POSTER PRESENTATION SCHEDULE

10th Annual Johns Hopkins Critical Care Rehabilitation Conference

Time	Presenter(s)	Title	Institution
Saturday, November 6, 2021 - AM Session [Facilitator - Sapna Kudchadkar, MD, PhD]			
7:30 AM - 8:30 AM	Patricia Mesa, MD	Delirium Incidence in the Intensive Care Unit and Its Associated Variables In Two Age Ranges	ICU Pasteur Hospital, Montevideo, Uruguay
	Rachel Troch, MD	Slow and Steady: Reducing Setbacks in Pediatric Chronic Critical Illness	Children's National Hospital, Washington, DC, USA
	Matthew Thackeray, BSc	Changes in Body Composition in the Year Following Critical Illness	Deakin University and Barwon Health, Victoria, Australia
	Karina Knutsen, MSc	Nursing and Early Rehabilitation in Long-Term Patients in Intensive Care Units: a Qualitative Study	Nord University, Bodø, Norway
	Logan Russell, PT, DPT	Building Trusting Relationships Throughout Prolonged ICU Stays During the COVID-19 Pandemic	Virginia Hospital Center, Arlington, VA
	Debora Schujmann, PhD	Functional Status and Physical Variables in Post-Intensive Care Unit COVID-19 Patients: Characterization and Prognostic Factor	University of São Paulo, São Paulo, Brazil
	Kelly Bennett, PT	Safety and Feasibility of Mobilizing Patients with Femoral Arterial and Hemodialysis Catheters in the Intensive Care Setting	Yale New Haven Hospital, New Haven, CT, USA
	Samantha Torres Grams, MSc	Feasibility and Safety of Functional Electrical Stimulation in COVID-19 Critically Ill Patients	Hospital Sírio-Libanês, São Paulo, Brazil

Delirium incidence in the intensive care unit and its associates variables in two age ranges

Mesa P.[1], Previgliano I.[2], Lecor C.[1], Favretto S.[1], Leyes D.[1], Banchero R.[1], Orellano M.[1], Ortiz S.[1], Da Luz J.[1], Pereira L.[1], Cugliari T.[1], Peretti D.[1], Olivera L.[1], Soca D.[1], Pontet J.[1]
[1] PASTEUR HOSPITAL Montevideo – Uruguay [2] J. A. FERNANDEZ HOSPITAL Buenos Aires – Argentina
www.porunaucisindelirium.com

BACKGROUND

DELIRIUM, the most common form of acute brain dysfunction, serving both as a marker of:

- BRAIN VULNERABILITY WITH DECREASED RESERVE
- A POTENTIAL MECHANISM FOR PERMANENT COGNITIVE DAMAGE

As we know, delirium incidence and severity increase with age, and is associated with cognitive impairment, which is why our study was carried out in two age groups of adulthood.

OBJECTIVE

To study the incidence of delirium, its risk factors and its association with length of hospital stay (LOS) and mortality in two age ranges.

METHODS

DESIGN

This study design was a single center descriptive, prospective, observational, cohort study that included all patients admitted from March 1st to May 31st, 2017.

SETTING

Pasteur Hospital, Assistance of State Health Services (ASSE), Montevideo, Uruguay.
It is a General ICU with medical and surgical patients.

EXCLUSION CRITERIA

- ICU readmission in less than 48 hours.
- Patients with severe neurological or neuropsychiatric pathology.
- Patients who come and / or are transferred to another health care center.

INCLUSION CRITERIA

- 50 years old and older.
- ICU stay longer than 24 hours.

We divided the population into two groups:

1 population with 50 years old and older → 146 patients included

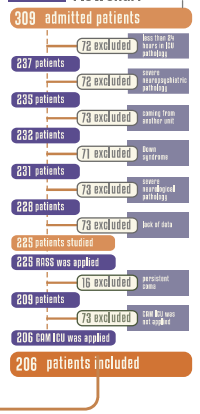
2 population with 65 years old and older → 92 patients

STATISTIC ANALYSIS

- Define demographic and clinical variables using descriptive statistics, continuous variables using means and SD or medians, depending on the distribution of the data.
- The comparison between delirium and non-delirium for continuous variables was performed using the Student's test for independent samples for normally distributed data or Mann-Whitney test or if they do not meet the previous condition, and by the tests x^2 or Fisher's test for qualitative variables. The normality of the variables was tested by the Kolmogorov-Smirnov test.
- In the determination of risk factors associated with the development of delirium, an univariate analysis was performed in the first instance. Values <0.05 were considered significant.
- The variables that were significant in the univariate analysis and the variables with p <0.20 clinically relevant, were used for the multivariate analysis by logistic regression.
- The results of multivariate analysis were expressed as odds ratios with 95% confidence intervals. The software used for all the calculations was SPSS (State Corp LP, version 13).

RESULTS

FIGURE 1 Flowchart



POPULATION WITH 50 YEARS OLD AND OLDER (1)

TABLE 1 Baseline characteristics and clinical outcomes by delirium status in patients 50 years old and older

Variables	All patients N=146	Non - Delirium N=68	Delirium N=78	p value
Age mean (SD)		65 (9)	72 (11)	<0.001
Gender				
Male, *n* (%)	88 (60 %)	44 (30 %)	44 (30 %)	0.32
Medical history, *n* (%)				
Tobacco use	93 (63 %)	46 (49 %)	47 (51 %)	0.39
Psychiatric disorder	13 (20 %)	3 (15 %)	10 (85 %)	0.13***
Disease severity				
APACHE II score mean(SD)		17 (6)	23 (9)	<0.001**
Disease stratification				
Medical	104 (71 %)	48 (46 %)	56 (54 %)	1
Surgical	42 (29 %)	20 (47 %)	22 (53 %)	
Mechanical Ventilation	72 (49 %)	15 (21 %)	57 (79 %)	<0.001**
MV days (SD)		1 (4)	7 (8)	<0.001**
Hospital LOS (SD)		21 (20)	26 (22)	0.098
Analgesia days median (SD)	2 (1-3)	1 (1)	3 (4)	<0.001**
Sedation days median mean (SD)	2 (1-3)	0 (1)	3 (3)	<0.001**
Mortality				
In ICU, *n* (%)	20 (14 %)	3 (15 %)	17 (85 %)	0.003***
In hospital, *n* (%)	26 (18 %)	3 (12 %)	23 (88 %)	<0.001***

Values expressed as the N (%), means (SD: standard deviation), [*] Student test for independent samples, [**] Mann Whitney for independent samples, [***] χ². In the Mortality study , the patients in whom the CAM ICU was not applied were not included

In the Univariate analysis when comparing **delirium patients** with **non delirium patients** we found significant relation between delirium and:
Age | ICU length of stay | Apache II | MV | MV days | analgesia days | sedation days

Regarding delirium and mortality:
ICU MORTALITY was **20 / 146** (13%) ,**17 / 20** (85%) with delirium (p=0.003).
HOSPITAL MORTALITY was **3 / 78** (4%) and **23 / 78** (30%) in delirium patients. (p<0.001).

