A HIERARCHY OF NEEDS IN ICU SEDATION

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Disclosure

- Research grants from Hospira, Theravance, Brahms, Fisher Paykel.
- Speakers honorarium from Hospira, Edwards, Brahms and Lilly.
- No financial interest in Hospira Inc. or any of its products.

Soccer is the real football
Goaaaaal .....


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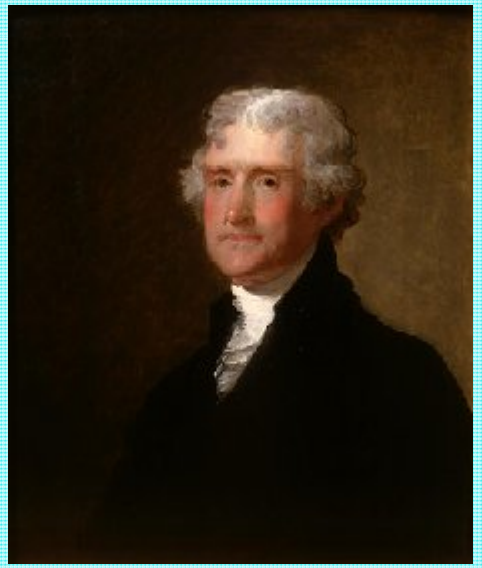
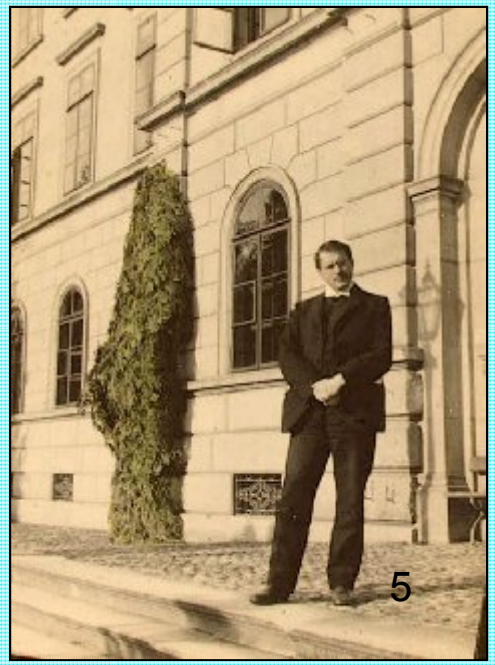
Happiness and Pain

- Happiness is not being pained in body or troubled in mind.



Thomas Jefferson

- There is no coming to consciousness without pain.

