

# Oral Presentations

## Adult Content

1. The Critical Illness Recovery Center at UPMC Mercy: The First Year in Review  
*Brad Butcher, MD*  
Affiliation: UPMC Department of Critical Care
2. Variability in Home Health Rehabilitation Utilization Among Older ICU Survivors  
*Jason Falvey, PT, DPT, PhD*  
Affiliation: Yale School of Medicine
3. Retrospective Analysis of Mobility in the CICU after Protocol Modification  
*Chirag Patel, MS4*  
Affiliation: Brody School of Medicine at East Carolina University
4. Development of an ICU Survivorship Program  
*Julie Rogan, MSN, CNS, ACCNS-AG*  
Affiliation: Penn Presbyterian Medical Center
5. Morale with a Tail: Initiating Animal Assisted Therapy in Critical Care in Plymouth (UK)  
*Kate Tantom, MRes, PGCE, BSc (hons), RN*  
Affiliation: University Hospital Plymouth NHS Trust, UK

## Pediatric Content

6. Increasing Occupational Therapy and Physical Therapy Consultations Through Quality Improvement  
*Rebekah Music, OT*  
Affiliation: Cincinnati Children's Hospital
7. Early Mobility in Young Children Supported with Paracorporeal Total Artificial Hearts  
*Nathan Thompson, MD, PharmD, MS*  
Affiliation: Medical College of Wisconsin

## Poster Presentations

### Adult Content

1. Addressing Post Intensive Care Syndrome (APICS-01)  
Narges Akhlaghi, MD, MPH  
Johns Hopkins medicine
2. A Unique Approach to Exercise and Mobilization for Individuals Undergoing Venovenous ECMO, a Pilot Study  
*Eric Andersen, PT, DPT*  
Affiliation: University of Minnesota and Fairview Health
3. Support and Compress S.A.C Protocol Scrotal Edema in Trauma Patients  
*Brigit Anderson, OTR/L, CLT*  
Affiliation: HonorHealth Scottsdale Osborn Medical Center
4. Using A Portable Power Source To Ambulate While On Continuous Renal Replacement Therapy  
*Haley Bento, PT, DPT, CCS;*  
Affiliation: University of Utah Health
5. Prevalence and Severity of Laryngeal Injury After Oral Endotracheal Intubation  
*Sai Phani Sree Cherukuri, MBBS*  
Affiliation: Johns Hopkins School of Medicine
6. Nutrition and exercise in Critical illness: A Case Series  
*Arooj Fatima, MD*  
Affiliation: Johns Hopkins Medicine
7. The Safety and Feasibility of the Ramsey Tilt Table Protocol for Mobilizing Critical Care Patients with Femoral IABP  
*Mary G. Fischer, PT, DPT, GCS*  
Affiliation: New York University Langone Health
8. Analgesia using Transcutaneous Electrical Nervous Stimulation in the early Postoperative Period of Cardiac Surgery  
*Giulliano Gardenghi, Ph.D*  
Affiliation: Encore Hospital, Brazil
9. Effects of Tilt Training on Orthostatic Tolerance and Heart rate Variability in Hospitalized HIV+/AIDS Patients  
*Giulliano Gardenghi, Ph.D*  
Affiliation: Encore Hospital, Brazil

10. Optimizing Time to Volume Based Enteral Nutrition and Reaching Goal Within the First Full Day in Critically Ill Patients Reduces Time in ICU, Hospital Length of Stay and Readmit Rate by Half  
*Gerry Howick, MBA, RDN, CDN*  
Affiliation: Legacy Salmon Creek Medical Center
11. Current use of Animal Assisted Therapy in Critical Care throughout the United Kingdom and the Development of a Set of National Guidelines  
*Emma Jackson, MBCHB*  
Affiliation: Blackpool Victoria Hospital, England
12. Developing a Culture of Early Identification of Delirium Combined with Reducing Sedation Use in Critical Care Patients  
*Emma Jackson, MBCHB*  
Affiliation: Blackpool Victoria Hospital, England
13. The BEHAB Study: Is a Combined Behavioral Activation and Rehabilitation Intervention in Acute Respiratory Failure Survivors Feasible and Acceptable?  
*Albahi Malik MBBS*  
Affiliation: Johns Hopkins Medicine
14. Constructing a Grounded Theory of Critical illness Survivorship: The Dualistic Worlds of Survivors and Family Members  
*Pamela Page, PhD, BSc (Hons), PGCert E*  
Affiliation: The Nursing and Midwifery Council (NMC), UK
15. Grupo Ítaca: Returning home after the Odyssey  
*Miguel Rodríguez-Rubio, MD*  
Affiliation: Hospital Universitario La Paz
16. Abdominal Functional Electrical Stimulation in Spinal Cord Injury Patients May Decrease ICU Cost and Length of Stay  
*Yunna L. Sinskey, MD*  
Affiliation: Mary Free Bed Rehabilitation Hospital
17. Rehabilitation of a Person with Obesity and Post-Operative Hemiparesis  
*Bonnie B. Swafford, PT, DPT*  
Affiliation: Saint Luke's Health System
18. The #Rehablegend Campaign – A Motivational Tool to Empower and Promote Excellence  
*Kate Tantum, Mrs, PGCE, BSc*  
Affiliation: University Hospital Plymouth NHS Trust, UK

19. Development & Implementation of a Practical Multi-Hospital ICU Rehab and Training Program

*Kari V. Voll, OTR/L*

Affiliation: Sentara Healthcare, Norfolk VA

### **Pediatric Content**

20. Quality Improvement Intervention to Promote Early Mobilization in Critically Ill Children

*Sjoukje Hoekstra, RN*

Affiliation: Erasmus Medical Centre Rotterdam

21. Quality Improvement Intervention to Promote Early Mobilization in the PICU: Nurses' and Physicians' Opinions and Perceived Barriers

*Sjoukje Hoekstra, RN*

Affiliation: Erasmus Medical Centre Rotterdam

22. The Safety and Feasibility of Sitting an Infant on Extracorporeal Cardiac Life Support: A Case Study

*Holly Hyland, DPT*

Affiliation: Children's Hospital of Wisconsin

23. "Rady-Set-Go": Promoting Early Mobilization in the Pediatric Intensive Care Unit

*Elizabeth Kantor BSN, RN, CCRN, C-NPT*

Affiliation: Rady Childrens Hospital Pediatric Intensive Care Unit

24. Barriers for Early Mobilization in a Pediatric Intensive Care Unit in Mexico

*Miguel Angel Martinez, PT*

Affiliation: Universidad Autónoma de Querétaro

25. Grupo Ítaca: Returning home after the Odyssey

*Miguel Rodríguez-Rubio, MD*

Affiliation: Hospital Universitario La Paz

26. Healing Walks: Giving Light to a Pediatric Intensive care Unit

*Miguel Rodríguez-Rubio, MD*

Affiliation: Hospital Universitario La Paz

27. Better Together: Long-Term Behaviors & Perspectives after a Provider-Family Writing Intervention in the ICU

*Madeline Schaufel, MS*

Affiliation: Hospital Universitario La Paz



28. Optimizing Functional Outcomes After Pott's Shunt Palliative Surgery

*Atara Sheinson, OTR/L*

Affiliation: Morgan Stanley Children's Hospital

# **Oral Presentations: Adult Content**



**CRITICAL  
CARE  
MEDICINE**

# The Critical Illness Recovery Center at UPMC Mercy: The First Year in Review

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Brad W. Butcher, MD

Tammy Eaton, MSN, RN, FNP-BC, ACHPN

8<sup>th</sup> Annual Hopkins ICU Rehab Conference

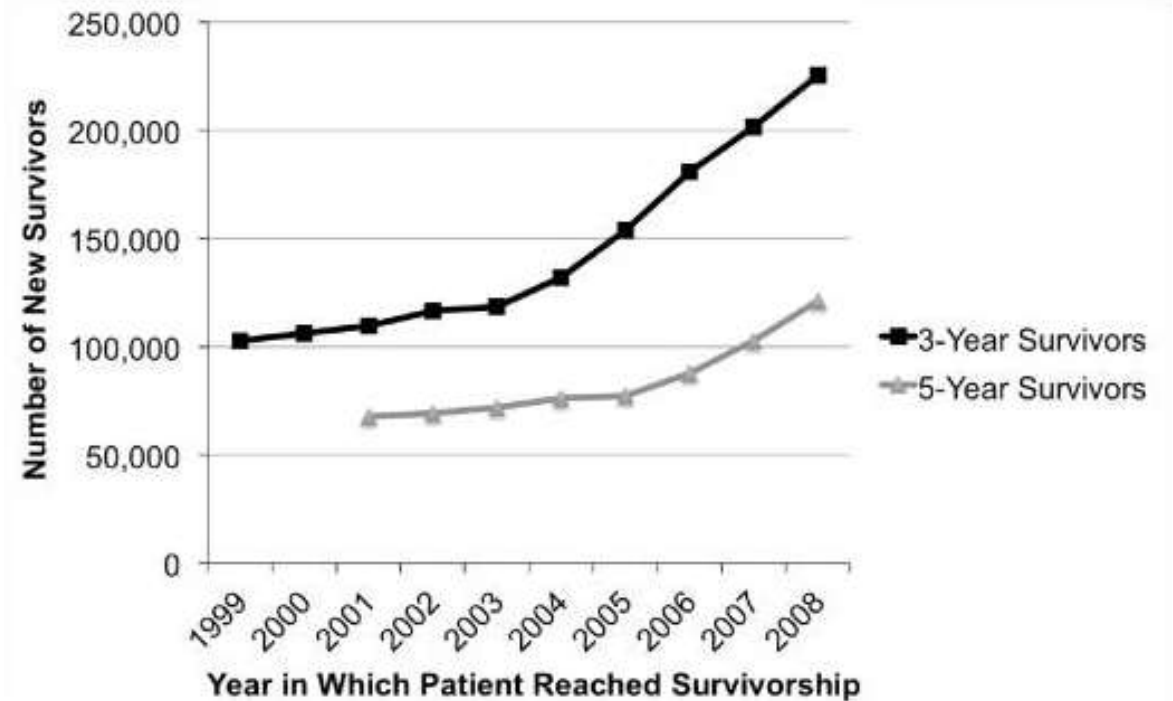
October 11, 2019

# Survivors of critical illness: a growing population

J Am Geriatr Soc. 2012 June;  
60(6): 1070–1077

## The Population Burden of Long-Term Survivorship after Severe Sepsis Among Older Americans

Theodore J. Iwashyna, MD, PhD<sup>1,2</sup>, Colin R. Cooke, MD<sup>1,3</sup>, Hannah Wunsch, MD<sup>4,5</sup>, and Jeremy M. Kahn, MD<sup>6,7</sup>



# Post-intensive care syndrome (PICS)

Needham et al. Crit Care Med  
(2012) 40(2); 502-9

Griffith et al., Crit Care Med  
(2013); R100

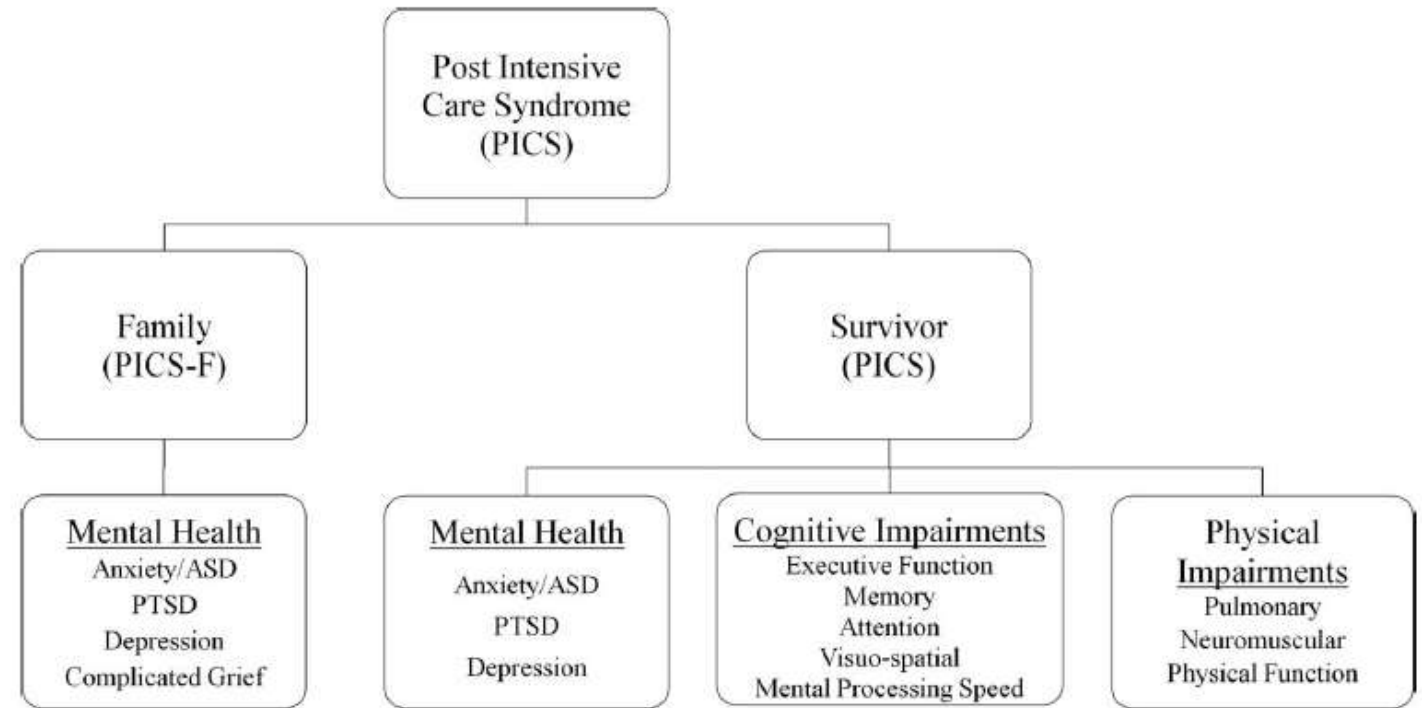
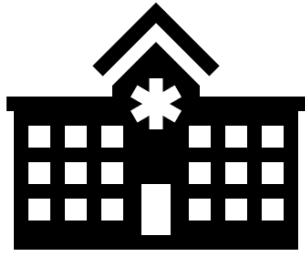


Figure 1. Postintensive care syndrome (PICS) conceptual diagram. *ASD*, acute stress disorder; *PTSD*, posttraumatic stress disorder.

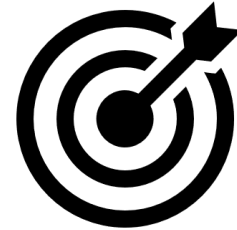
# Arguments for post-ICU clinics



Continuity of care



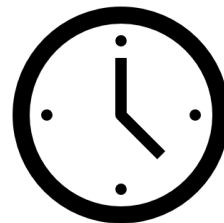
PICS assessment



Goal-directed rehab plan



Therapeutic listening



Luxury of time



Benefits to providers

# Clinic logistics – patient selection

## Primary inclusion criteria

- ICU LOS  $\geq 4$  days
- Sepsis, respiratory failure requiring mechanical ventilation, delirium

## Primary exclusion criteria

- Limited rehabilitation potential
- Limited life expectancy ( $< 6$  mo)
- Incarceration, severe psychiatric disease

## Patient factors

- Refusal
- Distance
- Lost to follow-up

# Clinic logistics - operations



Visits occur at 2-4 weeks, 3 months, 6 months, occ 9 months, 12 months after discharge from inpatient care



Clinic occurs every Thursday from 8am to 5pm



Initial visits last 2.5-3 hours, follow-up visits 2 hours



Patients are scheduled at either 9am or 1pm, allowing providers to rotate through the rooms to minimize downtime

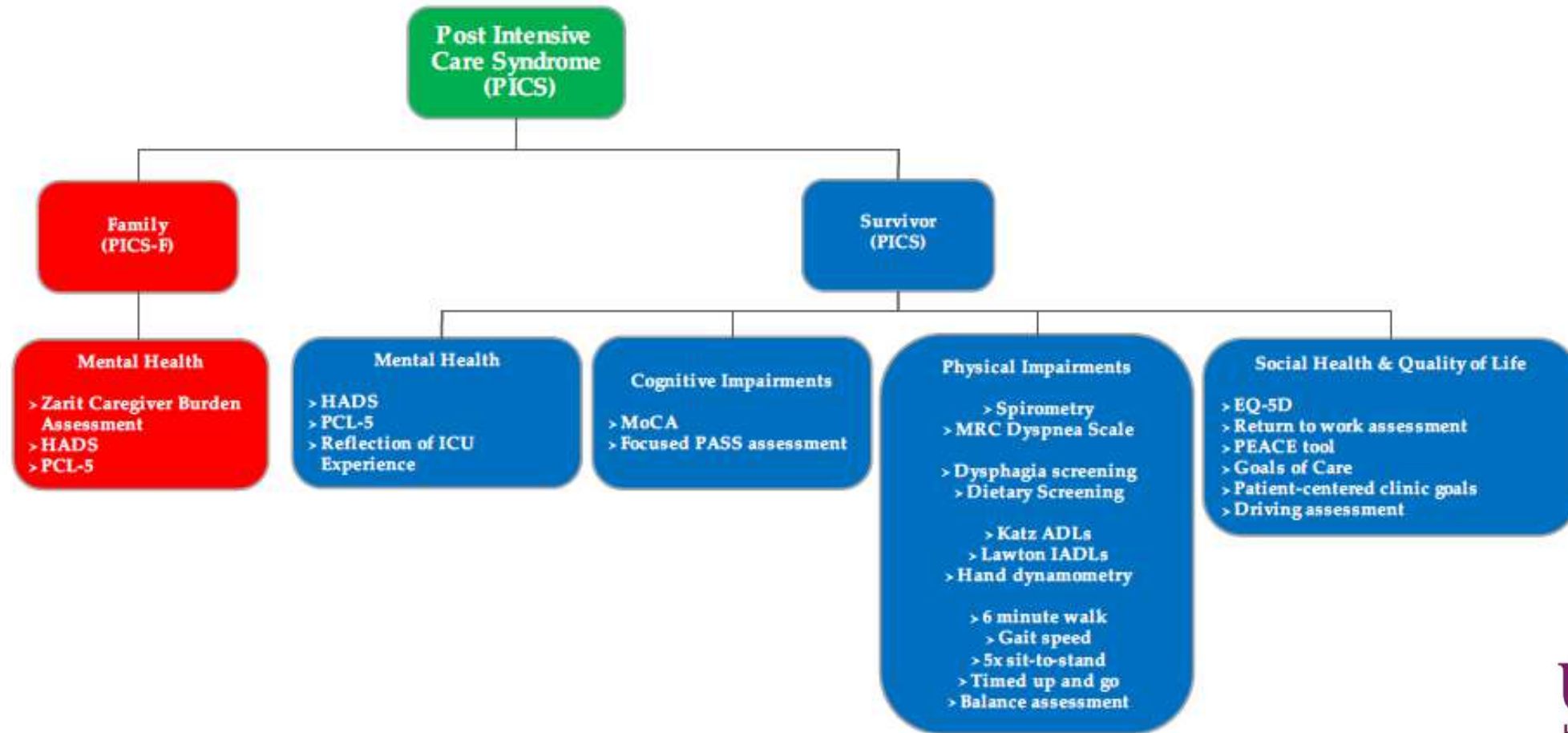


# Multidisciplinary approach to ICU survivor care

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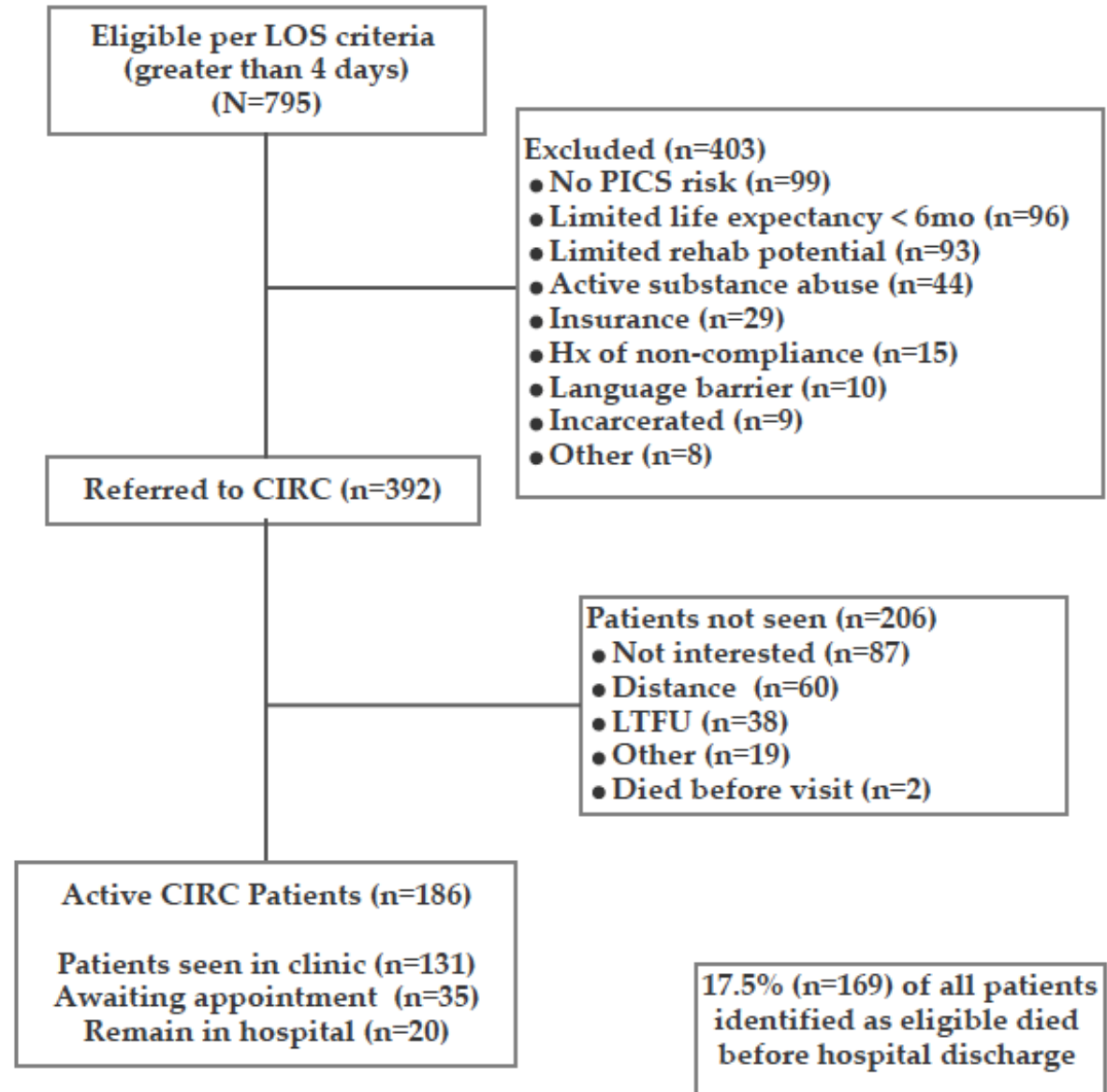


# Clinical Assessment



# Screening and referral summary

5/22/18 through 9/17/19



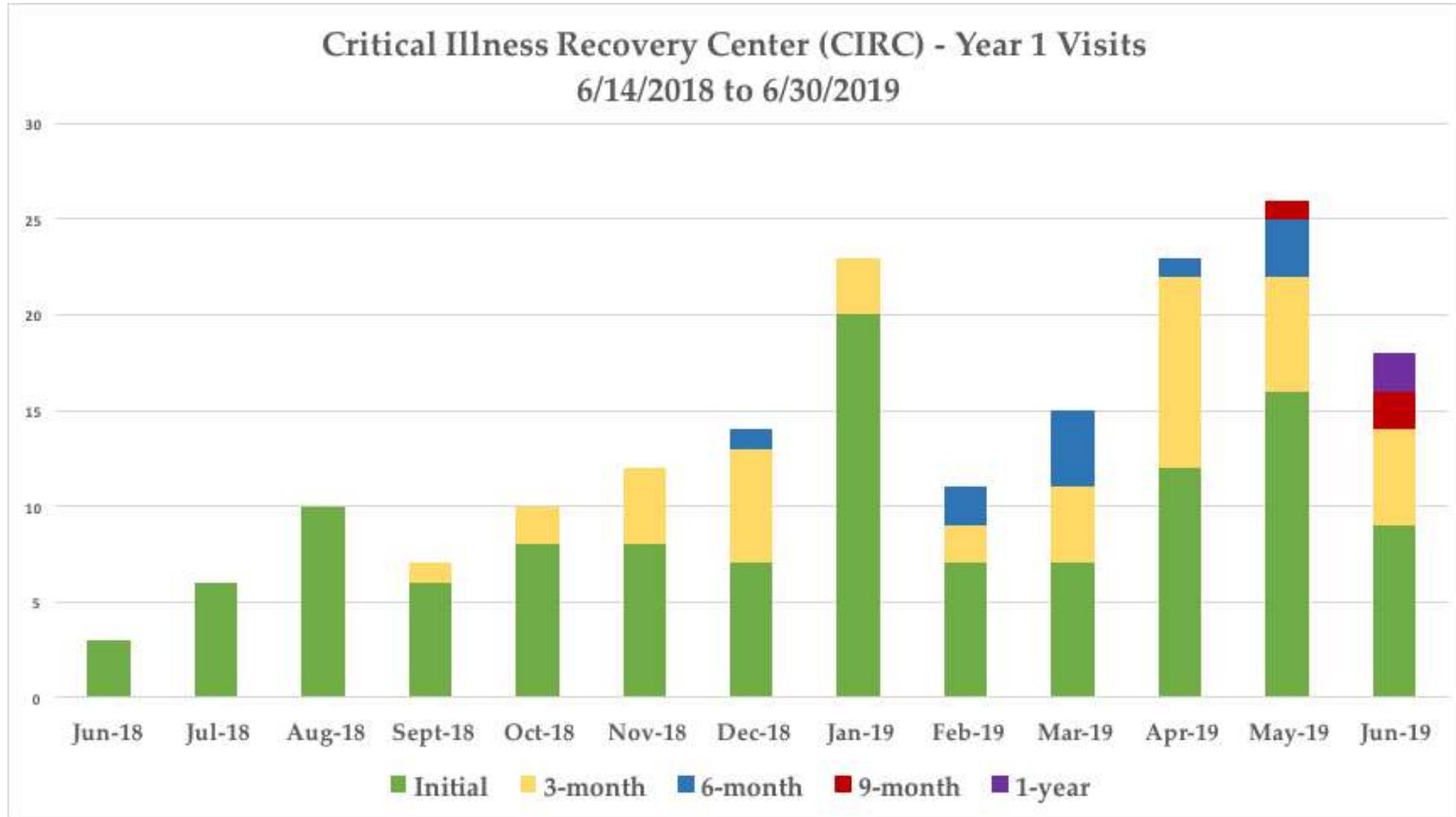
# Patient demographics

5/22/18 through 4/1/19

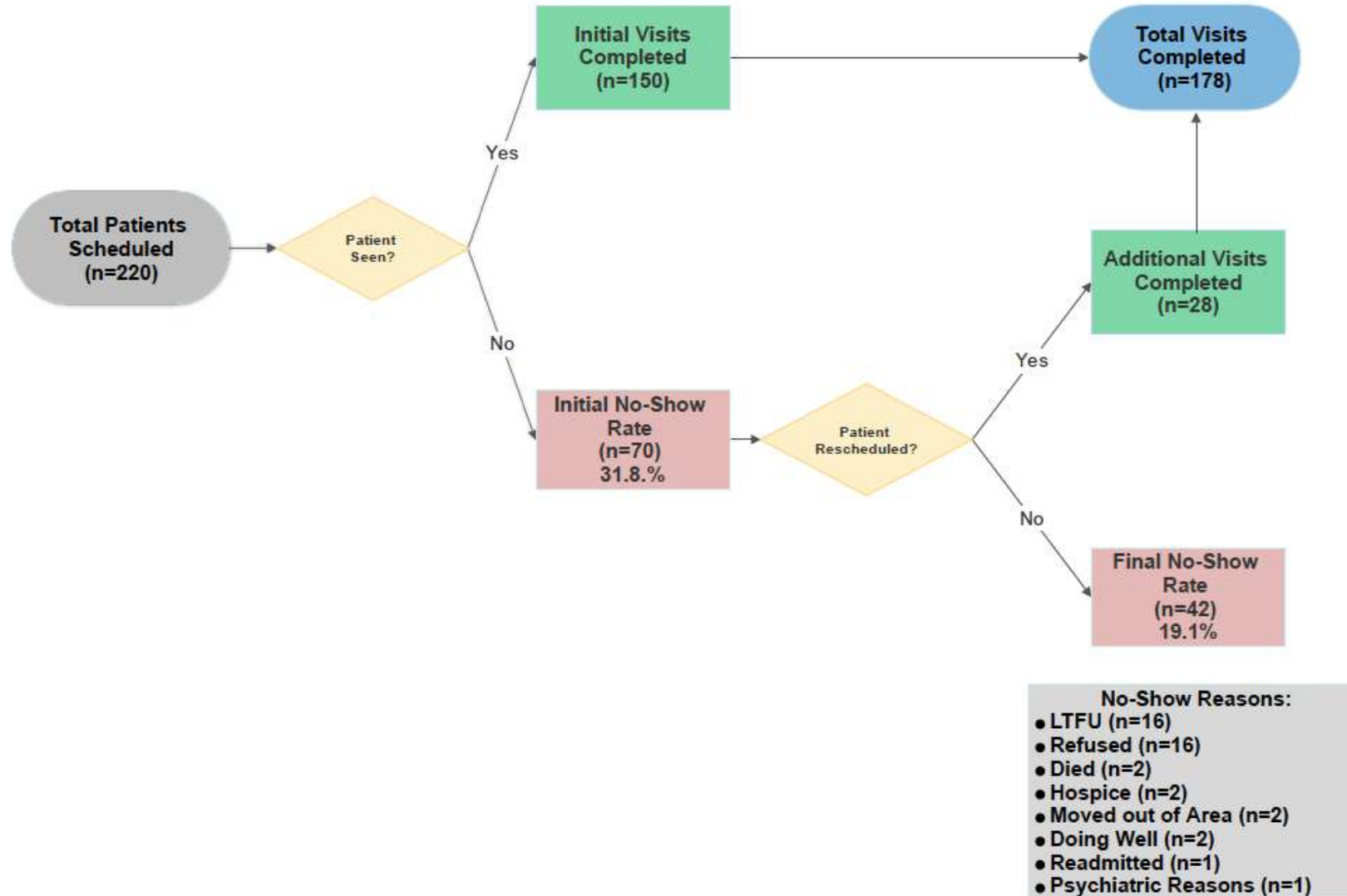
Demographics <sup>a</sup>	Patients seen (n=82)
Age, years	59 (51, 67)
Sex, male	36 (56%)
Race, white	64 (78%)
<u>Referral ICU type</u>	
Medical	42 (51.2%)
Neurological	19 (23.2%)
Trauma/Burn	15 (18.3%)
Surgical	6 (7.3%)
<u>ICU characteristics</u>	
Acute respiratory failure	71 (86.6%)
Delirium during ICU stay	62 (75.6%)
Sepsis/septic shock	55 (67.1%)
<u>Discharge disposition</u>	
Home	22 (26.8%)
Skilled nursing facility	27 (32.9%)
Inpatient rehabilitation	27 (32.9%)
Long term acute care	6 (7.3%)
<u>Time to clinic visit (days)</u>	
Home	22 (18, 31)
Skilled nursing facility	23 (15, 46)
Inpatient rehabilitation	52 (38, 70)
Long term acute care	40 (35, 56)
Readmitted before visit	30 (36.7%)
Readmitted after visit, within 90 days of hospital discharge	5 (6.1%)

<sup>a</sup> Data presented as n (%) or median (interquartile range)

# Visits per month



# Managing No Shows



# Referrals Generated

Specialist	# of Referrals
Physical therapy	112 outpatient, 12 home referrals
Occupational therapy	64 outpatient, 13 home referrals
Cognitive therapy	81 outpatient, 10 home referrals
Swallowing therapy	4
Behavioral health	20
Pulmonary rehabilitation	15
Pulmonology	17
Other sub-specialists	32

# Clinic Interventions

Specialist	# of Interventions (% pts eligible)
Immunizations	Flu – 15 (23%) Pneumovax – 29 (69%)
Pill boxes provided	33
Spacers provided	35
Medication education	217 (100%)
Medication reconciliation	217 (100%) 72 visits - unnecessary medications stopped 56 visits - new medications initiated 47 visits - dose adjustments
Inhaler education	55 (100%)
Smoking cessation counseling	54 (84%)



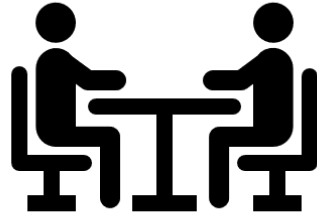
# Goals of Care Conversations and Advance Care Planning

Intervention	#s/%
Code status determination	96% (only 5 unable to do)
Surrogate decision maker identification	92% (only 11 unable to do)
Provision of advance directives	76 (58%)
Completion of POLST forms	21 (16%)
Palliative care referral	3 (0.02%)

# Program Intangibles



Education



Discussion



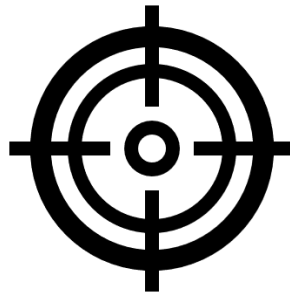
Expectation  
management



Normalization



Counseling

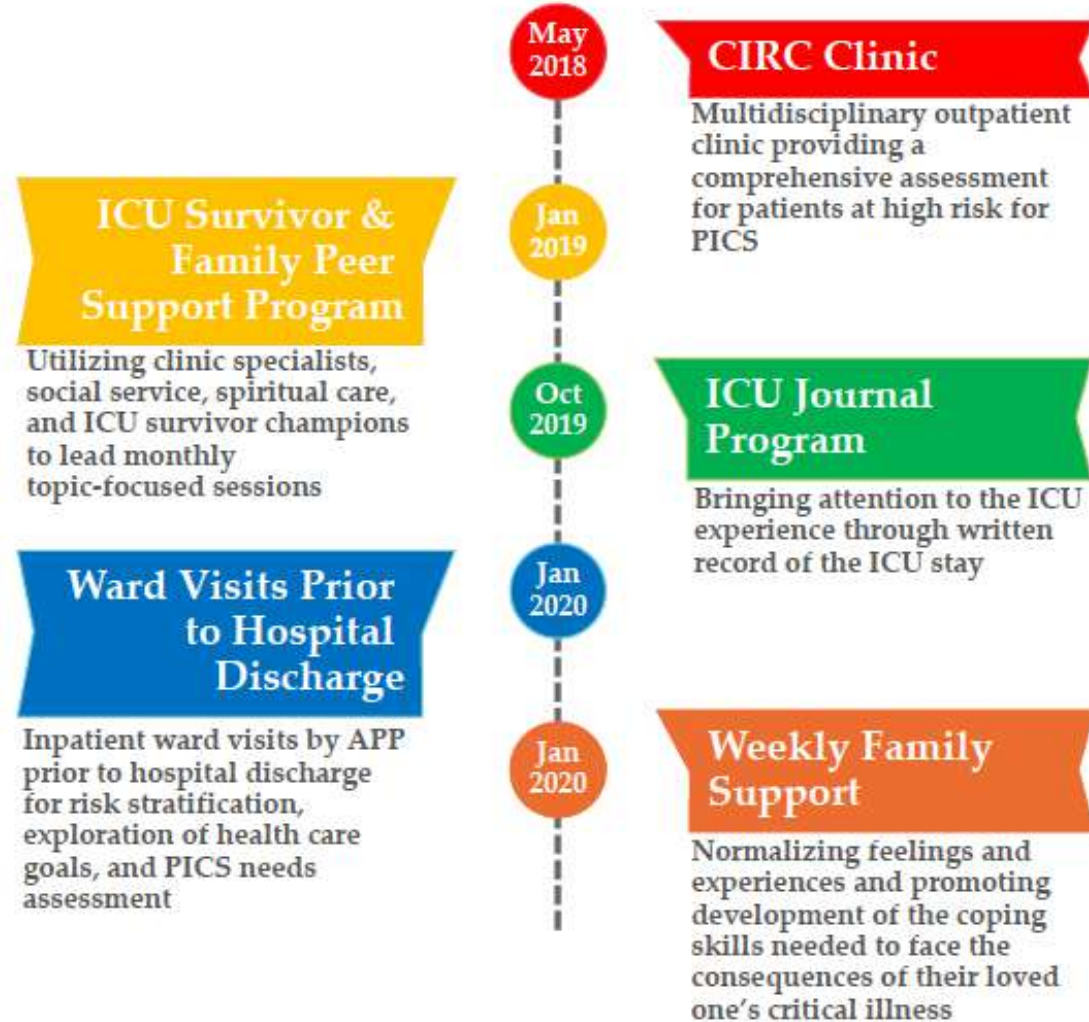


Goal setting



Holistic approach

# Critical Illness Recovery CENTER



# Variability in Home Health Rehabilitation Utilization Among Older ICU Survivors



**Jason Falvey, PT, DPT, PhD**

**Board Certified Geriatric Clinical Specialist**

**Post-Doctoral Fellow**

**Yale School of Medicine**

**@JRayFalvey**

# Disclosures

None

# Introduction

- Older adults have high vulnerability to functional decline after ICU stays
- Rehabilitation services may improve outcomes after ICU stays
- Yet, the extent of participation in rehabilitation after ICU stays is unclear

Chao, 2014, Brummel, 2015, Major 2016

# Post-Acute Care After Critical Illness

Jones et al, 2015

Critical Illness

```
graph TD; A[Critical Illness] --> B[30% Home Health Care]; A --> C[26% Skilled Nursing Facility]; A --> D[9% Rehab Hospital]; A --> E[9% LTACH];
```

The diagram is a flowchart starting with a box labeled 'Critical Illness'. A line descends from this box and branches into four horizontal lines, each leading to a separate box below. The boxes contain the following information: '30% Home Health Care', '26% Skilled Nursing Facility', '9% Rehab Hospital', and '9% LTACH'. The first box is highlighted with a thick red border.

