

<b>POSTER PRESENTATION SCHEDULE</b> <b>11th Annual Johns Hopkins Critical Care Rehabilitation Conference</b>					
Time	Presentation Order	Presenter	Author(s)	Title	Institution
Facilitator -Annette Lavezza					
Friday, November 4th, 2022 - AM Session					
7:30AM - 8:30AM	1	Andrea Rapolthy-Beck	Andrea Rapolthy-Beck, M.Sc; Jennifer Fleming, PhD; Merrill Turpin, PhD.	The effectiveness of early occupation-based therapy in an intensive care unit: a single-site randomised controlled feasibility trial (EFFORT-ICU)	Surgical Treatment and Rehabilitation Service
	2	Soohyun Wi	Soohyun Wi, PT, Ph.D, Hyung-Ik Shin,MD, Ph.D, Sung Eun Hyun,MD, Hyemin Ji, MD, Junghyun Kim, PT, PhD, Woo Hyung Lee, MD, Ph.D	Protocol for a single-blinded randomized-controlled clinical trial to investigate the effect of in-bed cycling/stepping on functional mobility in critically ill patients	Seoul National University Hospital
	3	Vimal Palanichamy	Fazila Binte Abu Bakar Aloweni, Irene Too Ai Ling,Oh Xueyan, Vimal Palanichamy	Compact ICU Trolley for Efficient and Safe Mobilisation of Critically ill Patients	Singapore General Hospital
	4	Abhinandan Chittal	Abhinandan Chittal, MBBS; Isabel Trejo-Zambrano, MD; Israa Hassan, MBBS; Muna Abbas, MBBS; Earl Mantheiy, BA; Vasudha Maddukuri, MBBS; Constant Olivier Nemi Pondy; Stephanie Hiser, PT, DPT	Physical Therapy Dose Among Mechanically Ventilated Patients in the Medical ICU at Johns Hopkins Hospital	MedStar Health Internal Medicine Residency Program
	5	Shirah Moses	Madeline Arena, PT, DPT; Shirah Moses, OTR/L	Non-Pharmacological Delirium Management in the Medical ICU	New York Presbyterian Hospital Columbia Irving Medical Center
	6	Lydia Sura	Lydia Sura MOT, OTR/L, Jenna Hightower PT, DPT, CCS, Jennifer Birst, OT, Olivia Davis, MOT, OTD, OTR/L, Pablo Moreno Franco, MD, Pramod Guru, MBBS, MD, Gregory Worsowicz, MD, Nikki Matos, APRN, DNP, Devang Sanghavi, MD	The Role of Occupational Therapy in Patients Requiring Extracorporeal Membrane Oxygenation with Coronavirus Disease: A Pilot Case Series	Mayo Clinic
	7	James Stout	Elizabeth Turnipseed, MD, Phillip R. Morris, RN, BSN, Jimmy Stout, RN, MBA, Sam Nimah	A Dynamic Interdisciplinary Approach to Weaning the Complex Ventilator Patient in the Acute Inpatient Setting	Special Care Providers/UAB Hospital

\*\*\*Vote for your Favorite Poster Presentation from Friday, November 4, 2022 – AM Session [here](#)\*\*\*





# The effectiveness of early occupation-based therapy in an intensive care unit: a single-site randomized controlled feasibility trial (EFFORT-ICU)

Andrea Rapolthy-Beck<sup>1, 2, 3</sup>, Jennifer Fleming<sup>3</sup>, Merrill Turpin<sup>3</sup>, Kellie Sosnowski<sup>2</sup>, Simone Dullaway<sup>2</sup> and Hayden White<sup>2</sup>

<sup>1</sup> Surgical Treatment and Rehabilitation Service <sup>2</sup> Logan Hospital <sup>3</sup> School of Health and Rehabilitation Sciences, The University of Queensland



**CONTACT**  
Andrea Rapolthy-Beck  
Occupational Therapist,  
Email: [andrea.rapolthy-beck@health.qld.gov.au](mailto:andrea.rapolthy-beck@health.qld.gov.au)  
**Funding Acknowledgement**  
ARB has been awarded a Metro South Health Research Support Scheme Postgraduate Scholarship to pursue doctoral studies.

## Multidisciplinary Rehabilitation: Why OT?

Early multidisciplinary rehabilitation within ICUs has become an established validated practice to improve functional outcomes with associated financial savings.

Occupational therapists have been recognised as key team members of the multidisciplinary team providing therapeutic input into other acute care services and contributing to cost savings. Yet there is limited evidence regarding the effect of occupational therapy within the intensive care setting on long term functional gains and the symptoms of PICS, further influencing occupational therapy staffing, service provision and scope of practice.

This feasibility trial explored the safety and efficacy of delivering occupational therapy to mechanically ventilated patients in a medical surgical ICU.

## Methods

**Design:** randomised controlled assessor-blinded feasibility trial comparing enhanced early occupational-based therapy (intervention) to standard care (control) with outcomes measures at ICU discharge, hospital discharge and 90 days Post randomisation

**Setting:** level 5, eight bed medical/surgical ICU at Logan Hospital, Brisbane

**Participants:** Participants were consecutive admissions to the unit between August 2018 and October 2019 ( $n=30$ )

**Inclusion criteria** were a) aged 18 and over, b) requiring mechanical ventilation for greater than 48 hours.

## Outcome Measures and Intervention

**Primary Outcome Measure:** The Functional Independence Measure™ (FIM)

**Secondary Measures:** The Modified Barthel Index (MBI), The Montreal Cognitive Assessment (MoCA), Grip strength was measured using a dynamometer (Jamar), The Hospital Anxiety and Depression Scale (HADS), The Short-Form (36) Health Survey (SF-36v2™)

### Intervention:

**Control Group:** usual occupational therapy including splinting, positioning, pressure care management

**Intervention Group:** Up to 60 mins daily of individualised occupation-based therapy which covered a range of activities which were individualised based on the pre-intervention measures and included grooming, leisure tasks, cognitive stimulation and upper limb practice in function.

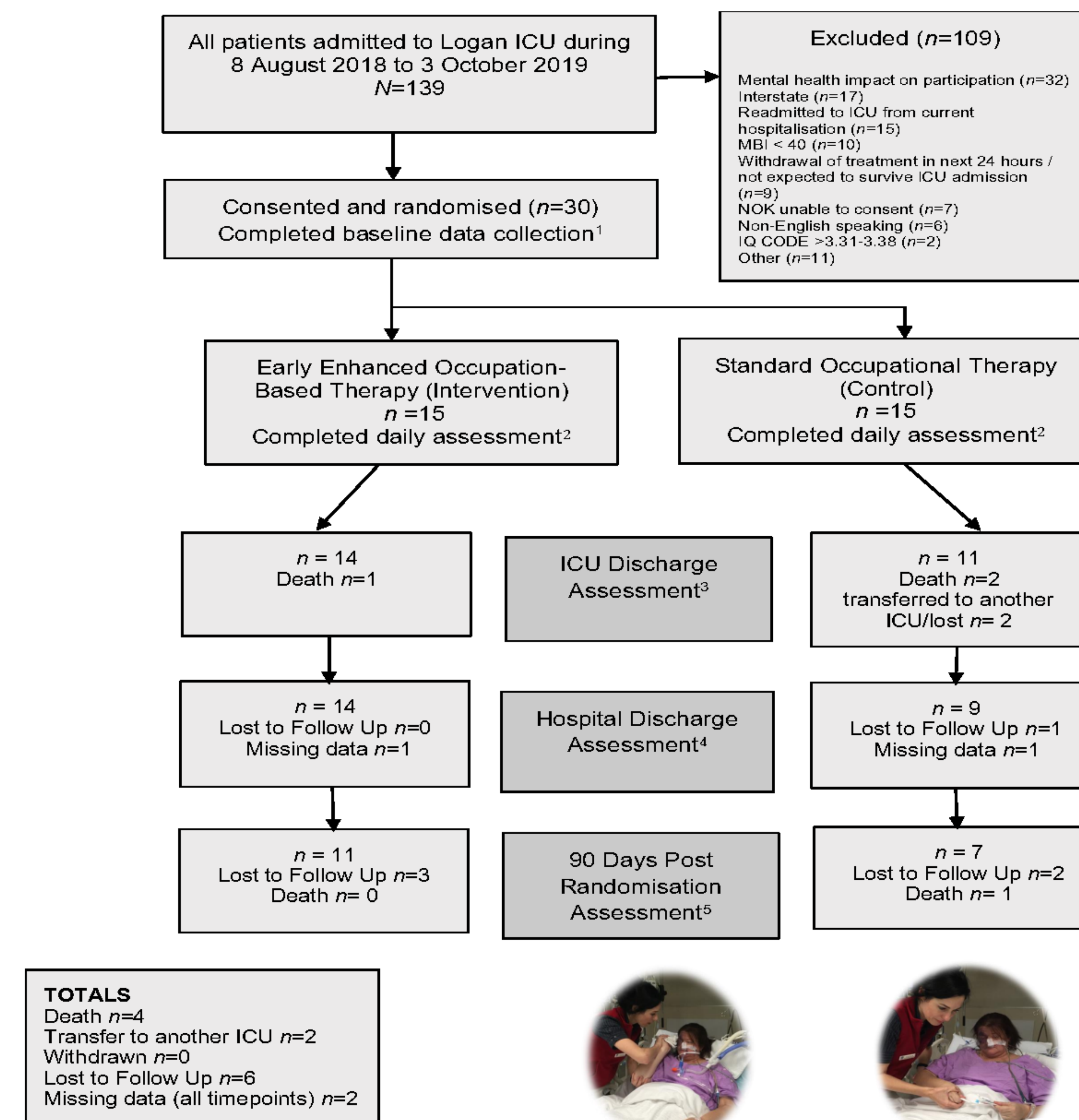
**Data Analysis:** SPSS version 28.0 was used. Data were analysed via per protocol and intention to treat methods. Continuous variables were compared between the groups at each follow-up using independent groups  $t$ -tests with adjustment if indicated by Levine's test for equal variance. Effect sizes were calculated using Cohen's  $d$  and interpreted as a small ( $d=0.2$ ), medium ( $d=0.5$ ) and large ( $d=0.8$ ) effect [45]. A  $p$  value of 0.05 (one-sided) was considered significant.