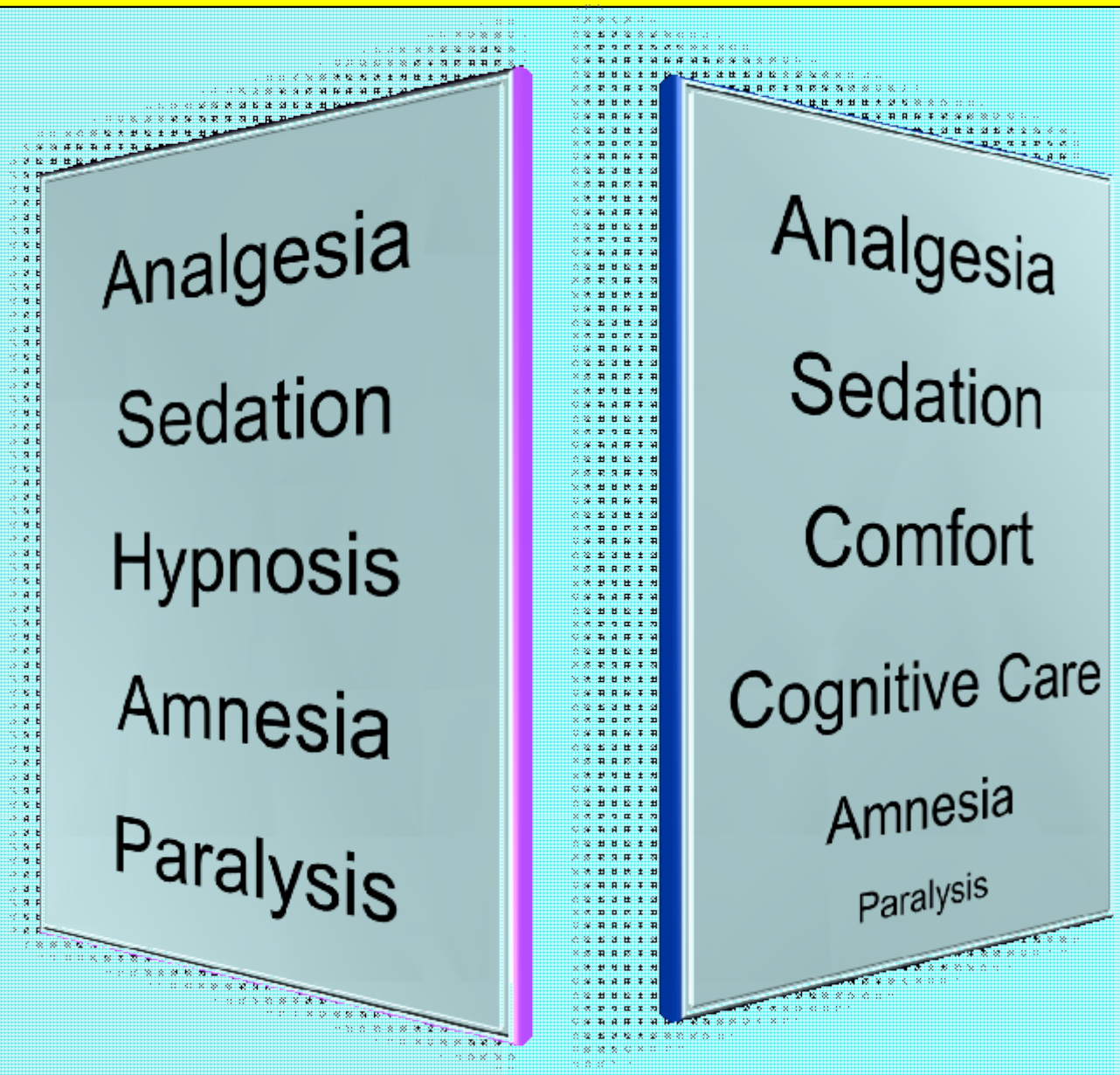


Carl Jung

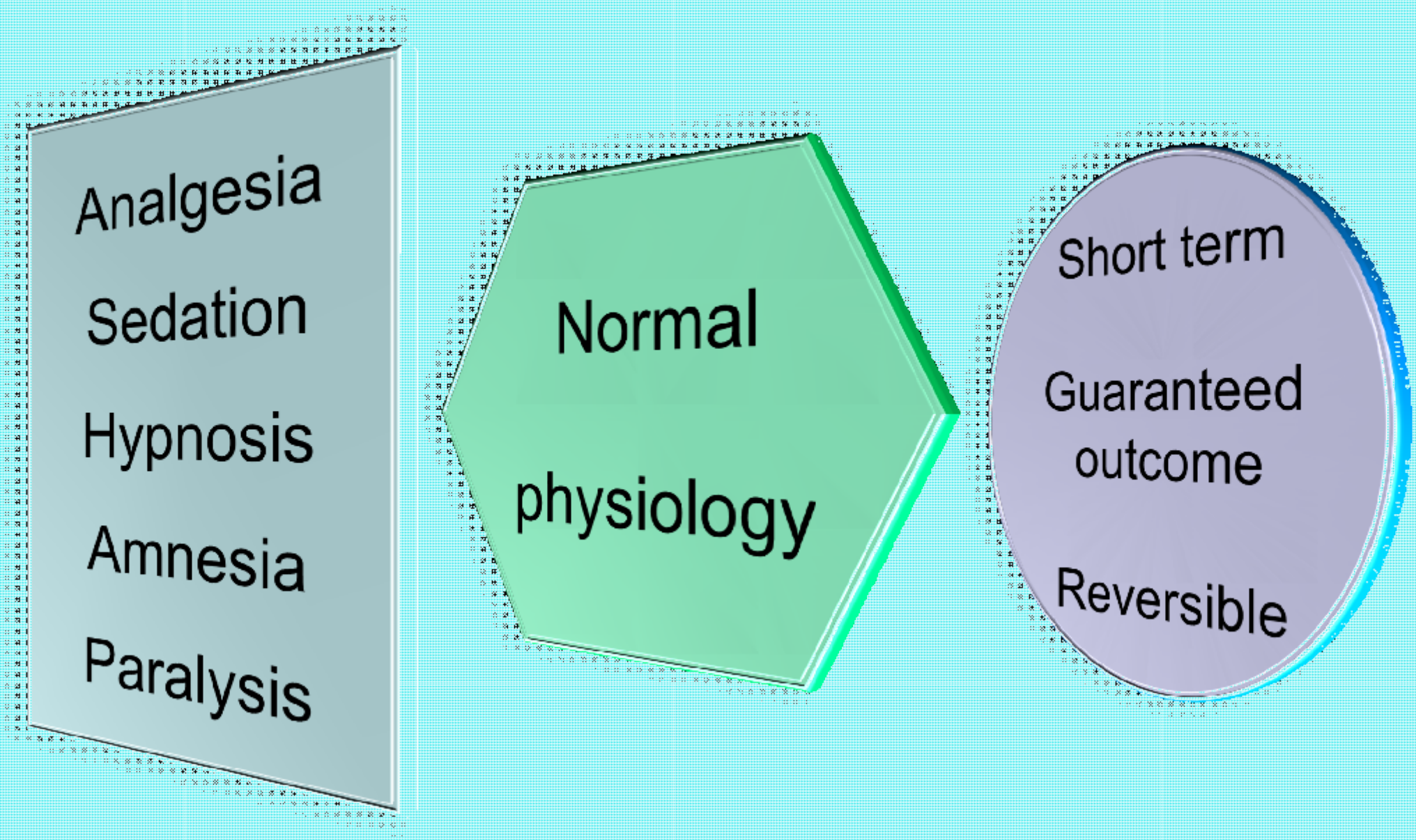
Anaesthesia

Intensive Care

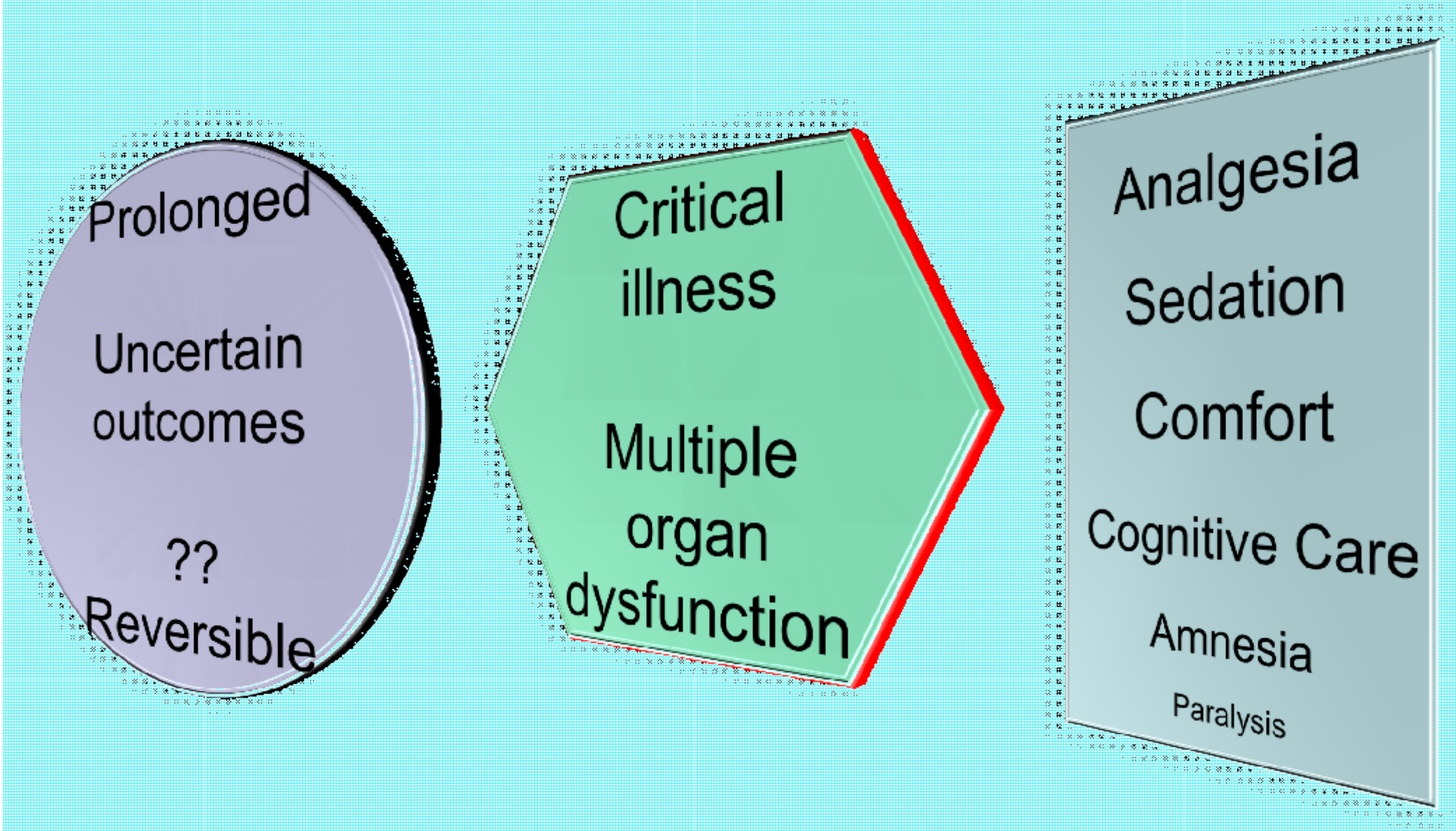
Patient Centred Management



Balanced Anaesthesia



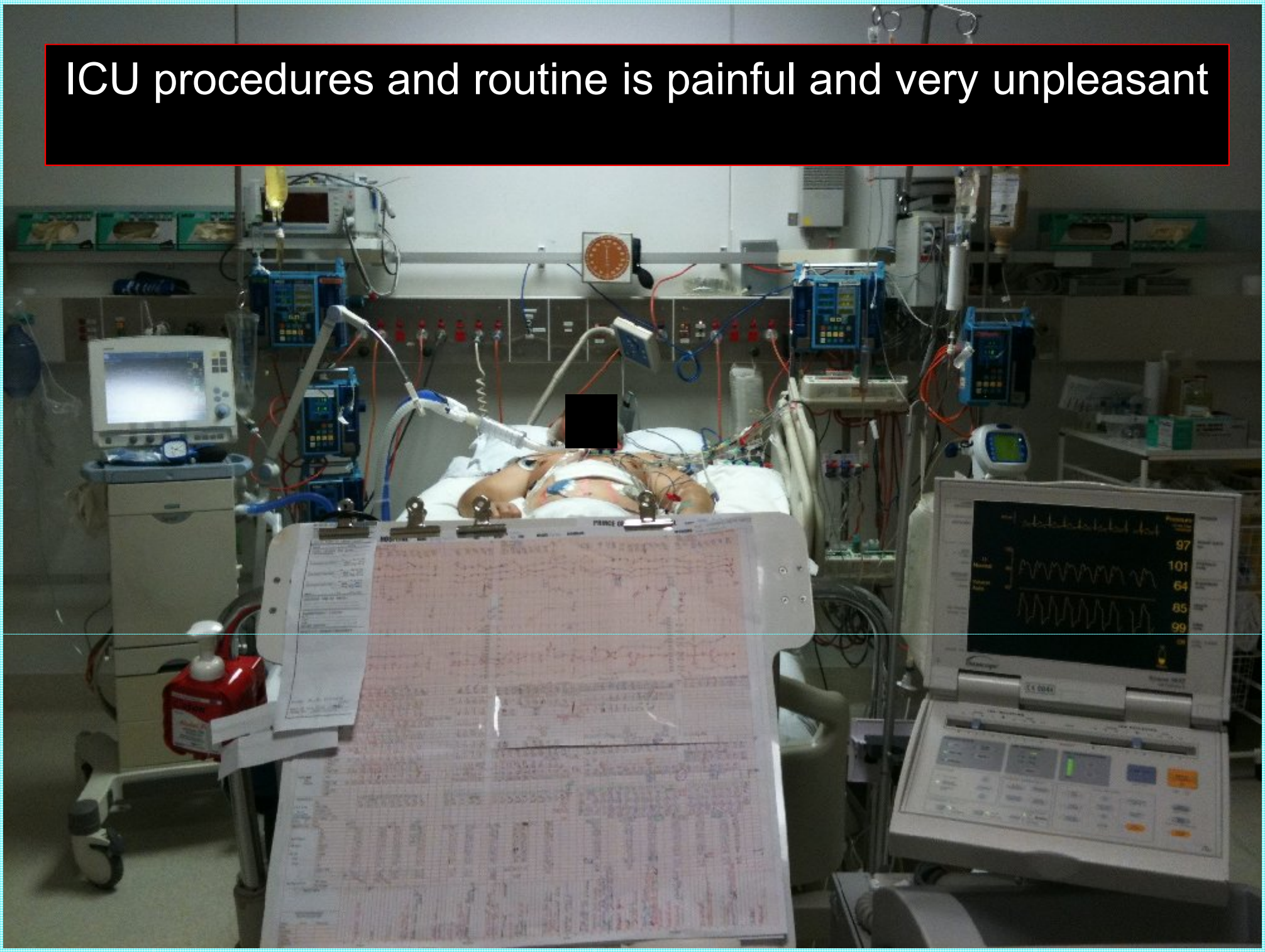
Imbalanced ICU Sedation



Is there a GOLD standard for ICU Sedation ?

SCCM Guidelines 2002 vs 2010 / 2011

ICU procedures and routine is painful and very unpleasant



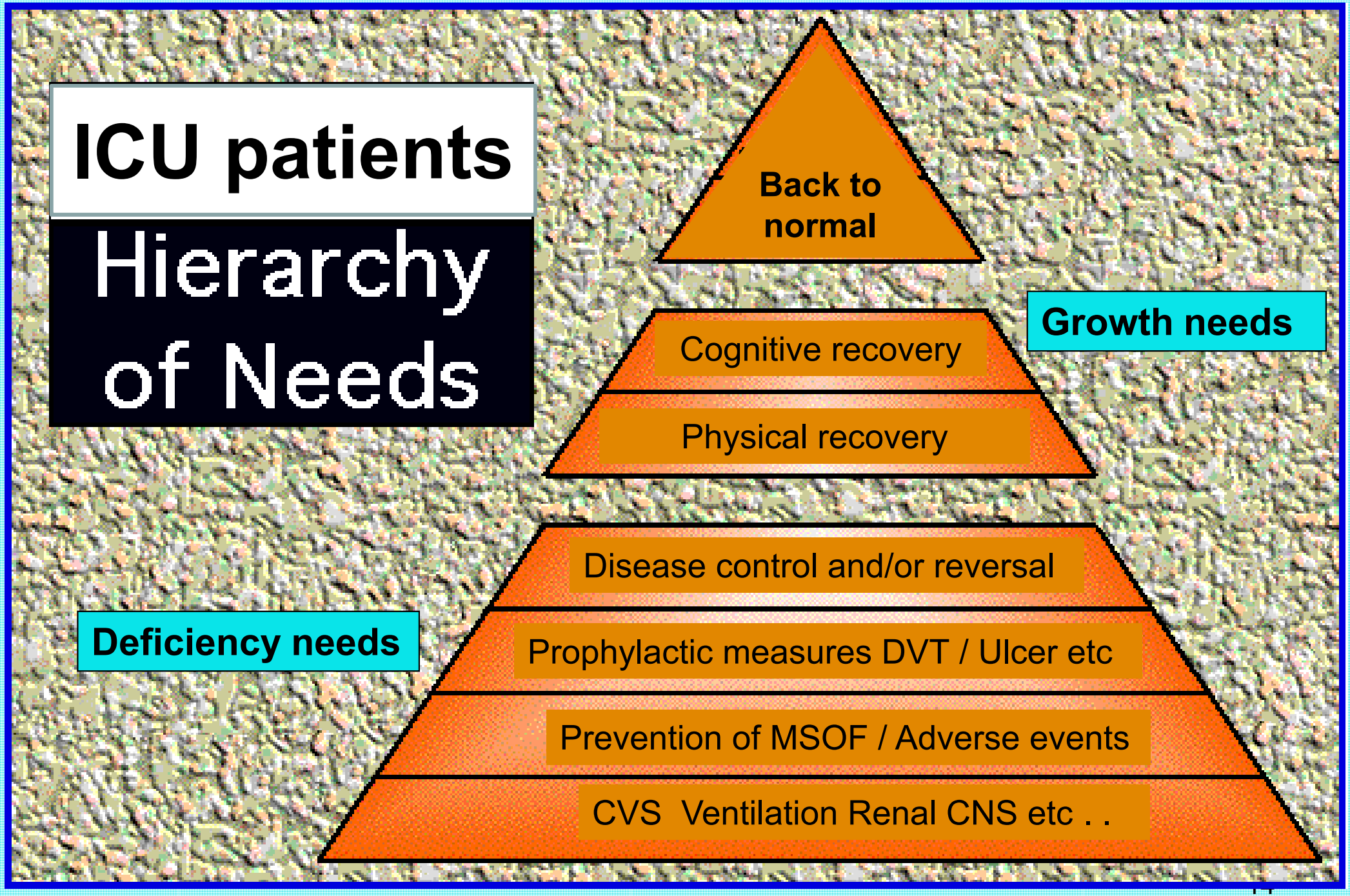
It is a matter of mind set

“… If you don’t like something, change it . .

If you can’t , change the way you think about it . . . “

Mary Engelbreit

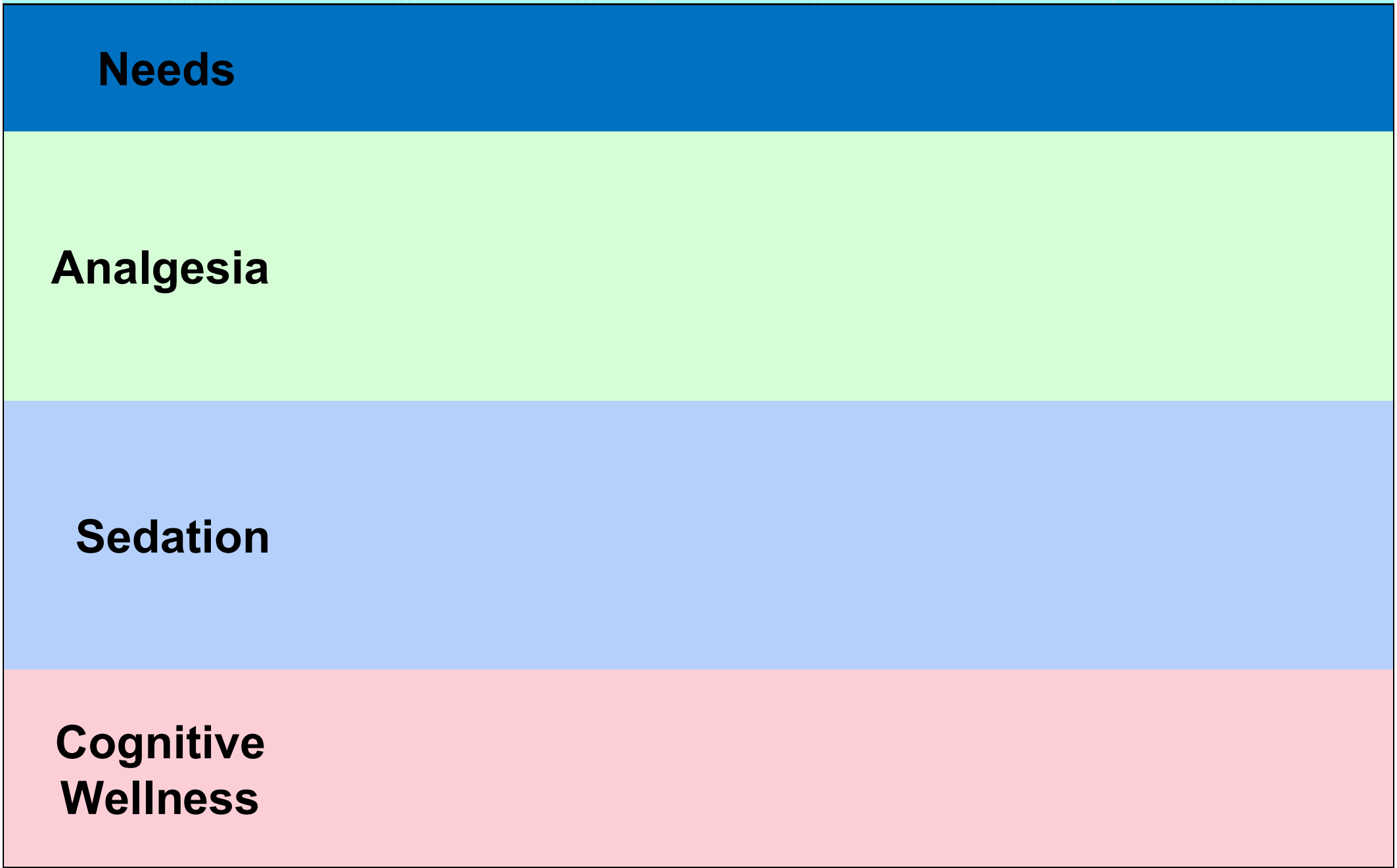

Self-
Actualization:
Vitality
Creativity
Self-Sufficiency
Authenticity
Playfulness
Meaningfulness
Self-Esteem
Love and Belongingness
Safety and Security
Physiological Needs:
Air, Water, Food, Shelter, Sleep, Sex


ICU patients
Hierarchy of Needs
Back to normal
Growth needs
Cognitive recovery
Physical recovery
Disease control and/or reversal
Deficiency needs
Prophylactic measures DVT / Ulcer etc
Prevention of MSOF / Adverse events
CVS Ventilation Renal CNS etc . .

