



# Kritický stav a dlouhodobé následky – lze jim zabránit ?

**Vladimír Černý**

Klinika anesteziologie, resuscitace a intenzivní medicíny,  
Univerzita Karlova v Praze, Lékařská fakulta v Hradci Králové,  
Fakultní nemocnice Hradec Králové

Dept. of Anesthesia, Pain Management and Perioperative Medicine,  
Dalhousie University, Halifax, Nova Scotia, Canada





**“THREE SISTERS”**, Blue Mountains, Australia, 2000



# Obsah

- 1) **Mění se základní pohled na vnímání “úspěchu” v intenzivní péči ?**
- 2) **“Long-term” komplikace/následky – jaká je evidence ?**
- 3) **Co dělat jinak než doposud ? Děláme vše co je možné ?**



***V čem je “ta” změna ?***

**“ICU survival” – je to vždy náš  
úspěch ?**

**Kde je opravdový smysl, cíl a  
účel intenzivní péče ...**

A blue-tinted landscape photograph featuring a sunburst breaking through a cloud over a body of water. The sunburst is the central focus, with rays of light extending downwards. The background shows a horizon line with distant mountains under a deep blue sky. The entire image is framed by a white border.

**ATTENTION**

**PARADIGM SHIFT**



# Long-Term Outcomes After Critical Illness: With All Thy Getting, Get Understanding\*

Greg S. Martin, MD, MSc, FCCM  
Department of Medicine  
Emory University  
Atlanta, GA

May 2013 • Volume 41 • Number 5

## Challenges and possible solutions for long-term follow-up of patients surviving critical illness

Teresa A. Williams RN, ICU Cert, M Hlth Sci (Res), PhD<sup>a,b,\*</sup>,  
Gavin D. Leslie RN, ICU Cert, PhD<sup>c,1</sup>

*Australian Critical Care* (2011) 24, 175–185

**Propuštění z ICU nemůže být nadále synonymem “good clinical outcome” !!!**

**Přežití “critical illness”  
= doživotní hendikep ?**

Plenary | 43rd Critical Care Congress

**Presidential Address**

**J. Christopher FARMER, MD, FCCM**  
Professor of Medicine and Consultant  
in Critical Care Medicine  
Mayo Clinic  
Phoenix, Arizona, USA

**Table of Contents:**

- Presidential Address - J. Christopher Farmer, MD, FCCM
- From Meritism to Safe Design in the ICU  
Peter J. Pronovost, MD, PhD, FCCM
- Four Centuries of Biomedical Research in the US Army Medical Corps: Benefits and Challenges  
Basil A. Pruitt Jr., MD, FACS, MCCM
- Don't Just Do Something, Stand There

02:38

The future of critical care medicine is ...



- 1) **Critical care will be everywhere around us**
- 2) **Family is part of critical care team**
- 3) **Our goal is define who is the most likely to benefit from life saving care on ICU**

***4) “We should prevent the badness of intensive care ...”***



# “Long-term” ICU následky

*Jaká je evidence ?*

Kdy (a zda vůbec) dojde k úplnému zotavení orgánových funkcí ?

Jaké systémy jsou nejvíce postiženy ?

Lze se následkům vyhnout nebo je minimalizovat ?



MEDICINE AND SOCIETY

## Chronic Critical Illness

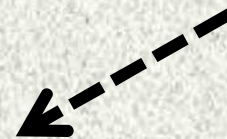
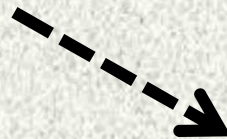
Daniela Lamas, M.D.

N ENGL J MED 370;2 NEJM.ORG JANUARY 9, 2014

ICU complications



Chronic critical illness



Poor long-term clinical outcome or death



- **Jen cca 12% “ICU survivors” je soběstačných po 1 roce od propuštění z nemocnice**
- **10% ICU pacientů přejde do kategorie “long term ICU patients”, z nich ...**
- **50% nepřežije jeden rok**



# Jaké jsou nejčastější dlouhodobé komplikace ?

Concise Definitive Review **=====** Section Editor, Jonathan E. Sevransky, MD, MHS

Long-term complications of critical care

Sanjay V. Desai, MD; Tyler J. Law, BHSc; Dale M. Needham, MD, PhD

Crit Care Med 2011 Vol. 39, No. 2

**Table 1. Long-term complications, selected risk factors, and management suggestions**

Complication	Description	Selected Risk Factors	Natural History	Management Suggestions
Pulmonary	Impairment in spirometry, lung volumes and diffusion capacity	Diffusion capacity: duration of mechanical ventilation	Generally mild and improves during first year, but can persist to $\geq 5$ yrs	
Neuromuscular	Includes critical illness polyneuropathy and myopathy	Hyperglycemia Systemic inflammatory response syndrome Sepsis Multiorgan dysfunction	Polyneuropathy may recover more slowly than myopathy; can extend to 5 yrs	Glycemic control Limit corticosteroids and neuromuscular blockers
Physical function	Disuse atrophy Impairment in activities and instrumental activities of daily living and 6-min walk distance	Immobility/bed rest Systemic corticosteroids ICU-acquired illnesses Slow resolution of lung injury Age Preexisting impairment of instrumental activities of daily living	Some improvement within months, but impairments in activities of daily living may be seen at 1 yr and in instrumental activities of daily living at 2 yrs Long-lasting impairment in 6-min walk distance vs. population norms May decrease over first year	Early rehabilitation (below) Early rehabilitation in ICU continued throughout post-ICU recovery
Psychiatric symptoms	Depression	Traumatic/delusional memories of ICU, sedation, psychiatric symptoms at discharge, impairment of physical function		Prevent hypoglycemia
	Posttraumatic stress disorder	Sedation, agitation, physical restraints, traumatic/delusional memories	Little improvement in first year	Limit use of sedation
	Anxiety	Unemployment, duration of mechanical ventilation Overall risk factors: female sex, younger age, lower education, and pre-ICU psychiatric symptoms and personality	May persist past first year	
Cognitive	Impairments in memory, attention, executive function	Lower pre-ICU intelligence ICU delirium Sedation Hypoglycemia	Significant improvement during first year, with residual deficits up to 6 yrs later	Delirium prevention Prevent hypoglycemia
Quality of Life	Deficits most observed in physical domains	Older age Severity of illness Critical illness polyneuropathy Psychiatric symptoms Delusional memories of ICU Pulmonary function abnormalities	Physical deficits improve over first year, but could recur or persist during 5-yr follow-up	Handbook for self-guided rehabilitation

ICU, intensive care unit.



