POSTER PRESENTATION SCHEDULE

10th Annual Johns Hopkins Critical Care Rehabilitation Conference

Time	Presenter(s)	Title	Institution
Saturday, November 6, 2021 - PM Session [Facilitator - Hallie Lenker, PT]			
12:15 PM - 1:15 PM	Ana-Carolina Gonçalves, PhD	Rehabilitation Following Severe COVID-19 – Views from Survivors, Relatives and Health Professionals	Worthing Hospital, West Sussex, England
	Susan Ferozan, PT	The Effectiveness of Physical Therapy on Ambulation Distance for Patients Following Left Ventricular Assist Device Implantation in the Acute Care Setting	Deborah Heart and Lung Center, Browns Mills, NJ, USA
	Heather Tattersall, MS, OTR/L	Assessing Outcomes Following COVID-19 Hospitalization and Prone Positioning	Virginia Hospital Center, Arlington, VA
	Kelly Potter, RN, PhD	The IMPAiR (Identifying coMorbid subgroups of Patients with Acute Respiratory failure) Study: Risk Stratification of Physical Disability Post-Intensive Care	University of Pittsburgh, Pittsburgh, PA, USA
	Caitlyn Anderson, PT, DPT, NCS, GCS	To Mobilize or Not to Mobilize: That is the Question! A Scoping Review of Physical Therapy Management of COVID-19 Patients with Cardiovascular Complications	University of Wisconsin - Milwaukee, Milwaukee, WI, USA
	Carleigh Dabritz, OTR/L	Eye Can Communicate!: Implementation of Eye Gaze Technology to Improve Patient Communication and Participation in The Acute Hospital Setting	Johns Hopkins Hospital, Baltimore, MD, USA
	Timothy Rogers, MD	Impact of a PICU Early Mobility Program on Functional Status	Kaiser Permanente, Oakland, CA, USA
	Miguel Martinez Camacho, PT, MSc	Functional and Muscular Status in Critically Ill Patients Surviving COVID-19. Unmasking Their Relationship.	University of Wisconsin - Milwaukee, Milwaukee, WI, USA

Rehabilitation in severe Covid-19: views of survivors, relatives and health professionals

A-C Gonçalves, A Hill, C Koulouglioti, A Williams, T Leckie, A Hunter, D Fitzpatrick, A Richardson, B Hardy, R Venn, L Hodgson

Intro

The experiences of those who were critically ill, their families and the professionals involved in their care can inform our understanding of the recovery process in severe COVID-19. Such knowledge is essential to plan rehabilitation pathways for this patient group.

Methods

In-depth semi-structured interviews were conducted with survivors of critical care (n=6), informal carers (n=3) and health professionals (n=12), three months post hospital discharge, from five acute hospitals in the UK.

Recruitment followed a maximum variation strategy, completed during the first wave of the pandemic.

The interviews were conducted remotely (phone or video call), transcribed verbatim and analysed using reflexive thematic analysis.

Deteriorating fast

- **Down hill journey from onset to critical care**
- *People aren't really seeing how bad you are […] if it wasn't for my wife making that phone call [to 999] I wouldn't be here today, […] and that is getting too near the knuckle, really too close for comfort. [Survivor, male, 70 years old]*

Facing a new virus

- **Hospital as a remote place**
- *'…and they just say, you know "he is stable" or "he is sleepy" or something. I suppose if there is nothing else to say, there is nothing else to say. But it is not much when you are at the other end of the phone and just want to know what is going on medically' [Relative, female, 66 years old]*

Home as a survivor

- **Maintaining normality & recovering slowly**
- *"As soon as anyone wrote: "medically fit for discharge", they were gone. And (…) that was very different and quite difficult to manage sometimes" [Occupational Therapist, Female, 36 years old]*
- *"They have had 18 very poorly, in my situation: had COVID, on a ventilator and in a coma. Five of them are dead [crying] why not me? They would have been better people than me! And you get this… you know, PTSD. And I don't deal with that very well actually" [Survivor, Male, 59 years old].*

Family

Faith

Remote consultations

Technology

Discussion

Survivors and relatives struggled to access care at the onset of symptoms. Our findings suggest some lessons to be learnt from the first wave of the pandemic regarding the triage of patients over the phone.

Hospitals became remote places during the pandemic; communication in and out was a challenge and a key priority to all stakeholders.

When returning home a "survivor identity" was assumed as part of a process of recalibration with a new reality. It is known that a reframed "survivor identity" may be linked to better mental health outcomes and better engagement in rehabilitation. Therefore it may be beneficial to promote the concept of survivorship in severe COVID-19 in public health messages.

@WSHTResearch

NHS
University Hospitals Sussex
NHS Foundation Trust

The Effectiveness of PT on Ambulation Distance for Patients Following LVAD Implantation in the Acute-Care Setting

Ferozan, S.[1]; MacFarlane, S.[2]; Byars, K.[2]; Parrott, J.S.[2]
1 - Deborah Heart and Lung Center - Browns Mills, NJ, USA
2- Rutgers University, The State University of NJ - Doctor of Physical Therapy Program, Backwood, NJ, USA

Objective:

LVAD is a surgically-implanted mechanical pump that provides circulatory support for patients in heart failure.
Effectiveness of PT at optimizing function after LVAD implantation has only been researched in the inpatient rehabilitation setting.
The purpose of this pilot study is to report effectiveness of PT at improving ambulation distance and function for patients after LVAD implantation in the acute-care setting.