### Results Summary:

Sample characteristic for the groups suggested they were similar.

All outcome measures could be administered at the 3 timepoints

The difference between groups approached significance at 90 days post randomisation in the FIM Motor and MBI ( $p=0.05$ ) with both values having large effect sizes ( $d=0.76$ ,  $d=0.75$ ) in favour of the intervention group. Further moderate to large effect sizes were obtained in favour of the intervention group for cognitive status, functional ability and quality of life. Nil statistically significant results were obtained.



## Results

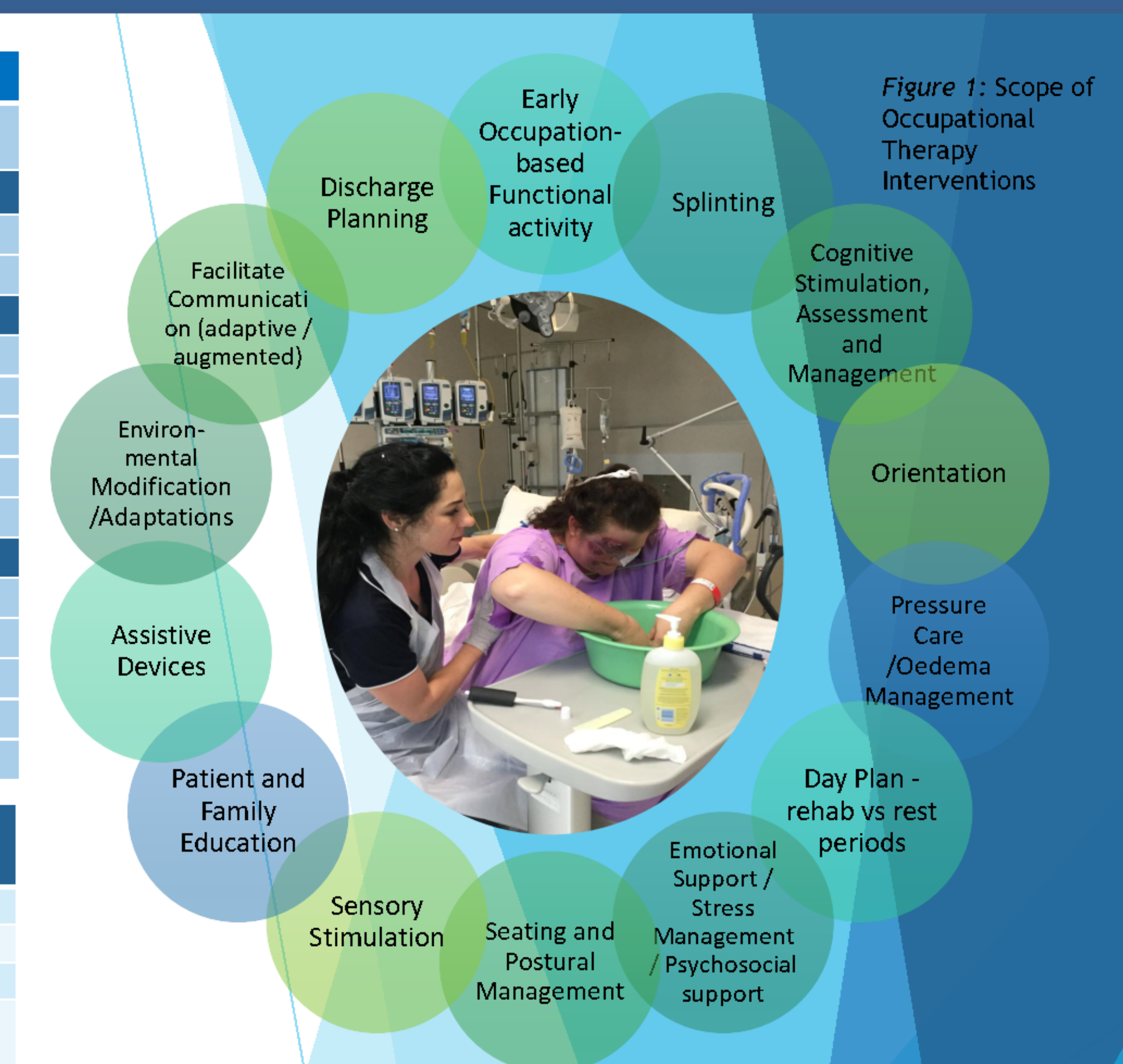
Intention to Treat Analysis (Control vs Intervention)		
Outcome Measure	Cohen's $d$	$t$
ICU Discharge		
FIM Cognitive	0.51	-1.38
MoCA	0.46	-1.27
Hospital Discharge		
FIM Total	0.59	-1.63
FIM Motor	0.52	-1.42
FIM Cognitive	0.73	-1.99
MBI	0.60	-1.65
MoCA	0.51	-1.40
90 days Post Randomisation (Follow Up)		
FIM Motor ( $p=0.05$ )	0.76	-2.07
MBI ( $p=0.05$ )	0.75	-2.06
FIM Total	0.72	-1.96
MoCA	0.62	-1.69
SF-36 PCS	0.69	-1.72

Treatment variables	Control (n=15)	Intervention (n=15)	p	Cohen's $d$
ICU LOS	Mean (SD) 13.07 (8.76)	Mean (SD) 12.00 (11.41)	0.78	0.11
Hospital LOS	19.93 (10.12)	22.80 (18.25)	0.60	0.19
Hours of Intubation (survivors)	235.45 (148.02)	161.51 (122.25)	0.18	0.55*
Days recorded as delirious in ICU	2.4 (3.94)	1.13 (1.60)	0.26	0.42
% of eligible days on which treatment provided	4.42 (8.67)	82.65 (34.36)	<0.001*	3.12*
Days contraindication was met	2.27 (3.24)	1.93 (2.87)	0.77	0.11
Days sedated	3.13 (3.00)	2.47 (3.66)	0.59	0.20
Treatment time per session (minutes)	6.70 (4.49)	40.35 (18.00)	<0.001*	2.56*

Percentage of eligible treatment days in which therapy types were provided in ICU	Control (n=15)	Intervention (n=15)
Total days eligible for occupational therapy	87	76
Cognitive stimulation	0%	96.05%
Functional Upper Limb training	0%	61.84%
Grooming	0%	55.26%
Family Engagement	0%	27.63%
Selfcare	0%	25.00%

Trial registered on the Australian New Zealand Clinical Trials Registry (ACTRN12618000374268).

References: contact author for full list of references



## Clinical Implications

Occupational therapy intervention in ICU is safe and feasible

Daily cognitive stimulation has potential to contribute to better outcomes

Participation in individualised occupation-based therapy may enhance recovery

The feasibility trial supports progressing to a full-scale RCT of occupation-based therapy in ICU.

Protocol publication: Rapolthy-Beck, A., et al., *A comparison of standard occupational therapy versus early enhanced occupation-based therapy in a medical/surgical intensive care unit: study protocol for a single site feasibility trial (EFFORT-ICU)*. Pilot Feasibility Stud, 2021. 7(1): p. 51.





# Protocol for a single-blinded randomized-controlled clinical trial to investigate the effect of in-bed cycling/stepping on functional mobility in critically ill patients

Soohyun Wi<sup>1,2</sup>, Hyung-Ik Shin<sup>1</sup>, Sung Eun Hyun<sup>1</sup>, Hyemin Ji<sup>1</sup>, Junghyun Kim<sup>1,2</sup>, Woo Hyung Lee<sup>1</sup>  
<sup>1</sup>Department of Rehabilitation Medicine, Seoul National University Hospital, Seoul National University College of Medicine, Korea  
<sup>2</sup>Biomedical Research Institute, Seoul National University Hospital, Seoul, South Korea

## Introduction



- **ICU-acquired weakness:** prolonged immobility in the ICU can trigger neuromuscular weakness due to disuse atrophy, decrease in strength, and functional denervation
- **Early rehabilitation of critically ill patients** can reduce the incidence and severity of ICU-acquired weakness.