- (1) severe muscle wasting and weakness including decreased cough, pharyngeal weakness;
- (2) contractures, frozen joints;
- (3) heterotopic ossification;
- (4) alopecia;
- (5) numbness, paresthesia (peripheral neuropathy);
- (6) taste changes, decreased visual acuity, hearing loss/tinnitus;
- (7) sleep disturbances;
- (8) cardiac and circulatory decompensation: postural hypotension;
- (9) rare bronchiectasis and pulmonary fibrosis;
- (10) iatrogenic
  - (a) tracheal stenosis,
  - (b) entrapment neuropathies, dental caries and tooth loss,
  - (c) scarring (CVC, arterial lines, CT drains) and
  - (d) striae.

## Long-term outcome after acute lung injury

**Curr Opin Crit Care 2012, 18:8–15**

*Catherine L. Hough<sup>a</sup> and Margaret S. Herridge<sup>b</sup>*

# Nejčastěji postižené systémy

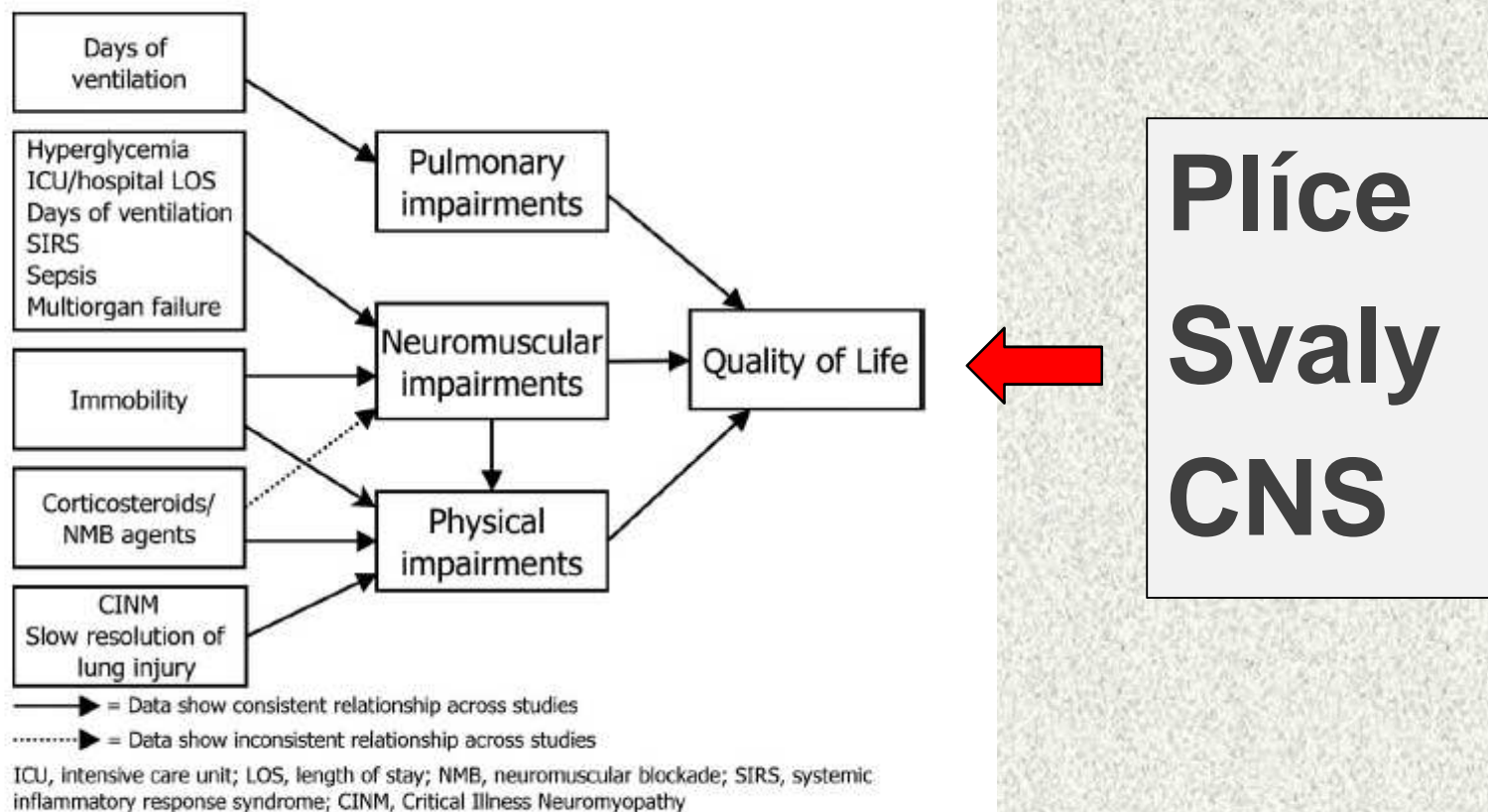


Figure 1. Patient and ICU risk factors for long-term physical complications.