TABLE 2 Multiple logistic regression model using delirium as dependent variable in patients 50 years old and older

variables	multivariate analysis		
	OR	p value	95% CI
Age	1.109	0.0001	[1.052 - 1.168]
Alcohol consumption	4.88	< 0.013	[1.397 - 1.704]
APACHE II	1.09	0.039	[1.004 - 1.183]

The logistic regression model using **delirium as a dependent variable**, revealed that **age, alcohol consumption** and **APACHE II** were independent variables associated to delirium development in the patients over 50 years old.

TABLE 3 Multiple logistic regression model using ICU mortality as dependent variable in patients 50 years old and older

variables	multivariate analysis		
	OR	p value	95% CI
Age	1.24	0.055	[0.996 - 1.529]
Sedation days	2.67	0.053	[0.989 - 6.690]
MV days	2.3	0.017	[1.162 - 4.530]

Included only variables with p < 0.2

In the logistic regression model using **ICU mortality as a dependent variable** we found that:
AGE OR 1,24 p= 0,055
MV DAYS OR 2,3 p= 0,017
SEDATION DAYS OR 2,67 p=0,053
were independent variables associated to ICU mortality.

We would also like to mention that delirium was a significant variable in the univariate analysis to ICU mortality with an OR 6,04 p= 0,006, but it was not significant in the multivariate analysis. Perhaps it was a small sample.

Besides, it is important to emphasize that patients with delirium are 6 times more likely to die in the ICU than patients without delirium.

TABLE 4 Multiple logistic regression model using hospital mortality as dependent variable in patients 50 years old and older

variables	multivariate analysis		
	OR	p value	95% CI
MV days	1.329	0.012	1.06 - 1.65
Hospital length of stay	0.809	< 0.001	0.71 - 0.90

Included only variables with p < 0.2

The model of logistic regression using **hospital mortality as dependent variable** revealed that **MV days** and hospital **length of stay** were independent variables associated to hospital mortality.

In the univariate analysis when comparing dead patients vs non dead patients we found significant relation between hospital mortality and:
- MV
- ICU length of stay
- analgesia days
- MV days
- hospital length of stay
- sedation days
- age
- APACHE II
- Delirium

POPULATION WITH 65 YEARS OLD AND OLDER (2)

TABLE 5 Baseline characteristics and clinical outcomes by delirium status in patients 65 years old and older

Variables	All patients N=92	Non- Delirium N=30 (32%)	Delirium N=62 (68%)	p value
Age mean (SD)		73 (6)	77 (7)	0.013
Gender				
Male, *n* (%)	53 (57 %)	19 (36 %)	34 (64 %)	0.6
Medical history, *n* (%)				
Tobacco use	55 (59 %)	20 (36 %)	35 (64 %)	0,37
Psychiatric disorder	7 (7 %)	1 (15 %)	6 (85 %)	0,42
Disease severity				
APACHE II score mean(SD)		18 (5)	27 (9)	<0.001**
Disease stratification				
Medical	65 (70 %)	21 (32 %)	44 (68 %)	1
Surgical	27 (29 %)	9 (33 %)	18 (67 %)	
Mechanical Ventilation	49 (49 %)	5 (10 %)	44 (90 %)	<0.001**
MV days (SD)		1 (2)	7 (9)	< 0.001**
Hospital LOS (SD)		19 (13)	26 (23)	0.093
Analgesia days median (SD)		1 (1)	3 (4)	<0.001**
Sedation days median mean (SD)		0 (1)	2 (3)	<0.001**
Mortality				
In ICU, *n* (%)	16 (17 %)	1 (7 %)	15 (94 %)	0.017***
In hospital, *n* (%)	21 (23 %)	1 (4 %)	20 (96 %)	0.001***

Values expressed as the N (%), means (SD: standard deviation), [*] Student test for independent samples, [**] Mann Whitney for independent samples, [***] χ². In the Mortality study , the patients in whom the CAM ICU was not applied were not included

In the Univariate analysis when comparing delirium patients with non delirium patients we found significant relation between delirium and:
Age | ICU length of stay | Apache II | MV | MV days | Analgesia days | Sedation days

TABLE 6 Multiple logistic regression model using delirium as dependent variable in patients 65 years old and older

variables	multivariate analysis		
	OR	p value	95% CI
Age	1.92	0.003	[1.060 - 1.340]
APACHE II	1.11	0.05	[0.999 - 1.245]

The logistic regression model using **delirium as a dependent variable**, revealed that **age** and **APACHE II** were independent variables associated to delirium development in the patients over 65 years old.

RESULTS OF THE POPULATION 65 YEARS OLD AND OLDER

Patients older than 65 years old were **92**, 41% of the total population.

The population was divided into delirium group and non delirium group.

The incidence of delirium was **62/92** (67%).
In MV patients was **44/49** (90%).

The ICU mortality was **6/92** (6%) patients,
15/28 (54%) in delirium patients.

The Hospital mortality was **33/109** (31%),
20/33 (61%) in delirium patients.

REGRADING DELIRIUM IN 65 YEARS OLD AND OLDER:
ICU mortality was **6/92** (6%) patients,**15/28** (54%) in delirium patients.
Hospital mortality was **33/109** (31%), **20/33** (61%) in delirium patients.

REGRADING DELIRIUM AND HOSPITAL MORTALITY IN PATIENTS OLDER THAN 65 YEARS OLD:
Hospital mortality in patients older than 65 was **23%** (**21** patients).
When comparing delirium group with non delirium group we found that hospital mortality was **95%** in delirium group vs **5%** without delirium (p=0.001).