## Objective

- To compare effects of conventional rehabilitation plus graded multimodal exercises with cycling/stepper compared to conventional rehabilitation on functional mobility in critically ill patients

## Methods

Mental Status		Modified ICU Rainbow Mobilization Scales						
		Unconscious		Yellow	Green	Blue	Dark blue	Violet
Rainbow mobilization Scale		1-2	3-4	5-6	7-8	9-10	11-12	13-14
RASS		≤3, ≤4	≤3, ≤4	≤2, ≤2	≤2, ≤2	≤2, ≤2	≤2, ≤2	≤2, ≤2
Motor power				grossly 1	grossly 2	UE ≤ 3, LE < 3	LE ≤ 3	LE ≥ 3
Check list		Safety Criteria: V/S, airway, bleeding, pain, lines						
Rehab program								
No activity		○	○	○	○	○	○	○
ROM	Passive exercise		○	○	○	○	○	○
	Active assistive exercise		○	○	○	○	○	○
Active exercise	Active exercise		○	○	○	○	○	○
	Leaning or Tilting (in bed)		○	○	○	○	○	○
Sitting	Supported sitting			○	○	○	○	○
	Long sitting/tailor sitting				○	○	○	○
Standing	Sitting on edge of bed					○	○	○
	Sit to stand/standing					○	○	○
Ambulation	Marching on the spot					○	○	○
	Assisted gait & endurance training					○	○	○
Goal		Lying without contractures	Turning self	Sitting balance	Sit at edge	Standing & Transfer (bed-chair)	Assisted Gait	Gait endurance
Multimodal Exercise								
Cycle ergometer	Passive exercise			○	○	○	○	○
	Active assistive exercise			○	○	○	○	○
Active exercise	Active exercise			○	○	○	○	○
	Resistive exercise			○	○	○	○	○
Stepper	Passive exercise			○	○	○	○	○
	Active assistive exercise			○	○	○	○	○
Resistive exercise	Active exercise			○	○	○	○	○
	Resistive exercise			○	○	○	○	○

- **Design:** Prospective, pragmatic, open-label, add-on, assessor-blinded RCT
- This study protocol is a randomized control trial with an **intervention time** from ICU admission to ICU discharge.
- After screening, the participants are **randomly allocated** to the intervention group or the control group with stratification of age, sex, and status of mechanical ventilation.
- **The intervention** consists of graded multimodal exercises according to the condition of consciousness and motor power of patients and provides passive, active-assistive, active, and resistance exercises using in-bed cycling/stepper **daily** in addition to conventional rehabilitation.
- **The control group** will receive only conventional rehabilitation.

Table 1. Modified ICU Rainbow Mobilization Scale- Graded multimodal exercise intervention

## Results

- **Primary outcome:** functional mobility of de Morton Mobility Index at ICU discharge
- **Secondary outcomes:** level of consciousness, mobility assessment, muscle strength, and quality of life
- Outcome measurements will be taken by **blinded assessors**.
- All adverse event data will also be gathered from the beginning of each intervention session.

Location		Study period						
		Admission-ICU			ICU-General ward		Hospital Discharge (D/C)	
Time point		Screening	Enrollment	Allocation	Baseline	ICU D/C	Hospital D/C	1 mo after hospital D/C
Enrollment	Eligibility screening	X						
	Informed consent		X					
	Randomization			X				
Intervention	Conventional PT				X	X	X	
	PT + cycling/stepper				X	X	X	
Assessment	FAC	X			X	X		
	RASS				X	X		
	CAM-ICU				X	X		
	Sum of MRC score				X	X	X	X
	Hand grip strength				X	X	X	X
	DEMMI				X	X	X	X
	FSS-ICU				X	X		
	SPPB				X	X	X	
	MBI				X	X	X	
	SF-36v2					X	X	X
	FES					X	X	X
	ABC					X	X	X
	Days to initiate ambulation (FAC≥2)							
Safety	Adverse event							
	Mortality							
Medical condition	Length of MV (days)							
	Length of stay in ICU (days)							
	Length of hospital stay (days)							

Table 2. Outcome measurements

## Conclusion

This study is a clinical trial to estimate the effect of multimodal exercise intervention using in-bed cycling/stepper on functional mobility in critically ill patients. If expected results are achieved in this study, methods of ICU rehabilitation will be enriched.

## Acknowledgement

This work was supported by the Korea Medical Device Development Fund grant funded by the Korea government (the Ministry of Science and ICT, the Ministry of Trade, Industry and Energy, the Ministry of Health & Welfare, the Ministry of Food and Drug Safety) (KMDF-RnD, NTIS 202013C18).





# Compact trolley for efficient and safe mobilization of critically ill patients

Mr Vimal Palanichamy<sup>1</sup>, Dr Sewa Duu Wen<sup>2</sup>, Ms Olikh Harminder Singh<sup>3</sup>, Ms d/o Thirusalven Deborah Heymamarini Deborah<sup>3</sup>, Dr Too Ai Ling Irene<sup>3</sup>, Ms Binte Sunari Raden Nurheryany<sup>3</sup>, Mr Oh Xueyan<sup>4</sup>  
Ms Fazila Aloweni<sup>3</sup>, 1. Physiotherapy, 2. Department of Respiratory and Critical Care Medicine, 3. Nursing, 4. Engineering

## Background of the problem

Early mobilisation is vital in ensuring good clinical outcomes for patients in intensive care unit.. However, mobilising acute ill patients is labour intensive and require significant coordination and resources. Current mobilisation process needs to be simplified.

## Aims

To develop a trolley prototype that can hold all the equipment needed and can  
1. Act as a mobility aid to ambulate ICU patients  
2. Be attached to a wheelchair for safe and efficient mobilisation out of ICU (ambulation and sunshine therapy).

## Method:

### Phase 1:

Adopting a design thinking methodology, we designed a compact trolley prototype that can be attached to an existing wheelchair and has compartments that can safely hold all equipment such as monitoring devices, portable suction pump, infusion pumps and drainage bottles. Technical inputs from biomedical engineers, physiotherapists and nurses were thoroughly considered when designing the prototype. The completed prototype was evaluated on healthy volunteers, and feedback was be used to inform the design of the final prototype.

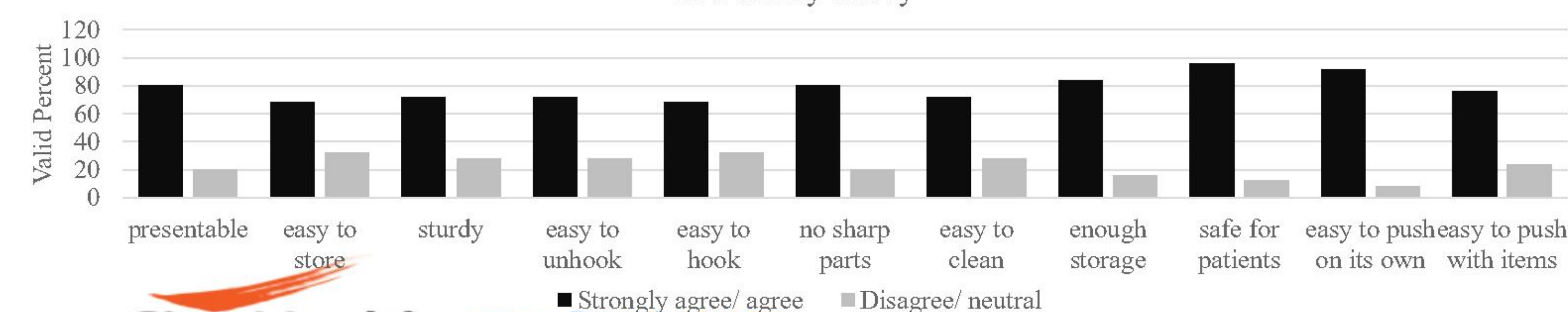
### Phase 2:

Final prototype was approved by the hospital infection control personnel, patient safety advocate and environmental services. It was used on patients for sunshine therapy and ambulation. Feedback was collected from health care workers and patients

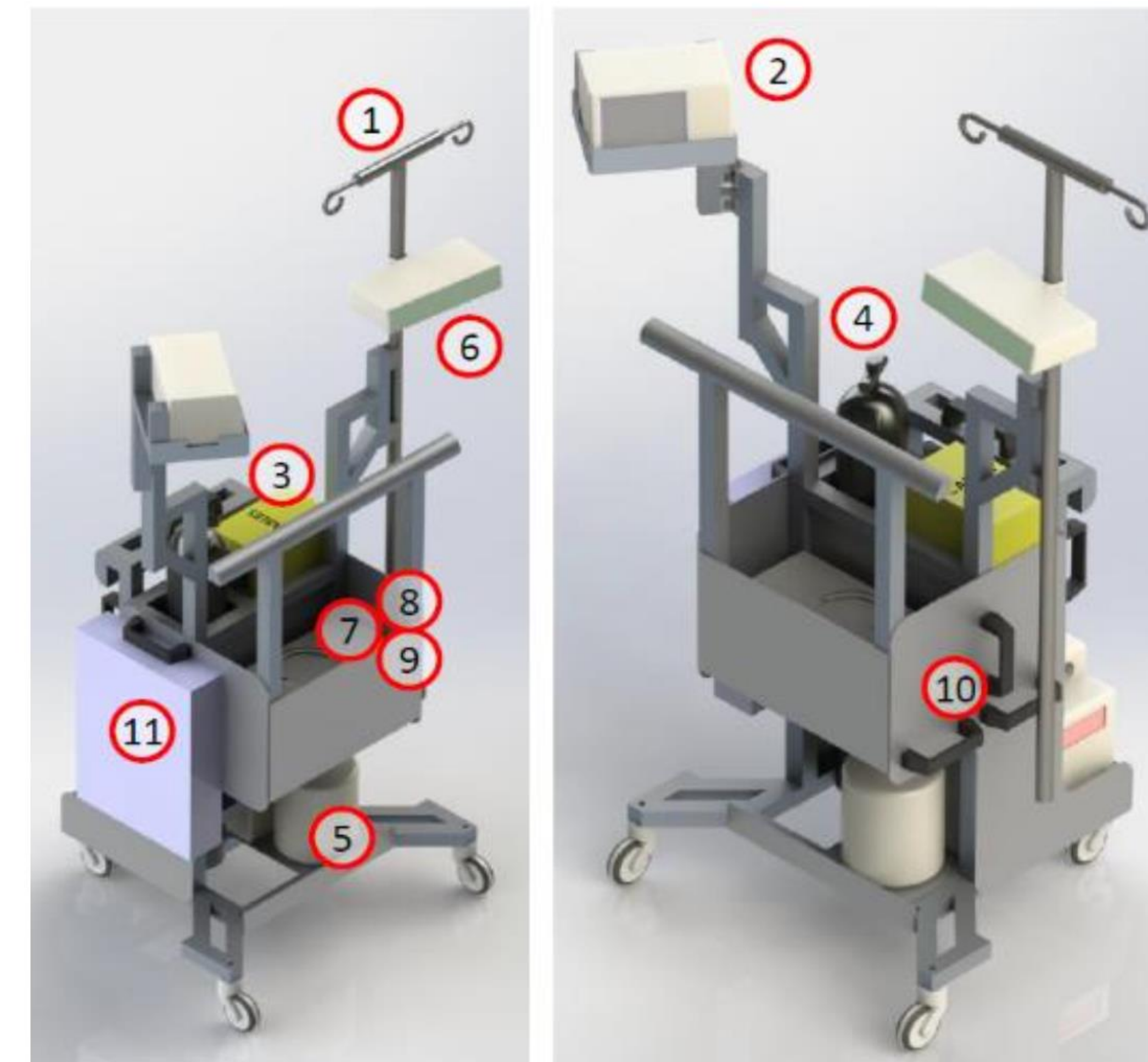
## Results:

Twenty-five participants (1 doctor, 3 physiotherapists and 21 nurses) evaluated the ICU trolley prototype. No one had opted for strongly disagree in the survey. All factors were rated above 70% (range 72% to 96%) except for two factors: easy to store (68%) and easy to hook (68%). The highest rated factors were that the evaluators agreed that the trolley will be safe for patient use (96%) and it is easy to push on its own (92%).

ICU trolley survey



Picture 1: Simulated items on trolley and its location



No	Description	Location
1	Drip pole	
2	Cardiac monitor	Top
3	Portable ventilator	Compartment
4	Oxygen tank	Compartment
5	Portable suction pump	Compartment
6	Infusion/ syringe pump	IV pole
7	Emergency medical kit	Basket
8	Resuscitator bag	Basket
9	Trachy dilator	Basket
10	Urine bag	Hook on
11	Chest drainage bottle	Hook on

Picture 2 :Final product



## Features

- 65 cm by 65 cm base
- 4 wheels with brakes
- Provision to latch on to high recline wheel chair.
- No sharp edges
- Easy to clean
- Easy to store

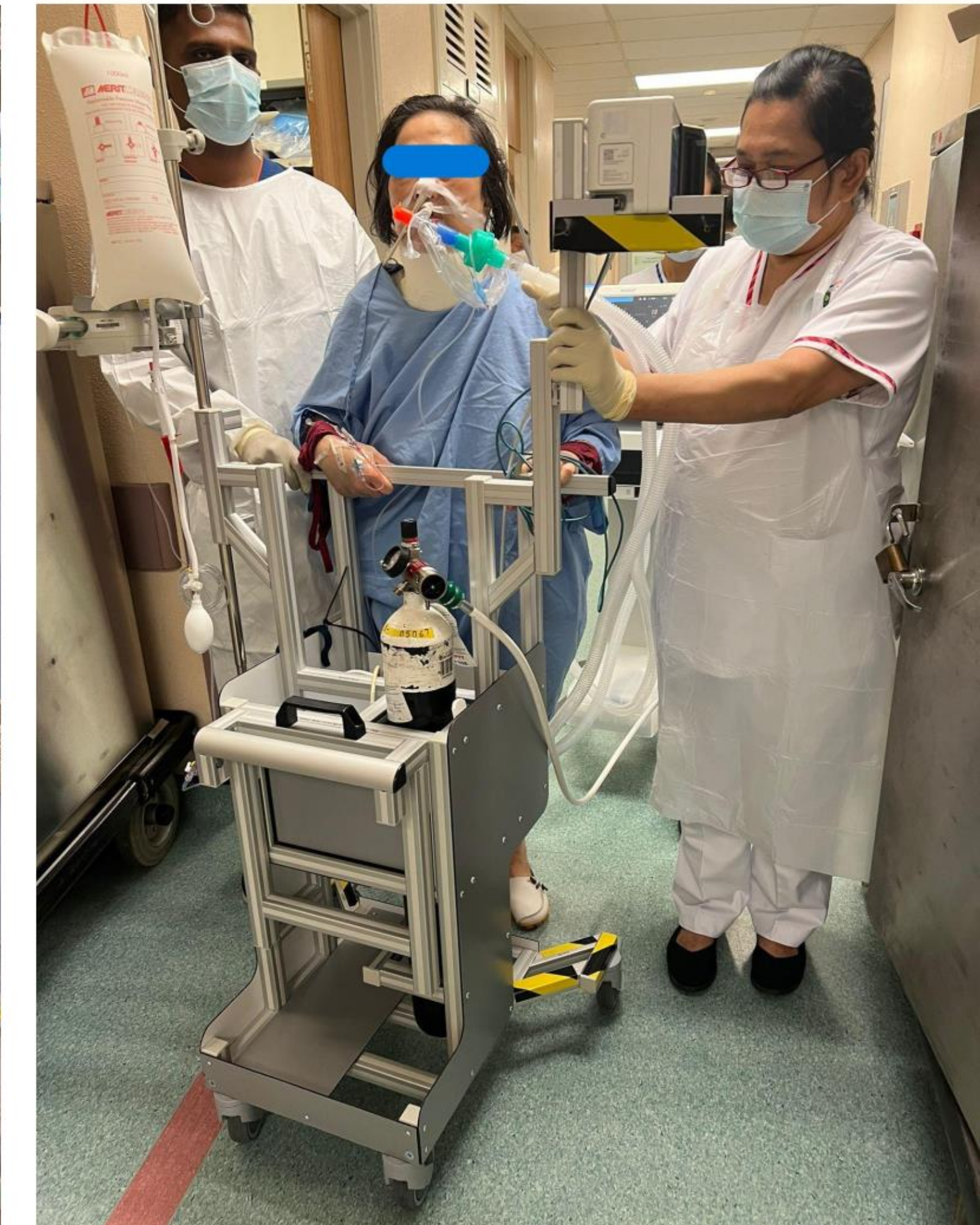
Picture 3 : Sunshine therapy with volunteer



Picture 4: Walking Old process



With compact trolley



Picture 5 Sunshine therapy old process



With compact trolley



## Conclusion :

Patients, patient's family and health care providers found the trolley safe, easy to use, clean and store. It could be used for ambulation of ICU patients and for sunshine therapy.



# Physical Therapy Dose Among Mechanically Ventilated Patients



Abhinandan Chittal MBBS; Isabel Trejo Zambrano MD; Israa Hassan MBBS; Muna Abbas MBBS; Earl Manthey BA; Vasudha Maddukuri MBBS; Stephanie Hiser PT DPT

## Objective

To describe the dose of physical therapy among mechanically ventilated patients:

- Timing of initiation
- Frequency
- Intensity
- Duration
- Types of interventions.

## Methods

- **Design:** Cross sectional study
- **Inclusion criteria:** admitted to the medical ICU at Johns Hopkins Hospital between June 1, 2021 and January 31, 2022; admitted > 24 hours; mechanically ventilated; receiving physical therapy services
- **Exclusion criteria:** prone position; receiving paralytics; COVID-positive; presence of temporary/permanent pacemakers
- **Data extracted:** Demographics, PT data, physiological data
- **Analyses:** Data was summarized via descriptive statistics; intensity was defined as % of heart rate reserve