Methods:

- Retrospective chart reviews were completed for 15 consecutive patients who received a scheduled LVAD implantation at Deborah Heart and Lung Center
- Data extracted: PT data, ambulation distance, and function (JH-HLM)
- Inclusion criteria were: 18-89 years old, ambulatory at admission, received ≥ 3 PT sessions
- Data analysis: Wilcoxon sign rank for within-group and Mann-Whitney for between-group data

Legend:
LVAD: Left Ventricular Assistive Device
PT: Physical Therapy
JH-HLM: John Hopkins Highest Level of Mobility Scale

Deborah Heart and Lung Center
Rutgers School of Health Professions

PT provided to patients after LVAD implantation in the acute-care setting increases ambulation distance, more so when PT is initiated within 72 hours, and optimizes function.

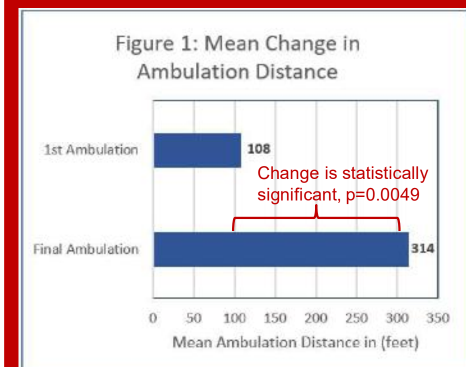


Figure 1: Mean Change in Ambulation Distance

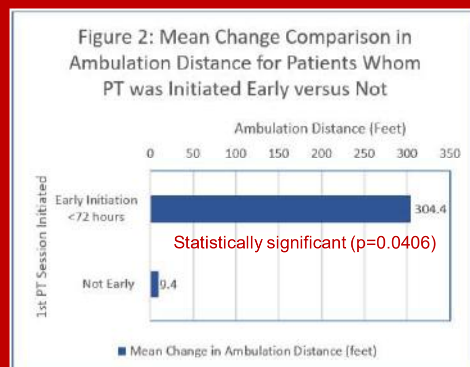


Figure 2: Mean Change Comparison in Ambulation Distance for Patients Whom PT was Initiated Early versus Not

100% of patients achieved ambulation as highest level of mobility
JH-HLM scores at final PT session: 46% of participants achieved an 8/8

Table 1. PT Interventions Performed Over Average of 6.3 (SD 1.88) Sessions

Intervention	Frequency	Description
Bed Mobility	79%	-Rolling and supine to/from sit **Note**: Log-rolling technique
Transfer Training	89%	-Sit to/from stand transfers, Stand-pivot transfers, or Stand-step transfers **Note:** Minimal use of upper extremities
Gait Training	77%	-Part-Task Training -Short-distance ambulation within room -Long-distance ambulation within unit **Note:** When Swan-Ganz catheter present, hospital protocol prohibited gait training
Endurance Training	48%	-Gait Training or Therapeutic Exercise -Increased time -High repetition -Minimize rest breaks
Balance Activities	42%	-Static: received multidirectional perturbations -Dynamic: reached or shift weight outside of base of support
Therapeutic Exercises	41%	-Supine: isometric, short arc quads, hip abd/adduction, bridges and ankle pumps -Seated: marching, hip abd/adduction, and long arc quads -Standing: marching, hip abd/extension, heel raises, mini-squats, lunges, side-stepping with squats Equipment: manual-pressure, Theraball, or TheraBand
Education	98%	-Sternal precautions -Optimal breathing technique -Role of acute-care PT -ICU therapeutic exercise -LVAD equipment management -Discharge recommendation -Activity recommendation status post discharge

Assessing Outcomes Following COVID-19 Hospitalization and Prone Positioning

Heather Tattersall, MS, MPH, OTR/L
Kelly Negley, PT, DPT
Caroline Morris, PT, DPT
Julie Pierce, MS, BSN, RN, OCN, CBCN

VIRGINIA HOSPITAL CENTER
MARYMOUNT UNIVERSITY

Objectives

The prone position quickly emerged as a treatment technique at our facility for patients with acute respiratory distress syndrome (ARDS) from COVID-19. Our practice was based on prior evidence about the benefit of the prone position for patients with ARDS as well as clinical practice guidelines that quickly evolved over the course of the pandemic. Patients admitted with a COVID-19 diagnosis were frequently placed on a positioning schedule and were followed by an interdisciplinary group of clinicians called the "Prone Team." The prone team in the ICU at our facility typically consisted of five clinicians: respiratory therapist, two rehabilitation therapists, a nurse and a rehab aide. The prone team on the standard units consisted of two to three rehabilitation therapists. The purpose of our project was to examine the demographics, clinical presentation, and health outcomes for all patients that were admitted to our small, community-based non-profit facility with COVID-19. We specifically focused on the comparison of discharge disposition for those patients who spent time in the prone position and those patients who spent time in the ICU.

