#PedsICU #ICURehab

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Respiratory Therapists as Champions for Illness Doesn't Mean Stillness

Sapna R. Kudchadkar, MD, PhD, FCCM
Associate Professor
Anesthesiology & Critical Care Medicine,
Pediatrics & Physical Medicine & Rehabilitation
Associate Vice Chair for Research, ACCM

@SapnaKmd
@PICU_Up

JOHNS HOPKINS
MEDICINE

December 2nd, 2021

Learning Objectives

- Discuss the research/evidence to support early mobility in pediatric patients

- Describe strategies for implementation of early mobility in the PICU with a focus on the role of respiratory therapists

Engage on Twitter! @SapnaKmd

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#PedsICU

#ICURehab

#COVID19

Some timely resources

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bit.ly/pedsicucovid

bit.ly/picucovidpubmed

One stop shopping for up-to-date PICU & NICU Liberation Literature

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bit.ly/pedsliberationliterature

Updated DAILY!!

JOHNS HOPKINS MEDICINE

Physical Rehabilitation in Critically Ill Children: A Multicenter Point Prevalence Study in the United States

Sapna R. Kudchadkar, MD, PhD, FCCM[1,2,3]; Archana Nelliot, MD[1]; Ronke Awojoodu, RN, MPH[1]; Dhananjay Vaidya, PhD[4]; Chani Traube, MD[5]; Tracie Walker, MD[1]; Dale M. Needham, MD, PhD[3,6,7]; for the Prevalence of Acute Rehabilitation for Kids in the PICU (PARK-PICU) Investigators and the Pediatric Acute Lung Injury and Sepsis Investigators (PALISI) Network

Crit Care Med 2020

park.web.jhu.edu

RESEARCH Open Access

Mobilization practices in critically ill children: a European point prevalence study (EU PARK-PICU)

Erwin Ista[1,2*], Barnaby R. Scholefield[3,4], Joseph C. Manning[5,6], Irene Harth[7], Orsola Gawronski[8], Alicja Bartkowska-Śniatkowska[9], Anne-Sylvie Ramelet[10], Sapna R. Kudchadkar[11,12,13] and EU PARK-PICU Collaborators[14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48]

Critical Care 2020

FEATURE ARTICLE

Prevalence of Acute Rehabilitation for Kids in the PICU: A Canadian Multicenter Point Prevalence Study

OBJECTIVES: To evaluate mobilization practices, barriers, and mobility-related adverse events in Canadian PICUs.

Karen Choong, MB BCh, MSc[1,2]
David J. Zorko, MD[1]

Ped Crit Care Med 2020

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Physical Rehabilitation in Critically Ill Children: A Multicenter Point Prevalence Study in the United States

What was the point prevalence of PT or OT–provided mobility?

35% of patient days

How often were patients completely immobile?

19% of patient days

A potential safety event occurred in 4% of 4,700 mobility sessions; most commonly a transient change in vital signs.

Who is at risk for a delayed PT or OT consult?

PATIENTS WITH HIGHER BASELINE FUNCTION*

(Consults by Day 3: 27% vs 38%; p < 0.001)

*Pediatric Cerebral Performance Category, < 2 vs > 2

Who had lower odds of PT or OT-provided motility?

FEMALES

(OR for females, 0.76; 95% CI, 0.61–0.95)

YOUNGER

(13–17 vs < 3 yr, 2.1; 95% CI, 1.5–3.1)

What factors promote or prevent being out of bed?

FACTORS THAT PROMOTE MOBILITY

PARENTS PRESENT AT BEDSIDE*

(OR 4.33; 95% CI, 3.1–6.6)

*Hospitalized younger than 3 years of age

MOBILITY PROTOCOL

(OR 1.73; 95% CI, 1.14–2.6)

BARRIERS TO MOBILITY

ENDOTRACHEAL INTUBATION

(OR 0.13; 95% CI, 0.1–0.2)

URINARY CATHETER

(OR 0.28; 95% CI, 0.1–0.6)

DATA COLLECTED FROM 82 PICUS IN 65 HOSPITALS (N=1,769 PATIENT DAYS)

PARK-PICU

PREVALENCE OF ACUTE REHABILITATION FOR KIDS IN THE PICU (PARK-PICU)

CROSS-SECTIONAL POINT PREVALENCE STUDY (PALISI NETWORK)

CONCLUSIONS

Younger children, females, and patients with higher baseline function less commonly receive rehabilitation in U.S. PICUs, and early rehabilitation consultation is infrequent.

Data from Kudchadkar SR, et al: *Crit Care Med* 2020.

ccmjournal.org
#CritCareMed #PedsICU

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A CULTURE OF IMMOBILITY

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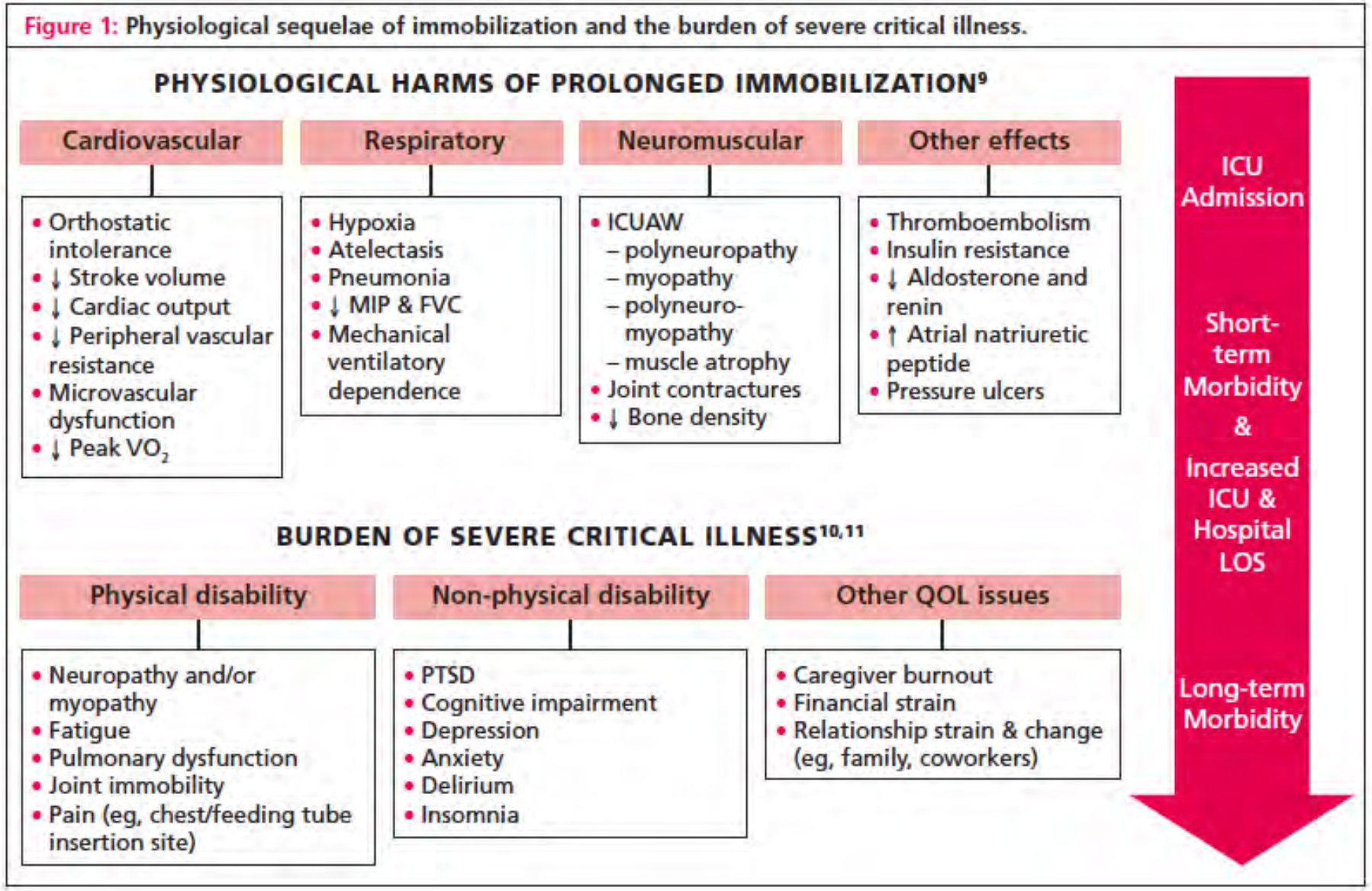
Consequences of IMMOBILITY



K Koo, K Choong, E Fan, Crit Care Rds 2011

Liberation is NOT a new concept

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"It means a great deal. . .to be put on their own feet in a short time, rather than be confined to bed, having their weak backs and general debility increase rather than disappear after the operation which was to cure them."—Dr Emil Ries, JAMA 1899[1]

THE JOURNAL OF PEDIATRICS • www.jpeds.com EDITORIALS

Early Mobility in the Pediatric Intensive Care Unit: Can We Move On?

JAMA 1944

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THE ABUSE OF REST AS A THERAPEUTIC MEASURE IN SURGERY

EARLY POSTOPERATIVE ACTIVITY AND REHABILITATION

JOHN H. POWERS, M.D.
COOPERSTOWN, N. Y.

Rest, as a therapeutic measure, is fraught with hazard. Prolonged periods of recumbency in bed are anatomically, physiologically and psychologically unsound and unscientific. Conversely, early restoration of medical and surgical patients to normal life is an essential feature of modern convalescent supervision. Prompt postoperative activity and walking provide manifest, safe and agreeable modifications in customary convalescent care by which ready rehabilitation may be achieved in the realm of surgery.

The desirability of such a program for patients of advanced years has long been recognized; surgical wounds heal firmly even though early postoperative activity is encouraged. Infants and young children cannot be kept quietly at rest in bed after operation, yet postoperative hernias are not common. Utilization of this knowledge in the management of patients between the extremes of life promotes an equally uneventful convalescence. Early rising from bed and walking preclude the protracted period of inertia which traditionally follows in the wake of surgery and encourage the prompt resumption of normal activity.[1]

"Prolonged (bedrest is) anatomically and physiologically unsound…
early restoration of medical and surgical patients to normal life is an essential feature of modern convalescent supervision."

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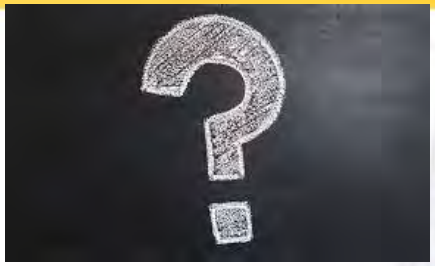
So what changed?



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Increased Survival!

- Technologic and scientific advances
- Bedrest to promote stability and safety
- Continuous sedative and paralytic infusions- “rest and recovery”

Suspended Life or Extending Death? Thomas Petty, 1998

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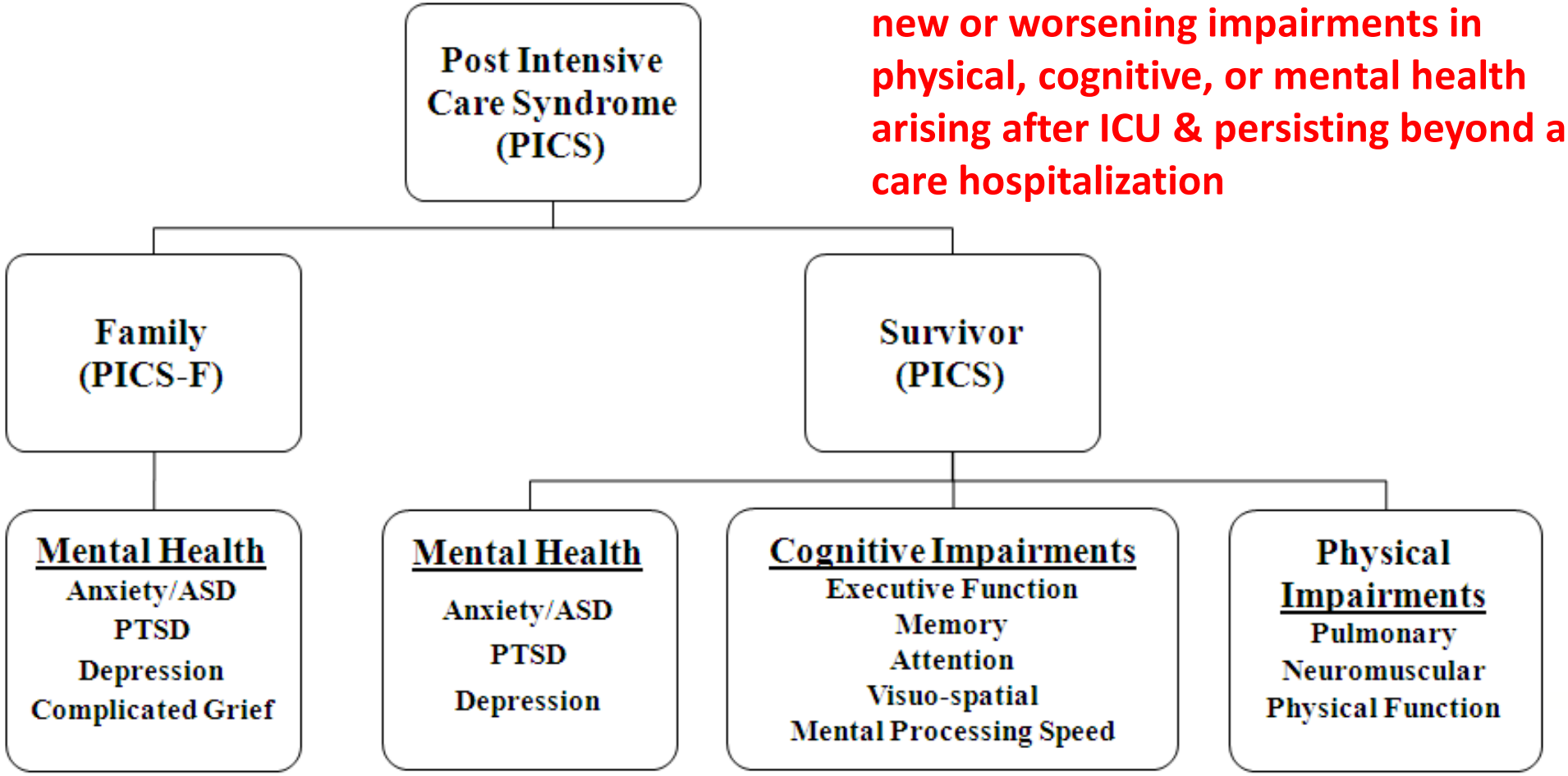
"But what I see these days are sedated patients, lying without motion, appearing to be dead, except for the monitors that tell me otherwise. **By being awake and alert…they could interact with family…feel human…sustain the zest for living which is a requirement for survival."**

SCCM Post Intensive Care Syndrome (PICS)



new or worsening impairments in physical, cognitive, or mental health arising after ICU & persisting beyond acute care hospitalization

Crit Care Med. 2012;40:502-9.

MEDICAL PROGRESS

www.jpeds.com • THE JOURNAL OF PEDIATRICS

Life after Critical Illness in Children—Toward an Understanding of Pediatric Post-intensive Care Syndrome

R. Scott Watson, MD, MPH[1,2], Karen Choong, MB, BCh, MSc[3], Gillian Colville, MPhil, CPsychol, AFBPsS[4], Sheri Crow, MD, MSc[5], Leslie A. Dervan, MD, MS[2], Ramona O. Hopkins, PhD[6,7,8], Hennie Knoester, MD, PhD[9], Murray M. Pollack, MD[10], Janet Rennick, RN, PhD[11], and Martha A. Q. Curley, RN, PhD[12,13]

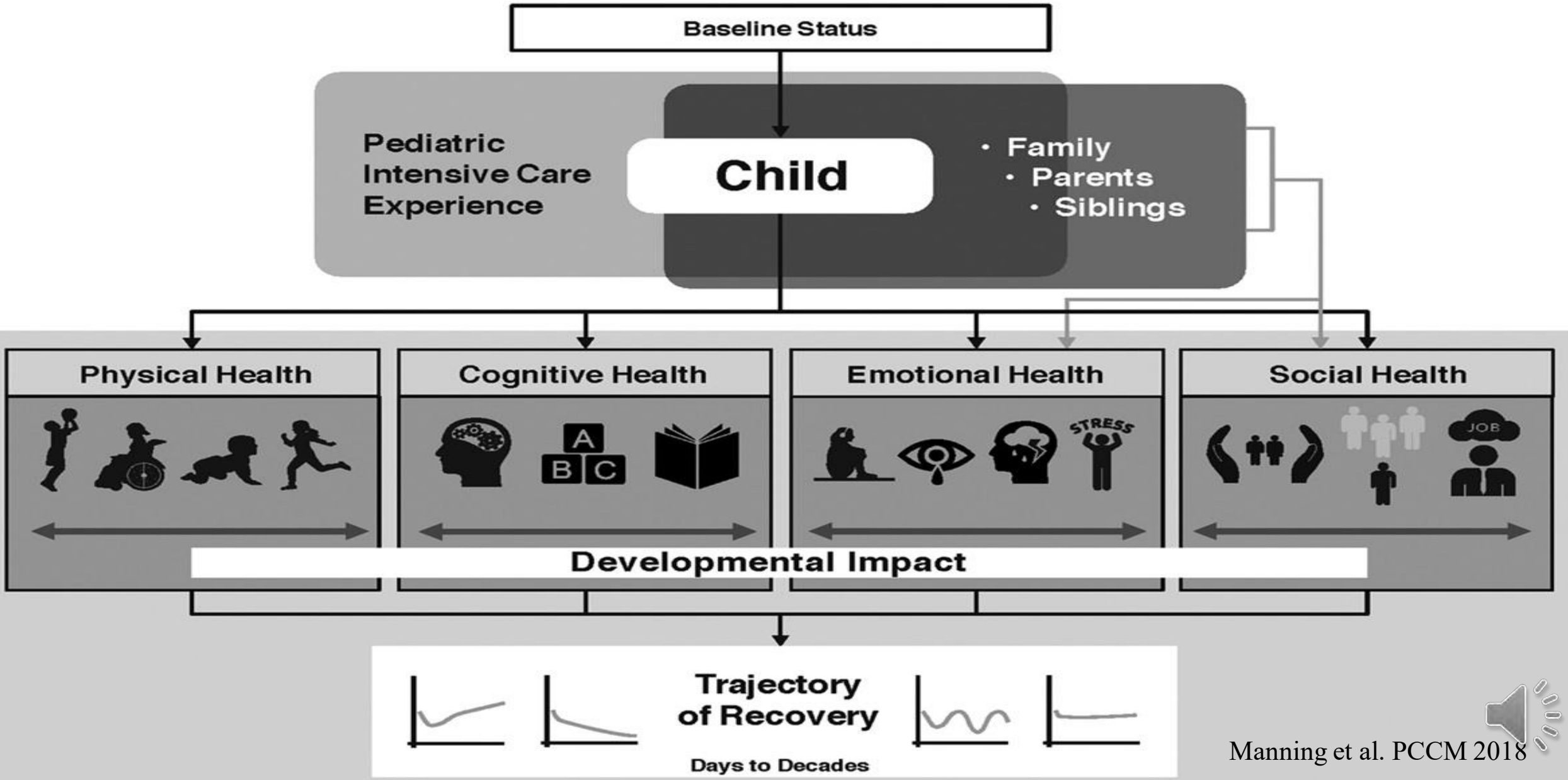
Conceptualizing Post Intensive Care Syndrome in Children—The PICS-p Framework*

Joseph C. Manning, RN, PhD[1,2,3]; Neethi P. Pinto, MD, MS[4]; Janet E. Rennick, RN, PhD[5,6]; Gillian Colville, MPhil, CPsychol[7]; Martha A. Q. Curley, RN, PhD[8,9,10]

J Peds 2018

Ped Crit Care Med 2018

Post Intensive Care Syndrome - Pediatrics (PICS-p)



Manning et al. PCCM 2018

Functional Recovery following Critical Illness in Children: the "Wee-cover" Pilot Study

Karen Choong, MB BCh, Samah Al-Harbi, MD, Katie Siu, MD, Katie Wong, BSc, Ji Cheng, MSc, Burke Baird, MD, David Pogorzelski, BSc, Brian Timmons, PhD, Jan-Willem Gorter, MD PhD, Lehana Thabane, PhD, and Mary Khetani, ScD OTR Conducted on behalf of the Canadian Critical Care Trials Group

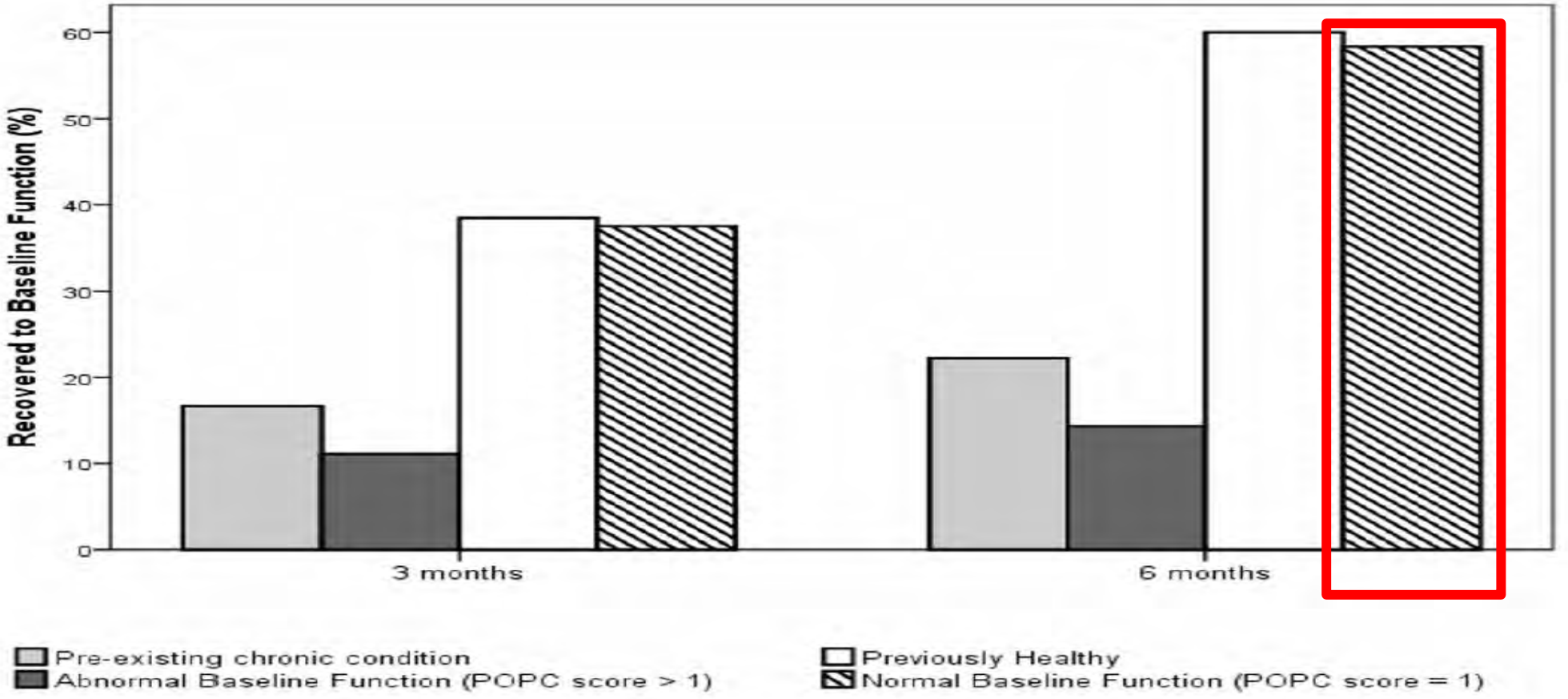


Figure 3. Proportion of patients recovering to baseline functional status at 3 and 6 months post PICU discharge

Baseline functional limitation was defined as patients with a Pediatric Overall Performance Category (POPC) score > 1.

