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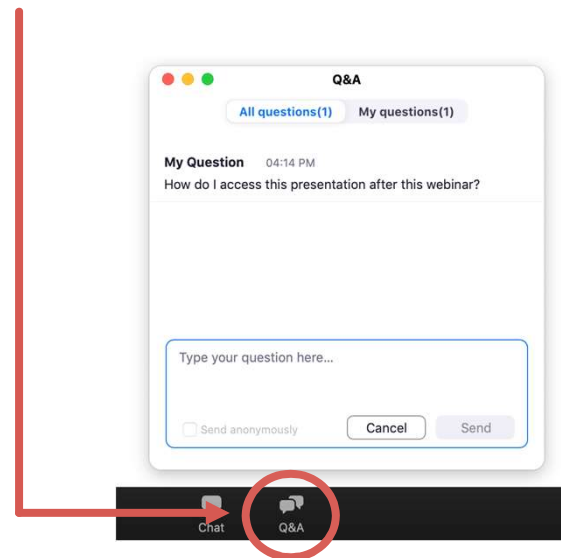
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The COVID-19 Impact

Exploring the long-term effects
& management of COVID-19 cases

Paradigm



Speaker Panelists



**Michael Choo, MD, MBA,
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Kathy Galia, RN, BSN
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Course Objectives

Discuss the current state of COVID-19

Explore in-depth the long-term effects of COVID-19—Defining categories of persistent post-COVID symptoms

- Hospitalization related long-term effects
 - Organ dysfunction related long-term effects
 - Persistent viral syndrome related long-term effects
-

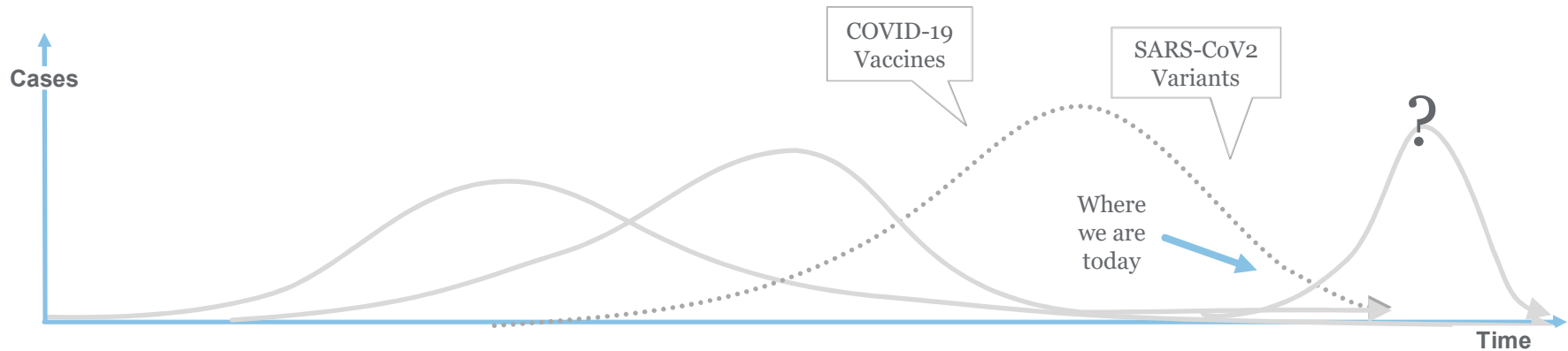
Present COVID-19 case studies

Current State of COVID-19

The ever-changing societal impact

Our Nation Faces One of the Great Challenges of Our Generation

Managing the spread and mortality associated with COVID-19



Emerging

- ▶ Initial cases identified
- ▶ Community spread begins
- ▶ No disruption to health care system
- ▶ Providers still accessible
- ▶ No impact on workers' comp claims

Rapid escalation

- ▶ Rapid growth in positive cases
- ▶ Severe access to care challenges
- ▶ Delivery through non-traditional sites of care
- ▶ Contraction in medical supply chain
- ▶ Evolving coverage positions for work-related COVID-19 claims