TABLE 7 Multiple logistic regression model using ICU mortality as a dependent variable in patients 65 years old and older

variables	multivariate analysis		
	OR	p value	95% CI
Age	1.148	0.04	[1.005-2.207]
ICU length of stay	0.37	0.012	[0.173-0.804]
MV days	2.8	0.021	[1.170-6.701]

Included only variables with p < 0.2

The logistic regression model using **ICU mortality as a dependent variable** revealed that **age, ICU length of stay** and **MV days** were independent variables associated to ICU mortality in patients 65 years old and older.

Delirium was a significant variable in the univariate analysis to ICU mortality with an OR 9,23, with p = 0,036, but it was not in the multivariate analysis.
Perhaps it was a small sample. Patients with delirium are 9 times more likely to die in the ICU compared to these without delirium.

TABLE 8 Multiple logistic regression model using hospital mortality as dependent variable in patients 65 years old and older

variables	multivariate analysis		
	OR	p value	95% CI
MV days	1.4	0.013	[1.074 - 1.823]
Hospital length of stay	0.78	0.002	[0.666 - 0.915]

Included only variables with p < 0.2

In the logistic regression model using hospital mortality as dependent variable, we found that **ICU length of stay** and **MV days** were independent risk factors to hospital mortality in patients 65 years old and older.

IN SUMMARY

- Multiple logistic regression model using delirium as the dependent outcome variable revealed that age and APACHE II were independent variables associated with the development of delirium in both groups.
- The history of alcohol consumption was an independent risk factor only for patients with 50 years old and older.
- The multiple logistic regression model using hospital mortality as the dependent outcome variable showed that MV days and LOS were independent predictors for Hospital mortality in both groups.

CONCLUSIONS

- The incidence of delirium and hospital mortality was higher in patients older than 65 years
- The risk factors for the development of delirium were the same for both groups
- Alcohol consumption was a risk factor only for those patients with 50 years old and older
- MV and LOS were independent risk factors for hospital mortality

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Inouye S. K., Westendorp R. G., & Saczynski J. S. (2014). Delirium in elderly people. The Lancet, 383(9920), 911-922.

Slow and Steady
Reducing Setbacks in Pediatric Chronic Critical Illness

Rachel Troch, MD, Alexandra Lazzara, MD, Avery Zierk, MD, Flora Yazigi, MD, Bethany Chalk, PharmD, Jamie Schwartz, Sofia Perazzo MD, Khodayar Rais-Bahrami, MD, Renee Boss, MD, MHS

Background and Aim

The growing population of children with pediatric chronic critical illness (PCCI) comprise a disproportionate amount of ICU utilization.

Clinicians and parents report that the frequent treatment alterations typical for ICU care may be interrupting the slow recoveries typical for children with PCCI and prolonging ICU stays.

Our aim is to determine whether there is an optimal number of ICU treatment titrations per week associated with the lowest quartile of patient decompensations and shortest ICU length of stay for children with PCCI.

Methods

A retrospective chart review of children with PCCI
Eligibility: patients 0-18 years who were

1) admitted to the NICU for >30 days and corrected to ≥34 weeks gestational age OR admitted to the PICU/CICU >21days; AND

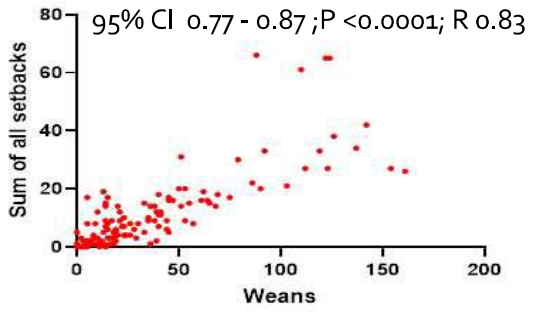
2) dependent on ≥1 technology to sustain vital functions

150 pediatric patients admitted between 2016 – 2020 were randomly selected with participants divided equally between ICU's.

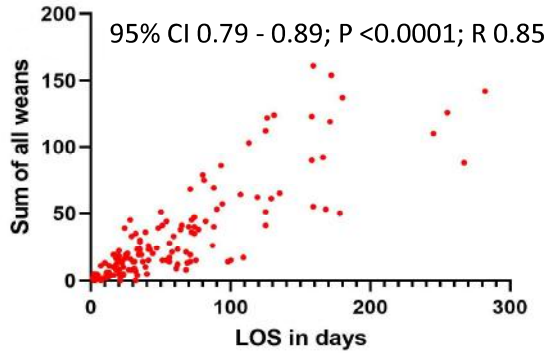
Daily changes to respiratory, nutrition, and sedation management were tracked.

Children with PCCI may benefit from slower paced care.

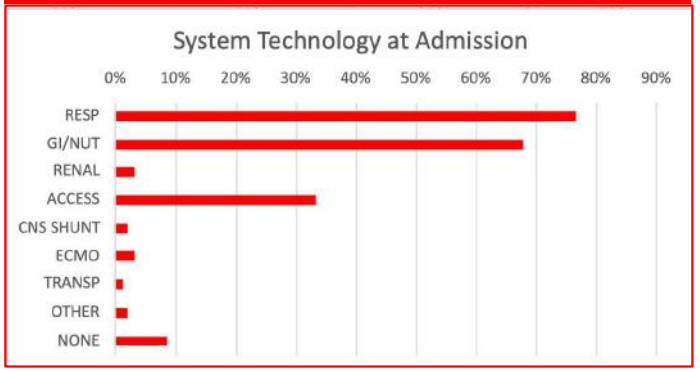
Weans and Setbacks



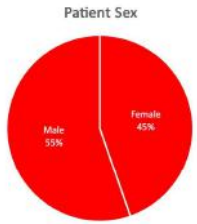
Weans and ICU LOS



Demographic Data



Age at admision	NICU	CICU	PICU	Total	% of Total
<1 year	75	24	8	107	71
1-3 years		4	6	10	7
3.1-6 years		1	3	4	3
6.1-10 years		1	4	5	3
10.1-18 years		3	17	20	13
>18 years		1	3	4	3
TOTAL	75	34	41	150	



Conclusions

This retrospective chart review of patients with PCCI demonstrates a correlation between pace of ICU weans and patient stability and ICU LOS

This data suggests that rapid ICU titrations for CCI patients may increase their resource utilization.