Hierarchy of Needs for ICU patients

Needs	Survival	Growth and independence
Physiological Function		
Liberation from artificial support		
Recovery and rehabilitation		

Hierarchy of Needs for ICU Sedation



Hierarchy of Needs for ICU Sedation

Needs	Essential
Analgesia	Pre-emptive Early Effective Monitored Multi-modal
Sedation	Targeted Light Monitored
Cognitive Wellness	Sleep promotion Noise reduction Physical activity Day light exposure Interactive environment Delirium prevention

Hierarchy of Needs for ICU Sedation

Needs	Essential	Gain
Analgesia	Pre-emptive Early Effective Monitored Multi-modal	Physiological stress PTSD Agitation Wellbeing and motivation Less sedative agents
Sedation	Targeted Light Monitored	Agitation Delirium Ventilator dependency ICU infections ICU stay
Cognitive Wellness	Sleep promotion Noise reduction Physical activity Day light exposure Interactive environment Delirium prevention	Long-term cognitive function PTSD ? Mortality

Integrated Sedation Strategy
The three tenants

- Effective pain relief
  - Pain assessment
  - Treat underlying causes
- Targeted Sedation
  - Frequent monitoring RASS
  - Light sedation UNLESS clinically indicated
- Cognitive welfare
  - Sleep promotion, day light, noise reduction
  - Early recognition and Rx of delirium CAM-ICU
  - Psychological support

Sister Instruments for Consciousness Monitoring in ICU

Arousal Assessment

RASS Sedation Scale

- Validated in over hundreds of surgical and medical patients
- Excellent reliability (κ= 0.91)
- Verbal from physical stimulus
- Duration of eye contact

Content Assessment

CAM-ICU for Delirium

- Validity ~95%
- Excellent reliability (κ= 0.92)
- Takes 2 minutes at bedside (including RASS)
- Implemented with >90% compliance

Sessler et al, AJRCCM 2002;166:1338-44,
Ely et al, Crit Care Med 2001;29:1370-79
Ely et al, JAMA 2003;289:2983-91
Ely et al, JAMA 2001;286:2703-2710

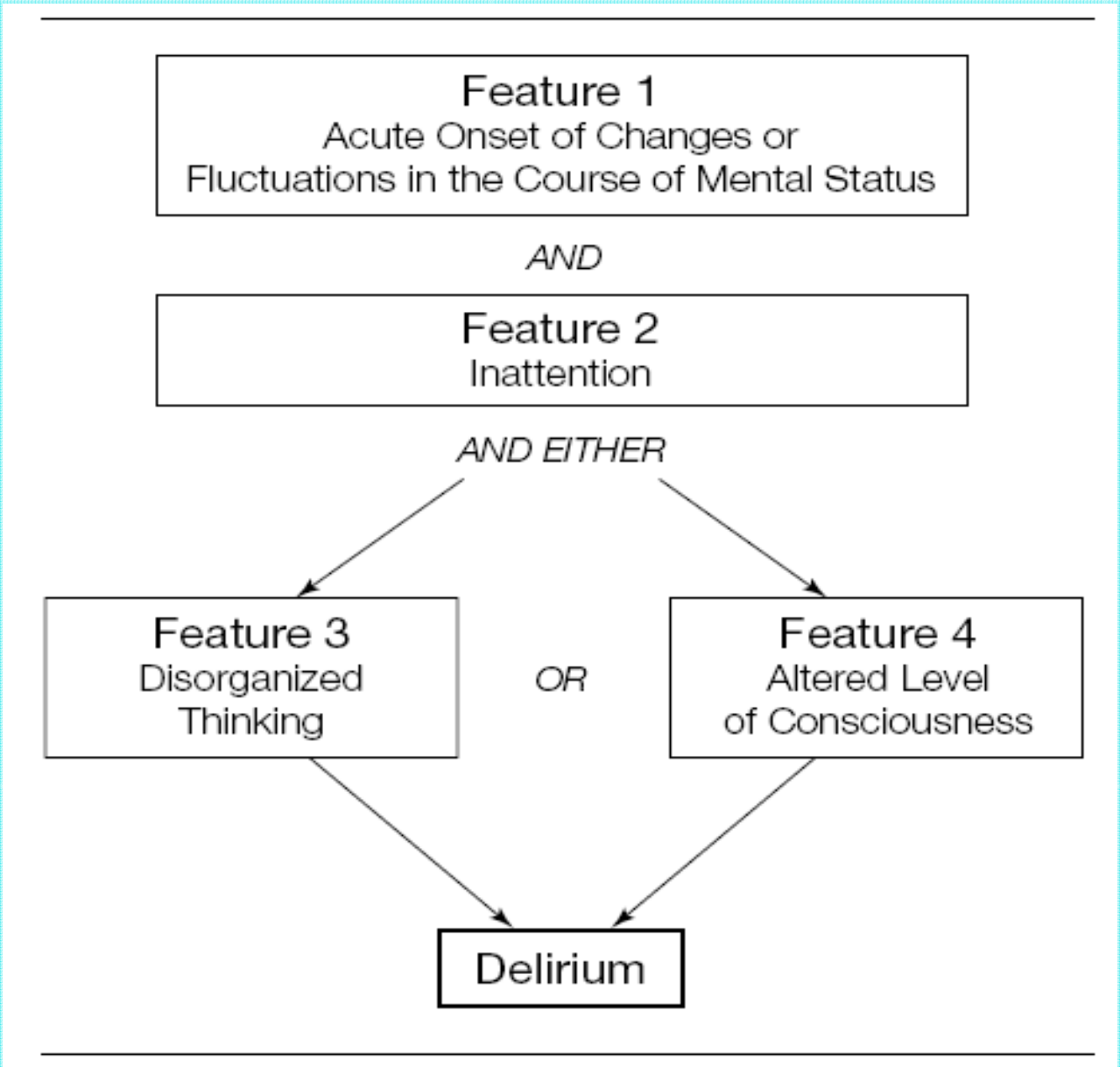
Richmond Agitation and Sedation Scale (RASS)

Sessler. Am J Respir Crit Care Med 2002; 166: 1338-44

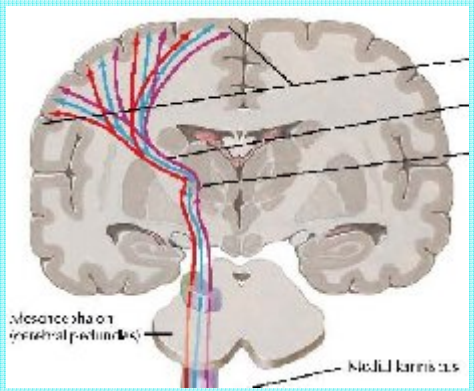
Clinical Score	Term	Level of Sedation Achieved
+4	Combative	Overtly combative, violent; immediate danger to the staff
+3	Very agitated	Pulls or removes tubes or catheters; aggressive
+2	Agitated	Frequent nonpurposeful movement, fights the ventilator
+1	Restless	Anxious; but movements not aggressive or vigorous
0	Alert and calm	
–1	Drowsy	Not fully alert, but has sustained awakening (eye opening/eye contact) to *voice* (≥10 seconds)
–2	Light sedation	Briefly awakens with eye contact to *voice* (<10 seconds)
–3	Mod. Sedation	Movement or eye opening to *voice* (but no eye contact)
–4	Deep sedation	No response to voice, but movement or eye opening to *physical* stimulation
–5	Unarousable	No response to *voice or physical* stimulation

Confusion Assessment Method for ICU (CAM-ICU)

Ely EW. JAMA 2001; 286:2703-10

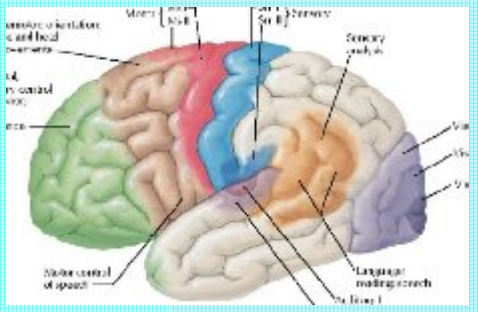


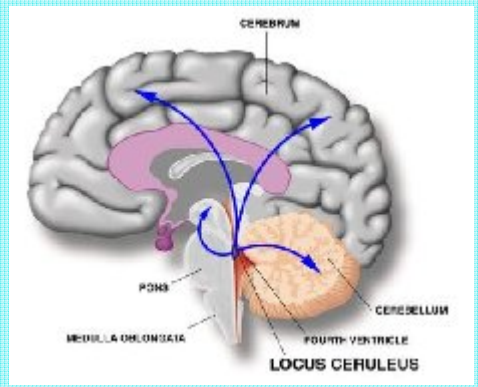
Axis of peace in ICU sedation



Effective analgesia Pain Scale

Targeted Sedation RASS





Anti-Delirium agent CAM-ICU

Pain & Analgesia

- Puntillo KA, White C, Morris AB, et al. **Patients' perceptions and responses to procedural pain: results from Thunder Project II**. Am J Crit Care 2001
- Gelinas C. **Management of pain in cardiac surgery ICU patients**: have we improved over time? Intensive Crit Care Nurs 2007
- Breen D, Karabinis A, Malbrain M, et al. **Decreased duration of mechanical ventilation when comparing analgesia-based sedation using remifentanil with standard hypnotic-based sedation** for up to 10 days in intensive care unit patients: a randomised trial. Crit Care 2005
- Dahaba AA, Grabner T, Rehak PH, et al. **Remifentanil versus morphine analgesia and sedation for mechanically ventilated critically ill patients**: a randomized double blind study. Anesthesiology 2004
- Rozendaal FW, Spronk PE, Snellen FF, et al**. Remifentanil-propofol analgo-sedation shortens duration of ventilation and length of ICU stay compared to a conventional regimen**: a centre randomised, cross-over, open-label study in the Netherlands. Intensive Care Med 2008
- 33. Muellejans B, Matthey T, Scholpp J, et al. **Sedation in the intensive care unit with remifentanil/propofol versus midazolam/fentanyl:** a randomized, open-label, pharmacoeconomic trial. Critical Care 2006

The Role of Postoperative Analgesia in Delirium and Cognitive Decline in Elderly Patients: A Systematic Review

Harold K. Fong, MD, Laura P. Sands, PhD, and Jacqueline M. Leung, MD, MPH

School of Medicine, Department of Anesthesia and Perioperative Care, University of California, San Francisco, California; Purdue University, West Lafayette, Indiana

Postoperative delirium and cognitive decline are adverse events that occur frequently in elderly patients. Preexisting patient factors, medications, and various intraoperative and postoperative causes have been implicated in the development of postoperative delirium and cognitive decline. Despite previous studies identifying postoperative pain as a risk factor, relatively few clinical studies have compared the effect of common postoperative pain management techniques (IV and epidural) or opioid analgesics on postoperative cognitive status. A systematic search of the PubMed and CINAHL databases identified six studies comparing different opioid analgesics on postoperative delirium and cognitive decline and five studies comparing IV and epidural routes of administering analgesia. Meperidine was consistently associated with an increased risk of delirium in elderly surgical patients, but the current evidence has not shown a significant difference in postoperative delirium or cognitive decline among other more frequently used postoperative opioids such as morphine, fentanyl, or hydromorphone. The available studies also suggest that IV or epidural techniques do not influence cognitive function differently. However, future investigations of sufficient study size and more standardized methods of defining outcomes are necessary to confirm the current findings.

(Anesth Analg 2006;102:1255–66)

Early Analgesia

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Morphine Use after Combat Injury in Iraq and Post-Traumatic Stress Disorder

Troy Lisa Holbrook, Ph.D., Michael R. Galarneau, M.S., Judy L. Dye, M.S., R.N., A.N.P., Kimberly Quinn, B.S.N., and Amber L. Dougherty, M.P.H.