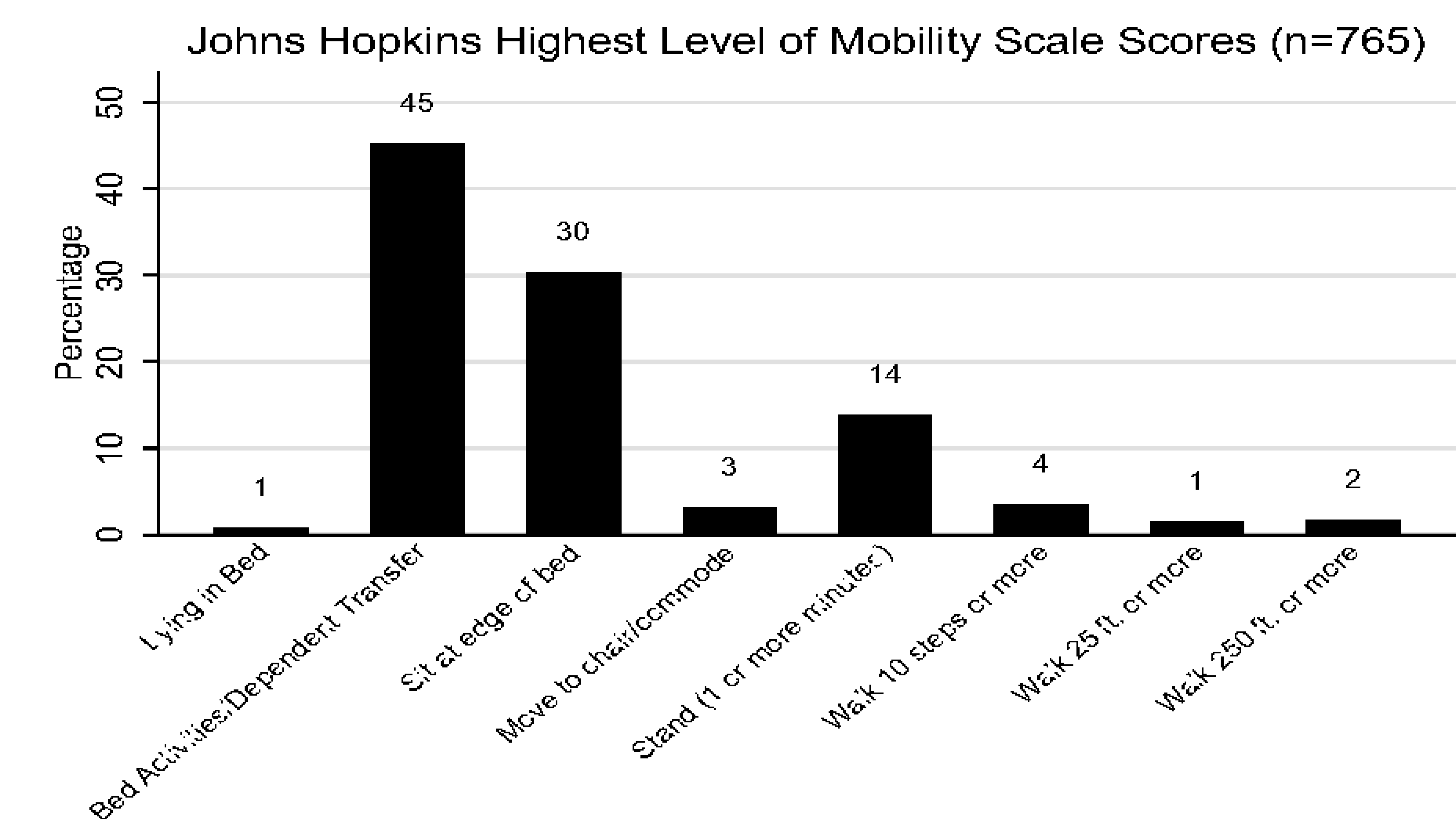
## Results

Table 1. Characteristics of Critically Ill Patients (n=106)

Characteristic	Range
Age, y	59 (47-68)
APACHE II Score	26 (20-32)
Male sex	55 (52)
FIO <sub>2</sub> , %	40 (30-40)
Race	
Black	55 (52)
White	41 (38)
Asian	5 (5)
Hispanic	2 (2)
Other	3 (3)
ICU admission diagnosis category	
Respiratory failure	41 (39)
Sepsis	18 (17)
Gastrointestinal	11 (10)
Cardiovascular	10 (9)
Cardiopulmonary arrest	7 (7)
Central Nervous System	4 (4)
Nephrology	3 (3)
Other	12 (11)
Location Prior to Hospital	
House/Apartment (independent)	91 (85)
House/Apt/Retirement facility (assistance)	6 (6)
Nursing home/sub-acute rehab	4 (4)
Homeless	4 (4)
Unknown	1 (1)
Highest Level of Activity prior to hospital	
Walking	94 (88)
Unknown	8 (8)
Bedbound	3 (3)
Transfer from bed/chair	1 (1)

Table 2. Physical Therapy in the ICU (n=765)

Variable	Median (IQR)
Time from ICU admission to first session	2 (1-5)
Session duration, min	38 (25-40)
Frequency, % of ICU days	77 (63-85)
Percentage of HRR	5 (0-13)
FSS-ICU Score	10 (4-16)



- Only 122 (16%) PT sessions achieved >20% of heart rate reserve (%HRR)
- With every 1-minute increase in duration or 1 unit increase in JH-HLM the odds of achieving >20% HRR increase by a factor of 1.0 or 1.2, respectively.

## Conclusion

- Among patients admitted to the ICU, physical therapy typically begins within the first 48 hours of admission and is provided at least five days per week.
- Most of the physical therapy sessions were classified as very light intensity (<20%) based on the %HRR that patients achieved during the sessions.



# Non-Pharmacological Delirium Management in the Medical ICU

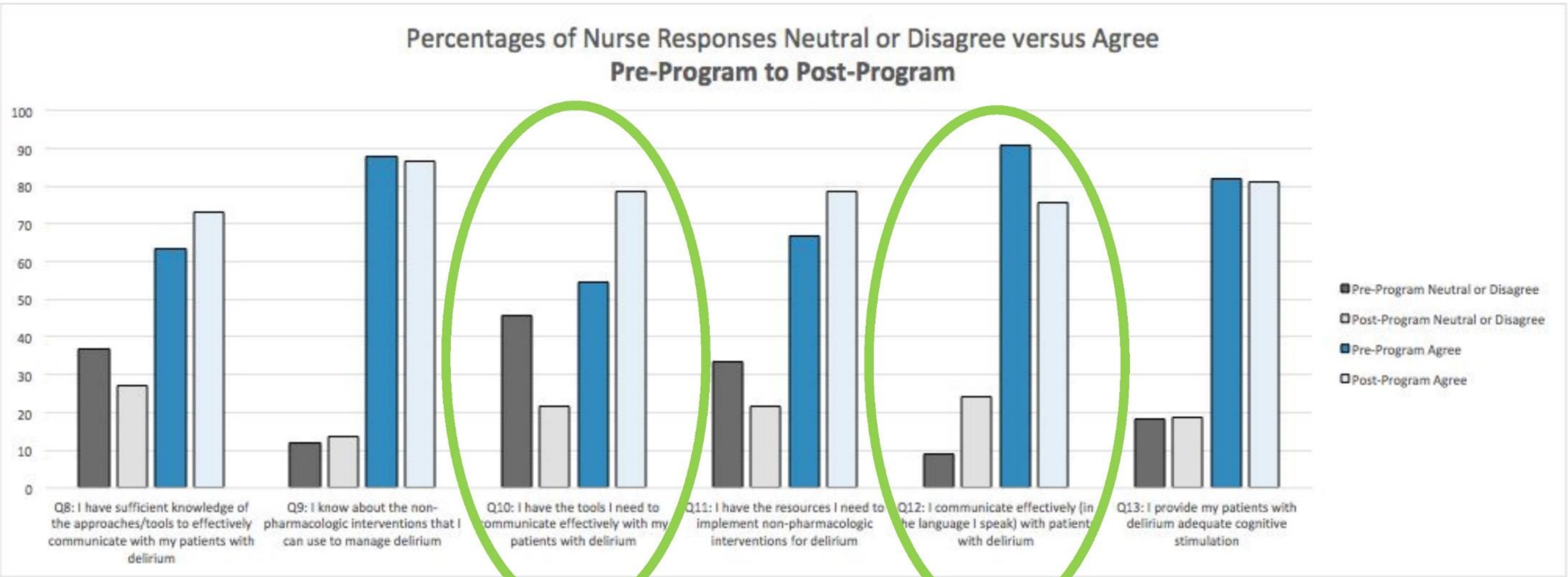
Madeline Arena, PT, DPT; Shirah Moses, OTR/L

## Objectives

Recent research supports use of multiple non-pharmacological interventions for delirium management. Nurses play an important role in managing delirium. An interdisciplinary team in the medical ICU developed an evidence-based delirium education intervention and the Communication & Cognition Cart (CCC) to address nursing communication and engagement with patients with delirium. The objective of this study was to evaluate nurses' perceptions about their management and communication with patients with delirium pre- and post-delirium intervention.

## Methods

A quasi-experimental (pre-test/post-test) design was used in this study. All nursing staff in the medical ICU were recruited. Participants anonymously completed a six-item survey pre and post intervention. The delirium intervention occurred over one month. Post surveys were administered six weeks after the intervention.



Delirium Survey

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I have sufficient knowledge of the approaches/tools to effectively communicate with my patients with delirium					
I know about the non-pharmacologic interventions that I can use to manage delirium					
I have the tools I need to communicate effectively with my patients with delirium					
I have the resources I need to implement non-pharmacologic interventions for delirium					
I communicate effectively (in the language I speak) with patients with delirium (i.e., minimize distractions, attempt to maintain attention, eye contact, repeat/reorient)					
I provide my patients with delirium adequate cognitive stimulation (frequent orientation, participation in ADLs as able, pen/paper tasks)					

Communication & Cognition Cart



## Results

Improvements were seen in nurses' perceived level of knowledge and resources needed to communicate effectively with patients with delirium. There was a significant increase in the perception of having the tools to communicate effectively ( $p = 0.017$ ). There was a significant decrease in the perception of being able to communicate effectively in the patient's primary language ( $p = 0.047$ ).

## Conclusions

Post intervention, nurses expressed an improvement in perceived knowledge and in having the tools to communicate effectively with patients with delirium. However, decreases in areas of perceived capability show that continued education is needed. This data can be used to improve future delirium education in the medical ICU.