PCCM 2015

Postdischarge Outcome Domains in Pediatric Critical Care and the Instruments Used to Evaluate Them: A Scoping Review

Aline B. Maddux, MD, MSCS[1]; Neethi Pinto, MD, MS[2]; Ericka L. Fink, MD, MS[3]; Mary E. Hartman, MD, MPH[4]; Sholeen Nett, MD, PhD[5]; Katherine Biagas, MD[6]; Elizabeth Y. Killien, MD, MPH[7]; Leslie A. Dervan, MD, MS[7,8]; LeeAnn M. Christie, MSN, RN[9]; Peter M. Luckett, MD[10]; Laura Loftis, MD, MS[11]; Mellanye Lackey, MSI[12]; Melissa Ringwood, BS[13]; McKenna Smith, BS[13]; Lenora Olson, PhD[13]; Sam Sorenson, BS[13]; Kathleen L. Meert, MD[14]; Daniel A. Notterman, MD[15]; Murray M. Pollack, MD[16]; Peter M. Mourani, MD[1]; R. Scott Watson, MD, MPH[7,17]; for the Pediatric Outcomes STudies after PICU (POST-PICU) and PICU-COS Investigators of the Pediatric Acute Lung Injury and Sepsis Investigators and the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development Collaborative Pediatric Critical Care Research Networks

Crit Care Med 2020

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POST- PICU INVESTIGATORS

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A Core Outcome Set for *Pediatric Critical Care*

Multi-national, multi-stakeholder survey

Objective: Develop an evidence-informed, stake-holder recommended pediatric ICU core outcomes set

Performed 2 rounds of a modified Delphi survey

PICU COS features Global Outcome Domains of

Cognitive Function · Emotional Function · Physical Function · Overall Health

PICU COS-Extended includes 14 Specific Outcomes from the Global Domains that met inclusion by > 90% of Family Stakeholders

PICU Core Outcome Set and PICU COS-Extended are recommended resources for clinical and research programs to assess and improve outcomes for critically ill children and their families.

Data from Fink EL, et al: *Crit Care Med*, 2020

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We must not just focus on survival….

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SURVIVORSHIP

SCCM ICU Liberation: As easy as ABCDEF?

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Assess, prevent & manage pain

- CPOT or BPS to assess pain, insure adequate pain control
- Use of regional anesthesia and nonopioid adjuncts
- Analgesia-based sedation techniques with fentanyl

Both SAT & SBT

- Daily linked SAT and SBT
- Multidisciplinary coordination of care
- Faster liberation from MV

Choice of sedation

- Targeted light sedation when sedation necessary
- Avoidance of benzodiazepines
- Dexmedetomidine if high delirium risk, cardiac surgery, MV weaning

Delirium monitoring & management

- Routine CAM-ICU or ICDSC assessments
- Nonpharmacologic intervention, including sleep hygiene
- Dexmedetomidine or antipsychotic if hyperactive symptoms

Early mobility & exercise

- Physical and occupational therapy assessment
- Coordinate activity with SAT or periods of no sedation
- Progress through range of motion, sitting, standing, walking, ADLs

Family engagement & empowerment

- Reorientation, provision of emotional and verbal support
- Cognitive stimulation, participation in mobilization
- Participation in multidisciplinary rounds

thrive

iculiberation.org

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Feature Articles

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Crit Care Med 2018

Caring for Critically Ill Patients with the ABCDEF Bundle: Results of the ICU Liberation Collaborative in Over 15,000 Adults

Brenda T. Pun, DNP, RN, FCCM[1]; Michele C. Balas, PhD, RN, CCRN-K, FCCM, FAAN[2,3]; Mary Ann Barnes-Daly, MS, RN, CCRN-K, DC[4]; Jennifer L. Thompson, MPH[5]; J. Matthew Aldrich, MD[6]; Juliana Barr, MD, FCCM[7,8]; Diane Byrum MSN, RN, CCRN-K, CCNS, FCCM[9]; Shannon S. Carson, MD[10]; John W. Devlin, PharmD, FCCM[11]; Heidi J. Engel, PT, DPT[12]; Cheryl L. Esbrook, OTR/L, BCPR[13]; Ken D. Hargett, MHA, FAARC, FCCM[14]; Lori Harmon, RRT, MBA, CPHQ[15]; Christina Hielsberg, MA[15]; James C. Jackson, PsyD[1]; Tamra L. Kelly, BS, RRT, MHA[4]; Vishakha Kumar, MD, MBA[15]; Lawson Millner, RRT[16]; Alexandra Morse, PharmD[4]; Christiane S. Perme, PT, CCS, FCCM[14]; Patricia J. Posa, BSN, MSA, CCRN-K[17]; Kathleen A. Puntillo, PhD, RN, FCCM, FAAN[18]; William D. Schweickert, MD[19]; Joanna L. Stollings, PharmD, FCCM[20]; Alai Tan, PhD[2]; Lucy D'Agostino McGowan, PhD[21]; E. Wesley Ely, MD, MPH, FCCM[1,22]

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Caring for Critically Ill Patients with the ABCDEF Bundle: Results of the ICU Liberation Collaborative in Over 15,000 Adults

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TABLE 2. Outcomes for Patients With Complete (vs Incomplete) ABCDEF Bundle Performance: Data are Adjusted Hazard Ratios (AHRs) and Adjusted Odds Ratios (AORs)

Outcomes	Complete Bundle Performance	*p* Value
Patient-Related Outcomes	**AHR (95% CI)**	
ICU discharge[a]	1.17 (1.05–1.30)	< 0.004
Hospital discharge[b]	1.19 (1.01–1.40)	< 0.033
Death[c]	0.32 (0.17–0.62)	< 0.001
Symptom-Related Outcomes[d]	**AOR (95%CI)**	
Mechanical ventilation	0.28 (0.22–0.36)	< 0.0001
Coma	0.35 (0.22–0.56)	< 0.0001
Delirium	0.60 (0.49–0.72)	< 0.0001
Significant pain	1.03 (0.88–1.21)	0.7000
Physical restraints	0.37 (0.30–0.46)	< 0.0001
System-Related Outcomes	**Adjusted OR (95%CI)**	
ICU readmission[e]	0.54 (037–0.79)	< 0.001
Discharge destination[f]	0.64 (0.51–0.80)	< 0.001

Pun et al.
Crit Care Med
2018

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Caring for Critically Ill Patients with the ABCDEF Bundle: Results of the ICU Liberation Collaborative in Over 15,000 Adults

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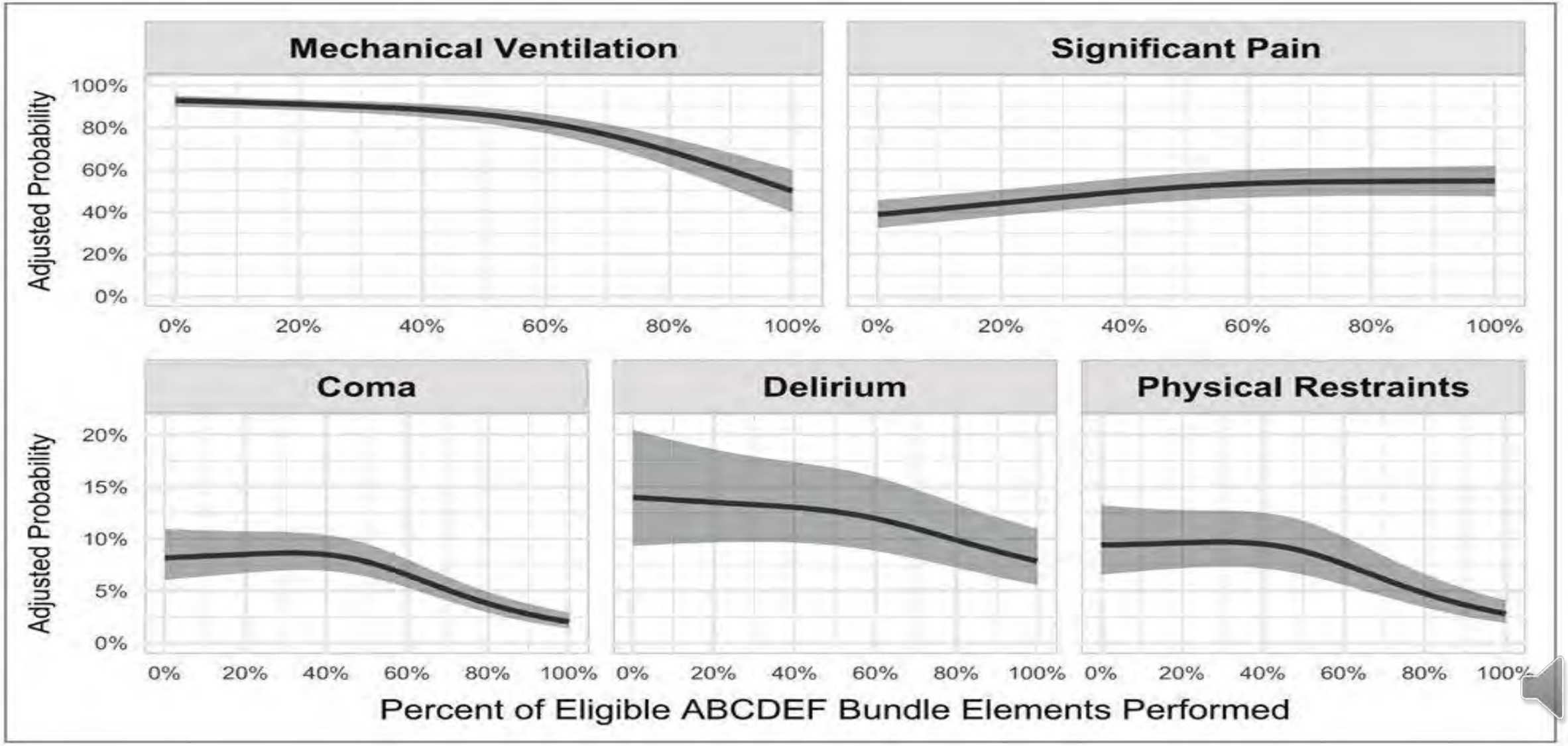

Fall 2013: Where we came from

- Oversedation
- Rapid drug escalation and no consistent sedation language
- PT/OT an afterthought
- Restraints=rule, not exception
- What's delirium?
- Benzos, diphenhydramine to improve sleep
- Family as observers

Creating a healing environment for children in the hospital: It's never too early!

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- Optimizing pain and sedation mgmt.
- Optimizing sleep
- Optimizing a child's ability to communicate
- Minimizing risk factors for delirium
- Early mobilization

Sedation, Sleep, Delirium, Early Rehab cannot be dealt with as silos!

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They are intimately interconnected.

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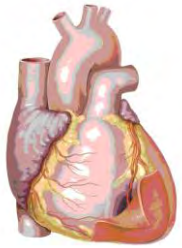
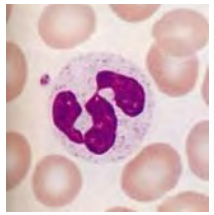
Why should we care about sleep in the hospital?

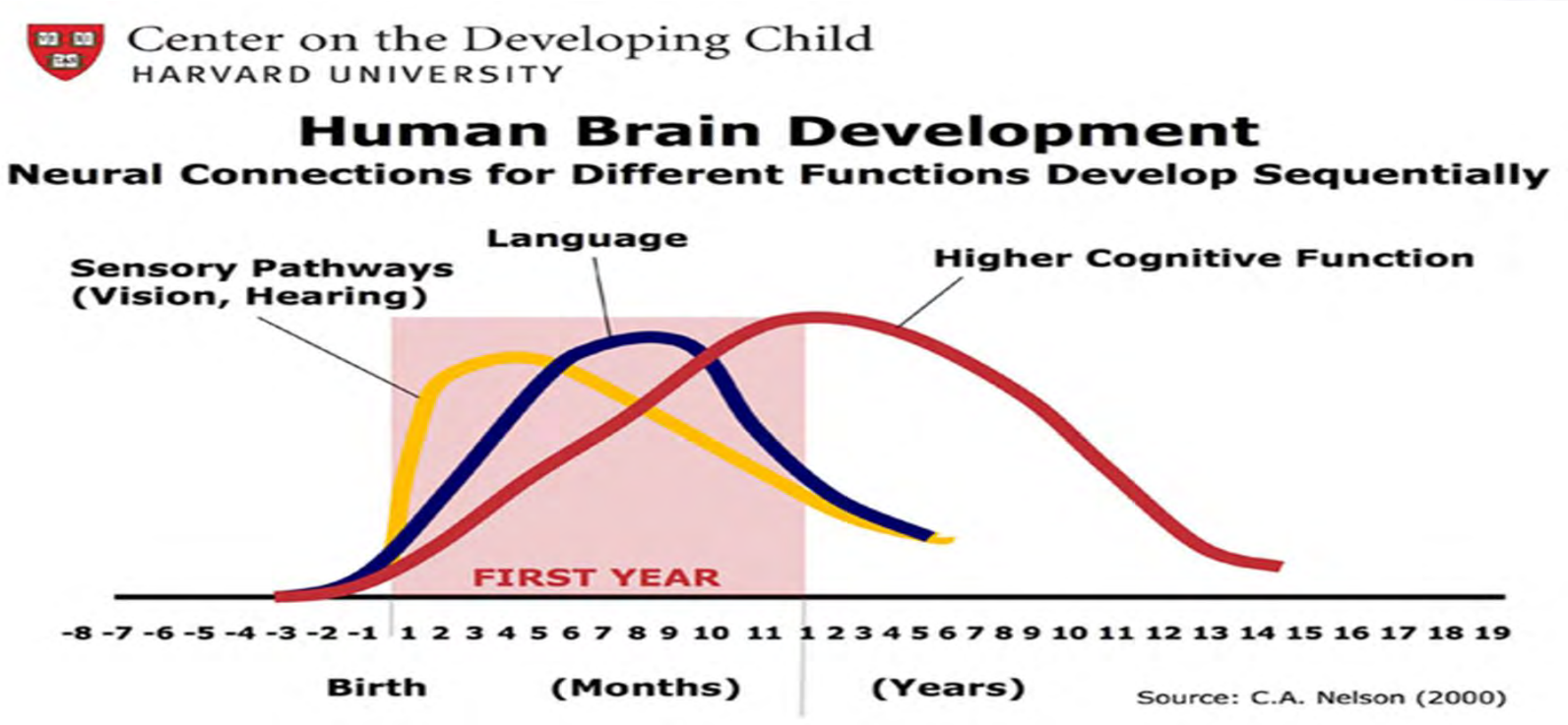
- Natural sleep is integral to physiologic homeostasis
  - Thermoregulation
  - Respiratory
  - Cardiovascular
  - Gastrointestinal
  - Immune defenses
  - Endocrine

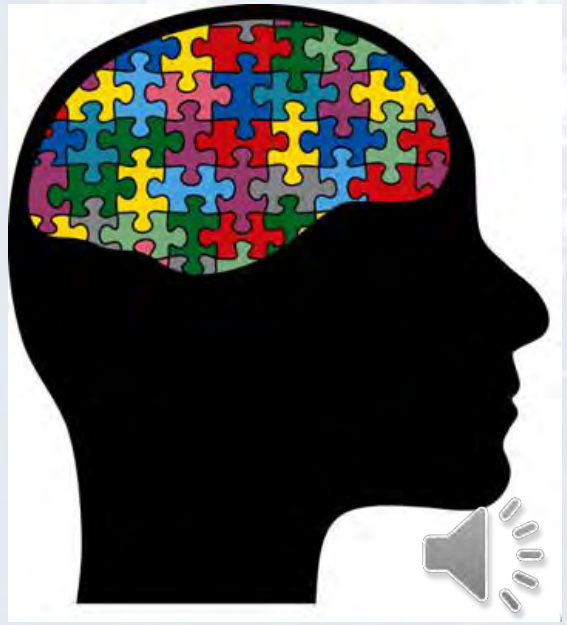



Principle Concept

Evolution of sleep in childhood reflects the complex brain maturational process during infancy, childhood and adolescence

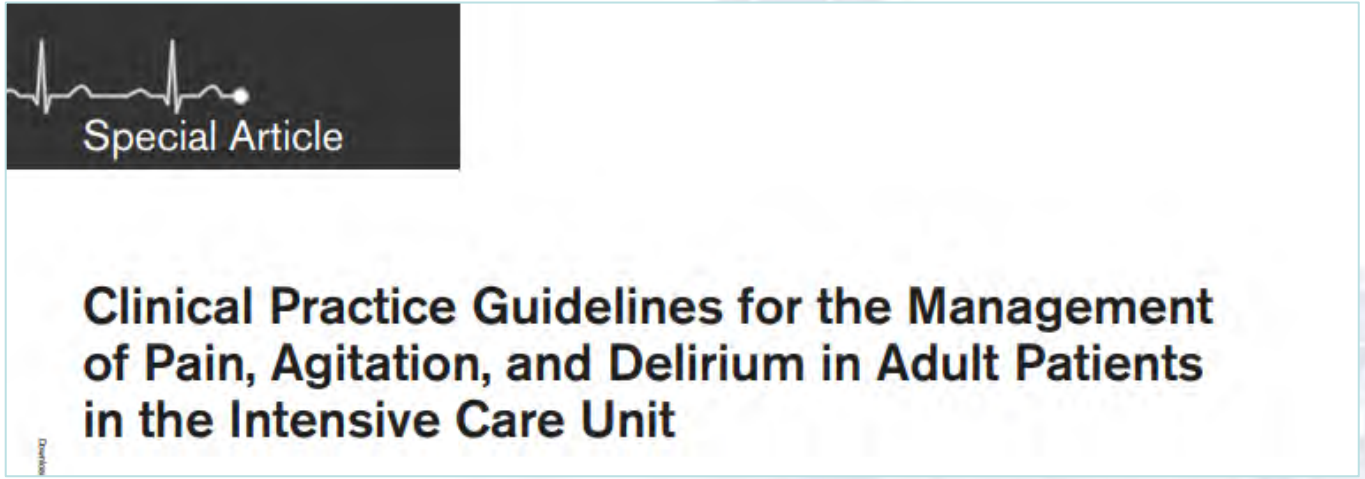




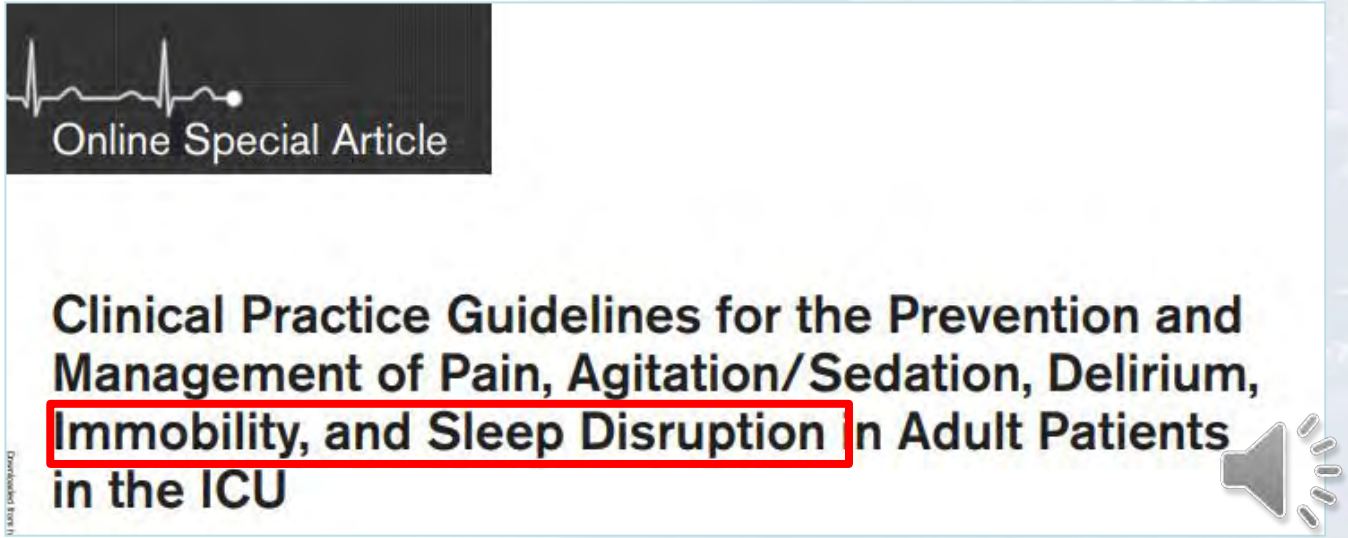
2018 means addressing sleep and immobility…in adults

Society of Critical Care Medicine
The Intensive Care Professionals

2013 "PAD" Guidelines



2018 "PADIS" Guidelines



They're not.