# **Dopad kritického stavu na rodinu/blízké pacienta**

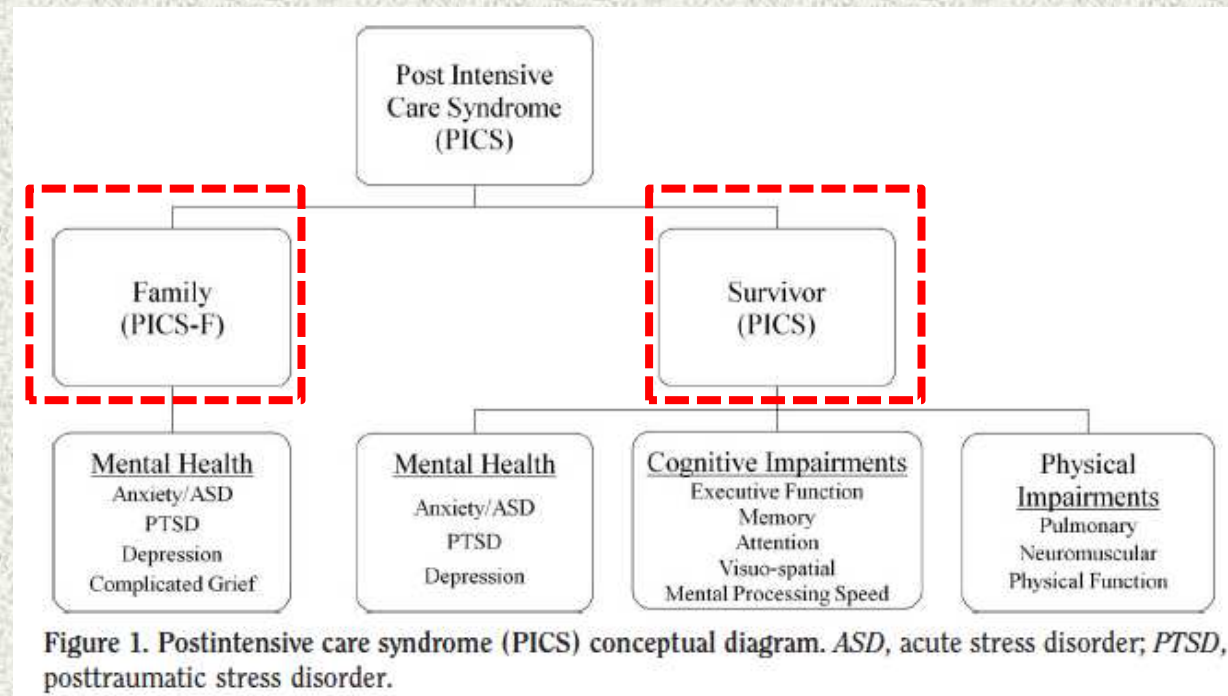
Zapomínané téma ?

# Improving long-term outcomes after discharge from intensive care unit: Report from a stakeholders' conference\*

American Physical Therapy Association

American Academy of Hospice and Palliative Medicine  
American Academy of Physical Medicine and Rehabilitation  
American Occupational Therapy Association  
America Speech-Language-Hearing Association  
Association of Academic Physiatrists  
Illinois Citizens for Better Care  
Kaiser Permanente Healthcare System

Acute Long-Term Hospital Association  
National Association of Long-Term Hospitals  
National Heart, Lung, and Blood Institute  
Sepsis Alliance  
Veterans Administration Healthcare System