### References

Vanderbilt University Medical Center (2022). Delirium in the Intensive Care Unit. [tandemjournal.org](https://www.tandemjournal.org)  
Mart, M. F., Roberson, S. W., Salas, B., Pandharipande, P. P., & Ely, E. W. (2021). Prevention and management of delirium in the intensive care unit.  
In *Seminars in Respiratory and Critical Care Medicine* (Vol. 42, No. 01, pp. 112-126). Thieme Medical Publishers, Inc  
Girard, T. D., Pandharipande, P. P., & Ely, E. W. (2008). Delirium in the intensive care unit. *Critical care (London, England)*, 12 Suppl 3(Suppl 3), S3.  
Vasilevskis, E. E., Ely, E. W., Speroff, T., Pun, B. T., Boehm, L., & Dittus, R. S. (2010). Reducing iatrogenic risks: ICU-acquired delirium and weakness—crossing the quality chasm. *Chest*, 138(5), 1224-1233.  
Barr, J., Fraser, G. L., Puntillo, K., Ely, E. W., Gélinas, C., Dasta, J. F., & Jaeschke, R. (2013). Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Critical care medicine*, 41(1), 263-306



# The Role of Occupational Therapy in Patients Requiring Extracorporeal Membrane Oxygenation with Coronavirus Disease: A Pilot Case Series

Lydia Sura MOT, OTR/L<sup>1</sup>, Jenna Hightower PT, DPT, CCS<sup>1</sup>, Jennifer Birst, OT<sup>1</sup>, Olivia Davis, MOT, OTD, OTR/L<sup>1</sup>, Pablo Moreno Franco, MD<sup>2</sup>, Pramod Guru, MBBS, MD<sup>2</sup>, Gregory Worsowicz, MD<sup>1</sup>, Nikki Matos, APRN, DNP<sup>2</sup>, Devang Sanghavi, MD<sup>2</sup>  
Department of Physical Medicine & Rehabilitation<sup>1</sup> and Critical Care Medicine<sup>2</sup>  
Mayo Clinic, Jacksonville, FL, United States

## ABSTRACT

### BACKGROUND

The purpose of this study is to describe the occupational therapy (OT) course and functional outcomes in critically ill patients requiring mechanical ventilation (MV) and extracorporeal membrane oxygenation (ECMO) with coronavirus (COVID-19).

### OBJECTIVE

This is a retrospective case series from a quaternary care hospital for patients with confirmed COVID-19 from April 2020 to July 2021.

### METHODS

Patients were included in the study if they were admitted to the intensive care unit (ICU) on MV, on ECMO, and had OT during their hospitalization. The Activity Measure for Post-Acute Care (AM-PAC) “6-Clicks” was utilized to track each patient’s functional progress throughout their hospitalization. A total of 11 (n = 11) patients that met study criteria were included in the series. A total of 5 (n = 5, 45%) patients were evaluated and treated while on ECMO, whereas the remainder (n = 6, 54%) were treated post-ECMO decannulation.

### RESULTS

The ECMO group had OT initiated earlier in the hospitalization than the post-ECMO group at 13.2 days versus 23.1 days, respectively. AM-PAC scores improved in the ECMO group by 40.41% and post-ECMO group by 23.75%.

### CONCLUSIONS

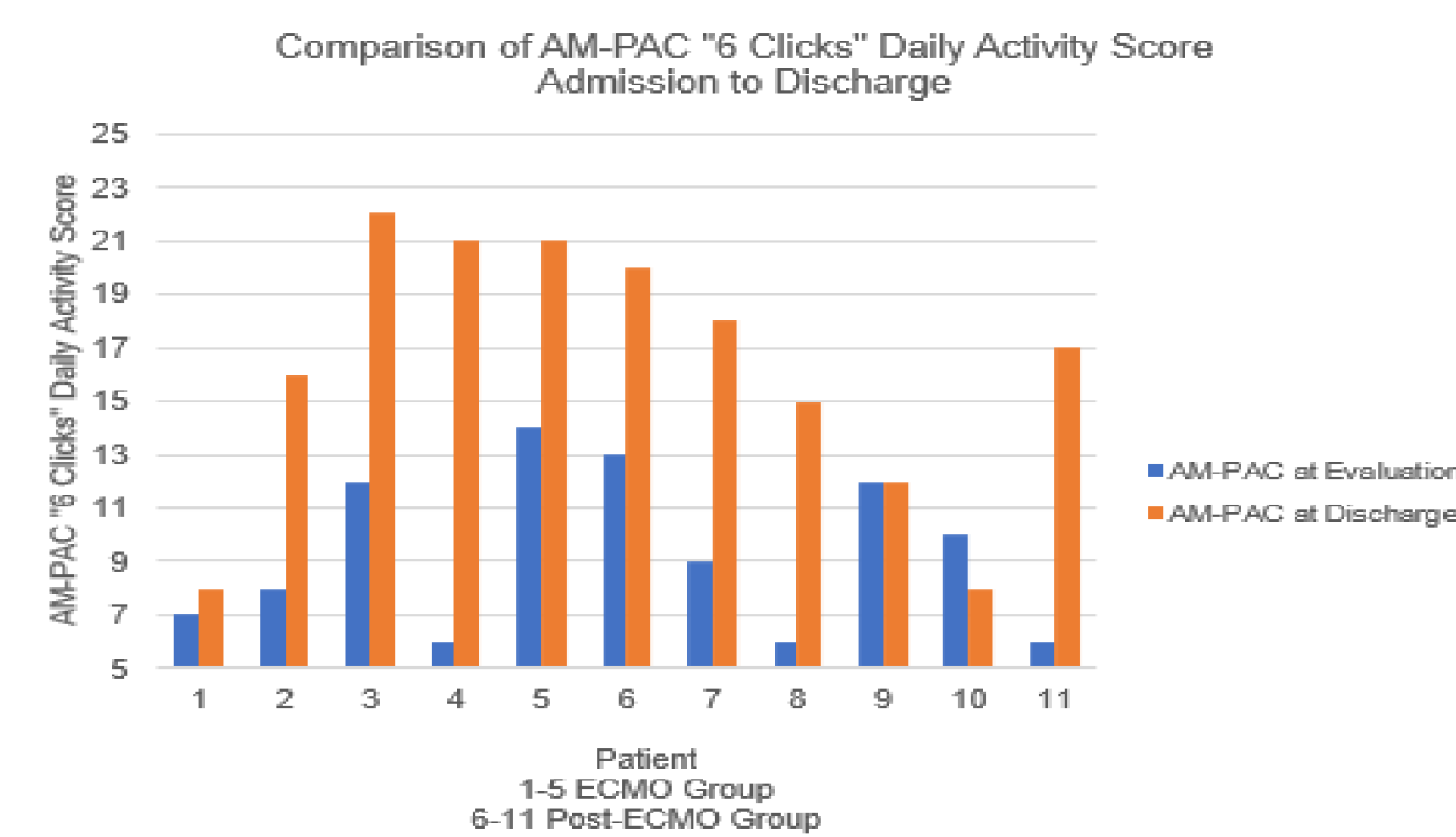
Patients who received OT for COVID-19 while on ECMO made substantial gains in their functional status by discharge compared to those who received OT only after ECMO decannulation.

## INTRODUCTION

Literature supports the hypothesis that physical rehabilitation for patients with ARDS requiring ECMO is safe, with a multidisciplinary team using procedural considerations, mobility safety checklists, and treatment guidelines<sup>2,3,4</sup>. Despite these advances, the role of OTs in the ICU is not currently well established in literature, while current interventions are focused on physical rehabilitation with a growing need for delirium prevention and functional ADL integration<sup>5</sup>.

The purpose of this study is to describe the role and importance of early OT intervention for patients requiring ECMO with COVID-19 through improvement of functional outcomes using The Activity Measure for Post-Acute Care (AM-PAC™) “6-Clicks” daily activity assessment.

FIGURE 1: COMPARISON OF AM-PAC



## METHODS

Inclusion criteria includes referral to OT from ICU team and ECMO cannulation due to COVID-19 diagnosis from April to July 2021, for adults. Patients were retrospectively included in the study once these five inclusion criteria were met. Thirteen patients met the initial inclusion criteria, however two expired during hospitalization and were excluded. Comparative analysis performed between ECMO and post-ECMO groups.

## RESULTS

Occupational therapy evaluation was initiated on median hospital day 13.3 for ECMO group and hospital day 23.2 for post-ECMO group. The ECMO group had more occupational therapy sessions on average: 13.2 sessions per hospitalization versus 10.5 sessions for the post-ECMO group (Figure 2).

ECMO group performed their first sit-to-stand on median hospital day 24.8, which was almost a week earlier than the post-ECMO group on hospital day 31.8 (Figure 2). ECMO group stood sooner in their therapy sessions (on session three versus session five for the post-ECMO group) to prepare for further occupational performance and ADL participation through functional mobility.

AM-PAC scores improved in the ECMO group by 40.41% and post-ECMO group by 23.75%, demonstrating a 16.66% increase with early occupational therapy intervention.