Temporal Characteristics of the Sleep EEG Power Spectrum in Critically Ill Children

Sapna R. Kudchadkar, MD[1]; Myron Yaster, MD[1]; Arjun N. Punjabi[2]; Stuart F. Quan, MD[3]; James L. Goodwin, PhD[4]; R. Blaine Easley, MD[5]; Naresh M. Punjabi, MD, PhD[6]

J Clin Sleep Med 2016

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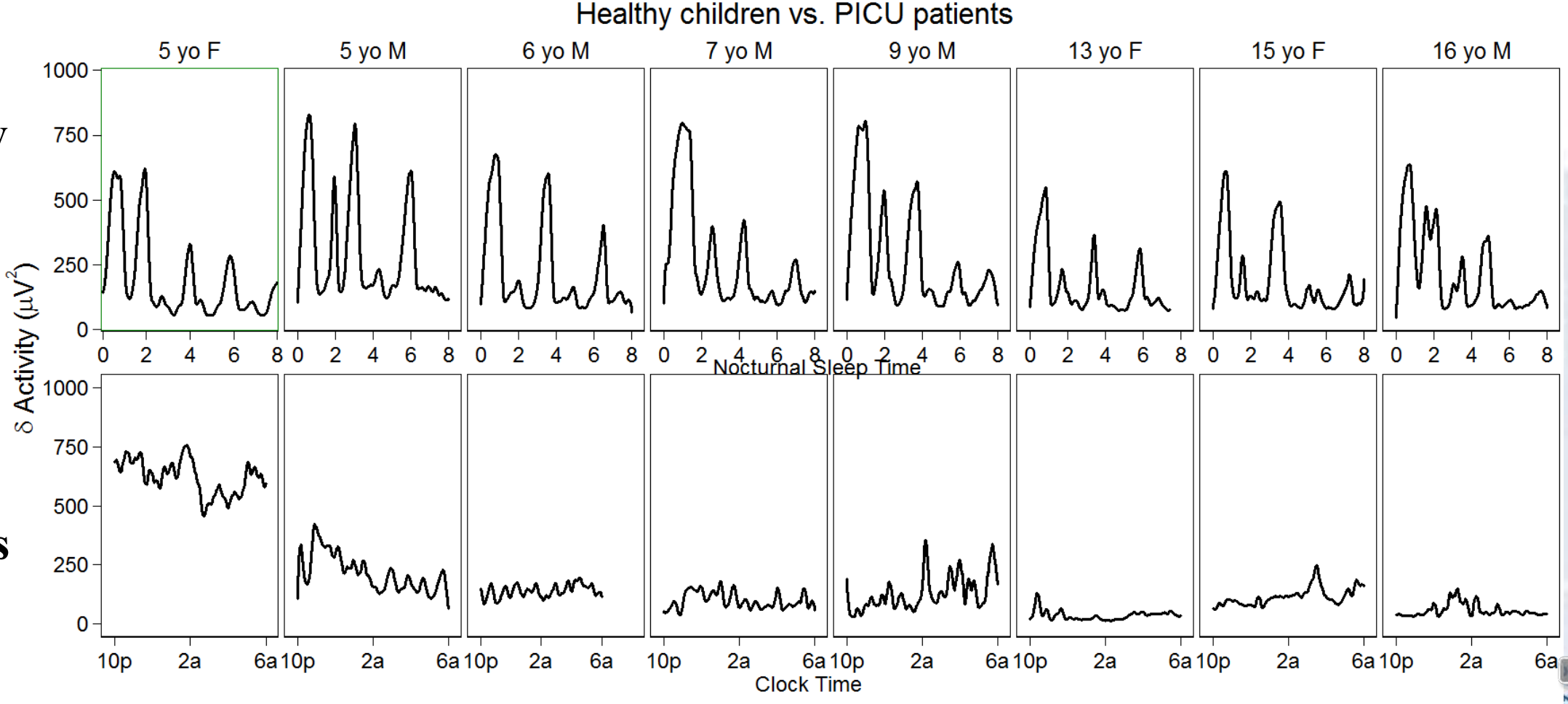
Healthy Kids

PICU Patients



Graphs by age and gender-matched pair

Hospital Sleep Disturbances

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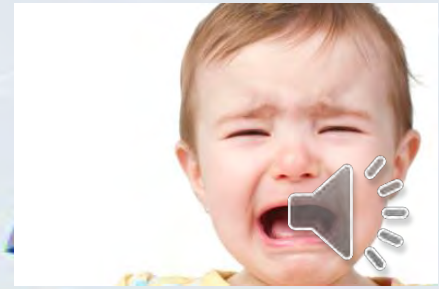

Medications

Noise
Light

Pain

Immobility

PICU Sleep Disturbance

Circadian rhythm disturbance

Sleep Loss

Sleep Fragmentation

Cares/
Interventions

Stress

PICU sleep is not a priority

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Sleep of critically ill children in the pediatric intensive care unit: A systematic review

Sapna R. Kudchadkar [a,*], Othman A. Aljohani [a], Naresh M. Punjabi [b]

- Multitude of studies of sleep in the NICU
- Nine publications about sleep in the PICU
  - Four publications from same RCT
  - Two studies using subjective assessment (PSBOT)

Kudchadkar et al., Sleep Med Rev 2014

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Improving Hospital Sleep is Not a Priority

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Cochrane Library
Cochrane Database of Systematic Reviews

Non-pharmacological interventions for sleep promotion in hospitalized children (Protocol)

Kudchadkar SR, Barnes S, Anton B, Gergen DJ, Punjabi NM

60,000 abstracts screened→<80 RCTs, mostly in neonates

Thank you, NICU colleagues!

[Sleep CHEST Reviews] CHEST

Sleep in the Hospitalized Child
A Contemporary Review

Check for updates

Jessica Berger, MD, MHS; Munfarid Zaidi, BS; Irene Halferty; and Sapna R. Kudchadkar, MD, PhD

Acute illness and hospitalization introduce several risk factors for sleep disruption in children that can negatively affect recovery and healing and potentially compromise long-term cognition and executive function. The hospital setting is not optimized for pediatric sleep promotion, and many of the pharmacologic interventions intended to promote sleep in the hospital actually may have deleterious effects on sleep quality and quantity. To date, evidence to support pharmacologic sleep promotion in the pediatric inpatient setting is sparse. Therefore, nonpharmacologic interventions to optimize sleep-wake patterns are of highest yield in a vulnerable population of patients undergoing active neurocognitive development. In this review, we briefly examine what is known about healthy sleep in children and describe risk factors for sleep disturbances, available sleep measurement tools, and potential interventions for sleep promotion in the pediatric inpatient setting. CHEST 2021; 160(3):1064-1074

KEY WORDS: children; hospital; ICU; neonatal; pediatric; sleep

Chest 2021

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Sedation, Sleep Promotion, and Delirium Screening Practices in the Care of Mechanically Ventilated Children: A Wake-Up Call for the Pediatric Critical Care Community

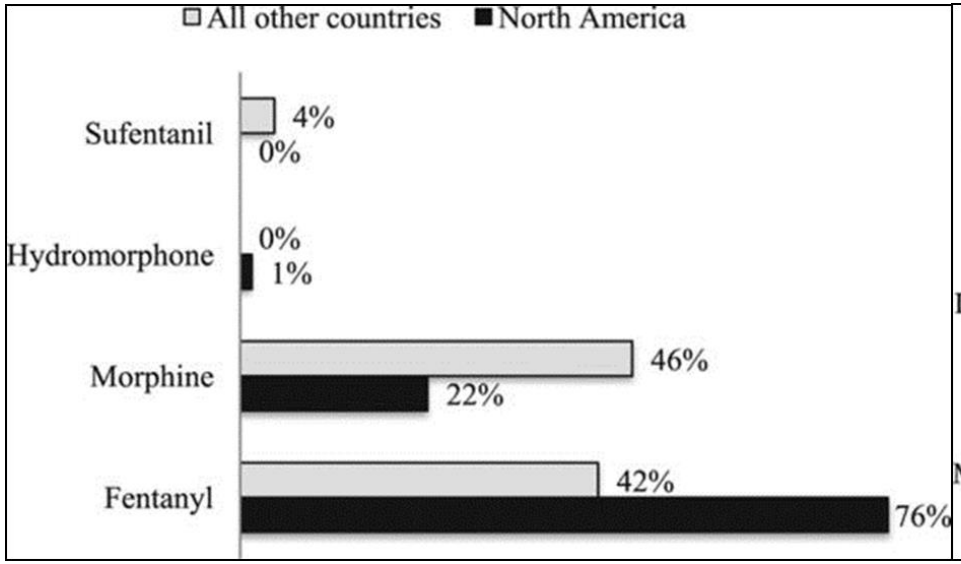
Sapna R. Kudchadkar, MD[1,2]; Myron Yaster, MD[1,2]; Naresh M. Punjabi, MD, PhD[3,4]

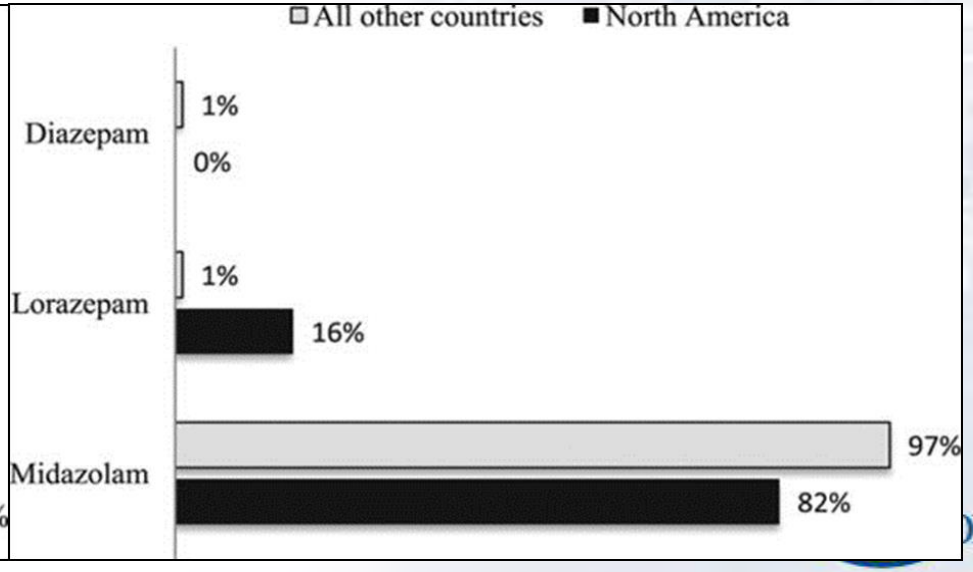
- 341 pediatric intensivists
- <15% aware of efforts to optimize sleep of critically ill children in their unit including any of following:
  - Noise reduction
  - Lighting
  - Earplugs/eyemask

Crit Care Med 2014.

Pediatric Intensive Care and Sleep: Is it a priority?

- >85% use a combination of benzodiazepine and opioid for sedation in mechanically ventilated children
- <10% use dexmedetomidine





Kudchadkar et al. 2014, *Crit Care Med.*

What's wrong with opioids and benzodiazepines?

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Table 5. Common ICU Medications and Their Effect on Sleep

Medication	Effect on Sleep	Possible Mechanism
Sedative/hypnotics		
Benzodiazepines	↑TST, ↓SWS, ↓REM, ↓W	GABA (type A) receptor stimulation
Propofol	↑TST, ↓W, ↓SL	GABA (type A) receptor stimulation
Dexmedetomidine	↑SWS, ↓SL, ↓REM	$Alpha_2$-agonist
Analgesics		
Opioids	↑W, ↓TST, ↓SWS, ↓REM	Mu-receptor stimulation
NSAIDs	↓TST, ↓SE	Prostaglandin synthesis inhibition

Benzodiazepines are an independent risk factor for the development of delirium

Kudchadkar et al. Contemporary Critical Care 2009
Pandaripande, et al. J Trauma 2008

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Protocolized sedation in the PICU: The RESTORE Study: No difference in outcomes

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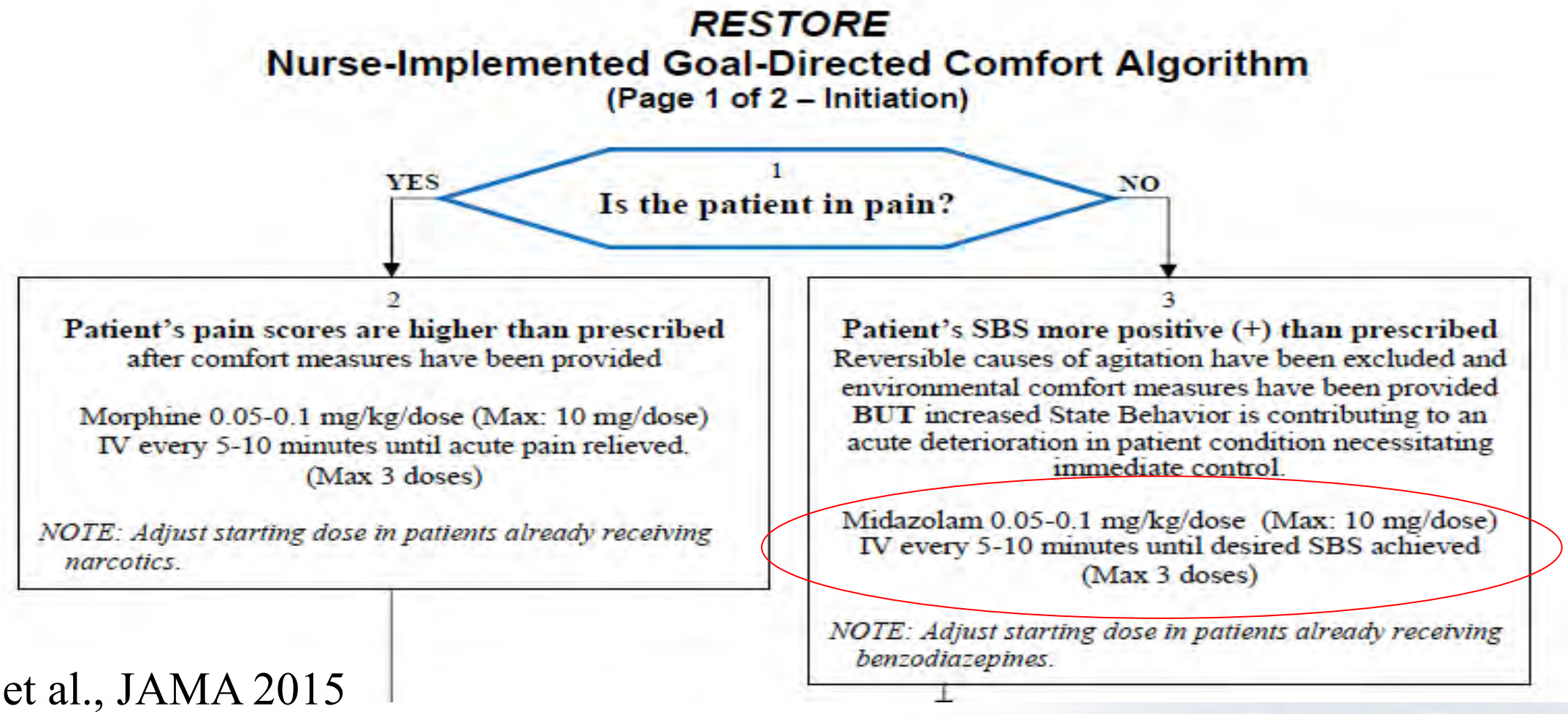

Curley et al., JAMA 2015

Hospital Sleep Disturbances

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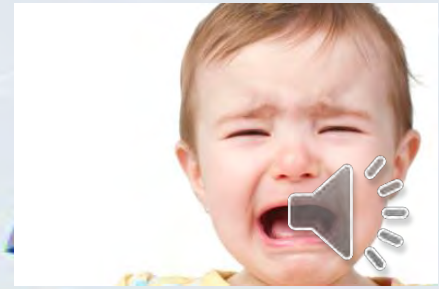

Medications

Noise
Light

Pain

Immobility

PICU Sleep Disturbance

Circadian rhythm disturbance

Sleep Loss

Sleep Fragmentation

Cares/
Interventions

Stress

What is the *most common* time for…..

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A. 7 a.m.-10 a.m.

B. 10 p.m.-5 a.m.

C. 5 a.m.-7 a.m.

Should this really be our "normal"?

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- Baths at 2 a.m.
- Daily X-rays at 5 a.m.
- Labs at midnight
- Endotracheal tube=immobile
- Benzo & opioid infusion=automatic

Sedation, Sleep Promotion, and Delirium Screening Practices in the Care of Mechanically Ventilated Children: A Wake-Up Call for the Pediatric Critical Care Community

Sapna R. Kudchadkar, MD[1,2]; Myron Yaster, MD[1,2]; Naresh M. Punjabi, MD, PhD[3,4]

***Benzodiazepines are an independent risk factor for delirium!**

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A vicious circle?