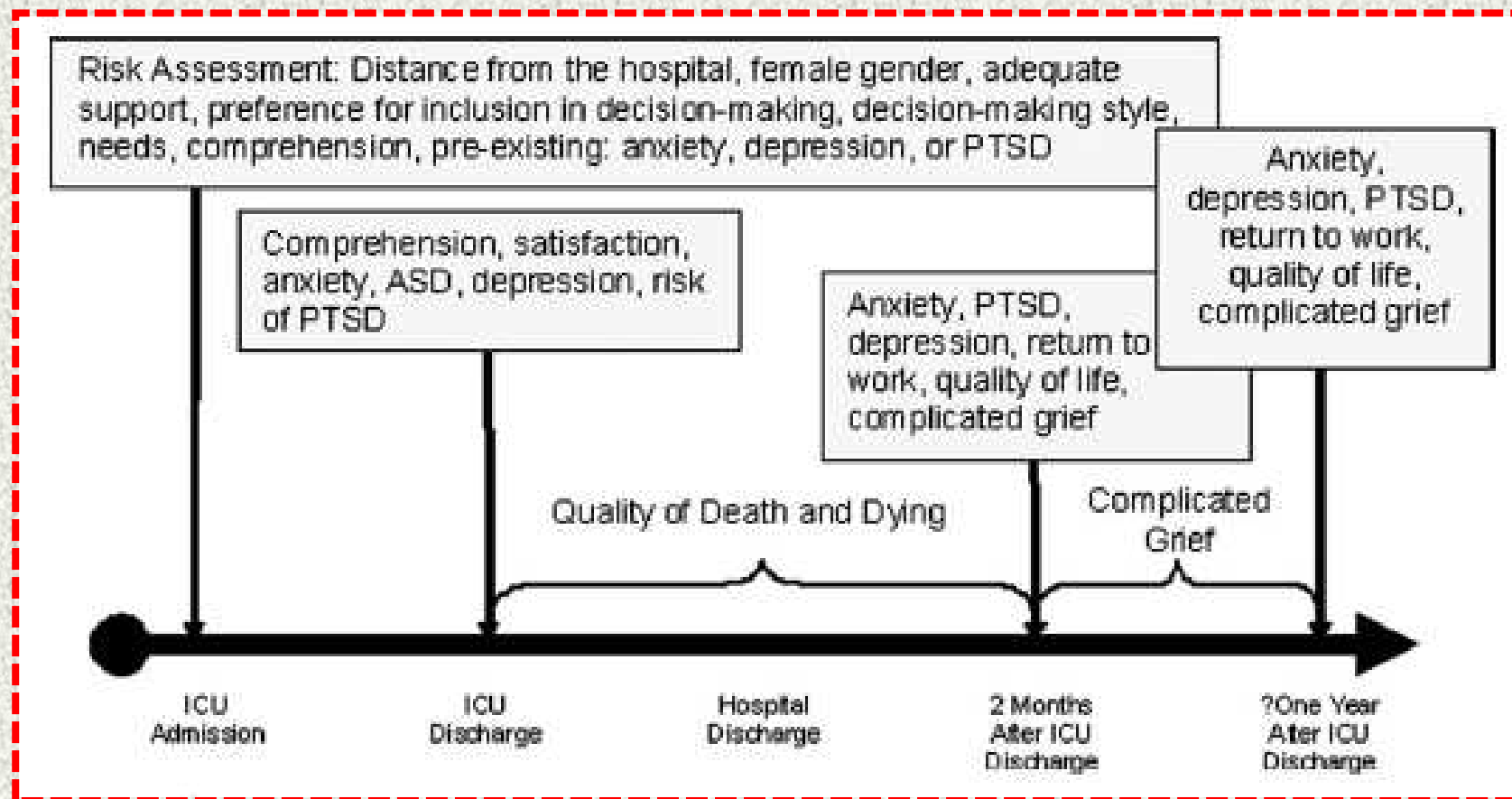


**Post Intensive Care Syndrome - Family**



## Family response to critical illness: Postintensive care syndrome–family

Judy E. Davidson, DNP, RN, FCCM; Christina Jones, RN, PhD, MBACP, I Crit Care Med 2012 Vol. 40, No. 2  
O. Joseph Bienvu, MD, PhD



**Limited family members/staff communication in intensive care units in the Czech and Slovak Republics considerably increases anxiety in patients' relatives – the DEPRESS study**

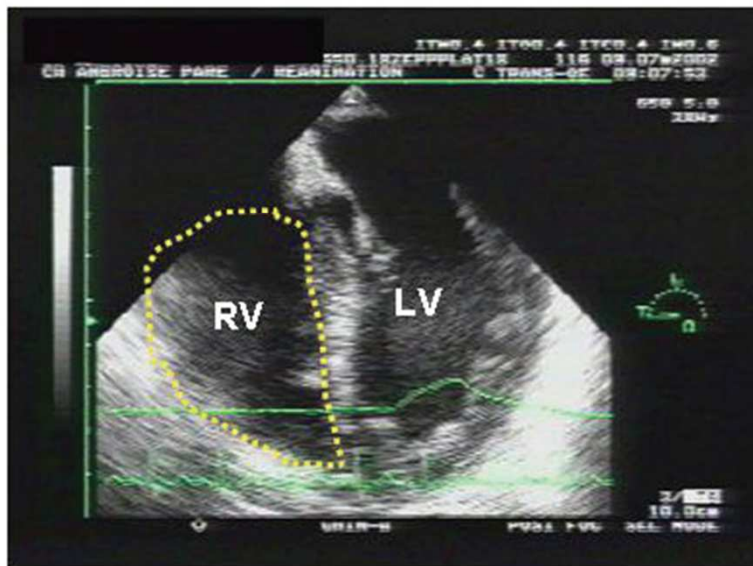
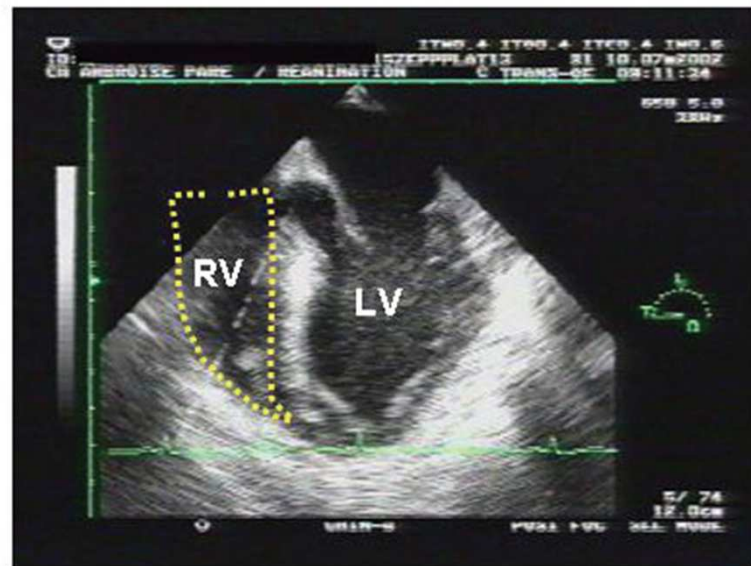
*Rusinova and Cerny, BMC Psychiatry, 2014, in press*



**Je postižení orgánů/tkání  
reverzibilní ?**

**Jak dlouho trvá ?**



**A****B**

Dysfunkce myokardu je reverzibilní  
(u přeživších)

Vieillard-Baron *Annals of Intensive Care* 2011, 1:6  
<http://www.annalsofintensivecare.com/content/1/1/6>

 **Annals of Intensive Care**  
a SpringerOpen Journal

**REVIEW**

**Open Access**

**Septic cardiomyopathy**

Antoine Vieillard-Baron<sup>1,2</sup>



# Plíce

## Pacienti po ARDS a UPV

- Abnormality ve všech plicních funkcích
- Funkční stav  $\cong$  pacienti s plicní fibrozou
- Zotavení trvá 1-5 let, ale i déle ?
- Význam UPV