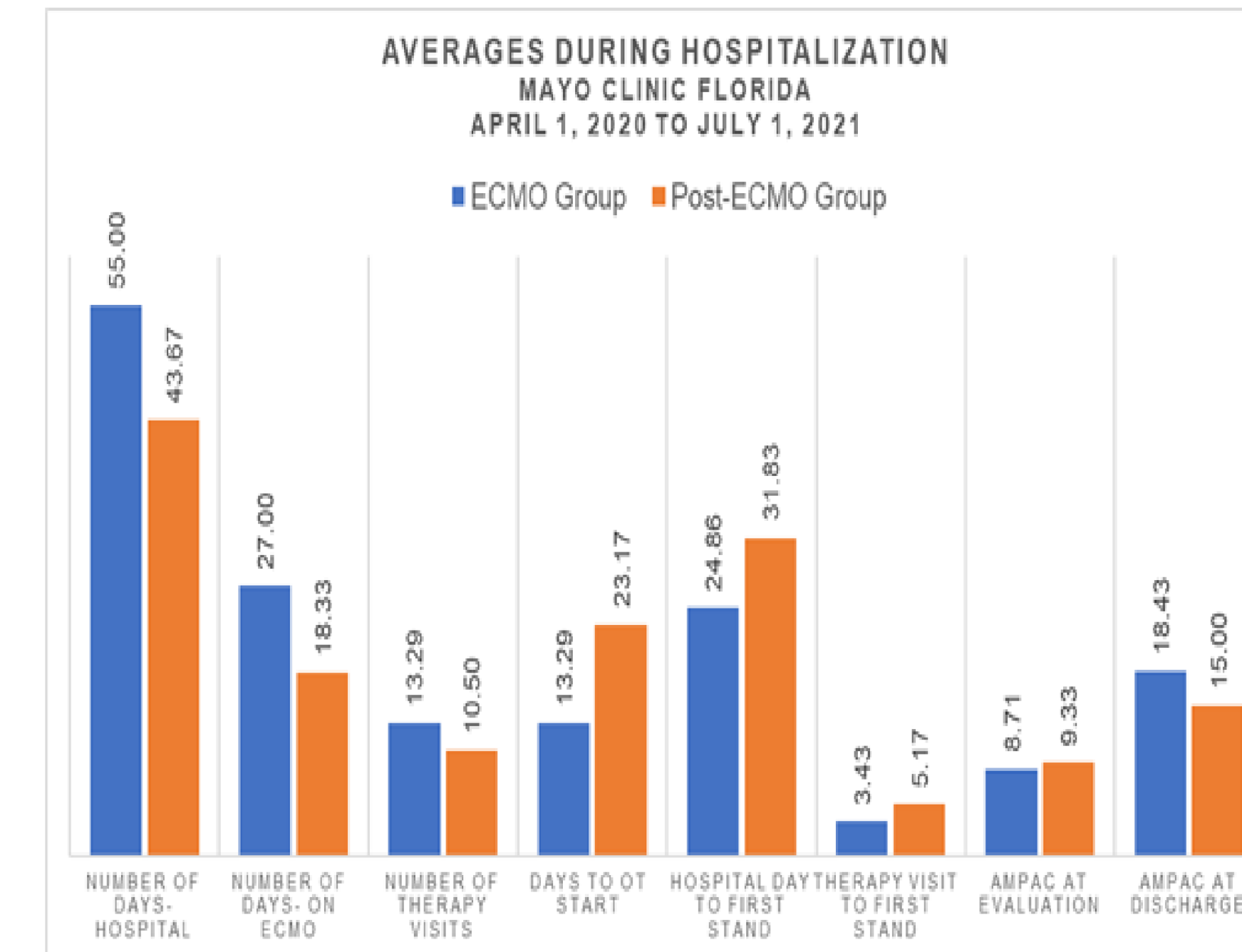
Length of stay for patients in both the ECMO and post-ECMO group ranged from 13 days to 111 days. The median length of stay for the ECMO group was 55.0 days while the post-ECMO group was 43.6 days (Figure 2). The COVID-19 ECMO group was cannulated longer at 27.0 median days (52% of hospital days) compared to post-ECMO group at 18.3 (41% of hospital days).

Average Charlson Comorbidity Index at admission for ECMO group was 1.6 and post-ECMO group 0.5. SOFA score of ECMO group at cannulation was 8.4 and post-ECMO group 10.8.

## DISCUSSION

The role of early intervention OT in the ICU with mechanical circulatory support is important, leading to greater functional outcomes and decreasing the required level of care upon discharge. The role of OT should focus on ADL integration, delirium prevention, functional mobility, and activity tolerance to promote occupational performance. OT departments may benefit from establishing safety protocols, mobility checklists, and standardized outcome measures related to self-care performance and cognition for this patient population with collaboration of their intensive care interdisciplinary team.

FIGURE 1: AVERAGES DURING HOSPITALIZATION



## CONCLUSIONS

- Early functional OT intervention improves AM-PAC “6-Clicks” daily activity score, decreases level of care required for post-acute care discharge destinations, and improves functional mobility
- The role of OT in the ICU with mechanical circulatory support is important, leading to greater functional outcomes and decreasing the required level of care upon discharge
- The role of OT should focus on ADL integration, delirium prevention, functional mobility, and activity tolerance to promote occupational performance

## REFERENCES

- Weinreich, M., Herman, J., Dickason, S., & Mayo, H. (2017). Occupational therapy in the intensive care unit: A systematic review. *Occupational Therapy in Health Care*, 31(3), 205-213.
- Abrams, D., Javidfar, J., Farrand, E., Mongero, L. B., Agerstrand, C. L., Ryan, P., Zimmel, D., Galuskin, K., Morrone, T. M., Boerem, P., Bacchetta, M., & Brodie, D. (2014). Early mobilization of patients receiving extracorporeal membrane oxygenation: a retrospective cohort study. *Critical Care*, 18(1), R38. <https://doi.org/10.1186/cc13746>
- Ferreira, D. D. C., Marcolino, M. A. Z., Macagnan, F. E., Plentz, R. D. M., & Kessler, A. (2019). Safety and potential benefits of physical therapy in adult patients on extracorporeal membrane oxygenation support: a systematic review. *Revista Brasileira de Terapia Intensiva*, 31, 227-239. <https://doi.org/10.5935/0103-507X.20190017>
- von Stumm, M., Bojes, P., Kubik, M., Söffker, G., Braune, S., Deuse, T., Kluge, S., & Reichenspurner, H. (2016). Feasibility and safety of mobilization of patients with extracorporeal membrane oxygenation -[A3] a prospective cohort study. *The Thoracic and Cardiovascular Surgeon*, 64(S 01), OP73. <https://doi.org/10.1055/s-0036-1571526>
- Costigan, F. A., Duffett, M., Harris, J. E., Baptiste, S., & Kho, M. E. (2019). Occupational therapy in the ICU: a scoping review of 221 documents. *Critical Care Medicine*, 47(12), 1014-1021.



# Free At Last: A Dynamic Interdisciplinary Approach to Address Prolonged Mechanical Ventilation.

Elizabeth Turnipseed, MD; Jimmy Stout RN,BSN, MBA; Phillip Morris RN, BSN; Sam Nimah, MBA

Special Care Providers/University of Alabama at Birmingham

### Introduction

In October 2016, UAB Hospital partnered with Special Care Providers to open the Special Care Unit (SCU) designed to improve care for patients who experience Prolonged Mechanical Ventilation (> 21 days) with a goal of reducing ventilator days, improving quality, and reducing overall length of stay.

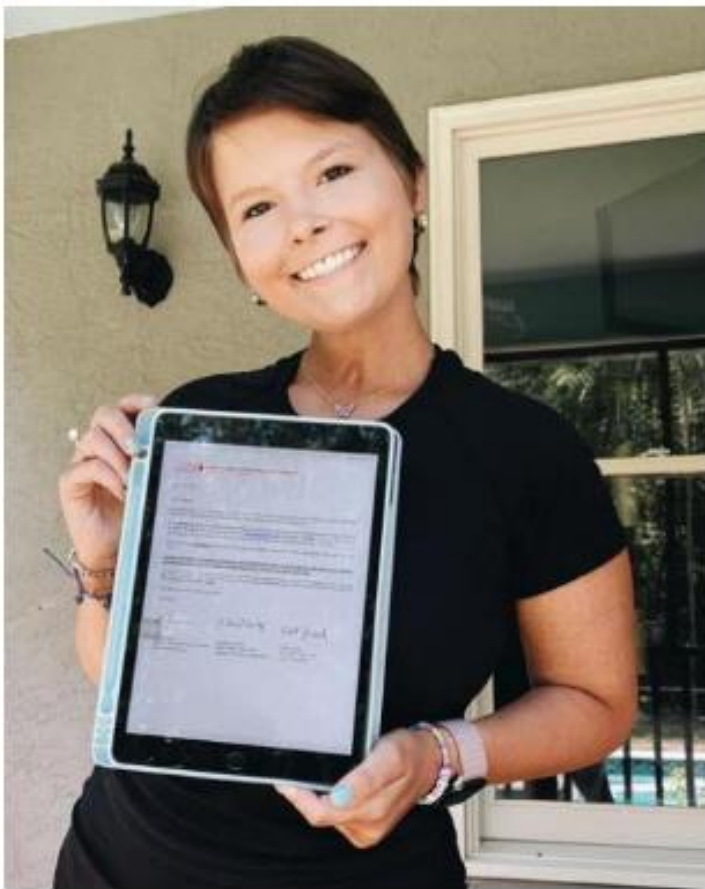


### Objective

To add information to the body of knowledge surrounding Prolonged Mechanical Ventilation, Early mobilization, and dedicated Respiratory Weaning Units.



From fighting for life,  
to celebrating life



### Methods

#### Setting:

*Patients are cohorted within an Intermediate Care Respiratory Weaning Unit with dedicated multi-disciplinary staffing in an 1100 bed Academic Medical Center.*



#### Participants:

*Prolonged Mechanical Ventilation (PMV) is defined as requiring at least 6 hours daily of ventilator support for at least 21 days. Ventilated patients admitted are evaluated based on a referral process with our Intensive Care Units and are eligible for admission to the unit based on the following Criteria:*

- A) Hemodynamic stability defined as not requiring continuous vasoactive infusions to maintain normotensive pressures*
- B) FiO2 of  $\leq 60\%$  and PEEP  $\leq 10$  while maintaining an oxygen saturation  $\geq 90\%$*
- C) No continuous infusion of a sedating or pain relieving medication*
- D) No critical or acute Renal failure resulting in the need for continuous dialysis*
- E) No acute or critical renal failure*
- F) No uncontrolled severe infectious processes*
- G) No pending Surgical Interventions*
- H) No severe life threatening arrhythmias.*

### Results

All participants were cohorted on a ventilator weaning unit and received individualized daily multidisciplinary care (this team includes medical, Nursing, RT, PT,OT, and SLP) with a Low Patient to Therapist Ratio (Therapy is defined as the following roles: RT, PT, OT, SLP) until it was determined ready for discharge.