The next step is a prospective study of "Slow & Steady" ICU weans for children with PCCI, examining the causative nature between weans and setbacks.

Changes in body composition in the year following critical illness

Matthew Thackeray [a,b], Mark A Kotowicz [a,b,d], Julie A Pasco[a,b,c,d], Mohammadreza Mohebbi [a,e], Neil Orford [a,b,f]

Introduction

Intensive care unit (ICU) patients undergo acute skeletal muscle wasting due to immobility and critical illness associated systemic inflammation [1]. Survivors of ICU are reported as having persistent physical impairment and disability in the years following discharge [2,3]

A current hypothesis for the mechanism of post-ICU reductions in physical function is the lack of recovery of muscle atrophy sustained during critical illness. There is a need to measure changes in body composition in ICU survivors and determine its contribution to functional impairment. Previous research has examined muscle mass from 6-12 months following ICU but data from ICU discharge is lacking.

Aims

- Measure changes in spine and hip dual x-ray absorptiometry estimated lean and fat mass in ICU patients between discharge and one-year follow-up and compare to population controls
- Examine the association between health-related quality of life (HRQoL) measures and estimated body composition variables

Methods

Participants were taken from a prospective observational study performed at University Hospital Geelong, a tertiary level ICU in South-eastern Australia [4]. Previously developed equations were used to estimate whole-body lean mass, whole-body fat mass, and appendicular lean mass from dual x-ray absorptiometry of the spine and hip at ICU discharge and 1-year follow up. Controls were taken from The Geelong Osteoporosis Study (GOS) [5], an ongoing population-based study. GOS participants with available spine and hip DXA data from two visits were included and group matched for age, sex, and height in a ratio of up to 1:10.

Annualised changes in total and percentage whole-body lean mass, whole-body fat mass, and appendicular lean mass were measured and compared to controls via multi-variable linear regression with adjustment for age, sex and height. One-year values of body composition were also compared to controls. Pearson's correlation was used to determine the relationship between HRQoL measured via EuroQol-5D-3L and EuroQol Visual analog scale (VAS) and body composition variables.

Results

Sixty-four ICU patients were assessed at ICU discharge and one-year follow up (median time b/w scans 409.5d IQR 378.5, 445.0). Baseline data is presented in Table 1. Unadjusted between group differences in the primary outcome are presented in Table 2. ICU patients gained a greater amount of lean and fat mass in the year following ICU than controls. In multi-variable regression analysis, ICU admission remained a significant predictor of change in lean and fat mass, with medium partial eta-squared effect sizes observed. At one-year, ICU patients had lower lean mass (-0,96kg, p=0.047) and greater fat mass (+6.79kg, p<0.001) than controls, and a greater proportion in the sarcopenic range (12.5% vs 3.89%, p=0.002). Fat mass but not lean mass was associated with EQ-5D-3L index scores (r=-0.29, p=0.03) and EQ VAS (r=-0.30, p=0.03).

Table 1: Baseline characteristics for ICU patients and matched controls

	ICU (n=64)	GOS Controls (n=540)	P value
Age (yr)	68.8 [60.8, 74.6]	67.4 [56.5, 74.5]	0.51
Female	30 (47)	300 (56)	0.19
Height (cm)	166.2 (±10.5)	165.0 (±9.7)	0.30
Weight (kg)	77.0 (±16.10)	74.4 (±14.2)	0.21
Body mass estimates (kg)			
WBLM	44.9 (±11.9)	46.0 (±11.0)	0.34
WBFM	29.4 (±10.5)	25.1 (±8.8)	<0.001
ALM	19.7 (±5.6)	20.3 (±5.3)	0.32
Comorbidity		-	
Renal	5 (7.8)		
Cardiovascular	30 (46.9)		
Respiratory	15 (23.4)		
Diabetes mellitus	11 (17.2)		
ICU admission category		-	
Cardiac failure	11 (17.2)		
Cardiothoracic surgery	14 (21.9)		
General surgery	11 (17.2)		
Respiratory failure	5 (7.8)		
Sepsis	18 (28.1)		
Other	5 (7.8)		
APACHE III score	66 [56, 92.5]		
ICU outcomes		-	
Duration of ventilation (hrs)	87 [47, 143]		
Corticosteroid use (n)	21 (32.8)		
CRRT use (n)	11 (17.2)		
ICU LOS (days)	6.5 [4, 9]		
Hospital LOS (days)	16.5 [11, 31.5]		

Results

Table 2: Comparison of mean body composition changes between ICU cases and controls. All p values < 0.01

Variable	ICU (n=64)	Controls (n=540)	Difference (95%CI)
Whole-body lean mass			
Annualised Change (kg)	0.75 (±2.21)	-0.17 (±0.72)	0.92 (0.67 to 1.18)
Percentage Annualised change (%)	1.97 (±5.73)	-0.28 (±1.88)	2.25 (1.58 to 2.92)
Whole-body fat mass			
Annualised Change (kg)	2.79 (±5.45)	0.29 (±1.28)	2.50 (1.94 to 3.05)
Percentage Annualised change (%)	10.90 (±18.88)	1.87 6.29)	9.04 (6.81 to 11.26)
Appendicular lean mass			
Annualised Change (kg)	0.34 (±1.17)	-0.11 (±0.35)	0.45 (0.32 to 0.58)
Percentage Annualised change (%)	2.07 (±6.89)	-0.44 (±2.11)	2.50 (1.73 to 3.28)

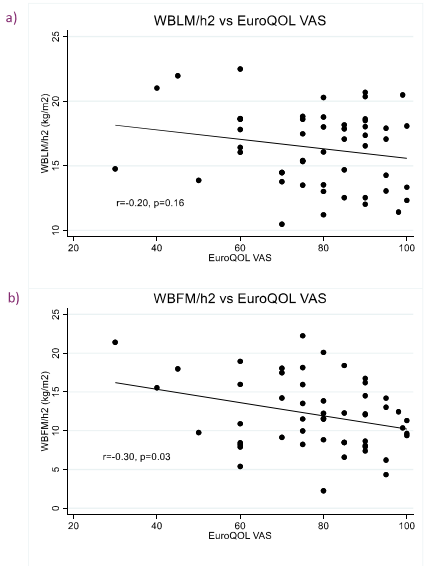


Figure 1: Scatterplots for a) whole-body lean mass corrected for height (WBLM/h^2) and b) whole-body fat mass corrected for height (WBFM/h^2) and EuroQOL VAS

Conclusion

In this prospective observational study ICU patients gained greater amounts of estimated lean and fat mass in the year following critical illness than matched controls. However, at one-year ICU survivors had lower lean mass and greater fat mass than controls. At this time point increased fat mass was also associated with poorer HRQoL.