Concise Definitive Review ——— Section Editor, Jonathan E. Sevransky, MD, MHS

Long-term complications of critical care

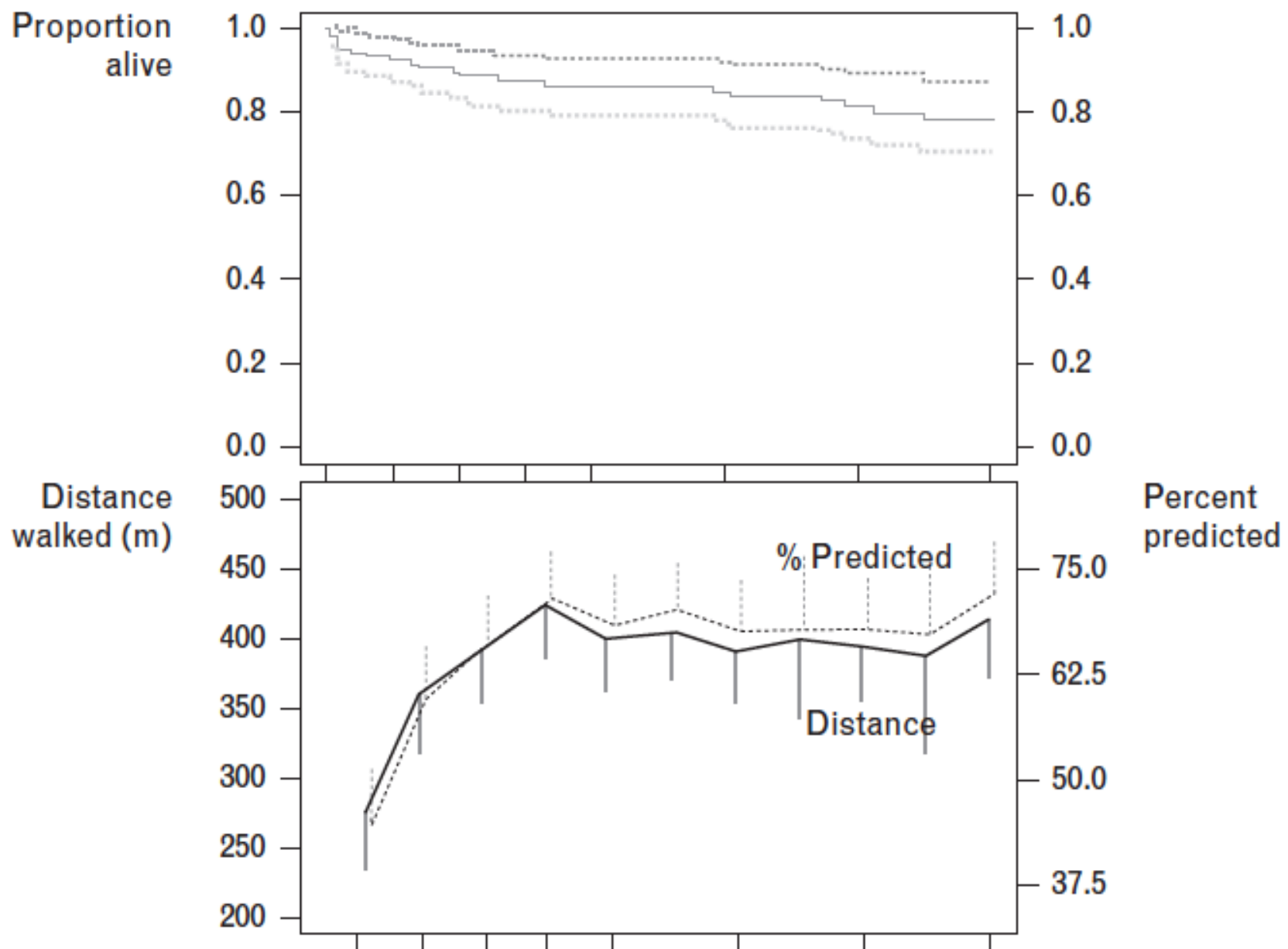
Sanjay V. Desai, MD; Tyler J. Law, BHSc; Dale M. Needham, MD, PhD

Crit Care Med, 2011

**Long-term outcome after acute lung injury**

*Catherine L. Hough<sup>a</sup> and Margaret S. Herridge<sup>b</sup>*

**Curr Opin Crit Care 2012, 18:8–15**





# Svaly (ICU weakness)

- Abnormality i po 6 měsících až u 90% pacientů po propuštění
- Zásadní podíl na nesoběstačnosti a nutnosti asistence
- Role NMBA je spíše malá

Concise Definitive Review ——— Section Editor, Jonathan E. Sevransky

Long-term complications of critical care

Sanjay V. Desai, MD; Tyler J. Law, BHSc; Dale M. Needham, MD, PhD

Crit Care Med, 2011

ELSEVIER  
SAUNDERS

Clin Chest Med 27 (2006) 691–703

MEDICINE

## Neuromuscular Sequelae in Survivors of Acute Lung Injury

Catherine Lee Hough, MD, MSc

*Division of Pulmonary and Critical Care Medicine, Harborview Medical Center, University of Washington,  
325 Ninth Avenue, Box 359762, Seattle, WA 98122, USA*