30%

Home Health Care

26%

Skilled Nursing  
Facility

9%

Rehab Hospital

9%

LTACH

# Home Health Care

Provides nursing, rehabilitation, social support, and health aide services

- Unlimited rehabilitation benefits

No clear rules or guidelines for patients recovering from critical illness





# Research Questions

- 1) Determine the amount and type of home-based rehabilitation that older adults receive after surviving an ICU stay
- 2) Evaluate factors associated with variability in home-based rehabilitation use

# Methods

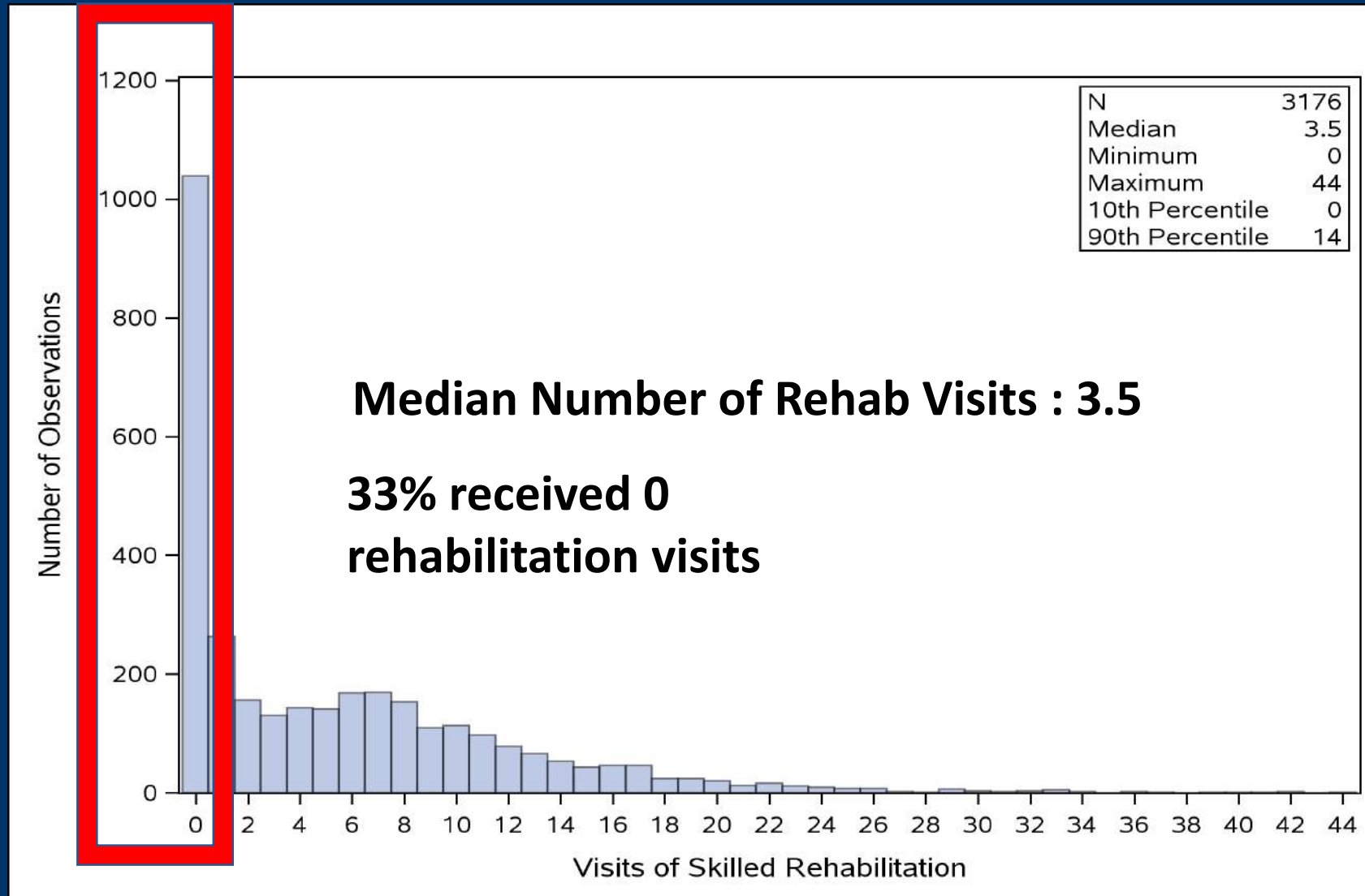
- Combined data from 2012 5% Medicare hospitalization files, home health files, and beneficiary demographic files
  - Extracted revenue codes for HH physical, occupational, and speech therapy
  - Included granular assessment data from HH admission
- Limited sample to the 3176 Medicare beneficiaries who
  - Stayed in the ICU >1 day
  - Survived at home without readmission or hospice transfer for 30 days

# Statistical Methods

- Bivariate and multivariate negative binomial regression to model count of therapy visits received during HH care
- Geographic mapping to visual variability across regions

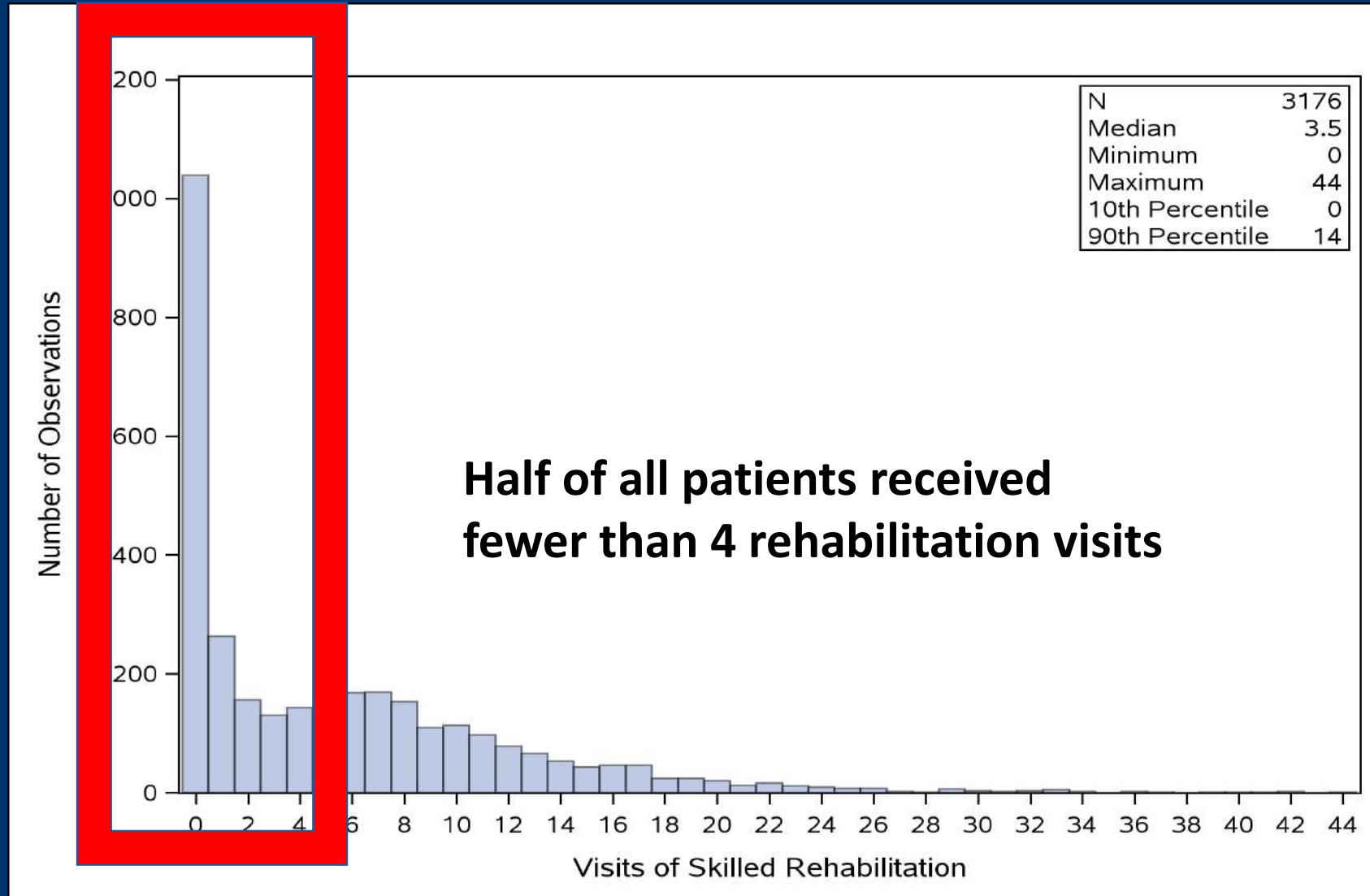
# Results

Median time in home care: 30 days



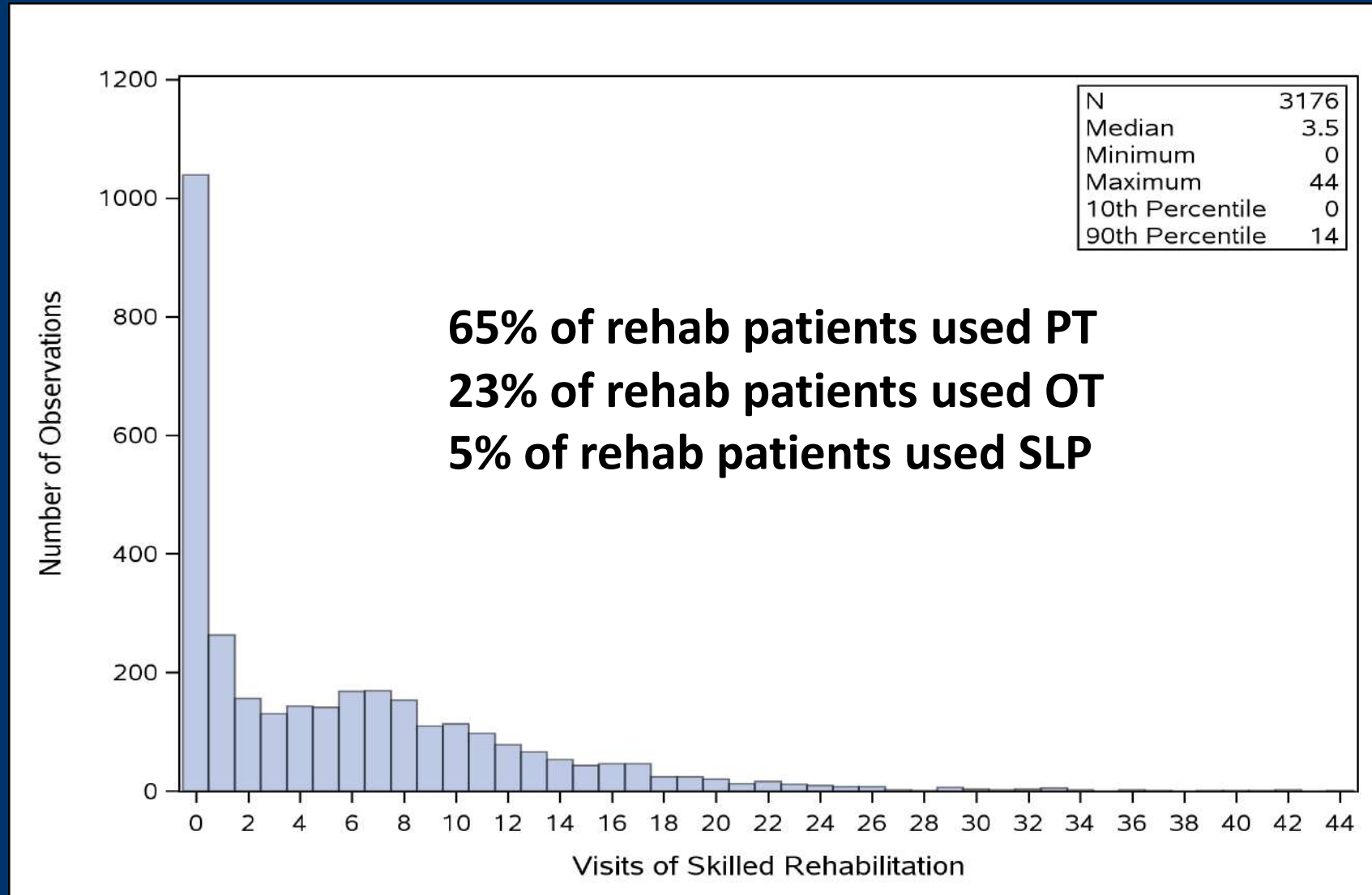
# Results

Median time in home care: 30 days

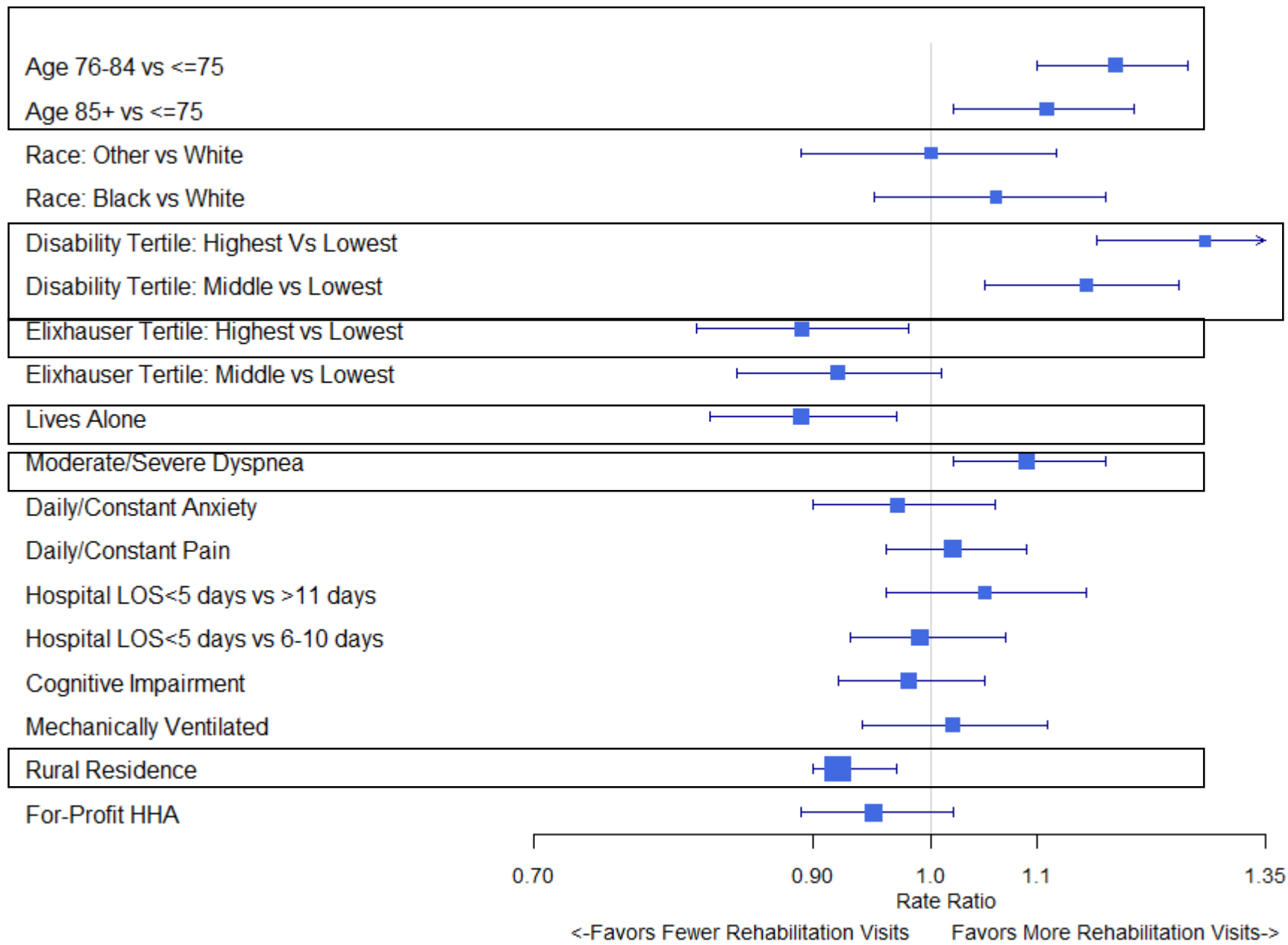


# Results

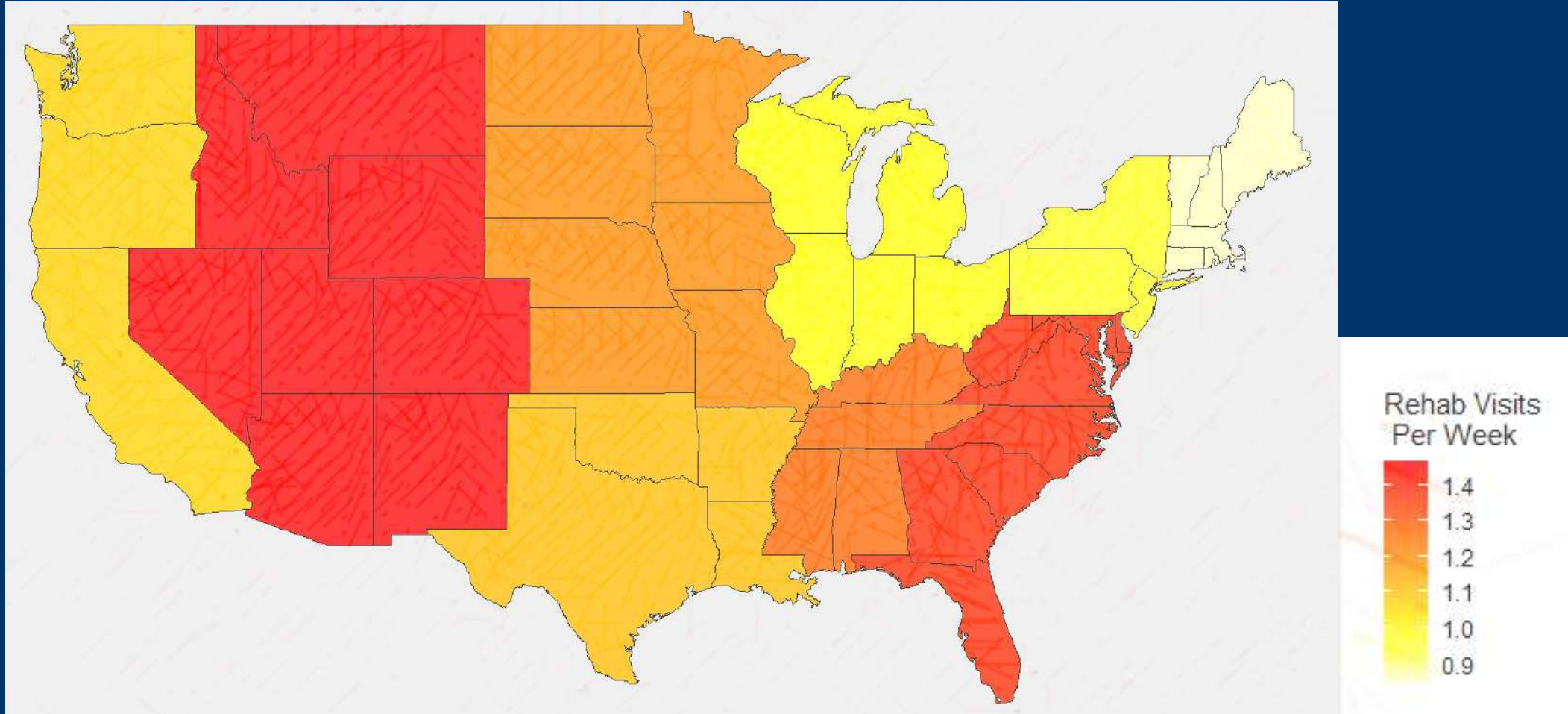
Median time in home care: 30 days



# Results



# Results





# Discussion

- Most patients receive low doses of rehabilitation in HH settings, which may limit functional recovery after critical illness
- Social and geographic factors explain large amount of variability in rehabilitation use, suggesting potential disparities
- Impact of home rehabilitation on recovery after critical illness unclear, but recent research indicates moderate benefit
- Disparities in use likely worsen when patients no longer qualify for home based services

# Acknowledgements

## Yale Mentors:

- Dr. Thomas Gill, MD
- Dr. Lauren Ferrante, MD, MHS
- Dr. Terry Murphy, PhD

## Dissertation Mentor:

- Dr. Jennifer Stevens-Lapsley, PT, PhD

## Funding:

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- Support from Rocky Mountain VA Medical Center and VA VINCI

# References

- Brummel NE, Balas MC, Morandi A, Ferrante LE, Gill TM, Ely EW. Understanding and reducing disability in older adults following critical illness. *Critical care medicine*. 2015;43(6):1265-1275
- Chao P-w, Shih C-J, Lee Y-J, et al. Association of postdischarge rehabilitation with mortality in intensive care unit survivors of sepsis. *American journal of respiratory and critical care medicine*. 2014;190(9):1003-1011
- Major ME, Kwakman R, Kho ME, et al. Surviving critical illness: what is next? An expert consensus statement on physical rehabilitation after hospital discharge. *Crit Care*. 2016;20(1):354

# Questions?



# *RETROSPECTIVE ANALYSIS OF MOBILITY IN THE CICU AFTER PROTOCOL MODIFICATION*

**By: Chirag Patel, MS4  
ECU BSOM, Greenville NC  
Leaders in Innovative Care  
(LINC) Scholar**

# CICU Population

- 24 beds; one nurse per two patients
- Post-STEMI, decompensated HF, post vascular / thoracic surgery
- Intubations, central lines, IABP, Impella, ECMO

# Why is mobility important?

- Decrease ventilator days
- Decrease length of stay
- Reduce delirium and chances of death
- Improves patient outlook / quality of life

# Greenville Early Mobility Scale (GEMS)

## Mobility Level 1 = In Bed Activity

- Ankle pumps
- Arm raise
- Heel slide
- Straight leg raise
- Rolling
- Bridge



\* Turn every 2 hours  
\* Perform Range of Motion

## Mobility Level 2 = Edge of Bed Activity

- Sitting at edge of bed
- Leg kicks
- Seated marching
- Partial stand



## Mobility Level 3 = Standing Activity

- Standing
- Walking in place
- Step forward and back
- Walk with assistive device and/or staff member



## Mobility Level 4: Independent Activity

- Please encourage patient to walk
- May use assistive device



# Concerns with GEMS

- Patient population differences
- Not enough instruction on how long and what type of activities to perform
- Level 1 often assigned with little intervention
- PT consults for mobility difficult to obtain

# Protocol Change

```
graph LR; PC[Protocol Change] --> H[ ]; H --> IPM[Increase Patient Mobility]; CD[Clarify duration of activities] --> PC; CWA[Clarify which activities to perform] --> PC;
```

Clarify duration of activities

Clarify which activities to perform

**Increase  
Patient  
Mobility**

# The ICU Mobility Protocol: VMC Early (IMPROVE) Movement

IMPROVE Routine	Exercise Routine
1.	<b>GEMS 1A: Bed bound/Non-participatory:</b> passive range of motion
	a. Flexion and extension of elbow and shoulder: 10 min (30-40 reps per joint) <b>And</b> b. Flexion and extension of the knee and hip: 10 min (30-40 reps per joint)
2.	<b>GEMS 1B: Bed bound/Participatory:</b> active range of motion
	a. Pedal Exerciser for upper extremities: 10-15 min <b>And</b> b. Active leg adduction/abduction and leg raises: 10 min (30-40 reps per) <b>Or</b> Pedal Exerciser for lower extremities: 10-15 min
3.	<b>GEMS 2: Able to get in chair but unable to walk:</b> active range of motion
	a. Pedal Exerciser for upper extremities: 10-15 min <b>And</b> b. Sitting to standing exercise with assistance: 10 min (10-20 reps) <b>Or</b> Pedal Exerciser for lower extremities: 10-15 min
4.	<b>GEMS 3: Able to walk with support:</b> active range of motion
	a. Pedal Exerciser for upper extremities: 15 min <b>And</b> b. Walk from chair to bed/bathroom 3-5 times with assistance <b>Or</b> Walk the hallway 50-100 feet with cardiac rehab walker
5.	<b>GEMS 4: Walking independently</b>
	a. Walk the hallway 50-100 feet with/without cardiac rehab walker



# Protocol Change

Clarify duration of activities

Clarify which activities to perform

## Increase Patient Mobility

Speak to nursing staff to educate

Place protocol at each nurse station

# Education

# Feedback

## IMPROVE Protocol Survey

Thank you for participating in our survey. This past month the IMPROVE protocol was implemented in the CICU to increase patient mobility and progressive their mobility throughout their stay. This was done by detailing which exercises each patient should perform at a certain level. The current protocol in place is the Greenville Early Mobility Scale (GEMS) and this supplement was added for the CICU. In order to better understand how the IMPROVE protocol has impacted patient care and mobility in the CICU, we invite you to answer these questions honestly to better serve you and our patients!

Instructions: Circle the number that corresponds to your stance on the IMPROVE model:

1: strongly disagree; 2: somewhat disagree; 3: neither; 4: somewhat agree; 5: strongly agree.

- 1) The IMPROVE protocol clearly defined which mobility level each patient falls under.

1      2      3      4      5

- 2) The IMPROVE protocol clearly defined which exercises a patient should complete at a specific mobility level.

1      2      3      4      5

- 3) I believe that the IMPROVE protocol has helped my patients become progressively more mobile from initial level.

1      2      3      4      5

- 4) I believe the IMPROVE protocol has helped me track patient mobility effectively.

1      2      3      4      5

- 5) The IMPROVE protocol has exercises that are easy for me to help the patient perform.

1      2      3      4      5

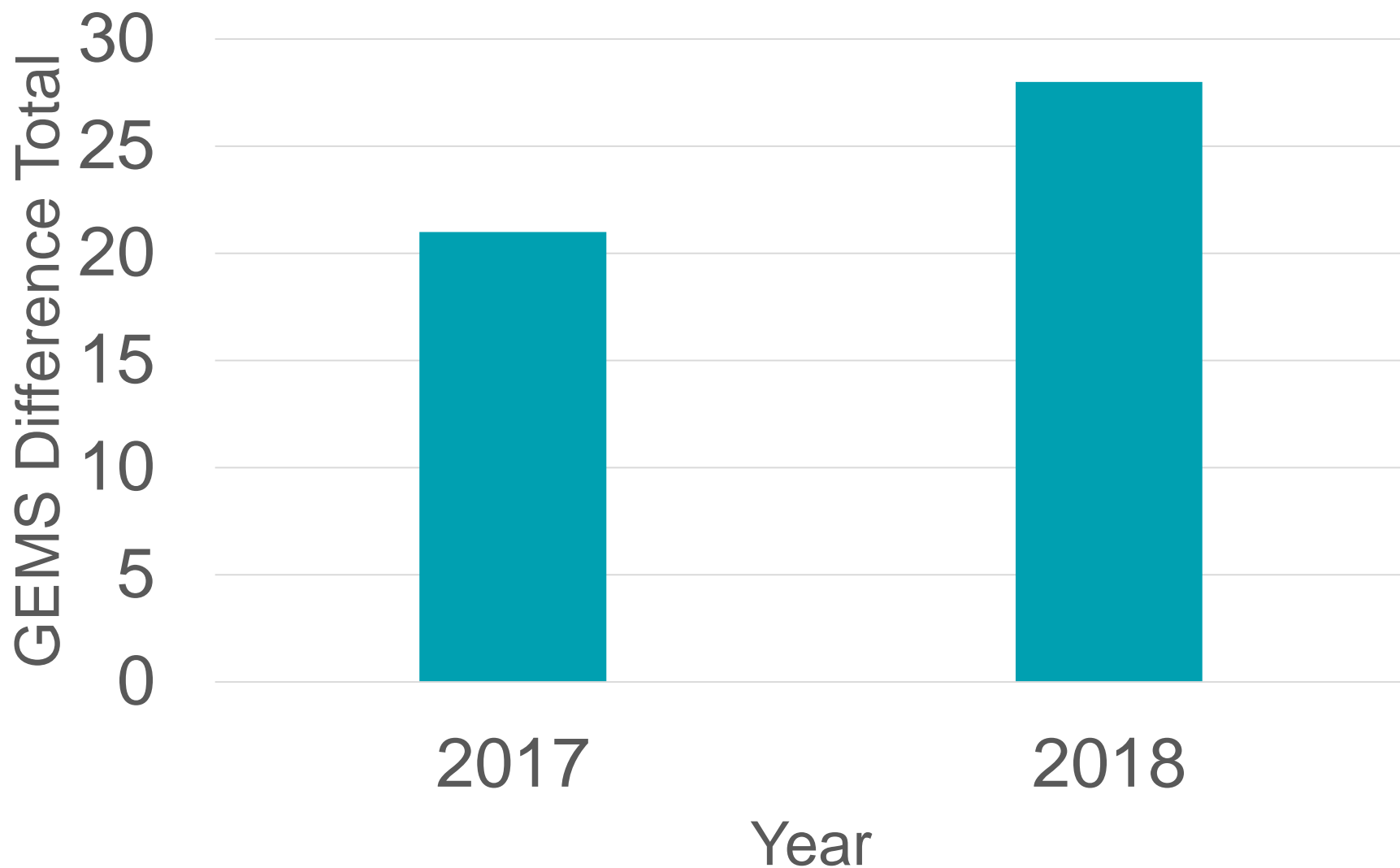
- 6) The IMPROVE protocol was a helpful addition to the GEMS.

1      2      3      4      5

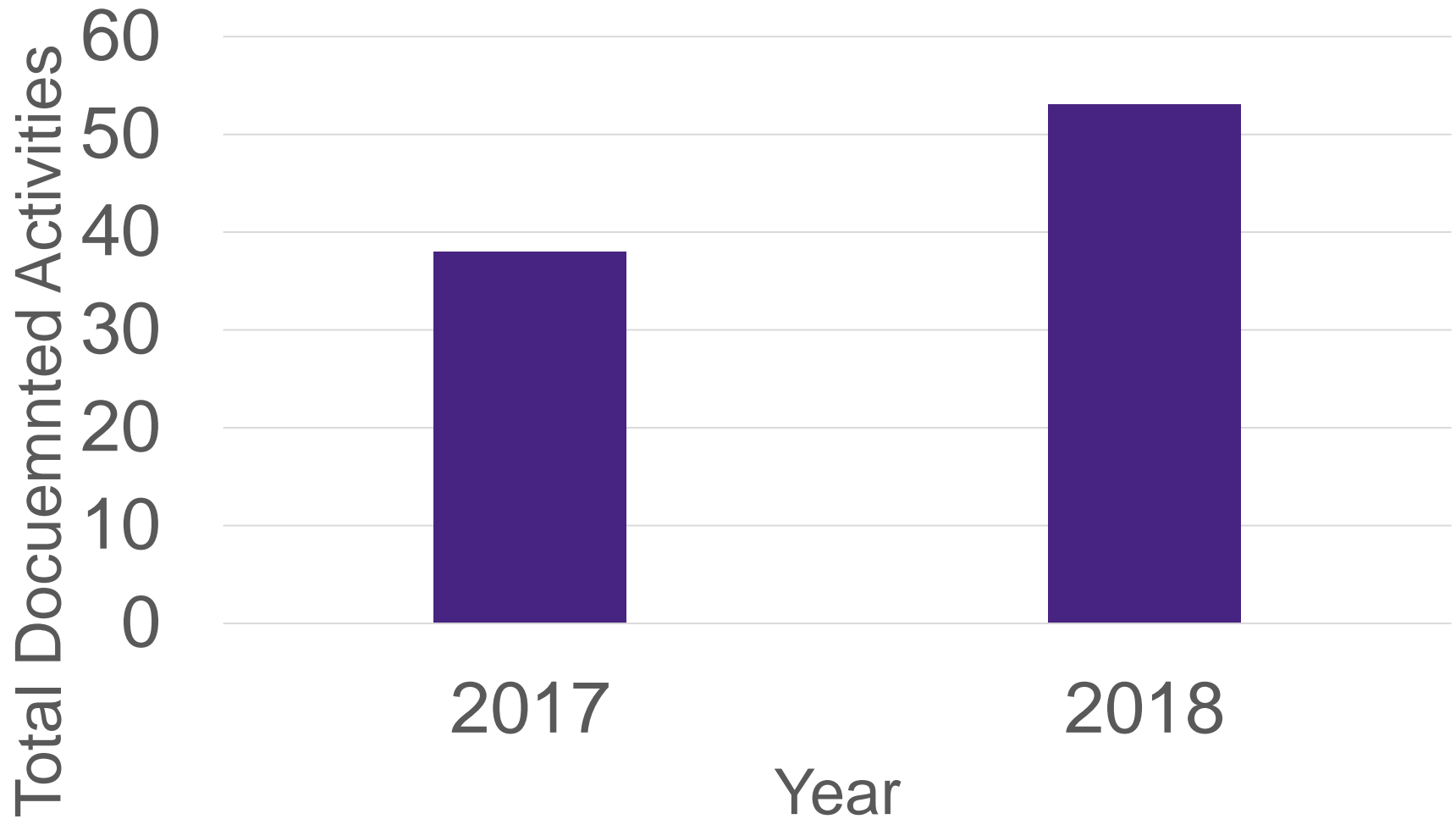
- 7) I am more aware of the importance of mobility after this protocol was implemented

1      2      3      4      5

# Year vs. Total GEMS Advancement



# Year vs. Total Number of Documented Activities



# Roadblocks

- Data collection
  - No flowsheet of GEMS scores
  - Looked at each provider note to determine exercises performed
  - No structured way to track mobility



# EHR Change

Create drop down menu for level, duration, activity

Auto populate in notes / flowsheet

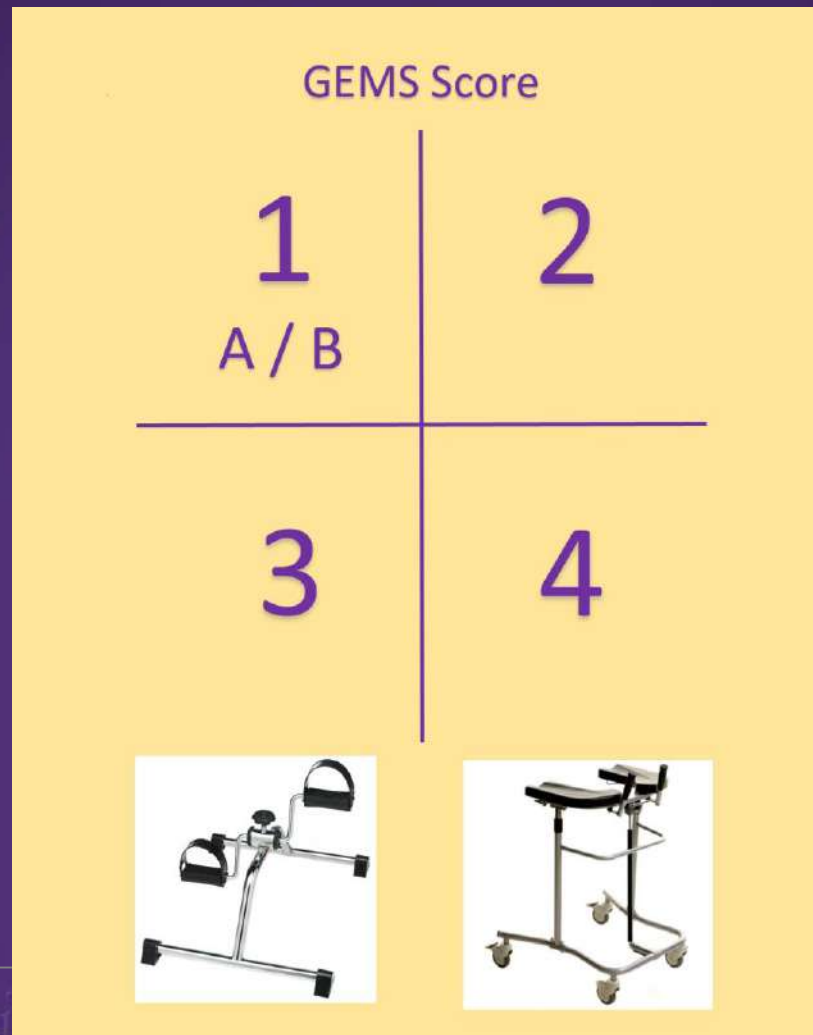
## Increase Patient Mobility

Display GEMS level outside room

Monitor on rounds regardless of provider status

# Rounding

# Proposed Rounding Aid



# Contributors

- Michael Ritchie, MD
- Tim Reeder, MD
- Toni Holden, BSN
- Pamela Moss, RN
- Kimberly Carter, RN, Information Services
- PT representatives

# Development of an ICU Survivorship Program

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Philadelphia, Pennsylvania

[jrogan@nursing.upenn.edu](mailto:jrogan@nursing.upenn.edu)



[@JulieRoganCNS](https://twitter.com/JulieRoganCNS)





The Healing Journal: A Novel Idea from Penn's Medical Intensive Care Unit (MICU)



Watch later



Share



# MEDICAL ICU HEALING JOURNAL



Penn Medicine

# Support ICU survivors and their families

- Interprofessional implementation team
- ABCDEF bundle
- ICU diary
- Website
- Peer support group

# Which survivors are we reaching out to?

- Inclusion criteria ICU Diary:
  - Anticipated intubation for greater than 48 hours
- Inclusion criteria Peer Support:
  - ICU diary recipients
  - Survived ICU stay

# When does outreach begin?

- Follow up after ICU
  - Before hospital discharge
  - Phone call after discharge
  - Mailed invitation
  - Emailed invitation



# What does peer support look like?

- Peer Support Session:
  - In-person
  - Telemedicine option
  - Biweekly

# What are the sessions like?

- Rotating themes:
  - ICU survivorship overview
  - ICU diary utilization during recovery
  - Managing challenges with strength and balance
  - Managing challenges with meaning-making
  - Getting back to doing more of what you love

# How many people have been reached?

- **160** journals
- **90** invitations/6 cohorts
- **56** phone conversations
- **44** participants
- **6** online participants
- **9** routinely returning participants

# Keys to Success

- Organized, consistent process
- Anticipate obstacles
- Interprofessional team
- Frequent reassessment for optimization
- Well-received by ICU survivors and their loved ones

# Acknowledgements

- **Penn Presbyterian Medical Center**

- Megan Zielke, PharmD, BCCCP
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- Bridget McQuate, BA

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- Adair Andrews

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- UCSD: Miranda Covalesky and Truong-Giang Huynh
- MAMC: Mary McCarthy
- Mission Health: Mary Kay Bader and Arianna Barnes

- **Debriefing**

- Christina Jones
- Teresa Deffner
- Anne Nielsen

# Thank you!

---

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*#MoraleWithATail*

## Initiating Animal Assisted Therapy in Critical Care in Plymouth (UK)

**PETS AS  
THERAPY**

**Kate Tantom**      MRes PGCE BSc (hons) RN

Specialist Rehabilitation Sister in Critical Care

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@tantamkate

#Rehablegend



## Animal Assisted Intervention in Critical Care





Listening  
=  
Learning

Our ICU clinical teams wanted to support our patients and their loved ones to engage in rehabilitation in different ways

They asked if it was possible to bring in dogs..

I wasn't a "dog person"....





Inclusion	Exclusion
Patient Choice	Allergy or Asthma
	Phobia of dogs
	Infection control issues
	Immunosuppressed

### Visiting Schedule

- Twice weekly visits
- Escorted in ICU
- All communicative patients offered visit

Evaluation of the Quality improvement project has been completed using qualitative and quantitative methodologies in the month of November 2018.

#### Staff

- ICU Staff Survey (n=80)

#### Patients were asked to provide a self assessment for

- Mood (Visual Analogue Scale)
- Pain scores (0-10 Linear Scale)
- Anxiety (0-10 Linear scale)
- Patient feedback – Free Comments
- Patient observations pre and post intervention (Heart Rate, Blood Pressure and Respiratory Rate).



# Staff Survey Findings (n=80)

Pet Therapy is incredibly powerful. We see levels of increased awareness when provided with a pet to pat

We all love Hovis he has had such an amazing impact on the whole unit



Hovis greatly improves staff morale.. He is morale with a tail!

Hovis's visits bring some relief and joy on very difficult shifts



- 100% stated that Hovis visits are a positive experience
- 99% felt Hovis improves patient experiences of ICU
- Average staff mood levels lifted by 20%

## Challenges of service

- 2.5% of staff reported that some patients found it difficult when Hovis was unable to attend.



# Patient Findings (n=20)

Qualitative feedback from patients and carers has been 100% positive with some of the quotations included below.

- 80% of patients surveyed were unable to fill out outcome measure due to fatigue/limb strength/attention/cognition.
- No changes were observed in physiological parameters, patients reported verbally a change in mood and a reduced pain score.

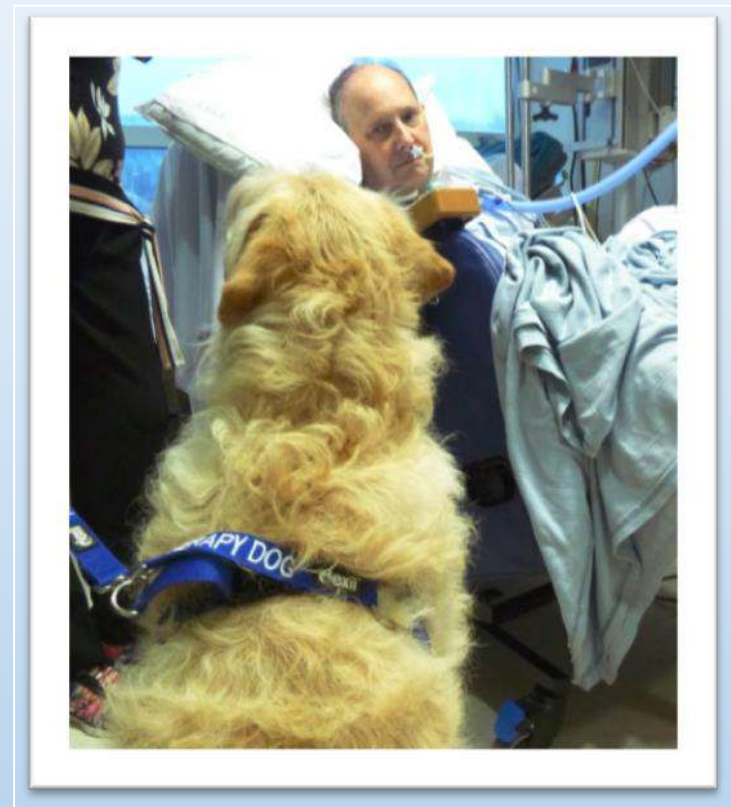
It was so lovely that he came to see me on the ward



.....It always makes a difference when you see a dog like Hovis because he takes my mind off my illness, a good distraction...

.....Hovis helped me to practise throwing the ball with my arm which I needed to recover, from paralysis and build muscle strength .....





# Conclusion

- Animal assisted therapy in ICU is seen as a positive and is an active intervention to improve staff and patient experience.
- Patients and their loved ones report that Hovis and Moira are able to help distract and engage patients in a way that clinical staff may not.
- Outreach visits have been positively received by patients and staff outside ICU but the impact of this has not been fully explored.
- Limitations to this project are the challenges with completion of patient feedback due to; fatigue, weakness, memory and impaired communication and availability of our animal team.
- Animal assisted therapy in ICU is feasible and we would encourage other ICU departments to embrace this intervention to support psychological recovery of patients, loved ones and staff.



# Future

- ICU specific policy for AAT
- Increase ICU Rehab outreach capacity
- Support staff education in value of AAT for rehabilitation after ICU
- Humanisation of ICU – Secret Garden
- Increase capacity for AAT – Harvey



@hovistherapydog  
#Rehablegend  
@tantamkate



# **Oral Presentations: Pediatric Content**



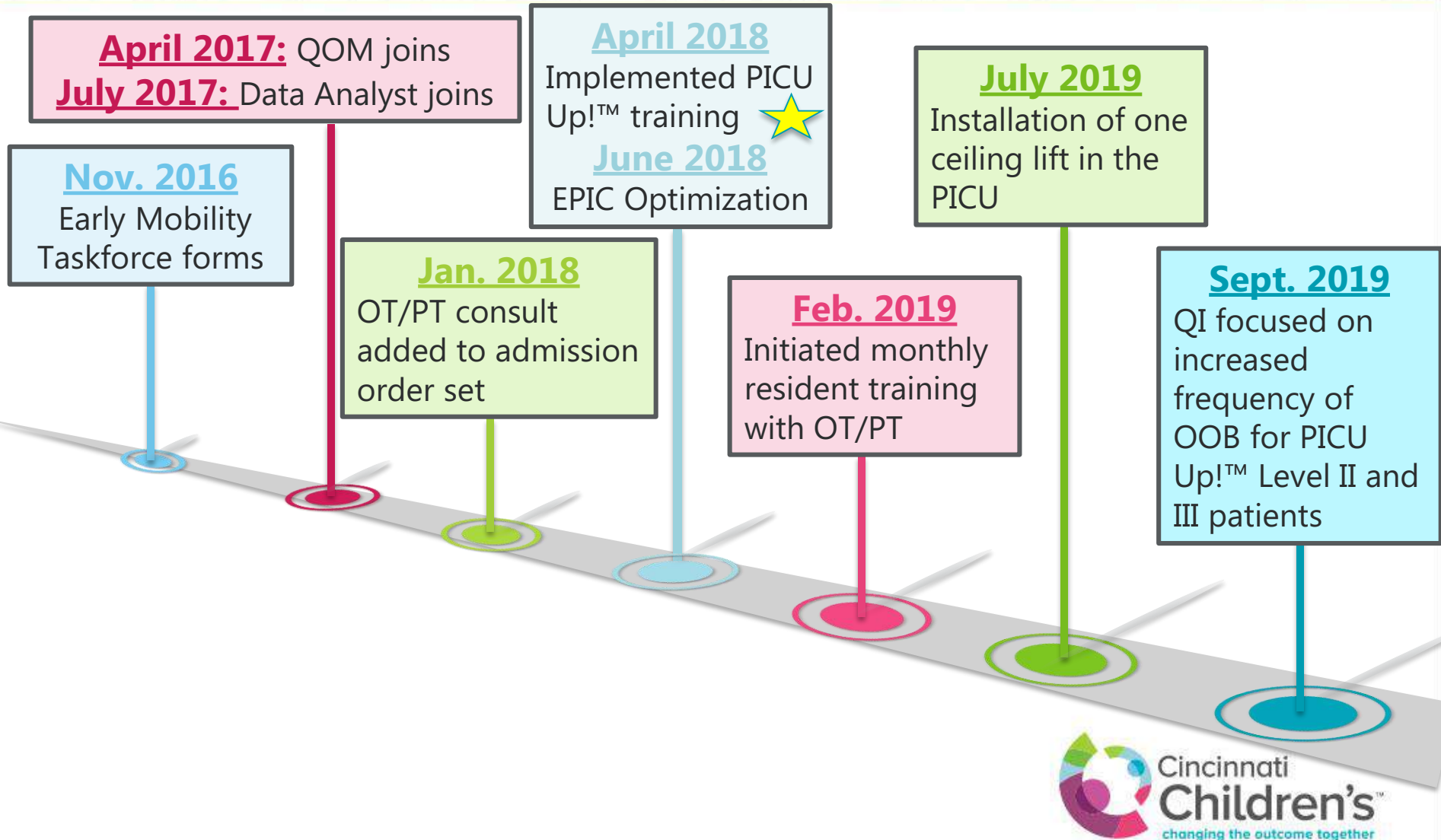
# Increasing Occupational Therapy and Physical Therapy Consultations Through Quality Improvement

October 11, 2019

Rebekah Music, OT; Emily Fox, PT; Michelle Kiger, OT;  
Lindsay Cipriani, RN



# Cincinnati Children's Road to Early Mobility



# Evidence

## Pediatric Early Mobility Programing:

- Is Safe
- Is Feasible
- A catalyst to increase OT/PT consults
- Increases early mobility activities

(Wieczorek et al, 2015; Choong et al, 2017; Wieczorek et al, 2016)

## Adult Early Mobility Programing:

- Reduces ICU and hospital LOS
- Decreases number of ventilated days
- Is associated with increased muscle strength
- Improves self perception of functional status
- May decrease sedation utilization and delirium

(Cameron et al, 2014)

# Defining Our Problem

OT/PT referrals were noted to be *perpetually delayed!*

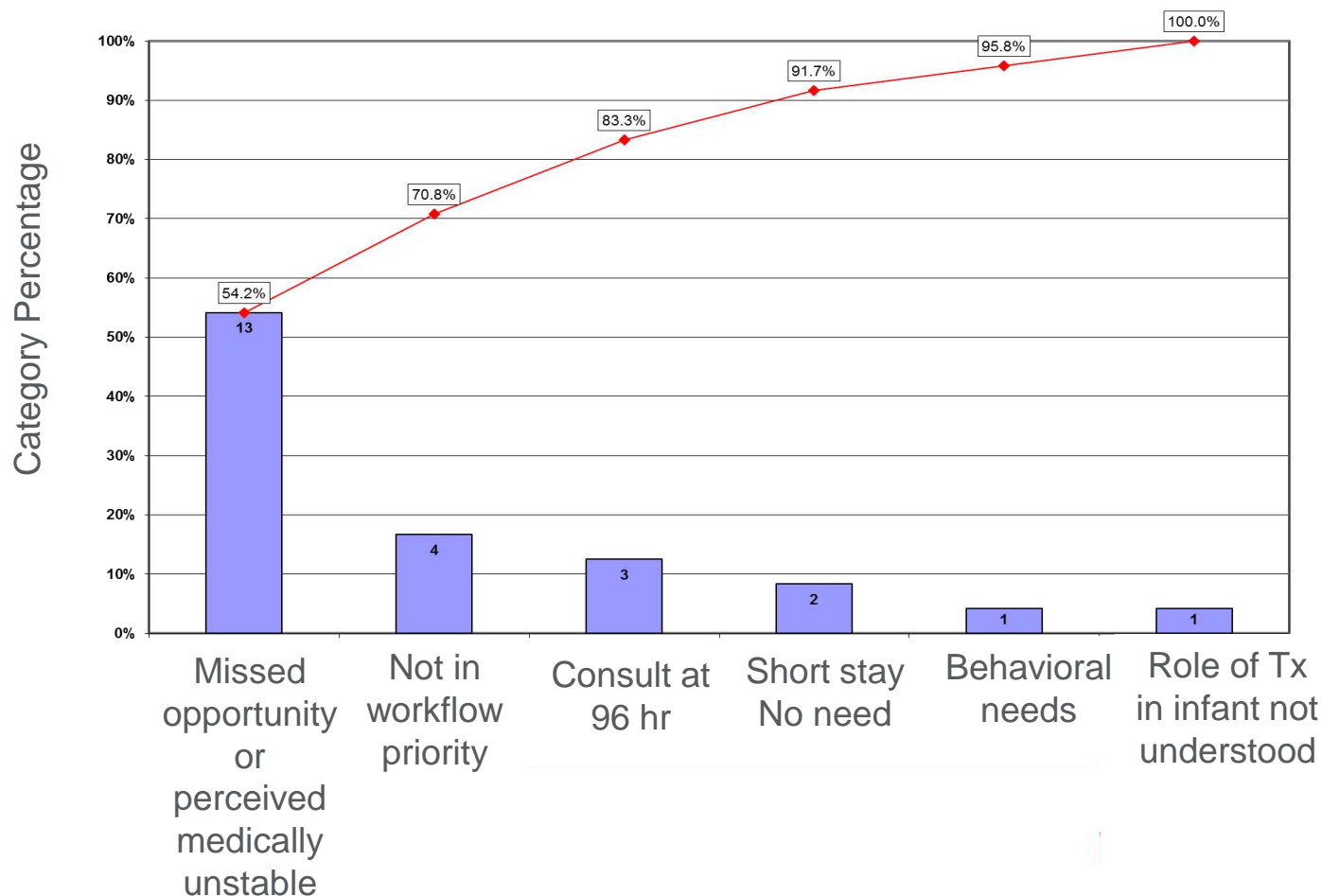
Only **8% of patients** received an OT/PT consult within 72 hours of PICU admission in 2016.