These findings may represent a return to pre-morbid state, changes in metabolic profile, or low activity levels and nutritional inadequacy in ICU survivorship.

Understanding the factors associated with, and effect of, increasing muscle mass and reducing fat mass in the year after critical illness requires further investigation.

Acknowledgements

The authors would like to acknowledge the participants in the study and the participants of GOS who were used as controls

Author affiliations

a. Deakin University, IMPACT (Institute of Mental and Physical Health and Clinical Translation), Geelong, Australia,
b. Barwon Health, Geelong, Australia
c. Department of Medicine-Western Health, The University of Melbourne, St Albans, Australia
d. Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia
e. Deakin University, Faculty of Health, Biostatistics Unit, Geelong, Australia
f. Australian and New Zealand Intensive Care Research Centre (ANZIC-RC) Department of Epidemiology and Preventive Medicine (DEPM), Monash University, Melbourne, Australia

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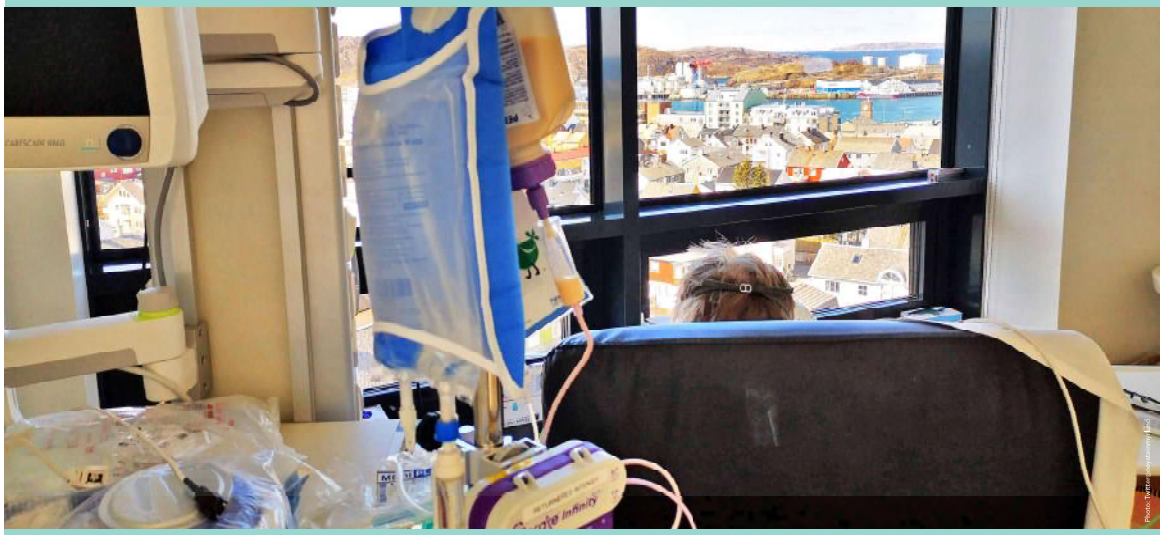
For further information regarding this research contact
Matthew Thackeray: mthack@barwonhealth.org.au

Nursing and early rehabilitation in long-term patients in intensive care units: a qualitative study

Karina Knutsen, Hege Selnes Haugdahl, Britt Normann



BACKGROUND:

Early rehabilitation in intensive care units (ICUs) is requested, and it reduces the likelihood for developing intensive care units acquired weakness. Knowledge regarding how intensive care nurses perform the actual patients' exercises and mobility schedules, how they handle the patient during mobilization, and what they consider important regarding timing, safeness, structures and competencies are lacking.

PURPOSE:

The study aims to identify essential intensive care nurses' competencies in optimizing patients' participation in early rehabilitation to develop a new integrated nursing intervention to promote recovery of body functions and structures, activities and participation for these patients.

OVERALL RESEARCH QUESTION:

What are essential professional clinical nursing competencies, enablers and barriers to optimize long-term ICU patients' participation in early rehabilitation?

DIVIDED INTO THREE WORK PACKAGES:

A How do ICU nurses use their competencies, particularly their handling- and interactional skills, to optimize patients' participation in early rehabilitation during their long term stays in ICUs?

Method:
- Non-participating observations of clinical practice (n=12-18)
- Videorecording of relevant situations
- Field notes

B What are ICU nurses' reflections regarding enablers and barriers to optimize patient's participation in early rehabilitation during long-term stays in the ICU?

Method:
In-depth interviews with ICU nurses based on interview guide and observations (n=12-18)

C How is participation in early mobilization and rehabilitation during long term stays in ICUs experienced from the patients' perspective?

Method:
In-depth interviews with patients after discharge from the ICU (n=12-18)

Contact: karina.knutsen@nord.no

NORD University

www.nord.no

Building Trusting Relationships Throughout Prolonged ICU Stays During the COVID-19 Pandemic

Logan Russell, PT, DPT
Heather Tattersall, MS, MPH, OTR/L

VIRGINIA HOSPITAL CENTER

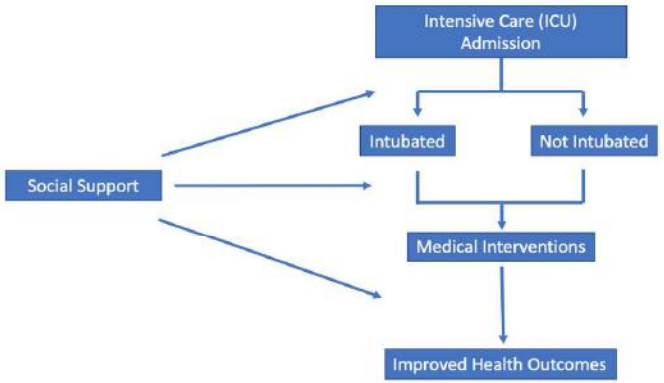
Introduction

The COVID-19 pandemic challenged healthcare in many ways. Continuous stress, limited resources, and overworked staff created a perfect environment for compassion fatigue and emotional burnout. Clinicians facing empathy fatigue may experience a lack of motivation and decreased ability to provide effective, meaningful patient interactions.[1] The ability to provide needed social support for patients is also a lower priority than emergent medical care. Thus, clinicians may focus less on these relationships, especially in the Intensive Care Unit (ICU). Patients diagnosed with COVID-19 are quarantined in rooms throughout their hospitalization. They rely primarily on social support from the patient-clinician relationship as they have access to limited family support. Given clinicians inability to provide consistent social interactions due to isolation procedures as well as burnout, patients may suffer mentally and emotionally.