Physiologic dependence, prolonged hospital stay for withdrawal

[Sleep CHEST Reviews]

CHEST

Sleep in the Hospitalized Child

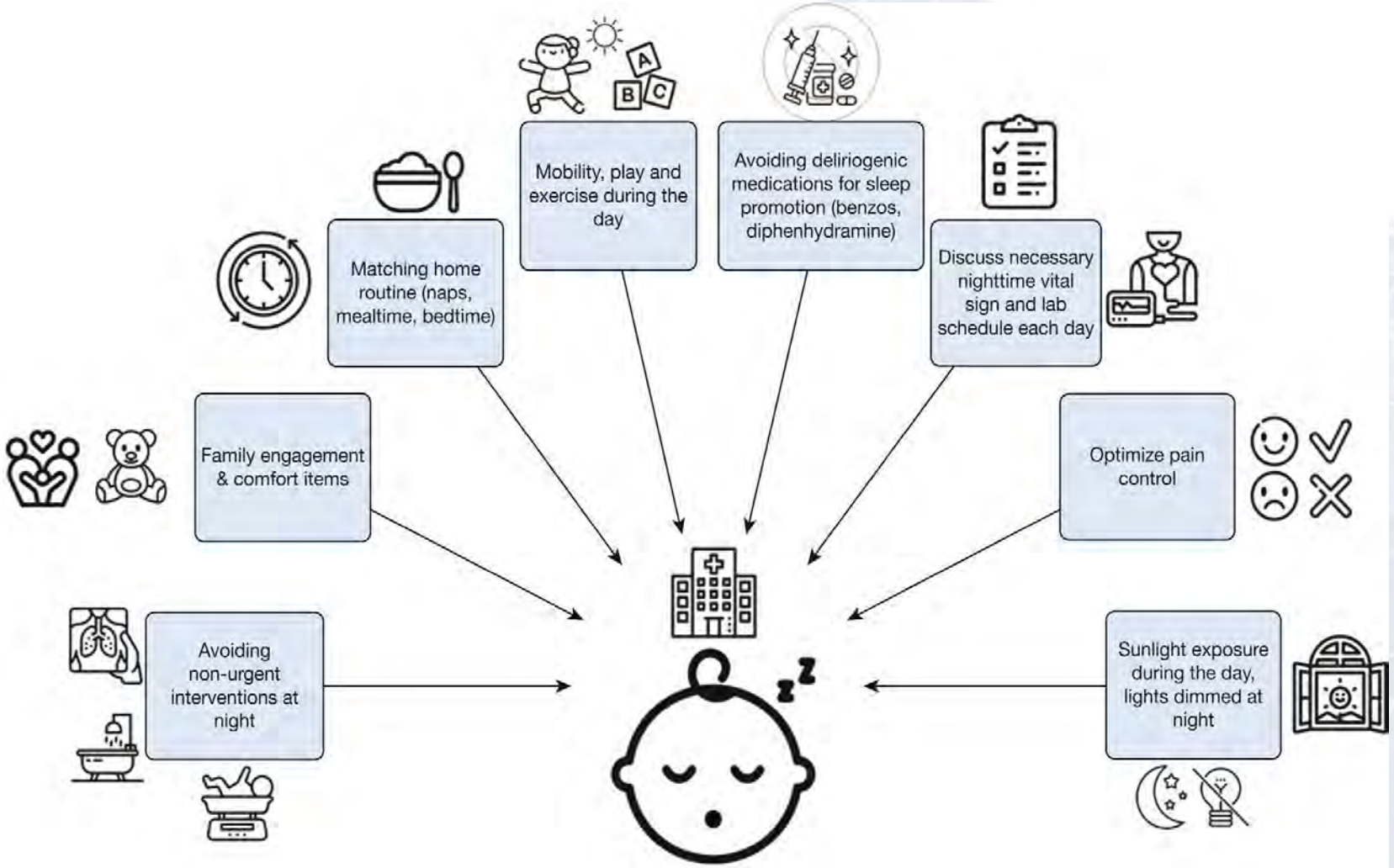
A Contemporary Review

Jessica Berger, MD, MHS; Munfarid Zaidi, BS; Irene Halferty; and Sapna R. Kudchadkar, MD, PhD

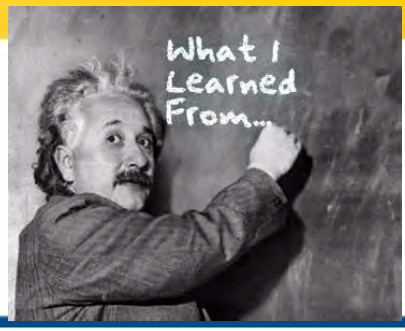
Acute illness and hospitalization introduce several risk factors for sleep disruption in children that can negatively affect recovery and healing and potentially compromise long-term cognition and executive function. The hospital setting is not optimized for pediatric sleep promotion, and many of the pharmacologic interventions intended to promote sleep in the hospital actually may have deleterious effects on sleep quality and quantity. To date, evidence to support pharmacologic sleep promotion in the pediatric inpatient setting is sparse. Therefore, nonpharmacologic interventions to optimize sleep-wake patterns are of highest yield in a vulnerable population of patients undergoing active neurocognitive development. In this review, we briefly examine what is known about healthy sleep in children and describe risk factors for sleep disturbances, available sleep measurement tools, and potential interventions for sleep promotion in the pediatric inpatient setting. CHEST 2021; 160(3):1064-1074

KEY WORDS: children; hospital; ICU; neonatal; pediatric; sleep

Chest 2021



What we've learned



- Evolution of sleep is a marker of brain development in childhood
- Sleep is severely fragmented in children admitted to the hospital
- The behavioral phenotype of sleep fragmentation presents as…

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Delirium Definition

Abrupt onset of inattention and other cognitive signs with **fluctuation** during day

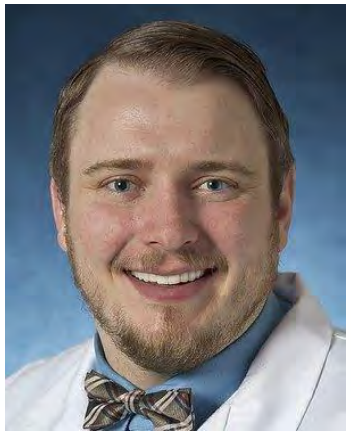
- **Inattention** – inability to direct, sustain & shift attention
- **Decreased awareness** of environment – disoriented
- **Change in cognition &/or perception**
  - Short-term memory, language/speech abnormalities
  - Hallucinations: auditory or tactile [*not* a requirement]
- **May have delusions, emotional lability including significant anxiety, sleep-wake disturbance.**

Adapted from ***DSM -5*** *American Psychiatric Association.* 2013

World Delirium Day 2021

World Delirium Awareness Day
#WDAD2020
March 11, 2020

AMERICAN DELIRIUM SOCIETY



WORLD
DELIRIUM AWARENESS DAY
#WDAD2021
17 Mar 2021

Become a Delirium Superhero

Delirium Citizen
- Take the Challenge
- Screen Patients for Delirium
- Pledge #IcanPreventDelirium

Delirium Hero
- Develop a Quality Program for Delirium
- Educate others to increase Delirium Awareness

Delirium Superhero
- Expand Delirium Awareness Across the Country/World
- Engage with your Delirium Society
- Collaborate Across the Globe to Improve Delirium Care

WORLD
I can prevent DELIRIUM
Awareness
DELIRIUM READY
DELIRIUM DAY

Sedation, Sleep Promotion, and Delirium Screening Practices in the Care of Mechanically Ventilated Children: A Wake-Up Call for the Pediatric Critical Care Community

Sapna R. Kudchadkar, MD[1,2]; Myron Yaster, MD[1,2]; Naresh M. Punjabi, MD, PhD[3,4]

- **Only 2% of respondents reported delirium screening is performed for all mechanically ventilated patients once per shift**
- When asked which tools were being used for delirium, several listed withdrawal scales
  - –Sophia Observation Scale
  - –Withdrawal Assessment Tool-1 (WAT-1)

Crit Care Med 2014

Delirium is everyone's problem

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The Johns Hopkins Delirium Consortium: A Model for Collaborating Across Disciplines and Departments for Delirium Prevention and Treatment

Karin J. Neufeld, MD, MPH,[*] O. Joseph Bienvenu, MD, PhD,[*] Paul B. Rosenberg, MD,[*] Simon C. Mears, MD, PhD,[†] Hochang B. Lee, MD,[*] Biren B. Kamdar, MD, MBA,[‡] Frederick E. Sieber, MD,[§] Sharon K. Krumm, RN, PhD,[‖,#] Jeremy D. Walston, MD,[**] David N. Hager, MD, PhD,[‡] Pegah Touradji, PhD,[††] and Dale M. Needham, MD, PhD[‡,††]

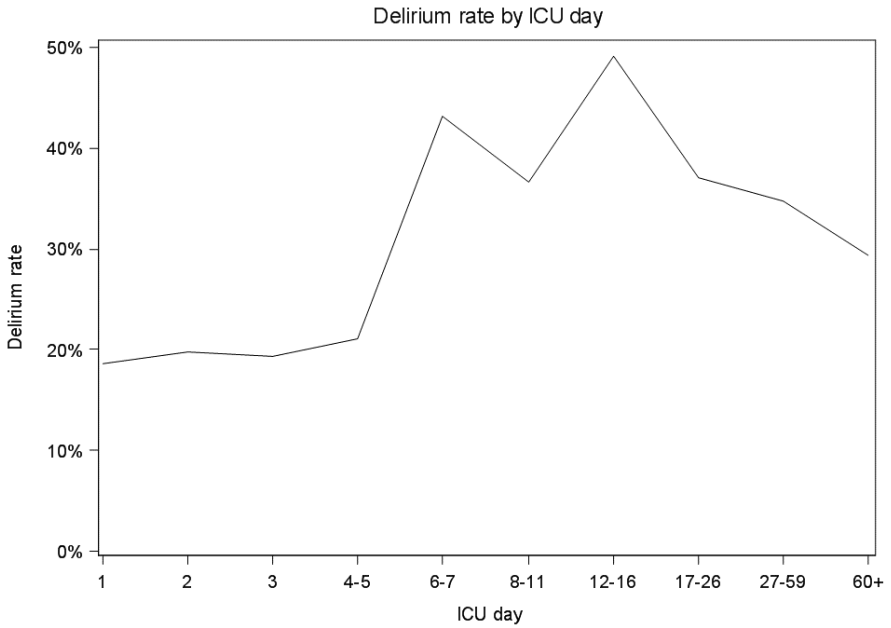
J Am Geriatr Soc 2011

Insight from half a century ago…

'The problem of delirium is far from an academic one. Not only does the presence of delirium often complicate and render more difficult the treatment of a serious illness, but also it carries the serious possibility of permanent irreversible brain damage'

-Engel & Romano, 1959

Delirium in Critically Ill Children: An International Point Prevalence Study*



Variable	(95% CI)
Age > 2 years	0.7 (0.5, 1.0)
Physical restraints	4.0 (2.0, 7.7)
Mechanical ventilation	1.7 (1.1, 2.7)
Narcotics	2.3 (1.5, 3.5)
Benzodiazepines	2.2 (1.5, 3.3)
Antiepileptics	2.9 (1.8, 4.8)
General anesthesia	0.4 (0.3, 0.8)
Vasopressors	2.4 (1.5, 3.8)

25% Delirium Prevalence

N=835, Traube et al, Crit Care Med 2017

Why should we *consistently* screen for delirium in the ICU setting?

- Not just to diagnose delirium and treat it!

- "A positive delirium screen after several negative screens is a warning sign for impending badness" - Wes Ely, MD

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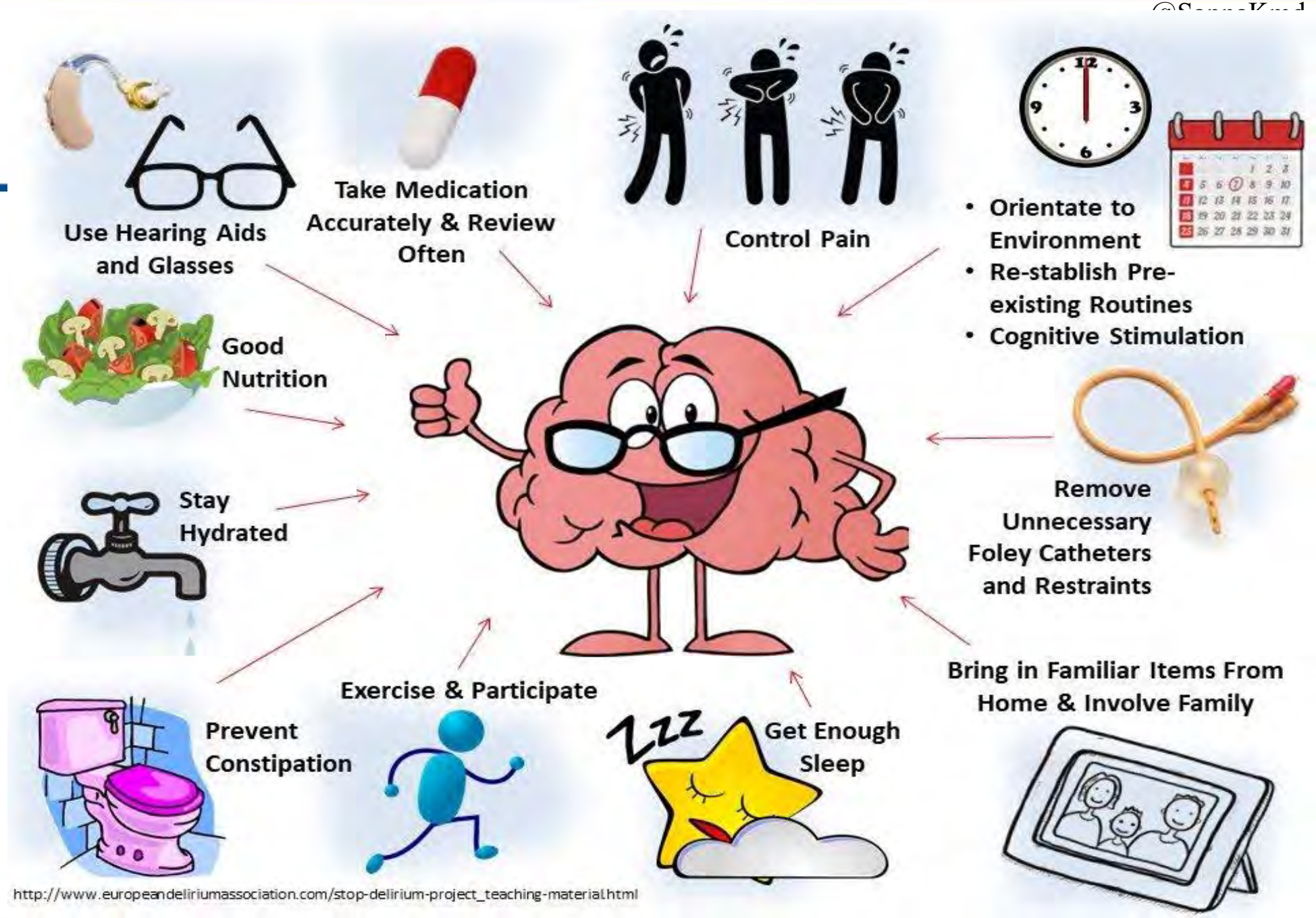
Delirium: Basics of Prevention



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Where do we go from here?

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Fall 2013: Our PICU culture of immobility

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- Oversedation
- Rapid escalation
- PT/OT an afterthought
- Restraints=rule, not exception
- What's delirium?
- Benzos, diphenhydramine to improve sleep
- Family as observers

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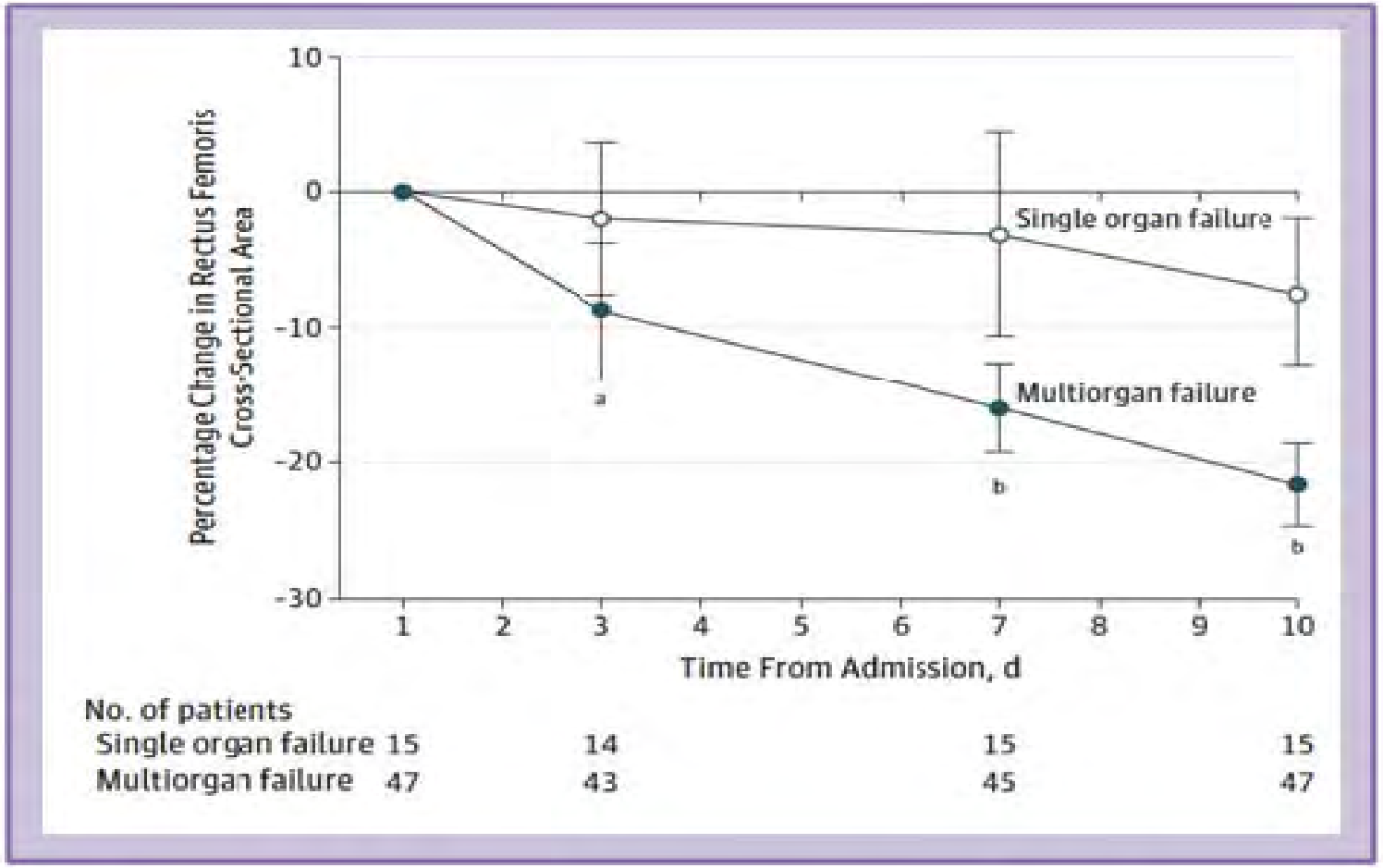
Benefits of mobility

- Blood sugar homeostatsis
- Cardiovascular function
- Pulmonary function
- Decreases chronic inflammation
- Hormonal regulation
- Musculoskeletal & neuromuscular integrity
- Sleep/wake pattern
- Cognition
- Decreases depression

Muscle wasting occurs quickly in the ICU



Puthucheary Z. *JAMA* 2013

Our culture change goals

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- Every kid, every day
- Get the experts to the bedside EARLY.
- No child is ever “too sick” to turn away the PT or OT
- Analgesia first– then sedation IF NEEDED
- Kids and families can tell us what they need
- Sleep hygiene and delirium prevention= more mobility

The Cost: Multiprofessional Collaboration to Promote Culture Change--It just makes sense!

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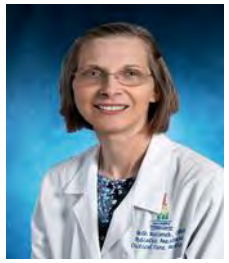

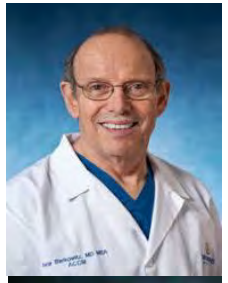

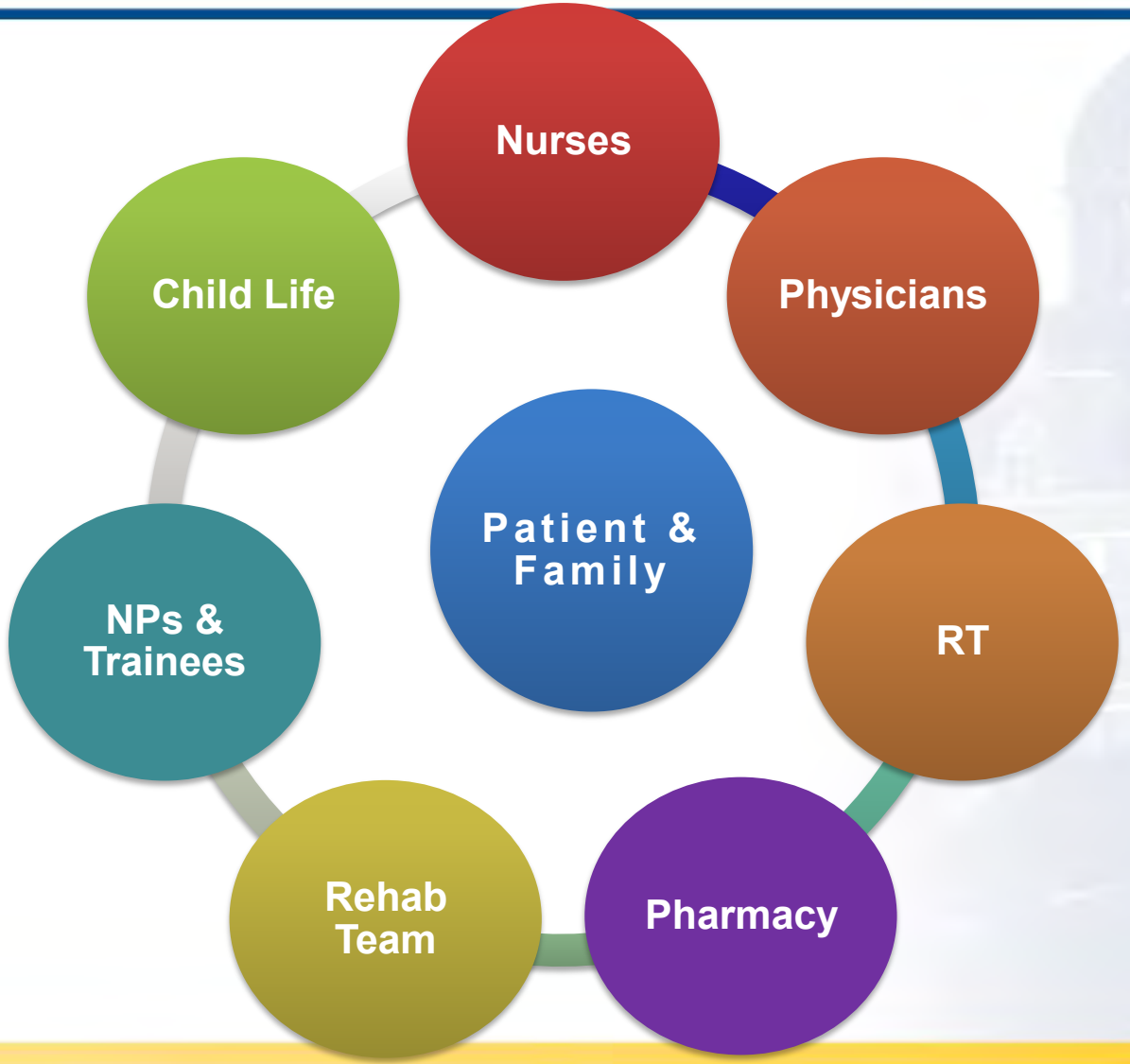

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A cool name is the first step

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PICU UP!