## Evidence suggested:

- ❖ Initiation of OT and/or PT within 72 hours of PICU admission should occur for appropriate patients (Wieczorek et al., 2016)
- ❖ Patients should be assessed for appropriate level of activity within 24 hours of PICU admission (Choong et al., 2018)

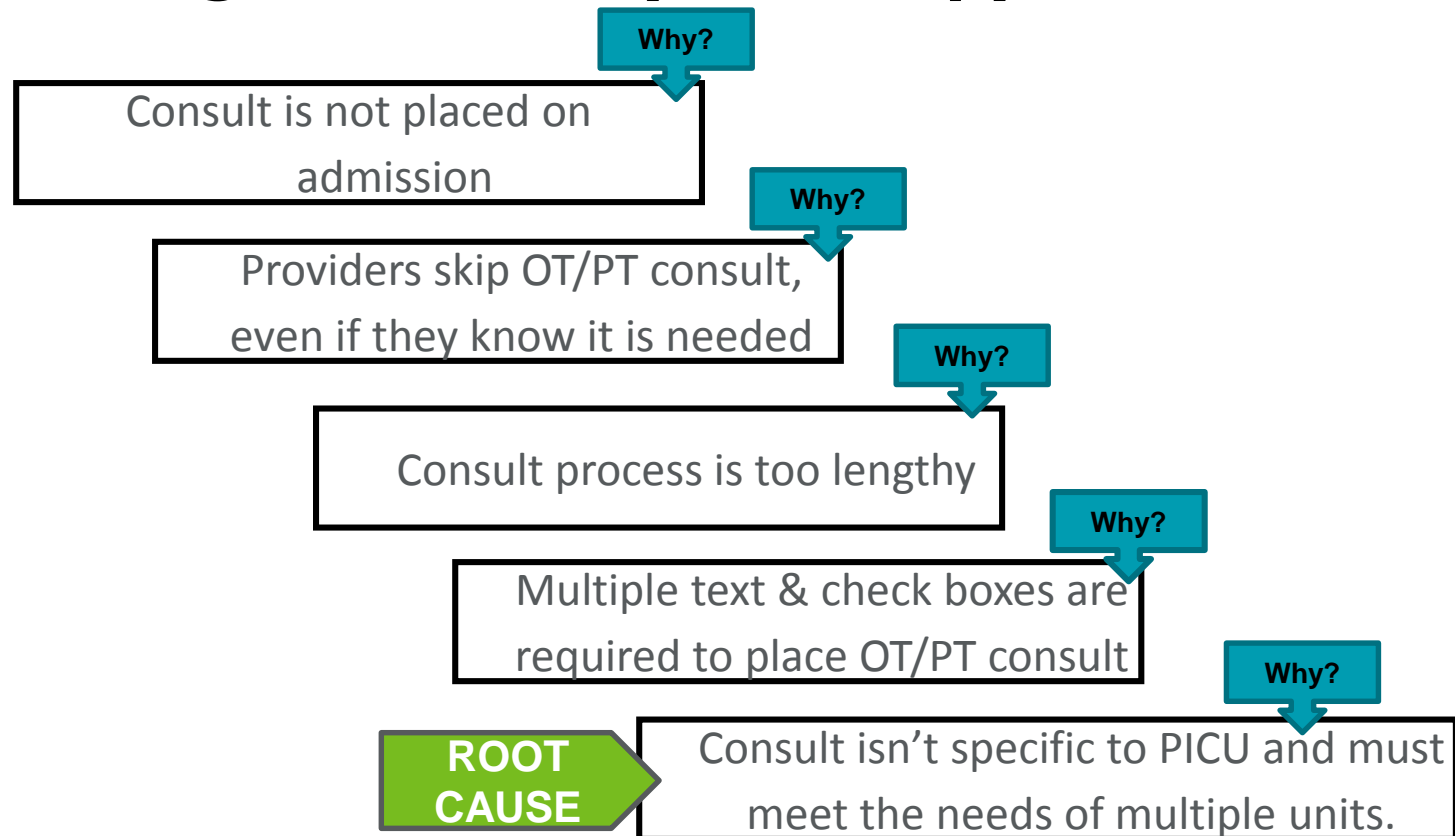
# Reasons for Missed Referrals

Reasons for no OT/PT consultation within 72 hours of PICU admission were assessed via retrospective chart review and staff interviews.



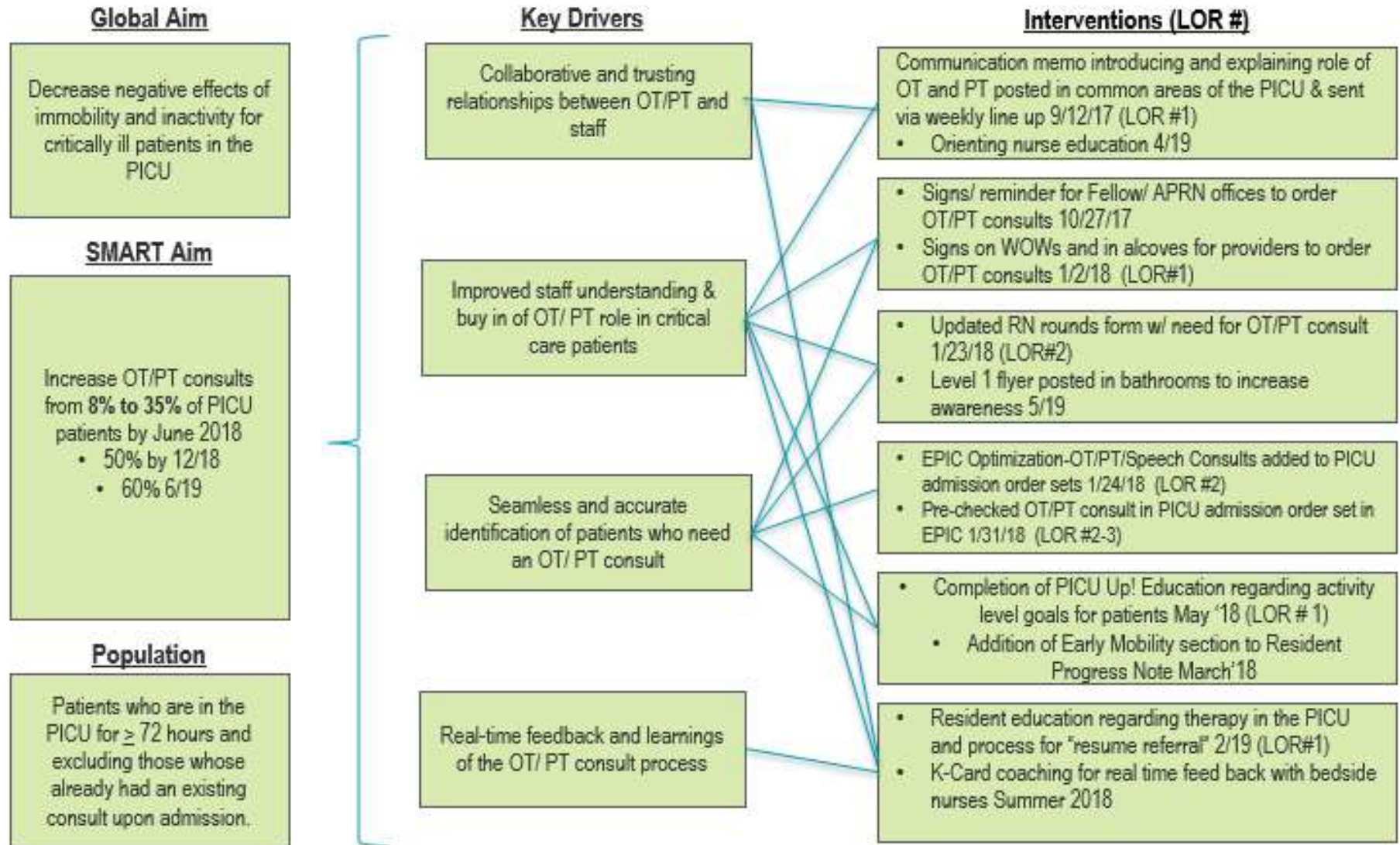
# 5 Whys to Identify the Root Cause

## ***Significant delay in therapy consults***





# PICU OT/PT Consultations Key Driver Diagram



# Aims

## Global Aim

Decrease negative effects of immobility in critically ill children

## Smart Aim

Increase OT/PT consults

- From 8% to 35% by 6/18
- To 50% by 12/18
- To 60% 6/19

## Inclusions

- Patients in the PICU for  $\geq 72$  hours

## Exclusions

- Patients with existing OT/PT consult







# Key Drivers

- Collaborative relationship between OT/PT and PICU staff
- Improved staff understanding PT/OT role in care for critically ill patients
- Seamless and accurate identification of patients needing OT/PT consult
- Real-time feedback of OT/PT consult process


# Interventions: Education and Reminders



Did you know there is a **Physical Therapist** and an **Occupational Therapist** in the PICU?



Bekah, OT x42150



Emily, PT x41871

Please place a therapy consult if your patient has any of these needs:

OT:	PT:
<ul style="list-style-type: none"><li>• Limited participation in daily living skills (ADL)</li><li>• Feeding difficulties</li><li>• Sensory sensitivities</li><li>• Muscle weakness affecting functional participation</li><li>• Muscular tightness</li><li>• Splinting needs</li><li>• Development delays or risk for developmental declines</li><li>• Positioning challenges, in or out of bed</li><li>• Prolonged PICU stay lasting more than 72 hours</li></ul>	<ul style="list-style-type: none"><li>• Muscular weakness/strength deficits</li><li>• Muscular tightness</li><li>• Bracing needs</li><li>• Deficits in ambulation</li><li>• Balance deficits</li><li>• Positioning needs</li><li>• Challenges with endurance</li><li>• Challenges with bed mobility</li><li>• Development delays or risk for developmental declines</li><li>• Prolonged PICU stay lasting more than 72 hours</li></ul>

An OT/PT consult must be placed by the medical team but can be requested by nursing, family, or other staff members. If you have any questions about OT or PT contact Bekah, OT (42150), Emily, PT (41871), or the Therapy department (803-7396). We are currently working on an early mobility initiative to increase activity in the PICU. More info to come later!



Stickers placed around the unit

Updated RN AM rounds form  
DO WE NEED A CONSULT?

 Flyer placed on bathroom doors

# Interventions: EPIC Enhancements

- OT/PT consult was preselected in all PICU admission order sets.
- Consult order was simplified with auto-filled sections.
- Resident progress note template was updated to include discussion of mobility and need for OT/PT consult.

# Interventions: PICU Resident Orientation

Please place a therapy consult if your patient has any of these needs:

## OT:

- ☐ Limited participation in daily living skills (ADL)
- ☐ Feeding difficulties
- ☐ Sensory sensitivities
- ☐ Muscle weakness affecting functional participation
- ☐ Muscular tightness
- ☐ Splinting needs
- ☐ Development delays or risk for developmental declines
- ☐ Positioning challenges, in or out of bed
- ☐ Prolonged PICU stay lasting more than 72 hours

## PT:

- ☐ Muscular weakness/strength deficits
- ☐ Muscular tightness
- ☐ Bracing needs
- ☐ Deficits in ambulation
- ☐ Balance deficits
- ☐ Positioning needs
- ☐ Challenges with endurance
- ☐ Challenges with bed mobility
- ☐ Development delays or risk for developmental declines
- ☐ Prolonged PICU stay lasting more than 72 hours

## Exclusions:

- ☐ Bronchiolitics not requiring intubation
- ☐ PICU admission less than 72 hours with no acute changes in developmental or functional skills
- ☐ DKA with expected return to functional baseline with resolution of illness
- ☐ Asthma exacerbation with expected recovery without functional decline

**If you are uncertain if a patient needs therapy just ask a therapist!**



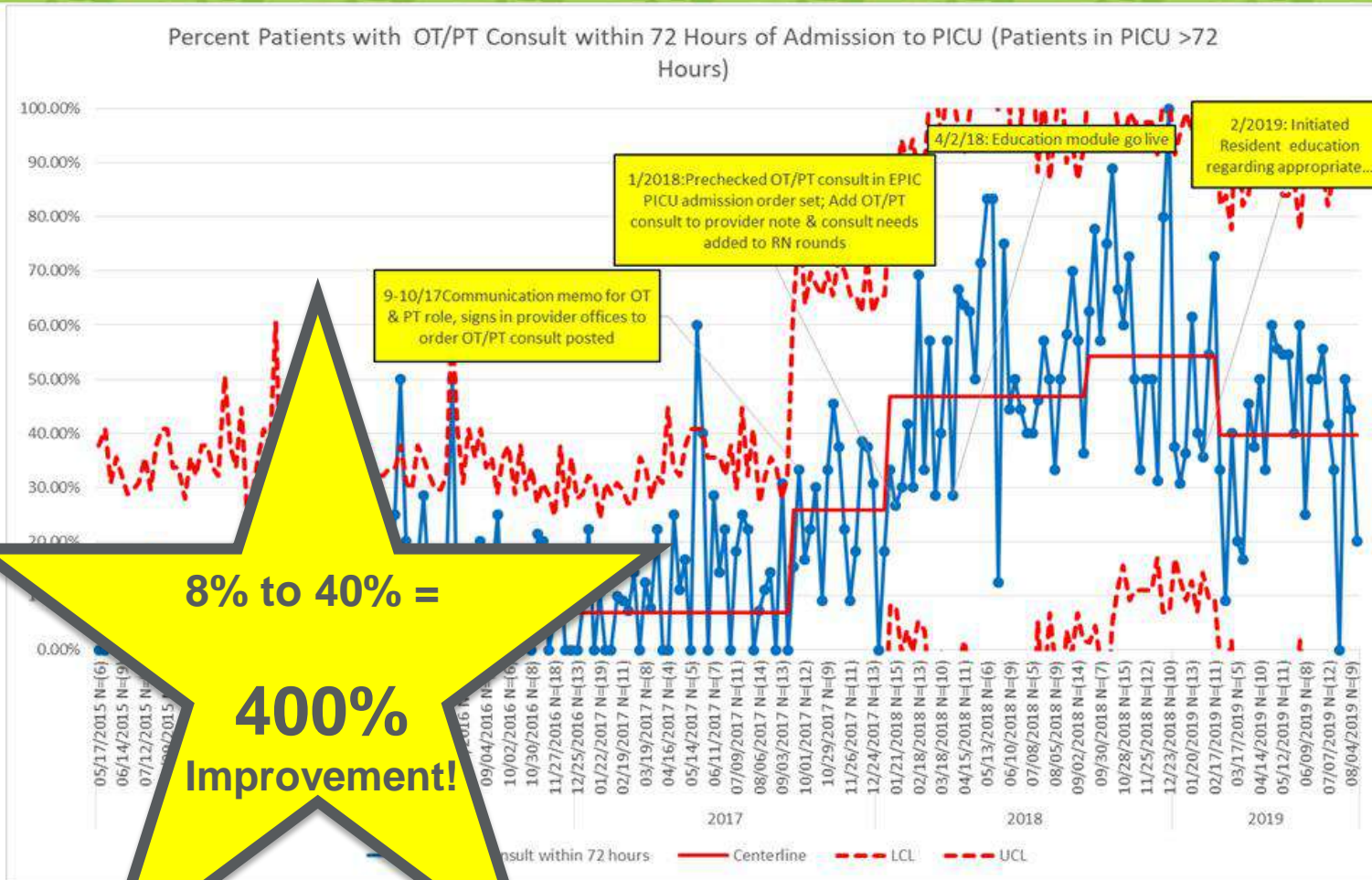
# Interventions: Success Stories

<p><b>PICU Up!™ Level 1</b></p> 	<p>He was initially a PICU Up!™ Level 1 due to being intubated with PEEP &gt;10 and SBS of -3 or -2. At times he was on ECMO but had physician approval to receive Level 1 activities.</p> <p>As a Level 1, he was:</p> <ul style="list-style-type: none"> <li>• Focusing on healing</li> <li>• Receiving passive range of motion and positioning support</li> <li>• Following PICU Up!™ Level 1 activity recommendations</li> <li>• Being monitored for splinting and positioning needs.</li> </ul>	<p><b>PICU Up!™ Level 2</b></p> 	<p>He was next a PICU Up!™ Level 2 due to being intubated with a PEEP ≤ 10 and SBS of -1 to +2.</p> <p>As a Level 2, he was:</p> <ul style="list-style-type: none"> <li>• Positioned in chair mode by nursing</li> <li>• Sitting at edge of bed with therapy to improve head and trunk control</li> <li>• Sitting in a wheelchair while intubated to increase strength</li> <li>• Beginning to work on assisted reaching to play with toys</li> <li>• Normalizing day night schedule through lighting</li> </ul>
<p><b>PICU Up!™ Level 3</b></p> 	<p>Finally he was a PICU Up!™ Level 3 once he received his trach and was on "new baseline" respiratory support.</p> <p>As a Level 3, he was:</p> <ul style="list-style-type: none"> <li>• Leaving his room for a stroll (shown to the left)</li> <li>• Getting down to a play mat</li> <li>• Sitting in wheelchair</li> <li>• Working on sitting head control</li> <li>• Learning to eat and hold his spoon.</li> <li>• Practicing reaching for toys</li> </ul> <p><u>After leaving the PICU, he went to TCC and then rehab to continue his recovery process.</u></p>		



↑ Success stories posted around the unit and sent to staff via email

# Run Chart for Tracking Progress





# Overall Learnings & Challenges

## Learnings:

1. Our OT/PT consult order process was lengthy and complicated and progress was not achieved until this was simplified.
2. It is best to narrow in on a small part of the process and build over time.
3. Efforts must be measured to ensure that change is a real improvement.
4. Without high reliability interventions, change is difficult to sustain.

## Challenges:

1. Rotating staff adds challenges to maintaining comfort with and understanding of referral process.
2. Can be difficult to define which patients will not need therapy without hands on efforts.

# A Special Thank You to:

**Dr. Lesley Doughty (Project Co-Leader),  
Brandy Seger (Quality Outcomes Manager),  
Katie Simon (Data Analytics)  
& the CCHMC Early Mobility Taskforce**



# Early Mobility Taskforce

## SPONSORS:

Erika Stalets, MD - Medical Director, PICU  
Dave Mayhaus, PharmD, MS – AVP, Patient Services  
Jerry Schwartz, RN - Clinical Director, PICU

## TEAM LEADERS:

Rebekah Music, MSOT, OTR/L – Occupational Therapist  
Lesley Doughty, MD - Associate Professor – Critical Care Medicine

## TEAM MEMBERS:

Lindsey Capizzi – Speech Language Pathologist  
Andrea Chamberlain – Clinical Specialist-Pharmacy  
Missy Christen - Nursing Clinical Manager (*former member*)  
Tina Fettig – Nursing Clinical Manager  
Lindsay Cipriani– Nursing Education Specialist II  
Linda Miller– Bedside RN  
Steve Rogers– Bedside RN  
Amanda Kelly - Respiratory Therapist  
Lori Passey – Respiratory Therapist  
Michael Culp – Respiratory Therapist (*former member*)  
Mike Jaeger – Clinical Manager, Respiratory Care  
Emily Fox– Physical Therapist  
Michelle Kiger– Clinical Manager OT/PT IP Services  
Sarrah Schultz – Nurse Practitioner  
Cat Urban, MD – Clinical Fellow

## TEAM COACHES:

Brandy Seger, Quality Outcomes Manager  
Chris Kremer, Quality Outcomes Manager  
Katie Simon, Data Analyst



# Key References

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# *Early Mobility in Young Children Supported with Paracorporeal Total Artificial Hearts*

*Nathan Thompson MD, PharmD, MS*

*Holly Hyland DPT*

*October 12, 2019*

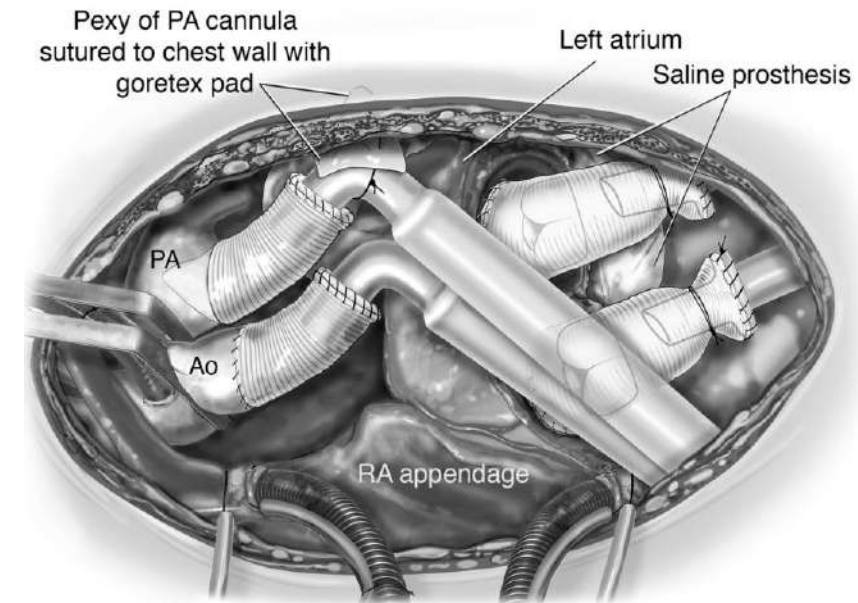
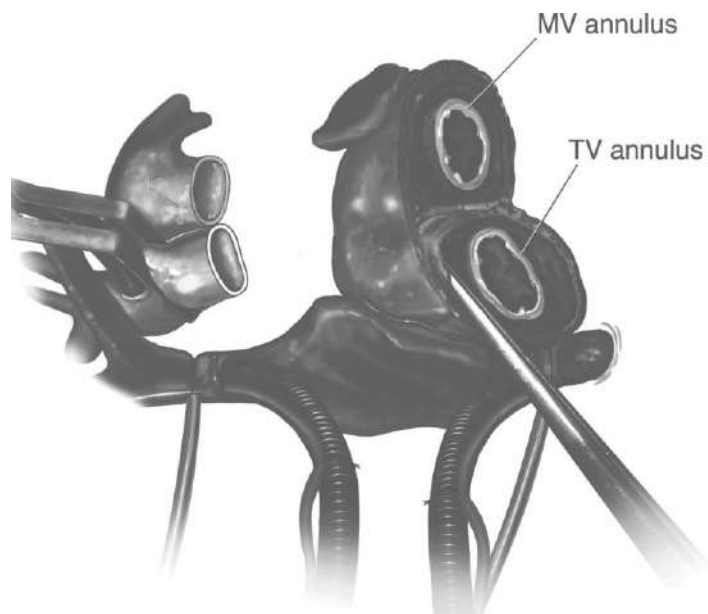
# Objectives

- Explain the Paracorporeal Total Artificial Heart
- Describe 2 cases of young children with acute heart failure
- Share their physical therapy achievements

*Written consent obtained for all photographs shown*

# The Paracorporeal Total Artificial Heart

- Novel Ventricular Assist Device (VAD) configuration
- Combines aspects of the Berlin Heart EXCOR and the SynCardia Total Artificial Heart
- Serves as a bridge to transplant



Woods RK, et al. Ann Thorac Surg  
2018;105:e255-7



# Goals of this VAD Configuration

- Improved three dimensional conformation
  - Small thoracic space
  - Avoids external compression of cannulas
- Improved quality of life while waiting for transplant
  - Reduced length of mechanical ventilation
  - Better nutrition
  - More time out of bed

# Mobility Program

- Multidisciplinary approach with buy-in from leadership
- Unit culture
- Team – bedside nurse and therapist
- Tiered approach to therapy



# Case #1

- 20 month old with acute heart failure from congenital heart disease
- Placed on ECMO in OR following brief arrest
- TAH placed 14 days later
  - Chest closed following day
- Transplanted 3 months after admission

Mark Johnson, *Milwaukee Journal Sentinel* April 19, 2019

<https://www.jsonline.com/story/news/2019/04/18/groundbreaking-surgery-toddler-leads-a-miracle-us/3472755002/>

# Physical Therapy

- Physical therapy initiated – POD 2
- Sitting in bed – POD 10
- Out of bed playing – POD 14
- Out of room – POD 15
- Off unit to gym – POD 18
- Physical therapy frequency (sessions/wk) - 5
- Total number of therapy encounters - 42
- Average length – 66 mins



# Case #2

- 13 month old admitted in cardiogenic shock
- Atypical Kawasaki's disease – giant coronary aneurysm and thrombosis
- V. fib arrest – VA-ECMO
- Converted to TAH 12 days later
  - Chest closed next day
- Transplanted 3 months later

# Physical Therapy

- Physical therapy initiated – POD 1
- Sitting in bed – POD 6
- Out of bed playing – POD 12
- Out of room – POD 18
- Off unit to gym – POD 33
- Physical therapy frequency (sessions/wk) - 5
- Total number of therapy encounters - 54
- Average length – 57 mins











# Safety

- No significant safety events
- 2 minor events – low battery alarm while in therapy gym

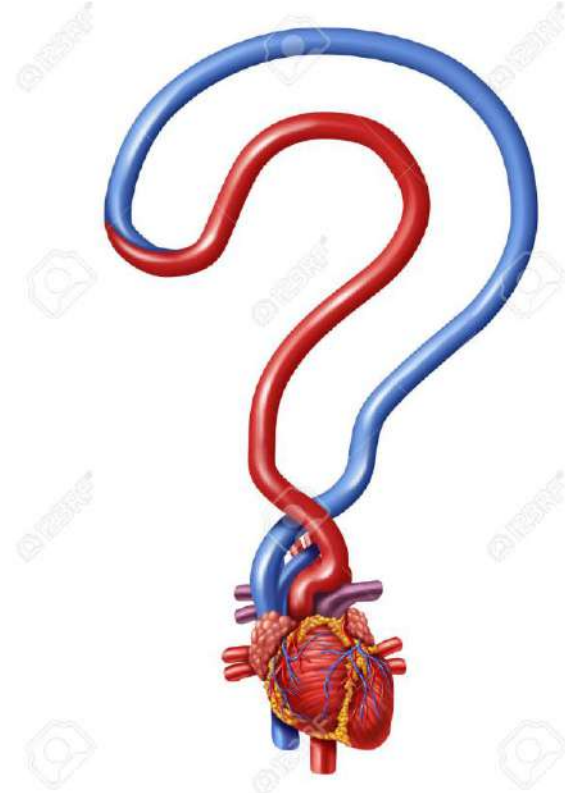
# Conclusion

- Aggressive physical therapy can safely be performed in this hemodynamically vulnerable population
- Gross motor skills can be maintained or even increased during the bridge to transplant period with good VAD support

# Acknowledgements

- CV surgery
  - Dr. Ron Woods
- Heart failure
  - Dr. Steve Kindel
  - Dr. Ann Punnoose
- CICU
  - Dr. Rob Niebler
  - Kathy Miller

# Questions



# **Poster Presentations: Adult Content**



## Background

- Acute lung injury (ALI) is a devastating clinical and public health problem across military and civilian populations.
- As ALI mortality has improved in recent decade, focus has shifted to significant long-term morbidities, including impairments in physical, cognitive, and mental health.

## Objectives

- Understanding new or worsened disabilities after critical illness, often termed **post intensive care syndrome (PICS)**.
- Evaluating the association between unmet needs in the first few weeks of hospital discharge and adverse outcomes (death or re-hospitalization) and other functional outcomes (physical, mental, cognitive).

## Methods

- APICS-01 is a multi-center observational study investigating the implications of unmet medical needs in the first weeks after hospital discharge.

### Enrolling sites

Intermountain Medical Center

Vanderbilt Medical Center

Johns Hopkins Hospital

Beth Israel Deaconess Medical Center

Salt Lake City Veterans Administration Hospital

### Eligibility Criteria\*

At least 24 hours of respiratory failure in the ICU

Lack of baseline dementia

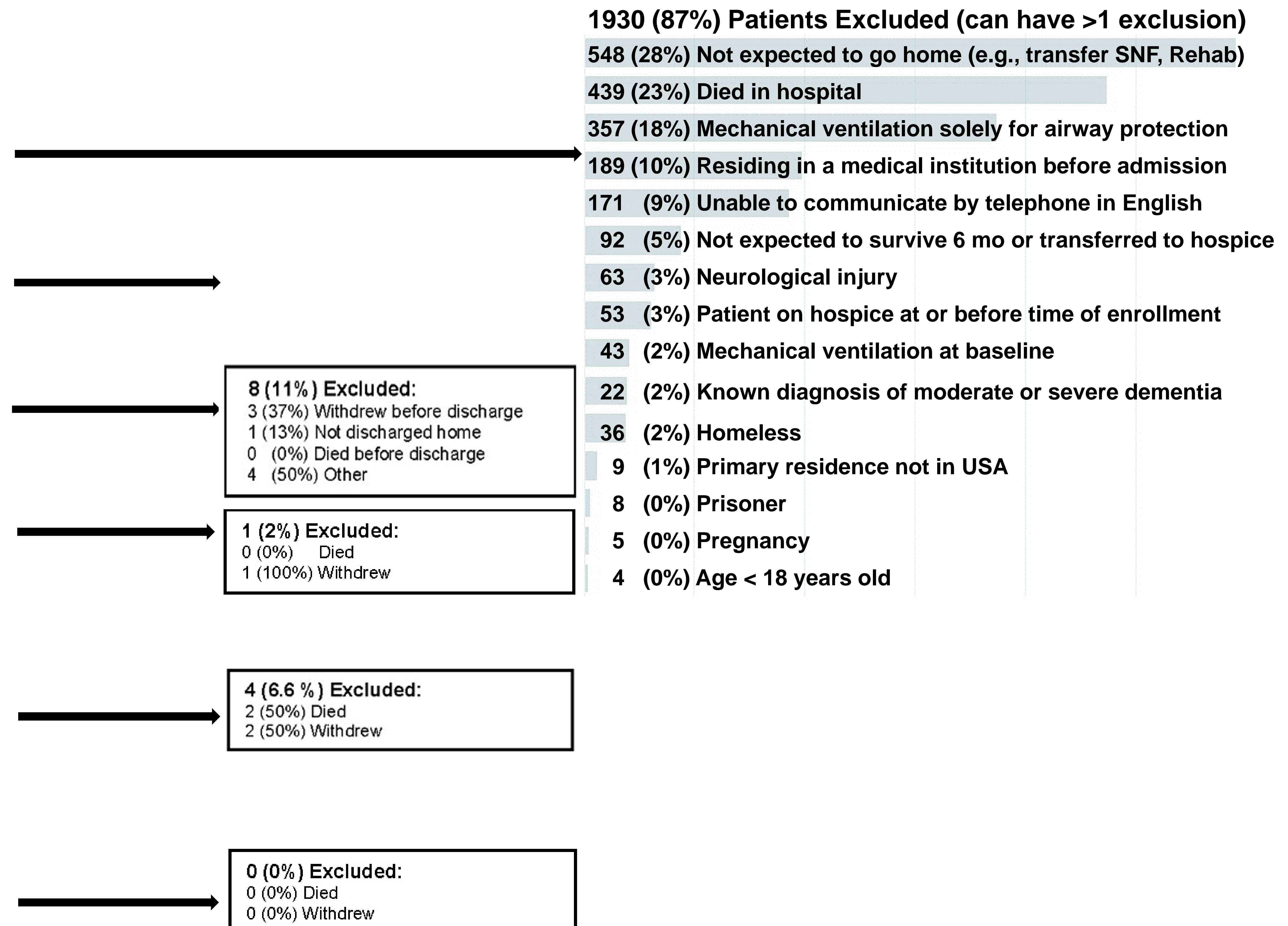
Ability to engage in telephone follow-up

Anticipated lifespan greater than six months

\*Excluded: if died in the hospital or discharged to institutional care

- To help control for confounding, we will use advanced statistical techniques.

## Results



## Discussion

The recovery of the wounded Service Member with ALI (and civilians who are similarly ill or injured) is an urgent clinical and research priority. Having survived life-threatening illness, many individuals struggle to reintegrate into their former lives and may experience new morbidities. Interventions that can limit such burden and thereby improve recovery is a high priority. It is possible that focused interventions in the first days and weeks after hospital discharge may improve patient-centered outcomes, and the first steps to evaluating this hypothesis are being explored in the APICS-01 study.



OBJECTIVES

- Determine the safety and feasibility of lower extremity weight-bearing exercise in subjects undergoing ECMO
- Identify barriers to physical therapy intervention
- Assess function and hospital outcomes

METHODS

- Three subjects met inclusion criteria
  - Adults undergoing venovenous ECMO
  - Follow 3/3 commands
  - Able to weight-bear on legs
- Functional outcomes measured
  - Days to standing/ambulation
  - Medical Research Council (MRC) sum score
- Hospital outcomes measured
  - Length of stay
  - Discharge destination



MOVEO™ (DJO, LLC, Dallas, TX)

RESULTS

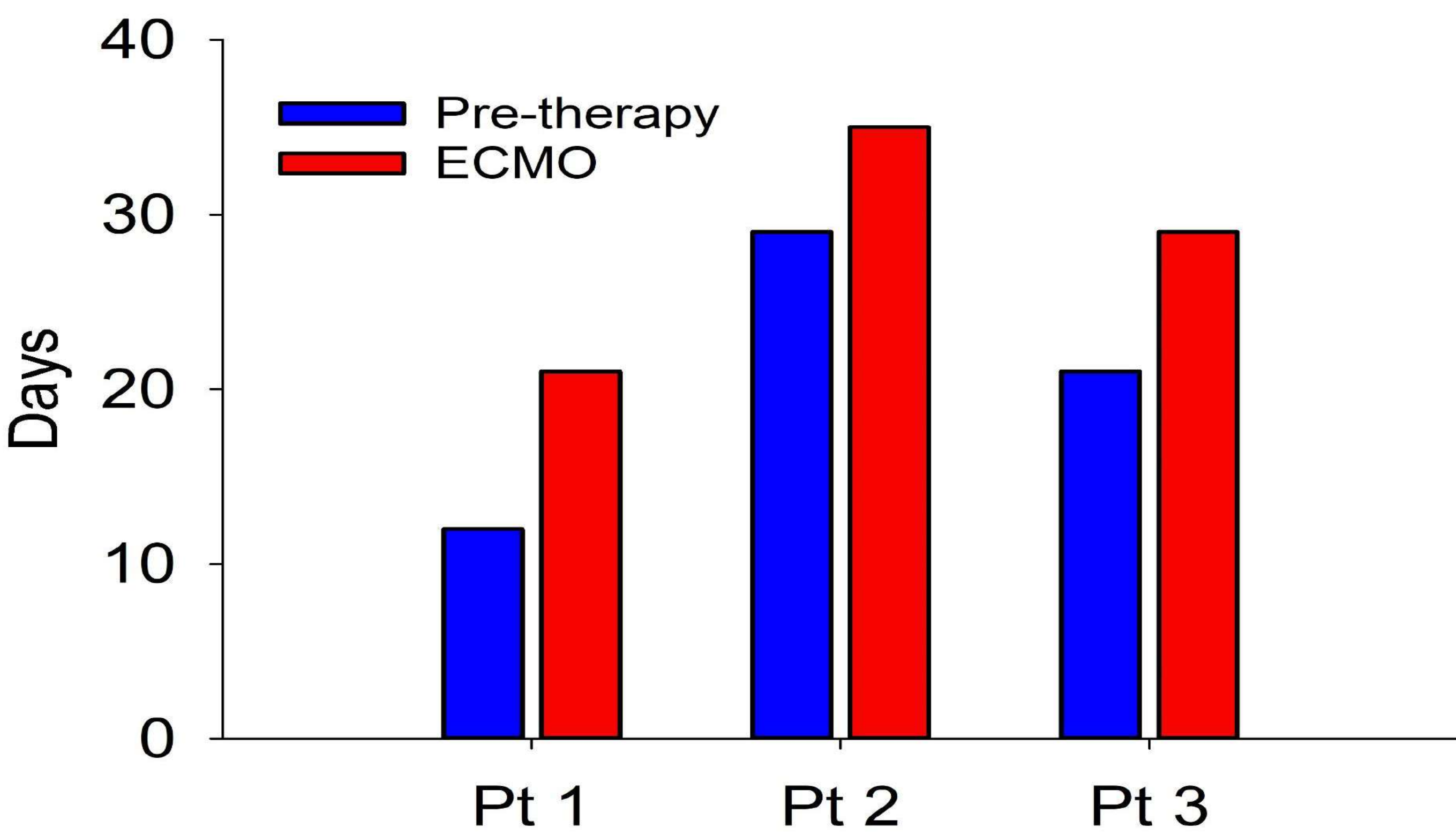


Figure 1. Pre-physical therapy days and total ECMO days

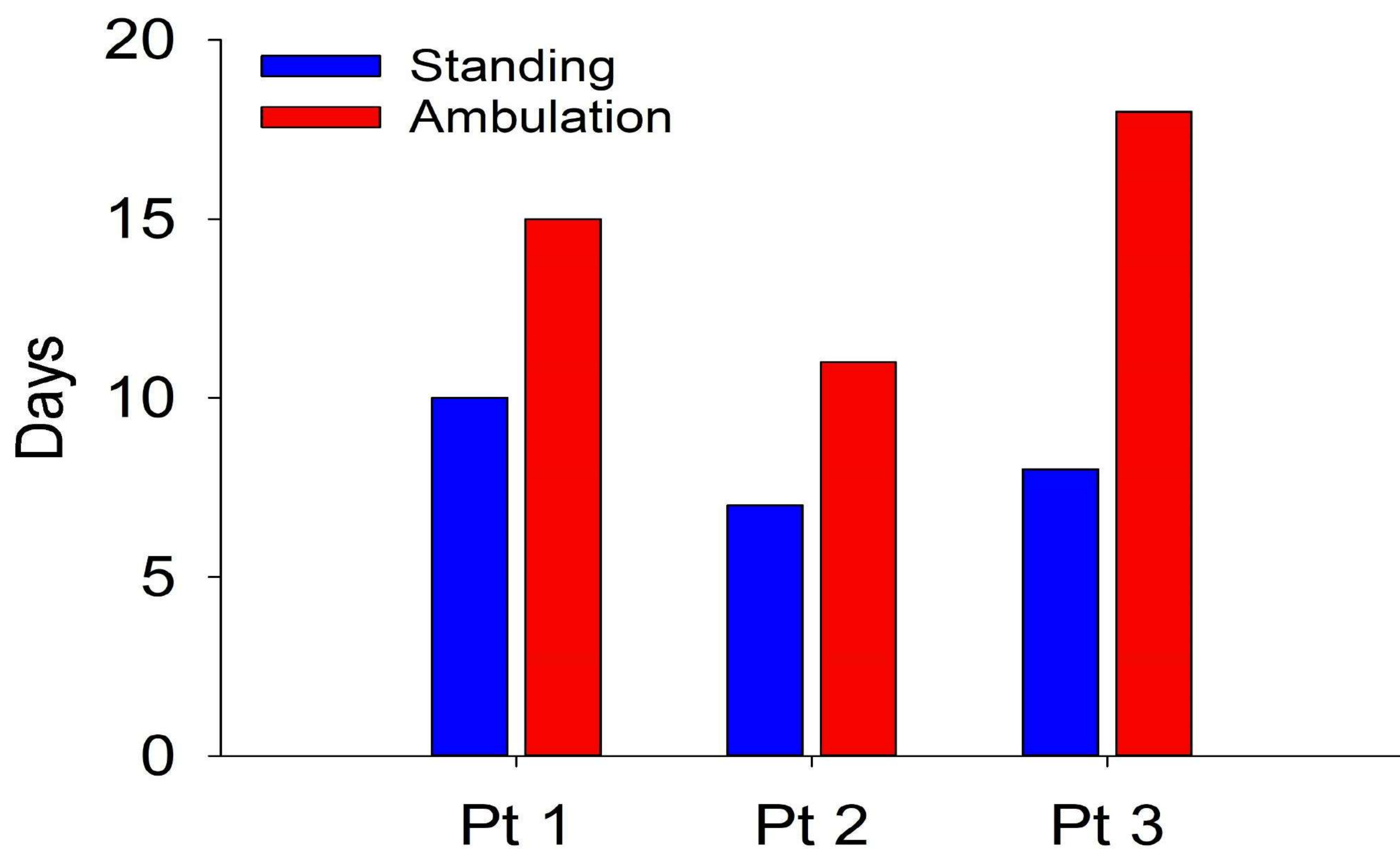


Figure 2. Days to stand and to ambulate

	Intervention	MRC Score	Length of Stay	Discharge Destination
Pt 1 27 y.o. male	MOVEO + ECMO Mobilization Protocol	32 → 55	35 days	Long term acute care hospital
Pt. 2 49 y.o. male	ECMO Mobilization Protocol	14 → 53	49 days	Long term acute care hospital
Pt. 3 48 y.o. male	ECMO Mobilization Protocol	19 → 53	69 days	Home with outpatient PT

Table 1. Hospital Outcomes. MRC; Medical Research Council

DISCUSSION

**Eric Andersen, PT, DPT<sup>1</sup>; Manda Keller-Ross, PhD, PT, DPT<sup>2,3</sup>; Melissa Brunsvold, MD<sup>1</sup>; Amanda LaLonde, PT, DPT, GCS<sup>2</sup>**  
<sup>1</sup>M Health Fairview,  
<sup>2</sup>Division of Physical Therapy,  
<sup>3</sup>Division of Rehabilitation Science,  
University of Minnesota

- MOVEO™ (DJO, LLC, Dallas, TX) was utilized safely with one individual undergoing venovenous ECMO
- Patient 1 had a shorter hospital length of stay
- Strength and functional measures were not greater when compared to those who did not use the MOVEO
- All three subjects ambulated before leaving the hospital
- Limitations include: interdisciplinary coordination and a small sample

CONCLUSION

- Due to a small sample size, we were unable to determine if this specified training improves functional capacity compared with standard care
- We propose this to be a safe and potentially effective tool to utilize with patients on ECMO





# SUPPORT AND COMPRESS S.A.C. Protocol SCROTAL EDEMA IN TRAUMA PATIENTS

Brigit Anderson, OTR/L, CLT; Kaveh Najafi, DO  
Karen Lewandowski, RN, BSN



## Background

### Background:

Clinical intervention of scrotal edema in the trauma patient has essentially been ignored. Literature on scrotal edema in an acute care setting with traumatic injuries is limited and there are no standard of care models. Recognizing the need for intervention, we adapted the lymphedema principle of complete decongestion therapy (CDT) components: compression, elevation, isometric exercise, deep breathing and manual lymph drainage to treat scrotal edema patients focusing on traumatic injuries in the acute care setting. Therapy was initiated with the aim of improving patient outcomes by increasing functional mobility, decreasing ICU stay, ventilator and urinary-catheter days, decreasing pain levels and scrotum size.