Early Analgesia

Morphine Use after Combat Injury in Iraq and Post-Traumatic Stress Disorder

RESULTS

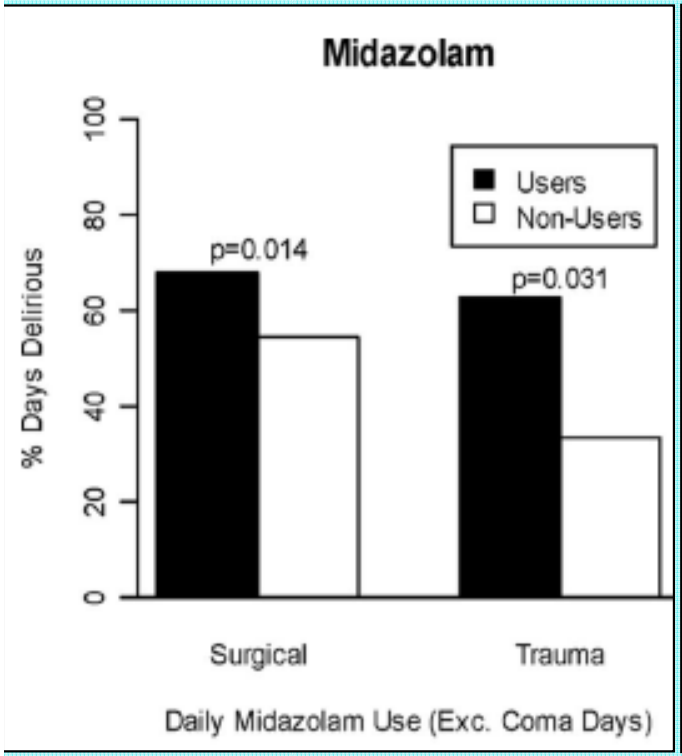
Among the 696 patients studied, 243 received a diagnosis of PTSD and 453 did not. The use of morphine during early resuscitation and trauma care was significantly associated with a lower risk of PTSD after injury. Among the patients in whom PTSD developed, 61% received morphine; among those in whom PTSD did not develop, 76% received morphine (odds ratio, 0.47; P<0.001). This association remained significant after adjustment for injury severity, age, mechanism of injury, status with respect to amputation, and selected injury-related clinical factors.

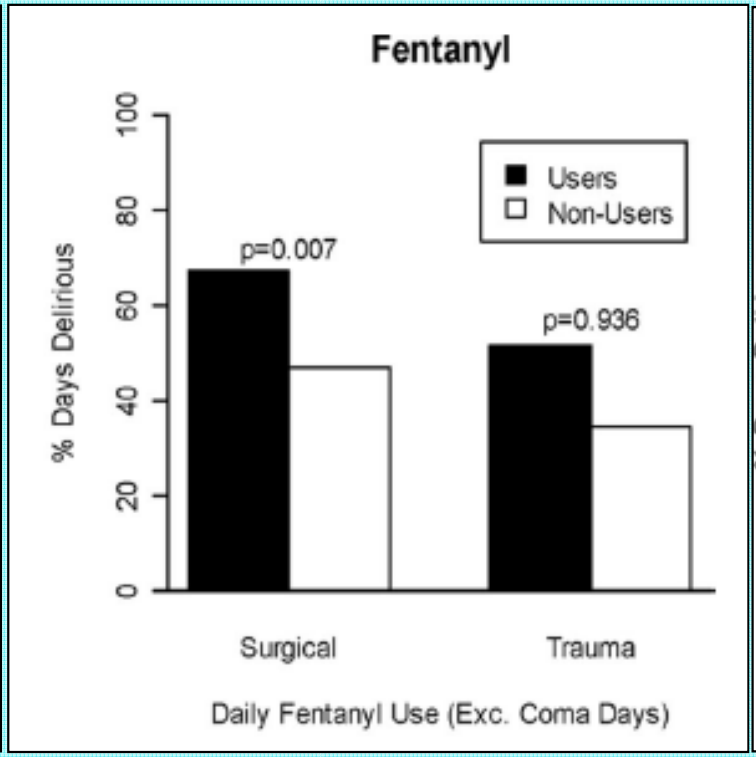
Table 3. Unadjusted and Adjusted Odds Ratios for the Association between Morphine Use and the Risk of PTSD.*

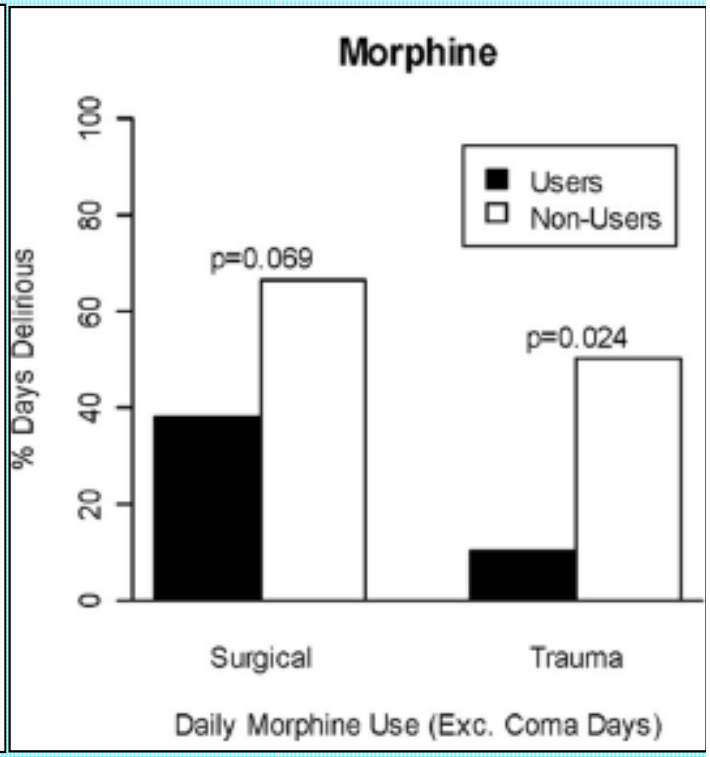
Variable	PTSD (N=243)	No PTSD (N=453)	Unadjusted Odds Ratio (95% CI)	Odds Ratio Adjusted for ISS (95% CI)
	no. (%)			
Morphine use	147 (60)	346 (76)	0.47 (0.34–0.66)†	0.48 (0.34–0.68)†

Analgesia and Delirium

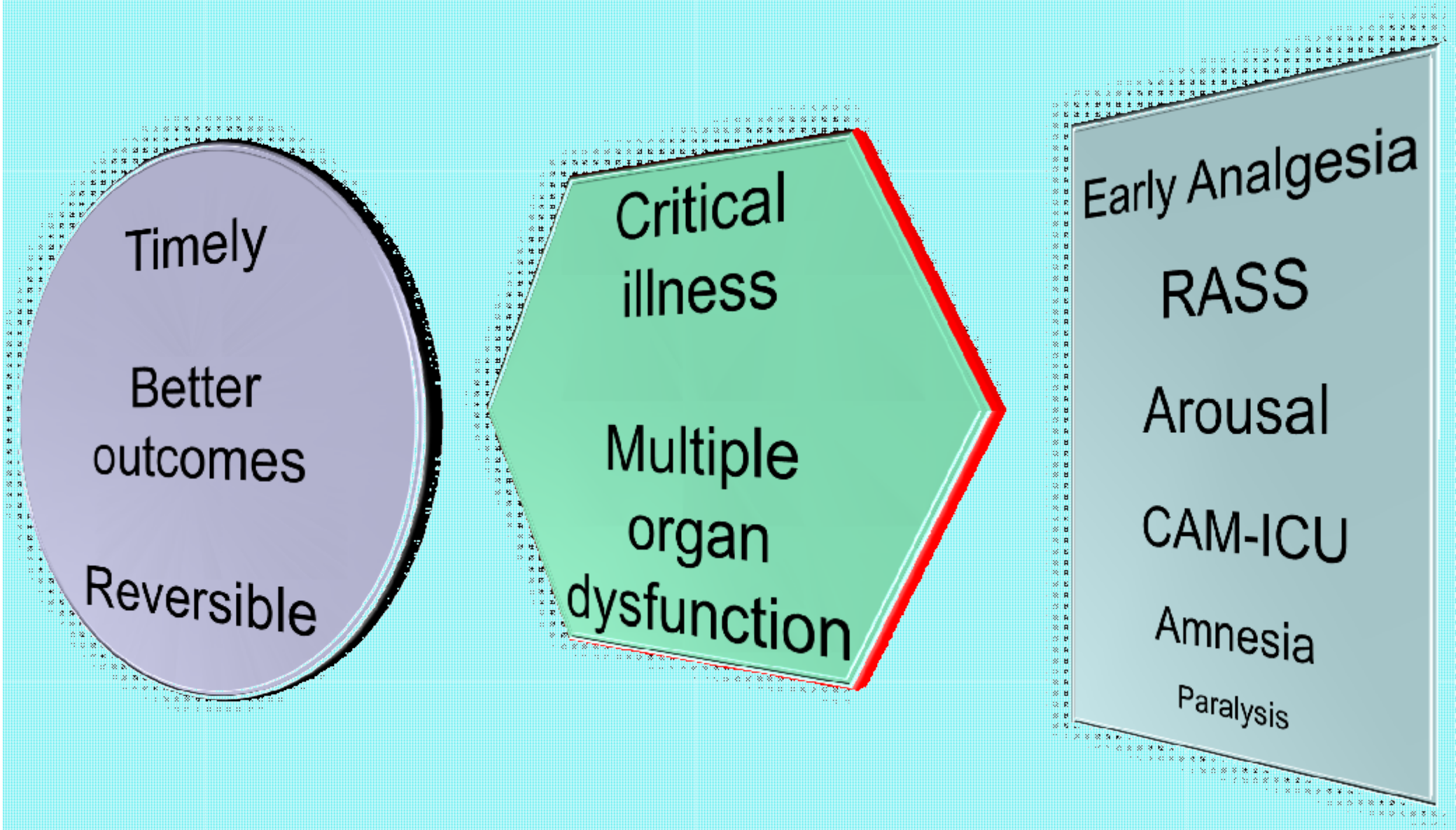
Pandharipande Journal Trauma 2008







Balanced ICU sedation



Midazolam Kinetics in Critically Ill

- Reduced Albumin - Higher free midazolam in critically ill
- First 4 days of treatment, midazolam clearance decreased by 25% and plasma midazolam concentrations increased significantly
- α_1-hydroxymidazolam responsible for prolonged sedative effect
- Good correlation between both median midazolam and α_1-hydroxymidazolam plasma concentrations with the degree of sedation. However, due to high interpatient variability.
- Age effect
  - the younger patients required higher midazolam doses (mean ± SD 71 ± 9 vs 35 ± 6 mg) compared with the older patients to achieve same EEG endpoints.
- Renal impairment
  - significantly reduced clearance of the α_1-hydroxymidazolam metabolite and significantly longer half-lives of both midazolam (mean ± SD clearance 132 ± 21 vs198 ± 32 ml/min) and α_1-hydroxymidazolam (14 ± 2.9 vs186 ± 23 ml/min) compared with patients without renal failure
- Liver
  - Patients with cirrhosis have a significantly prolonged midazolam half-life (mean ± SD 2.89 ± 1.08 vs1.65 ± 26 hrs) compared with patients without cirrhosis

Clinical pharmacokinetic monitoring of midazolam in critically ill patients.
Spina SP, Ensom MH. Pharmacotherapy 2007

Light Sedation

JAMA®

Online article and related content current as of February 2, 2009.

Dexmedetomidine vs Midazolam for Sedation of Critically Ill Patients: A Randomized Trial

Richard R. Riker; Yahya Shehabi; Paula M. Bokesch; et al.

JAMA. published online Feb 2, 2009; (doi:10.1001/jama.2009.56)

http://jama.ama-assn.org/cgi/content/full/2009.56v1

JAMA®

Online article and related content current as of February 2, 2009.

A New Era for Sedation in ICU Patients

Hannah Wunsch; John P. Kress

JAMA. published online Feb 2, 2009; (doi:10.1001/jama.2009.24)

http://jama.ama-assn.org/cgi/content/full/2009.24v1

Light Sedation

Mayo Clin Proc. 2010 Jan;85(1):18-26.