Early Mobilization

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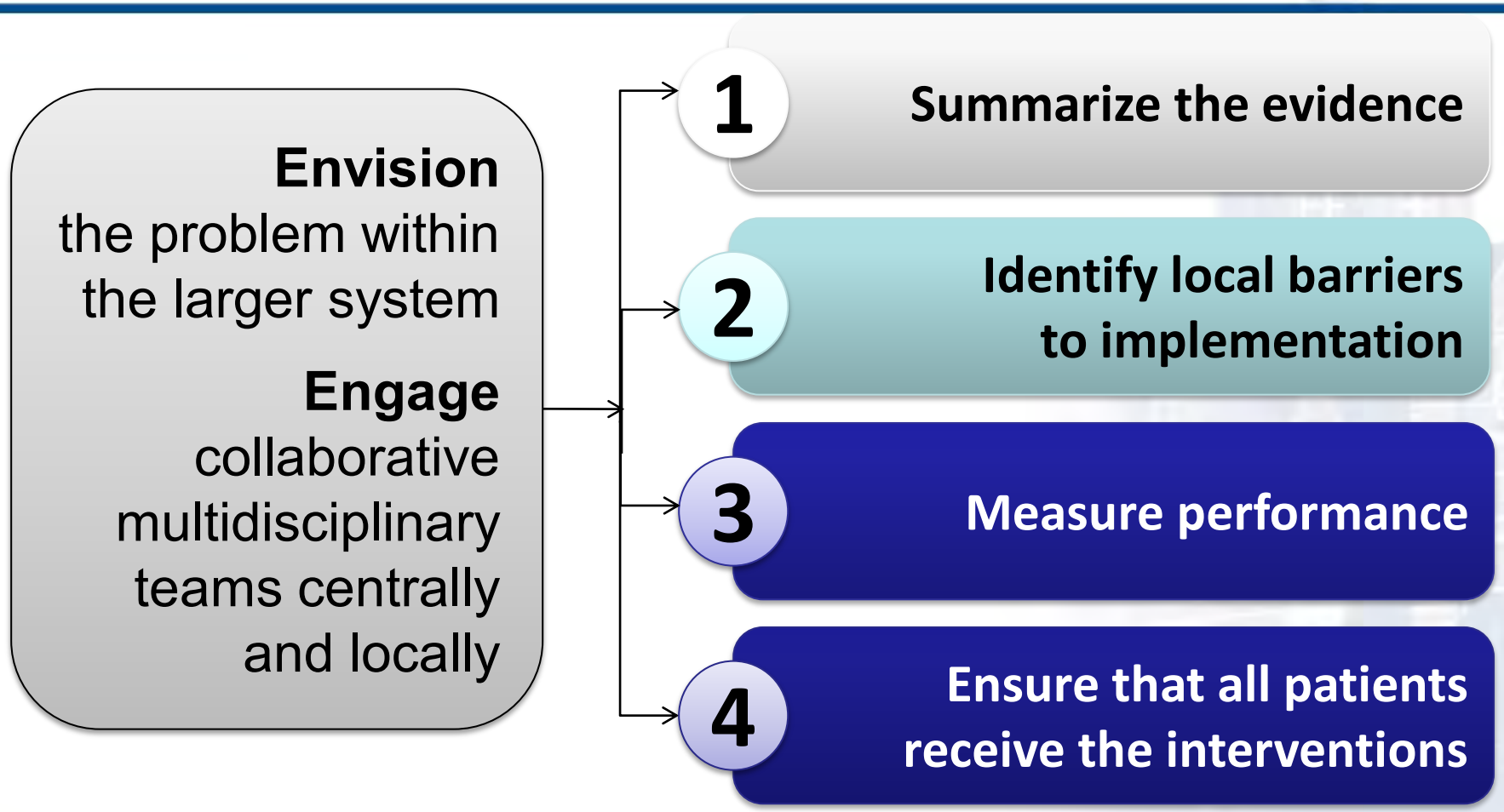
Translating Research Into Practice



1. Pronovost PJ, Berenholtz SM, Needham DM. Translating evidence into practice: a model for large scale knowledge translation. BMJ. 2008 Oct 6;337:a1714. PMID: 18838424.

Ahrq.gov

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Pediatric Literature Review

Early Mobilization in the Pediatric Intensive Care Unit: A Systematic Review

Beth Wieczorek[1] Christopher Burke[1] Ahmad Al-Harbi[1] Sapna R. Kudchadkar[2]

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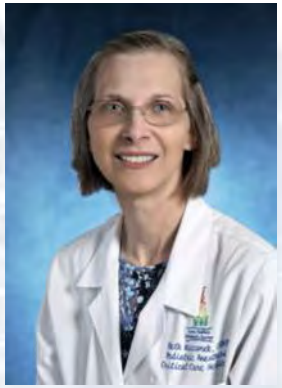
- Melchers et al 1999: 30 severe TBI
- Jacobs et al 2001: 133 LTRs
- Andelic et al 2012: 61 severe TBI
- Abdulsatar et al 2013: 8 Wii boxing
- Hollander et al 2014: 14 VADS
- Schweitz & Van Aswegan 2013: Pectus



EM was safe and feasible in these studies

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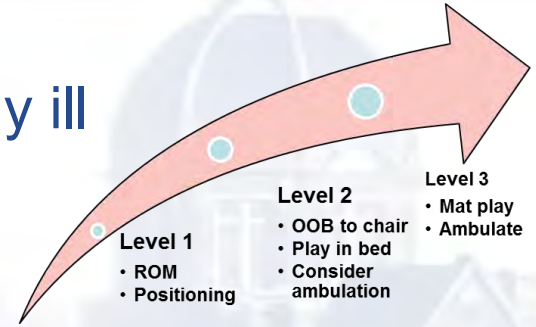
PICU Up!™: Early Rehabilitation and Progressive Mobility

- Structured and interdisciplinary program
- Integrated into the routine care of the critically ill child
- Outcomes
  - Provide a standardized mechanism to increase activity level
  - Improve patient outcomes
    - Lower rates of mobility associated complications
    - Decrease length of mechanical ventilation
    - Decrease length of stay
      - PICU
      - Hospital



PICU UP!
Early Mobilization

What is Early Mobilization?

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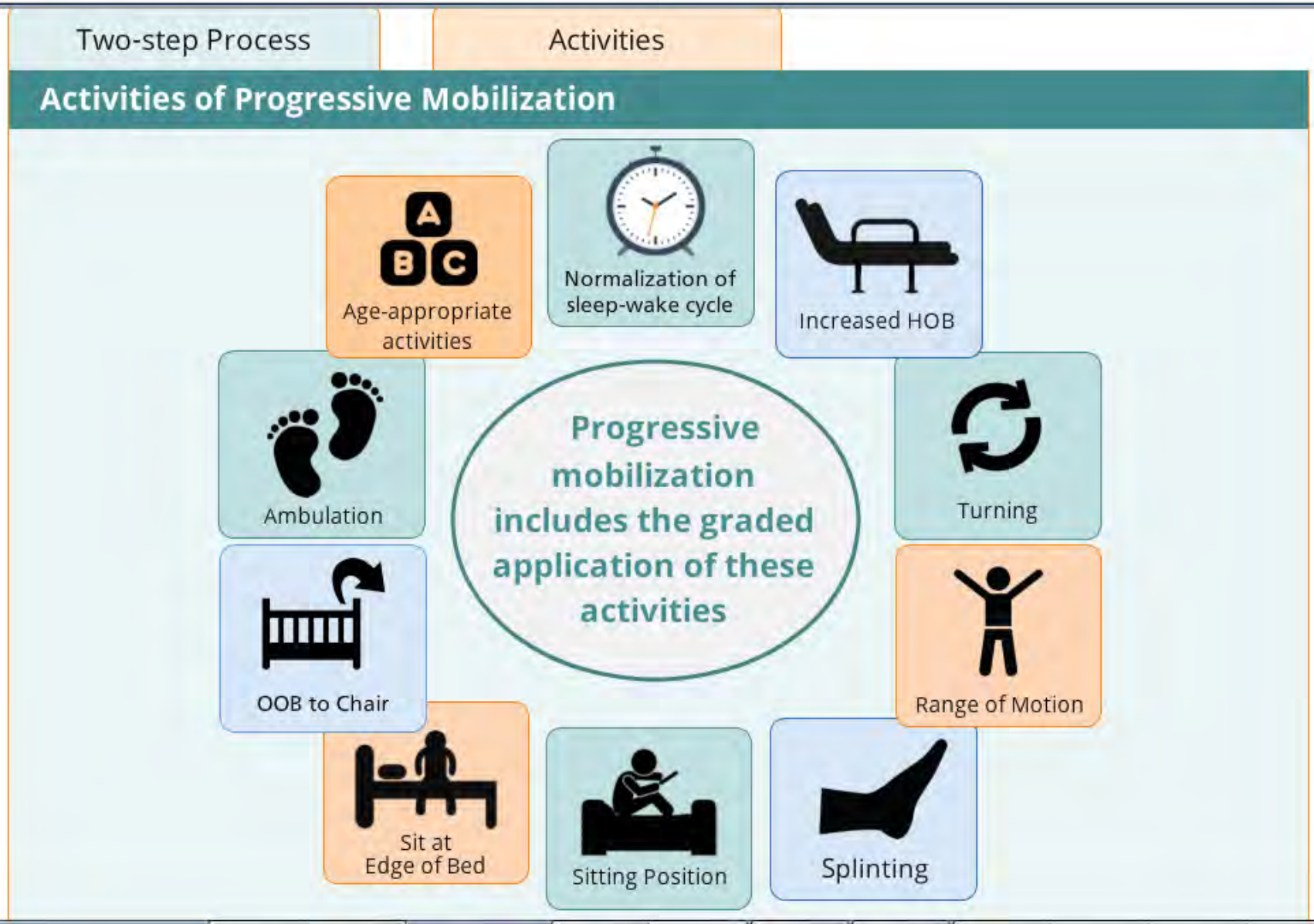

Ambulation is not the goal for everyone!!

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PICU Up! Levels: Shared mental models

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Step 1-Screening Process: Early Activity and Mobility Levels

These are the criteria for inclusion at each level of the screening process.

LEVEL 1: Parameters for Inclusion	LEVEL 2: Parameters for Inclusion	LEVEL 3: Parameters for Inclusion
• Intubated with FiO2 >60% *or* • Intubated with PEEP > 8 *or* • Intubated difficult airway *or* • New tracheostomy *or* • Acute neurological event *or* • Sedated and SBS -3 to –2 *or* • Vasopressor other than Milrinone	• Intubated or tracheostomy with FiO2 ≤ 60% +/or PEEP ≤8 *and* SBS -1 to +3 *or* • Noninvasive respiratory support with FiO2 > 60% *or* • Dialysis/Renal Replacement Therapy *or* • Femoral access	• Non-invasive respiratory support with FiO2 ≤ 60% *or* • Baseline pulmonary support *or* • EVD cleared by NUS *and* SBS -1 to +3

PCCM 2016

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Early Mobilization

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PICU Up! Activity Progression: Sleep is a priority

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Step 2-Activity Progression

Screening is followed by a progression of activities appropriate for the patient's level.

Activity Progression: Level 1

- Lights on/shades up by 0900
- Bed/bath/weight by 2300
- Lights dimmed/out by 2300 increase lighting as needed for cares/interventions
- TV limited to 30 min at a time. Goal of < 2 hours per day for children >2 yo
- HOB elevated ≥ 30°
- Turn q2h daytime and q4h at night
- Positioned in developmentally supportive position or as recommended by OT/PT
- OT consult by PICU day 3
- PT consult as needed

Activity Progression: Level 2

- Level 1 activities *plus*
- Positive touch for infants/toddlers
- Sitting up in bed TID
- Team to consider OOB to chair +/or ambulation
- OT/PT consult by PICU day 3
- Assess for difficulty with communication or phonation and consult SLP
- Assess for swallowing readiness in high risk children and consult SLP
- Assess need for daily schedule
- pCAM-ICU BID

Activity Progression: Level 3

- Level 1 and 2 activities *plus*
- OOB to chair TID or sitting up in bed TID if appropriate chair is not available
- Ambulate BID if trunk control present

PICU UP!
Early Mobilization

The Joint Commission Journal on Quality and Patient Safety 2020; 46:706–714

IMPROVEMENT BRIEF

Design and Implementation of an Analgesia, Sedation, and Paralysis Order Set to Enhance Compliance of pro re nata Medication Orders with Joint Commission Medication Management Standards in a Pediatric ICU

David Procaccini, PharmD, MPH, BCPS, CACP; Rebecca Rapaport, BSN, RN; Brent Petty, MD; Dana Moore, MS, RN, CJCP; Dorothy Lee, MS, RN; Sapna R. Kudchadkar, MD, PhD, FCCM

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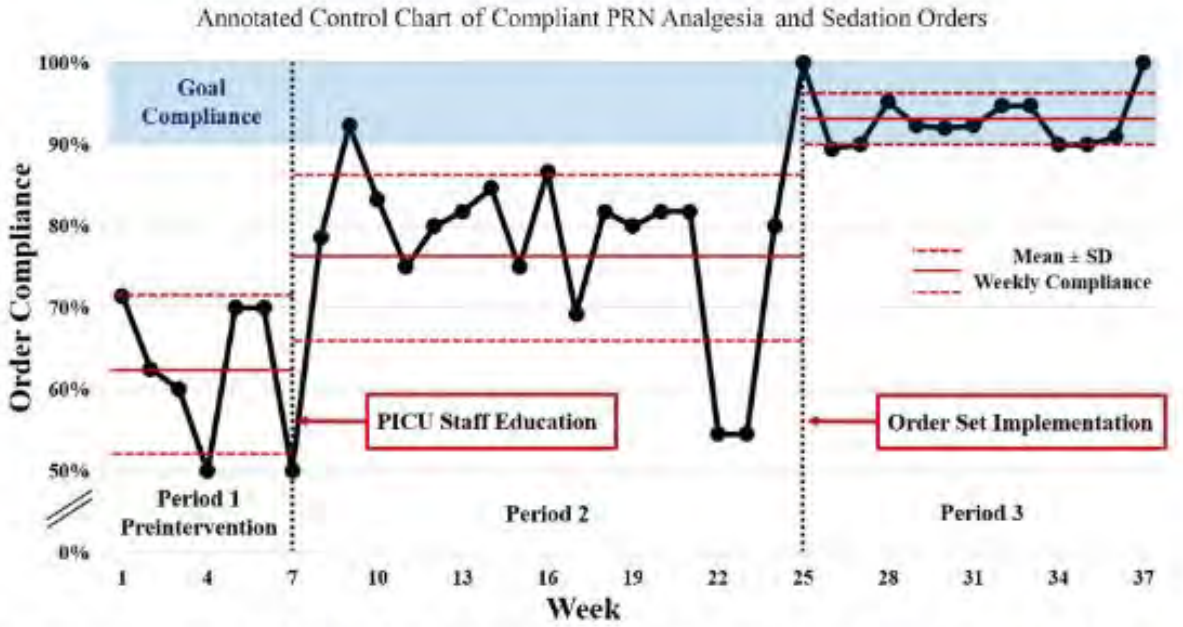

Figure 2: This annotated control chart displays the rates of compliance with Joint Commission Medication Management (MM) standards for PRN orders during the 37-week study period. PRN, pro re nata; SD, standard deviation; PICU, pediatric ICU.

Online module for ALL PICU staff

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"Rest and Reassess"

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PICU065 Appendix B: Criteria to Pause PICU UP! Activity, Rest and Reassess

- Change in baseline HR by 20%
- Change in baseline BP by 20%
- Change in baseline RR by 20%
- Decrease in baseline SaO2 by 15%
- Increase in baseline FiO2 by 20%
- Increase in baseline ETCO2 by 20%
- Ventilator asynchrony
- CPAP/BiPAP asynchrony
- Respiratory distress
- New arrhythmia
- Hemodynamic concerns
- Change in mental status
- Concern for airway device, vascular access or EVD integrity
- Behavior interfering with safe activity

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Results

PICU Up!: Impact of a Quality Improvement Intervention to Promote Early Mobilization in Critically Ill Children

Beth Wieczorek, DNP, PNP-AC[1]; Judith Ascenzi, DNP, RN, CCRN[2]; Yun Kim, MS, OTR/L[3]; Hallie Lenker, PT, DPT, STAR/C[3]; Caroline Potter, MS, CCLS, CIMI[4]; Nehal J. Shata, MBBS[1]; Lauren Mitchell, MS, CCLS[4]; Catherine Haut, DNP, CPNP-AC,CCRN[5,6]; Ivor Berkowitz, MBBCh, MBA[1,7]; Frank Pidcock, MD[1,7]; Jeannine Hoch, MA, CCC-SLP[7]; Connie Malamed, MA[8]; Tamara Kravitz, MS[8]; Sapna R. Kudchadkar, MD[1,7]

- 82% of PICU patients had a PT session prior to discharge from PICU vs. 53% (p=0.02)
- Median number of mobilization activities per patient by day 3 doubled from 3 to 6
- ***0% adverse event rate over 737 PICU days***
- ***ETT ambulation increased from 0% to 10%***

PCCM 2016

@SapnaKmd

Normal Baseline Function Is Associated With Delayed Rehabilitation in Critically Ill Children

Journal of Intensive Care Medicine
1-6

DOI: 10.1177/0885066618754507
journals.sagepub.com/home/jic
SAGE

Shinya Miura, MD, MPH[1], Beth Wieczorek, CRNP, DNP[2], Hallie Lenker, PT, DPT, STAR/C[3], and Sapna R. Kudchadkar, MD[2,3,4]; on behalf of the PICU Up! Early Mobilization Task Force

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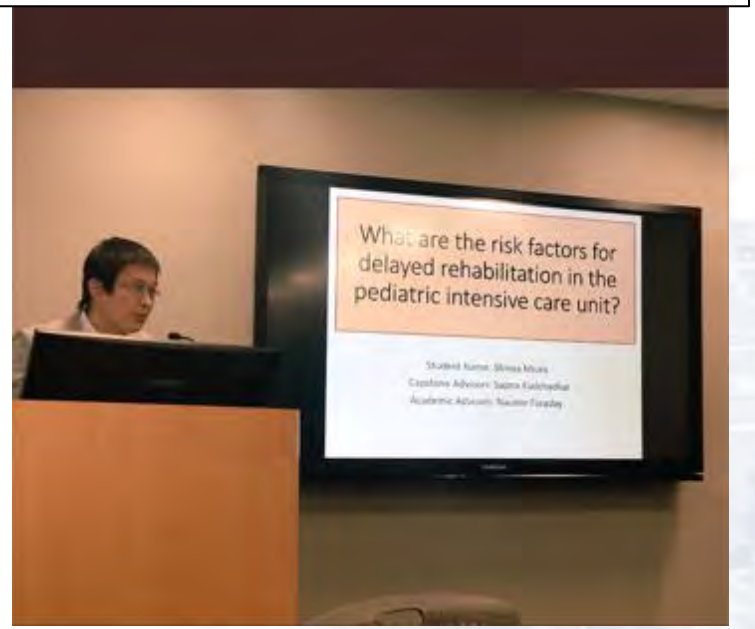
Table 3. Multivariable Analysis

Characteristic	Odds ratio (95% CI)	*P* value
Age	1.00 (1.00–1.01)	.09
Female sex	2.03 (0.73–5.66)	.18
PRISM	1.17 (1.02–1.34)	.02
Motor impairment	5.13 (1.24–21.17)	.02
Intellectual disability	0.90 (0.24–3.42)	.88
Mechanical ventilation	1.41 (0.74–2.68)	.30
Number of devices	1.16 (0.97–1.40)	.11
Weekend[a]	0.42 (0.14–1.22)	.11

Abbreviations: CI, confidence interval; PRISM, pediatric risk of mortality.

[a]Admission on Thursday or Friday.