### Materials:

Paper measuring tape, stockinette, tubular netting, pillow cases



This is an observational study of 50 patients, 25 interventional and 25 standard of care. The primary objective of this study is to compare the current standard of care to our modified CDT intervention on functional mobility, pain level, scrotal size, UTI and urinary catheter days in trauma patients with scrotal edema

**Inclusion:** Male trauma patients; ≥18 years old; physician order for interventional treatment; swollen scrotum; following commands with spontaneous movements

**Exclusion:** ICU admission <72hr (earlier if patient is stable) GCS <8; unstable ICP; unstable hemodynamics significant hematuria or urethral trauma; wound present; enrolled in Donor Network

## Process

### Process Steps:

1. Visual assessment
2. Measurements
3. Application of compression
4. Elevation
5. Deep breathing as appropriate
6. Therapeutic exercise

### Visual Assessment and Measurements (in centimeters)

Scrotum measurements to be taken pre-intervention and at 24 hour intervals. Position for measuring: Patient is supine with head of bed elevated no greater than 20 degrees or specify degree.

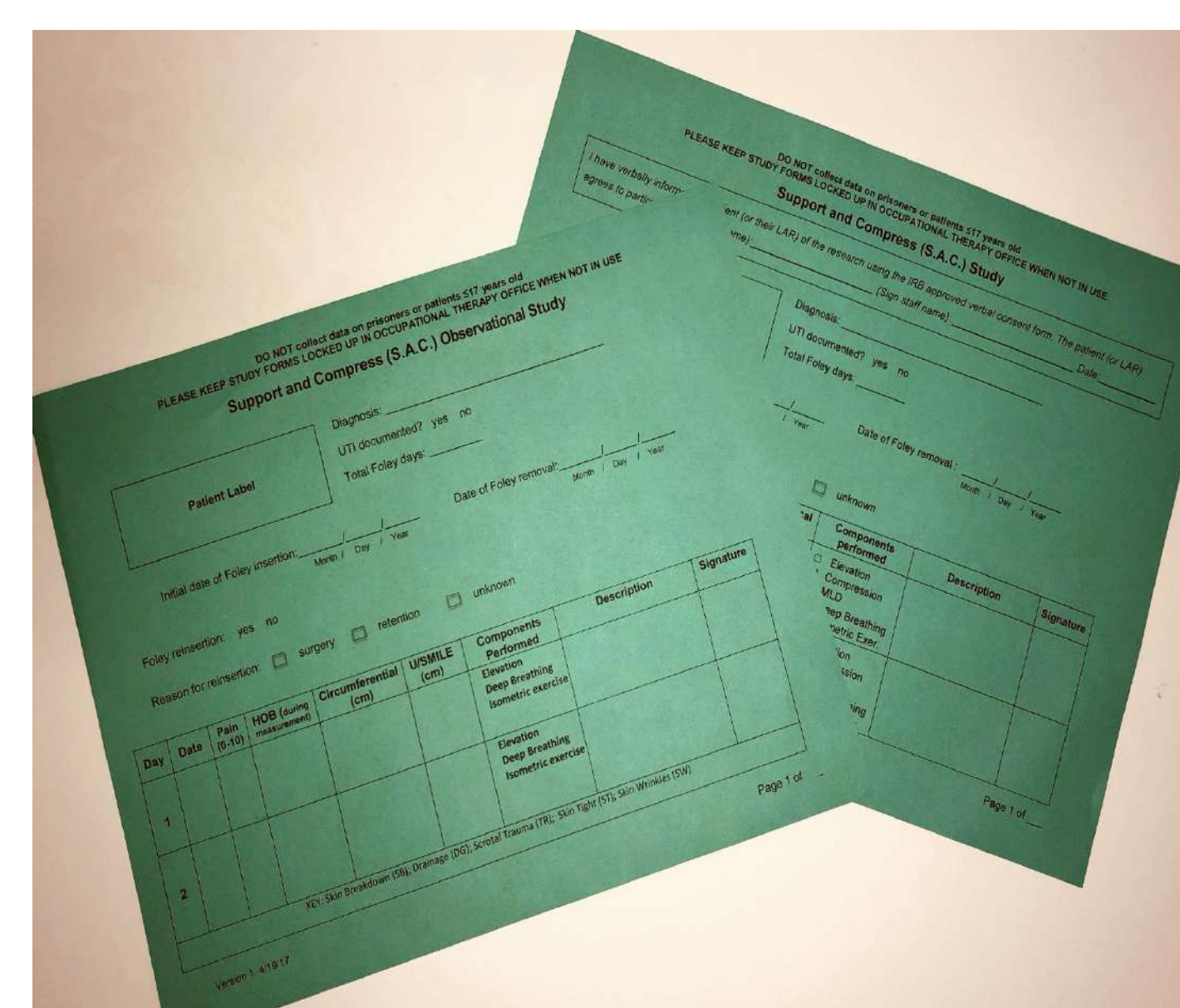
Support and elevate scrotum so the posterior surface is flush with top of thigh (as tolerated).

**Circumferential:** Measure in centimeters to the nearest millimeter of scrotum at widest visual point of scrotum using disposable tape measure.

**U/SMILE:** Most medial point of inguinal ligament within the inguinal crease to same point on the opposing inguinal ligament within inguinal crease. Record measurements in data table.

### Application of Compression

Stockinette and tubular netting size appropriate with multiple layering



### Elevation

Support and elevate scrotum so the posterior surface is flush with top of thigh (as tolerated). Keep scrotum elevated as often as possible.

### Deep breathing:

Hourly or as often as possible, complete 2 sets of 10 repetitions each. Instruct patient to inhale through the nose and out the mouth using abdominal muscle to expand (inhale), to contract (exhale).

### Isometric/concentric exercise:

Hourly or as often as possible complete, 2 sets of 10 repetitions each

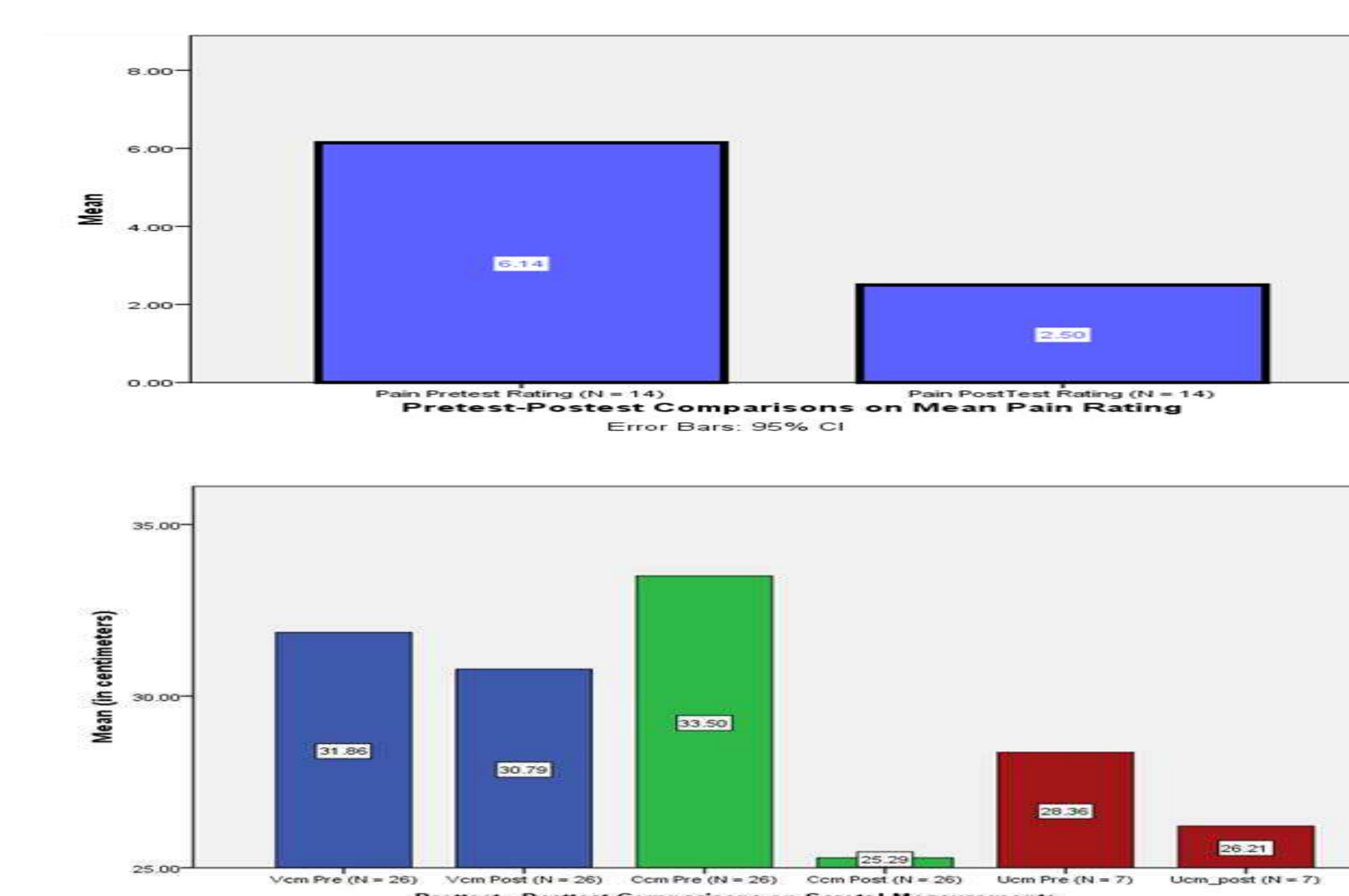
**Isometric:** tighten/release of muscles i.e. gluteal, quadriceps, stomach

**Concentric:** AROM for hip flexion/extension, knee flexion/extension, and ankle dorsi/plantar flexion as able

## Discussion

### Results:

This is an ongoing study, 25 interventional patients completed therapy and the data is in analysis. The control arm standard of care patient data is currently being collected. Preliminary data shows statistical significance in edema and pain reduction with modified complete decongestive therapy.



	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pain	3.64286	4.7492	1.26928	0.90075	6.38497	2.87	13	0.013
VCM	5.19231	6.37507	1.25025	2.61736	7.76725	4.153	25	0
CCM	8.40385	5.96158	1.16916	5.99591	10.81178	7.188	25	0
UCM	2.14286	2.54484	0.96186	-0.21072	4.49644	2.228	6	0.067

### Conclusion:

During the study modifications of inclusion/exclusion criteria along with improved measurement technique were implemented. This was done to create a more objective parameter in patient selection and data collection. We plan to initiate procedural change in the treatment of scrotal edema by implementing a standard of care practice model for all patients with scrotal edema. Future studies are under development

## References

Whitaker, J. (2007). Best practice in managing scrotal lymphedema. *British Journal of Community Nursing*, 12(10), S17,-8, 20-1.

## Acknowledgments

HonorHealth Scottsdale Osborn MC  
HonorHealth John C. Lincoln MC  
HonorHealth Research Institute  
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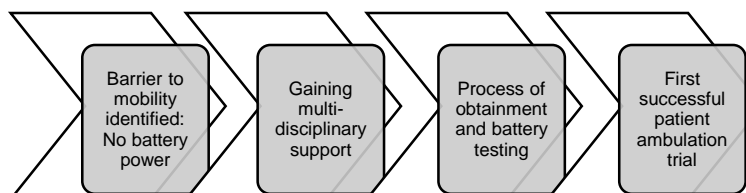


# Using A Portable Power Source To Ambulate While On Continuous Renal Replacement Therapy

Haley Bento, PT, DPT, CCS; Ross Imburgia, BSME; Christopher Noren, OTR/L; Joseph Tonna, MD

## BACKGROUND

Early Mobility is largely regarded as a safe and feasible way to help mitigate the immobility harm in critically ill patients. Barriers to mobility for patients on continuous renal replacement therapy (CRRT) include catheter type and location, sensitivity of the scales, risk of catheter dislodgement, and lack of internal battery power on the machine itself. Previous studies have looked at safety of bed exercises, edge of bed activity, standing and marching at edge of bed or transferring to a chair while still receiving CRRT and have so far supported the notion that mobility while on CRRT is safe. The lack of battery power, however, has kept patients from being able to mobilize out of their rooms while on these devices.



## PROCESS OF OBTAINMENT

### Multi-disciplinary support

- Presented to an interdisciplinary council which includes all attending MD's on our ICU. A Physician volunteered to support the project
- Worked with a mechanical engineer to help determine appropriate power equipment
- Gained nursing management support
- Consulted Biomedical Engineering team to provide guidelines on hospital policies for equipment
- Worked with Risk Management department to get approval from a legal standpoint



## FIRST PATIENT TRIAL

A patient requiring CRRT and deemed appropriate for ambulation by the physical therapy team was chosen. The patient consented, and was excited about being able to mobilize. The portable battery was placed on a dolly which was able to rest on the IV pole. As this was the patient's first time out of bed in 6 days, he was assisted by 2 staff members. A third and fourth person were used to follow with a chair and help manage both the equipment



Above: Patient ambulating in hall with 2 person assist, a chair follow, and a 4<sup>th</sup> person managing equipment.



Right: The portable battery on a dolly resting on the base of the IV pole for ease of transport.

The patient successfully ambulated 170 ft, and including rest breaks was out of his room for 19 minutes. There were no alarms on the CRRT machine or interruption to the renal therapies. The patient and his family were excited to see the degree of mobility he achieved and to have the opportunity to participate in activity outside of the patient's hospital room.

## CONCLUSIONS

Use of a portable battery source is a feasible way to overcome the barriers limiting mobility for patients requiring CRRT. The process required multidisciplinary support and approval from various hospital committees for purchase of a device. Careful testing should be performed to determine run-time and learn how to use the battery. Patients enjoy not being confined to their rooms while on CRRT and it allows for increased participation in mobility.

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## THE BATTERY

### Requirements:

- Adequate for max power draw of CRRT machine (600W) +10%
- Certified medical grade
- Small enough to fit on IV pole and be portable
- Mechanical engineer gave choices, approved by biomedical engineers

### Chosen Equipment:

**Brand:** Cyberpower\*

**Model:** M1100XL\*

**Capacity:** 1100VA / 880W

**Output:** 120 VAC

**Plug type:** NEMA 5-15P-HG, 6 ft. cord

**Outlet types:** 6 x NEMA 5-15R-HG

**Warranty:** 3 year

**Connected Equipment Guarantee:** \$400,000

\*Note, equivalent models exist from other brands



## TESTING AND PERFECTING

- Testing on CRRT machines while not in use
- Testing while machine was providing CRRT for a patient in bed
- Testing while machine was providing CRRT for a patient while ambulating in hallway
- Perfected ease of use including testing a dolly for transport, securement to IV pole
- Worked on written instructions for use, educating staff
- Will continue tracking data each time the battery is used for several months to gather as much data as possible to understand battery properties and usage

*Testing determined the CRRT machine could run while using the portable battery safely for 90 minutes with no interruption to the renal therapies or equipment*



Prevalence and Severity of Laryngeal Injury After Oral Endotracheal Intubation

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OBJECTIVE

To identify the presence and severity of laryngotracheal injuries found in critically ill patients post-extubation from mechanical ventilation in the intensive care unit (ICU).

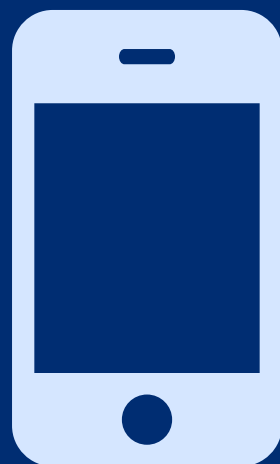
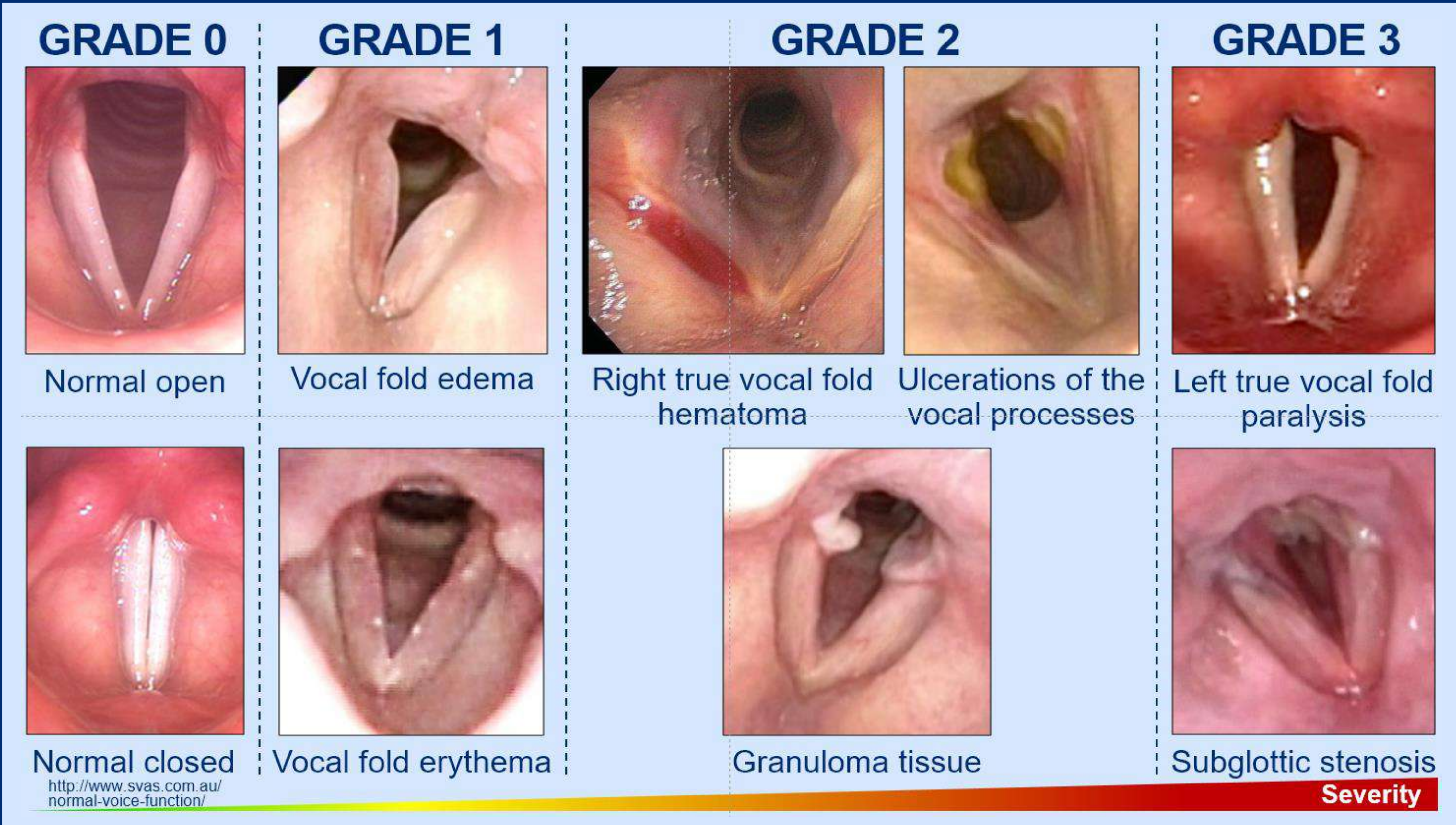
METHODS

- Prospective, single site, academic hospital, non-randomized cohort study
- Subjects recruited from 5 ICUs (i.e., medical, medical-surgical)
- Inclusion criteria
  - Adult patients (≥18 years old)
  - Intubated with mechanical ventilation >48 hours
- Relevant exclusion criteria
  - Pre-existing dysphagia, aspiration, voice disorder
  - Head and neck disease/surgeries
  - Pre-existing CNS, neuromuscular, or connective tissue disease
  - Prior intubation/tracheostomy
  - Expected death
- Flexible nasolaryngoscopy completed ≤48 hours following extubation
- Laryngeal injury grading: 4-point categorical scale (Table 1)
- Statistical analysis
  - Non-parametric descriptive statistics
  - MS Excel 2016

Table 1. Laryngeal Injury Grading Schema

Grade	Description
Grade 0	No injury
Grade 1	Self-limited, soft tissue injury
Grade 2	Hematoma, ulceration, fibrin without glottis narrowing, mass lesion, granulation
Grade 3	Stenosis, stenosis with glottis narrowing, hypomobility/immobility of the vocal folds and/or the arytenoid complex.

Post-extubation laryngeal injury was present in ALL patients; moderate-to-severe injuries are more common than mild injuries after endotracheal intubation.



Take a picture to download the abstract and obtain contact information

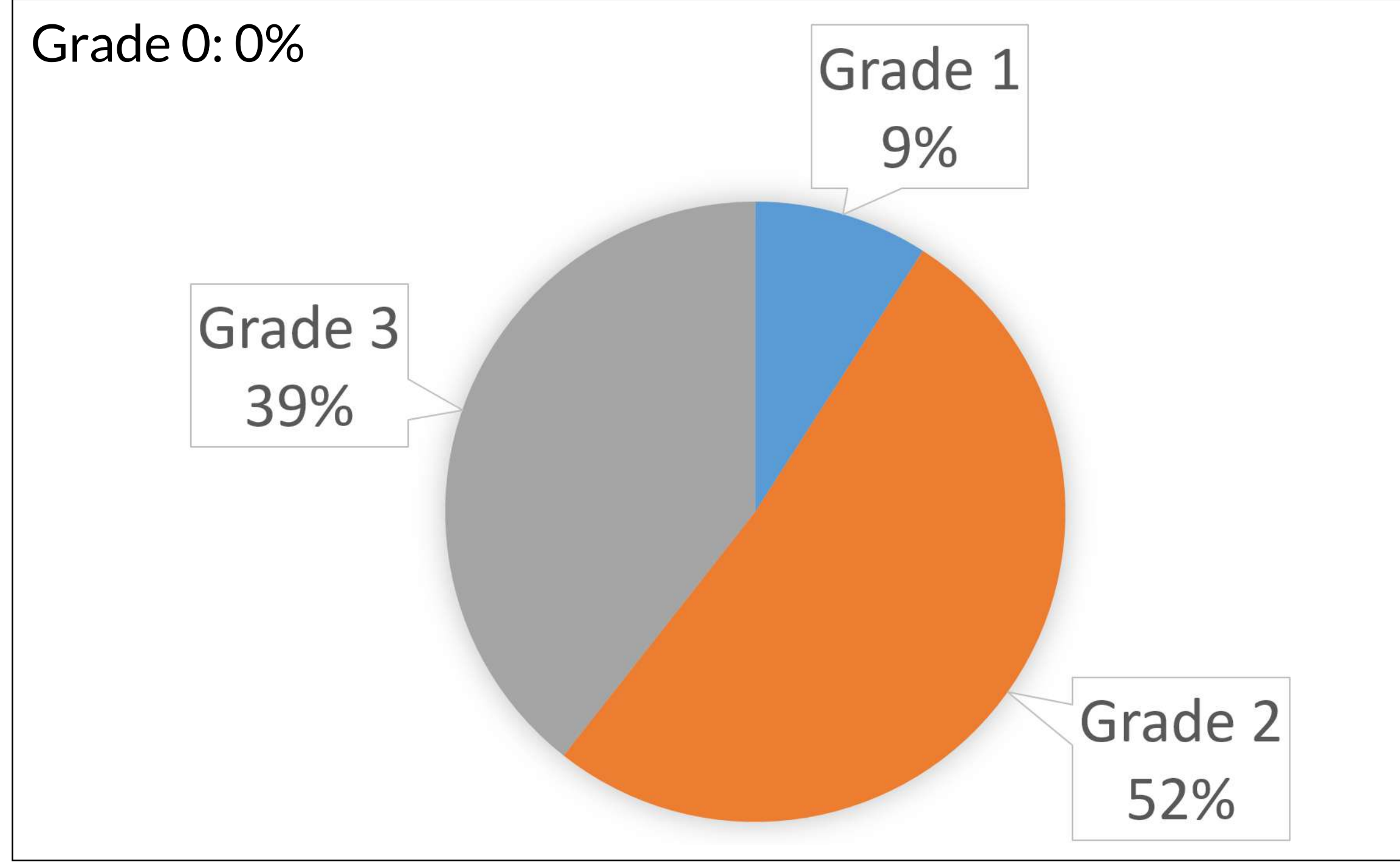
RESULTS

Table 2. Demographics (N = 33)

Age in years, median (IQR)	63 (52, 68)
Sex, Males (%)	17 (51%)
Endotracheal tube size in Males, median (IQR)	8 (7.5, 8)
Endotracheal tube size in Females, median (IQR)	7.5 (7, 7.5)
Duration of intubation, median (IQR)	6 ( 5, 8)

- All 33 (100%) patients presented with laryngeal injury, most were moderate-to-severe.
  - Grade 1: 3/33 (9%)
  - Grade 2 injury: 17/33 (52%)
  - Grade 3 injury: 13/33 (39%)
- Recommendations:
  - Grade 1 injuries: recommended observation
  - Grade 2 injuries: recommended for follow-up
  - Grade 3 injuries were recommended for acute intervention by a laryngologist.

Figure 1. Prevalence of laryngeal injury by grade



DISCUSSION

- Our data suggest that laryngeal injuries are more common than previously documented.
- More severe (Grades 2 and 3) injuries occurred at a higher prevalence than mild (Grade 1) injuries.
- Endotracheal intubation is a source of both acute and chronic laryngeal injury.
- Early detection and treatment of these injuries may prevent long-term complications.
- Guidelines suggesting a standardized approach to screening and assessment post-extubation in ICU patients are needed.



## Background

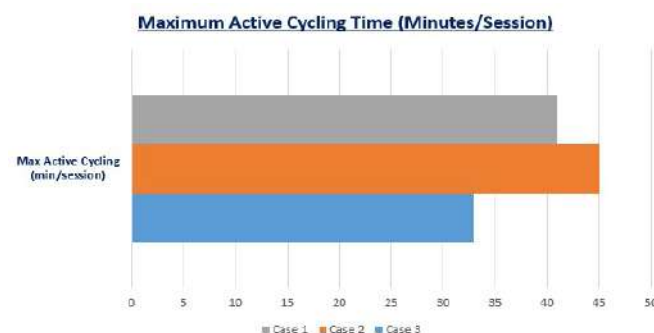
- Mechanically ventilated patients frequently experience long-term post-ICU morbidities, including muscle weakness and impaired physical functioning
- Exercise and protein supplementation, delivered early during critical illness, is hypothesized to mitigate muscle weakness and impaired physical functioning, and is being evaluated in the ongoing NIH-funded NEXIS randomized trial (NCT03021902)
- This **case series** reports on the intensity and duration of in-bed cycle ergometry-based exercise completed by mechanically ventilated patients enrolled in the NEXIS trial.

## Case Description

- NEXIS is a multi-centered Phase II randomized trial, with blinded outcomes assessment, evaluating a combination of **intravenous (IV) amino acid supplementation and early in-bed cycle ergometer exercise** versus usual care in ICU patients requiring mechanical ventilation.
- As part of this trial, we report on 3 enrolled patients receiving in-bed cycle ergometry:
  - **Case 1:** 18 year old male with septic shock
  - **Case 2:** 35 year old male with hypothermia
  - **Case 3:** 52 year old male with traumatic injury and shock
- This case description includes:
  - (1) total cycling time (active + passive) for all sessions (NEXIS goal: 45 min/session)
  - (2) average percent of active cycling/session
  - (3) average active cycling watts (W).

## Outcomes

- **Case 1:** completed 5 cycling sessions, actively cycling a maximum of 41 min/session at mean of 4 Watt. This participant reached 87% of the goal total cycling time and actively cycled for a mean of 83% of sessions.
- **Case 2:** completed 5 cycling sessions, actively cycling a maximum of 45 min/session at mean of 3.6 W. This participant reached 98% of the goal total cycling time and actively cycled for a mean of 80% of sessions, but 99% for 4 of 5 sessions.
- **Case 3:** completed 4 cycling sessions, actively cycling a maximum of 33 min/session at mean of 1.9 W. This participant reached 41% of the goal total cycling time and actively cycled for a mean of 78% of sessions.
- All participants received physical therapy sessions, as part of routine care, in addition to the research cycling intervention. Case 1 reported pain due to a posterior chest tube, contributing to reduced cycling time, but there were no serious adverse events related to cycling.



## Discussion

- The case series reports how 3 critically ill participants engaged in early in-bed cycle ergometry as part of the NEXIS clinical trial.

## Reference

- Heyland DK, Day A, Clarke GJ, et al. Nutrition and Exercise in Critical Illness Trial (NEXIS Trial): a protocol of a multicenter, randomized controlled trial of combined cycle ergometry and amino acid supplementation commenced early during critical illness. *BMJ Open* 2019;9:e027893. doi: 10.1136/bmjopen-2018-027893

# The safety and feasibility of the Ramsey tilt table protocol for mobilizing critical care patients with femoral IABP



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## INTRODUCTION

The IABP is a temporary mechanical circulatory assist device which provides hemodynamic support by augmenting cardiac output and coronary blood flow. Used for patients in cardiogenic shock, the IABP can be inserted via the femoral or axillary artery. The tip of the flexible catheter is a helium filled balloon which rests in the thoracic aorta. The IABP inflates during cardiac diastole, thereby increasing coronary perfusion, and deflates during systole, thereby reducing left ventricular afterload. Patients with femoral IABPs must not flex the hip housing the IABP greater than 30 degrees relegating them to bedrest while awaiting a procedure such as VAD, Heart Transplant or CABG.

Stephen Ramsey, a critical care PT developed a protocol to allow patients with femoral IABPs to safely transfer out of bed to a standing position through the use of a tilt table. This protocol includes assessment of the patient's pre-morbid function, current strength and medical stability. Candidates for this protocol include those who were ambulatory prior to femoral IABP insertion, demonstrated against gravity muscle strength, followed multi-step instructions and had stable vitals. The NYULH protocol added: IABP augmentation parameters, print-out of the IABP waveform before and after mobilization, and tilt table follow during ambulation

## PURPOSE

To determine the safety and feasibility of ambulating patients with femoral Intra-aortic Balloon Pumps (IABP) using a tilt table protocol.

## METHOD

Patients are dependently transferred from bed to the tilt table which is then gradually tilted (20° increments) from supine to 90 degrees with continual monitoring of vital signs, IABP augmentation, patient status. If all factors are stable, the patient steps off the tilt table with the non-IABP lower extremity. The patient then ambulates with assistance making sure they do not flex their hip past 30°. The patient then returns to the tilt table, stepping up with the non-IABP lower extremity. Patient is lowered to supine and returned to bed.

## REFERENCE

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## RESULT

NYULH has safely mobilized 9 patients for 23 sessions of ambulation without major or minor complication. No changes in augmentation, waveform, or balloon position were noted. 9 of the 9 patients received heart transplants and progressed well post-procedure.



## CONCLUSION

Select patients with femoral IABPs who meet criteria for the Ramsey tilt table protocol can be safely mobilized and ambulated, avoiding the deleterious effects of bedrest (deconditioning, delirium, impaired ventilation) often seen in this population. We plan to continue to use and refine our protocol to safely mobilize patients with femoral IABP and potentially other populations with restrictions in hip flexion due to invasive equipment or post-operative precautions.



# ANALGESIA USING TRANSCUTANEAL ELECTRICAL NERVOUS STIMULATION IN THE EARLY



## POSTOPERATIVE PERIOD OF CARDIAC SURGERY

ENCORE Hospital; CEAfi College – Brazil



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### INTRODUCTION

Patients undergoing cardiac surgery and median sternotomy present significant pain during hospitalization. Transcutaneous electrical nerve stimulation (TENS) is a noninvasive method capable of promoting analgesia and may be an alternative in the management of postoperative pain in this population.

### OBJECTIVE

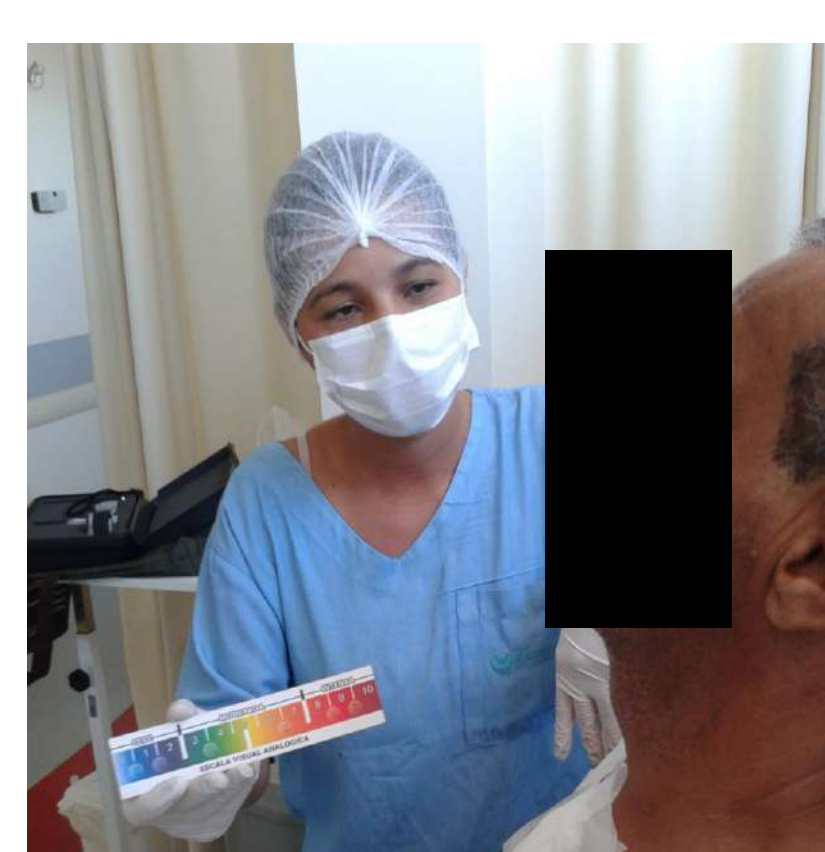
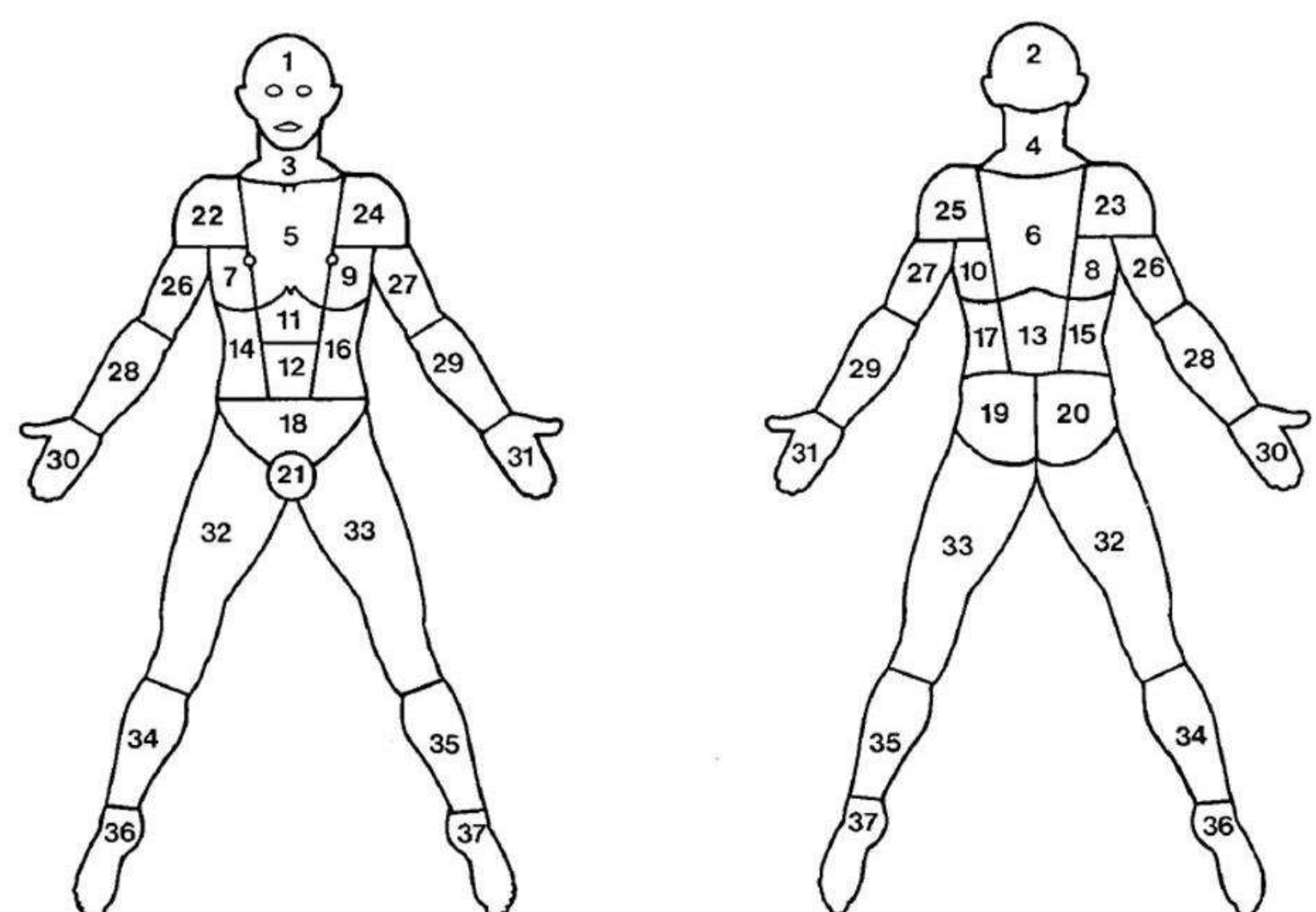
To verify the effects of the use of TENS on sternum pain sensation and on the cardiovascular and respiratory parameters in patients undergoing cardiac surgery by median sternotomy.

### METHODS

⇒ Case series including 15 patients, age:  $54 \pm 13$  years old, 11 male;

⇒ Submitted to cardiac surgery (myocardial revascularization or valve replacement) and median sternotomy.

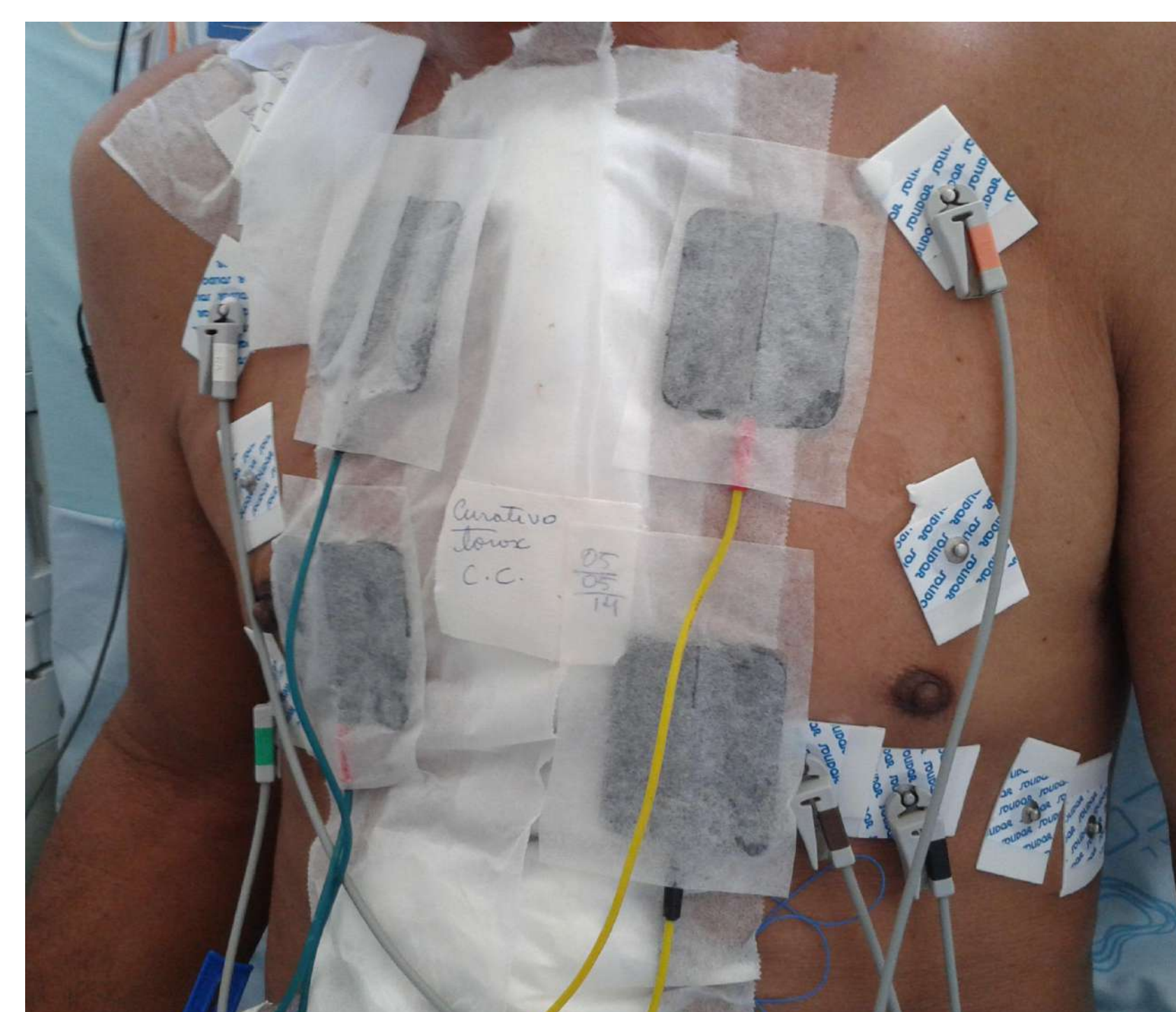
⇒ Pain evaluation



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On the first postoperative day and already extubated, they were evaluated regarding:

- heart rate (HR) and EKG behavior,
- oxygen saturation ( $\text{SpO}_2$ ),
- respiratory rate (RR);
- Peak Cough Flow (PCF);
- Sternal pain (visual analog scale);
- The statistical analysis used Student “t” test assuming as significant values  $<0.05$ . Data presented as mean  $\pm$  standard deviation.