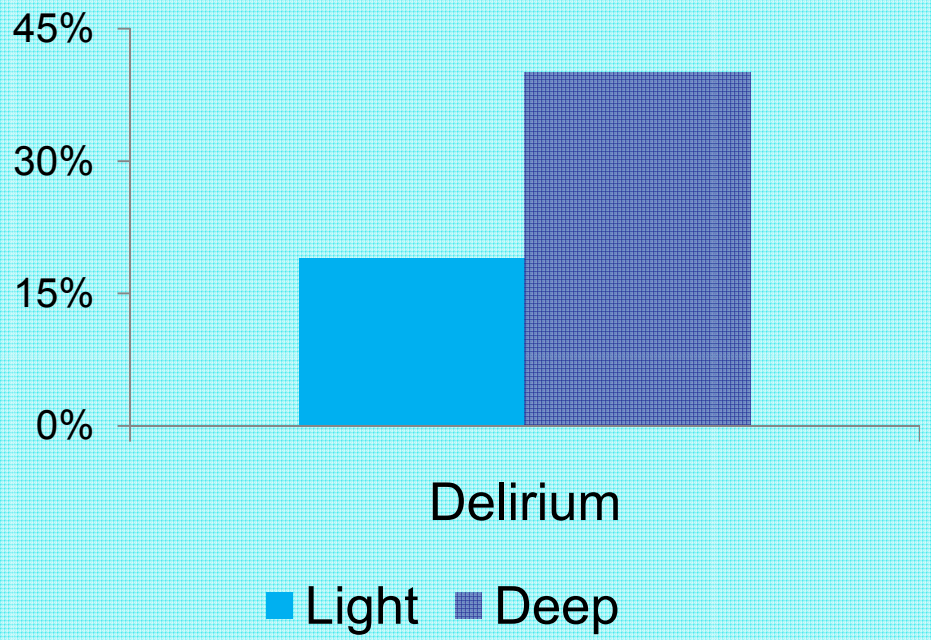
Sedation depth during spinal anesthesia and the development of postoperative delirium in elderly patients undergoing hip fracture repair.

Sieber FE, Zakriya KJ, Gottschalk A, Blute MR, Lee HB, Rosenberg PB, Mears SC.Department of Anesthesiology & Critical Care Medicine, Johns Hopkins Bayview Medical Center, 4940 Eastern Ave, Baltimore, MD 21224, USA. fsieber1@jhmi.edu

Comment in: Mayo Clin Proc. 2010 Jan;85(1):12-4.

Sedation depth

- 114 patients randomised
- Hip replacement/repair under spinal anaesthesia
- Propofol sedation
  - Deep (BIS ± 50) vs Light (BIS ± 80%)
  - 19% vs 40%
  - P=0.02



Sedation strategy and outcome

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.

Methods Of 428 patients assessed for eligibility, we enrolled 140 critically ill adult patients who were undergoing mechanical ventilation and were expected to need ventilation for more than 24 h. Patients were randomly assigned in a 1:1 ratio (unblinded) to receive: no sedation (n=70 patients); or sedation (20 mg/mL propofol for 48 h, 1 mg/mL midazolam thereafter) with daily interruption until awake (n=70, control group). Both groups were treated with bolus doses of morphine (2·5 or 5 mg). The primary outcome was the number of days without mechanical ventilation in a 28-day period, and we also recorded the length of stay in the intensive care unit (from admission to 28 days) and in hospital (from admission to 90 days). Analysis was by intention to treat. This study is registered with ClinicalTrials.gov, number NCT00466492.

Findings 27 patients died or were successfully extubated within 48 h, and, as per our study design, were excluded from the study and statistical analysis. Patients receiving no sedation had significantly more days without ventilation (n=55; mean 13·8 days, SD 11·0) than did those receiving interrupted sedation (n=58; mean 9·6 days, SD 10·0; mean difference 4·2 days, 95% CI 0·3–8·1; p=0·0191). No sedation was also associated with a shorter stay in the intensive care unit (HR 1·86, 95% CI 1·05–3·23; p=0·0316), and, for the first 30 days studied, in hospital (3·57, 1·52–9·09; p=0·0039), than was interrupted sedation. No difference was recorded in the occurrences of accidental extubations, the need for CT or MRI brain scans, or ventilator-associated pneumonia. Agitated delirium was more frequent in the intervention group than in the control group (n=11, 20% vs n=4, 7%; p=0·0400).

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See Online/Comment DOI:10.1016/S0140-6736(10)60103-1

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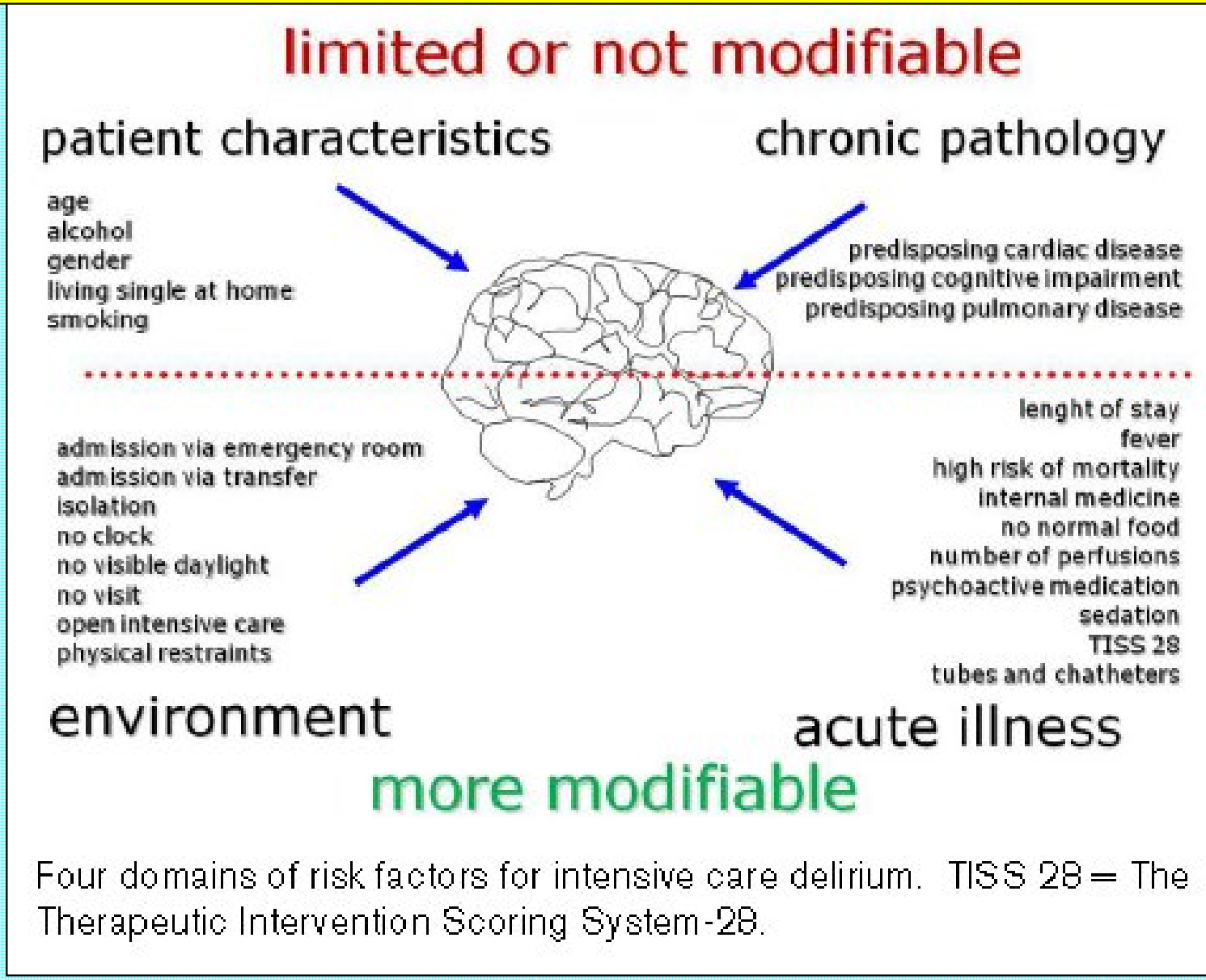
Correspondence to: Dr Thomas Strøm, Department of Anesthesia and Intensive Care Medicine, Odense University Hospital, University of Southern Denmark, 5000 Odense C, Denmark
t.s@dadlnet.dk

	No sedation (n=55)	Sedation (n=58)	p value
Days without MV	13(11.8);18(0-24)	9·6 (10·0); 6·9 (0–20·5)	0·0191
LOS ICU	13·1 (5·7–..)	22·8 (11·7–..)	0·0316*
LOS Hosp	34 (17–65)	58 (33–85)	0·0039*
Mortality ICU	12 (22%)	22 (38%)	0·06
Mortality Hosp	20 (36%)	27 (47%)	0·27
Drug doses mg/kg)			
Propofol /h/infusion	0 (0–0·515)	0·773 (0·154–1·648)	0·0001
Midazolam	0 (0–0)	0·0034 (0–0·0240)	<0·0001
Morphine (per h of mech.ventilation)	0·0048 (0·0014–0·0111)	0·0045 (0·0020–0·0064)	0·39
Haloperidol /day / mech.ventilation	0 (0–0·0145)	0 (0–0)	0·0140
Tracheostomy	16 (29%)	17 (29%)	0·98
VAP	6 (11%)	7 (12%)	0·85
Agitated delirium	11 (20%)	4 (7%)	0.04


People were coming to get me , they came on horses, they were killing people

Risk factors for delirium in intensive care patients: a prospective cohort study

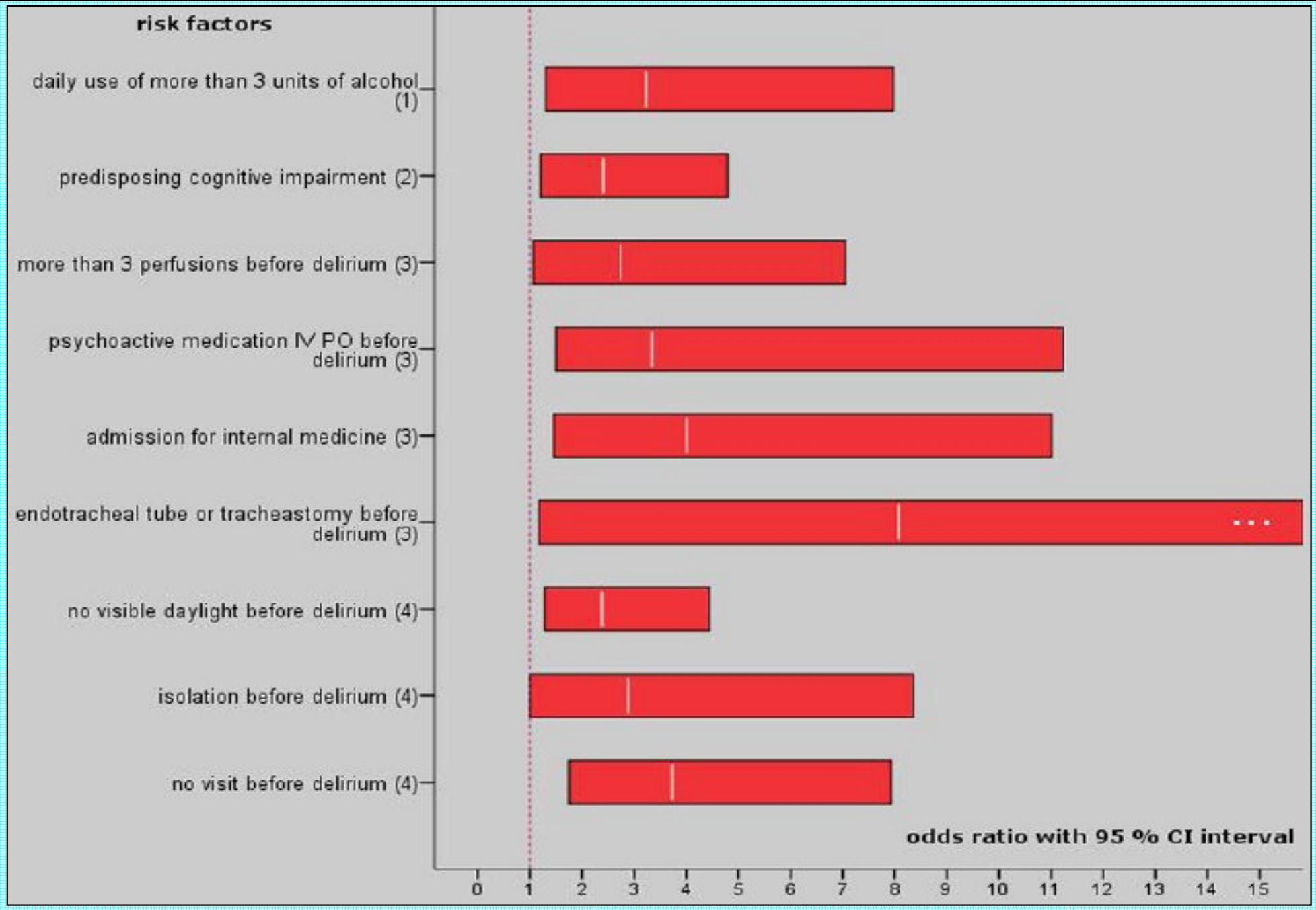
Bart Van Rompaey Critical Care 2009



Four domains of risk factors for intensive care delirium. TISS 28 = The Therapeutic Intervention Scoring System-28.