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ORIGINAL RESEARCH article

Front. Oncol., 08 March 2021 | https://doi.org/10.3389/fonc.2021.645716

Beginning Restorative Activities Very Early: Implementation of an Early Mobility Initiative in a Pediatric Onco-Critical Care Unit

Saad Ghafoor[1*], Kimberly Fan[2], Sarah Williams[1], Amanda Brown[1], Sarah Bowman[1], Kenneth L. Pettit[3], Shilpa Gorantla[3], Rebecca Quillivan[3], Sarah Schwartzberg[4], Amanda Curry[4], Lucy Parkhurst[4], Marshay James[1], Jennifer Smith[5], Kristin Canavera[6], Andrew Elliott[7], Michael Frett[8], Deni Trone[9], Jacqueline Butrum-Sullivan[10], Cynthia Barger[11], Mary Lorino[11], Jennifer Mazur[12], Mandi Dodson[12], Morgan Melancon[12], Leigh Anne Hall[11], Jason Rains[10], Yvonne Avent[1], Jonathan Burlison[13], Fang Wang[14], Haitao Pan[14], Mary Anne Lenk[15], R. Ray Morrison[1] and Sapna R. Kudchadkar[16]

Stephanie Sparacino, RRT[b], Mary L. deAlmeida, MD[a,b]

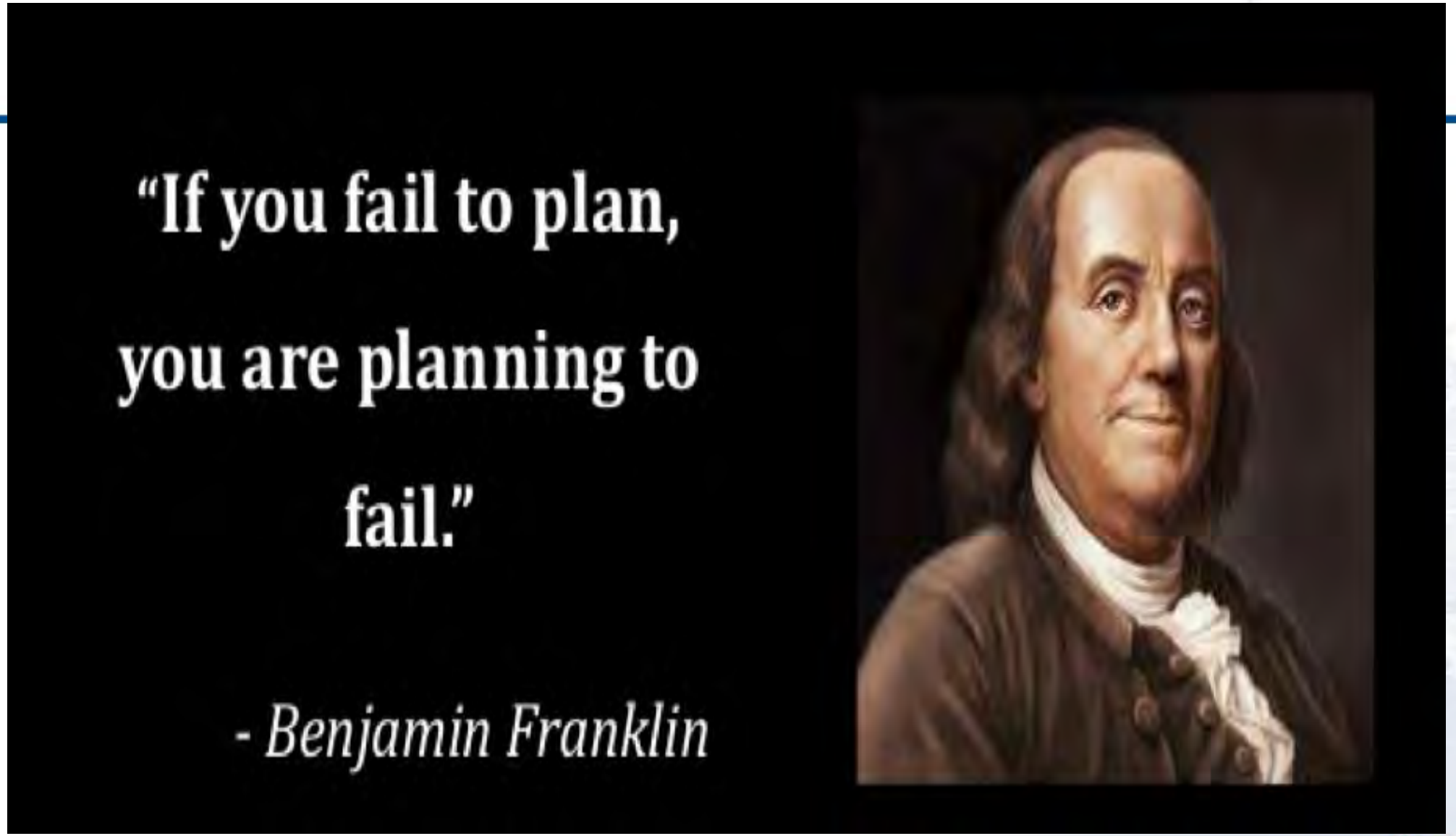
J Crit Care 2017

Role of the Respiratory Therapist

@KristaHajnik
@Steph_Hazen

- Work in collaboration with medical team to determine patient readiness and activity goal for the day on morning rounds
- Screen and perform ERT in children who meet criteria*
- Coordinate with multidisciplinary staff to determine timing and strategy for safe mobilization
- **Educate the team about challenges specific to the respiratory status and needs of the patient**

@KristaHajnik
@Steph_Hazen
@SapnaKmd



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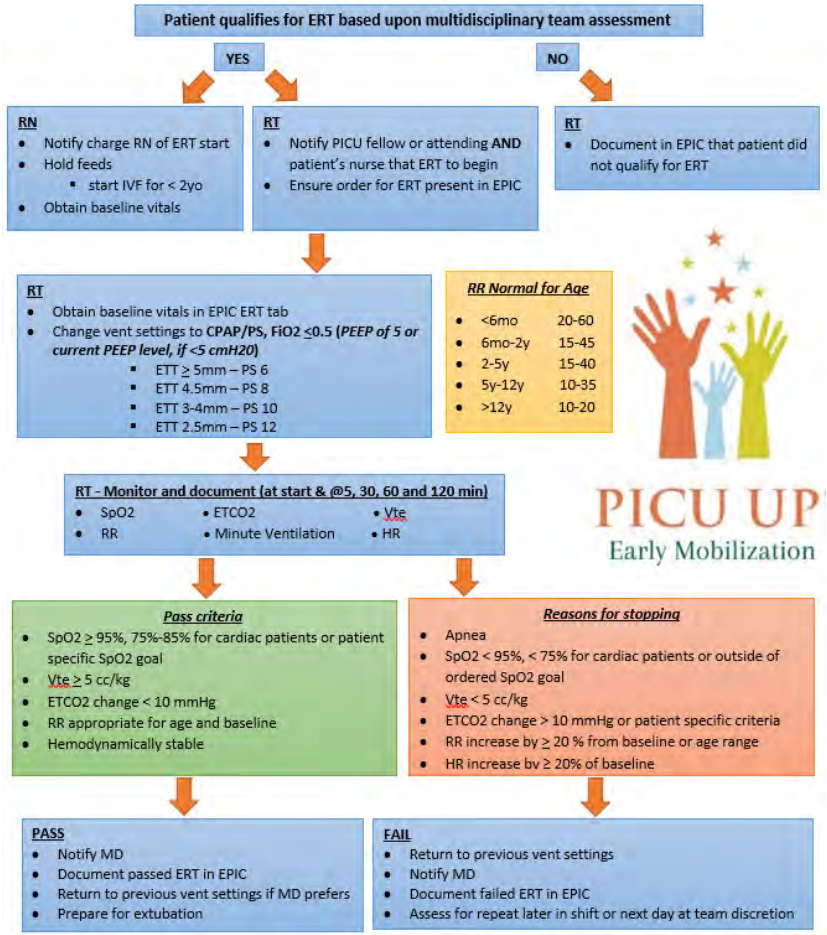
@KristaHajnik
@Steph_Hazen
@SapnaKmd

Modality Specific Considerations

Oxygen Therapy Nasal Cannula, Aerosol Therapy, Continuous Nebulizers, Heated High Flow Nasal Cannula	Noninvasive Ventilation CPAP/BiPAP	Invasive Ventilation ETT/Trach

• Sufficient O2 for activity
• Emergency equipment
• **Educate staff to potentially mobilize without RT**
	• Sufficient O2 for activity
	• Emergency equipment
	• Sufficient battery life on device for duration of activity
	• Circuit support
	  • In chair
	  • While ambulating
	• CPAP/BiPAP asynchrony
		• Sufficient O2 for activity
		• Emergency equipment
		• Sufficient battery life on device for duration of activity
		• Circuit support
		  • In chair
		  • While ambulating
		• Ventilator asynchrony
		• Increase in etCO2 by 20%
		• Emergency/back up airway equipment
		• Airway security

Extubation readiness testing: RT/NP collaboration



Presenting at #PCCC18 and AARC 2018 meeting

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Exclusions…but no longer- bringing new energy to the table

Excluded from PICU UP! Levels and Activities	• ECMO • Open chest • Open abdomen • Unstable fracture • Medical orders specifying alternate activity

PICU UP! Level	Parameters for Inclusion	Activities	Criteria to Pause Activity, rest and reassess

Level 1 ECMO	• VV or VA ECMO: femoral or neck cannulation
	• Stable and secure ECMO cannula
	• Stable hemodynamics with stable ECMO flows, stable inotropic support
	• No significant bleeding
	• Stable SVO2
		• Lights on/shades up by 0900
		• Bed/bath/weight by 2300
		• Lights dimmed/out by 2300
		  ○ Increase lighting as needed for cares/interventions
		• TV limited to 30 minutes at a time and a goal of <2 hours per day for children >2 years of age
		• HOB elevated ≥ 30°
		• Turn q2h during the day and q4h at night
		• OT and PT consulted on ECMO initiation
		• Maintain head and body alignment during activity and/or repositioning
		  ○ PROM as per discussed by PICU team
		• Positive touch for infants and toddlers
		• pCAM or psCAM assessment BID if SBS -1 to +3
			• Decrease in SvO2 by 20% of baseline or SvO2 < 50%
			• Decrease in NIRS by 20% from baseline
			• New arrhythmia or ST changes
			• Reportable conditions to provider
			  • Increase in bleeding around cannula site and/or general increased bleeding
			  • Persistent changes to ECMO flow or pump pressures

Sapna Kudchadkar, MD, PhD
@SapnaKmd

Congratulations to our #respiratory @PICU_Up champions @KristaHajnik & @Steph_Hazen, making @HopkinsKids proud with their research presentation at #AARC18! #PedsICU #RT #ICUrehab

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So are we the only ones who needed to change our mobility culture?

- Before large scale interventional trials can be designed, it is critical to understand the current state of PICU practice at the bedside for early mobilization and acute rehabilitation

Physical Rehabilitation in Critically Ill Children: A Multicenter Point Prevalence Study in the United States

Sapna R. Kudchadkar, MD, PhD, FCCM[1,2,3]; Archana Nelliot, MD[1]; Ronke Awojoodu, RN, MPH[1]; Dhananjay Vaidya, PhD[4]; Chani Traube, MD[5]; Tracie Walker, MD[1]; Dale M. Needham, MD, PhD[3,6,7]; for the Prevalence of Acute Rehabilitation for Kids in the PICU (PARK-PICU) Investigators and the Pediatric Acute Lung Injury and Sepsis Investigators (PALISI) Network

Crit Care Med 2020

park.web.jhu.edu

RESEARCH Open Access

Mobilization practices in critically ill children: a European point prevalence study (EU PARK-PICU)

Erwin Ista[1,2*], Barnaby R. Scholefield[3,4], Joseph C. Manning[5,6], Irene Harth[7], Orsola Gawronski[8], Alicja Bartkowska-Śniatkowska[9], Anne-Sylvie Ramelet[10], Sapna R. Kudchadkar[11,12,13] and EU PARK-PICU Collaborators[14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48]

Critical Care 2020

FEATURE ARTICLE

Prevalence of Acute Rehabilitation for Kids in the PICU: A Canadian Multicenter Point Prevalence Study

Karen Choong, MB BCh, MSc[1,2]
David J. Zorko, MD[1]

OBJECTIVES: To evaluate mobilization practices, barriers, and mobility-related adverse events in Canadian PICUs.

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What is PARK-PICU?

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Prevalence of **A**cute **R**ehabilitation for **K**ids in the **PICU**

- 2-day point prevalence study being conducted around the world to characterize acute rehabilitation practices for critically ill children.
  - USA
  - Canada
  - Brazil
  - Europe
  - Australia & New Zealand

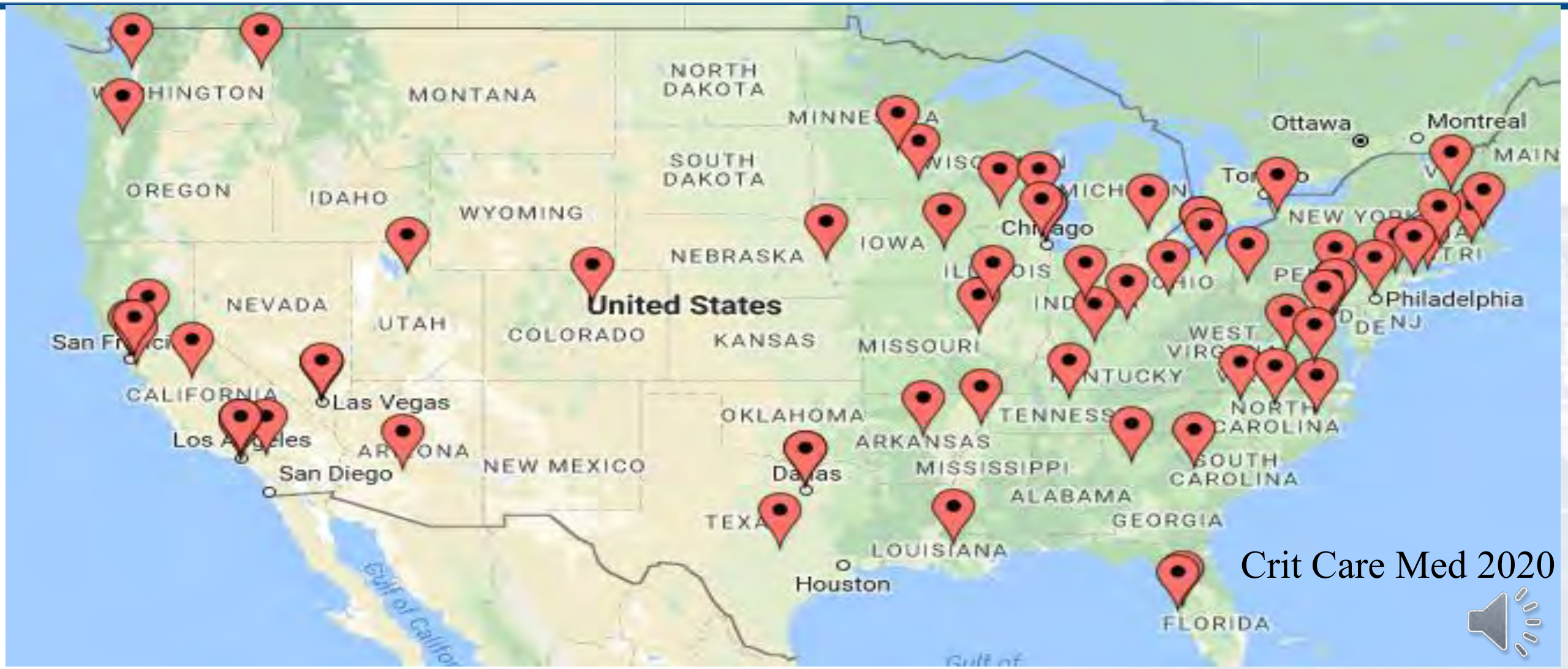
PARK-PICU

- All PICU patients admitted ≥ 72 hours

PREVALENCE OF ACUTE REHAB FOR KIDS IN THE PICU

82 sites/1800 patients

PARK-PICU



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Wolters Kluwer

Physical Rehabilitation in Critically Ill Children: A Multicenter Point Prevalence Study in the United States

What was the point prevalence of PT or OT–provided mobility?

35% of patient days

How often were patients completely immobile?

19% of patient days

A potential safety event occurred in 4% of 4,700 mobility sessions; most commonly a transient change in vital signs.

Who is at risk for a delayed PT or OT consult?

PATIENTS WITH HIGHER BASELINE FUNCTION*

(Consults by Day 3: 27% vs 38%; $p = 0.001$)

*Pediatric Cerebral Performance Category: <2 vs >2

Who had lower odds of PT or OT-provided motility?

FEMALES

(OR for females, 0.76; 95% CI, 0.61–0.95)

YOUNGER

(13–17 vs <3 yr, 2.1; 95% CI, 1.5–3.1)

What factors promote or prevent being out of bed?

FACTORS THAT PROMOTE MOBILITY	BARRIERS TO MOBILITY
PARENTS PRESENT AT BEDSIDE* (OR 4.33; 95% CI, 3.1–6.0)	ENDOTRACHEAL INTUBATION (OR 0.13; 95% CI, 0.1–0.2)
MOBILITY PROTOCOL (OR 1.73; 95% CI, 1.14–2.6)	URINARY CATHETER (OR 0.28; 95% CI, 0.1–0.6)

*Inpatients younger than 3 years of age

DATA COLLECTED FROM 82 PICUS IN 65 HOSPITALS (N=1,769 PATIENT DAYS)

PARK-PICU

PREVALENCE OF ACUTE REHABILITATION FOR KIDS IN THE PICU (PARK-PICU)

CROSS-SECTIONAL POINT PREVALENCE STUDY (PALISI NETWORK)

CONCLUSIONS

Younger children, females, and patients with higher baseline function less commonly receive rehabilitation in U.S. PICUs, and early rehabilitation consultation is infrequent.

Data from Kudchadkar SR, et al: *Crit Care Med* 2020.

ccmjournal.org
#CritCareMed #PedsICU

Critical Care Medicine
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Mobilisation practices in critically ill children: A European point prevalence study (EU PARK-PICU)

What was the point prevalence of PT or OT–provided mobility?

39% of patient days

How often were patients completely immobile?

25% of patient days

WHAT PROMOTES BEING OUT OF BED?

FAMILY PRESENT AT BEDSIDE

(OR 7.83, 95% CI 3.09-19.79)

WHAT PREVENTS BEING OUT OF BED?

ENDOTRACHEAL INTUBATION

(OR 0.28, 95% CI 0.12-0.68)

Who is less likely to receive therapist provided mobility?

PATIENTS WITH HIGHER BASELINE FUNCTION

PCPC 4 vs PCPC 1*
OR 2.24 (95% CI 1.14-4.40)
**Pediatric Cerebral Performance Category*

Who had lower odds of PT or OT-provided motility?

PATIENTS <3 YEARS OLD

OR 2.28 (95% CI 1.23-4.22)
(7-12 compared to <3 years)

Data obtained from:

38% of patient days

- *cardiovascular instability (n= 47, 10%)*
- *oversedation (n= 39, 9%)*
- *medical contraindication (n=37, 8%)*

38 PICUS FROM 15 EUROPEAN COUNTRIES

456

456 PATIENT-DAYS INCLUDED IN ANALYSIS

PARK-PICU

CROSS-SECTIONAL POINT PREVALENCE STUDY

CONCLUSIONS

Therapists are infrequently consulted for mobilization of critically ill children in European PICUs. There is a need for a systematic and interdisciplinary mobilisation approach.

Pediatric Critical Care Medicine

Society of Critical Care Medicine

World Federation of Pediatric Intensive & Critical Care Societies

Prevalence of Acute Rehabilitation for Kids in the PICU: A Canadian Multicenter Point Prevalence Study

Study Objective:
This national point prevalence study evaluated mobilization practices, barriers, and mobility-related adverse events in Canadian PICUs.

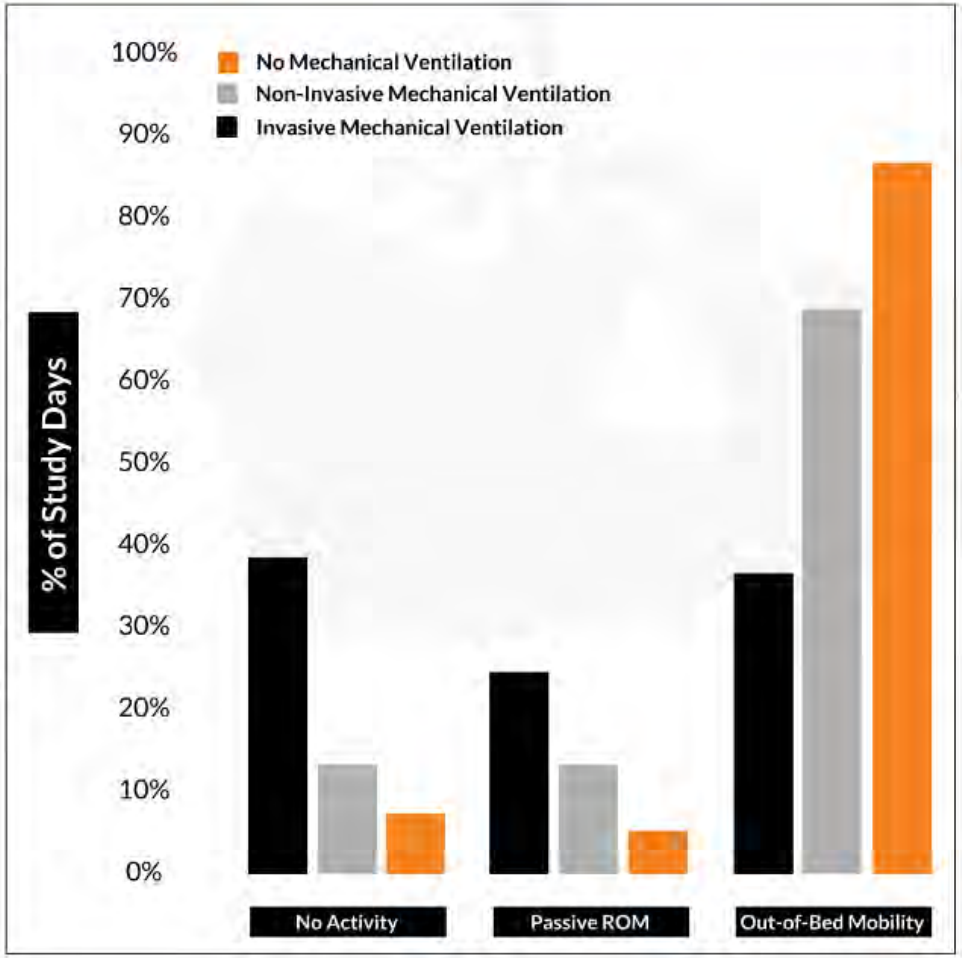
Study Population:
Children with a minimum 72-hour PICU length of stay on the allocated study day in thirteen PICUs across Canada were included.

