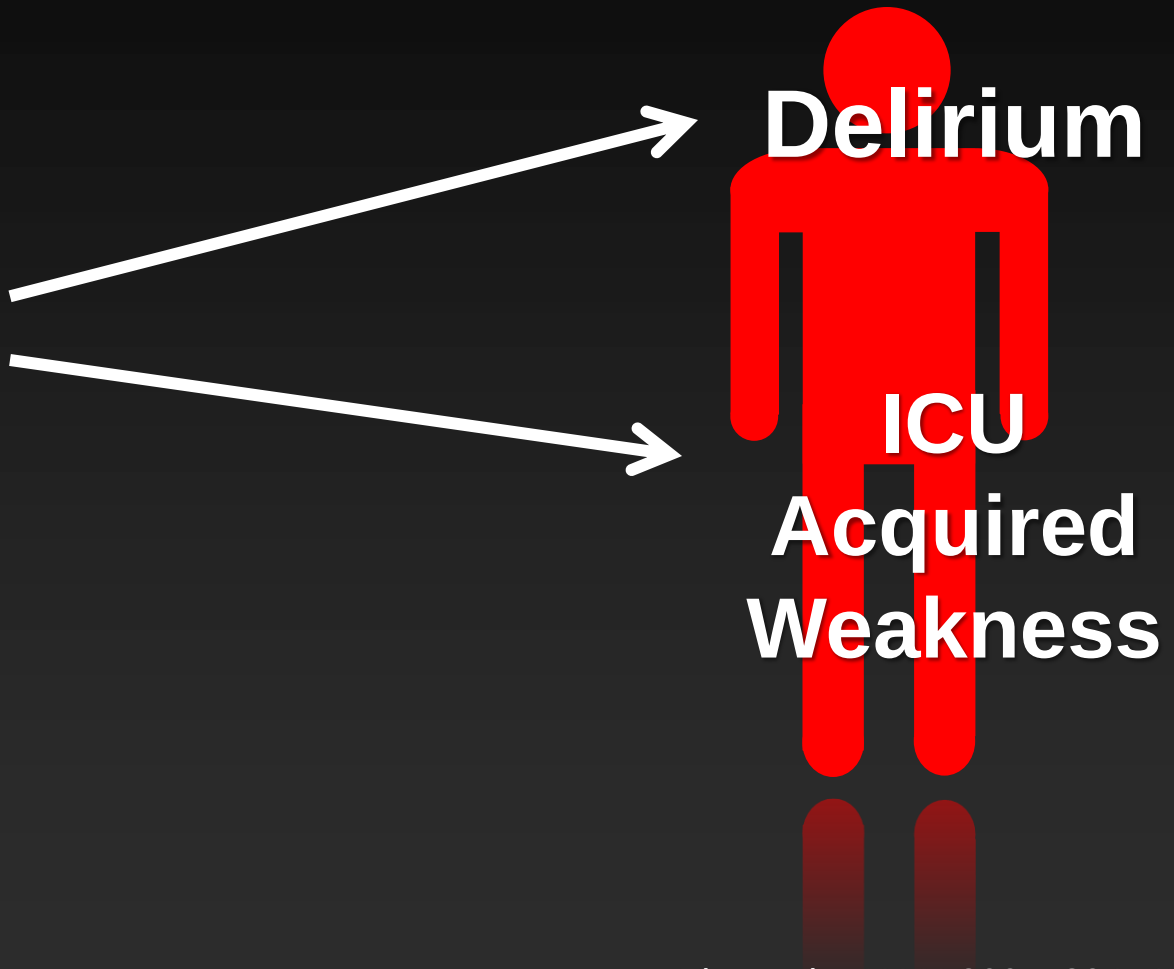
**E**nvironment

*Immobilization, sleep and day/night, hearing aids, glasses, noise*

Critical Illness



# Critical Illness




Ely, et al., *JAMA* 2004; 291: 1753-62
Devlin et al., *Intensive Care Med* 2007; 35:2721-4
Bergeron et al., *Intensive Care Med* 2001; 27:859-
Needham DM *JAMA* 2008; 300: 1685-90
DeJonghe, et al., *JAMA* 2002; 288: 2859-67