Methods

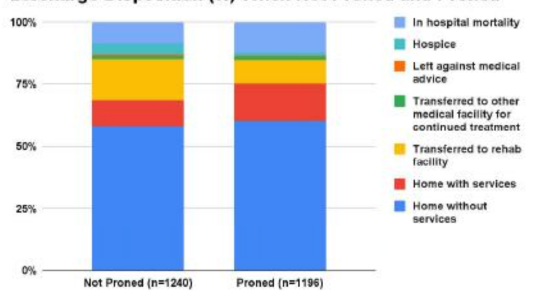
A retrospective chart review of all patients (n = 2,436) with a diagnosis of COVID-19 admitted between March 8th, 2020 and March 31st, 2021 was performed. SPSS was used to analyze the data. Demographic data, BMI, clinical presentation, use of the prone position, admission to the ICU and discharge disposition were analyzed via observational analysis. Chi-square analysis was used to determine initial relationships between demographics, use of the prone position, and discharge disposition. Regression analysis was used to look for the presence of correlations between our categorical data.

Results

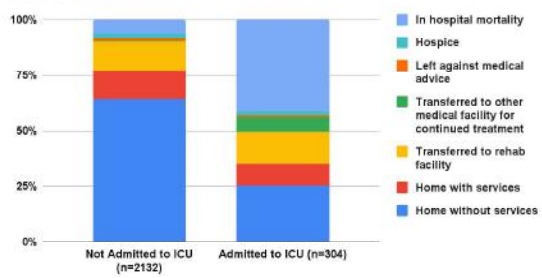
Fast Facts

7.18	8.98	10.3%	59.2%	73.2%
Mean length of stay (days) for **all** patients admitted to VHC with COVID-19.	Mean length of stay (days) for patients admitted to **ICU** with COVID-19.	In-hospital mortality rate	Percentage of patients discharged home with **no** services.	Mortality rate of ICU patients who underwent prone positioning.

Discharge Disposition (%) When Not Proned and Proned



Discharge Disposition (%) When Not Admitted to ICU and Admitted to ICU



Sample Demographics of Patients with COVID-19 n=2436	
Age	
Range	16-102
Biological Sex	
Female	47.6%
Body Mass Index	
Underweight	2.9%
Healthy Weight	23.1%
Overweight	31.4%
Class I Obesity	19.0%
Class II Obesity	9.5%
Class III Obesity	7.8%
Unknown	6.3%
Prone Intervention	
Proned	50.9%
ICU Admission	
Admitted to ICU	12.5%

Multiple regression analysis revealed a moderate relationship **(r=0.520, p<0.001)** between length of stay and the combination of BMI, Biological Sex, Admission to ICU, Age and Prone status. A fair predictive relationship (**r=0.462, p<0.001**) was revealed between in-hospital mortality and BMI, Biological Sex, Admission to ICU, Age and Prone Status.

Conclusion

As treatment strategies for patients with COVID-19 evolved in the literature during the early days of the pandemic, there was a rapid transition in the clinical care of patients admitted with a COVID-19 diagnosis at our facility. There was also a need to restructure staffing of clinicians in response to the pandemic, which provided an opportunity to form prone teams across the hospital. Our data have provided an initial picture of the demographics of the patients that were admitted to our facility with a COVID-19 diagnosis and their discharge dispositions.

As the pandemic evolved, many patients that were initially admitted to our standard COVID-19 units underwent prone positioning with and without supplemental oxygen. Many of these patients were discharged to home either with or without services and did not require admission to the ICU. There was a large proportion of in-hospital mortality for those patients that were admitted to the ICU. It still remains unclear if the patients that were admitted to the ICU benefitted from prone positioning or not. However, there were more cases of in-hospital mortality for proned ICU patients (vs. non-proned ICU patients). Our data reveal areas for further exploration. We intend to explore additional outcomes, including prevalence of wounds in proned patients, as well as to further understand the relationship between comorbidities, insurance status, and the prone position. We also intend to explore changes in outcomes over the course of the pandemic.

References

The IMPAiR (Identifying coMorbid subgroups of Patients with Acute Respiratory failure) Study: Risk Stratification of Physical Disability Post-Intensive Care

Kelly Potter PhD RN CNE;[1] Heather Dunn PhD ACNP-BC ARNP;[2] Martina Mueller PhD;[3] Anna Krupp PhD MSHP RN;[2] Susan Newman PhD RN CRRN;[3] Sarah Miller PhD RN[3]

[1] The CRISMA Center, Department of Critical Care Medicine, University of Pittsburgh School of Medicine; [2] University of Iowa College of Nursing; [3] Medical University of South Carolina College of Nursing

University of Pittsburgh

INTRODUCTION

- Many independent risk factors for physical disability post-intensive care have been identified
- Patient heterogeneity and co-occurrence of multiple risk factors limits the ability to identifying which patients are at greatest risk for physical disability post-intensive care