⇒ Patients underwent TENS (frequency of 80 to 110 Hz and pulse width between 50 and 80  $\mu\text{s}$ ) for a period of 20 minutes and were reevaluated;

⇒ None of the individuals used analgesics for eight hours prior to the application of TENS.

#### References:

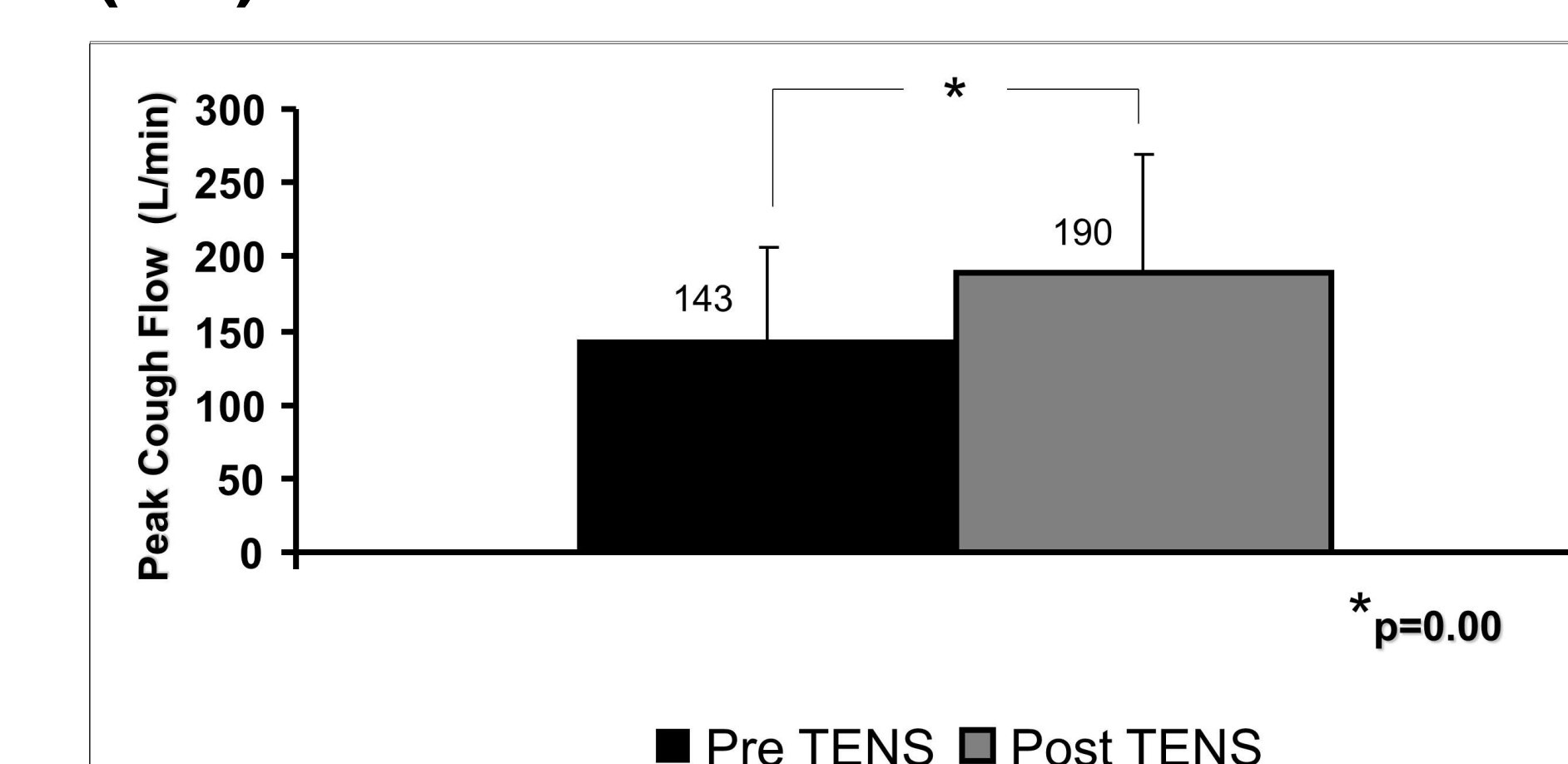
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### RESULTS

Table 1. Values of the various variables studied before and after the application of TENS.

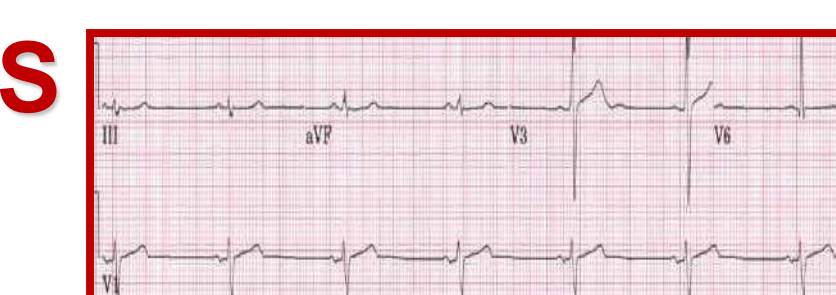
Protocol Assessed Items	Pre (n = 15)	Post (n = 15)	*p
Pain – VAS (points)	$4 \pm 2$	$1 \pm 1$	0.00
HR (bpm)	$104 \pm 20$	$97 \pm 16$	0.02
RR (rpm)	$26 \pm 5$	$20 \pm 2$	0.00
$\text{SpO}_2$ (%)	$93 \pm 2$	$96 \pm 1$	0.00

VAS - visual analogue pain scale; HR - heart rate; RR - respiratory rate;  $\text{SpO}_2$  - arterial oxygen saturation. Student's t-test “p” value (5%)



*Peak cough flow behavior before and after TENS*

None of the patients had EKG changes during TENS application.



### CONCLUSION

The use of TENS was able to minimize the pain sensation in patients undergoing cardiac surgery. There was a significant improvement in all measured variables. No EKG changes were observed using this technique, which should be considered as an alternative for pain control after cardiac surgery.



# EFFECTS OF TILT TRAINING ON ORTHOSTATIC TOLERANCE AND HEART RATE VARIABILITY IN HOSPITALIZED HIV+/AIDS PATIENTS



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## INTRODUCTION

Hospitalized HIV+/AIDS patients may have autonomic dysfunction associated with regular use of antiretroviral therapy. Bed immobilization may potentiate orthostatic intolerance (OI) and dysautonomia with sympathetic hyperactivation, which in turn is related to the higher frequency of OI. Exposure of the cardiovascular system to orthostatic stress may have a therapeutic effect, causing the reconditioning of the arterial baroreceptor system, preventing exacerbated increases in sympathetic activity.

## OBJECTIVE

To verify if tilt training (TT) during hospitalization improves the autonomic balance and orthostatic tolerance of hospitalized HIV+/AIDS patients who remain bedridden.

## METHODS

⇒ Controlled clinical trial; 31 patients (age: 36±15 years old, 14 males) diagnosed with HIV+/AIDS who remained in the ward for a minimum of seven days prior to inclusion in the protocol;

All underwent the tilt table test (TTT) on the eighth day of hospitalization.



### Experimental Protocol:

⇒ Those with +TTT associated with IO [19 patients (61.2% of the sample)] were randomized into two groups, which were treated by the institution's standard clinician care:

- 1) TT Group: kept standing with the back against the wall and with the feet 15 cm away for 30 minutes daily;
- 2) Control Group (CO): was not exposed to specific orthostatic training.

⇒ Patients remained bedridden for 19 ± 2 hours / day.



Example of the tilt training

⇒ Before discharge, patients underwent a new TTT. During TTT, HRV data were collected and analyzed in the frequency domain (Polar S810i®).

⇒ Statistical analysis used Chi-square test or two-way ANOVA with Scheffé Post hoc when necessary (5% significance). Data presented as mean ± standard deviation.

### References:

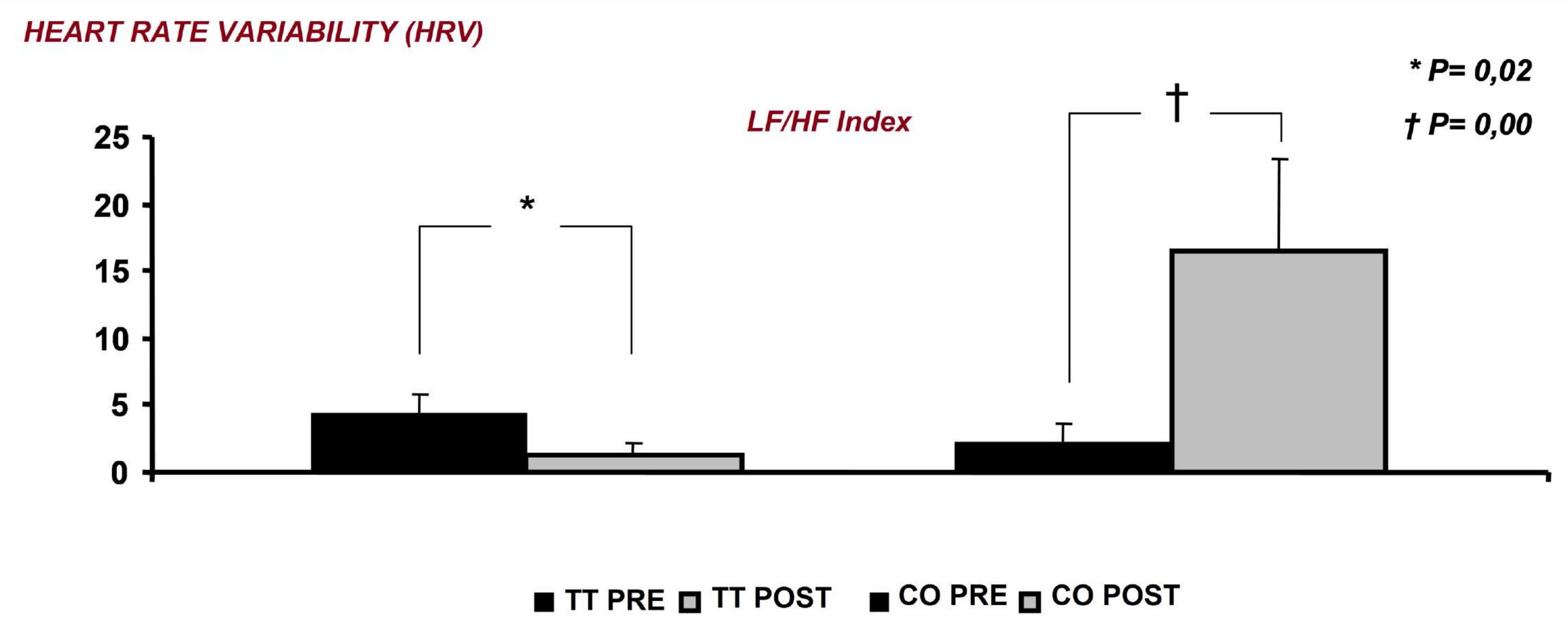
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2. Correia D et al. Power spectral analysis of heart rate variability in HIV-infected and AIDS patients. Pacing Clin Electrophysiol. 2006;29(1):53-8.

## RESULTS

Table 1. Variables studied, comparing the CO and TT groups.

Protocol Assessed Items	CO (n =09)	TT (n = 10)	*p between groups
Length of stay in hospital (days)	9±11	8±4	0.58
Positive TTT before hospital discharge	6 (66%)	1 (10%)	0.00
Time for pre-discharge TTT positivity (minutes)	17±12	30	----
HRV in 1 <sup>st</sup> TTT (LF / HF index)	2.2	4.4	0.32

CO - control group; TT - tilt training; TTT - tilt table test; HRV - heart rate variability; LF - low frequency; HF - high frequency.



## CONCLUSION

TT during hospitalization minimized the incidence of OI in patients with HIV+/AIDS, and a higher sympathetic predominance was observed in the CO group during the pre-discharge period, which could be related with triggering OI.



# “Optimizing Time to Volume Based Enteral Nutrition and Reaching Goal Within the First Full Day in Critically Ill Patients Reduces Time in ICU, Hospital Length of Stay and Readmit Rate by Half”

Presented by: Gerry Howick, MBA, RDN, CDN, Krysta Pilot, MSN, RN, CCRN, Racquel Regala, MBA, RDN, CDN, CNSC

### Abstract:

Reduce time to initiate nutrition and decrease time to goal nutrition by 25% in critically ill patients using an early volume based enteral nutrition protocol. Therefore improving patient outcomes.

A retrospective analysis was used to review the adequacy of protein and calorie provision and outcomes of an ICU early volume based enteral nutrition protocol (EVBEN). The protocol transpired in three phases. Phase one initiated Enhanced Protein Energy Provision via the Enteral Route (PEP-uP) which followed a standard early volume-based feeding program utilizing any gastric tube for nutrition to start on the first day of admit, with the intention to reach goal calorie and protein needs in first full day in ICU. Phase two, EVBEN, incorporated PEP-uP and specified using a small-bore feeding tube to aid in post-pyloric placement within four hours of intubation. Using plan-do-study-act (PDSA), it was clear time to feed was prolonged and phase three, EVBEN QII, was created which successfully focused on reducing time to start nutrition and time to goal nutrition.

### Background:

The clinical nutrition and ICU team created an early feeding volume-based protocol in 2015. In 2017, this protocol was updated to specify a small-bore weighted tip feeding tube to meet best practice standards. In July 2018, the updated protocol was deemed successful in shortening time to goal nutrition but had an increase in time to start nutrition.

Research suggests starting nutrition sooner and reaching goal volume by day one in stable ICU patients reduces ICU length of stay (LOS) and hospital LOS.

Observing the practice prompted a “deep dive” and collaboration with the ICU team to review the protocol and modify practice to start nutrition within four hours of intubation.

### Methods / Strategies:

The clinical nutrition and ICU team at LSCMC utilized lean management tools including root cause analysis and PDSA to analyze the workflow around the existing protocol. This process enabled us to differentiate between what is successful and what needs improvement through the collaboration of the Interdisciplinary team in order to start and advance nutrition early, accordingly and appropriately.

Process	Interventions
PEP-uP (Enhanced Protein Energy Provision via the Enteral Route - Prior to October 2017)	First early feeding protocol using gastric tube and feeding started on day 1 of ICU admit.
EVBEN (Early Volume Based Enteral Nutrition- October 2017)	Continue PEP-uP goals and initiating TF within 4 hours of intubation using small bore feeding tube.
EVBEN QII (Quality Improvement initiative- July 2018)	Continue EVBEN with clinical nutrition and ICU team collaboration, updating bedside RN’s, weekly to monthly meetings, education, daily huddles, flyers, and daily Interdisciplinary rounds which includes nutrition adequacy assessments (pt needs to meet >80% of estimated nutrition needs).

### Measurement / Results:

A 2-year retrospective review of ICU patients found that patients who received nutrition earlier and transitioned to volume goal had:

- Decreased ICU LOS by 5 days.
- Decreased Hospital LOS by 7-11 days
- Reduced readmission rate to 9%.

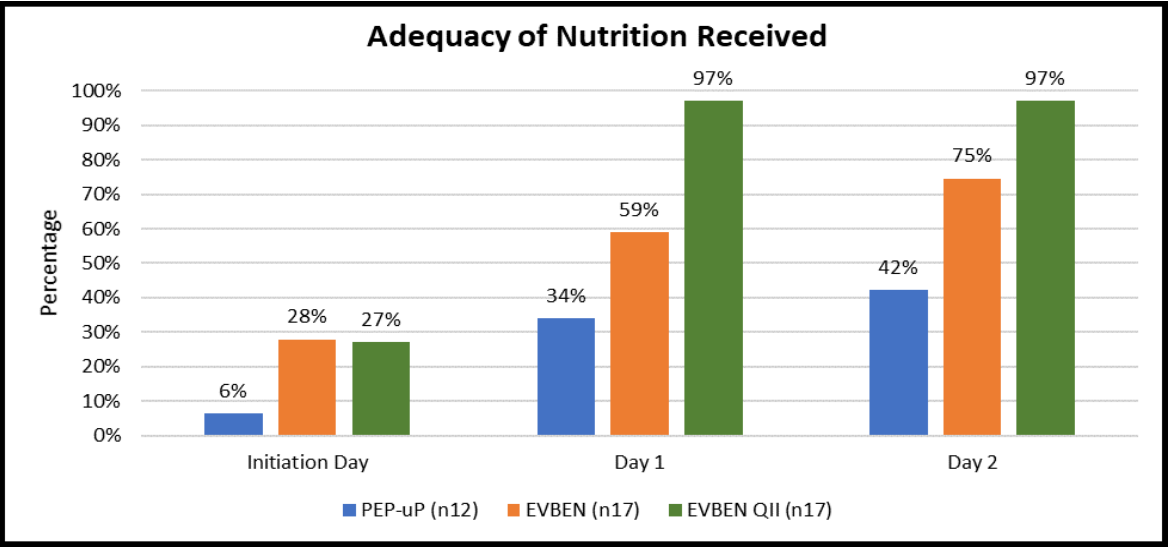


Figure 1. Patients started nutrition sooner and got to goal nutrition on day one of admission using EVBEN with QII.

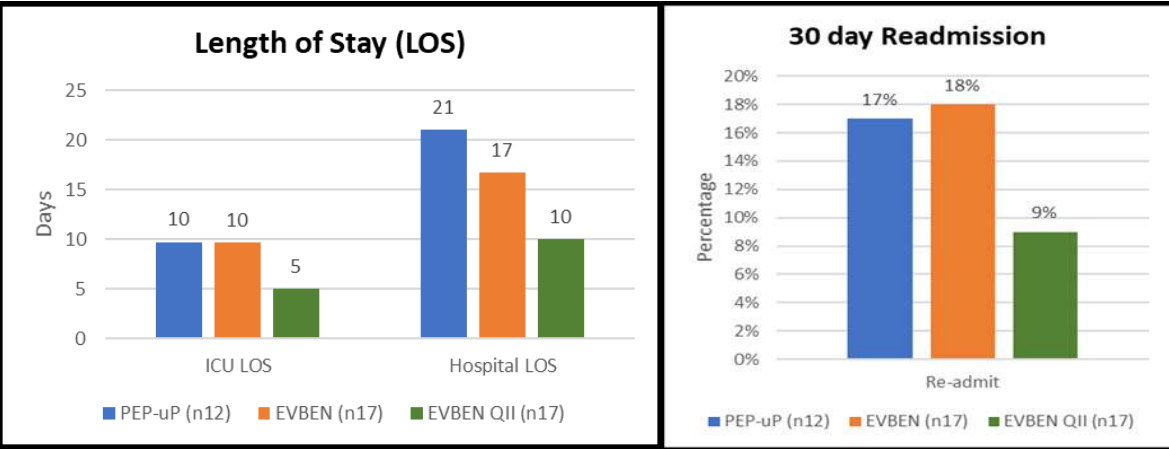


Figure 2 When PEP-uP and EVBEN were initiated no changes in ICU LOS were found; however, under EVBEN QII patients LOS in ICU reduced from 10 to 5 days and hospital LOS reduced from 21 to 10 days

Figure 3. Readmission rates reduced from 18% to 9% when EVBEN QII was implemented.

### Conclusions:

Early nutrition and providing goal calories and protein significantly reduced ICU LOS, hospital LOS and readmission rates. The use of a small-bore feeding tube allows patients to continue nutrition support post extubating, which ensures to bridge the gap as they transition to oral diet. This time is typically found to be low in nutrition intake and may have impacted these results.

### Recommendations:

Evidence supports the standardization of an early feeding protocol as it is associated with improved patient outcomes.

This is a small retrospective study, and recommendation for a large-scale study is warranted.



# Current use of Animal Assisted Therapy in Critical Care throughout the United Kingdom and the development of a set of National Guidelines.

Dr Emma Jackson<sup>1</sup>, Sarah Anderson<sup>2</sup>, James Evans<sup>3</sup>, Kate Tantom<sup>4</sup>, Lyndsey Uglow<sup>5</sup>, Simon Riley-Fuller<sup>6</sup>

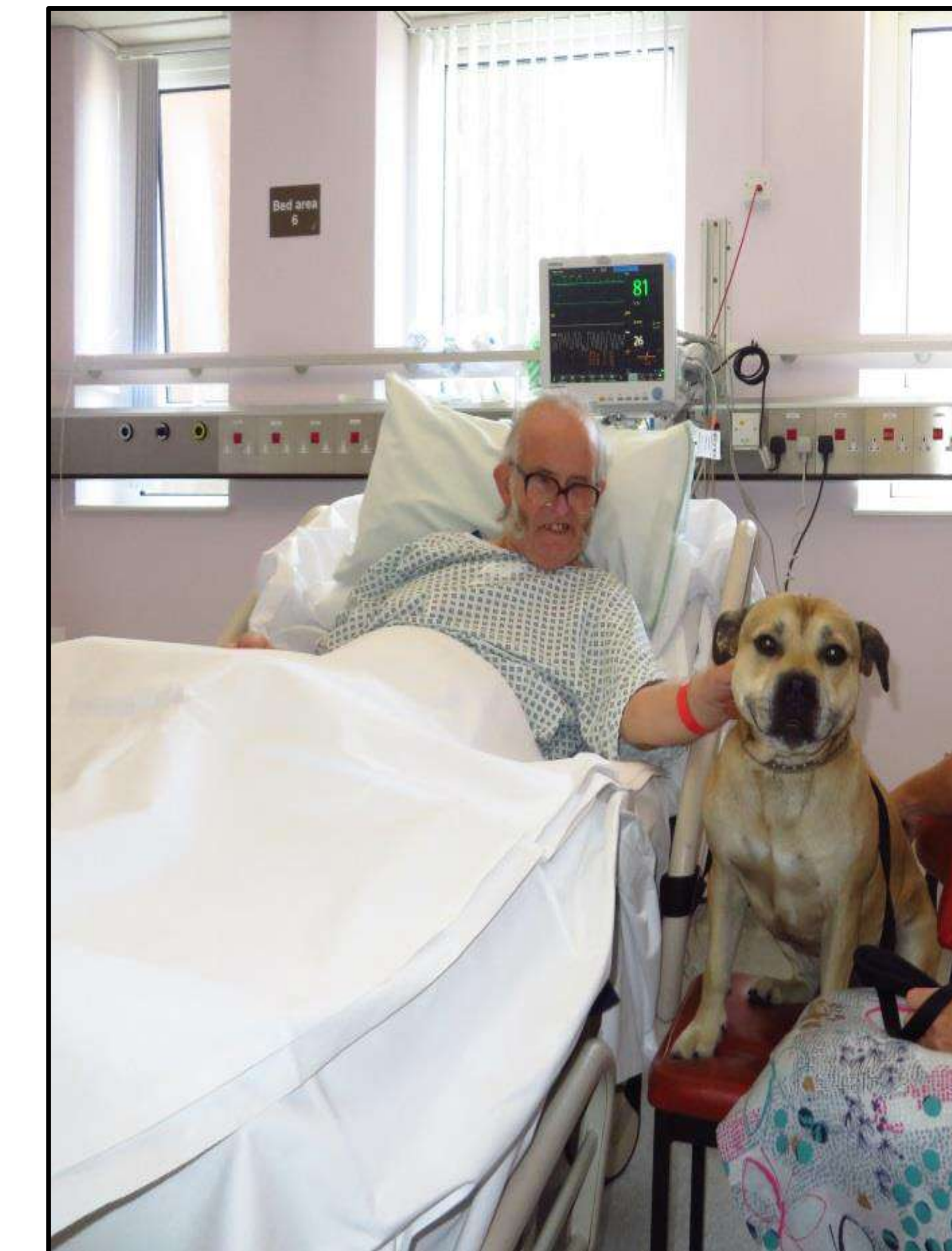
1. ICM trainee - Blackpool Victoria Hospital 2. PAT Volunteer - Leeds Teaching Hospitals NHS Trust 3. Matron - Leeds Teaching Hospitals NHS Trust 4. Critical Care Sister - University Hospitals Plymouth NHS Trust 5. SCH Therapy Dogs - University Hospital Southampton NHS FT 6. Critical Care Head of Nursing - Leeds Teaching Hospitals NHS trust

## Objectives

There is limited evidence and guidelines on how to make Animal Assisted Therapy (AAT) accessible in a safe and controlled manner following its increasing use in the Critical Care environment.

## Methods

A National meeting was coordinated by the Leeds Teaching Hospitals inviting 21 Critical Care Units using AAT. We had a variety of representatives from 14 different hospitals.



## Results:

- Varying use of AAT in current practice.
- Local policies had already been developed; others used the Royal College of Nursing 'Working with Dogs in Healthcare settings.' This provided robust internal measures and was reflected in positive reference to AAT in CQC reports.
- Wide discussion on the varying views held by infection control teams on the use of AAT and the importance of adhering to the strict infection prevention on visits.
- Consensus about the importance of accountability and development of a set of standards which AAT can be held up to, in particular logging patients who experience AAT.
- Each hospital had its own inclusion and exclusion criteria for the use of AAT in Critical Care.
  - **Common exclusion criteria** included patients that are: in isolation, barrier-nursed, immunosuppressed, allergic, phobic, affected by hyperactive delirium, and patients who declined a visit from AAT.

## Conclusions:

- Great enthusiasm for the use of AAT in Critical Care but this needs to be balanced with protecting patients, staff, handlers and the animals.
- Need to collect data to show that AAT is beneficial for our patients.
- We are currently working towards creating a set of National Guidelines with the target of launching them by the end of 2020 with the support of Intensive Care Society and long-term aim of inclusion into Guideline for the Provision of Intensive Care Services.



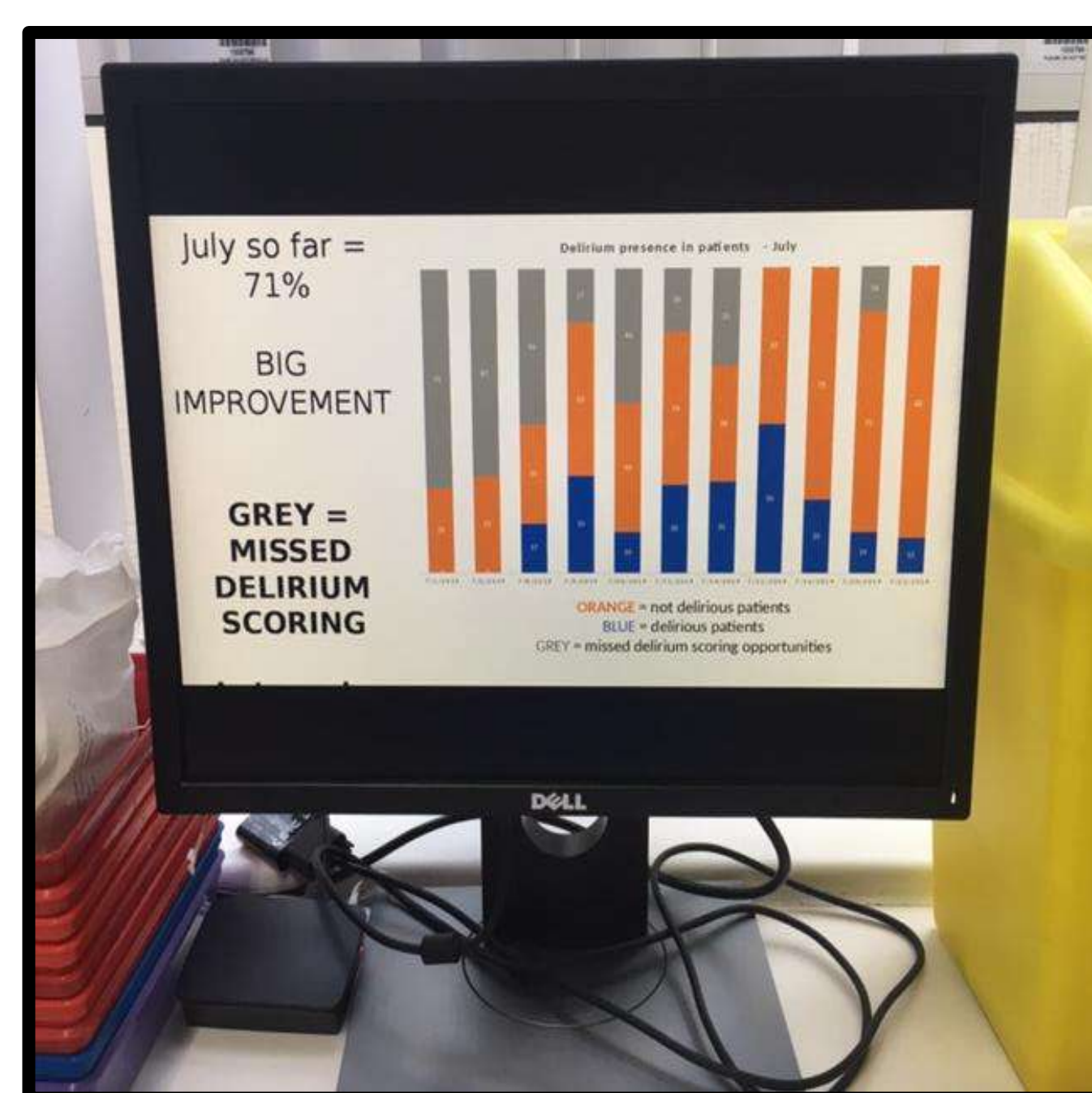
# Developing a culture of early identification of delirium combined with reducing sedation use in Critical Care Patients

Dr Emma Jackson, SN Rebecca Bell, Dr Jason Cupitt  
Blackpool Victoria Hospital

## OBJECTIVES

Identification and treatment of delirium in Critical Care (CC) patients is notoriously poor. This Quality Improvement (QI) project aimed to facilitate earlier rehabilitation of patients through:

- 1.Improving CC staff knowledge of delirium
- 2.Improving detection of delirium
- 3.Reducing patient sedation levels



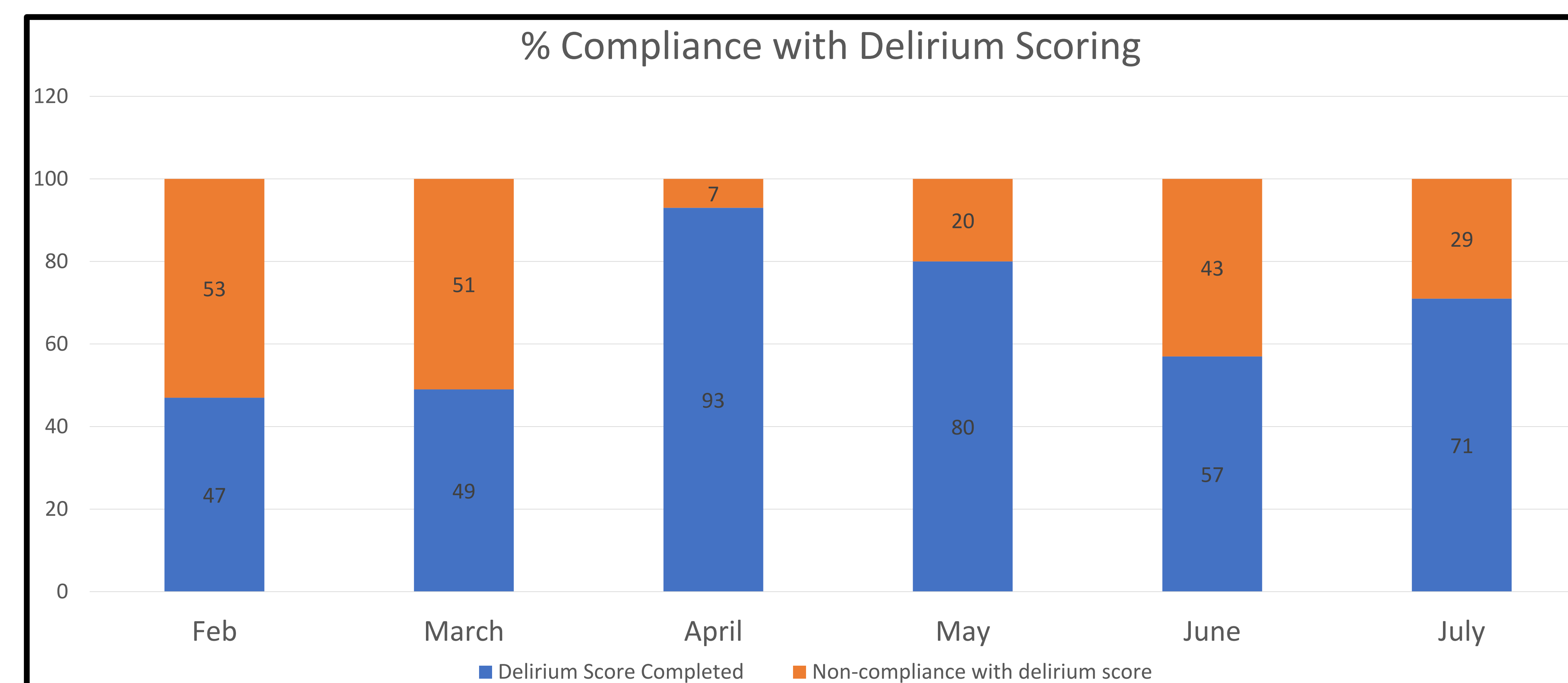
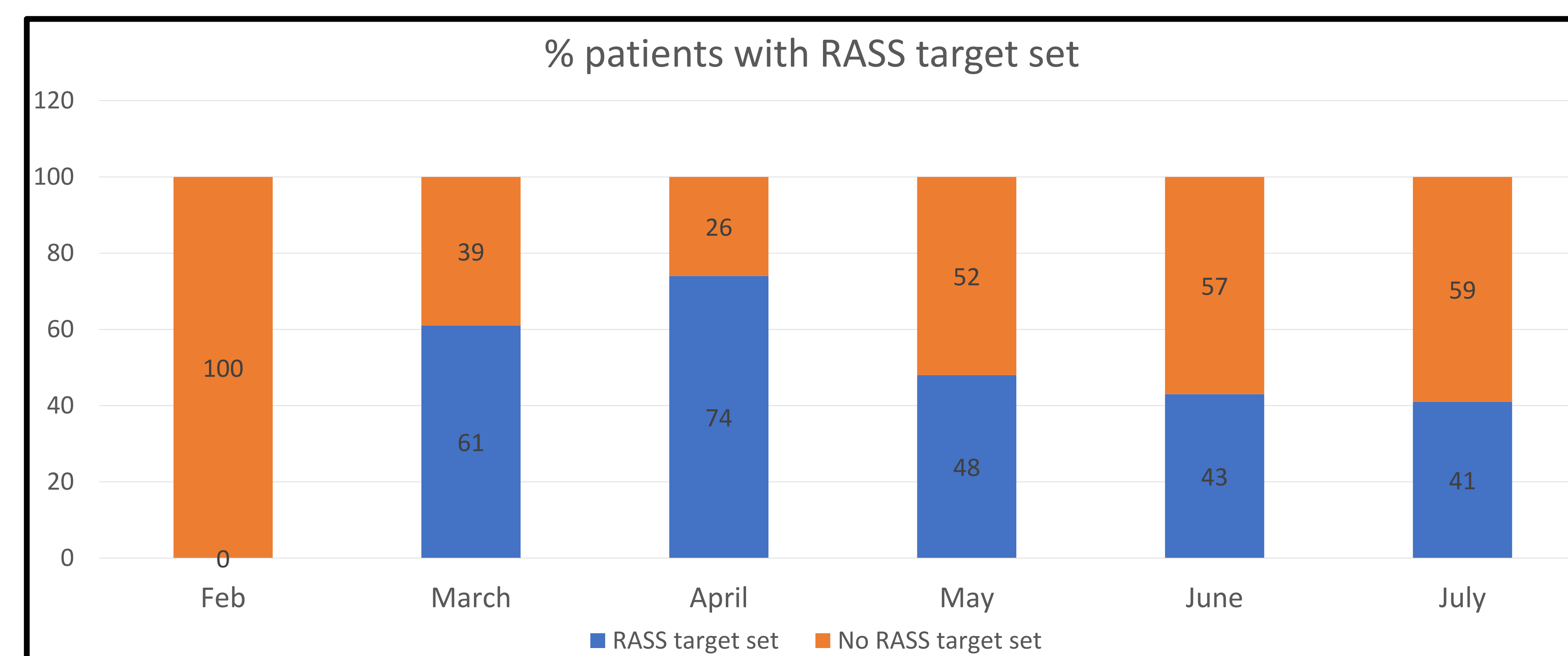
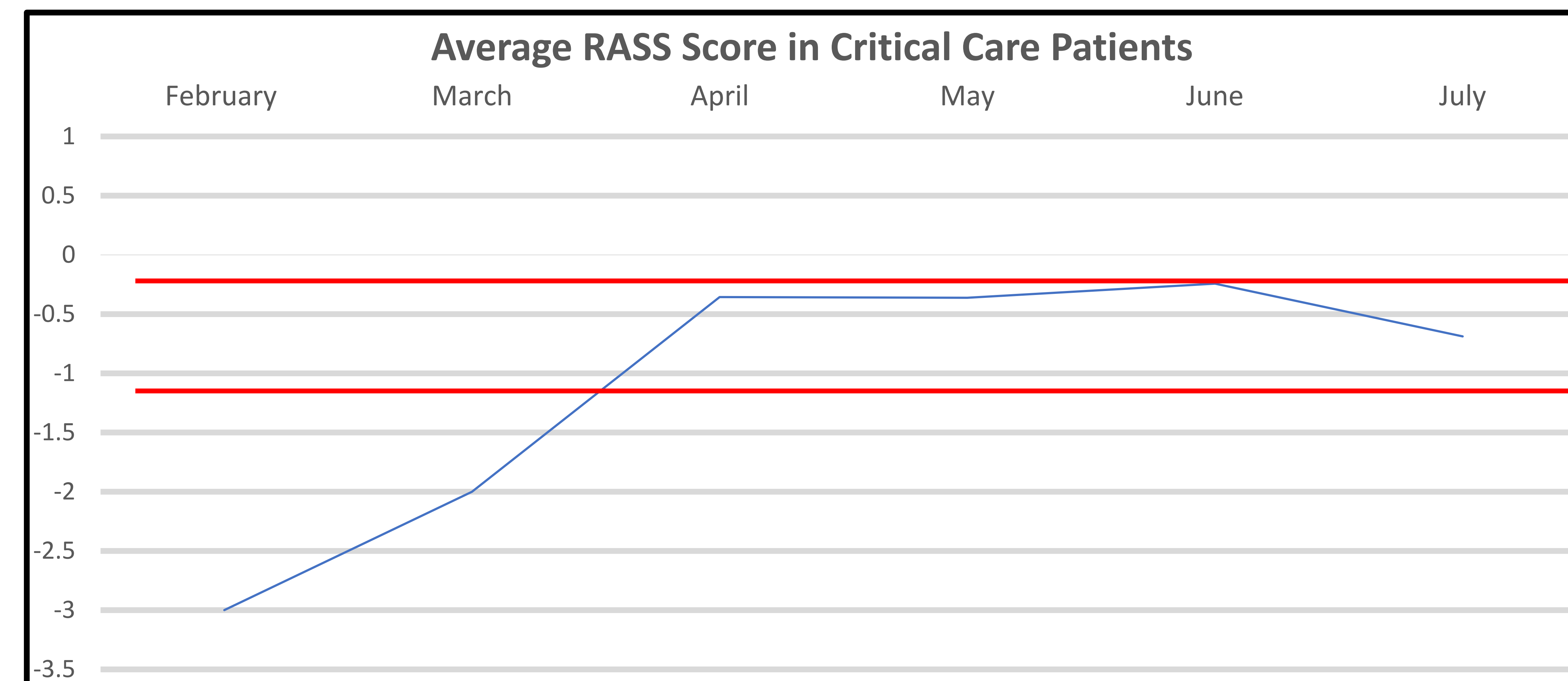
## METHODS

Stage One: Nursing staff survey revealed identifying delirium was a key barrier to treatment.

Stage Two: In response, we introduced a novel delirium scoring system (TUFT)<sup>(2)</sup> This system tracks a patient over a whole shift, producing an overall delirium score on which to base treatment.

We supported this with Raspberry PI technology and the introduction of nurse champions in 4 key fields; Delirium, Sleep, Mobility and Sedation.

Alongside this system, we enforced prescribing of target RASS levels for each patient.



## RESULTS

### Stage One: Survey

- Staff felt the greatest barriers to reducing sedation were:
  - poor staffing
  - fear of self-extubation.
- Increased sedation and/or analgesia was the most common response to patient agitation

### Stage Two: TUFT and RASS interventions

- Introduction of TUFT resulted in a 12-27% reduction in delirium score over 4 months
- Enforcement of RASS target prescription standards resulted in 74% compliance
- RASS compliance led to average RASS reduction of 3 points
- Nurses felt both systems were easy to implement and follow

## CONCLUSIONS

A short and dedicated teaching period, in combination with the introduction of minimally effortful technologies:

- Significantly improved delirium detection
- Significantly reduced unnecessary deep sedation of CC patients



**Title:**  
*A Pilot, Feasibility Randomized Controlled Trial of a Behavioral Activation and Rehabilitation Intervention to Improve Psychological and Physical Impairments in Acute Respiratory Failure Survivors*

**Ann Parker MD, Albahi Malik M.B.B.S.,**

**INTRO**

- Decreasing mortality from acute respiratory failure → growing number of survivors
- Survivors have long-lasting impairments in physical function, mental health & cognition (Post-intensive care syndrome (PICS))
- Depressive symptoms are risk factor for new impairments in physical function post-ICU

**Objectives**

- A 12-week BA-R intervention will be feasible by **1.5 patient/month accrual rate and 80% competition of intervention calls**
- Decreased depressive symptoms, less impairments in physical function and quality of life, and reduced healthcare utilization.
- The HADS and PHQ-8 will adequately discriminate depressive symptom severity vs. the SCID-5 “gold standard” using the combined patient cohort from the BA-R and control groups

**METHODS**

- To conduct a single-site, pilot RCT (N=54) evaluating the feasibility (primary objective) and efficacy (secondary objective) of a 12-week behavioral activation-rehabilitation (BA-R) intervention versus “usual care”, in acute respiratory failure (ARF) survivors.
- Primary outcome – feasibility
  - Secondary outcome – HADS and PHQ-8

**The BEHAB Study:  
Is a combined Behavioral  
Activation and Rehabilitation  
intervention in acute respiratory  
failure survivors feasible and  
acceptable?**



Take a picture to  
find description of study



## Background, Study Aims and Research Question:

In the context of increasing survivorship from critical illness it is important to enhance our understanding of the subjective experience of survivors and their families. The critical illness experience is enormously complex, varied and multifaceted. The need to consider the legacy of critical care beyond physiological survival is imperative.