Decreased perceived social support can negatively impact the patient experience and health outcomes. Past research has shown that patient's perceived social support during an ICU stay is related to improved treatment effectiveness and improved health related quality of life following discharge.[2] The perception of that support as readily available leads to improved physical and mental health outcomes.[3] During a time when patients' families were unable to provide daily social interaction and support due to isolation and visitor restrictions, the clinician-patient relationship became even more important. Using two specific patient cases, this study focuses on the benefits of maintaining therapeutic relationships throughout an entire ICU stay, even during a pandemic, to maximize functional outcomes and improve patients' well-being.

Methods

Mixed methods approach was utilized by combining objective data from a retrospective chart review and qualitative data from lived experiences by two critical care therapists. Specific outcomes were assessed for overarching themes.



Discussion

Patients diagnosed with COVD-19 were isolated in rooms with limited in-person interactions with clinicians and families. Isolation led to increased stress, as shown with increased respiratory rate, increased heart rate, and poor oxygen saturation for intubated and sedated patients. For patients without sedation, poor mental and emotional well-being was shown through depressed mood, refusal of medical treatment, and self-isolating behavior, impacting the patients' overall medical and functional status. Clinicians' own emotional burnout during the pandemic, as well as hospital isolation procedures, prevented standard social interaction between clinicians and patients. However, as the two following case studies showed, providing increased social support during different times of ICU admission improved overall patient outcomes. One patient with COVID-19 experienced significant anxiety while intubated in the ICU, limiting his ability to tolerate sedation. During a period of wakefulness, therapeutic touch and social interaction decreased respiratory rate, improved oxygen saturation, and decreased anxiety, allowing the patient to tolerate lying prone.

An additional patient experienced significant ICU-acquired delirium and weakness following a multi-week intubation after a COVID-19 diagnosis.Through therapeutic use of self, cognitive retraining, and anxiety reduction strategies, this patient became highly motivated and engaged in therapy, experiencing significant functional improvements. Perceived social support, however, was not measured. Given that perception of social support, not just the sole act of providing social support, has been shown to have a significant effect on health outcomes, it would be important to measure perceived social support in future studies. Thus, despite clinicians' own emotional burnout, it is vital to remember the importance of providing social support to patients throughout their entire ICU stay.

Conclusion

Clinicians' ability to build trusting and empathetic relationships with patients can impact functional and medical outcomes. During the COVID-19 pandemic, clinicians may think that they might not be able to provide the same degree of compassionate care to their patients. However, it is important to uphold these values and relationships as part of the standard of care throughout the entire hospitalization, especially in the ICU. Future studies could include a large sample size with patient questionnaires focusing on their perceived social support levels both during and after ICU admission.

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Functional status and physical variables in post-intensive care unit COVID-19 patients: characterization and prognostic factor

Debora S. Schujmann[1]; Claudia N. Peso[1]; Adriana Claudia Lunardi[1]; Jose Eduardo Pompeu[1]; Adriana Lourenço[2]; Sabrina Aguera[2]; Caroline M. Censo[3]; Mieko Claudia Miura[3]; Luzia N. T. Taniguchi[3]; Marisa M. Regenga[3]; Wellington P Yamaguti[4]; Christina M M de Brito[4]; Renato F Righetti[4]; Elaine C de Campos[4]

[1]Department of Physical Therapy, Communication Sciences & Disorders and Occupational Therapy School of Medicine. University of Sao Paulo, Sao Paulo, Brazil

[2]Hospital de Clínicas de São Bernardo do Campo e Hospital Anchieta

[3]Hospital do Coração HCOR

[4] Hospital SírioLibanês

Introduction

- The coronavirus disease 2019 (COVID-19) increased demand for ICU.
- Many ICU therapeutics could be risks factors for functional losses.
- Although studies have identified decreased physical capacity after hospital discharge the acute impact on physical function of ICU admission due to COVID-19 is still unclear.
- Recognized factors associated with poor physical function may help to identify strategies to improve the process of care, prevention and rehabilitation.

Objective

To analyses the impact on functional status and physical variables of patients with COVID-19 after ICU stay and the prognostic factors associated.

Participants

Inclusion Criteria:

• Adult patients with COVID-19

• Previously independent for activities of daily living

Exclusion Criterion:

• Death

• Functional decline due to other complications

• Cognitive impairment

•ICU length of stay (LOS) shorter than four days

Methods

It was a prospective multicenter cohort study performed from July 2020 to April 2021

Methods

- The patients were recruited from the COVID-19 ICUs of these centers and followed throughout the ICU stay. Demographic, clinical and therapeutic variables were collected.
- Evaluation of functional status and physical data were performed at ICU discharge.
- The primary outcome was BI score categorized into dependent and independent for functionality (lost > 15 points in the BI)
- Were evaluated: maximal inspiratory and expiratory pressure test, handgrip dynamometer, MRC test and step test.
- Regression models were used to determine the functional status prognostics and factors associated.
- The dependent variable was dependent or independent. The independent variables were demographic, clinic, and therapeutics data suggests in the literature associated with functional decline.