OBJECTIVES

- Identify comorbid subgroups of patients with acute respiratory failure who required mechanical ventilation
- Determine which comorbid subgroups of patients are at greatest risk for physical disability post-intensive care at hospital discharge

METHODS

- Latent class analysis of a dataset of medical ICU admissions in a Midwestern tertiary medical center
  - Indicators: demographic and clinical data from electronic health records
  - Local fit: Wald statistic, R-squared loadings, and bivariate residuals
  - Global fit: Bayesian Information Criterion, proportion of classification errors, and entropy R-squared statistics
- Kruskal-Wallis H tests to determine group differences in percent functional impairment at hospital discharge (converted from last documented Activity Measure for Post-Acute Care total score during hospitalization)

RESULTS

From a sample of 934 patients age ≥ 18 years who required ≥ 24 hours mechanical ventilation and survived their hospitalization, six latent classes were identified.

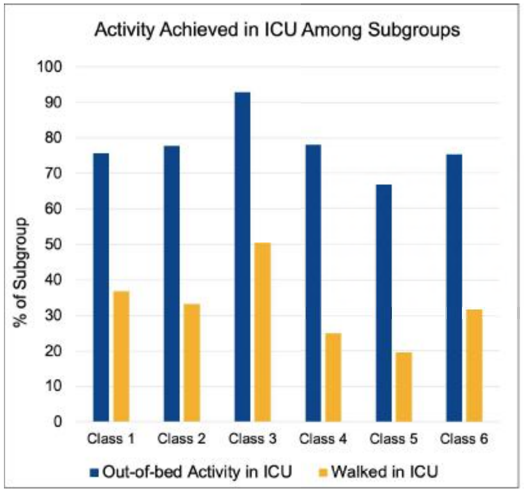
The classes differed statistically significantly in body mass index and clinical characteristics measured early in the ICU stay.

Subgroup-Stratified Demographic & Clinical Characteristics (total n=934)

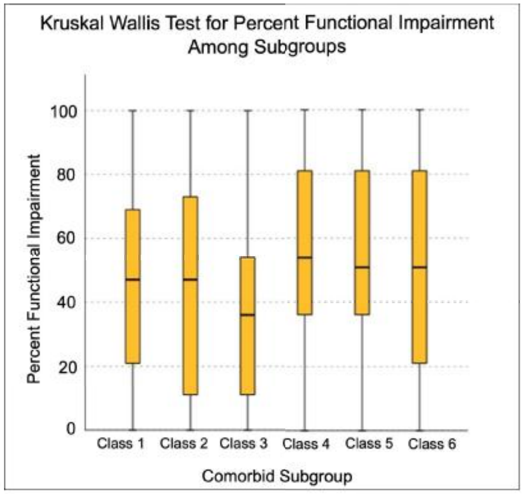
Demographic or Clinical Characteristic	Class 1 (n=367)	Class 2 (n=220)	Class 3 (n=113)	Class 4 (n=105)	Class 5 (n=72)	Class 6 (n=57)	p-value
Age (years)	61.0 (49.0, 69.0)	58.0 (43.0, 69.0)	60.0 (53.5, 68.0)	57.0 (44.0, 67.0)	63.0 (49.0, 69.0)	55.5 (50.0, 65.0)	0.66
BMI (kg/m^2)	27.5 (23.1, 32.1)	32.9 (26.9, 39.5)	33.5 (25.9, 45.7)	40.6 (29.7, 46.2)	32.6 (28.5, 37.7)	28.6 (22.6, 32.9)	<.0005 †
GCS score (admission)	7.0 (6.0, 10.0)	7.0 (3.0, 10.0)	15.0 (14.5, 15.0)	11.0 (8.0, 14.0)	6.0 (3.0, 9.0)	15.0 (14.0, 15.0)	<.0005 †
Laboratory results (mean in ± 24 hours of mechanical ventilation initiation)							
BUN (mg/dL)	18.2 (12.0, 29.7)	20.4 (13.0, 28.0)	23 (17.3, 37.3)	43.0 (26.0, 62.0)	76.5 (53.7, 95.5)	13.8 (10.0, 17.7)	<.0005 †
Creatinine (mg/dL)	0.9 (0.7, 1.4)	1.1 (0.8, 1.6)	1.1 (0.8, 2.0)	2.9 (1.9, 4.3)	3.4 (2.4, 4.5)	0.8 (0.6, 1.4)	<.0005 †
Glucose (mg/dL)	122.1 (106.8, 160.8)	148.4 (121.0, 201.0)	130.5 (113.3, 142.8)	136.0 (113.7, 154.0)	262.3 (128.3, 402.4)	121.5 (97.0, 160.5)	<.001 †
Ventilation Settings (mean in 24 hours after mechanical ventilation initiation)							
PEEP (cm H_2O)	5.0 (5.0, 5.0)	10.0 (8.0, 11.0)	8.0 (5.0, 11.0)	8.0 (5.0, 10.0)	8.0 (5.0, 10.0)	6.5 (5.0, 10.0)	<.0005 †
FiO2	0.38 (0.33, 0.44)	0.51 (0.42, 0.65)	0.63 (0.40, 0.71)	0.44 (0.40, 0.57)	0.49 (0.39, 0.54)	0.57 (0.43, 0.74)	<.0005 †
Days to intubation	0.7 (0.4, 0.7)	0.6 (0.4, 0.8)	0.7 (0.6, 0.9)	0.7 (0.5, 1.0)	0.7 (0.5, 0.8)	2.4 (1.5, 3.8)	<.0005 †
Continuous Infusions (in first 7 days of ICU stay)							
Ever on vasopressors	113 (30.8)	102 (46.4)	18 (15.9)	55 (52.4)	44 (51.1)	32 (56.1)	<.001 *
Ever on cisatracurium	3 (0.8)	16 (7.3)	2 (1.8)	3 (2.9)	1 (1.4)	7 (12.3)	<.001 ‡
Ever on insulin infusion	27 (7.4)	26 (11.8)	9 (8.0)	9 (8.6)	30 (41.7)	12 (21.1)	<.001 *