# **Postižení CNS**

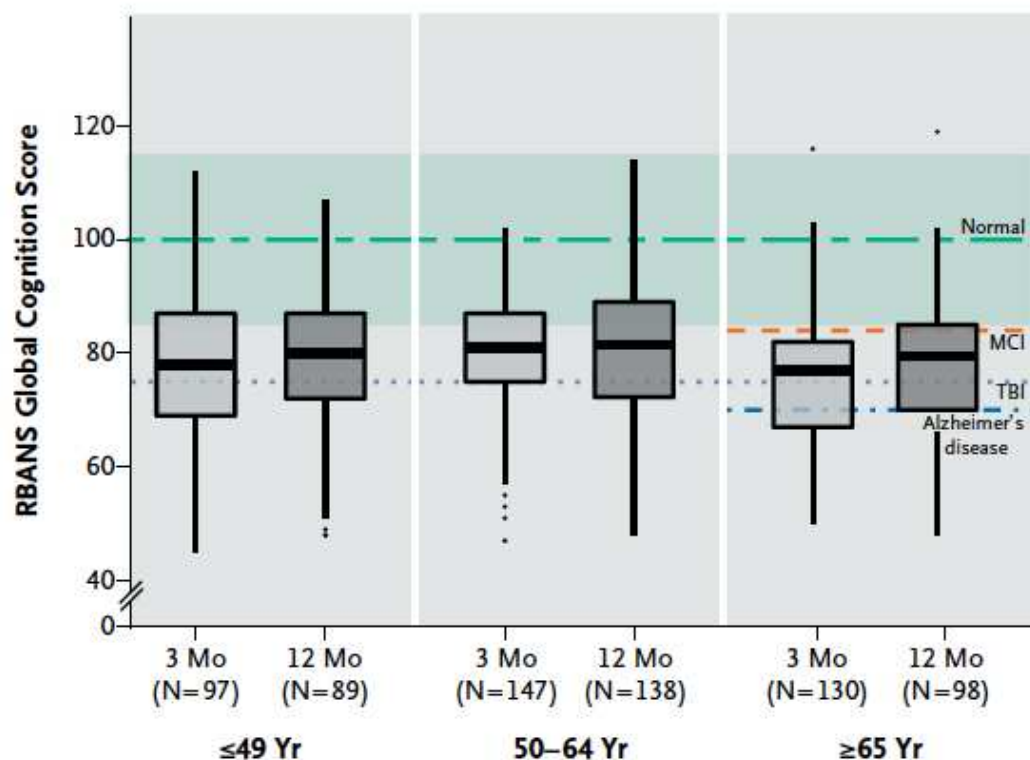
## **Kognitivní dysfunkce**

*Je jen dočasná ?*  
*Pokud ano, jak dlouho ?*



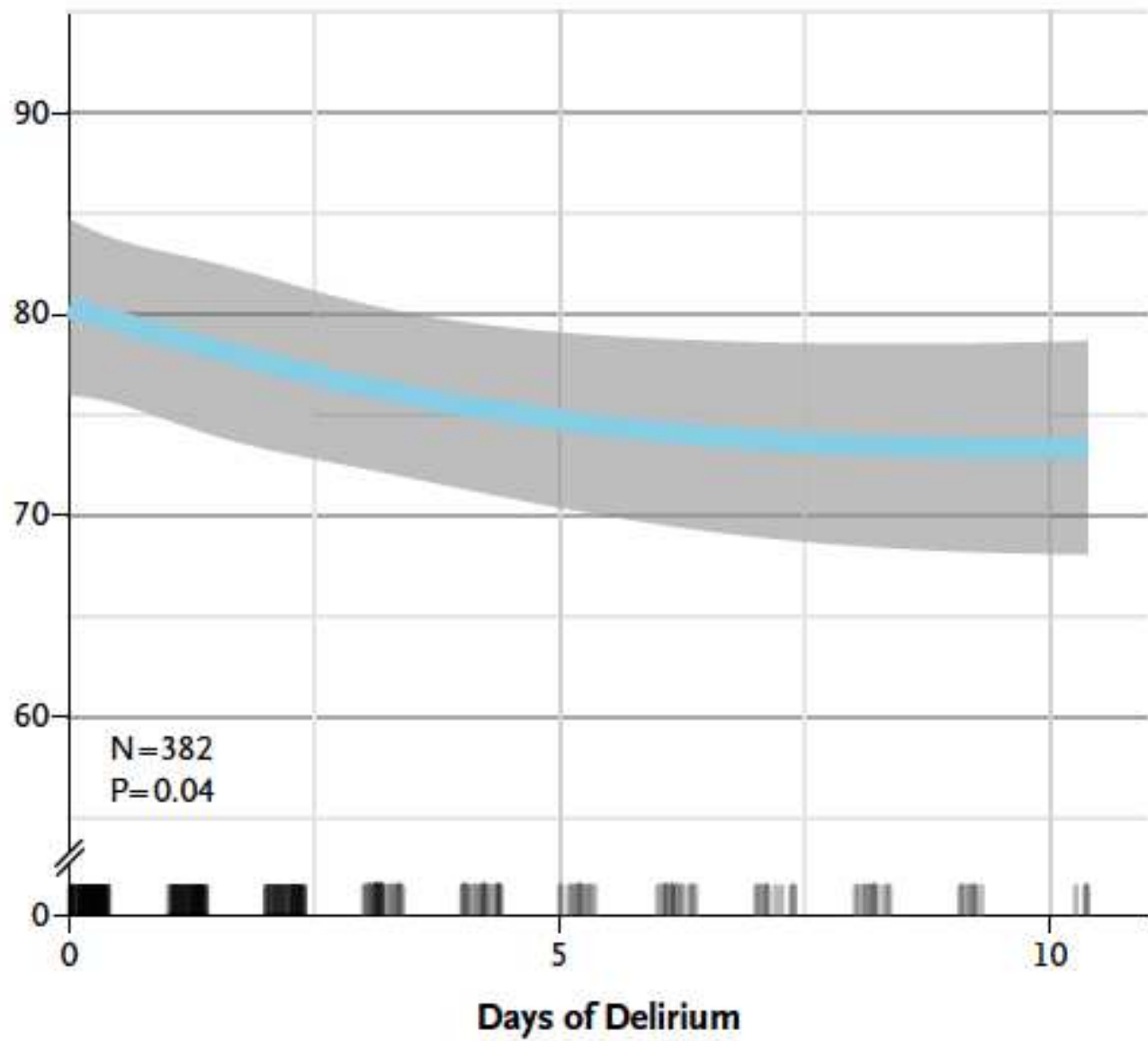
## Long-Term Cognitive Impairment after Critical Illness

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. Geervarghese, A. Canonico, R.O. Hopkins, G.R. Bernard, R.S. Dittus, and E.W. Ely, for the BRAIN-ICU Study Investigators\*