Aims of the study:  
To formulate a mid-range theory in relation to patient and family's critical illness trajectory

Research question:  
How do patients and family members experience their critical illness trajectory?

## Methods:

Working within a relativist ontology and a constructivist grounded theory methodology (Charmaz 2014), a series of in-depth interviews were undertaken with survivors of critical illness (n=16), family members (n=15). Interviews were undertaken in a district general hospital setting in England, UK. All interviews were transcribed verbatim. Constant comparative analysis and data collection occurring concurrently with theoretical sampling commencing from the outset.

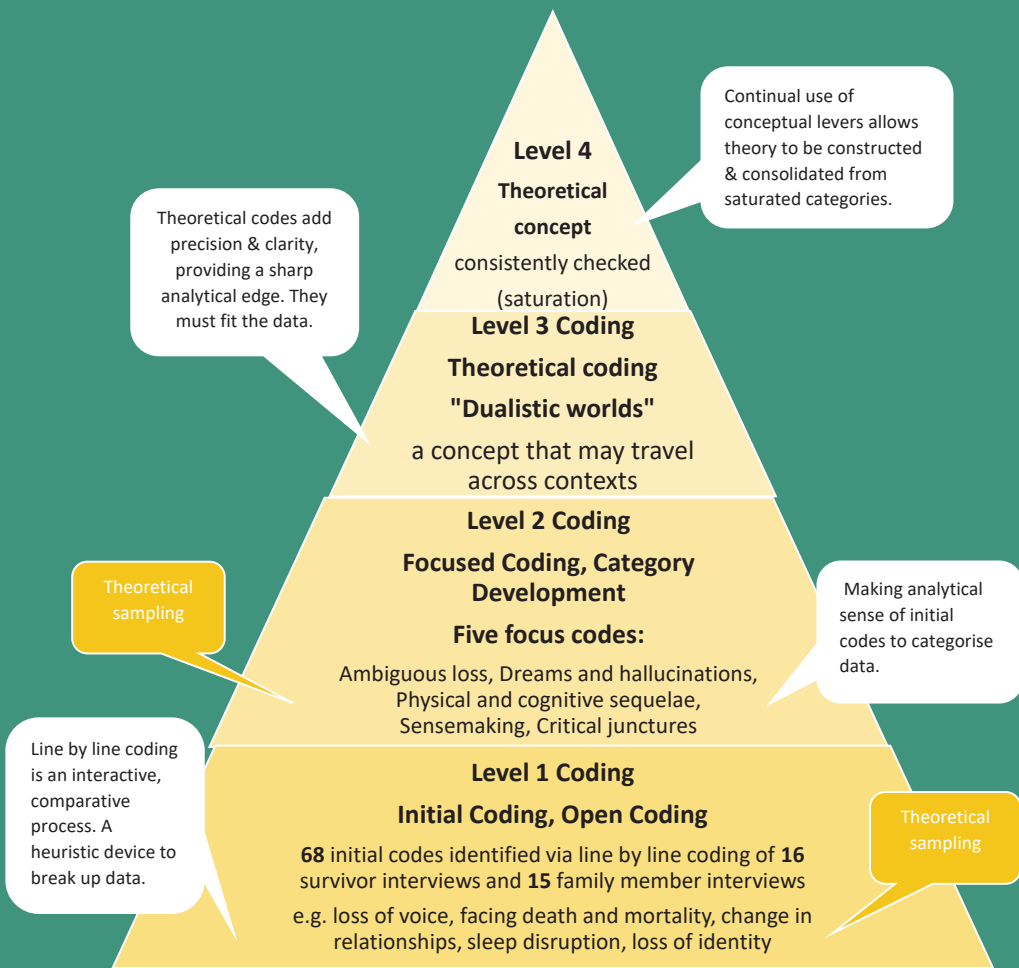
## Drivers for Study:

A 35-year-old professional women involved in a road traffic collision survived a prolonged stay in Critical Care. She describes the experience of surviving critical illness:

*“Emaciated, frail and unable to wash or dress myself I was discharged from hospital to the care of my parents. For those around me, leaving hospital was a milestone, a confirmation that I had survived. For me, it was a moment I had to face the skeleton in the mirror, an imposter masquerading as me. Where was the real me? Would I ever be me again? In my childhood bedroom, I sobbed silent tears. I had survived, but which part of me?”*

## Data Analysis

- Coding commenced with the first interview.
- Raw data scrutinised or fractured and each concept is named (or labelled) with a conceptual name.
- Concepts collapse in to categories or phenomena.
- As more data are collected the analyses develops and further concepts and categories are identified, the primary stage of theory development may come in to view (Charmaz 2014).
- Atlas ti™ data management tool.



## Theoretical sampling

As part of the concurrent analysis of data, in keeping with the method theoretical sampling was ongoing. One theory constructed was that of dualistic worlds between FMs and survivors and within survivors, exemplified by the following quotations:

*“It has been hard to reconcile the two separate lives that we lived during that time, and neither of us will ever be able to fully comprehend what the other went through.”* Jane

*“People don’t understand...people can’t understand. Though they’ve seen me go through it they can’t understand what it is like to go through it...”* Annie

*“In a way I suppose that was a worse nightmare for them two (partner and daughter), than it was for me, because I didn’t know too much, did I? It was a nightmare for me trying to get better because it was hard but that must have been a terrible nightmare for the family.... Two different nightmares”.* Sharon

## Ethical approval and sample size

- IRAS ethical approval gained via proportionate review (13/LO/0798)
- R&D approval gained at UK NHS Trust (R&D 936)
- 16 patient interviews, open to semi-structured
- 15 relative interviews (10 with patients), open to semi-structured

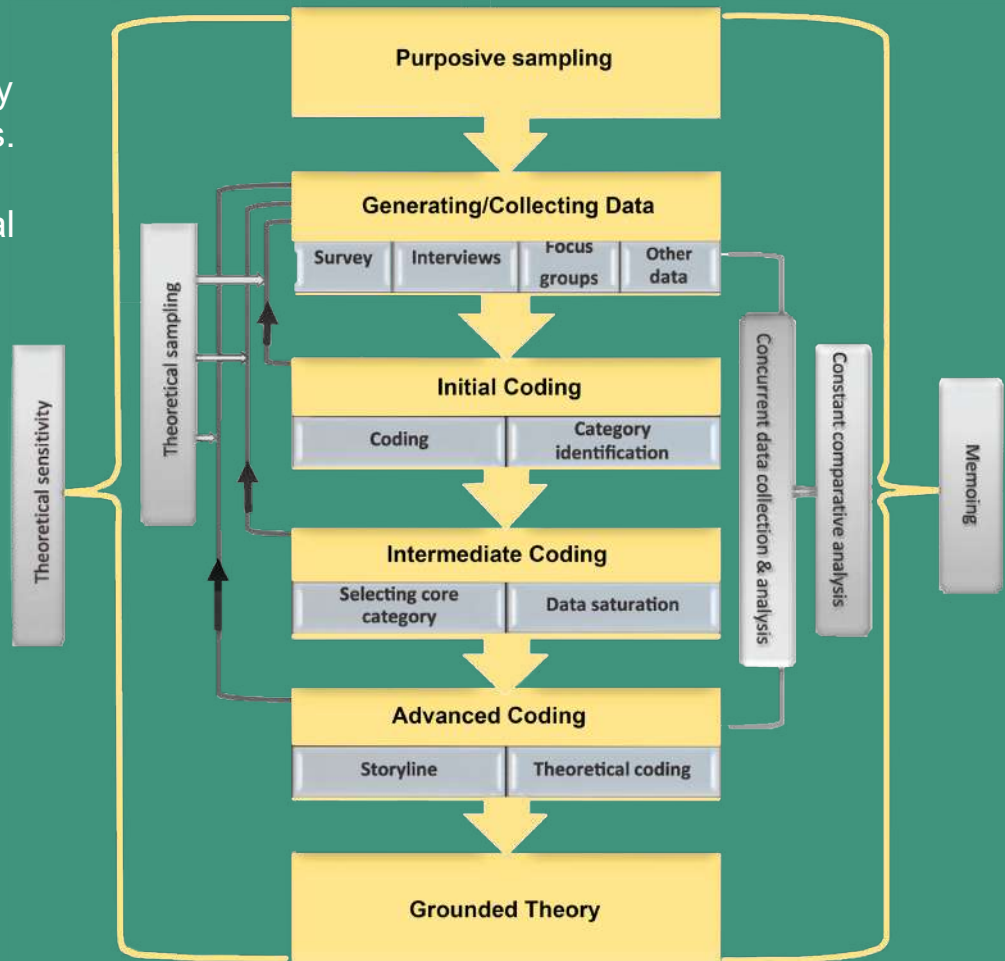
## Purposive Sampling

Survivors of critical illness are followed up post discharge from critical care between 3-6 months in an out-patient setting. Initial written approach to the participants provided access to information about the research and contact details of the PI prior to appointment.

Consent obtained prior to interview by PI.

Patients recruited were admitted to critical care as an emergency for greater than 72 hours e.g. medical & surgical emergencies. (n=16)

Family members (FM) (definition drawn from Fulbrook et al (2008) were interviewed whilst on Critical Care (n=5) or interviewed with survivor at follow up (n=10).



## Experiencing Delirium

*“I was convinced she was trying to kill me and as I say, it was really, really vivid, and it went on, it wasn’t just sort of like a one off thing, it went on for days, ....and I was convinced, because I think one day I actually hit one of the nurses because I thought she was joining in”.* Alan

*“I had very nasty, very nasty hallucinations, I was a drug runner, I was a booze runner, I was involved in money laundering.....Is that odd? Is it me that’s odd?”.* Charles

*“I was convinced they were trying to kill me.....fear they were trying to unplug my machinery”.* Linda

## Ambiguous loss

*“I had lost not only my physical sense of myself – my vitality, mobility and appearance –but with it my way of relating to the world around me. I’d lost everything I ever held to be ‘real’, everything that who and how I am in the world had previously been based on. I had no idea how I would continue to function in a world with any authenticity without that to guide me.”* Kathy

*“couldn’t communicate with anybody, literally I’d basically vegetated. When I finally did try and move it was more like going back to a baby”.* Andy

*“I’m just not the person I was, I’ve got no patience with anybody. I don’t like myself for that, I really dislike myself”.* Jane

## Critical Junctures of Care

*“I was in danger and that wasn’t really very nice at all, it really wasn’t” “I was too frightened to go to sleep on the ward...”* Linda

*“I was having to sleep in the dining room, you know, and that was awful... she was asleep upstairs and I was asleep downstairs, and I couldn’t get out of bed because I had no legs, I have all these pipes and bags and so forth, so if she decided to have a lie in, say 9 o’clock, if I woke up at 7.00... it was awful!”* James

## Psychological Sequelae

*“it feels like pre-hospital everything was OK, post-hospital, even though I am here, thank God, I’m not as good as what I was, and I can’t do what I can’t do – and it’s awful to know I can’t do it”. “Everything is an effort ...”* Annie

*“I do get very stressed and worried and.... not in control”. “People think, oh, you should be happy because you’re alive. It doesn’t quite work like that, you know, it doesn’t.”* Jane

*“I just felt life was worthless” “... there were a couple of times when I was thinking, how can I die? I was thinking, how can I commit suicide without hurting myself too much”.* Charles

*“I felt really, really weak when I was in the Unit and I was amazed how in four days how weak one can become and I found it difficult lifting a plastic cup half full of water...I was shaking”* Judith

*“I found it difficult to even pick up a cup of tea, and that’s why I thought it was wrong to actually be sent home...”* Richard

## Physical Debilitation

*“my wife brought my Kindle in so I could read, I couldn’t even turn it on. It took me about half an hour to turn it on by which time I was exhausted, so I just turned it back off again, you know? I was so feeble, it was crazy.”* Alan

## Scaling up Mid-Range Theory.

I sought to view and assess my constructed mid-range theory through the theoretical lens of liminality. This was a useful lens as it captured the betwixt and between worlds that survivors experience. Survivors experience a desynchrony with real time and critical illness which can and does cause relational disruption. This may be theorised as ‘*dualistic worlds*’.

- Supporting theoretical lens –anthropological theory of liminality.
- Reflects the ambiguity and uncertainty of living ‘betwixt and between’ different worlds (Blows et al 2012)
- Connectedness Vs disconnectedness
- Critical illness causes relational disruption
- Leading to dualistic worlds

## Discussion

Survivorship – the concept of moving from surviving to thriving is considered the greatest challenge for C21st critical care (Hart 2014, Kean et al 2017).

Critical care medicine can, and does save lives but has to date, failed to understand the consequential effects on individuals and how people ‘live’ (Oakley 2007 p 149) in their bodies.

Relatives and survivors appeared to experience two different versions of the patient’s critical illness. Charmaz (2014) urges Grounded Theorists to define their category. Dualistic Worlds is an abstract, explanatory concept that seeks to illuminate the experience of critical illness survivors.

*“You must decide what that life will be like. It will be different from before the ICU, because you are different. The people who care about you may not understand, but that’s OK. The only way to really understand it is to have lived through it”.* David



## INTRODUCTION

- Post intensive care syndrome (PICS) was defined by Needham et al. in 2012 and pediatric PICS (PICSp) was conceptualized by Manning et al. in 2018.
- Collaborative groups have gained interest in the field since the SCCM launched THRIVE.
- We present the first collaborative group for the prevention, detection, treatment and follow-up of PICS and PICSp in Spanish and Portuguese speaking countries.

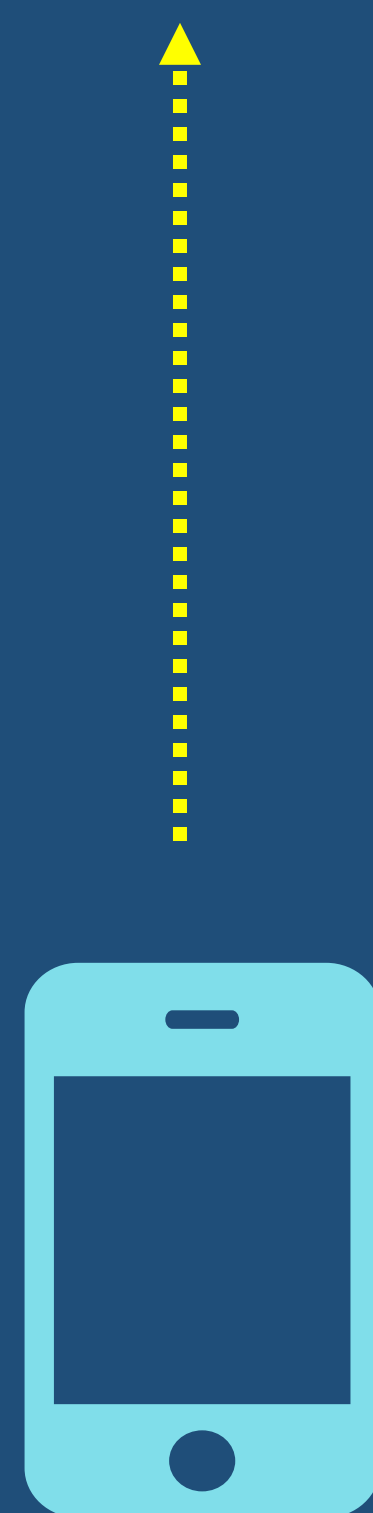
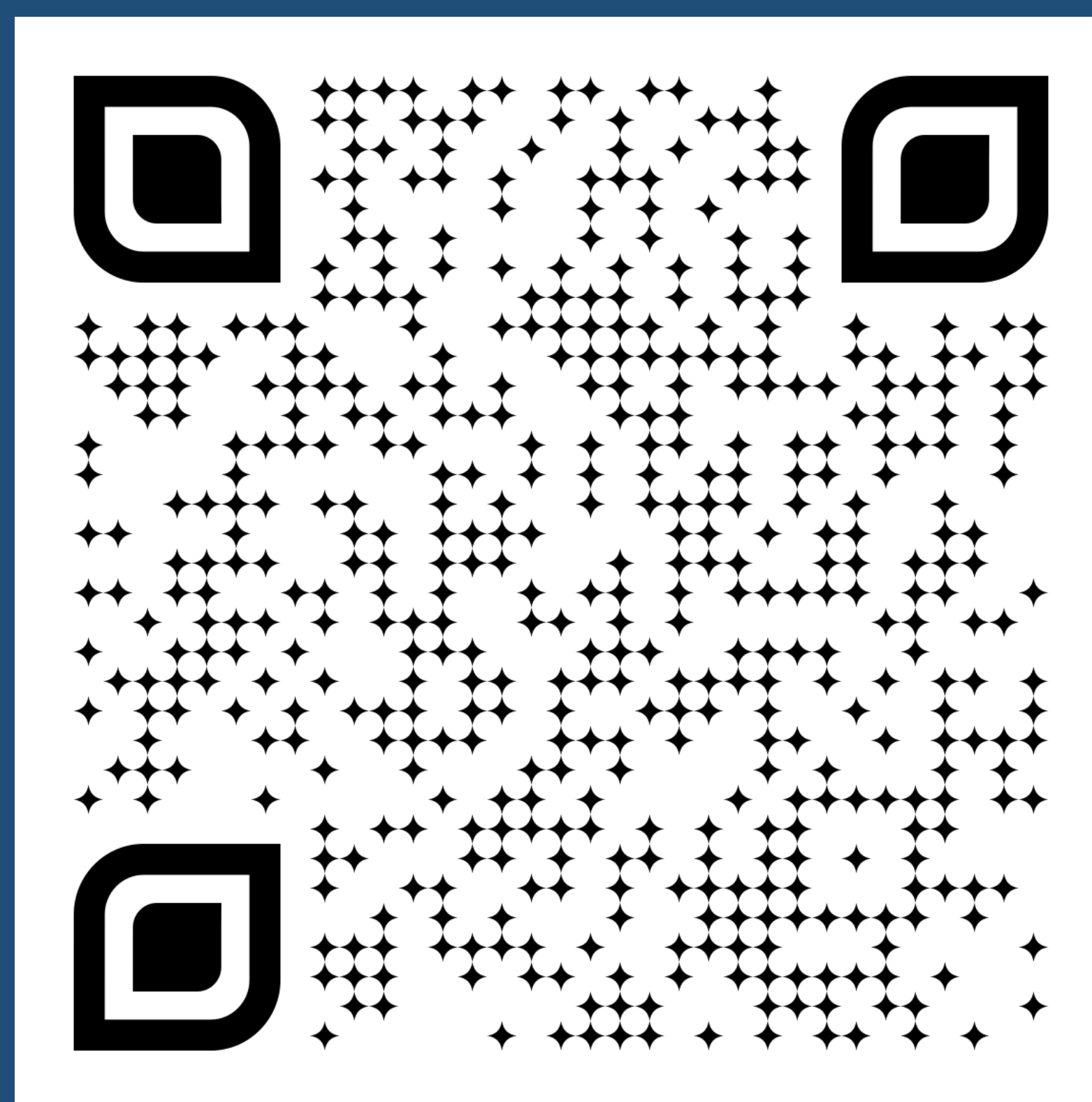
## METHODS

- Support from the International Research Project for the Humanization of Intensive Care Units (Proyecto HU-CI).
- Founders: 4 adult Critical Care Physicians, 2 Pediatric Critical Care Physicians and 1 adult Critical Care Registered Nurse.
- **The founders elaborated:**
  - Minimum requirements for acceptance
  - Obligations of the members
  - Design of a shared database
  - Social media presence
  - Program for the 2<sup>nd</sup> edition of the Spanish National Post Intensive Care Syndrome Meeting.

## RESULTS

- Expression of interest:
  - 6 adult teams from Spain
  - 3 pediatric teams from Spain and Mexico
- The project has been presented in: Spain, Brazil and Argentina.
- Endorsement from:
  - FEPIMCTI: Pan American and Iberian Federation of Societies of Intensive Care
  - SEMICYUC: Spanish Society of Intensive, Critical and Coronary Unit Medical Care
  - SECIP: Spanish Society Of Pediatric Intensive Care.

# “A new collaborative PICS and PICSp group is being launched in Spanish and Portuguese speaking countries”



**Scan the code with your phone to visit our website (in Spanish) and join us!**

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■ Miguel Rodríguez-Rubio<sup>1,10</sup>, MD; Elena Álvarez-Rojas, MD<sup>1</sup>; M Ángeles De La Torre Ramos, MD<sup>2</sup>; Ángela Alonso-Ovies, MD<sup>2,3</sup>; Gabriel Heras La Calle, MD<sup>3,4,5</sup>; Carlos Velayos Amo, MD<sup>2</sup>; Jose Antonio Ángel Sesmero, RN, MSc<sup>3,6</sup>; Jose M. Añón MD, PhD<sup>7,8,9</sup>

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9 Centro de Investigación Biomédica en Red Enfermedades Respiratorias (CIBERES), Spain.

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# Abdominal Functional Electrical Stimulation in Spinal Cord Injury Patients May Decrease ICU Cost and Length of Stay

Yunna L. Sinskey, MD; Nickolas L. Meyerkord, DO; Paul Lange, MD

## Introduction

Respiratory failure is a common cause of ICU admission and the primary cause of morbidity and mortality in spinal cord injury (SCI) patients. SCI patients have impaired respiratory muscle functions making it difficult to clear airways often resulting in respiratory complications. This is most frequent in patients with injuries higher than T7 due to weakened expiratory muscle force resulting in impaired cough. In high tetraplegic patients, the peak expiratory flow rate was less than 50% of predicted normal values. Artificial cough generation are commonly assisted by physiotherapists or through the use of mechanical devices that passively inflate and deflate the lung. However, these techniques are both expensive and cumbersome.

Functional electrical stimulation (FES) is a non-invasive application of electrical pulses to a motor nerve, causing muscles to contract. For patients with impaired ventilatory respiration, FES can be applied to the abdominal muscles (Abdominal-FES) to activate paralyzed respiratory muscles. Furthermore, FES applied repeatedly to paralyzed muscles can improve muscle strength and endurance overtime.

## Method

Literature search was performed on PubMed for peer-reviewed articles that investigated the effect of functional electrical stimulation on respiratory function in human subjects. Keywords used were electrical stimulation or functional electrical stimulation or muscle stimulation, and respiratory function or respiration or cough or tidal volume.

## Results

Results of A-FES can be largely divided into two categories: acute and chronic effects. Acutely, the use of Abdominal-FES has shown to improve cough peak flow in SCI patients causing immediate effective cough in tetraplegic patients. FES applied repeatedly overtime to paralyzed abdominal muscle also improves muscles strength and endurance, further improving respiratory functions in SCIs. Chronically, Abdominal-FES has also resulted in decreased duration of ventilatory support, decreased duration to achieve tracheostomy decannulation, and reduction of respiratory complications including pneumonia, atelectasis, ventilatory failure.

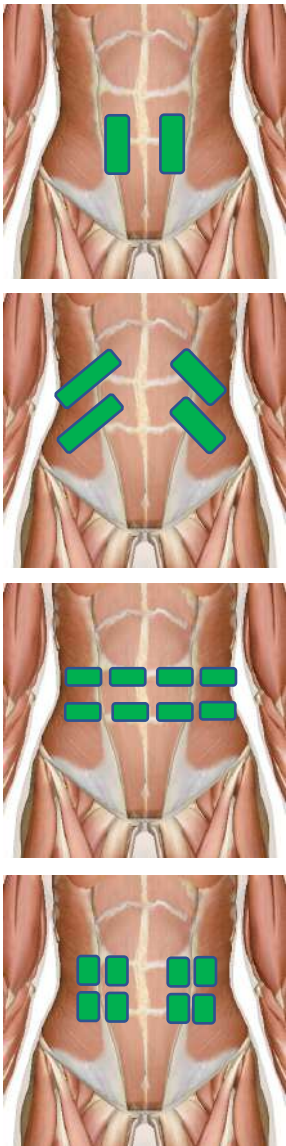


Figure 1. Representation of electrode positioning for abdominal - FES

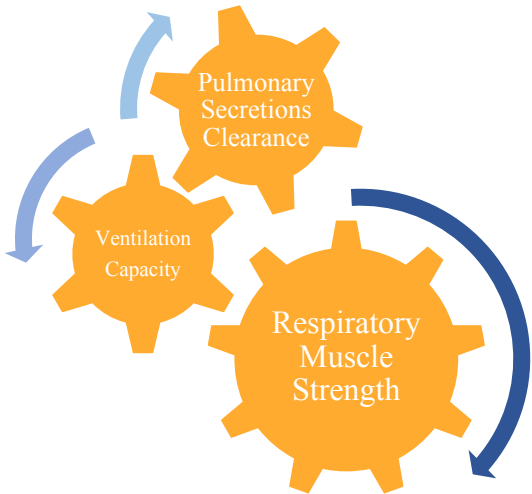
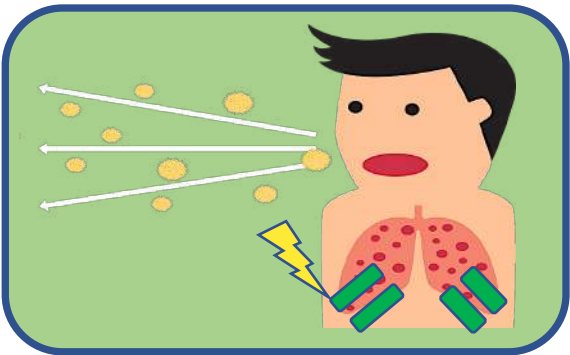


Figure 2. Proposed mechanism of abdominal-FES resulting in decreased pulmonary complications in SCI patients through increasing/assisting respiration



Amplitude	100 mA (100-450)
Pulse Duration	259 $\mu$ S (25-400)
Frequency	50 Hz

Table 1. Range of settings of applied abdominal – FES in studies reviewed

## Conclusion

Ventilatory patterns significantly alters during the first year of SCI due to flaccid paralysis of intercostal and abdominal muscles. The increase in muscle tone overtime assists in improvement of ventilation capacity. However, the ventilation capacity still remains at 60% prior to injury resulting in atelectasis and basal pulmonary fibrosis. Abdominal-FES is effective in significantly decreasing pulmonary complications in SCI patients both in acute and chronic settings. Acutely, the use of abdominal-FES resulted in significant increase in cough peak flow and increase in forced vital capacity. These combined results may overall improve quality of life, morbidity, and mortality. Furthermore, given the noninvasive nature of FES, cheap utilization cost, and decreased ventilatory duration, A-FES has high potential to result in significant cost savings especially in ICU patients. This effect suggests a possible expanded use of A-FES to all ventilated patients regardless of underlying cause of respiratory failure or even patients who were recently weaned off ventilatory support.

## Future Directions

Current studies have low participant numbers. A large scale study using abdominal-FES in SCI patients is necessary to further analyze its efficacy. An outcome measure study is planned to expand the use of Abdominal-FES to all ventilated patients within the critical care setting. This exciting research has potential to decrease length of ICU stay with cheap non-invasive technology. Limitations of Abdominal-FES include decreased penetration through fat layers limiting patient populations. Potential alternative treatments include magnetic stimulation over thoracic nerve roots or implanted spinal cord stimulation at T9-L1, which is more invasive.

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# Rehabilitation of a Person with Obesity and Post-Operative Hemiparesis

Bonnie B. Swafford, PT, DPT, Saint Luke’s Health System, Kansas City, Mo.



## Objective

Healthcare workers have among the highest on-the-job injury rates, according to the U.S. Centers for Disease Control and Prevention. Accreditation and reimbursement pressures are encouraging healthcare facilities to focus on safe, effective care of the highest quality. This report outlines an inpatient rehabilitation program for a person with obesity and post-operative hemiparesis—while maintaining the highest levels of safe patient handling.

## Methods

A 42-year-old male with BMI of 65.2 presented with flaccid left upper and lower extremities following a surgical resection of a glioma that was causing complex partial seizures. This summary outlines the interprofessional collaboration of hospital staff and equipment vendors for his care from intensive care to inpatient rehabilitation to discharge home. Patient evaluation and interventions included safe patient handling techniques and appropriate equipment.

## Interventions

### Neuro ICU (4 days)

- Active right-sided exercise, passive and assisted left-sided exercises
- Assisted rolling and sitting edge of bed
- Dependent transfers out of bed to chair using mechanical lifts

### Step-Down Unit (9 days)

- Progression of ICU interventions to facilitate more patient participation in movements and activities

### Inpatient Rehab Unit (26 days)

- Supine and seated assist, progressing to active then resistive left-sided exercises
- Sit to and from supine, lateral scooting, sliding board transfers
- Sit to stand from elevated mat with bariatric walker
- Static and dynamic standing balance activities
- Gait with roller walker and wheelchair follow
- Progression of walking to cane
- Step up on 4’ curb in parallel bars progressing to 6” steps with rail

## Results/Outcomes

Patient’s level prior to surgery was independent in all mobility and working full time. After surgery he was dependent in functional mobility. Patient was in Neuro ICU for four days, Step-Down Unit for nine days, and Inpatient Rehab Unit for 26 days. Mechanical lifts and bariatric seating systems were utilized as out-of-bed mobility started in the ICU. Specialized equipment was used for supine lateral transfers, upright standing transfers, seated mobility, and ambulation training.

Initial and discharge function was documented with outcome measures. Functional Index Measure mobility score improved 17 points. KUH sitting and standing balance improved 8 points. KUH Physical Therapy Acute Care Functional Outcomes improved 22 points.

## Conclusions

Patient progressed from dependent, using mechanical lifts and specialized bariatric equipment with assistance of 2-4 staff members to independent and safe walking with a cane on level surfaces and stairs. Extensive planning and procurement of appropriate equipment helped the patient progress in a safe and effective manner and no employees were injured providing care for this complex patient.

## KUH Physical Therapy Acute Care Functional Outcomes Tool

	Eval	Week 1	Week 2	Week 3	Discharge
Bed Mobility	2	3	4	5	6
Transfer	1	2	3	5	6
Gait Assist	0	3	4	5	6
Gait Distance	0	2	5	6	7

## References

1. Nonfatal Occupational Injuries and Illnesses Requiring Days Away from Work. (2016). Table 7. Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full-time workers by selected worker occupation and nature of injury or illness, all ownerships, 2015. Retrieved from [www.bls.gov/news.release/osh2.nr0.htm](http://www.bls.gov/news.release/osh2.nr0.htm)
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The author and her rock star patient, RB.  
(Photo used with permission.)



## About the Author

### Bonnie B. Swafford, PT, DPT

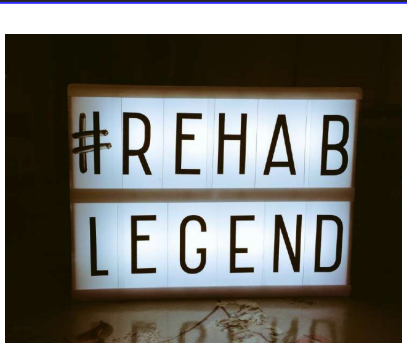
Bonnie is a front-line clinician at Saint Luke’s Health System in Kansas City, Mo. She has specialty experience in the rehab of bariatric patients. She is a clinical instructor, a frequent presenter, and a manuscript reviewer. [bbswafford@gmail.com](mailto:bbswafford@gmail.com)

### Special Thanks:

Mark Dwyer, PT, MHA, FACHE; Lorra Embers, PT, MSHA, FACHE; Jackie Dwyer, PT, DPT; Sue Worden, PT, MS; Sizewise.

Poster Presentation at the Johns Hopkins Critical Care Rehabilitation Conference, Baltimore, Md., 2019





## Introduction

We were a new rehabilitation team working in Critical Care. We wanted to support our colleagues and our patients to showcase the everyday excellence that takes place in practice, promoting rehabilitation and recovery during and after critical illness.

We wanted to improve the culture of rehabilitation

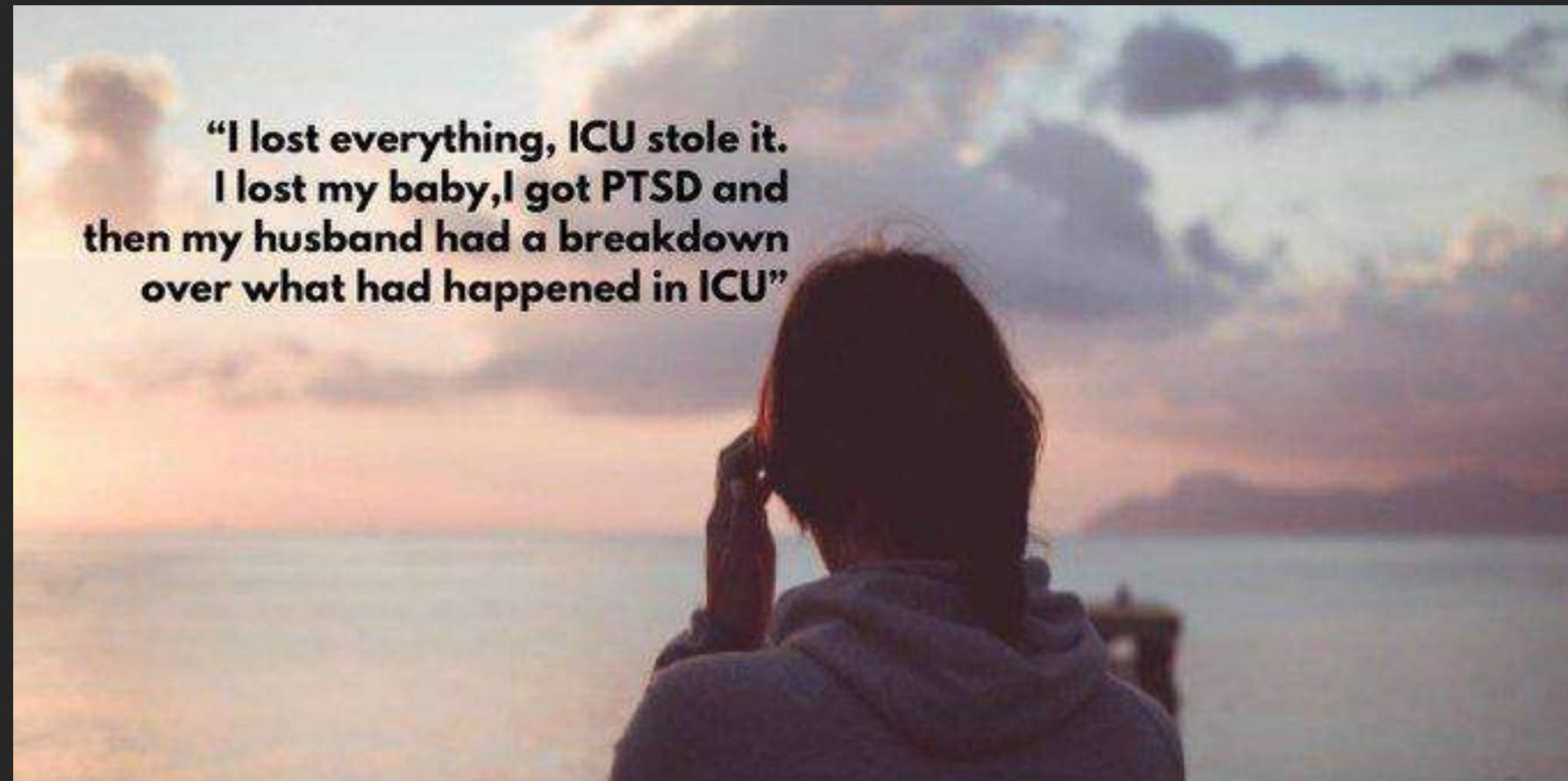
We wanted to promote holistic recovery

We wanted to improve teamwork

We wanted to share patient stories

We wanted to celebrate success

We wanted to empower staff, patients and loved ones

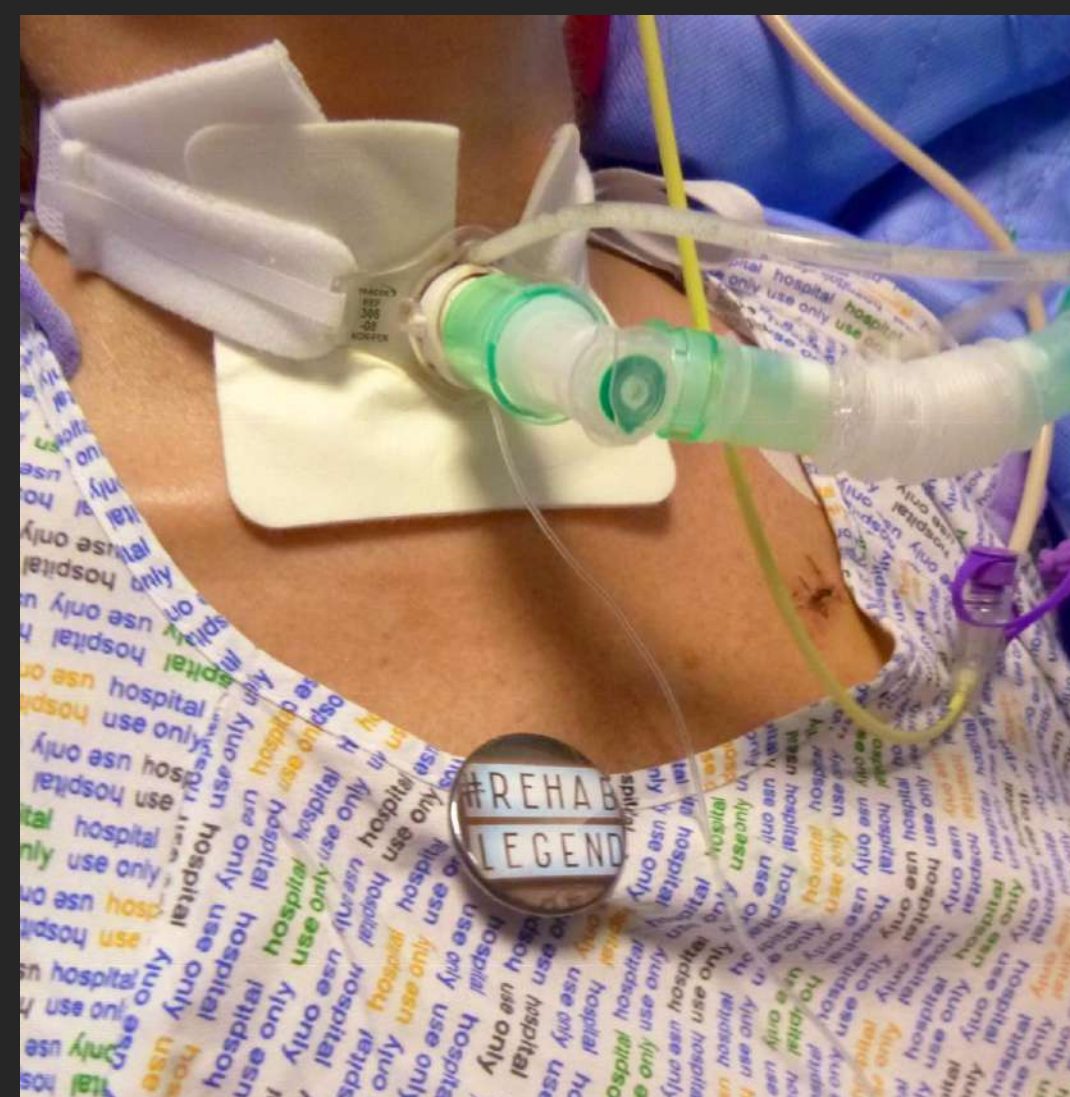


## Sharing Stories – A catalyst for change

We found that by sharing recovery stories from patients, staff and loved ones we were able to motivate, inspire and innovate clinical practice.



## Stories of Recovery - shared across professional teams and locations



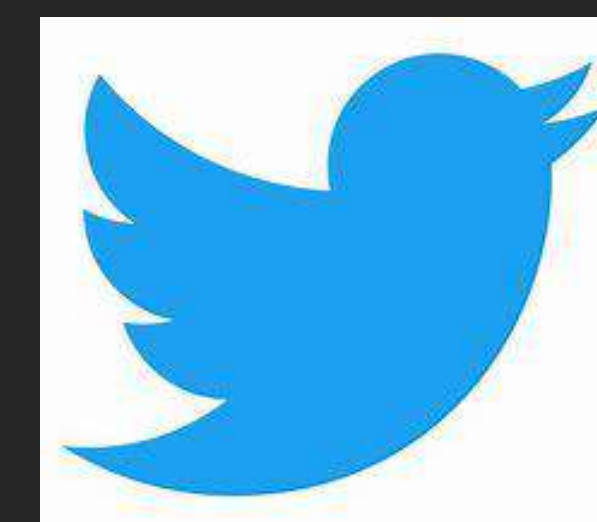
We needed a way to share these stories in teams, across hospitals - promoting clinical excellence

We created the #Rehablegend campaign



A #Rehablegend - Anyone who has done anything to enhance, support or facilitate rehabilitation

## Feedback



We launched our twitter campaign in June 2018

We have now shared over 2000 badges, 30 lightboxes, 200 cards and we have shared the idea online with 50 different healthcare teams from across the world. We have had an online reach of over 1million.

We share patient, loved ones and staff stories to promote the "little things" that happen everyday. Promoting rehabilitation and recovery after Critical Care.

Follow us @tantamkate, @PlymouthICUReh1 using the #Rehablegend to be inspired and to share the success of your patients and colleagues.

## Conclusions

- Sharing stories online to promote and foster a supportive rehabilitation culture is positively received by patients, loved ones and inter professional teams.
- Patients, loved ones and staff have been happy to share stories and have enjoyed receiving #Rehablegend badges, boxes and cards.
- This may be a useful tool to motivate staff and initiate a culture shift in Rehabilitation practice in Critical Care.