Undulating recovery

- ▶ Slowing vaccination rate in US
 - › Fully vaccinated – 49%
 - › State variations – MS/AL vs. VT/ME
- ▶ COVID-19 variants
 - › Much more infectious
- ▶ Management of severe COVID-19 infections and persistent post-COVID symptoms

Overview

What we know



Geographical distributions

- ▶ Above 192 M confirmed cases of COVID-19 globally with over 4.2 M deaths
- ▶ US total cases with 35 M and approximately 630 K deaths



Care Trajectory

- ▶ Nothing needed to ICU/Critical Care
- ▶ Multi-organ dysfunction (Acute & Chronic)
- ▶ Persistent post-COVID symptoms
 - ▶ Post-Acute Sequelae of SARS-CoV-2 infection (PASC)
 - ▶ Hospitalization related



SARS-CoV-2 Variants of Concern

- ▶ Alpha variant – B.1.1.7
 - ▶ United Kingdom (late 2020)
 - ▶ 50-75% more transmissible than the Wuhan version
- ▶ Delta variant – B.1.617.2
 - ▶ India 12/2020
 - ▶ 50-60% more transmissible than Alpha variant



Immunity

- ▶ National Institute of Health study suggests that virus-induced immunity is protective in short term—eight months
- ▶ Recent prospective study published in BMC Medicine (June 2021) demonstrated protective immunity for at least a year - up to 12.5 months
- ▶ Reinfections are a reality—but rare
- ▶ Infections post vaccination do occur – but uncommon (approximately 0.05% post two weeks post fully vaccinated)

Exploring the long-term effects of COVID-19

Defining the categories of persistent post-COVID symptoms

Long-Term Complications

Persistent symptom overview

Persistent Organ Dysfunction

- ▶ Respiratory
- ▶ Neurologic – Brain/Spinal Cord
- ▶ Heart/Cardiac
- ▶ Endocrine

Hospitalization Related Complications

- ▶ Post-ICU Syndrome
- ▶ Critical Care Polyneuropathy
- ▶ Severe Myopathy/Atrophy

Post-Acute Sequelae of SARS-CoV2 Infection (PASC)

- ▶ No explicit organ dysfunction
- ▶ Wide array of symptoms

Mental Health Impact

- ▶ PTSD, anxiety, and depression
- ▶ Loss of control over their daily lives
- ▶ Psychosocial impacts on individual workers and their families

More Than 50 Long-Term Effects of COVID-19

A systematic review and meta-analysis

Study details

- ▶ Prevalence of **55 long-term effects** were estimated
- ▶ 21 meta-analyses performed
- ▶ 47,910 patients included
- ▶ Follow-up time ranged from 14 to 110 days post-viral infection
- ▶ Age range was between 17 and 87 years
- ▶ **80%** (95% CI 65-92) of the patients that were infected with SARS-CoV-2 **developed one or more long-term symptoms**

The five most common symptoms were:

- ▶ Fatigue (58%)
- ▶ Headache (44%)
- ▶ Attention disorder (27%)
- ▶ Hair loss (25%)
- ▶ Dyspnea (24%)

Source: Emory University/Houston Methodist

Persistent Symptoms

Three to nine months after illness onset

177 questionnaire participants who contracted COVID-19

- ▶ Approximately **30% of participants** who were followed up for as long as nine months after illness reported **persistent symptoms**
- ▶ Overall:
 - > **6.2% asymptomatic**
 - > **84.7% outpatients with mild illness**
 - > **9.0% had moderate or severe disease requiring hospitalization**
- ▶ Most common comorbidity:
 - > **13.0% hypertension**

Persistent symptoms reported:

- ▶ 26.6% aged 18 to 39 years
- ▶ 30.1% aged 40-64 years
- ▶ 43.3% aged 65 years and older
- ▶ Overall, 49 of 150 outpatients (32.7%), five of 16 hospitalized patients (31.3%), and one of 21 healthy participants (4.8%) in the control group reported at least one persistent symptom