- **Kognitivní dysfunkce je velmi častá**
- **Může trvat rok i déle**
- **Čím déle trvá delirium, tím je kognitivní dysfunkce těžší**

Adjusted RBANS Global Cognition Score  
at 12 Mo



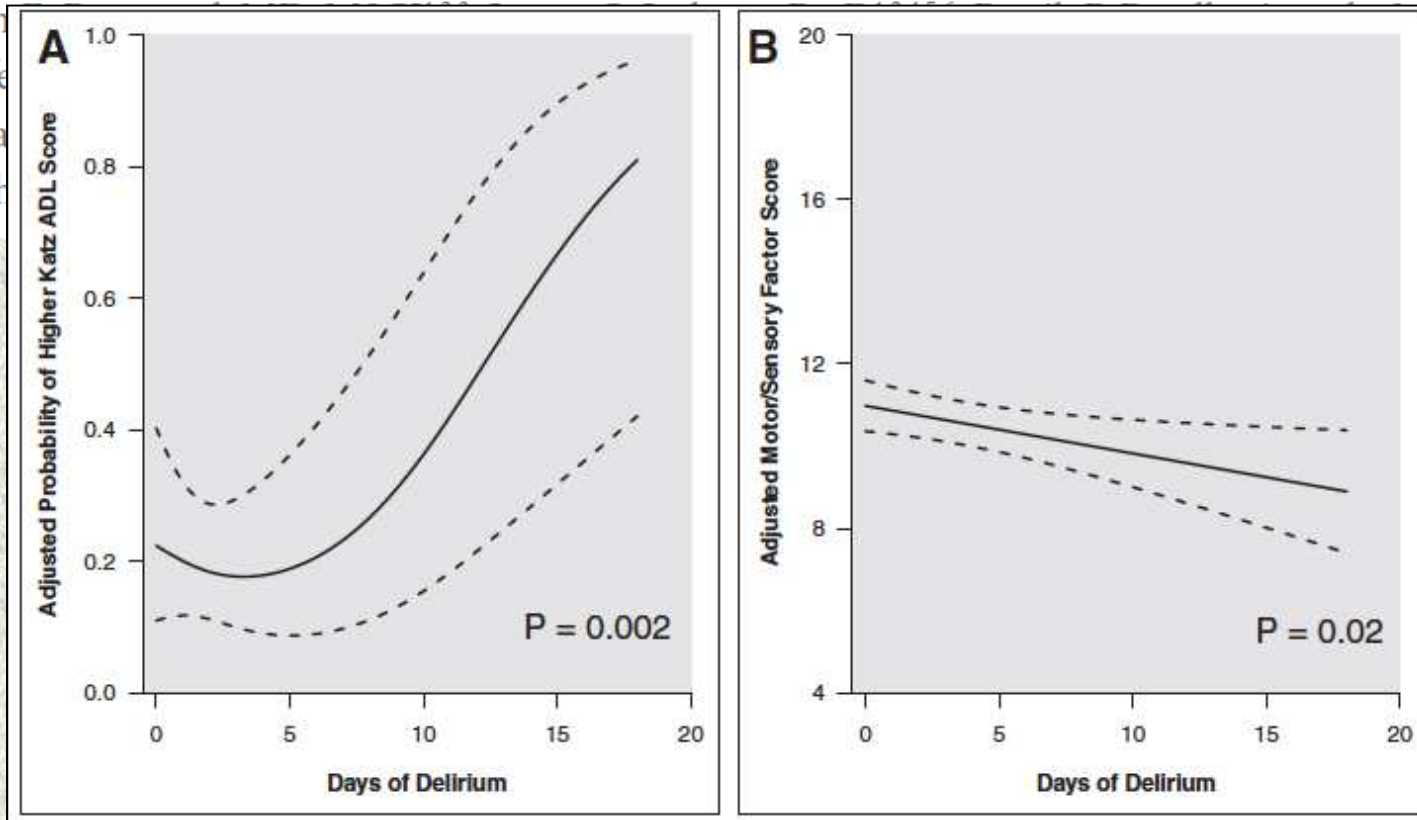


# Delirium in the ICU and Subsequent Long-Term Disability Among Survivors of Mechanical Ventilation\*

Crit Care Med, 2014

Nathan  
Jennifer  
Thomas  
Timoth

D, MSCI<sup>7,8</sup>;  
0;