Baseball (like life) is 90% mental…

Baseball (like life) is 90% mental…
the other half is physical

Yogi Berra


## Awake and Breathing Coordination

- ↓ Duration of mechanical ventilation
- ↓ Duration of coma
- ↓ Mortality


## Choose light sedation & avoid benzos

- ↓ Duration of mechanical ventilation
- ↓ Mortality
- ↓ Delirium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Morandi et al Curr Opin Crit Care 2011;17:43-9
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Zaal et al, ICM 2013;39:481-88
Colombo et al, Minerva Anest 1012;78:1026-33

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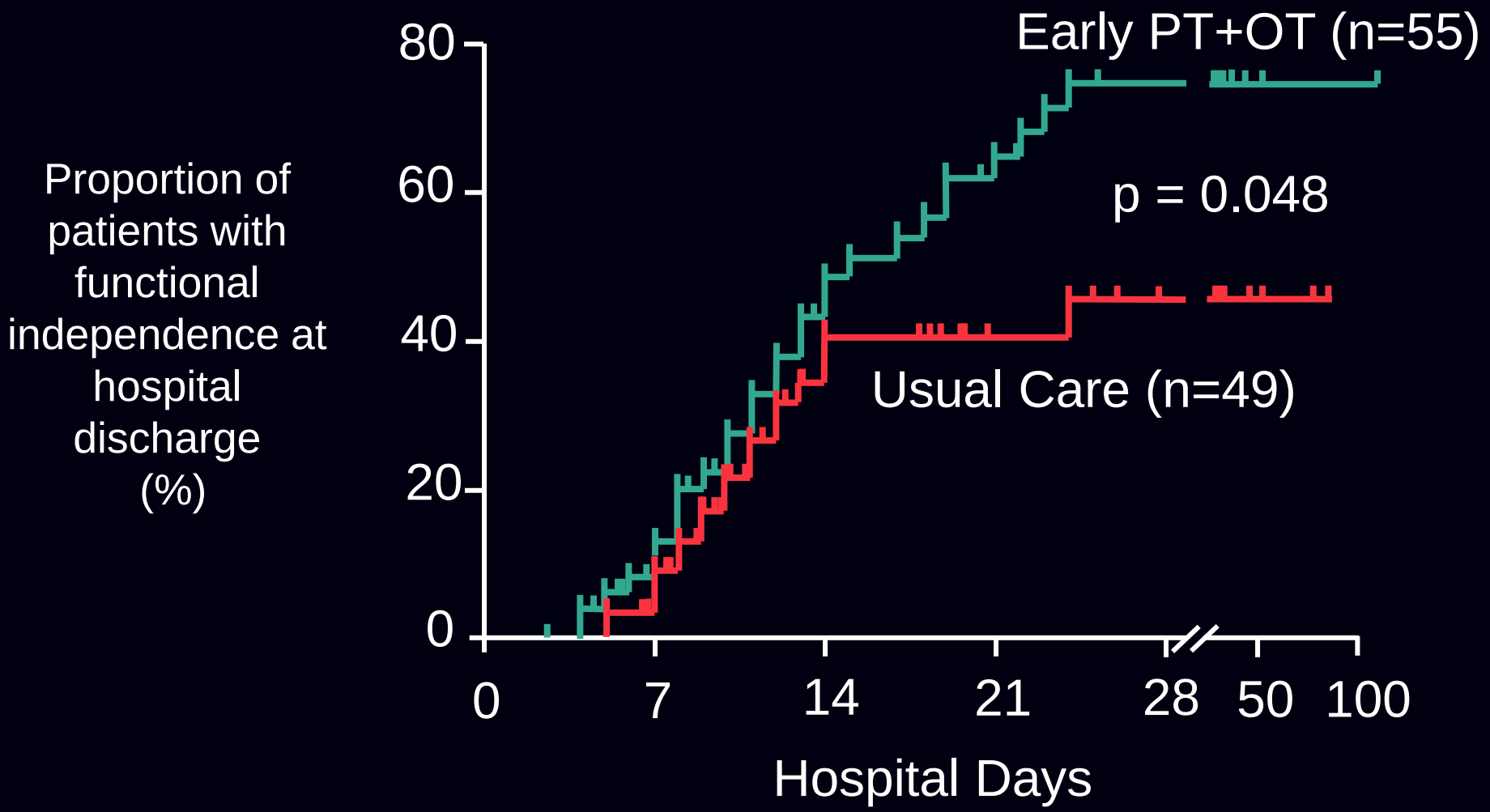
# Early physical rehabilitation