Importance of family at bedside:
Family participation was strongly associated with out-of-bed mobility (odds ratio 6.4; $p = 0.001$).

Mobilization is COMMON and SAFE

MOBILIZATION OCCURRED ON 110 OF 137 PATIENT-DAYS (80%)

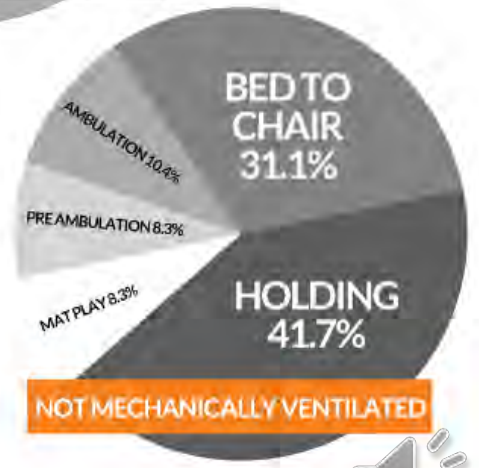
ADVERSE EVENTS OCCURRED IN 22 / 387 MOBILITY EVENTS (6%)
most commonly transient changes in vital signs (54.3%)



What does out-of-bed **MOBILITY** look like in the PICU?

Out-of-bed mobility occurred on (87/137) 64% of patient-days.

Mobility was most commonly facilitated by **NURSES** (74%) and **FAMILY** (49%).



Data from Choong, K, et al: *Pediatr Crit Care Med* 2020.

pccmjournal.org
#PedsICU

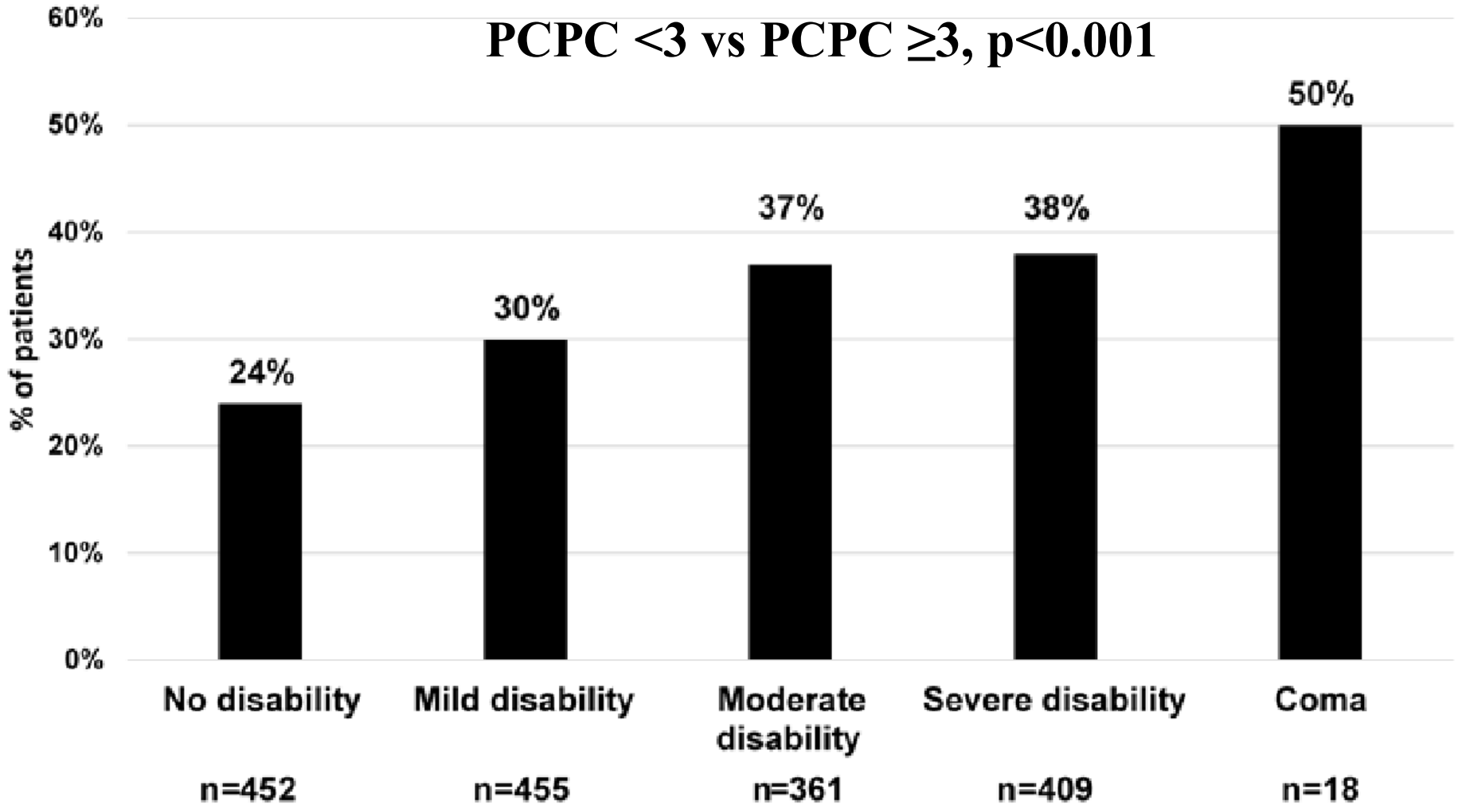
Patient Characteristics: 59% of all PICU patients included in data collection

PARK-PICU

Demographic	n=1,803
PICU Day median(IQR)	12 (6-30)
Surgery during PICU admission	55%
Age Category	
0-2	62%
3-6	11%
7-12	13%
13-18	11%
>18	3%
Male	57%
Ambulatory prior to admission (if >2 years)	64%
1:1 Nurse-Patient Ratio	38%
Endotracheal tube	34%

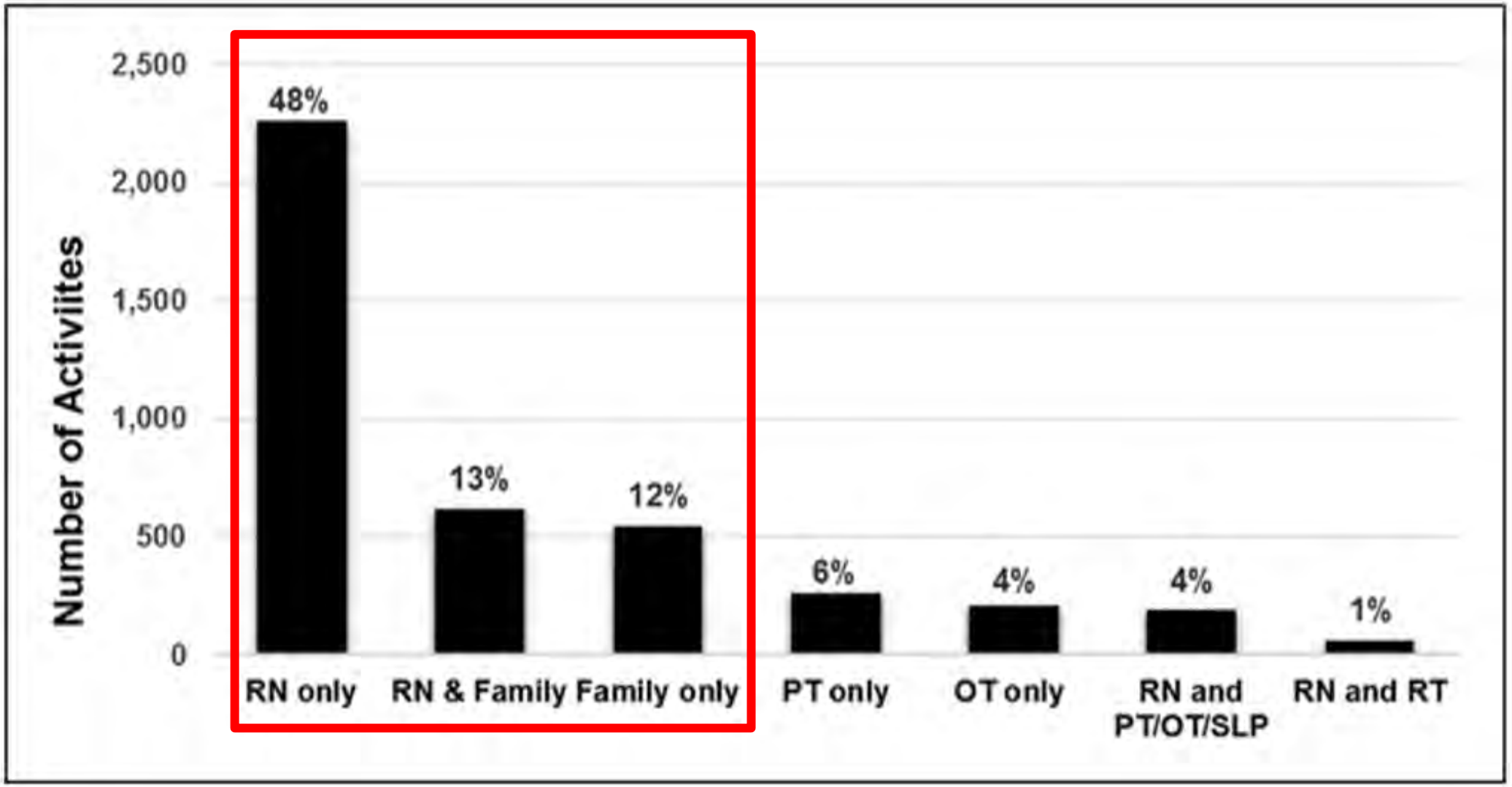
Kudchadkar et al. Crit Care Med 2020

Proportion of patients with PT or OT consult by Day 3, by PCPC



Kudchadkar et al CCM 2020

Nurses and families are the cornerstone of PICU mobility



Crit Care Med 2020.

Activities on the Study Day (n=4700)

PICU Up! Research Team
Clinical Trials · QI · Safety
Johns Hopkins Medicine

4% (n=196) with a reported potential safety event

95% of these transient vital sign changes

- 7 displaced feeding tubes
- 3 displaced chest tubes
- 2 displaced endotracheal tubes
- 2 displaced arterial lines
- 1 displaced tracheostomy
- 1 new arrhythmia

NO ARRESTS

NO FALLS

Kudchadkar et al.
Crit Care Med 2020.

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What about the outcomes??
PICU Up! Stepped-wedge RCT

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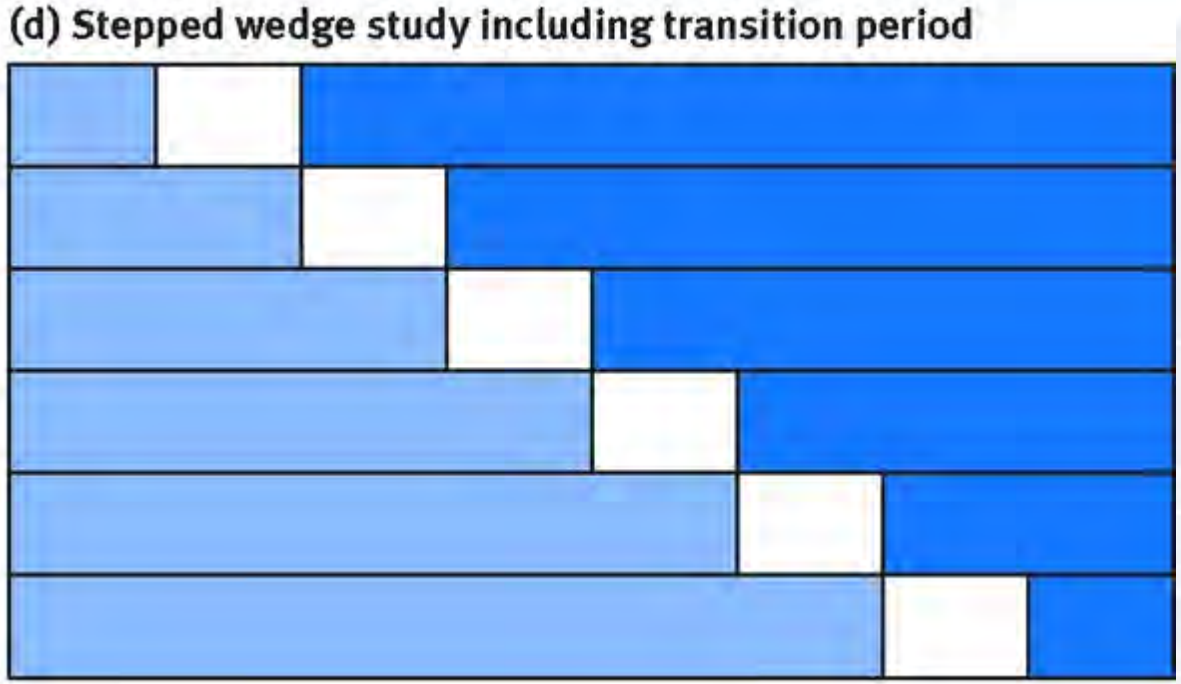


The Donaghue Foundation

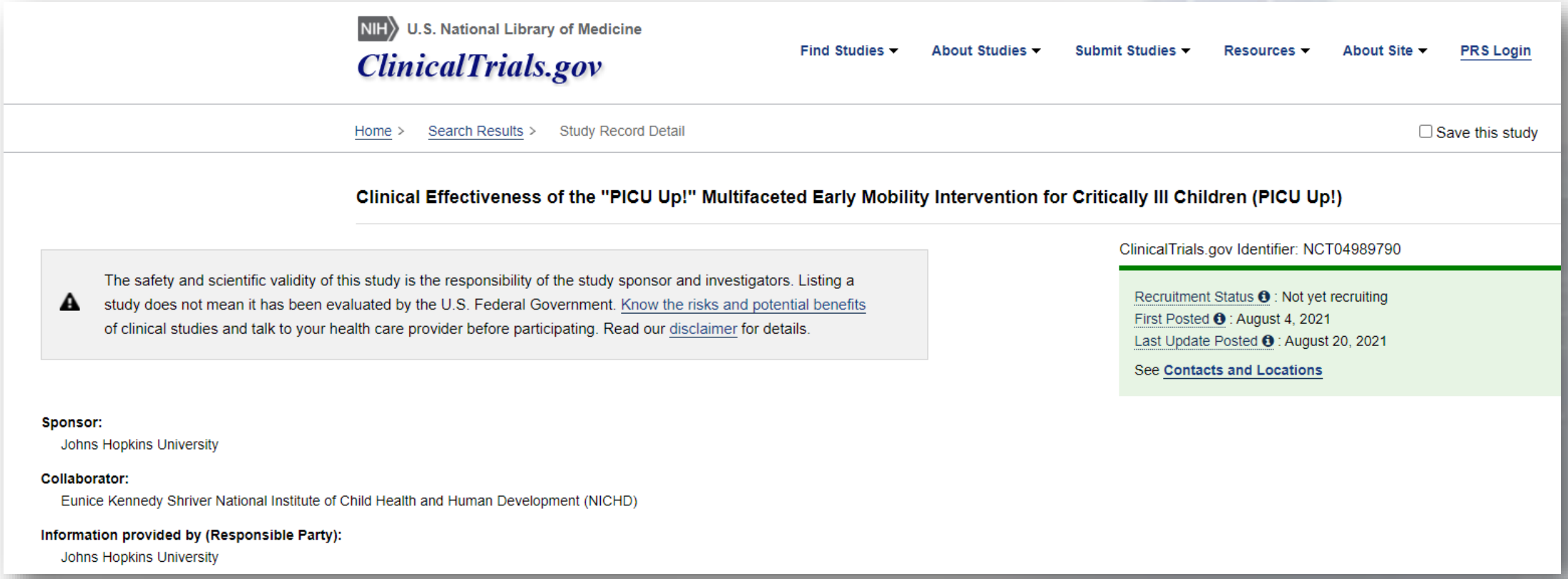
BMJ 2015

PICU UP!
Early Mobilization

Pilot trial

PICU UP!
Early Mobilization

NIH R01: ClinicalTrials.gov: NCT04989790



NIH U.S. National Library of Medicine

ClinicalTrials.gov

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Save this study

Clinical Effectiveness of the "PICU Up!" Multifaceted Early Mobility Intervention for Critically Ill Children (PICU Up!)

The safety and scientific validity of this study is the responsibility of the study sponsor and investigators. Listing a study does not mean it has been evaluated by the U.S. Federal Government. Know the risks and potential benefits of clinical studies and talk to your health care provider before participating. Read our disclaimer for details.

ClinicalTrials.gov Identifier: NCT04989790

Recruitment Status : Not yet recruiting
First Posted : August 4, 2021
Last Update Posted : August 20, 2021

See Contacts and Locations

Sponsor:
Johns Hopkins University

Collaborator:
Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)

Information provided by (Responsible Party):
Johns Hopkins University

Also: icurehabnetwork.org/picu-up/

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Johns Hopkins Medicine

PICU Up! SWT Sites

JOHNS HOPKINS MEDICINE

3 years later…

ONLINE CLINICAL INVESTIGATION: PDF ONLY

Early Mobilization in a PICU

A Qualitative Sustainability Analysis of PICU Up!

Patel, Ruchit V. BS[1]; Redivo, Juliana MD[1]; Nelliot, Archana MD[2]; Eakin, Michelle N. PhD[3,4]; Wieczorek, Beth DNP[1]; Quinn, Julie PT, MSEd[5]; Gurses, Ayse P. PhD, MS, MPH[1,6]; Balas, Michele C. PhD, RN[7]; Needham, Dale M. MD, PhD, FCPA[3,4,5]; Kudchadkar, Sapna R. MD, PhD, FCCM[1,5,8]

Author Information

April 2021

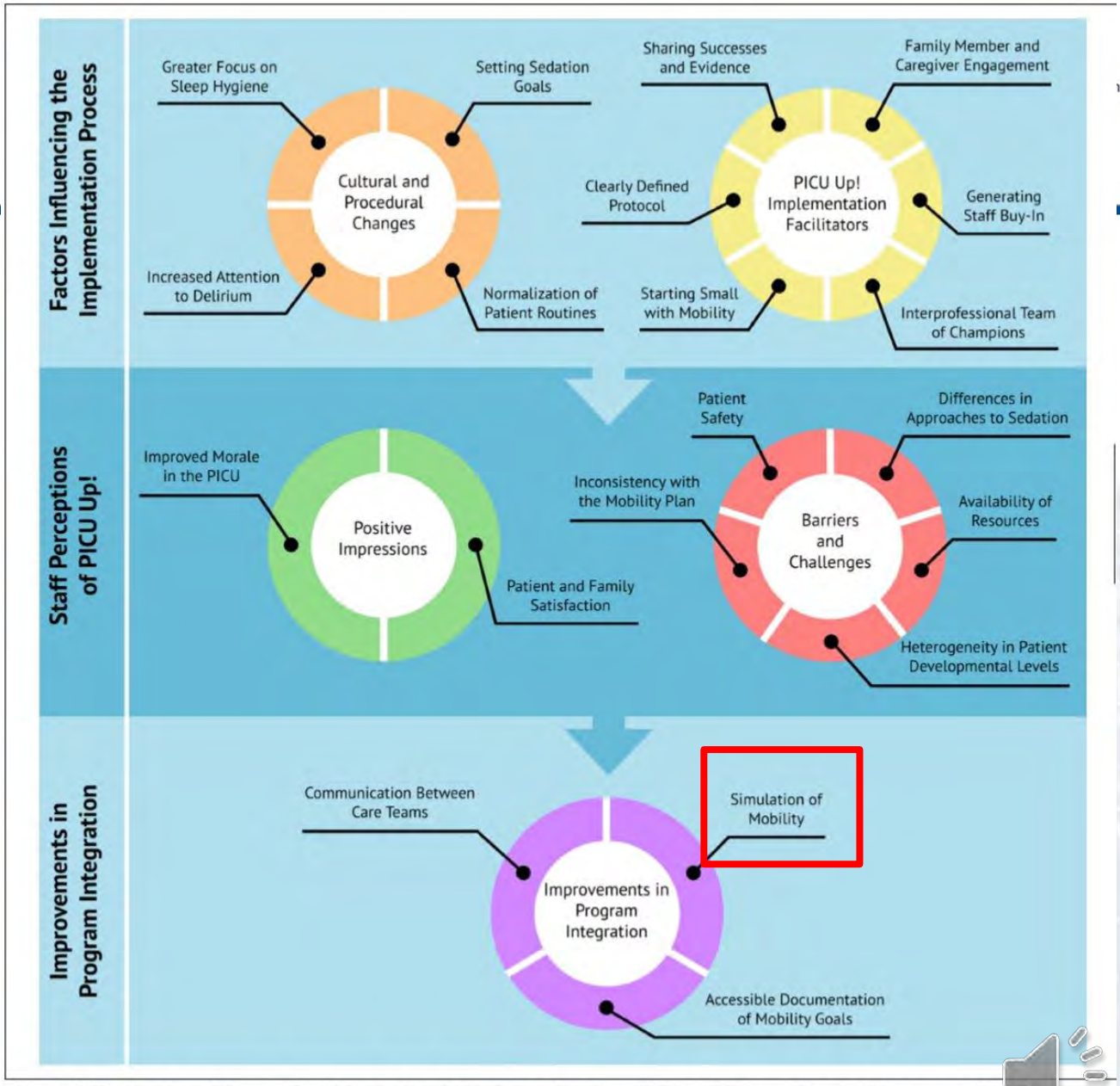


Figure 1. Constructs and themes describing factors that influenced implementation, staff perceptions, and improvements to the PICU Up! program.