† Difference among six groups by Kruskal-Wallis H test; * Difference among six groups by chi-square test of independence; ‡ Difference among six groups by Fisher's exact test

Class 3 had earlier ($x^2(5)=140.0$, $p<.0005$) and higher intensity mobility in the ICU than all other subgroups ($x^2(5)=25.5$, $p<.001$).



Class 4 had worse functional impairment at hospital discharge than Class 1, 2, and 3 ($x^2(5)=26.8$, $p \leq .014$ among all pairwise comparisons).



CONCLUSIONS

- Subgroups identified through latent class analysis exhibited statistically significant differences in physical disability post-intensive care
- Patients with obesity and kidney impairment were at greatest risk for physical disability post-intensive care
- Patients who were minimally sedated with less vasopressor burden had earlier and higher-intensity mobility in the ICU
- Early mobility in the ICU directed toward at-risk subgroups may be considered
- Future early rehabilitation research should consider subgroup heterogeneity in trial design and interpretation of results

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To Mobilize or Not to Mobilize: That is the Question!
A Scoping Review of Physical Therapy Management of COVID-19 Patients with Cardiovascular Complications

Caitlyn Anderson PT, DPT, NCS, GCS, Chloe Couves, SPT, Madison Glunn, SPT, Amy Sutheimer, SPT

University of Wisconsin - Milwaukee Doctor of Physical Therapy Program

INTRODUCTION

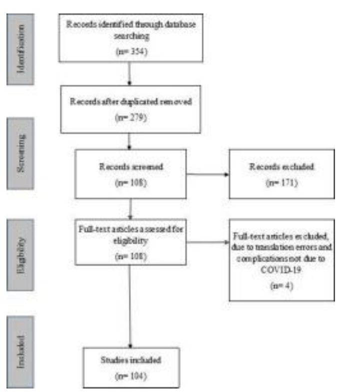
Long-standing research has shown positive outcomes associated with physical therapy (PT) intervention and the cardiovascular (CV) system. Through patient (pt) education, aerobic exercise, resistance training, airway clearance techniques, and early mobilization, patients demonstrate decreased hospital readmission and secondary complications.

In December 2019, COVID-19 spread rapidly around the world, wreaking havoc on healthcare systems and causing widespread illness without guiding literature. Despite many published studies outlining the major effects of COVID-19 on the cardiovascular (CV) system itself, extremely limited studies specifically describe PT treatment (tx) aimed at the CV system.

METHODS

Three separate electronic database searches were conducted to gather the studies for this scoping review between October 2019 and June 2021. The databases included LitCovid, PubMed, and Google Scholar. Inclusion criteria were limited to studies that specifically discussed how COVID-19 may affect the CV system. Publications following the year 2019 were included to ensure accuracy of research specific to COVID-19 strain. Publications evaluating PT modalities for CV complications were limited to original research that specifically discussed sequelae similar to complications seen thus far due to COVID-19. The PRISMA chart for the COVID-19 and CV complications article search can be found in Figure 1.

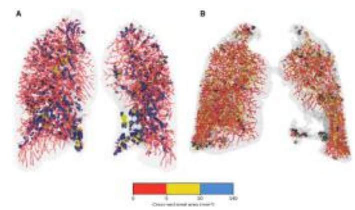
Figure 1



RESULTS

How COVID-19 Affects the Cardiovascular System

SARS-CoV-2, the virus causing COVID-19 in humans, affects host cells through the angiotensin-converting enzyme 2 (ACE 2) receptors via droplet transmission. After infection, an inflammatory cascade and cytokine storm can occur, as noted by increased troponin, ferritin, D-dimer, and C-reactive protein levels. In moderate to severe cases, this can lead to acute respiratory distress syndrome (ARDS), as noted in 11% of the articles.