Schweickert, Lancet 2009; 373: 1874-82

# Mobilization = Less Delirium

| Variable | Intervention (n=49) | Control (n=55) | P-value |
|---|---|---|---|
| ICU/Hosp Delirium Days | 2 days | 4 days | 0.03 |
| Time in ICU with Delirium | 33% | 57% | 0.02 |
| Time in Hosp. with Delirium | 28% | 41% | 0.01 |



Schweickert et al, Lancet 2009;373:1874-82

# Mobilizing the Brain with Sudoku & Scrabble

**“I survived and that is the main thing. And I am so grateful to God that I survived and am now off all oxygen and consider myself all well except that I can’t remember to take my medications...**

**-SB**

# Quote of the Day #1

Dr. Swenson explained, "I'll tell you the truth. What I have discovered…is not what I expected. It is something greater, much more ambitious than anything we had hoped for…**in science: Never be so focused on what you are looking for that you overlook the thing you actually find."**

Ann Patchett - 2011, ***State of Wonder***

# Quote of the Day #2

"I came awake on the fifth day. My first memory is that of **floating up from the ocean bottom**, my eyes still waterlogged and **with what felt like scuba gear stuffed in my mouth and throat**. I couldn't speak. As I broke to the surface, I understood that I was still in the ICU at Our Lady, but I **heard nothing of what anybody said**.

Abraham Verghese - 2009, ***Cutting for Stone***


# ICU Delirium and Cognitive Impairment Study Group: selected local members

Pratik Pandharipande
Jim Jackson
Jin Han
Ed Vasilevskis
Chris Hughes
Alessandro Morandi
Paula Watson
Lorraine Ware
Gordon Bernard
Bob Dittus
Ted Speroff
Wes Ely

Leanne Boehm
Joyce Okahashi
Cayce Strength
Brenda Pun
Lauren Hardy
Amy Lipsey
Ryan Black
Jessica McCurley
Michael Santoro
Carrie Jones
Morgan Crawford
Mayur Patel

Tim Girard
John Gore
Baxter Rogers
Stephan Heckers
Cathy Fuchs
Heidi Smith
Ty Berutti
Brad Strohler
Elizabeth Card
Jennifer Thompson
Ayumi Shintani
Stephanie Hamilton

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# Key Epidemiological Points:

1) Patients suffer from long-lasting and disabling aspects of critical illness that demand our attention as a medical community
2) Acquired or accelerated cognitive impairment is a major public health problem following ICU care for both the old and young
3) This cognitive impairment appears most pronounced in domains of executive dysfunction and memory
4) Frontal lobe and hippocampal atrophy are being consistently found in recent studies
5) This injury is likely distinct from or complementary to Alzheimer's pathology, though we are in our infancy in learning about this entity (e.g., large pathology study under review)
6) Delirium and drug exposure appear to be the most modifiable aspects of care, with need for more trials to delineate next steps

# Key Management Points:

1) Establish an overarching protocolized approach to daily ICU patient management using 2013 PAD Guidelines
2) Assess & treat pain first (may be sufficient)
3) If patient remains agitated after adequately treating pain, use prn/bolus sedation initially, if frequent boluses (>3/hr) use continuous sedation
4) Avoid traditional benzodiazepines in most patients
5) Turn off sedation daily and restart only if needed at lowest dose to maintain chosen target level of consciousness
6) Deep sedation (RASS -4/-5) appears harmful; target awake/alert
7) Screen for delirium (CAM-ICU or ICDSC); If delirious, first seek reversible causes and attempt non-pharmacologic management
8) Use the ABCDEs to improve outcomes for your patients

# 2013 PAD Guidelines: Benzodiazepines

1. General Choice: non-benzodiazepine sedation strategies preferred (propofol or dex), with statistically shorter ICU LOS (~0.5 day, p=0.04)
2. Benzodiazepines risk factor for delirium
3. Ventilated patients at risk for delirium prefer dexmedetomidine to benzodiazepine
4. Delirious ICU patients (excluding DTs and benzo w/drawal) - give dexmedetomidine (alpha-2) and not benzo (GABA)



Barr J et al, CCM 2013;41:263-306