CLINICAL INVESTIGATION

Assessing Pain, Both Spontaneous Awakening and Breathing Trials, Choice of Sedation, Delirium Monitoring/Management, Early Exercise/Mobility, and Family Engagement/Empowerment Bundle Practices for Critically Ill Children: An International Survey of 161 PICUs in 18 Countries

Erwin Ista, RN, PhD[1]
Juliana Redivo, MD[2]
Paurav Kananur[2]
Karen Choong, MB, BCh, MSc, FRCP[3,4]
Jose Colleti Jr, MD[5]
Dale M. Needham, MD, PhD[6,7]
Ronke Awojoodu, MPH, RN[2]
Sapna R. Kudchadkar, MD, PhD, FCCM[2,7,8,9]
on behalf of the International PARK-PICU Investigators

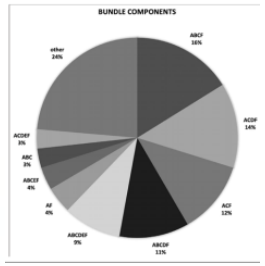
OBJECTIVES: To evaluate current international practice in PICUs regarding components of the "Assessing Pain, Both Spontaneous Awakening and Breathing Trials, Choice of Sedation, Delirium Monitoring/Management, Early Exercise/Mobility, and Family Engagement/Empowerment" ("ABCDEF") bundle.

DESIGN: Online surveys conducted between 2017 and 2019.

SETTING: One-hundred sixty-one PICUs across the United States (n = 82), Canada (n = 14), Brazil (n = 27), and Europe (n = 38) participating in the Prevalence of Acute Rehabilitation for Kids in the PICU study.

INTERVENTIONS: None.

MEASUREMENTS AND MAIN RESULTS: Of the 161 participating PICUs, 83% were in academic teaching hospitals and 42% were in free-standing children's hospitals. Median size was 16 beds (interquartile range, 10–24 beds).



Crit Care Med 2021

PARK-PICU

Ista et al

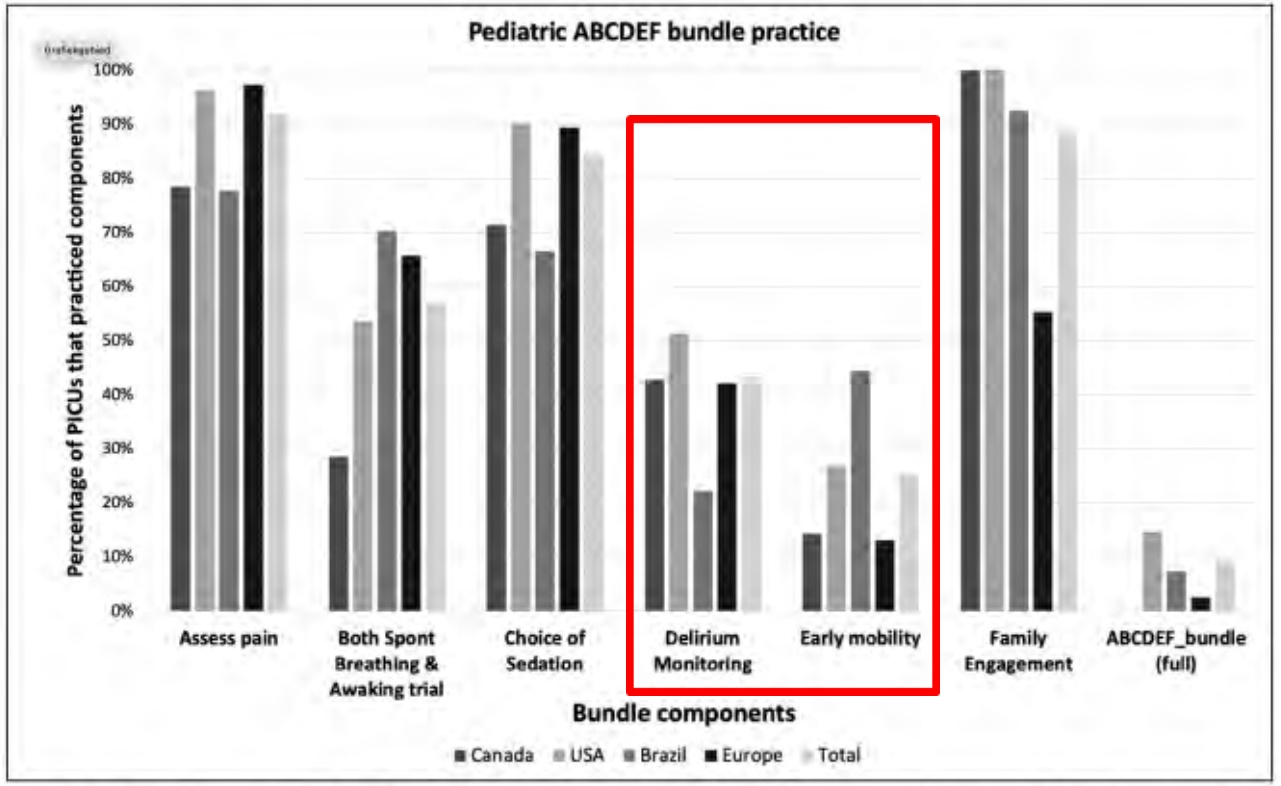


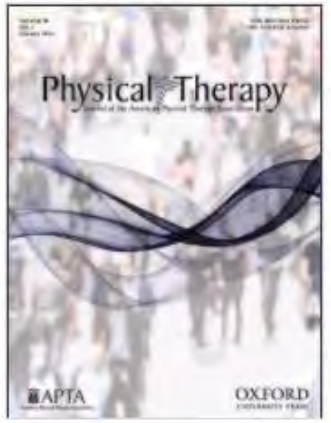
Figure 1. Pediatric Assessing Pain, Both Spontaneous Awakening and Breathing Trials, Choice of Sedation, Delirium Monitoring/Management, Early Exercise/Mobility, and Family Engagement/Empowerment (ABCDEF) bundle practice in PICUs by region. Number of PICUs: Canada, n = 14; United States, n = 82; Brazil, n = 27; Europe, n = 38; total n = 161.

A Common Language in Pediatrics

- Standardized measures of physical function provide a **common language** among healthcare providers
  - Why is this important?
- There is a huge gap in pediatric hospitals
  - Why is this a problem?

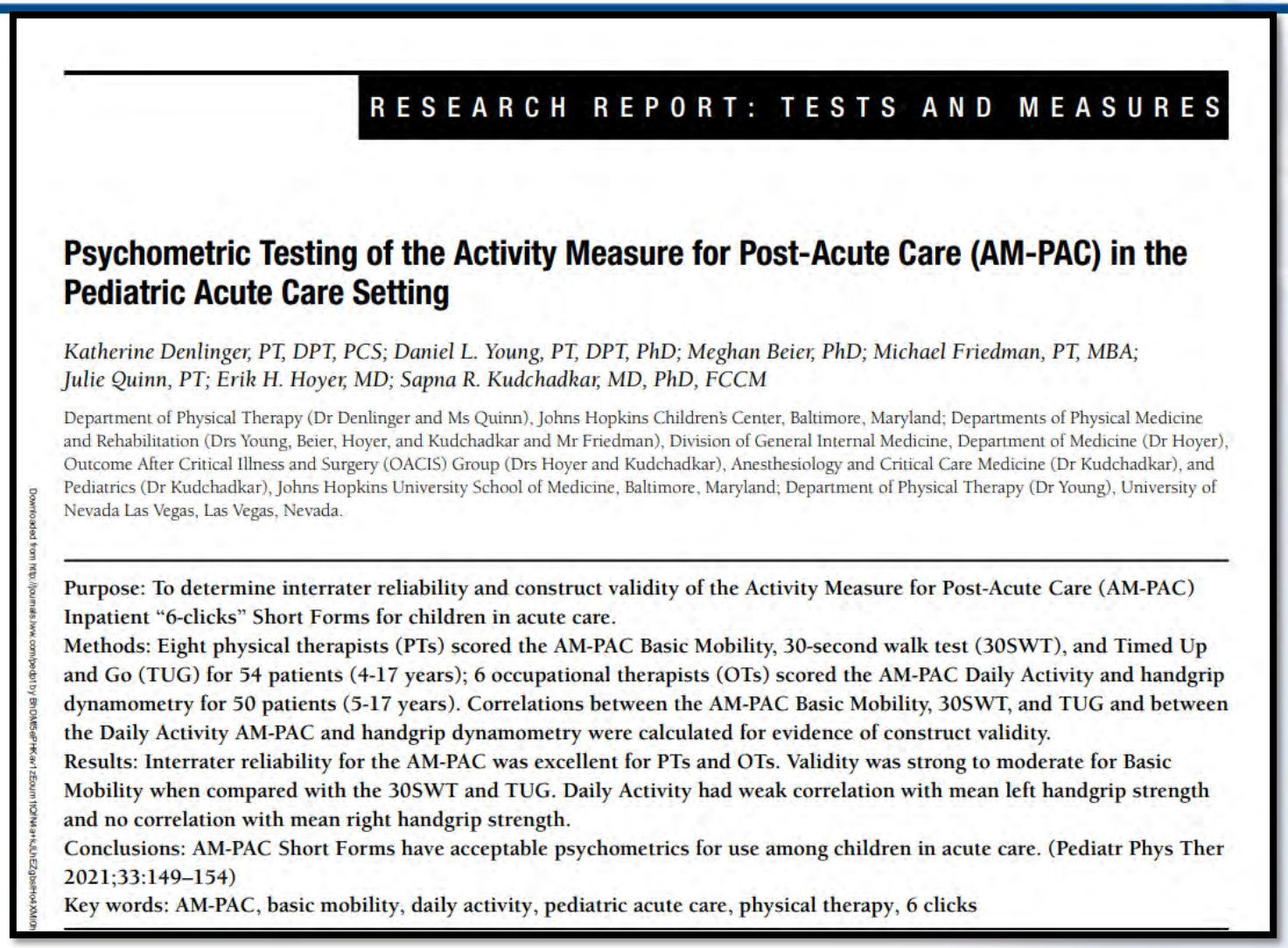
Toward a Common Language for Measuring Patient Mobility in the Hospital: Reliability and Construct Validity of Interprofessional Mobility Measures

Erik H. Hoyer, Daniel L. Young, Lisa M. Klein, Julie Kreif, Kara Shumock, Stephanie Hiser, Michael Friedman, Annette Lavezza, Alan Jette, Kitty S. Chan, Dale M. Needham



Volume 98, Issue 2
February 2018

AM-PAC in Pediatrics!



RESEARCH REPORT: TESTS AND MEASURES

Psychometric Testing of the Activity Measure for Post-Acute Care (AM-PAC) in the Pediatric Acute Care Setting

Katherine Denlinger, PT, DPT, PCS; Daniel L. Young, PT, DPT, PhD; Meghan Beier, PhD; Michael Friedman, PT, MBA; Julie Quinn, PT; Erik H. Hoyer, MD; Sapna R. Kudchadkar, MD, PhD, FCCM

Department of Physical Therapy (Dr Denlinger and Ms Quinn), Johns Hopkins Children's Center, Baltimore, Maryland; Departments of Physical Medicine and Rehabilitation (Drs Young, Beier, Hoyer, and Kudchadkar and Mr Friedman), Division of General Internal Medicine, Department of Medicine (Dr Hoyer), Outcome After Critical Illness and Surgery (OACIS) Group (Drs Hoyer and Kudchadkar), Anesthesiology and Critical Care Medicine (Dr Kudchadkar), and Pediatrics (Dr Kudchadkar), Johns Hopkins University School of Medicine, Baltimore, Maryland; Department of Physical Therapy (Dr Young), University of Nevada Las Vegas, Las Vegas, Nevada.

Purpose: To determine interrater reliability and construct validity of the Activity Measure for Post-Acute Care (AM-PAC) Inpatient "6-clicks" Short Forms for children in acute care.

Methods: Eight physical therapists (PTs) scored the AM-PAC Basic Mobility, 30-second walk test (30SWT), and Timed Up and Go (TUG) for 54 patients (4-17 years); 6 occupational therapists (OTs) scored the AM-PAC Daily Activity and handgrip dynamometry for 50 patients (5-17 years). Correlations between the AM-PAC Basic Mobility, 30SWT, and TUG and between the Daily Activity AM-PAC and handgrip dynamometry were calculated for evidence of construct validity.

Results: Interrater reliability for the AM-PAC was excellent for PTs and OTs. Validity was strong to moderate for Basic Mobility when compared with the 30SWT and TUG. Daily Activity had weak correlation with mean left handgrip strength and no correlation with mean right handgrip strength.

Conclusions: AM-PAC Short Forms have acceptable psychometrics for use among children in acute care. (Pediatr Phys Ther 2021;33:149–154)

Key words: AM-PAC, basic mobility, daily activity, pediatric acute care, physical therapy, 6 clicks

Pediatric Physical Therapy 2021

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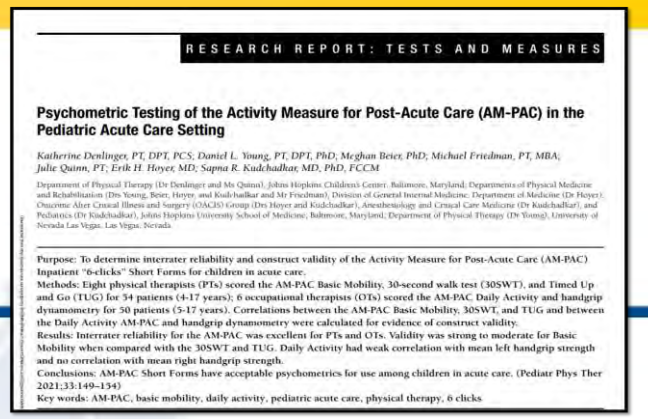
Conclusions



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Department of Physical Therapy (Dr Denlinger and Ms Quinn), Johns Hopkins Children's Center, Baltimore, Maryland; Departments of Physical Medicine and Rehabilitation (Drs Young, Beier, Hoyer, and Kudchadkar and Mr Friedman), Division of General Internal Medicine, Department of Medicine (Dr Hoyer); Outcome Alert Clinical Illness and Surgery (OACIS) Group (Drs Hoyer and Kudchadkar), Anesthesiology and Critical Care Medicine (Dr Kudchadkar), and Pediatrics (Dr Kudchadkar), Johns Hopkins University School of Medicine, Baltimore, Maryland; Department of Physical Therapy (Dr Young), University of Nevada Las Vegas, Las Vegas, Nevada.

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Conclusions: AM-PAC Short Forms have acceptable psychometrics for use among children in acute care. (Pediatr Phys Ther 2021;33:149–154)

Key words: AM-PAC, basic mobility, daily activity, pediatric acute care, physical therapy, 6 clicks

- This is one of the first outcome measures to be validated for use in pediatric acute care
  - Objectify crucial aspects of PT and OT in acute care
- It can be used for a wide range of ages, diagnoses, and settings
- It is possible to safely and feasibly perform various standardized measures in acute care, including the PICU
  - AM-PAC, TUG, 30SWT, handgrip dynamometry

Letting Kids be Kids?: You be the judge

PICU UP!
Early Mobilization

By being awake and alert…they could interact with family…feel human…sustain the zest for living which is a requirement for survival.”

-Thomas Petty

Case Studies

PICU Up! Research Team
Clinical Trials · QI · Safety
Johns Hopkins Medicine

Guiding *Pediatric Critical Care Medicine* Toward a Bigger "Impression" in 2017 and Beyond

"It is evident that we have much to learn from each other, and the cycle of local to global communities of practice can be fueled by leveraging social media."

-Kochanek, Kudchadkar, Kissoon PCCM 2017

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Professional Social Media and You

PICU Up! Research Team
Clinical Trials · QI · Safety
Johns Hopkins Medicine

The #PedsICU Influencers

Top 10 Influential

- @SapnaKmd 100
- @areinamo21 92
- @yoncabulutmd 88
- @PedCritCareMed 82
- @VSLanziotti 79
- @pccm_doc 78
- @WFPICCS 78
- @SCCM 76
- @MiguelrrMD 70
- @JennaMillerKC 70

Prolific Tweeters

- @PedsICU_tweets 1,607
- @DrSeanBarnes 648
- @PediAnesthesia 417
- @areinamo21 336
- @JinaSinskeyMD 318
- @SapnaKmd 310
- @drshahrul80 167
- @pccm_doc 159
- @MiguelrrMD 153
- @PedsGasDoc 140

Highest Impressions

- @PedsICU_tweets 4.6M
- @SCCM 3.3M
- @SapnaKmd 3.2M
- @DrSeanBarnes 2.3M
- @pccm_doc 1.9M
- @PediAnesthesia 1.4M
- @Nopanaden 1.2M
- @PedCritCareMed 1.0M
- @SCCMPresident 943.7K
- @DeannaMarie208 876.3K

The Numbers

40.717M Impressions

13,142 Tweets

3,077 Participants

20 Avg Tweets/Hour

4 Avg Tweets/Participant

Tweet

Twitter data from the #PedsICU hashtag from Fri, February 5th 2021, 12:00PM to Thu, March 4th 2021, 12:00PM (America/New_York) – Symplur.

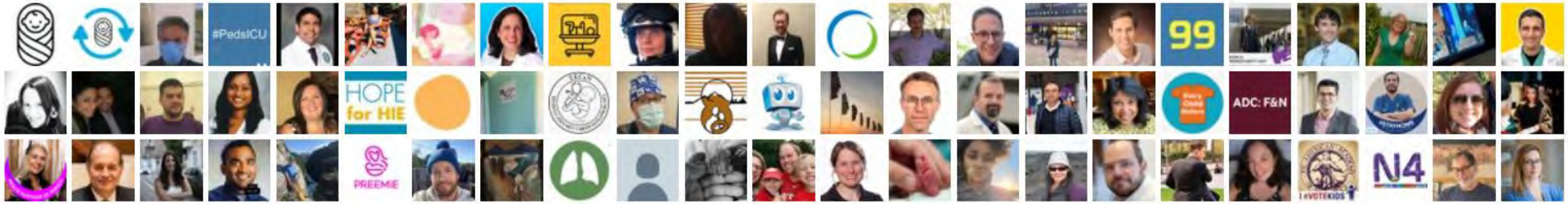
symplur

The #PedsICU & #Neotwitter community

PICU Up! Research Team
Clinical Trials · QI · Safety
Johns Hopkins Medicine

#PedsICU Participants

#neoTwitter Participants



Data for #neoTwitter can be up to 15 minutes delayed

Natalie Napolitano MPH RRT-NPS Retweeted

The National Board for Respiratory Care - NBRC
@NBRC_tweets

There are three main #respiratorycare organizations that RTs interact with: the NBRC, the AARC and CoARC. All three are separate entities that work collaboratively sharing the universal goal of enhancing patient lives through excellence in respiratory care. #respiratorytherapists

Medicine

a commor
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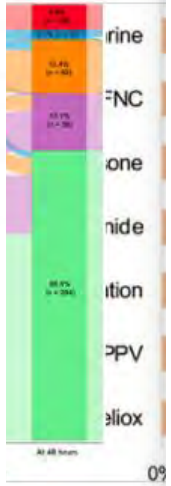
gh-risk pati

iedmanMD

#Respirato



ite Inc

The Johns Hopkins PICU Up! Program @PICU_Up · Aug 22, 2019

A #nurse, #RT, #acutePT & little one walked into a....#rehablegend photo op. ❤️

#IllnessDoesntMeanStillness #RehabLegends #icurehab **#PedsICU** #mdt #nurses **#respiratory**

Johns Hopkins Medicine and 4 others

Hopkins PICU Up!
@PICU_Up

Follow

Sydney drove a car 12 hours after #cardiac #surgery & came back today to donate one to @HopkinsPICU! ❤️ #icurehab

8:06 AM - 2 Sep 2016

Sapna Kudchadkar, MD
@SapnaKmd

Just another night in the #PedsICU -Amazing nurses making sure even the littlest ones get a much needed walk. ❤️ #ICURehab @PICU_Up

9:07 AM - 10 Jan 2018

Sapna Kudchadkar, MD, PhD · 10/3/18

Today's #PedsICU / adult #ICU challenge.

Pick one patient in your unit to go outside today. Make it happen safely with #multidisciplinary collaboration.

Sometimes all it takes is one person asking if it's possible.

#ICURehab #acutePT #sleep #delirium

Jackie Ong
@ongsoomay

Taking up @SapnaKmd's #icurehab challenge - we'll see your 1 day and raise you 3. #pedsICU @PICU_Up @HopkinsKids @WFPICCS

Bia Salgueiro
@bisalgueiro

Follow

Inspired by @PICU_Up, we succeeded in implementing the Early Mobilization after Cardiac Surgery! ❤ @SapnaKmd @DrDaleNeedham #ICUrehab

5:33 PM - 23 Jun 2017

Kathryn Sharp
@Kath_Sharp23

Follow

@SapnaKmd @jennakhills has introduced #MoVE to @PicuRhc after hearing about @PICU_Up last year. All the team involved! Great work!!

2:00 AM - 26 Jul 2017

Take home points

- It. Is. Never. Too. Early.
- Value each other's expertise
- Consistency
- No easy button
- Analgesia first
- Start low, go slow.
- Sleep. Sleep. Sleep….and Nutrition!
- Push the envelope…safely!

PICU Up! Research Team
Clinical Trials · QI · Safety
Johns Hopkins Medicine

Celebrate all successes, big and small!
Because we have MUCH work to do

JOHNS HOPKINS MEDICINE

More inspiration and ideas?

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Special thanks to the PICU Up! Research Team