Results

Table 1. Baseline demographic and clinical variables between independent and dependent functional groups

	IF (n=139)	DF (n=172)	p
Demographic variables			
Age (years)	51±15	58±14	<0.001
Female, n(%)	44 (14)	51(16)	0.7
Elderly (>60y)	48 (15)	94 (30)	<0.001
SAPS 3	47±14	60±26	0.05
Clinical variables			
Comorbidities, yes (%)	127 (40)	150 (48)	0.3
Sepse	9 (3)	42 (15)	<0.001
Hyperglycemia	11 (4)	19 (7)	0.3
Prona position, yes (%)	27(10)	62(23)	<0.001
Non invasive ventilation, yes (%)	48(18)	60(22)	0.8
Mechanical ventilation, yes (%)	43 (16)	92 (34)	<0.001
Days of mechanical ventilation	5±3	10±8	<0.001
Neuromuscular blocker, yes (%)	21 (8)	68 (27)	<0.001
Corticoid, n(%)	113 (43)	131 (50)	0.9
Sedation drug, yes (%)	43 (16)	98 (37)	<0.001
Days of sedation	4±2	8±6	<0.001
Vasoactive drugs, yes (%)	27 (10)	73 (27)	<0.001
ICU length stay	10±6	18±5	<0.001

Data described in mean ± SD, absolute number (%). IF Independent functional group, DF Dependent functional group, SAPS Simplified Acute Physiology Score.

Results

Table 2. Comparison between independent and dependent functional groups for physical variables

	IF (n=139)	DF (n=172)	p
Barthel Index	87±6	70±10	<0.001
MRC points	54±7	46±9	<0.001
Handgrip test	23±11	16±12	<0.001
Step test	31±20	8±5	<0.001
MEP	82±29	62±27	<0.001
MIP	76±29	58±25	<0.001
Walking in the ICU	118(85)	94(55)	<0.001

Data described in mean ± SD, absolute number (%). IF Independent functional group, DF Dependent functional group, MRC Medical Council Research, MEP maximal expiratory pressure, MIP maximal inspiratory pressure.

Table 3. Correlation between physical evaluated and delta Barthel Index

	r	p
MIP	0.39	<0,001
MEP	0.43	<0,001
Step Test	0.45	<0,001
MRC	0.61	<0,001
Handgrip test	0.37	<0,001

MRC Medical Council Research, MEP maximal expiratory pressure, MIP maximal inspiratory pressure. Delta Barthel (previous-ICU discharge).

Table 4. **Analysis of predictive variables during ICU stay on functional status loss in previously independent patients**

Coefficient	OR [95% CI]	p
Age	1.03 [1.01 – 1.05]	0.006
ICU length stay	1.09 [1.05 – 1.13]	<0.001
Walking in the ICU	0.24 [0.13 – 0.44]	<0.001

Conclusions

The results showed that functional loss in patients with COVID-19 after admission to the ICU is associated with muscle strength, respiratory pressures and step test. Factors related to functional loss are age and ICU lenght stay. The only protective factor for functional loss is the patient walking in the ICU.

Acknowledgements

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deborass@usp.br

Safety and Feasibility of Mobilizing Patients with Femoral Arterial and Hemodialysis Catheters in the Intensive Care Setting

Kelly Bennett PT, Alexandra Carbone DPT, Brian Foley DPT,
Lauren Ferrante MD, MHS, Vikki Winks PT, MBA

Objective

To assess the safety and feasibility of mobilizing patients with femoral arterial and hemodialysis catheters in the ICU at Yale New Haven Health System (YNHHS).

Background

Historically, patients with femoral arterial and hemodialysis lines at YNHHS were excluded from progressive active mobilization in the ICU. The pilot was developed to remove this barrier to mobility in the ICU setting. Patients with femoral triple lumen catheters were previously approved for mobility at YNHHS and therefore were excluded from this pilot.

Planning and Development

Identify Champions
- Rehabilitation
- Physician
- Nursing

Formulate Safety Checks
- STEPS mobility screening tool
- Femoral line algorithm
- Line and limb check
- Potential adverse events
- Additional safety practices

Education
- Rehabilitation staff
- Nursing staff and leadership
- ICU physician teams
- Hands on training with a rehabilitation champion

Data Collection
- Identify variables
- Add variables to electronic medical record
- Develop data set with IT

Additional Safety Practices
- Chair follow when ambulating
- Nurse present for mobility
- Team educated on response to an adverse event
- Line must be sutured
- Mechanical lift pad placed in chair
- Therapists assist with return to bed transfer

Femoral Line Mobility Intervention

ICU Screening Tool

STEPS Mobility Screening Tool

1. This patient has a *baseline condition that would limit their benefit* from out- of- bed?
   - Comfort measures only or actively dying
   - Bedbound at baseline
2. This patient is *too neurologically impaired* to participate in mobility?
   - RASS ≤ - 2 or ≥ +3
3. This patient is *not safe from a respiratory standpoint* to participate in mobility?
   - FiO2 on mechanical ventilation ≥ 60%
   - PEEP on mechanical ventilation ≥ 10
4. This patient is *not safe from a hemodynamic standpoint* to participate in mobility?
   - Vasopressor up titrated within the past 2 hours, or more than 2 vasopressors **(Vasopressin excluded)**
   - Active myocardial ischemia with EKG changes or rapidly rising troponins
   - Unstable arrhythmias
   - Ongoing, uncontrolled blood loss
   - **Femoral** Quinton, **Femoral** Cordis, **Femoral** Sheath in place

Femoral Line Mobility Algorithm

- Pre-mobility line and limb check
- Constant line assessment
- Progress mobility per PT/OT clinical judgement
- Post-mobility line and limb check

Table A: Line and Limb Check
- Waveform
- Hematoma and/or bleeding at site
- Proper catheter securement
- Note strength and presence of dorsalis pedis pulse

Potential Adverse Events

Pilot Adverse Events: 0

- Nonfunctioning catheter
- Removal of catheter
- Bleeding at catheter site
- Acute limb ischemia within 24 hours after rehabilitation intervention
- Retroperitoneal hematomas
- Catheter line-associated blood stream infections

Documentation
- Highest Level of Mobility
  - Therapeutic exercise
  - Sitting edge of bed
  - Standing
  - Bed to chair
  - Ambulation

Femoral Line Mobility Algorithm

Arterial / Hemodialysis

Does this patient screen IN using STEPS mobility tool?