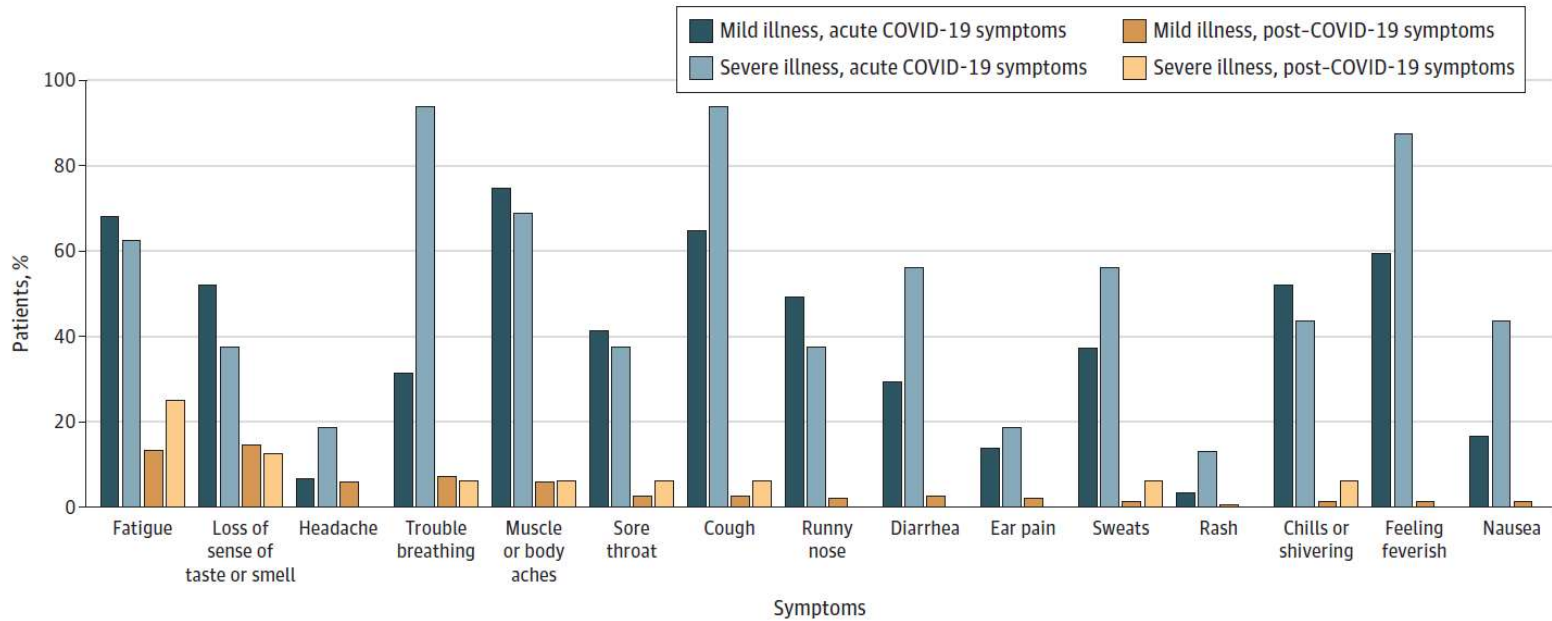
Source: Sequelae in Adults at 6 Months After COVID-19 Infection; 2021 Logue JK et al. JAMA Network Open

Persistent Symptoms

Three to nine months after illness onset

177 questionnaire participants who contracted COVID-19

Percentage of participants who reported COVID-19 symptoms during acute illness and at follow-up



Source: Sequelae in Adults at 6 Months After COVID-19 Infection; 2021 Logue JK et al. JAMA Network Open