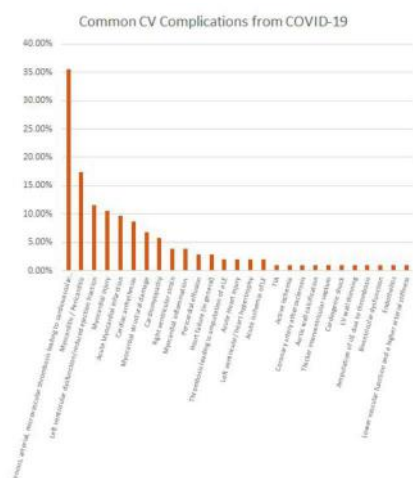
Wauters et al 2020

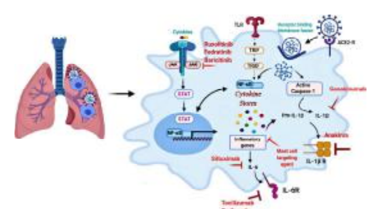
Cardiovascular Complications Associated with COVID-19

COVID-19 can lead to numerous CV complications. Figure 2 illustrates the prevalence, in percentage, of specific CV complications that were discussed in the literature search.

- Venous, arterial, or microvascular thrombosis Thromboses may be exacerbated by immobility and increase risk for vascular ischemia and stroke.
- Myocarditis or pericarditis, often resulting in pt readmission to hospitals.
- Left ventricular dysfunction and associated reduced ejection fraction, increasing length of stay and need for medical management.
- Myocardial injury and acute myocardial infarction.
- Cardiac arrhythmias, including atrial and ventricular arrhythmias. Some arrhythmias were noted to lead to increased morbidity and mortality.

Figure 2





Abdin et al 2020

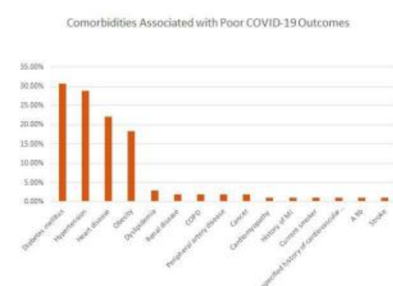
Comorbidities and COVID-19 Outcomes

Four primary comorbidities related to poor COVID-19 outcomes were identified: diabetes mellitus, hypertension (defined as systolic ≥ 130 and/or diastolic ≥ 85 mmHg), heart disease (defined as history of ischemic heart disease, at least moderate heart valve disease, or left ventricular dysfunction), and obesity (defined as BMI of 30 or greater).

Comorbidities such as dyslipidemia, renal disease, COPD, peripheral artery disease, an others were also mentioned in the articles as being linked to an overall poor prognosis after being diagnosed with COVID-19.

The full list and prevalence of mentioned comorbidities can be found in Figure 3.

Figure 3



CONCLUSION

Physical Therapy Considerations

The specific pathophysiology of COVID-19 lends to distinct considerations that must be taken into account by rehabilitation professionals to improve timeliness of intervention and overall outcomes.

ACE 2 receptors are found in numerous vital organs, thus contributing to multi-system involvement and failure. Increased troponin, ferritin, C-reactive protein levels coupled with a suppressed immune response creates an ideal environment for severe oxygen supply-demand imbalance. Conventional tx techniques and early mobilization of Covid pts who are moderately to severely ill may not follow the same trajectory as non-Covid pts due to the known hyperinflammatory, fluctuating state of the illness, particularly during the first 0-21 days of active infection.

- Careful chart review of inflammatory markers and oxygen trends is key
- Low intensity functional tx may benefit pts throughout their early rehabilitation journey to avoid exacerbation of illness.
- Chest PT should be performed when airway clearance is warranted
- Formal exercise testing, spirometry, and specific outcome measure assessment (6 minute walk, 2 minute step test, 30 second chair rise) may benefit PT assessment in subacute to outpatient settings to delineate long term effects on the CV system.

The Role of Physical Therapy and Prevention of Comorbidities

The specific comorbidities associated with poor COVID-19 outcomes are largely preventable or managed conservatively with physical activity. Therefore, PTs can and should intervene prophylactically through exercise prescription, pt education, health and wellness promotion, and interdisciplinary care with other professionals such as occupational and speech therapy, nursing, dietitians, athletic trainers, psychology, etc. Virtual therapeutic options, either individual or group-based, are viable options to limit exposure, decrease sedentary behaviors, and increase social engagement

Conclusion

PTs play a vital role in management of pts with COVID-19 from the intensive care unit to outpatient environments and must consider the viral pathophysiology to avoid adverse events and promote safe mobility. PT also plays a direct role in prevention of comorbidities through skilled exercise progression and health promotion. Further research and data collection is warranted to guide clinical practice.