Stupeň “disability” úměrný době deliria

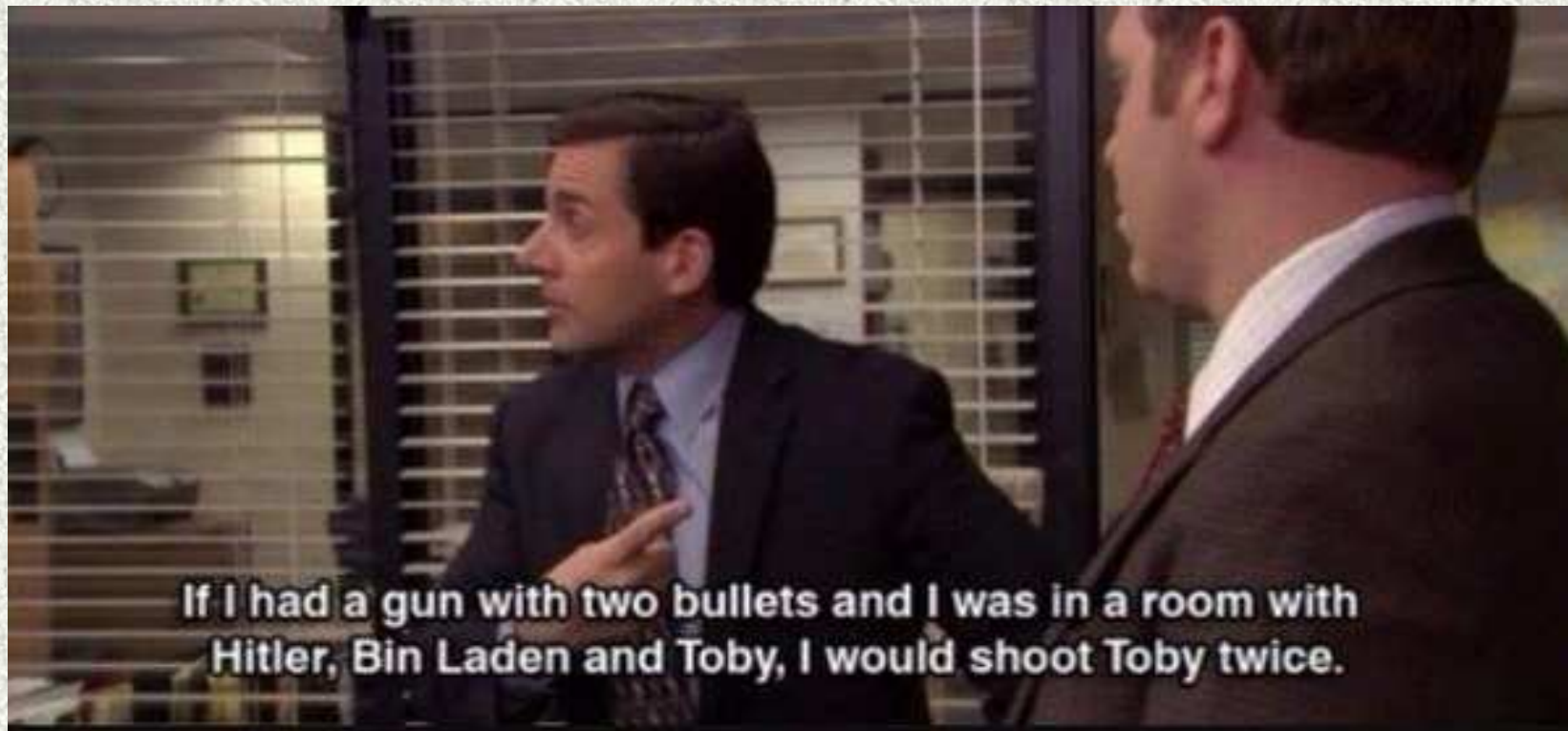
**Co dělat jinak než doposud ?  
Děláme vše co je možné ?**





**Sorry, no SINGLE magic bullet for our ICU problems ...**

**They are TWO ...**





1. Měnit naše systémové  
uvažování směrem k ...

**Myslet na “long-term”  
následky již “early”**

## 2. Realizovat systémové uvažování v denní klinické praxi





# **Plíce-svaly-CNS**

**... jako hlavní cíle ?**



# V klinické praxi

## Plíce

- Minimalizace poškození plic důsledným dodržováním zásad “bezpečné” ventilace



**Ventilation with lower tidal volumes for critically ill patients without the acute respiratory distress syndrome: a systematic translational review and meta-analysis**

*Ary Serpa Neto<sup>a,b,c</sup>, Liselotte Nagtzaam<sup>c</sup>, and Marcus J. Schultz<sup>c,d</sup>*

Curr Opin Crit Care 2014, 20:25–32

**Platí jenom u ARDS ?**



# V klinické praxi

## Svaly a neuromyopatie

- Časná, intenzivní a protokolizovaná rehabilitace

Physical Therapist–Established Intensive Care Unit Early Mobilization Program: Quality Improvement Project for Critical Care at the University of California San Francisco Medical Center

Heidi J. Engel, Shintaro Tatebe, Philip B. Alonzo, Rebecca L. Mustille, Monica J. Rivera

Establishing the Collaborative ICU Early Mobilization Group



- Kratší pobyt na ICU
- Vyšší % home discharge

*Phys Ther.* 2013;93:975–985.



# V klinické praxi

## Kognitivní dysfunkce

- Prevence (a léčba) deliria
- Dostatečný spánek
- Včasná identifikace a intervence “výkyvů homeostázy”
- HOT NEWS – “preemptive cognitive training ?”**

Cognitive Dysfunction in ICU Patients: Risk Factors, Predictors, and Rehabilitation Interventions

M. Elizabeth Wilcox, MD, MPH<sup>1</sup>; Nathan E. Brummel, MD, MSCI<sup>2</sup>; Kristin Archer, DPT, PhD<sup>3</sup>;  
E. Wesley Ely, MD, MPH<sup>2,4,5</sup>; James C. Jackson, PsyD<sup>2,5,6</sup>; Ramona O. Hopkins, PhD<sup>7,8</sup>

*Crit Care Med, 2013*



# A když nic z toho nejde na ICU prosadit, tak aspoň káva pro naše pacienty ?

nature  
neuroscience

online 17 January 2014;

Post-study caffeine  
administration enhances memory  
consolidation in humans

Daniel Borota<sup>1</sup>, Elizabeth Murray<sup>1</sup>, Gizem Keceli<sup>2</sup>, Allen Chang<sup>1</sup>,  
Joseph M Watabe<sup>1</sup>, Maria Ly<sup>1</sup>, John P Toscano<sup>2</sup> & Michael A Yassa<sup>1,3</sup>



**Kofein  
zlepšil  
významně  
dlouhodobou  
paměť**

# ČSIM a uvedená problematika

1. Doporučený postup **pro analgezii a sedaci** (první revize, 2014)
2. Doporučený postup **pro identifikaci, prevenci a léčbu delirantních stavů** (osnova textu, 2014)
3. Doporučený postup **pro fyzioterapii a rehabilitaci** (formování pracovní skupiny, 2015)



**Děkuji za pozornost**

[cernyvla1960@gmail.com](mailto:cernyvla1960@gmail.com)