# Development & Implementation of a Practical Multi-Hospital ICU Rehab and Training Program

Kari V. Voll, OTR/L, MBA, PMP & Shereen M. Davis, MS OTR/L

## Background

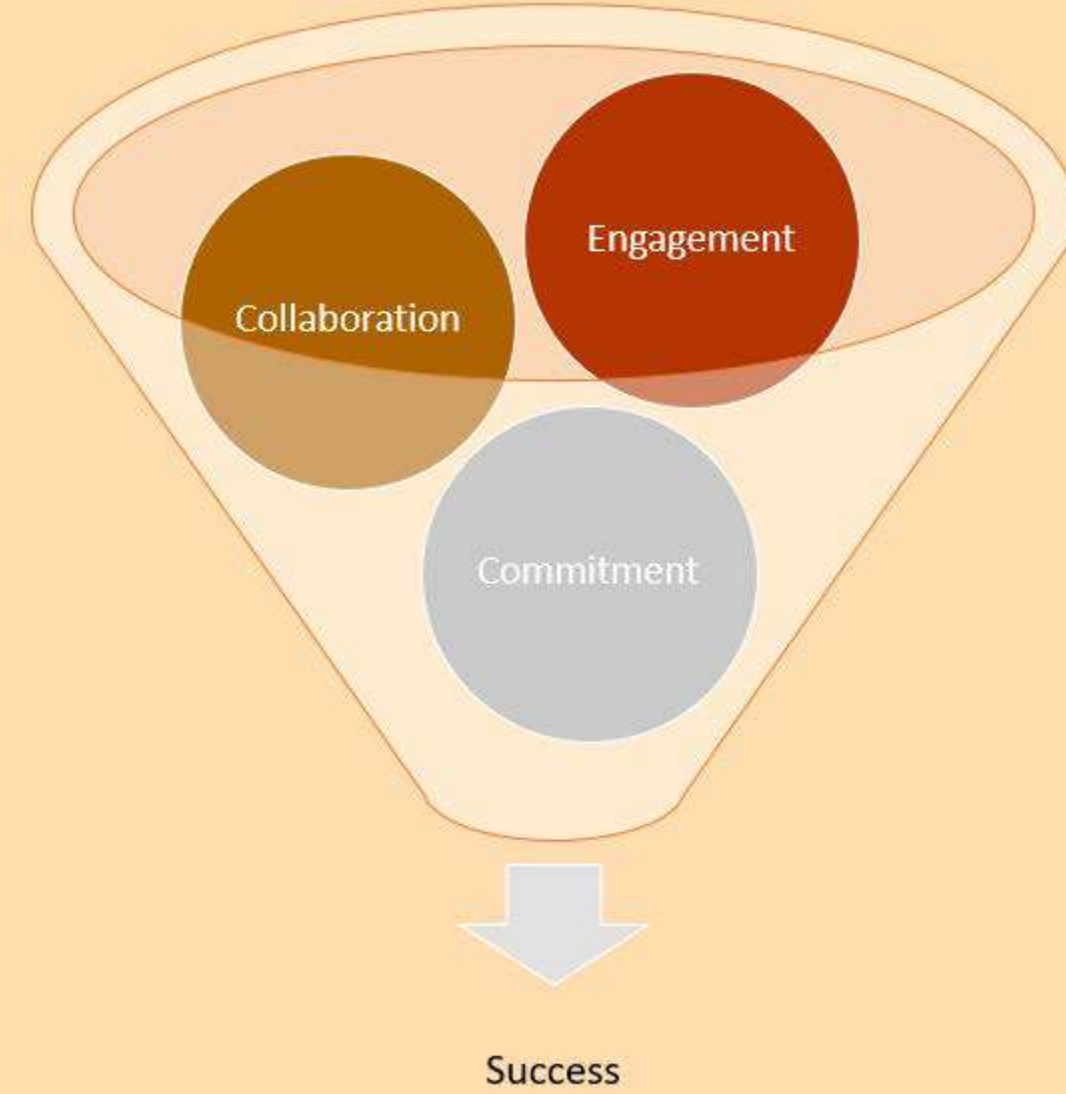
Hospital physicians and administrators requested a review of resources needed to have patients in Intensive Care Unit(s) treated by therapy more frequently. Therapy leadership responded to this request by using a structured approach to define the request and response.

### Objectives:

- Standardize and enhance the frequency and quality of therapy services provided to patients admitted to the ICU
- Supplement the current nursing-driven mobility practices

### Actions Taken:

- Extensive literature review to explore best practice and model programs
- Examined current practice versus best practice
- Provided ICU Rehab course by international expert for key therapy staff and leaders
- Developed and provided 4-hour training class for therapy staff
- Therapy leadership attendance at Johns Hopkins Critical Care Rehab Conference
- Reviewed financial models that project savings based on volume and program implementation
- Utilized a project management approach to define and manage program requirements including: expenses, risks, human resources, stakeholder analysis, outcomes measures, and data collection needs
- Developed a strategic communication plan
- Obtained stakeholder support, including hospital Presidents, VPMAs, Nurse Executives, Intensivists, and ancillary department leaders



## Pilot Program

Using the above process, a pilot program was developed. The pilot was implemented at 3 demographically diverse hospitals in the Hampton Roads region of Virginia.

### Pilot Program Parameters:

- Patients admitted to General/Medical ICU for >= 48 hours who met criteria for therapy
- Physical Therapy 5 times per week
- Staffed PT at 1:9 patient ratio
- Occupational and Speech Therapy as indicated
- Attendance at Multi-Disciplinary Rounds
- Collaboration with ICU clinical leaders and staff



Sentara Norfolk General Hospital, Norfolk VA  
575-bed destination medical center and academic hospital, Level I Trauma Center, Transplant Center, Comprehensive Stroke Center, nationally ranked Cardiology & Heart program at Sentara Heart Hospital



Sentara Obici Hospital, Suffolk VA  
172-bed full-service community-focused hospital, Primary Stroke Center, other specialties include: orthopedics, medicine, surgery



Sentara Leigh Hospital, Norfolk VA  
250-bed facility, dedicated orthopedic center, Primary Stroke Center, other specialties include: joint replacements, cardiology, women's health

### Data Collection:

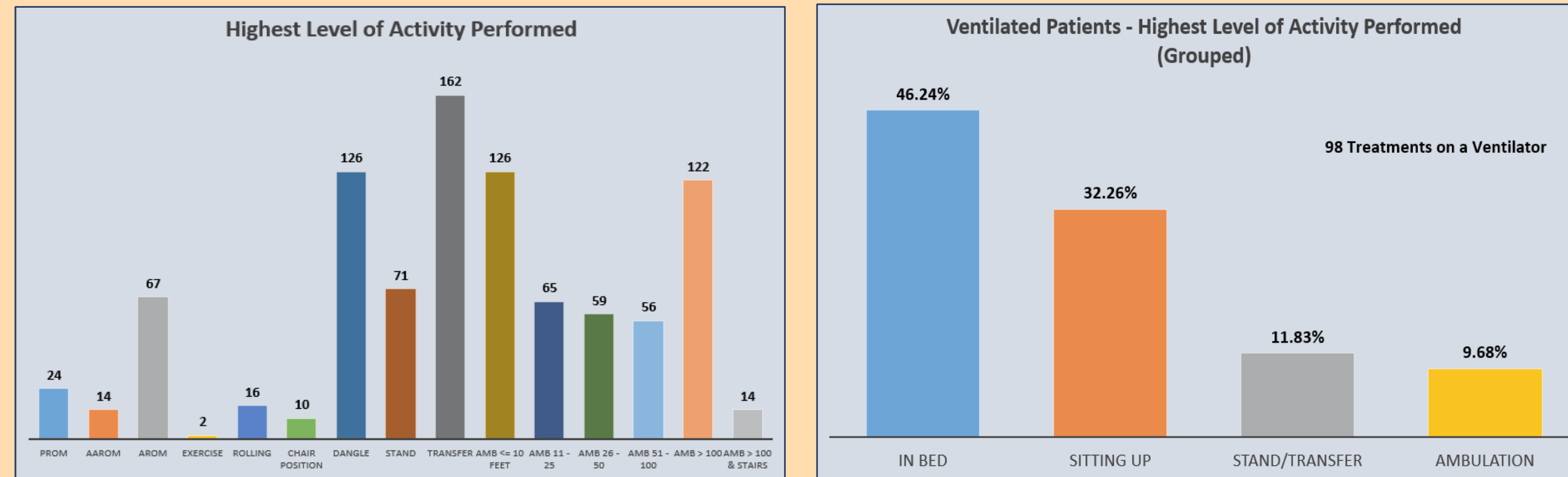
- Highest level of activity
- # staff required
- Adverse events
- Barriers
- Discharge destination
- Falls
- Plan of Care
- Treatments performed
- Reason not seen
- RASS
- CAM-ICU
- Vent status & mode

- ICU LOS
- Hospital LOS
- VAE
- HAPI
- CLABSI
- CAUTI

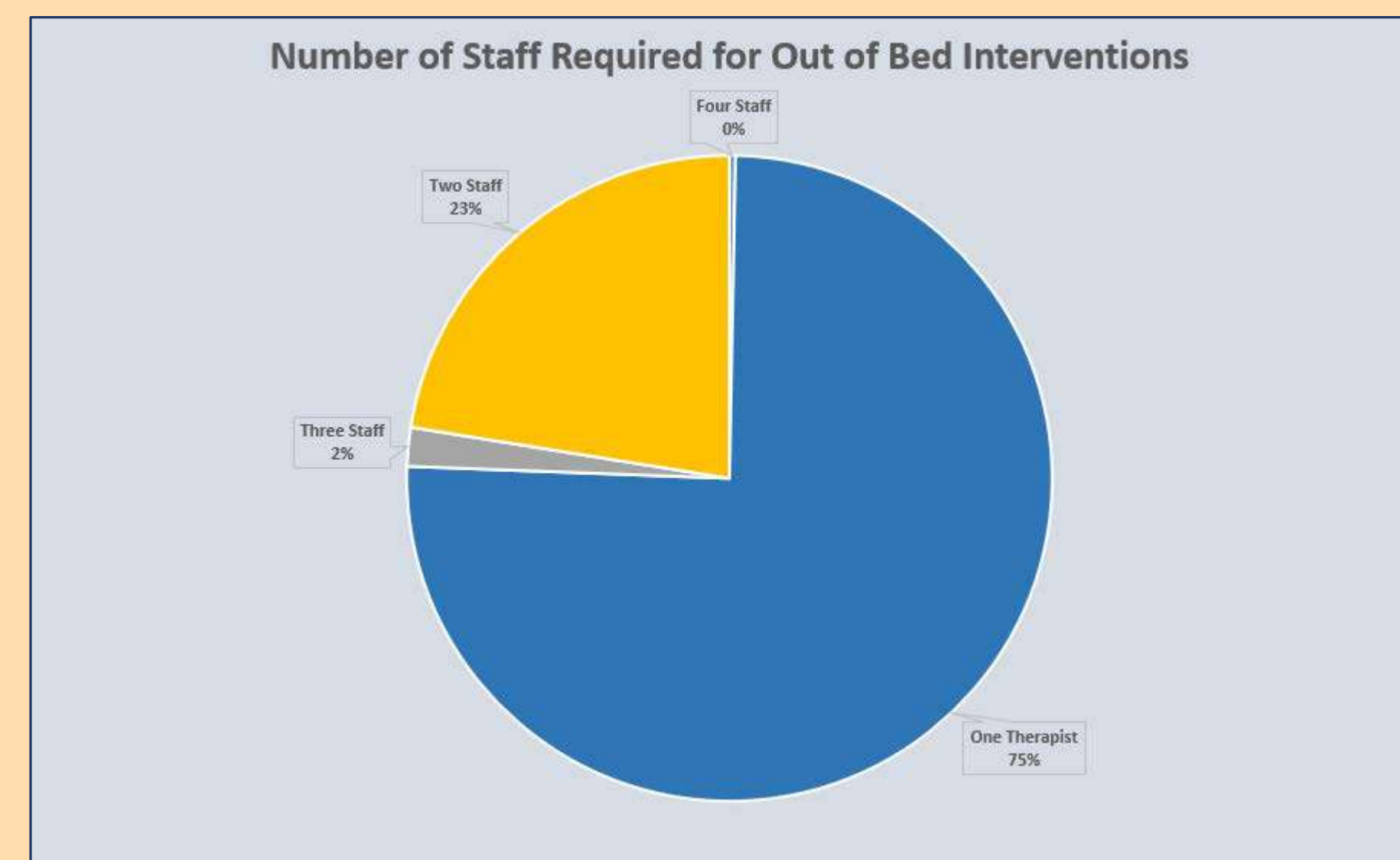
## Pilot Program Results

During the 3-month pilot program:

- 412 patients received 951 therapy interventions
- Average visits per patient while in ICU – 2.3
- 64.7% of interventions involved getting out of bed
- 33.8% of interventions involved ambulating >10 feet
- 20.6% of interventions involved ambulating > 50 feet
- 10.3% of interventions were with a ventilated patient



- 75.3% of out of bed interventions were performed by a therapist without additional staff
- No significant adverse events



The limited data available did not indicate a significant improvement for the cumulative ICU population (those receiving and not receiving therapy) for the following:

- ICU LOS
- Hospital LOS
- VAE, HAPI, CLABSI, CAUTI, Fall rates
- Ventilator days

## Positive Impact

While data was not available to demonstrate an impact on hospital metrics, other areas of impact were noted:

- Higher levels of mobility interventions occurred
- Substantially more therapy was provided
- Pilot was completed FTE neutral and without added expenses
- Significant impact on staff knowledge, engagement, interdisciplinary collaboration
- Overwhelming support from hospital leadership
- Requests to implement system-wide

## Lessons Learned

The program was unanimously supported by executive leaders, clinical leaders, and front line staff. Keys to success included:

- Gap analysis between current and best practices
- Stakeholder support
- Strategic communication plan
- Interdisciplinary collaboration
- Therapy staff education

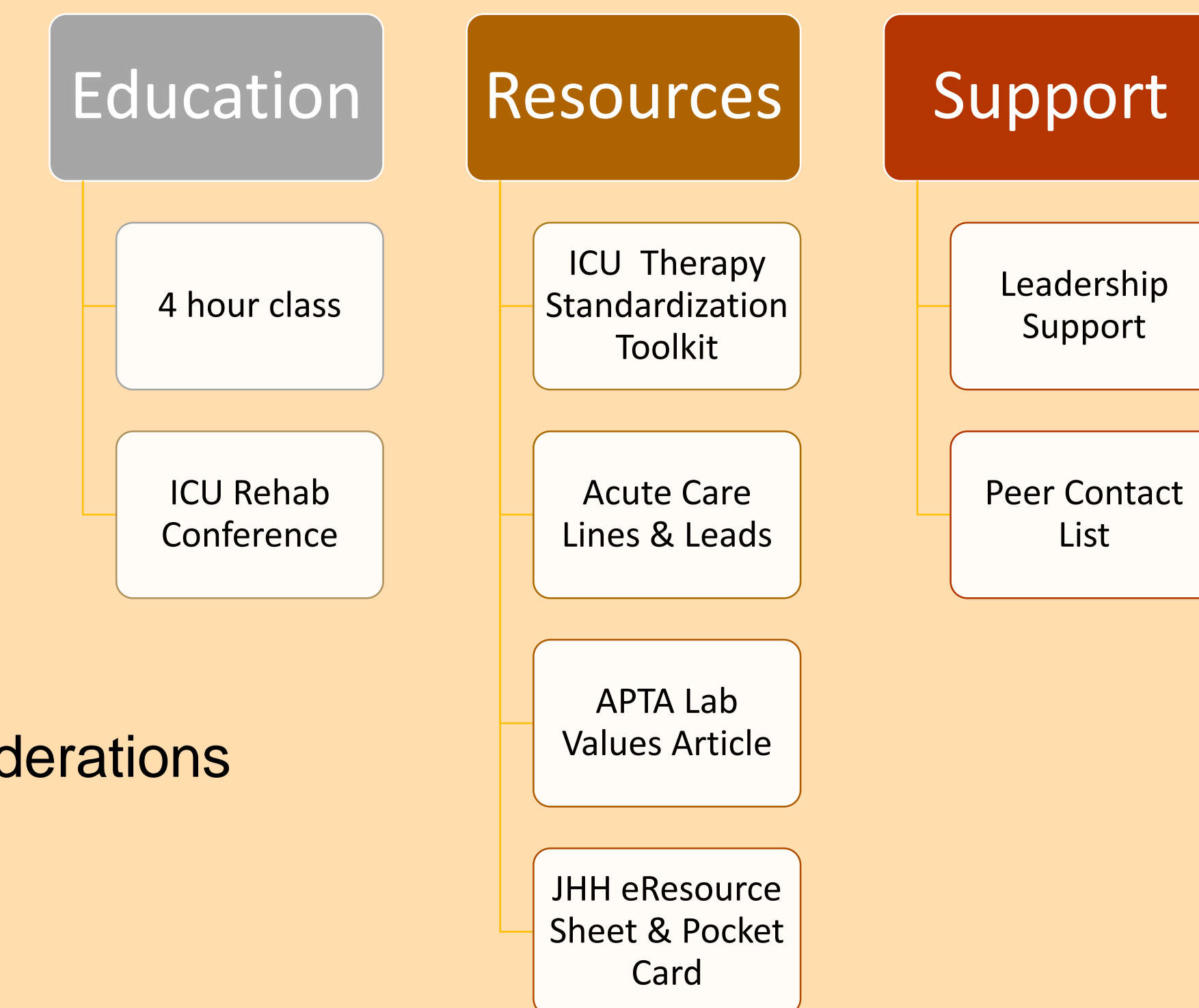
## Multi-Hospital Training Program

Classroom Training – 4 Hours:

- Program overview
- Video demonstrations
- Therapy presentation
- Respiratory presentation
- Panel Q&A

ICU Therapy Standardization Toolkit:

- Importance of therapy in the ICU
- Benefits of early ICU therapy
- Cautions with therapy in the ICU
- Medical, respiratory, and safety considerations
- Delirium in the ICU
- ICU-Acquired Weakness
- Barriers to implementation
- Outcomes – evidence-based intervention
- The ICU Rehab Program expectations
- ICU monitoring
- Lab values
- Treatment ideas
- Education resources, websites
- Literature list



## Expansion

Project initiation and program development	10 months
Pilot program	3 months
Data analysis and program refinement	6 months
Training and implementation at 8 additional hospitals	7 months



Next Steps → New hire training biannually

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# **Poster Presentations: Pediatric Content**



# Quality improvement intervention to promote early mobilization in critically ill children

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## Aim

We determined the feasibility and safety of the implementation of an early mobilisation program in a PICU.

## Setting

The PICU of the Erasmus MC-Sophia children's Hospital has 28 beds. Specialties are: ECMO center, (neuro) trauma center, neonatal surgery (e.g. gastro-abdominal birth defects) and cardiac(surgical) care.



**Table 1 Mobilization activities** (per patient per day)

	Before QI (n= 55)	After QI (n= 58)	p-value
In-bed activities*	3 (3-5)	5 (3-6)	<b>0.01</b>
Out-of-bed activities*	0 (0-1)	1 (0-1)	0.12
Total mobilization activities*	4 (3-5)	5 (4-7)	<b>0.006</b>

**Table 2 Clinical outcomes**

	Before QI (n= 55)	After QI (n= 58)	p-value
<b>Safety</b> , Adverse events (n)	0	0	NA
<b>Sedatives / opioids</b>			
- Midazolam, cumulative dose (mg/kg)*	2.8	2.9	0.79
- Morphine, cumulative dose (mg/kg)*	0.18	0.22	0.79
<b>Prevalence delirium (%)</b>			
SOS-PD score, at least one score ≥4	15.3	14.0	0.84

\* Median (IQR)

## Methods

**Design** A prospective pre-posttest implementation study was conducted in patients on a PICU for at least 3 days with a maximum of 28 days.



### Before EM (usual care)

- During this phase we assembled a mobilization team, consisting of PICU nurses, intensivist and pediatric physical therapist



### Quality improvement (QI) phase

- Set up a multicomponent, multidisciplinary protocol for EM with safety levels
- Education among PICU staff about the protocol
- Use of new equipment.
- More consultation between PT and nurse



### After implementation EM

- The last phase was after QI all included patients were treated according to early mobilization program
- Challenge:** To keep EM embedded in daily regular care

**Outcomes** Primary outcome was the number of mobilization activities. Secondary outcomes were prevalence of delirium, consumption in sedatives, and mobilization related adverse events.

## Results

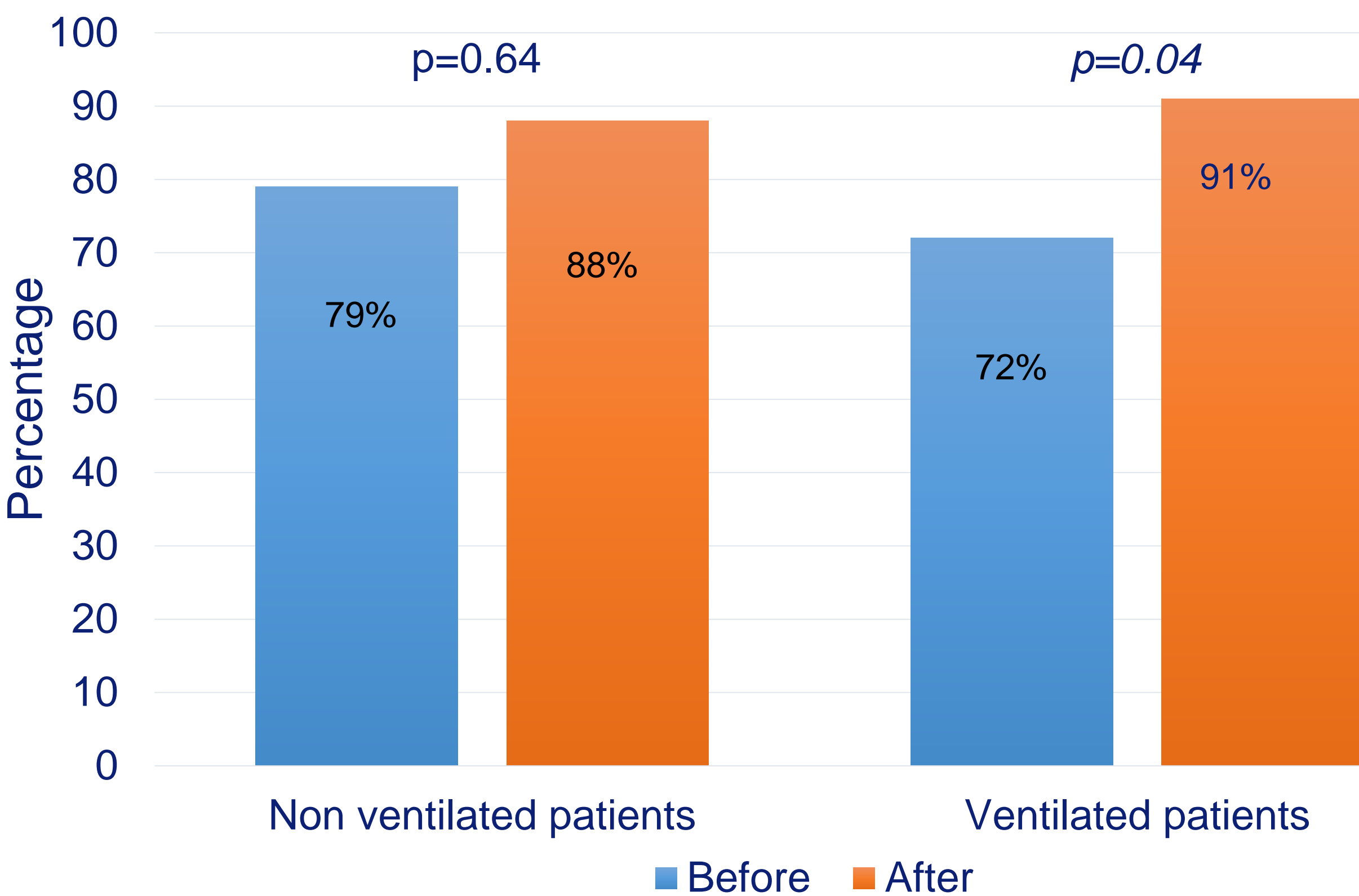
**Demographics** In total, 55 children (pretest) and 58 children (posttest) were included, with a median age of 31 months (IQR 7-106) and 35 months (IQR 8-147), respectively. More 60% of the patients were ventilated, with a median duration of 6 days (IQR 3-11) and 5 days (IQR 2-12), respectively.

**Mobilization activities** The median number of mobilization activities increased from 4 (IQR 3-5) to (IQR 4-8) (p<0.0001) (Table 1). Among children who were ventilated, there was an increase in the proportion who participated in sitting in a chair: 27% vs. 54% (p<0.029) (Figure 1).

The physical therapist was significantly more involved in mobilization after implementation of EM, 46% vs. 24% before (p=0.049).

**Conclusion** Implementation of a structured EM program in PICU patients is feasible and resulted in no adverse events

**Figure 1 Out-of-bed activities during PICU stay**







# Quality Improvement Intervention to promote Early Mobilization in the PICU: nurses’ and physicians’ opinions and perceived barriers

Sjoukje Hoekstra RN<sup>1</sup>, Tabitha van den Adel MSc<sup>2</sup>, Judith Steenhorst RN<sup>1</sup>, Mariska de Heer RN<sup>1</sup>, Petra Floor RN<sup>1</sup>, Sascha Verbruggen MD PhD<sup>1</sup>, Erwin Ista RN PhD<sup>1</sup>

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## Introduction

Early mobilization (EM) of critically ill adults has been found safe and effective, resulting in improved muscle strength and functional abilities to reduction in ICU and hospital length of stay.<sup>1</sup> Early mobilization of pediatric ICU patients seems feasible and safe.<sup>2,3</sup> However implementation of physiotherapy and mobilization is often withheld in critically ill children because of perceived problems to implement this strategy. To characterize these perceived barriers we evaluated the opinions of our PICU staff, including PICU nurses and physicians, before and after implementation of an EM program.

**Aim**  
In the current study we evaluated the opinions and perceived barriers of nurses and physicians to EM before and after implementation of an EM program

## Methods

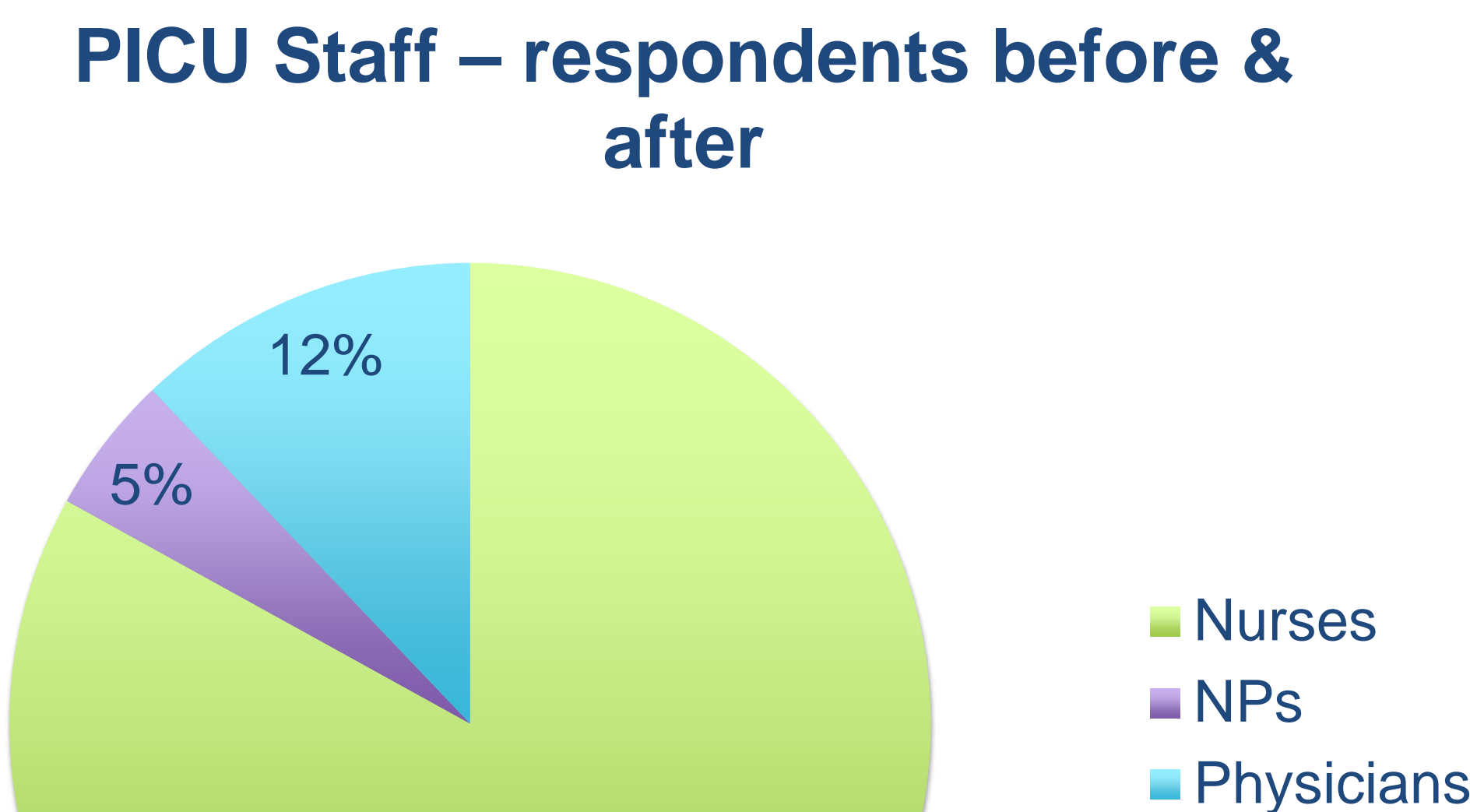
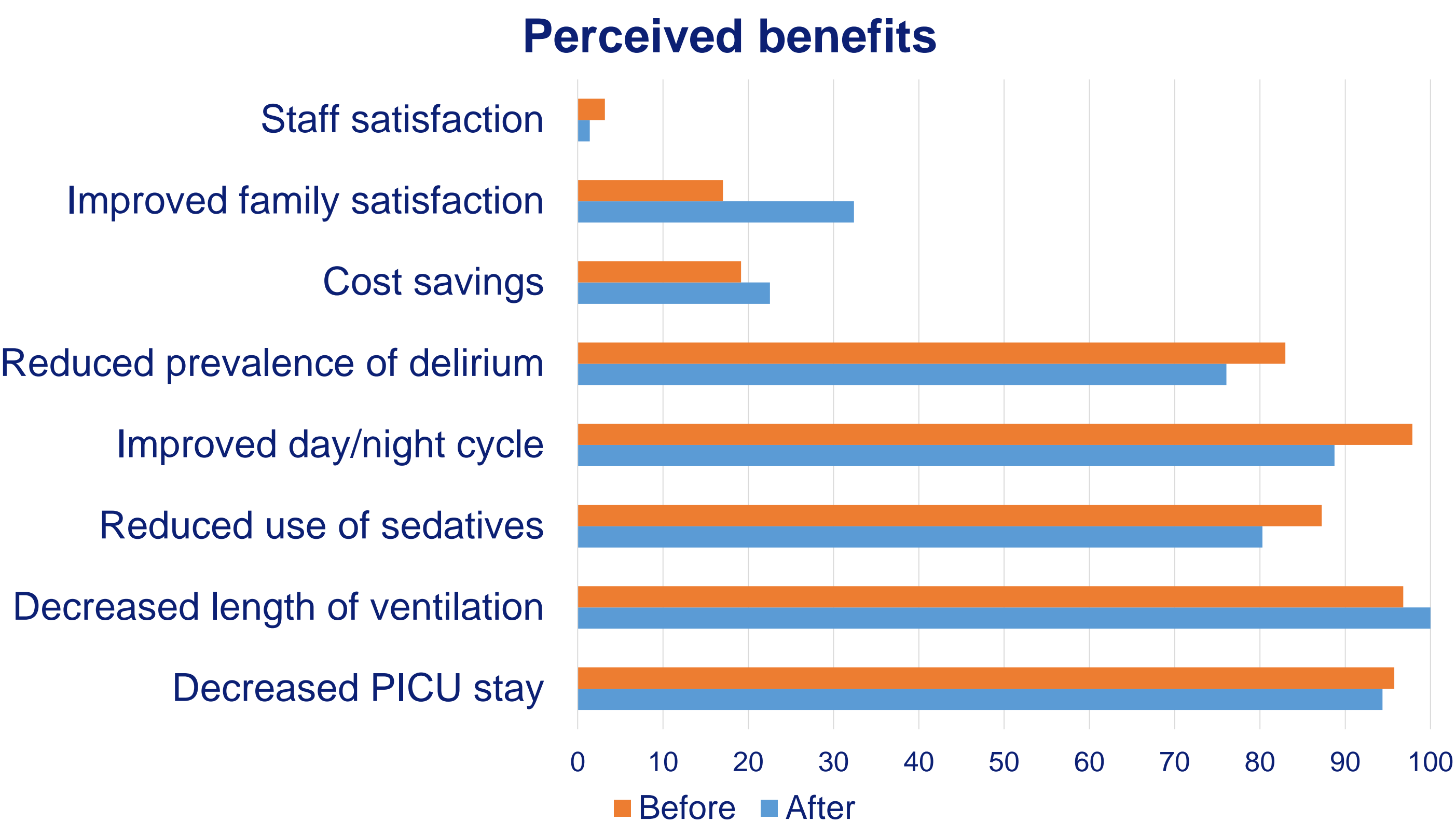
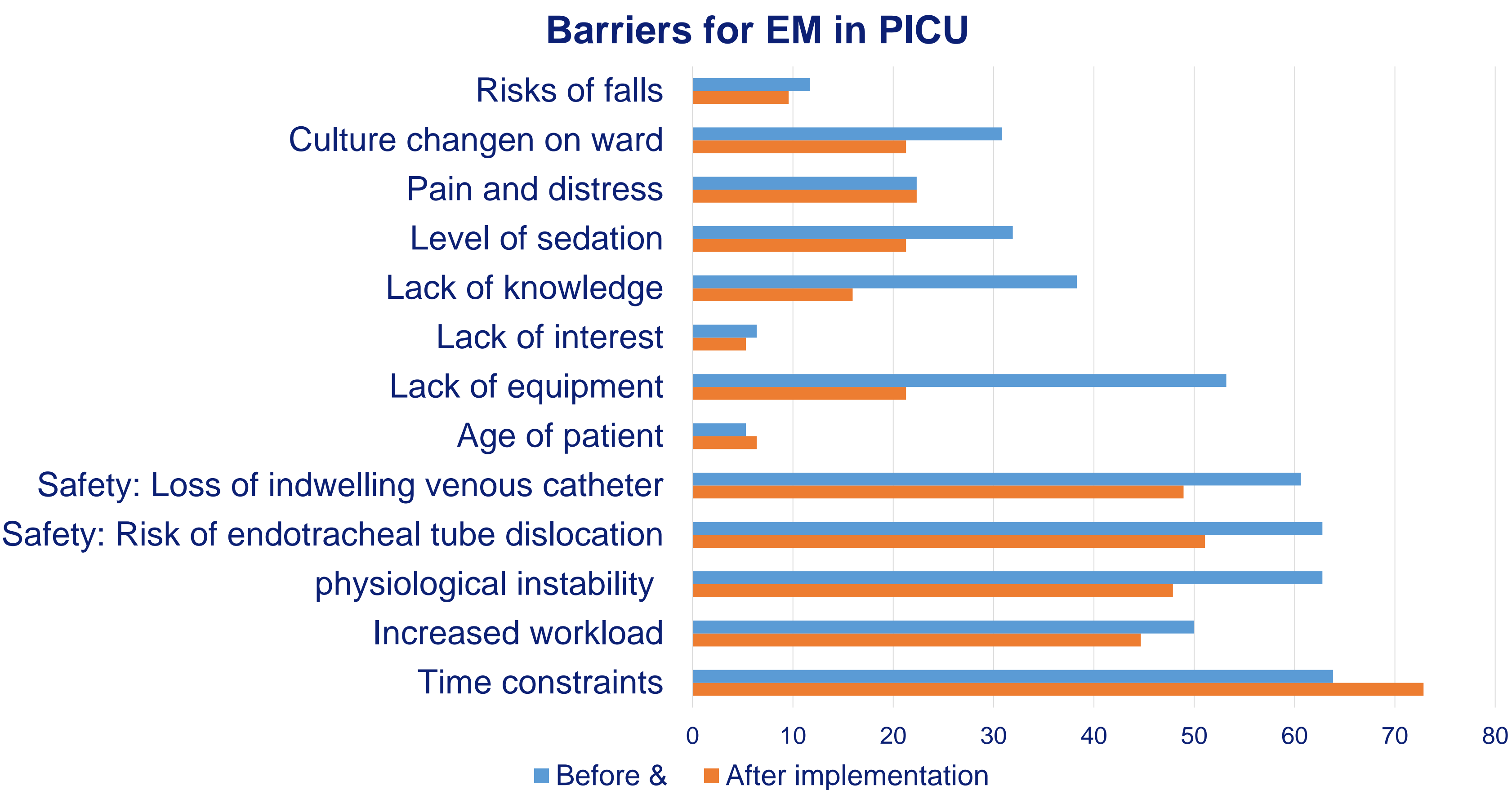
**Design** A 15-questions survey was disseminated before and after the implementation of an EM program to nurses, nurse practitioners and physicians of a level 3, 28-beds medical/surgical PICU in the Netherlands.

**Survey** A multidisciplinary team developed the questionnaire, using previously published data on provider concerns and barriers to implementation from adult and pediatric quality improvement studies. The questionnaire was sent out electronically to the PICU staff, 4 months before (December 2017) and 4 months after (October 2018) implementation of the EM program .

## Results

**Demographics** Ninety-four (59.1%) and seventy-one (48.6%) members of the PICU staff completed the survey respectively before and after implementation. Figure one shows the demographics of the respondents. The majority (83%) of the respondents were nurses.

**Questionnaire results** Support of physical therapists for EM was perceived as significantly higher after implementation: 33% vs. 76% (p<0.001). 17% of all participants before and 32% after implementation thought that patients’ family satisfaction would increase with EM.



## Conclusions

All nurses and physicians considered EM as important for critically ill children. Further, our research demonstrates that most of the perceived barriers had been resolved after implementation of EM.

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# The safety and feasibility of sitting an infant on Extracorporeal Cardiac Life Support: a case study

Holly Hyland, DPT  
Children's Hospital of Wisconsin  
Milwaukee, WI

## Introduction

- Extracorporeal life support provides mechanical support to the heart, lungs, or both<sup>1</sup>
  - A rotary or centrifugal pump, such as Rotaflow, can be used for short-term ventricular assist device (VAD) support<sup>1</sup>
  - The circuit set-up of Rotaflow VAD support and extracorporeal membrane oxygenation (ECMO) are similar; however, an oxygenator is not utilized in VAD support<sup>2</sup>
  - Extracorporeal VAD systems can be used for bridge-to-transplant<sup>1,2</sup>
- Deconditioning and immobilization are correlated with worse outcomes post heart transplant<sup>3</sup>
- Mobilizing infants on extracorporeal short-term VAD support has not been studied

## Case

- Former 35 week male twin born with decompensated heart failure likely due to intrauterine myocardial infarction
- Required inotropic support and intubation at birth
- 12 weeks of life:
  - Septic shock and necrotizing enterocolitis
  - Cannulated onto VA-ECMO via the neck
  - Left ventricular vent placed the next day
- On ECMO for 11 days prior to transition to left ventricular assist device (LVAD) via Rotaflow pump
- Extubated 30 days after cannulation
- Remained on extracorporeal cardiac life support for a total of 76 days prior to heart transplant

## Intervention

- Critical care attending physician approved transition to sitting
- Bedside RNs and PT or OT evaluated patient for appropriateness of sitting prior to each therapy session
- Caregivers involved:
  - One RN supported cannulas
  - Second RN supported endotracheal tube, chest tubes, and other lines
  - PT or OT
  - Child life specialist
- PT or OT actively transitioned patient to sitting position and provided patient with trunk and neck support while sitting
- Duration of sitting progressed with each session
- Therapist facilitated activation of neck flexors and extensors to work towards head control
- Activities while sitting included: reaching, sensory play, visual skills, and social interaction



Figure 1: Patient participating in sensory play

## Results

- Patient sat for a total of 399 minutes
  - Reclined sitting: 57 minutes
  - Full upright sitting: 342 minutes
- Patient had 52 PT or OT sessions while cannulated with 22 of these sessions focused on sitting
- Patient started sitting 24 days after cannulation onto ECMO
- Sitting duration per therapy sessions:
  - Average: 18.13 minutes
  - Longest: 45 minutes
- Sitting terminated in each session due to patient fatigue with no sessions being terminated due to safety concerns
- Sitting therapy sessions cancelled 14 times prior to initiation of session due to: newly repositioned cannula, acute hemodynamic instability, procedures, and decreased comfort level of nursing
- Patient progressed from no head control at initiation of sitting to bobbing head control by the last pre-transplant therapy session

## Conclusions

- Sitting/mobilizing an infant on extracorporeal cardiac life support via Rotaflow LVAD can be safe and feasible
- A multidisciplinary team approach is crucial
- Continued evaluation of a patient's appropriateness for sitting prior to each session is essential



Figure 2: Patient in supported upright sitting

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## Acknowledgments

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# “Rady-Set-Go”: Promoting Early Mobilization in the Pediatric Intensive Care Unit

Elizabeth Kantor BSN, RN, CCRN, C-NPT



## PICO Question

In pediatric intensive care unit patients, does an early mobilization protocol compared to current practice increase the number of early mobilization orders and nursing compliance?

## Methods

- Evidence Based Practice Implementation
- Met with stakeholders to cultivate early mobilization champions
- Created nomenclature: “Rady-Set-Go”
- Presented didactic education at team meetings and symposiums
- Executed scenario simulations at skills fairs
- Each identified champion spent 1:1 time on-shift with staff to role model and assist with compliance of activity orders

## Summary

This project demonstrated a multidisciplinary, collaborative approach and proper equipment for staff and patient protection as essential components to successful and safe mobilization of a PICU patient.