Risk factors for delirium in intensive care patients: a prospective cohort study

Bart Van Rompaey Critical Care 2009



Intensive Care Med (2004) 30:2188–2196
DOI 10.1007/s00134-004-2417-z

ORIGINAL

Yahya Shehabi
Urban Ruettimann
Harriet Adamson
Richard Innes
Mathieu Ickeringill

Dexmedetomidine infusion for more than 24 hours in critically ill patients: sedative and cardiovascular effects

JAMA®

Online article and related content current as of May 6, 2008.

Effect of Sedation With Dexmedetomidine vs Lorazepam on Acute Brain Dysfunction in Mechanically Ventilated Patients: The MENDS Randomized Controlled Trial

Pratik P. Pandharipande; Brenda T. Pun; Daniel L. Herr; et al.

JAMA. 2007;298(22):2644-2653 (doi:10.1001/jama.298.22.2644)

http://jama.ama-assn.org/cgi/content/full/298/22/2644

Online article and related content current as of February 2, 2009.

Dexmedetomidine vs Midazolam for Sedation of Critically Ill Patients: A Randomized Trial

Richard R. Riker; Yahya Shehabi; Paula M. Bokesch; et al.

JAMA. published online Feb 2, 2009; (doi:10.1001/jama.2009.56)

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A New Era for Sedation in ICU Patients

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http://jama.ama-assn.org/cgi/content/full/2009.24v1

Dexmedetomidine vs Midazolam for Sedation of Critically Ill Patients

A Randomized Trial

Richard R. Riker, MD
Yahya Shehabi, MD
Paula M. Bokesch, MD
Daniel Ceraso, MD
Wayne Wisemandle, MA
Firas Koura, MD
Patrick Whitten, MD
Benjamin D. Margolis, MD
Daniel W. Byrne, MS
E. Wesley Ely, MD, MPH
Marcelo G. Rocha, MD
for the SEDCOM (Safety and Efficacy of Dexmedetomidine Compared With Midazolam) Study Group

Context γ-Aminobutyric acid receptor agonist medications are the most commonly used sedatives for intensive care unit (ICU) patients, yet preliminary evidence indicates that the α_2 agonist dexmedetomidine may have distinct advantages.

Objective To compare the efficacy and safety of prolonged sedation with dexmedetomidine vs midazolam for mechanically ventilated patients.

Design, Setting, and Patients Prospective, double-blind, randomized trial conducted in 68 centers in 5 countries between March 2005 and August 2007 among 375 medical/surgical ICU patients with expected mechanical ventilation for more than 24 hours. Sedation level and delirium were assessed using the Richmond Agitation-Sedation Scale (RASS) and the Confusion Assessment Method for the ICU.

Interventions Dexmedetomidine (0.2-1.4 μg/kg per hour [n=244]) or midazolam (0.02-0.1 mg/kg per hour [n=122]) titrated to achieve light sedation (RASS scores between −2 and +1) from enrollment until extubation or 30 days.

Main Outcome Measures Percentage of time within target RASS range. Secondary end points included prevalence and duration of delirium, use of fentanyl and open-label midazolam, and nursing assessments. Additional outcomes included duration of mechanical ventilation, ICU length of stay, and adverse events.

Results There was no difference in percentage of time within the target RASS range (77.3% for dexmedetomidine group vs 75.1% for midazolam group; difference, 2.2% [95% confidence interval [CI], −3.2% to 7.5%]; $P=.18$). The prevalence of delirium during treatment was 54% (n=132/244) in dexmedetomidine-treated patients vs 76.6% (n=93/122) in midazolam-treated patients (difference, 22.6% [95% CI, 14% to 33%]; $P<.001$). Median time to extubation was 1.9 days shorter in dexmedetomidine-treated patients (3.7 days [95% CI, 3.1 to 4.0] vs 5.6 days [95% CI, 4.6 to 5.9]; $P=.01$), and ICU length of stay was similar (5.9 days [95% CI, 5.7 to 7.0] vs 7.6 days [95% CI, 6.7 to 8.6]; $P=.24$). Dexmedetomidine-treated patients were more likely to develop bradycardia (42.2% [103/244] vs 18.9% [23/122]; $P<.001$), with a nonsignificant increase in the proportion requiring treatment (4.9% [12/244] vs 0.8% [1/122]; $P=.07$), but had a lower likelihood of tachycardia (25.4% [62/244] vs 44.3% [54/122]; $P<.001$) or hypertension requiring treatment (18.9% [46/244] vs 29.5% [36/122]; $P=.02$).

Conclusions There was no difference between dexmedetomidine and midazolam in time at targeted sedation level in mechanically ventilated ICU patients. At comparable sedation levels, dexmedetomidine-treated patients spent less time on the ventilator, experienced less delirium, and developed less tachycardia and hypertension. The most notable adverse effect of dexmedetomidine was bradycardia.

Trial Registration clinicaltrials.gov Identifier: NCT00216190

JAMA. 2009;301(5):489-499 www.jama.com

PROVIDING SEDATION FOR PATIENT comfort is an integral component of bedside care for nearly every patient in the intensive care unit (ICU). For decades, γ-aminobutyric acid (GABA) receptor agonists (including propofol and benzodiazepines such as midazolam) have been the most commonly administered sedative drugs for ICU patients worldwide.[1-5] Practice guidelines for providing sedation in the ICU have identified the need for well-designed randomized trials comparing the effectiveness of different sedative agents for important clinical outcomes.[1] Despite the well-known hazards associated with prolonged use of GABA agonists,[6-12] few investigations of ICU sedation have compared these agents to other drug

Anesthesiology 2009; 111:1074–83

Prevalence of Delirium with Dexmedetomidine Compared with Morphine Based Therapy after Cardiac Surgery

A Randomized Controlled Trial (DEXmedetomidine COmpared to Morphine-DEXCOM Study)

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Background: **Commonly used sedatives/analgesics can increase the risk of postoperative complications, including delirium. This double-blinded study assessed the neurobehavioral, hemodynamic, and sedative characteristics of dexmedetomidine compared with morphine-based regimen after cardiac surgery at equivalent levels of sedation and analgesia.**

Methods: **A total of 306 patients at least 60 yr old were randomized to receive dexmedetomidine (0.1–0.7 $\mu g \cdot kg^{-1} \cdot h^{-1}$) or morphine (10–70 $\mu g \cdot kg^{-1} \cdot h^{-1}$) with open-label propofol titrated to a target Motor Activity Assessment Scale of 2–4. Primary outcome was the prevalence of delirium measured daily *via* Confusion Assessment Method for intensive care. Secondary outcomes included ventilation time, additional sedation/analgesia, and hemodynamic and adverse effects.**

Results: **Of all sedation assessments, 75.2% of dexmedetomidine and 79.6% ($P = 0.516$) of morphine treatment were in the target range. Delirium incidence was comparable between dexmedetomidine 13 (8.6%) and morphine 22 (15.0%) (relative risk 0.571, 95% confidence interval [CI] 0.256–1.099, $P = 0.088$), however, dexmedetomidine-managed patients spent 3 fewer days (2 [1–7] *versus* 5 [2–12]) in delirium (95% CI 1.09–6.67, $P = 0.0317$). The incidence of delirium was significantly less in a small subgroup requiring intraaortic balloon pump and treated with dexmedetomidine (3 of 20 [15%] *versus* 9 of 25 [36%]) midine-treated patients were more likely to be extubated earlier (relative risk 1.27, 95% CI 1.01–1.60, $P = 0.040$, log-rank $P = 0.036$), experienced less systolic hypotension (23% *versus* 38.1%, $P = 0.006$), required less norepinephrine ($P < 0.001$), but had more bradycardia (16.45% *versus* 6.12%, $P = 0.006$) than morphine treatment.**

Conclusion: **Dexmedetomidine reduced the duration but not the incidence of delirium after cardiac surgery with effective analgesia/sedation, less hypotension, less vasopressor requirement, and more bradycardia *versus* morphine regimen.**

ANALGESIA and sedation is an important component of the postoperative management of cardiac surgery patients. However, no single agent or combination of agents have shown a clear superiority in improving clinically relevant outcomes such as delirium.[1–3]

Delirium is a very common complication in older people admitted to hospital.[4,5] Given its high incidence, the consequences of delirium place a substantial burden on both patients and healthcare systems as a result of increased morbidity, decline in long-term cognitive function, and higher mortality rates.[6–7]

Anaesth Intensive Care 2010; 38:

The effect of dexmedetomidine on agitation during weaning of mechanical ventilation in critically ill patients

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SUMMARY

Ventilated patients receiving narcotics and/or benzodiazepines are at high risk of developing agitation, particularly upon weaning towards extubation. This is often associated with an increased intubation time and length of stay in the intensive care unit and may cause long-term morbidity. Anxiety, fear and agitation are amongst the most common non-pulmonary causes of failure to liberate from mechanical ventilation. This prospective, open-label observational study examined 28 ventilated adult patients in the intensive care unit (30 episodes) requiring narcotics and/or sedatives for >24 hours, who developed agitation and/or delirium upon weaning from sedation and failed to achieve successful extubation with conventional management. Patients were ventilated for a median (interquartile range) of 115 [87 to 263] hours prior to enrolment. Dexmedetomidine infusion was commenced at 0.4 μg/kg/hour for two hours, after which concurrent sedative therapy was preferentially weaned and titrated to obtain target Motor Activity Assessment Score score of 2 to 4. The median (range) maximum dose and infusion time of dexmedetomidine was 0.7 μg/kg/hour (0.4 to 1.0) and 62 hours (24 to 252) respectively. The number of episodes at target Motor Activity Assessment Score score at zero, six and 12 hours after commencement of dexmedetomidine were 7/30 (23.3%), 28/30 (93.3%) and 26/30 (86.7%), respectively (P <0.001 for 6 and 12 vs 0 hours). Excluding unrelated clinical deterioration, 22 episodes (73.3%) achieved successful weaning from ventilation with a median (interquartile range) ventilation time of 70 (28 to 96) hours after dexmedetomidine infusion. Dexmedetomidine achieved rapid resolution of agitation and facilitated ventilatory weaning after failure of conventional therapy. Its role as first-line therapy in ventilated, agitated patients warrants further investigation.

Key Words: dexmedetomidine, agitation, ventilation weaning, sedation, critical care

Research

Open Access

Dexmedetomidine vs. haloperidol in delirious, agitated, intubated patients: a randomised open-label trial

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Box 1
Important research findings that should guide ICU sedation practice

1. Routine daily ICU care procedures are among the most painful or stressful events reported by patients[27,28]
2. Providing analgesia before sedation may reduce sedation requirements and shorten ventilator time[29–33]
3. Dangerous adverse effects associated with sedative medications are better understood, including prolonged effects of midazolam,[34,35] propylene glycol toxicity with lorazepam,[36,37] delirium with benzodiazepines,[38–40] propofol infusion syndrome,[41–43] and bradycardia associated with dexmedetomidine[38,44]
4. Dexmedetomidine reduces the incidence of delirium,[44,45] shortens ventilator time,[44,46] and appears cost-effective, relative to the GABA agonists[47,48]
5. New monitoring tools help detect ICU delirium[23–26] and better define pain among nonverbal ICU patients[49,50]
6. Cognitive sequelae among critical illness survivors are beginning to be characterized[51,52]

R. Riker Crit Care Clin 25 (2009) 527–538

Commentary

Sedation practice: is it time to wake up and embrace change?