References

Please email ande2847@uwm.edu for a full list of references

Eye Can Communicate!: Implementation of Eye Gaze Technology to Improve Patient Communication and Participation in the Acute Hospital Setting

Carleigh Dabritz, MS, OTR/L
Kelly Casey, OTD, OTR/L, BCPR, ATP, CPAM

JOHNS HOPKINS MEDICINE
THE JOHNS HOPKINS HOSPITAL

Background and Clinical Relevance

- Communication impairments in the acute hospital and ICU setting disrupt a patient's ability to communicate their needs, symptoms, and pain levels. Patient and nurse frustrations increase and overall patient-nurse interaction time decreases (Happ et al, 2015).
- Assistive technology can improve a patient's ability to express thoughts, feelings, and basic medical and emotional needs (Jansson, Martin, Johnson & Nilsson, 2019).
- Use of an eye gaze device with patients in the ICU improved patient reported self-confidence, psychosocial status, basic communication abilities, cognitive functioning, and decreased frustration and delirium (Garry, et. al, 2016).

Appropriate Patients to Consider for Eye Gaze Technology

- Impaired communication
- Exertional dyspnea/shortness of breath
- Severe weakness in bilateral upper extremities
- Severe impairment in fine/gross motor coordination

Example Populations

- ALS
- SCI
- TBI
- Cerebral Palsy
- Intubation/Mechanical ventilation

Eye Gaze Device

- Tobii Dynavox I-15+ Eye Gaze device
- Speech-generating computer device using eye tracking technology
- Direct-selection text to speech, simple cause and effect, picture-based communication, games, visual scanning

Acquisition and Implementation

- Funding for 3 devices acquired by a grant written by Occupational therapy (OT)
- OTs, SLPs and PTs attended annual comprehensive training and skills competency check-off to ensure proper use and management of the device
- Device usage is monitored through a multi-step sign out process that provides multifaceted data for ongoing QI use
- Patient use: 94% successful

Future implications

- Implementation of the devices for social participation (e.g. social media) and environmental control (e.g. TV) to improve patient autonomy
- Examination of the use of eye gaze technology to address cognitive impairments

Impact of a PICU Early Mobility Program on Functional Status

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Background

While bed rest and sedation are often necessitated during resuscitation and stabilization of critical care patients in the pediatric intensive care unit (PICU), these practices may have negative impacts, including delirium, prolonged hospital stay, and worse functional status after discharge.

Our aim was to investigate the impact of a PICU early mobility protocol on patient functional status at PICU discharge and 3 months after discharge.

Methods

- Prospective, single center study at Kaiser Oakland PICU
- Ages 1 month to 21 years admitted to the PICU for 48 hours or more in 2019-2020
- Patients were divided into two cohorts: patients admitted in 2019 prior to the development of the PICU early mobility protocol and patients admitted in 2020 who underwent the protocol.
- Variations in demographic and clinical characteristics, hospital LOS, rates of physical therapy consultation, rates of bedside mobility activities, and functional status scores (FSS) were assessed in bivariate and multivariate analyses.

Early Mobility Protocol:

1. Early PT, OT, and SLP consultation
2. Frequent in-room mobility activities
3. Daily reassessment of mobility level with PT, MD and RN

Figure 1: Functional Status Scale

	Normal (Score = 1)	Mild Dysfunction (Score = 2)	Moderate Dysfunction (Score = 3)	Severe Dysfunction (Score = 4)	Very Severe Dysfunction (Score = 5)
Mental status	Normal sleep/wake periods; appropriate responsiveness	Sleepy but arousable to noise/touch/movement and/or periods of social nonresponsiveness	Lethargic and/or irritable	Minimal arousal to stimuli (stupor)	Unresponsive, coma, and/or vegetative state
Sensory functioning	Intact hearing and vision and responsive to touch	Suspected hearing or vision loss	Not reactive to auditory stimuli or to visual stimuli	Not reactive to auditory stimuli and to visual stimuli	Abnormal responses to pain or touch
Communication	Appropriate noncrying vocalizations, interactive facial expressiveness, or gestures	Diminished vocalization, facial expression, and/or social responsiveness	Absence of attention-getting behavior	No demonstration of discomfort	Absence of communication
Motor functioning	Coordinated body movements, normal muscle control, and awareness of action and reason	1 limb functionally impaired	≥2 limbs functionally impaired	Poor head control	Diffuse spasticity, paralysis, or decerebrate/decorticate posturing
Feeding	All food taken by mouth with age-appropriate help	Nothing by mouth or need for age-inappropriate help with feeding	Oral and tube feedings	Parenteral nutrition with oral or tube feedings	All parenteral nutrition
Respiratory status	Room air and no artificial support or aids	Oxygen treatment and/or suctioning	Tracheostomy	Continuous positive airway pressure treatment for all or part of the day and/or mechanical ventilatory support for part of the day	Mechanical ventilatory support for all of the day and night

Results

Of the 384 patients included in the study:

- 216 (56%) were pre-protocol patients and 168 (44%) underwent the protocol.
- There was no difference in demographic factors or PRISM3 score between the two groups.
- 2019 patients were less likely to have an oncologic diagnosis and more likely to have a respiratory diagnosis (p=0.018).
- Patients in 2020 were more likely to receive a physical therapy order in 2020 compared to 2019 (79% vs 47%, p<0.001).
- Patients in 2020 had a higher daily incidence of mobility activities compared to 2019 (4.9 vs 4.1 activities, p<0.001).
- There was no difference in admission, baseline, discharge, or 3-month FSS score between the two groups.