NO → STOP

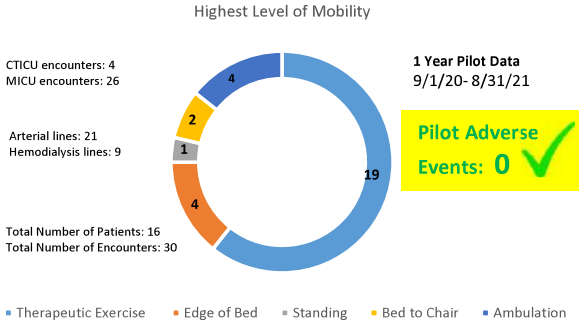
YES → Pre-Mobility: Have RN perform line check and limb check (Table A) prior to mobilizing

Progress to highest level of mobility based on clinical reasoning and patient presentation ↔ Constantly perform line check and monitor for adverse events (Table B)

Post- Mobility: Have RN perform line check and limb check (Table A) after mobilizing → Document highest level of mobility, presence of line, and adverse/lack of adverse events

*Line must be sutured

Results



Discussion

Interdisciplinary team planning to develop safety protocols was critical to the development and implementation of this pilot in two ICUs in our hospital. Zero adverse events occurred with thirty mobility encounters over the course of the one year pilot. Mobility encounters ranged from bed level exercise of involved extremity to ambulation. This data supports mobilization of patients with femoral arterial and hemodialysis lines as a safe and feasible practice in our institution. Future goals include obtaining administration approvals and implementing this practice change across the health system in order to remove this barrier to early mobility. In the future, data including length of stay, ICU days, and disposition will be collected to compare functional outcomes of patients with femoral arterial and hemodialysis lines pre and post practice change.

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FEASIBILITY AND SAFETY OF FUNCTIONAL ELECTRICAL STIMULATION IN COVID-19 CRITICALLY ILL PATIENTS

Samantha Torres Grams, Wesla Neves da Silva Costa, Leandro Teixeira Saraiva, Mariane Tami Amano, Wellington Pereira Yamaguti
Hospital Sírio-Libanês, Brazil.

BACKGROUND

Patients with severe COVID-19 develop early muscle wasting and decreased muscle strength during ICU stay. In a previous study, the loss of muscle mass reached a reduction of 30% in ten days of hospitalization, with expressive reduction of muscle strength of 22%.[1]

In other critical care patients, the role of early rehabilitation is well established. Among the available therapeutic resources, the electrical stimulation has been used as an adjunct strategy to preserve muscle strength, with the potential benefit of preserving muscle mass.[2,3] However, in severe COVID-19, these effects as well as the technique's feasibility and safety, are still unknown.

OBJECTIVE

The aim of this study was to investigate the feasibility and safety of a functional electrical stimulation protocol in COVID-19 critically ill patients with sepsis or septic shock to prevent muscle wasting and strenght loss.

METHODS

- We studied 19 subjects who met the inclusion criteria as follows: (1) patients admitted to ICU diagnosed with COVID-19 with sepsis or septic shock; age ≥ 18 years old; (2) BMI ≤ 35 kg/m²; (3) without diagnosis of neuromuscular diseases, diabetic polyneuropathy and cardiac pacemaker; (4) without skin lesions, infection or trauma in lower limbs; (5) able to walk independently or with the assistance of auxiliary devices prior to hospitalization; (6) immobilization period without walking of up to 7 days; (7) with no current use of neuromuscular blockers and without imminent risk of death within 48 hours.
- This was a randomized, controlled and single-blind clinical trial. The patients admitted to the ICU, after clinic stabilization, were randomly assigned to experimental (n = 9) or sham (n = 10) groups, and were invited to participate in 40 minute sessions, for 7 consecutive days.

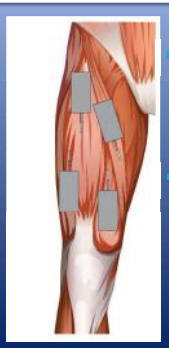

Figure 1. Placement of electrical stimulation electrodes on the thigh.

- The electrical stimulation was applied in the vastus medialis and vastus lateralis muscles in each lower limb, with frequency of 100 Hz, pulse duration of 350 µs, at intervals of 6 s, separated by 12 s off, thus eliciting a total of 120 contractions per session.
- Among the criteria of clinical stability for not performing or interrupting the electrical stimulation session, we highlight: high doses of inotropics; MAP < 65 mmHg; HR > 140 bpm or < 50 bpm; arrhythmias; patient-ventilator asynchrony; SpO2 < 88% refractory to O2 supplementation; FiO2 > 70%; prone positioning and ECMO.
- To determine the eletrical stimulation feasibility, we examined the percentage of patients who completed at least 85% of the sessions and the number of sessions where muscle contractions were observed. To determine its safety, we evaluated cardiorespiratory variables, temperature, pain, fatigue and burn.

RESULTS

- Seventy eight percent of the patients in the experimental group, and 80% in the sham group completed at least 85% of the scheduled sessions, without differences between groups (p > 0.05).
- A total of 56 sessions were performed in the experimental group. Effective muscle contraction occurred in 98,21% of the sessions.
- There were no significant changes in temperature in the experimental group (p > 0.05). No patient presented asynchrony, arrhythmia, pain or burn. One patient had fatigue in a single session.

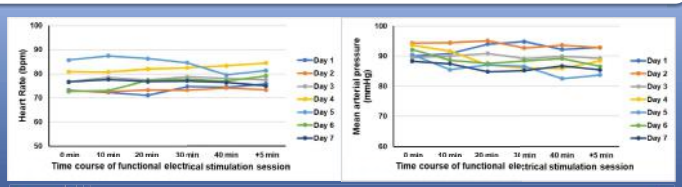

Figure 2 – Heart rate and mean arterial pressure responses during FES for all the experimental group patients.

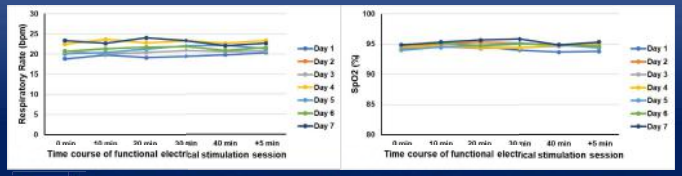

Figure 3 – Respiratory rate and SpO2 responses during FES for all the experimental group patients.

CONCLUSION

The functional electrical stimulation protocol seems to be feasible and safe in COVID-19 critically ill patients.

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