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See related research by Martin *et al.*, http://ccforum.com/content/11/6/R124

Changing Sedation Practice

Critical Care

CRITICAL CARE

Sedation Practice in the Intensive Care Unit: A UK National Survey

Henrik Reschreiter; Matt Maiden; Atul Kapila
Crit Care. 2008;12(6)
Posted 03/03/2009

Abstract and Introduction

Abstract

Introduction: The purpose of this study was to evaluate sedation practice in UK intensive care units (ICUs), particularly the implementation of daily sedation holding, written sedation guidelines, sedation scoring tools and choice of agents.
Methods: A national postal survey was conducted in all UK ICUs.
Results: A total of 192 responses out of 302 addressed units were received (63.5%). Of the responding ICUs, 88% used a sedation scoring tool, most frequently the Ramsey Sedation Scale score (66.4%). The majority of units have a written sedation guideline (80%), and 78% state that daily sedation holding is practiced. A wide variety of sedating agents is used, with the choice of agent largely determined by the duration of action rather than cost. The most frequently used agents were propofol and alfentanil for short-term sedation; propofol, midazolam and morphine for longer sedation; and propofol for weaning purposes.
Conclusions: Most UK ICUs use a sedation guideline and sedation scoring tool. The concept of sedation holding has been implemented in the majority of units, and most ICUs have a written sedation guideline.

Agents used by expected ICU LOS

Expected length of stay in the ICU	<24 hours	>24 hours	Weaning
For sedation			
Propofol	181	111	65
Midazolam	23	136	8
Clonidine	2	20	22
Lorazepam	2	13	3
Haloperidol	1	5	7
Diazepam	1	2	1
For analgesia			
Morphine	51	125	14
Fentanyl	45	46	16
Alfentanil	96	67	24
Remifentanil	43	11	24
Ketamine	1	3	0

Critical Care

CRITICAL CARE

Changes in sedation management in German intensive care units between 2002 and 2006: a national follow up survey

Critical Care 2007, **11**:R124 doi:10.1186/cc6189

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Table 2 - Sedation practices in 2002 and 2006

	2002 (n=220)	2006 (n=214)	p-value
	Percent (95 % CI)		
Sedation score	8 (-4 – 20)	51 (41-60)	< 0.001
Sedation protocol	21 (9 – 32)	46 (36 -56)	< 0.001
Medication selection according to sedation duration	92 (88 – 96)	93 (89 -97)	0.5
Oral procedure instructions	44 (33- 53)	93 (89- 97)	<0.001
Day-night rhythm	81 (75 – 87)	88 (84 – 94)	<0.001
Consideration of costs affecting drug selection	62 (54 – 70)	55 (46 – 64)	0.4

Chi-square test used to calculate p-values (n = number of positive answers, CI = confidence interval).

Sedation duration	< 24 hours			24 - 72 hours		
	Percent (95% CI)		P-value	Percent (95% CI)		P-value
Year	2002 (n=220)	2006 (n=214)		2002 (n=220)	2006 (n=214)	
Midazolam	45.9 (36.1-55.6)	34.6 (23.7-45.4)	<0.001	77.3 (71.0-83.6)	62.2 (53.9-70.4)	<0.001
Propofol	81.4 (75.7-87.1)	82.7 (77.1-88.3)	0.6	55,9 (47.2-64.7)	67.3 (59.6-74.9)	<0.001
Remifentanil	5.9 (-6.9-18.7)	16.8 (4.6-29.0)	<0.001	2.3 (-10.8-15.3)	7.9 (-4.9-20.8)	<0.002
Fentanyl	40.0 (29.8-50.3)	27.1 (15.7-38.5)	<0.001	55.9 (47.1-64.7)	40.7 (30.3-51.0)	<0.001
Sufentanil	35.0 (24.4-45.7)	41.6 (31.4-51.8)	<0.05	47.7 (38.2-57.3)	58.4 (49.8-67.1)	<0.002
Piritramide	38.2 (27.8-48.6)	35.1 (24.3-45.8)	0.3	15.5 (3.3-27.6)	16.8 (4.6-29.0)	0.6
Morphine	8.6 (-4.0-21.3)	7.5 (-5.4-20.4)	0.5	4.5 (-8.4-17.5)	7.9 (-4.9-20.8)	0.06

Use of intravenous infusion sedation among mechanically ventilated patients in the United States*

Hannah Wunsch, MD, MSc; Jeremy M. Kahn, MD, MSc; Andrew A. Kramer, PhD; Gordon D. Rubenfeld, MD, MSc

Objectives: Many studies compare the efficacy of different forms of intravenous infusion sedation for critically ill patients, but little is known about the actual use of these medications. We sought to describe current use of intravenous infusion sedation in mechanically ventilated patients in U.S. intensive care units.

Design: Retrospective cohort study of intravenous infusion sedation among mechanically ventilated patients. Intravenous sedatives examined included benzodiazepines (midazolam and lorazepam), propofol, and dexmedetomidine. Use was defined as having received an intravenous infusion for any time period during the stay in intensive care.

Setting: One hundred seventy-four intensive care units contributing data to Project IMPACT from 2001 through 2007.

Patients: All patients who received mechanical ventilation.

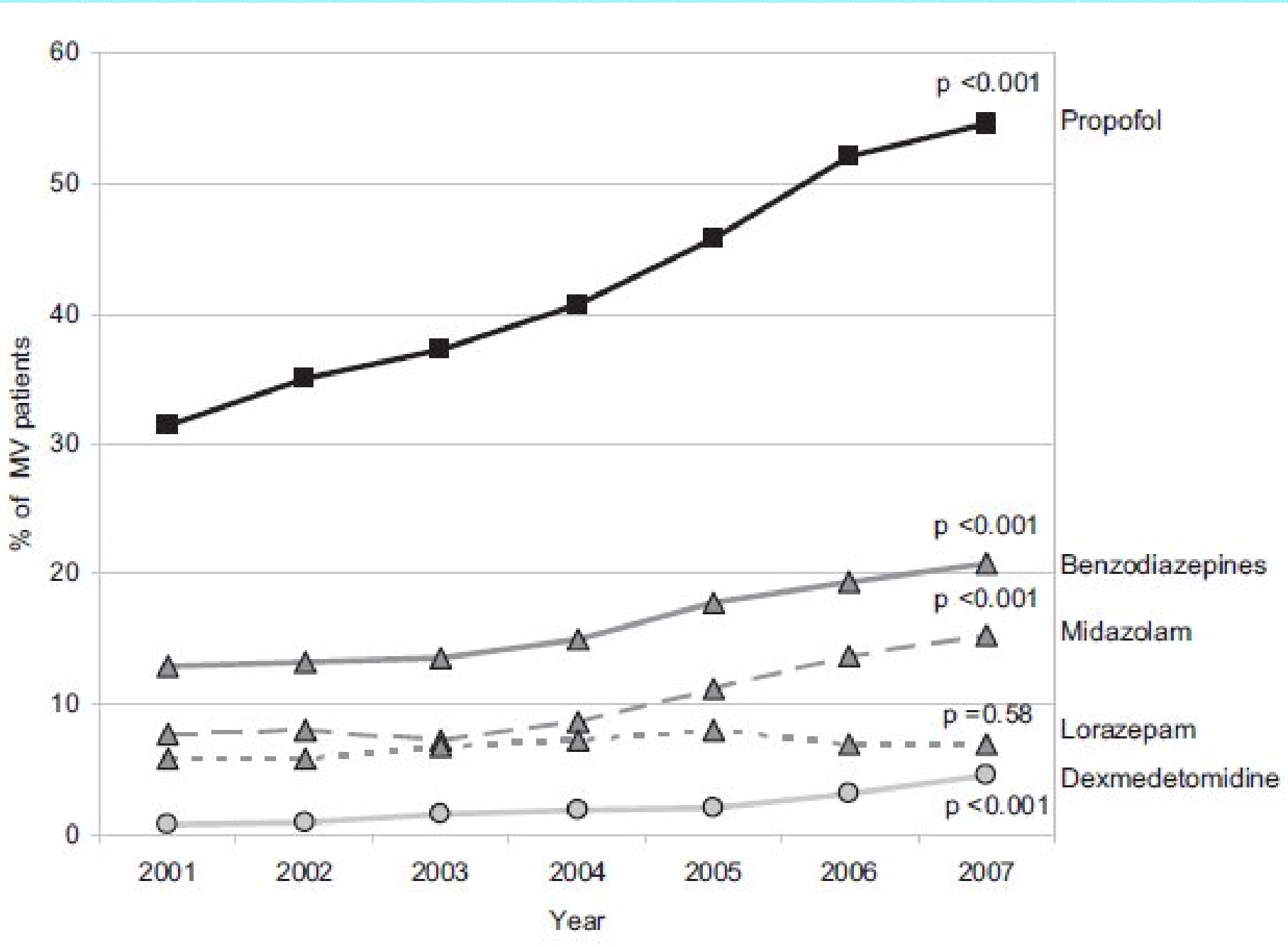
Interventions: None.

Measurements and Main Results: Of 109,671 mechanically ventilated patients, 56,443 (51.5%, 95% confidence interval 51.2–51.8) received one or more intravenous infusion sedatives. Sedative use increased over time, from 39.7% (38.7–40.6) of patients in 2001 to 66.7% (65.7–67.7) in 2007 ($p < .001$). Most patients who received intravenous infusion sedation received propofol (82.2%, 81.9–82.5) vs. benzodiazepines (31.1%, 30.7–31.5) or dexmedetomidine (4.0%, 3.8–4.2). Of the patients, 66.2% (65.8–66.6) received only propofol, and 16.2% (15.9–16.5) only benzodiazepines. Among patients mechanically ventilated >96 hrs, propofol infusions were more common. Intravenous infusion narcotics (fentanyl, morphine, or hydromorphone) were used more frequently among patients who received benzodiazepines (70.1%, 69.1–71.0) compared with propofol (23.9%, 23.5–24.3), $p < .001$.

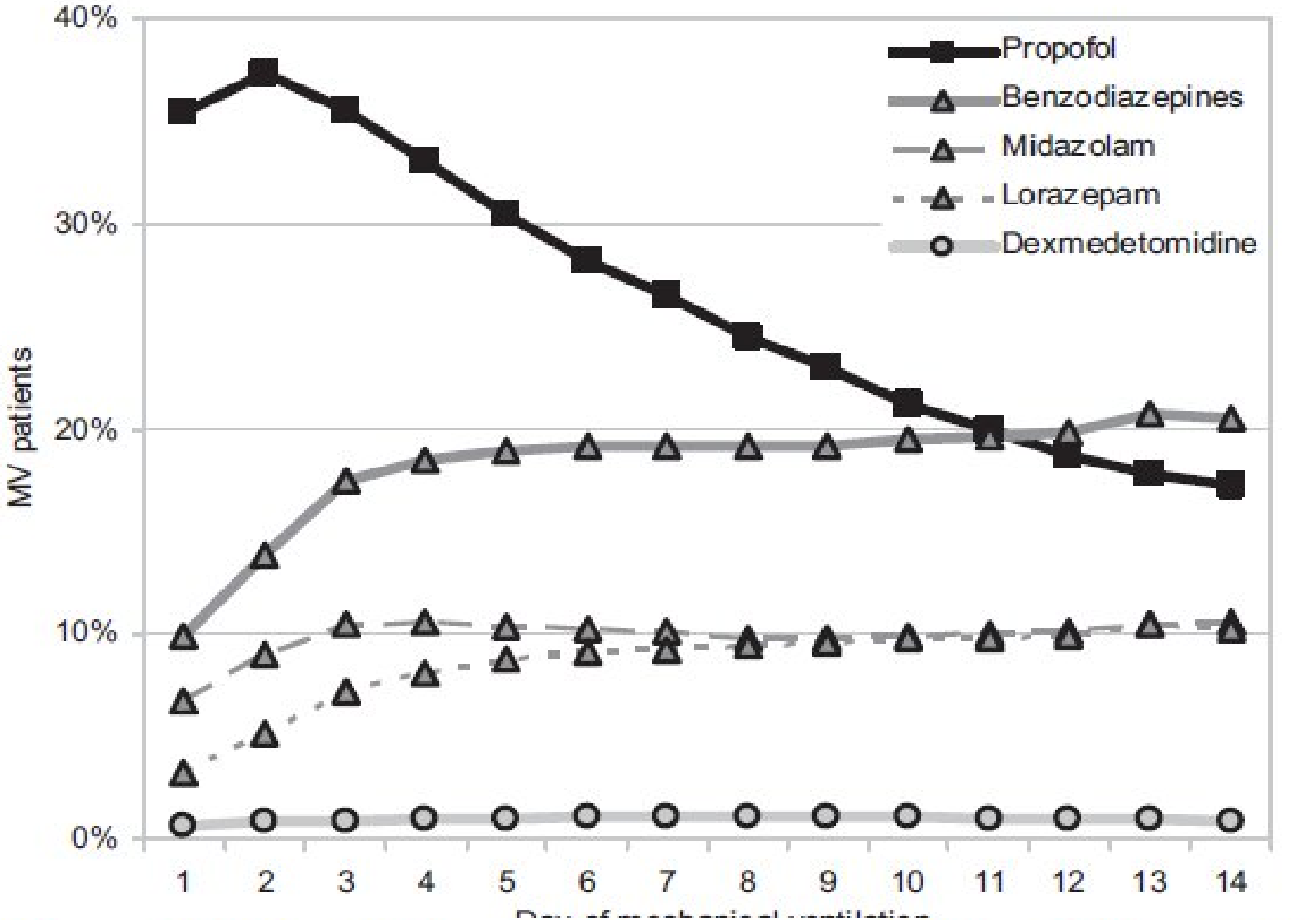
Conclusions: The percentage of mechanically ventilated patients receiving intravenous infusion sedation has increased over time. Sedation with an infusion of propofol was much more common than with benzodiazepines or dexmedetomidine, even for patients mechanically ventilated beyond 96 hrs. (Crit Care Med 2009; 37:3031–3039)