Table 1: Physical, occupational, and speech therapy orders by study year

	2020 vs. 2019	
	Adjusted odds ratio*	p-value
Received physical therapy order	5.49	<0.001
Received occupational therapy order	6.96	<0.001
Received speech therapy order	6.79	<0.001
Received physical therapy order in 48 hours	6.07	<0.001
Received occupational therapy order in 48 hours	6.74	<0.001
Received speech therapy order in 48 hours	9.88	<0.001

Table 2: Average rate of mobilization activities per patient per day by study year

	2019 (n=216)	2020 (n=168)	p-value
Adjusted estimate* (activities/day)	4.10	4.88	<0.001

*Adjusting for use of central line, PRISM3 score, and length of stay.

Table 3: Frequency of mobilization activities per patient per day by study year

	2019	2020	P-value
AROM (active range of motion) performed	1.334	1.393	0.694
PROM (passive range of motion) performed	0.806	0.745	0.568
Held	0.727	0.738	0.948
Up in chair	0.593	0.758	0.143
Ambulated	0.123	0.311	<0.001

Table 4: Functional status scores by study year

	2019 (n=72)	2020 (n=155)	
Functional status score	Least square mean	Least square mean	p-value
Baseline	7.14	7.59	0.335
Admission	11.98	12.06	0.927
Discharge	8.77	9.24	0.383
Three months after discharge	7.37	7.53	0.766

Conclusion

PICU early mobility was not associated with a reduction in functional morbidity at discharge or 3 months after discharge.

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Functional and muscular status in critically ill patients surviving COVID-19.

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Introduction.

Physical impairment (PI), alongside cognitive impairment, is one of the most relevant acute complication that critically ill patients have to endure during the Intensive Care Unit (ICU) stay. This is due to many risk factors such as immobility, prolonged sedation, invasive mechanical ventilation (MV), unrestrained use of benzodiazepines, sepsis, among others. Patients admitted into the ICU with a diagnosis of acute respiratory distress syndrome (ARDS) associated to severe COVID-19 will not be exempt from developing one of these complications. ICU-acquired weakness (ICUAW) acts as a main character in the genesis of PI. [1-6]

Design:

Observational prospective monocentric

Setting:

General Hospital of México

z

Patients:

Critically ill patients (n=26) dignosed with COVID-19

Measurements and main results

The mean functional and strenght score obteined by patients at discharge from the ICU, assesed with IMS, CPax, MRC-SS and Hand-held dynamometry and their correlation (Spearman).

The patients remained in the ICU for 21.57 ± 11.53 days (LOS). Every patient required invasive mechanical ventilation (IMV). Only 30.77% of these developed ICUAW diagnosed with the MRC-SS and 19.23% diagnosed with hand-held dynamometry. The average muscular strength score measured through MRC-SS was 48.76 ± 8.83 and 8.81 ± 9.34 kg in hand-held dynamometry. Muscular weakness was observed with a characteristic predominance pattern in proximal muscles affecting all 4 extremities.

Functionality scales and strenght assessment tools were found to correlate between each other. I

Table 1 . correlations between funtional scales and mucular strenght assessments.

IMS/CPAx Tool	0.92	p = < 0.01
CPAx Tool/hand-held dynamometry	0.81	p = < 0.01
CPAx Tool/MRC-SS	0.80	p = < 0.01
MRC/hand-held dynamometry	0.80	p = < 0.01
IMS/MRC-SS	0.75	p = < 0.01
IMS/hand-held dynamometry	0.52	p = < 0.01
		n=26

Table 2. Level of mobility at discharge from ICU

ICU Mobility Scale	Frequency	%
0) Lying in bed	0	0.00
1) Exercise in bed	0	0.00
2) Passively moved to chair	4	15.38
3) Sitting over the edge of the bed	1	3.85
4) Standing	8	30.77
5) Transferring bed to chair	0	0.00
6) Marching on spot	1	3.85
7) Walking with assistance of 2 o more people	0	0.00
8) Walking with assistance of 1 person	2	7.69
9) Walking independently with gait aid	9	34.62
10)Walking independently without a gait aid	1	3.85
		n=26

Table 3. Functional level at discharge from ICU (CPAx Tool score)

CPAx Tool	Mean score	SD
Respiratory function	3.92	0.39
Cough	4.76	0.71
Moving within the bed	3.42	1.44
Supine to sitting on the edge of the bed	3.42	1.33
Dynamic sitting	3.65	1.38
Standing balance	2.73	1.53
Sit to stand	3.23	1.45
Transferring bed to chair	3.19	1.35
Stepping	2.61	1.60
Grip strength	2.76	0.95
Total Score	33.73	10.55
		n=26

Conclusions:

Muscular strength and functionality have a strong correlation in the critically ill patient that survives COVID-19. Strength and mobility level progression must be implemented in a parallel direction. There would be no benefit if we encountered a strong patient at a muscular status with a deplorable functional level lying in bed. Every ICU complication that associates with movement must be overpowered by approaching strength and functionality as one.

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