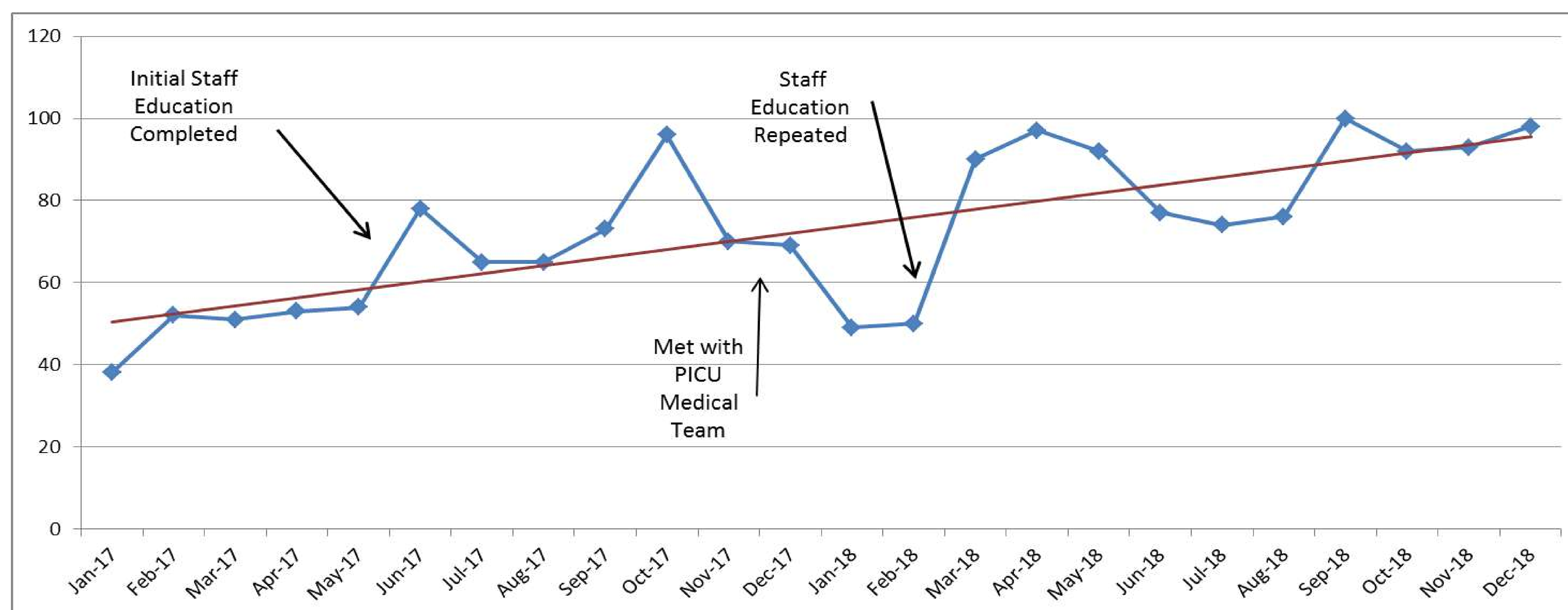
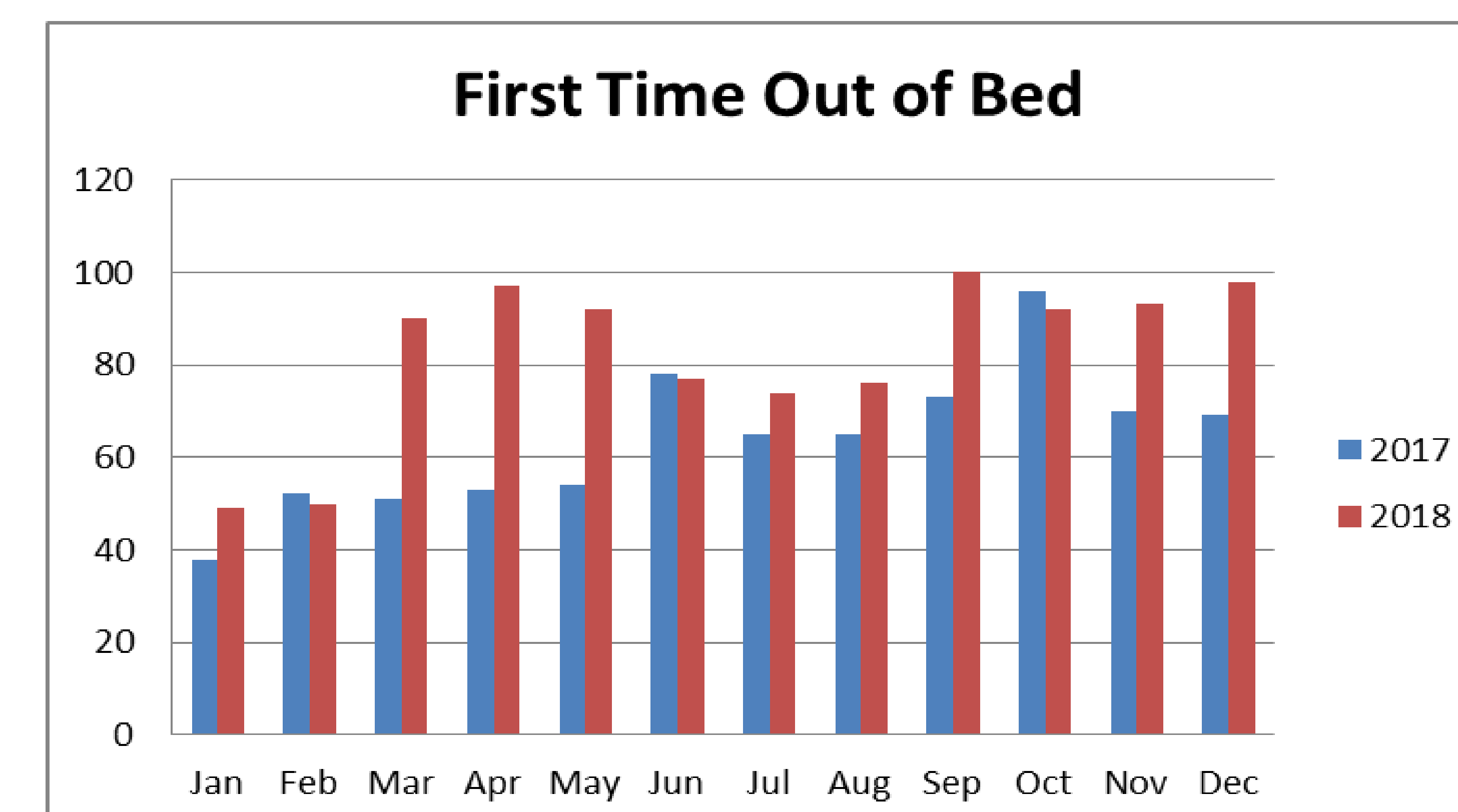
- Engage champions from each discipline: Physicians, NP, RN, RT, OT, PT, and nutrition
- Create and market a catchy name
- Write early mobilization maneuvers into order sets and standards of care
- Include parents and caregivers in early mobilization plans



This intubated PICU patient transferred out of bed to a wheelchair with the help of one nurse, one respiratory therapist, two physicians, and one parent!  
**“RADY-SET-GO!”**

## Results

To date, efforts to promote early mobilization have resulted in an increased number of patients getting out of bed for the first time while in the PICU.





# Barriers for early mobilization in a Pediatric Intensive Care Unit in Mexico.

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Universidad Autónoma de Querétaro \*  
Hospital de Especialidades del Niño y la Mujer "Dr. Felipe Nuñez Lara" \*\*

## Introduction:

Early mobilization (EM) is defined as the application of physical activity within the first two to five days of critical illness or injury in an Intensive Care Unit (ICU). EM is proven to be a safe practice. It is also been described as feasible and with great short to long term benefits. In order to implement EM in the ICU the multidisciplinary team must identify and overcome perception barriers. In Mexico EM is not a standardized practice in the ICU.

## Objetives:

- Describe the barriers for EM in a Pediatric intensive Care Unit (PICU) in a specialized children's hospital in Central Mexico.
- Identify the knowledge and beliefs about the benefits of EM in among the pediatric intensive care professionals .

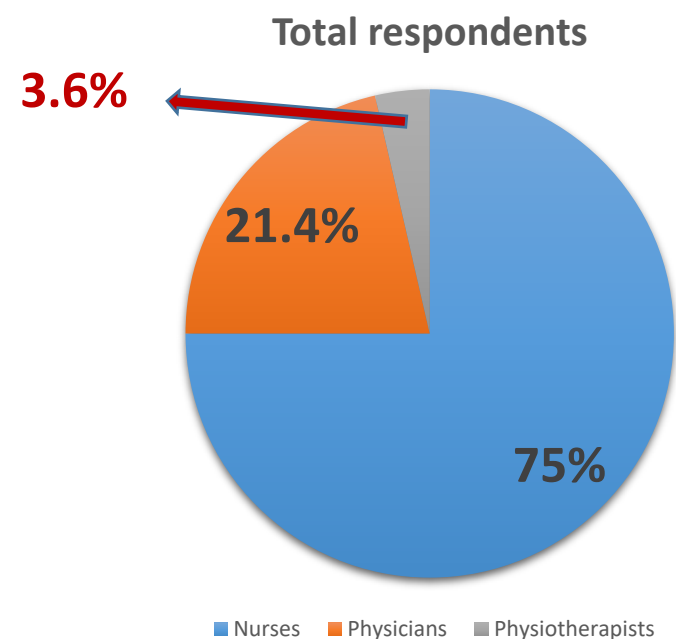
## Method:

- Apply a survey that determines the perceptions of PICU professionals concerning the most important barriers for EM in the Hospital of Children and Women Specialties in Querétaro.
- The survey instrument was based on Hoyer (2015), translated and validated by experts. Data was analyzed using Cronbach's Alpha (0.70).
- Twenty three professionals completed the survey. Of these, 63% were female and 37% male with a mean age of  $32,0 \pm 7,6$  years and  $2,6 \pm 3,1$  years of experience treating critically ill children.

## Results:

Health providers at the hospital knew the benefits and the security of EM. A total of 67.8% agreed or totally agreed that the hospital does not have the equipment and/or furnishing to apply EM. Survey results found that basic EM procedures were conducted by at least once a day. The most limiting barrier to greater implementation of EM identified by the survey was the lack of proper equipment.

EM in this unit seems to be well accepted and also was recognized that the physiotherapist (PT) should be in charge of mobilization. An additional problem observed was the absence of sufficient PT in this PICU (only the 3.6%). (Figure 1)



## Conclusion:

EM is accepted as an important part of the treatments involved in this PICU. If we want to completely describe Mexican's barriers for EM in pediatrics further multicenter study will be needed.



## INTRODUCTION

- Post intensive care syndrome (PICS) was defined by Needham et al. in 2012 and pediatric PICS (PICSp) was conceptualized by Manning et al. in 2018.
- Collaborative groups have gained interest in the field since the SCCM launched THRIVE.
- We present the first collaborative group for the prevention, detection, treatment and follow-up of PICS and PICSp in Spanish and Portuguese speaking countries.

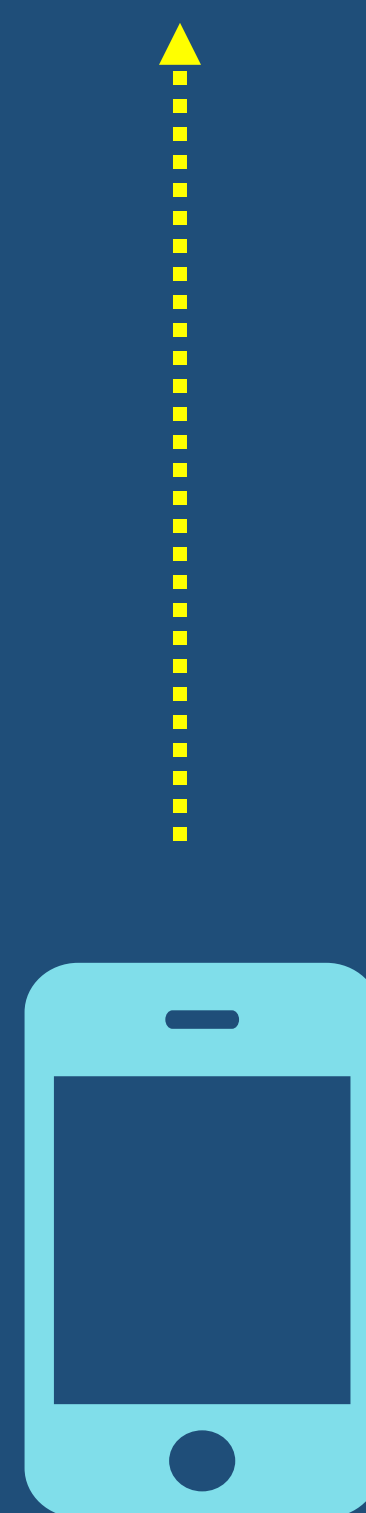
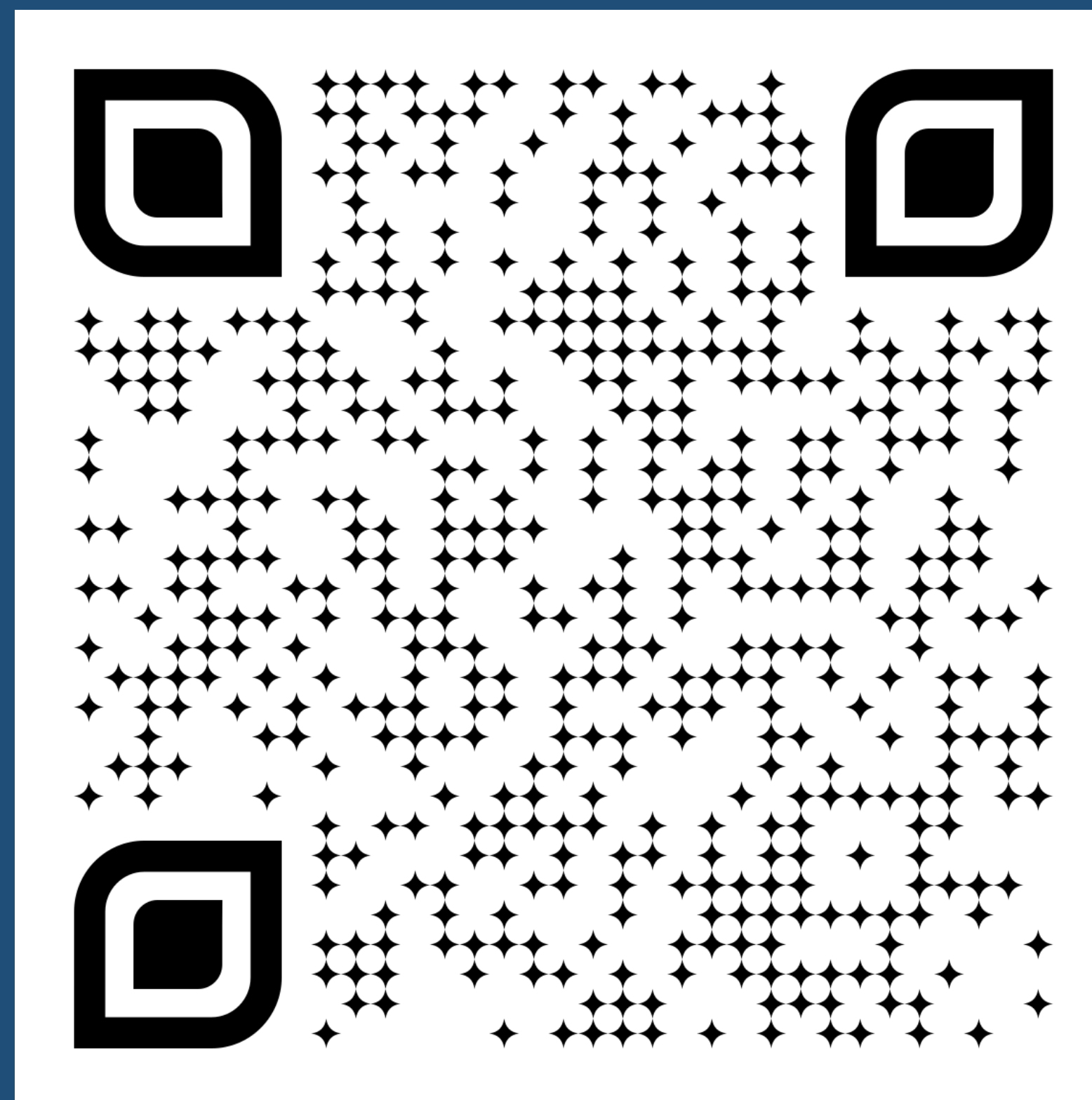
## METHODS

- Support from the International Research Project for the Humanization of Intensive Care Units (Proyecto HU-CI).
- Founders: 4 adult Critical Care Physicians, 2 Pediatric Critical Care Physicians and 1 adult Critical Care Registered Nurse.
- **The founders elaborated:**
  - Minimum requirements for acceptance
  - Obligations of the members
  - Design of a shared database
  - Social media presence
  - Program for the 2<sup>nd</sup> edition of the Spanish National Post Intensive Care Syndrome Meeting.

## RESULTS

- Expression of interest:
  - 6 adult teams from Spain
  - 3 pediatric teams from Spain and Mexico
- The project has been presented in: Spain, Brazil and Argentina.
- Endorsement from:
  - FEPIMCTI: Pan American and Iberian Federation of Societies of Intensive Care
  - SEMICYUC: Spanish Society of Intensive, Critical and Coronary Unit Medical Care
  - SECIP: Spanish Society Of Pediatric Intensive Care.

# “A new collaborative PICS and PICSp group is being launched in Spanish and Portuguese speaking countries”



**Scan the code with your phone to visit our website (in Spanish) and join us!**

Feel free to share on Twitter. Don't forget to add #ICURehab



• Miguel Rodríguez-Rubio<sup>1,10</sup>, MD; Elena Álvarez-Rojas, MD<sup>1</sup>; M Ángeles De La Torre Ramos, MD<sup>2</sup>; Ángela Alonso-Ovies, MD<sup>2,3</sup>; Gabriel Heras La Calle, MD<sup>3,4,5</sup>; Carlos Velayos Amo, MD<sup>2</sup>; Jose Antonio Ángel Sesmero, RN, MSc<sup>3,6</sup>; Jose M. Añón MD, PhD<sup>7,8,9</sup>

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HEALING WALKS:

GIVING LIGHT TO A

PEDIATRIC INTENSIVE

CARE UNIT

PRESENTER

 Miguel Rodríguez-Rubio, MD

 @miguelrdgzrubio

INTRODUCTION

- Natural light stimulates healing and promotes recovery
- Lack of natural light has been linked to disruption of sleep and circadian rhythm, increased delirium risk and increased risk of death
- In our architecturally outdated PICU, lack of light has been identified as a significant problem by children, parents and practitioners
- While a new state-of-the-art Unit with natural light and artificial lighting systems that replicate its intensity is being built, we designed interventions to mitigate the burden of the architecture of a busy and highly complex Unit built in 1976

METHODS

- With support from the Spanish ‘Fundación para el Progreso en el Tratamiento del Niño grave’ (Foundation for the Improvement in the Treatment of the Critically Ill Child) we developed a project called ‘Healing Walks’ consisting of protocolized walks outside of the Unit
- Patients with risk factors or previously diagnosed with delirium are selected for ‘Healing Walks’ hypothesizing that exposure to natural light and natural views can decrease the incidence of delirium, contribute to illness recovery and help prevent pediatric Post Intensive Care Syndrome (PICSp)
- Individual risk assessment for patients is mandatory before planning the walk in an open space within the hospital facilities but outside of the PICU. Family involvement in the planning process is ensured.
- An informational video in Spanish was produced to promote this project among families and institutions. In it, parents and siblings reflect on the impact of the admission to PICU and of the environment, specially the absence of natural light.
- The video was uploaded to YouTube® in Spanish with great impact on Social Media, specifically more than 8000 impressions on Twitter® and close to 3000 views on YouTube®.
- We hereby present the Spanish version with English subtitles

Healing walks expose critically ill children to natural light and natural views and they could decrease the incidence of delirium, Pediatric Post Intensive Care Syndrome (PICSp) and contribute to illness recovery

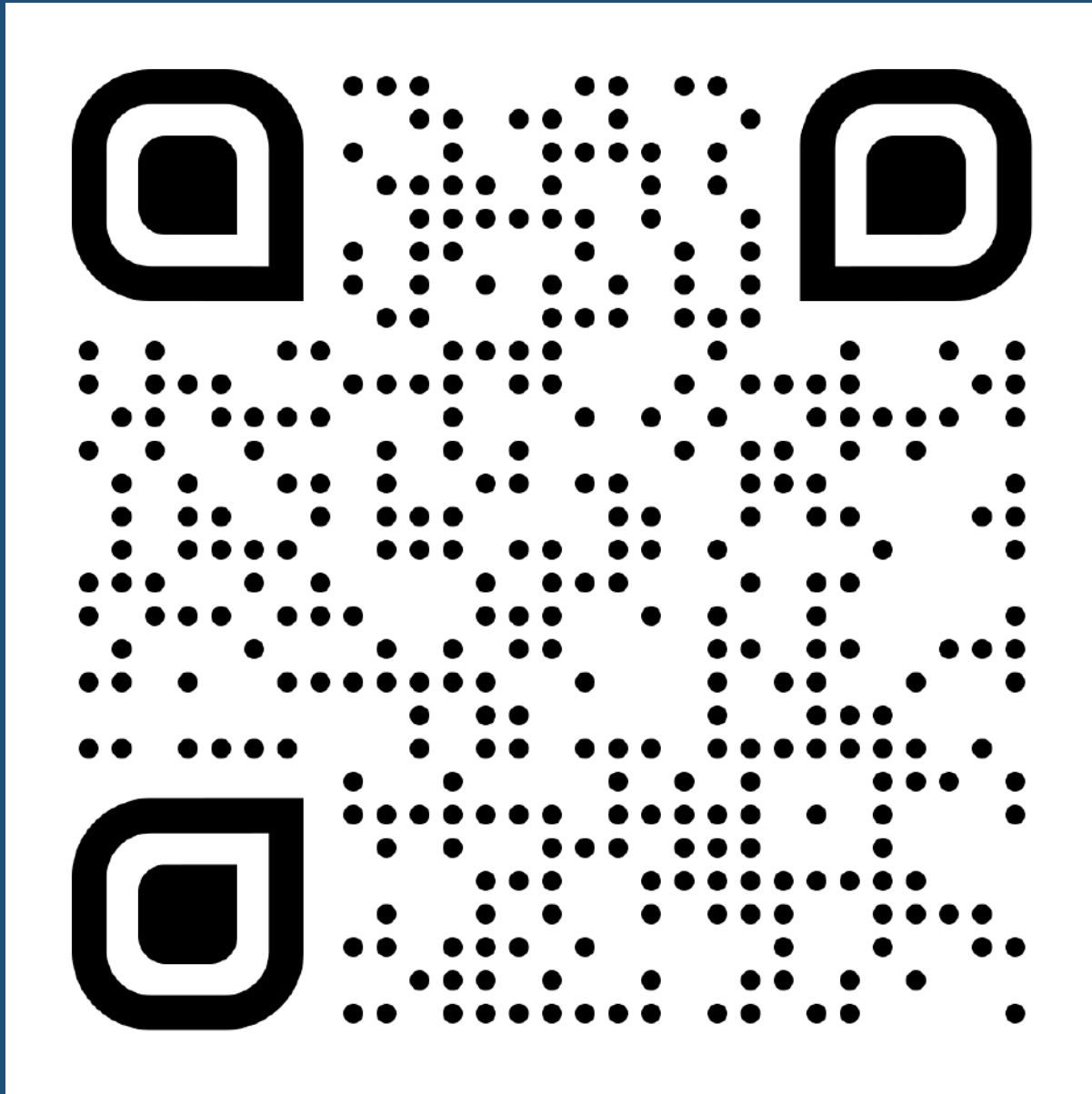
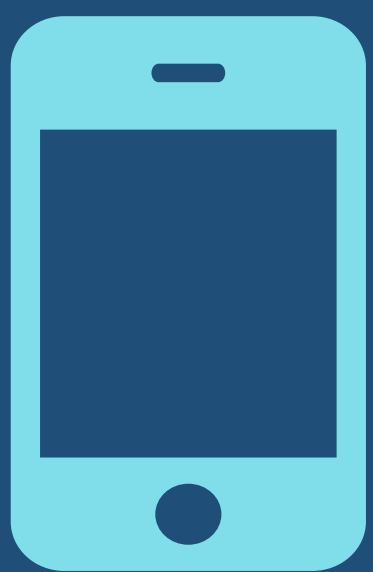


“It seems like he was telling us: that’s it, I made it this far, I can’t go on”

“We saw how he returned to the world”



“We thought that it couldn’t be possible, that he was not seeing or feeling what we were doing... but we found out that it was true!”



Scan the code with your phone to watch the full video in Spanish with English subtitles

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Don’t forget to add #ICUrehab #PedsICU #ICULiberation #HealingWalks



CONCLUSIONS

- Protocolized **HEALING WALKS** outside of PICU are a safe and effective way of exposing patients to natural light
- They provide an opportunity for the family to gather around the critically ill child outside the PICU environment and **help establish a positive work climate with families and healthcare practitioners**



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# Better Together: Long-Term Behaviors & Perspectives after a Provider-Family Writing Intervention in the ICU

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## Introduction

### Expressive Writing Background

- **Expressive writing (EW):** therapeutically-focused writing that involves disclosure of personal information, thoughts, or feelings (1).
- The ICU and other medical settings feature many stressors for patients, their families, and clinicians.
- Stress has been shown to be detrimental to human health in many ways (2).
- EW has been shown to reduce stress, improve disease-related quality of life, and reduce physical symptoms in numerous populations (3-15).
- EW interventions also have the potential to be cost-effective, low-risk, and generally well-accepted by patients.
- Many questions still exist related to optimal EW intervention design, delivery, and mode of benefit.

### History of The 3 Minute Mental Makeover (3MMM)

- The 3MMM is a brief, clinically-focused EW intervention designed for use in routine clinical practice (16).
- Practitioner and patient/family members both complete a short writing exercise and share what they have written with one another.
- The 3MMM has been shown to be associated with reduced stress for patient/family members and practitioners immediately post-intervention.

### Aim of this Study:

To examine long term practitioner and patient/family member perspectives regarding the 3MMM, as well as long term use of writing to cope with stress.

## Methods

### Sample:

- Patients and families in the NICU, PICU, general inpatient units and outpatient clinics of a suburban children's hospital (n=61).
- Practitioners who facilitated 3MMM intervention in the original study (n=8): 2 pediatric residents, 3 pediatric nurses, a developmental psychologist, a developmental educator, and a pediatric cardiologist.

**Patient/Family Contact:** A follow-up phone survey was attempted for all original patient/family participants (n=96) 12-18 months after participation in original 3MMM study.

**Practitioner Contact:** A follow-up survey was emailed to the practitioners (n=8) approximately 24 months after participation in original 3MMM study.

### Survey Contents:

- Perceived usefulness of 3MMM.
- Important/Unimportant aspects of the 3MMM.
- Continued use of the 3MMM/ other forms of writing to cope with stress.
- Barriers and benefits to using the 3MMM in clinical practice.

**Analysis:** Responses from the original study and follow-up survey were compared using the Wilcoxon signed rank test.

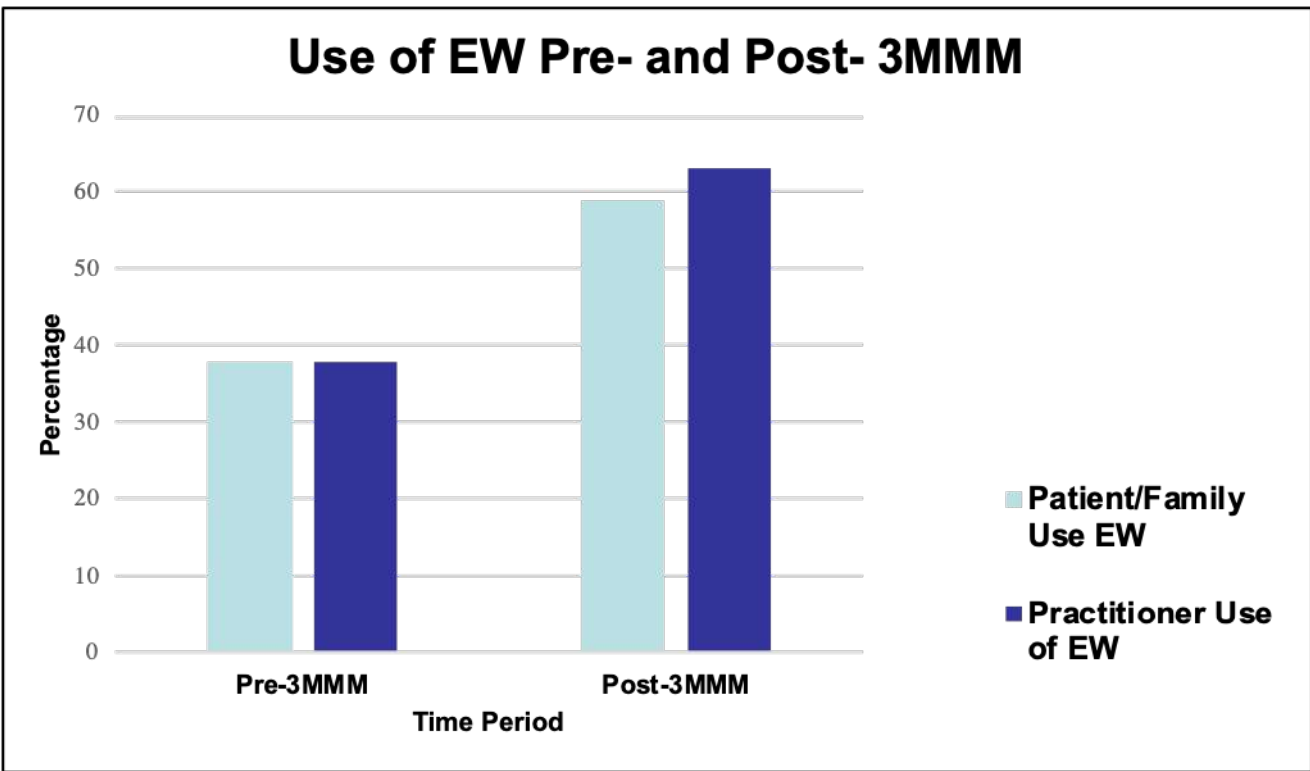
## Results

- Of the 61 original patient/family participants, 96 (64%) were reached for follow-up.

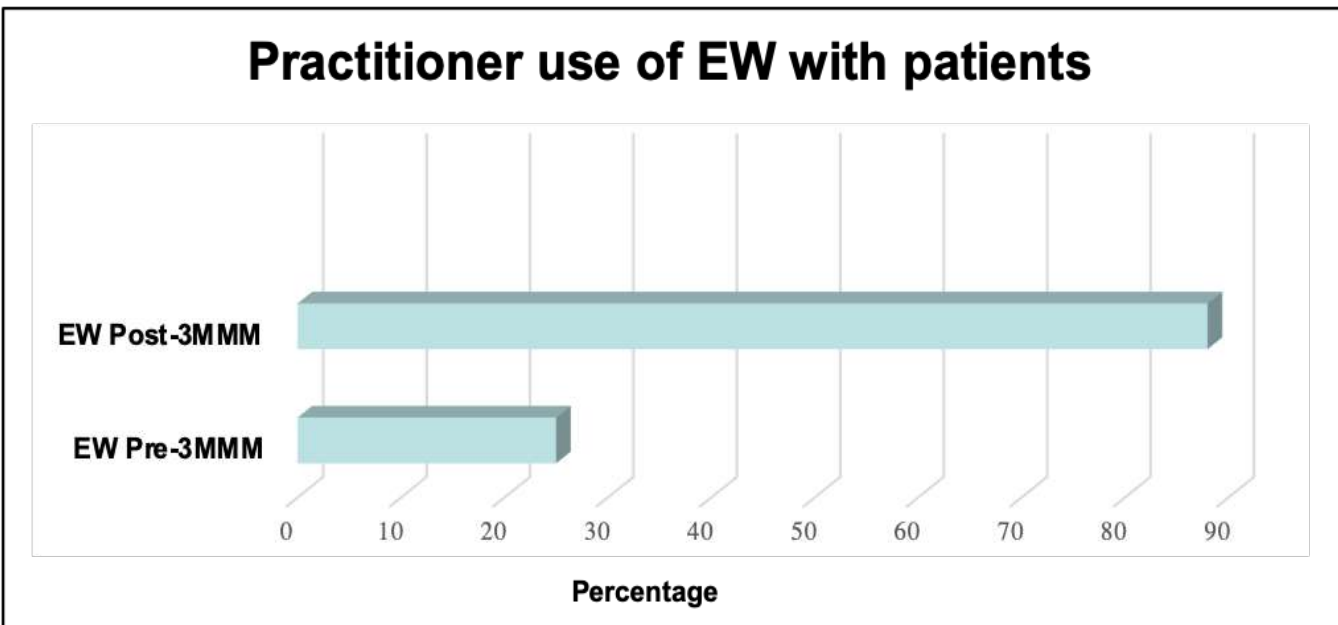
## Results

- 52 (85%) agreed that the 3MMM had been helpful.
- 54 (89%) of patient/family participants agreed it was important that providers and participants wrote together.
- 56 (92%) indicated that it was important that both provider and patient shared what they wrote.

### Writing Behavior Changes

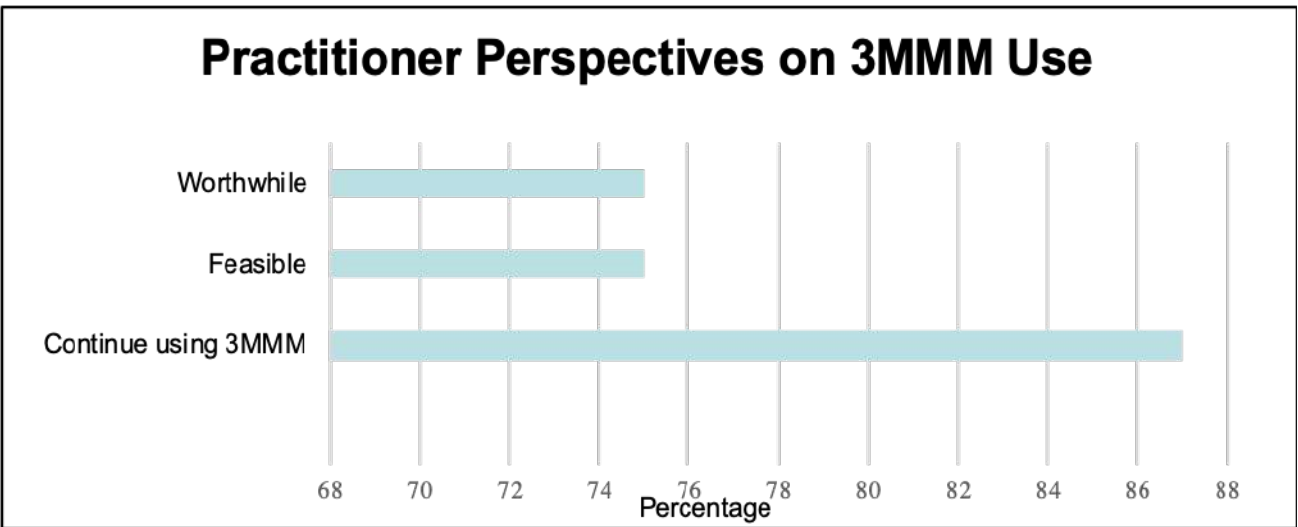


**Figure 1.** At follow-up, 36 (59%) of patient/family participants reported using writing to help cope with stress, compared to only 23 (38%) at baseline ( $p = 0.005$ ).



**Figure 2.** There was also a trend towards more clinicians using EW (the 3MMM) with their patients, comparing pre and post-original study.

### Clinician Perspectives



**Figure 3.** The majority of clinicians (87%) also continued to use the 3MMM in clinical practice following the 3MMM study and ranked it as both feasible (6/8) and worth the time investment (6/8).

## Discussion

**Comparing to current literature:** Compared to other EW interventions, the 3MMM is brief, used in clinical practice, and does not require advanced training. No other EW interventions in the literature have patient/family and practitioner write and share together, which may be an important factor. Also, no other EW studies have examined long-term clinician perspectives and use of an EW intervention.

**Limitations:** Possible volunteer bias, non-controlled, small practitioner sample size, non-validated survey instruments.

**Future Research:** Examine short and long-term effects on a larger group of practitioners, evaluate the impact of 3MMM on patient satisfaction, physical markers of stress (BP, cortisol, etc.), and practitioner burnout and job satisfaction.

## Conclusion

- 3MMM intervention demonstrated long-term perceived benefit and may be associated with lasting behavior change in both patients/family and practitioners.
- These findings provide preliminary support for the acceptability, feasibility, and helpfulness of 3MMM for practitioner use with patients and families in the ICU and other clinical settings.



**8<sup>th</sup> Annual Johns Hopkins Critical Care Rehabilitation Conference  
Poster Session**

**TITLE**

Better Together: Long-Term Behaviors and Perspectives after a Provider-Family Writing Intervention in the ICU

**ABSTRACT**

**Objective:** An expressive writing intervention, the Three-Minute Mental Makeover (3MMM), was previously associated with reduced stress for providers, patients, and families in ICUs and other clinical settings. The goal of this follow-up study was to evaluate long-term use of writing and perspectives after participation in the 3MMM.

**Methods:** The original study involved patients and families in the neonatal and pediatric intensive care, inpatient units and outpatient clinics of a children's hospital. Healthcare providers led the writing intervention, writing concurrently with patients and families using the 3MMM format. Follow-up contact by phone was attempted for all original patient/family participants 12 to 18 months after completing the exercise, and for providers, approximately 24 months. Participants were surveyed about perceived usefulness, what aspects of the 3MMM were important, and continued use of the 3MMM and other writing to cope with stressful situations. Original and follow-up survey responses were compared using the Wilcoxon signed rank test.

**Results:** Of the 96 original patient/family members, 61 individuals were reached, remembered the 3MMM, and agreed to participate in the follow-up study. Of the 61 participants, 52 (85%) agreed that the 3MMM had been helpful, 54 (89%) agreed it was important that providers and participants wrote together and 56 (92%) indicated that it was important that both provider and patient shared what they wrote. At follow-up, 36 (59%) reported using writing to help cope with stress, compared to only 23 (38%) at baseline ( $p = 0.005$ ). The majority of clinicians (87%) also continued to use the 3MMM in clinical practice following the 3MMM and ranked it as both feasible (6/8) and worth the time investment (6/8).

**Conclusion:** The 3MMM intervention demonstrated long-term perceived benefit and may be associated with lasting behavior change. Over one year after participating in this short writing exercise, families and patients continued to report that the 3MMM had been helpful. Respondents also reported that it was important to write and share together with their provider, and participation in the 3MMM was associated with increased writing use as a coping technique. Additionally, findings among practitioners surveyed provide preliminary support for the feasibility of 3MMM use as part of routine clinical practice.

**Abbreviations:** EW: expressive writing; 3MMM: Three-Minute Mental Makeover; NICU: neonatal intensive care unit; PICU: pediatric intensive care unit.

**Keywords:** communication, expressive writing, mindfulness, narrative medicine, stress reduction, writing together

**3MMM PROMPT**

1. Three things you are grateful for (be specific; for clinicians- make one of them about the patient).
2. The story of your life in 6 words (example: Born, school, work, work, work, work).
3. Three wishes -pretend you rub a magic lamp (for clinicians- make one of them about the patient).

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### Want to learn more? Read about the 3MMM Project:

<http://almanac.acehp.org/p/bl/et/blogid=2&blogaid=468>

<https://www.chicagotribune.com/suburbs/evanston/chi-ugc-article-narrative-medicine-can-improve-healing-lower-2018-10-24-story.html>

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# Optimizing Functional Outcomes After Pott's Shunt Palliative Surgery

Atara Sheinson, OTR/L  
Kathleen Riley, DPT  
Denise Gibbs, DPT



## Objectives

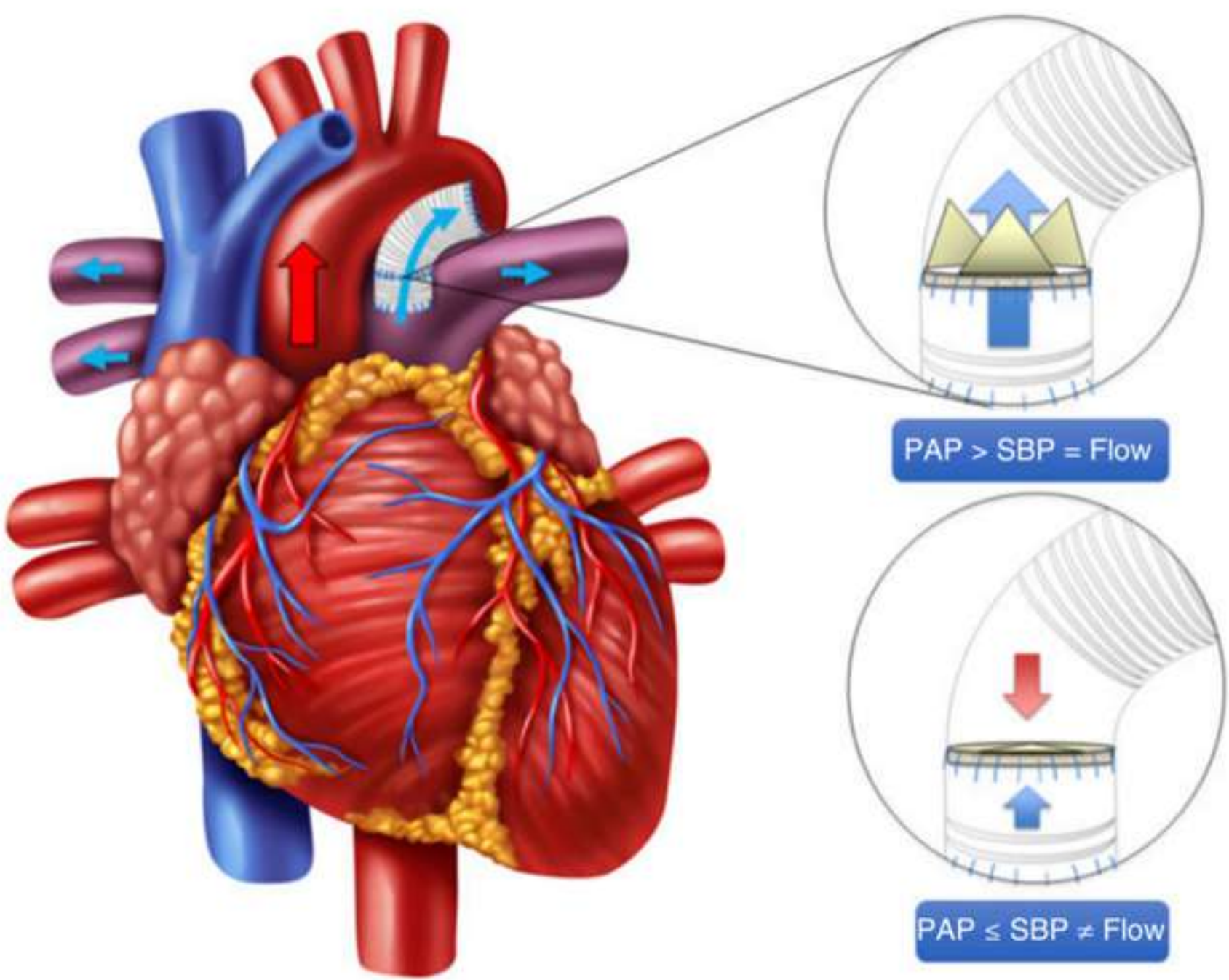
- Discuss rehabilitation considerations with the pediatric population recovering from Potts Shunt procedure.
- Explore rehabilitation potential during and post hospital course.
- Reinforce the importance of an interdisciplinary approach and culture of care

## Medical Background

- Recent treatment strategies have improved the life expectancy of pediatric pulmonary hypertension patients via medical management and a novel surgical approach called the Pott's Shunt.
- The shunt relieves pressure on the right ventricle and increases oxygen blood flow to upper body, preserving right ventricular function prior to lung transplantation. Team expects to see a decrease in lower extremity SpO2 with activity to ensure proper shunting of deoxygenated blood.
- Post operatively patients are on ECMO as a bridge to recovery, and rehabilitation consultations were conducted with each case.

## Case Series Description

- Four case series discussion performed at NY Presbyterian Children's Hospital over the past two years.
- Post operatively patients received ECMO, and participated with pediatric rehabilitation therapies during their ICU course.
- Therapists attended ECMO rounds, bedside rounds and closely communicated with ICU and ECMO teams, Perfusion and Nursing with regards to treatment progression and positioning.
- Clinical decisions guided by activity levels on daily basis
- 2 of 4 patients were successfully mobilized while cannulated



	Case 1	Case 2	Case 3	Case 4
Age	15	13	13	16
Duration Cannulation	4 days	3 days	13 days	6 days
Timing for therapy orders	POD 5	POD 2	POD 2	POD 1
Therapy Sessions	10 OT 14 PT	13 OT 15 PT	17 OT 16 PT	16 OT 8 PT
LOS after surgery	30 days	30 days	32 days	27 days
Pressure ulcers	Stage 1 sacral		Stage 2 coccyx	

## Results

- Early therapy consult and collaborative team approach are vastly beneficial.
- Pain, anxiety and skin care optimization.
- Individualized SpO2 parameters adapted to post-operative anatomy.
- Importance of patient and caregiver education regarding activity pacing and energy conservation methods.
- Beneficial use of the Livengood walker for this patient population.
- Initiating PICU levels of care for the Pott's Shunt patients.

## Rehabilitation Limitations

- Complicated discharge issues with this special population due to limited outpatient pediatric pulmonary rehab programs.
- Travel considerations and equipment needs.

## Conclusion

- This complex management of patients with pulmonary hypertension management is evolving and initiation of therapeutic interventions during the ICU course is substantially beneficial.
- Pain, skin care management, ADL and mobility performance improved with therapy interventions.
- Pulse oximetry monitoring parameters from several anatomical sites are important to monitor for appropriate shunting.
- Clear communication and parameter determination with the medical team is essential.

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