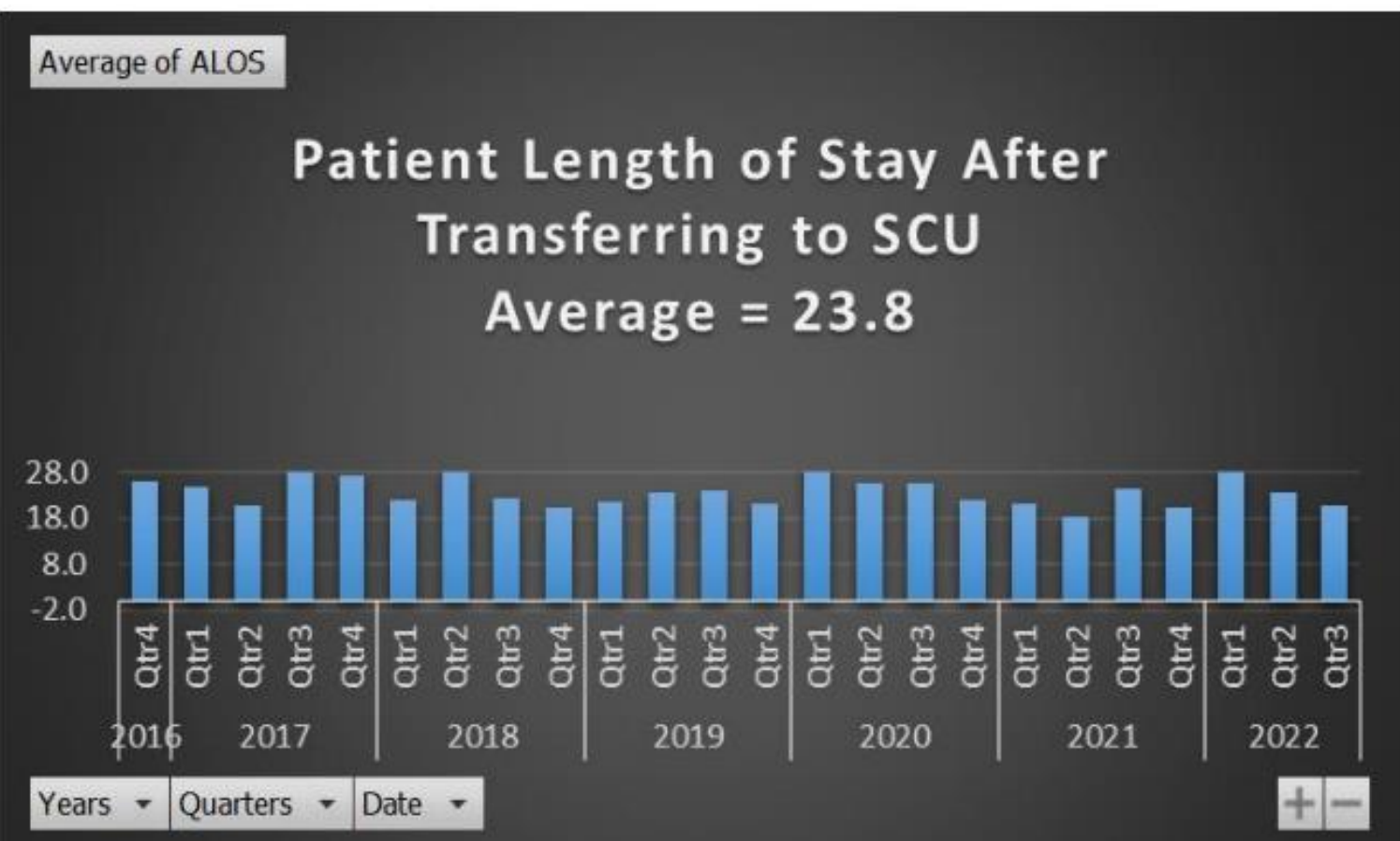
*A retrospective analysis of non- patient specific outcomes data from October 2016 to July 2022 on subjects (N=658) discharged from the Special Care Unit of University of Alabama-Birmingham Hospital.*

*We recorded the following observations for discharged patients: (A) Ventilator Liberation; (B) Discharge disposition (C ) Length of Stay on Unit; (D ) Readmissions*

- Wean Rate = 85.4%

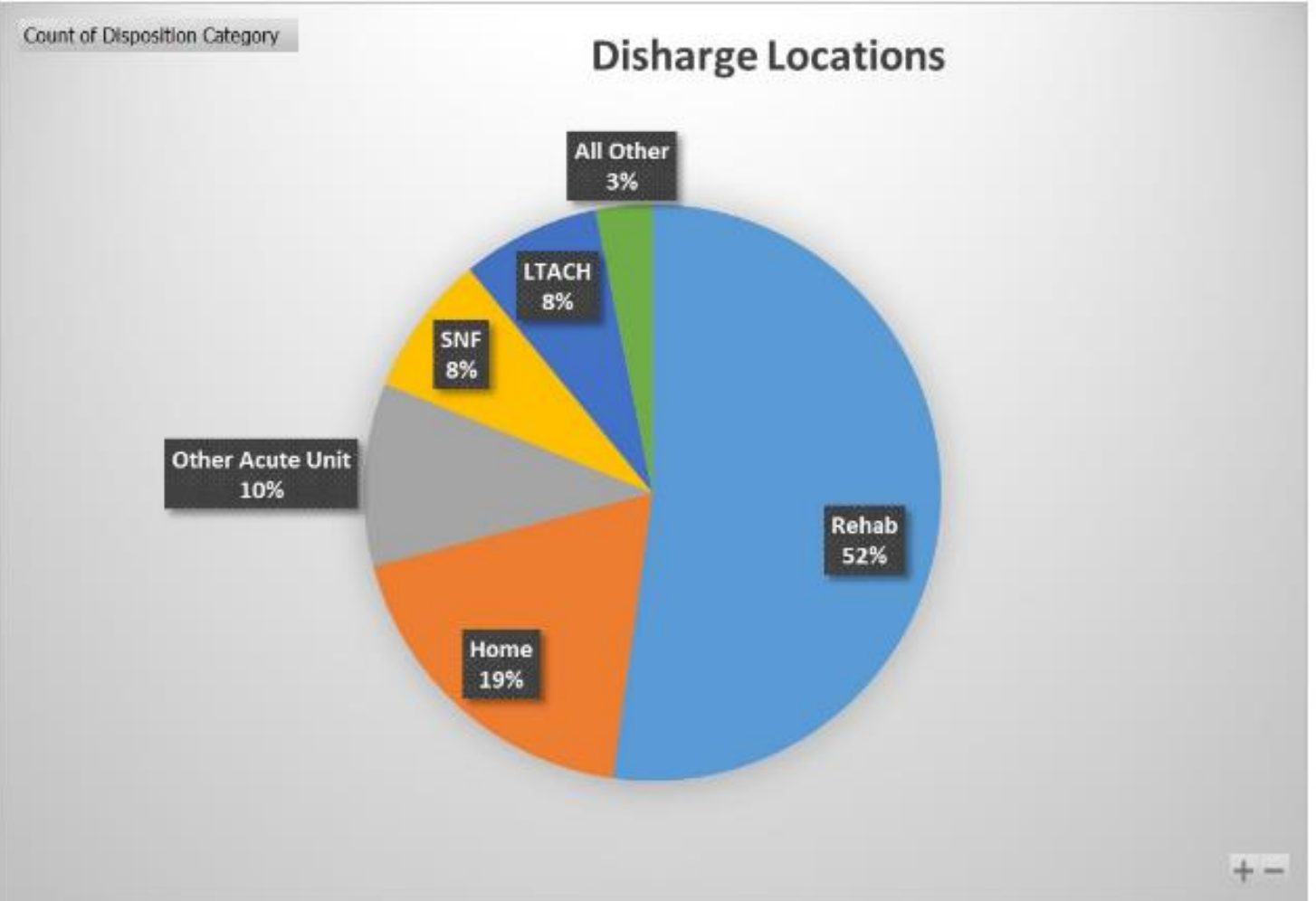


- Length of stay (on unit) = 23.8days



### Results (Cont.)

- Discharge locations:



- All cause readmission within 30 days: 5.9%

### Conclusions

Our work in this area suggests there is a strong association between successful weaning in the PMV population and the following Interventions: referral to specialized respiratory weaning unit, dedicated multi-disciplinary staff, and low therapist-to-patient ratios.

### References

1. MacIntyre NR, Epstein SK, Carson S, Scheinhorn D, Christopher K, Muldoon S. National Association for Medical Direction of Respiratory Care. Management of patients requiring prolonged mechanical ventilation: report of a NAMDRCC consensus conference. *Chest*. 2005 Dec;128(6):3937-54.
2. Ambrosino N, Vitacca M. The patient needing prolonged mechanical ventilation: a narrative review. *Multidiscip Respir Med*. 2018 Feb 26;13:6. doi: 10.1186/s40248-018-0118-7

#### Acknowledgements

There is potential relationship bias as I represent a company that operates for profit in a contractual agreement with hospitals to serve this patient population.

#### Limitations

Limitations include selective outcomes reporting related to discharged status of patients from whom data was collected

#### Contact:

Jimmy Stout, RN, BSN, MBA  
jstout@uabmc.edu  
635 19<sup>th</sup> Street South Room S617  
Spain – Wallace Building  
Birmingham, AL 34233