KEY WORDS: intensive care unit; sedation; propofol; benzodiazepine; dexmedetomidine; United States

Trends in IV sedation over time
GEE corrected



IV infusion of ventilated patients each day



ANZICS CTG Point Prevalence Program 2010

Seppelt, Glass and Taylor

- 582 pts in 41 ICUs.
  - Sepsis criteria 24.5%
  - APACHEII 18.6
- Ventilated 52%
  - Sedation score 58%
  - RASS most common score
  - Target sedation 35%
  - 1/3 no sedative drugs
    - More propofol less midazolam
  - 17% Planned interruption
  - 3% delirium assessment

Australian and New Zealand Sedation Practices in Intensive Care

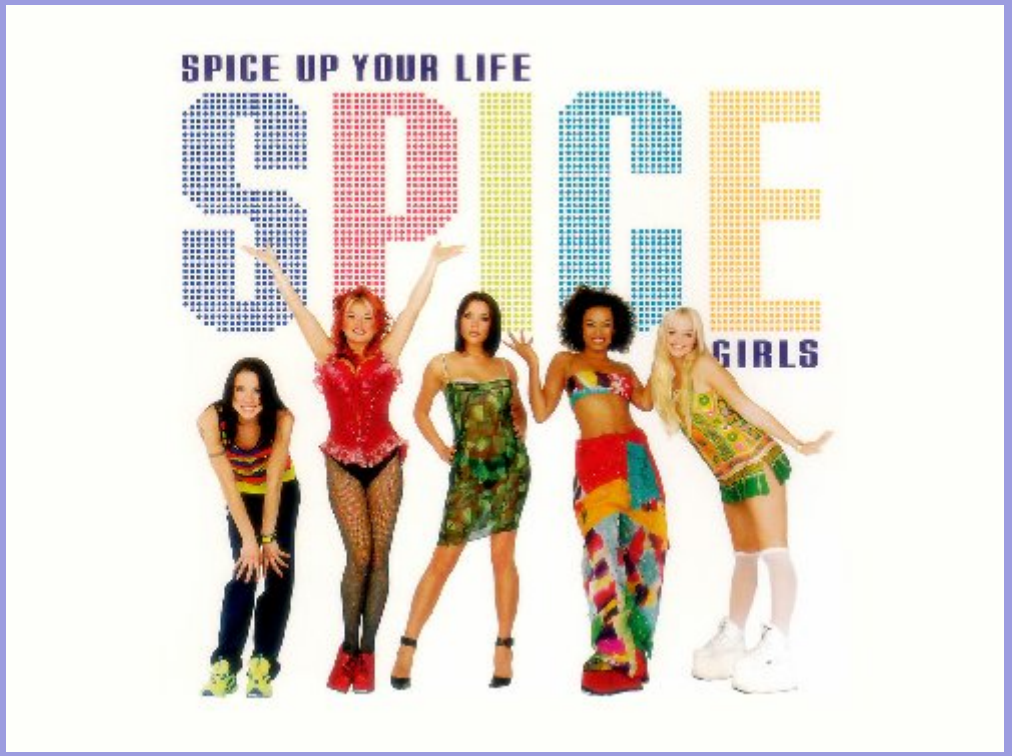
S P I C E

Chief Investigator

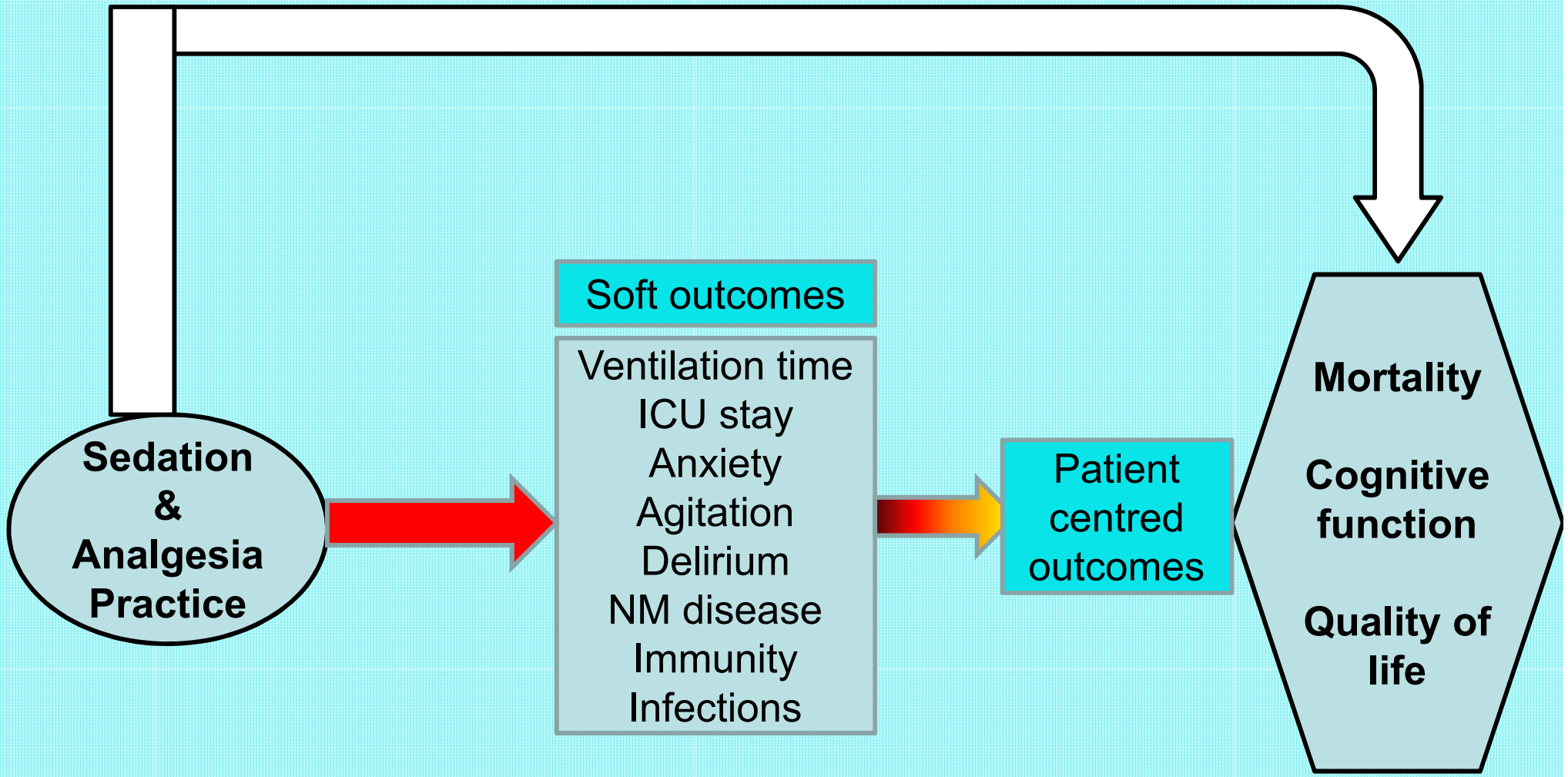
Yahya Shehabi

Principal investigators

Rinaldo Bellom
Steve Webb
John Myburgh
Michael Reade
Ian Seppelt
Frances Bass
Leonie Weisbrodt

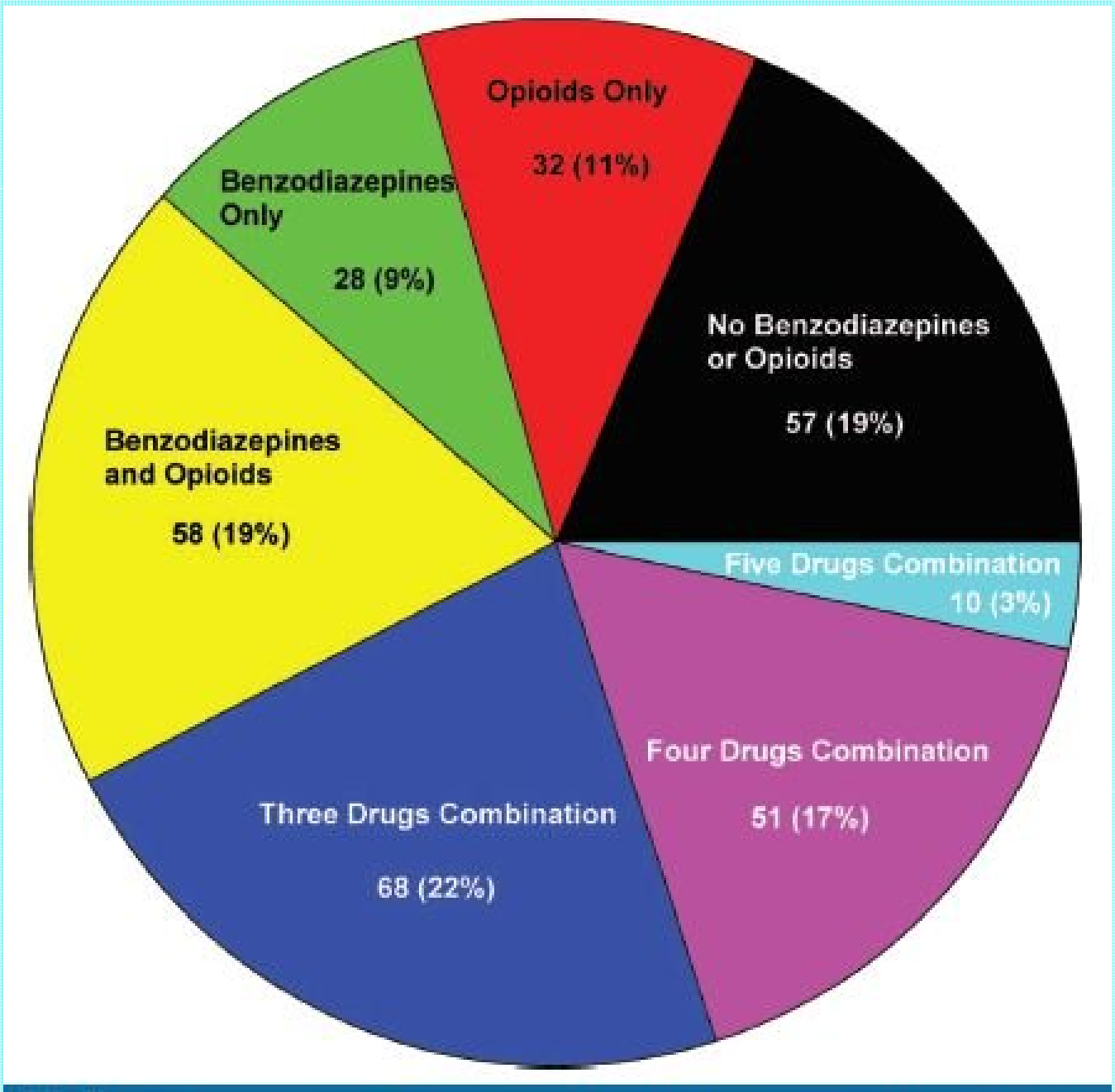


Our ultimate objective



Benzodiazepine and Opioid use and the Duration of Intensive Care Unit Delirium in an Older Population

Margaret A. Pisani CCM 2009 37(1)



Open minds can only enhance intelligent minds . . .

. . We must stop thinking about Sedation drugs . .

We must focus on **Sedation Strategy** , drugs are a means to achieve it . . “

Review Article

Crit Care & Shock (2010) 13:18-21

Clinical application, the use of dexmedetomidine in intensive care sedation

Yahya Shehabi, John A. Botha, David Ernest, Ross C. Freebairn, Michael Reade, Brigit L. Roberts, Ian Seppelt, Leonie Weisbrodt

Complex surgical procedures

Critically ill ventilated patients > 24 hours

Transition from other IV sedatives

Tomorrow is upon us . . .

“. . . Change is the law of life. And those who look only to the past or present are certain to miss the future . . .”

JFK


SCIENTIA
MANU ET MENTE


THE PRINCE OF WALES HOSPITAL