Patients with Severe COVID-19 Twice as Likely to Require Future Hospitalizations

Study details

- ▶ **2 million+** Americans have been hospitalized for COVID-19 since August 1, 2020
 - ▶ **10,646** patients health record data analyzed
 - ▶ **114 severe** COVID-19 requiring hospitalization
 - ▶ **211 mild to moderate** COVID-19 requiring hospitalization
- ▶ Subsequent hospitalization for varying problems:
 - ▶ Neurologic
 - ▶ Cardiac
 - ▶ Pulmonary

While a growing number of studies have explored long-term health complications among people who have recovered from COVID-19, most have focused on more mild symptoms such as altered sense of smell or taste or difficulty concentrating. The UF study, which appears in the [Journal of the American Board of Family Medicine](https://www.famj.com/), is among the first to explore serious outcomes among people who have recovered from the disease.

Source: Risk of New Hospitalization Post COVID-19 Infection for Non-COVID-19 Conditions, Arch G. Mainous III, PhD1,2; Benjamin J. Rooks, MS1; Frank A. Orlando, MD1 , <https://explore.research.ufl.edu/patients-with-severe-covid-19-twice-as-likely-to-require-future-hospitalizations-for-other-illnesses.html>

Expert Comments

“These patients get sick very fast, and it takes a long time for them to heal. What’s not really well appreciated is how much rehab and how much recovery time these patients are going to need.”

David Chong, MD, Medical Director at New York–Presbyterian Hospital/
Columbia University Medical Center ICU

“People who recover from COVID-19 hospitalization are significantly more likely to be hospitalized later for something else that is likely a complication of COVID-19. In other words, your risk of having other bad outcomes beyond COVID-19 is increased even after you recover.”

Arch G. Mainous III, Ph.D., the study's lead investigator and a professor in the department of health services research, management and policy at the UF College of Public Health and Health Professions, part of UF Health.

*“Some, but not all COVID-19 patients who develop ARDS may go on to develop **lung fibrosis**—scarring of the lungs—which may be permanent. Post-ARDS fibrosis typically is not progressive, but nonetheless can be severe and limiting. **The recovery period for post-ARDS fibrosis is approximately one year and the residual deficits persist.**”*

- The Pulmonary Fibrosis Foundation

Long-Term Complications & Post-Acute Care Need

How COVID complications lead to Post-Acute Care treatment : Part-I

Disease Complications

Pulmonary & Cardiovascular

- ▶ Dyspnea
- ▶ Hypoxia
- ▶ Palpitations
- ▶ Chest pain
- ▶ Decreased aerobic/exercise capacity and stamina
- ▶ Acute respiratory distress
- ▶ Long-term pulmonary damage requiring extended mechanical ventilation or cannulated oxygen delivery and monitoring

Neuropsychiatric

- ▶ Chronic fatigue
- ▶ Myalgia
- ▶ Headache
- ▶ Dysautonomia
- ▶ Altered mental status (ie. “brain fog”)
- ▶ Generalized anxiety
- ▶ Depression
- ▶ Circadian rhythm disturbance
- ▶ PTSD symptom set

Renal

- ▶ Pre-existing kidney disease with COVID-19 can lead to advancement of 1-2 stages and need for short or longer term dialysis support

Post-Acute Care Treatment

- ▶ Physical and Occupational Therapy
- ▶ Nursing services self-care protective oversight
- ▶ Medication administration and monitoring
- ▶ Nursing Services and Respiratory Therapy to manage more complex chronic pulmonary disease, vent weaning, and long term vent management

- ▶ Clinical/Counseling psych and social services for neuro-psych assess and short term talk therapy
- ▶ Nursing services reality orientation and threat recognition protective oversight
- ▶ Cognitive retraining with Speech/Language Pathology
- ▶ Activities of Daily Living (ADLs) support
- ▶ Recreational and Activities Therapy interventions

- ▶ Nursing services engagement with in-house or ambulatory clinic dialysis
- ▶ Metabolic and Clinical Dietetics management

Long-Term Complications & Post-Acute Care Need

How COVID complications lead to Post Acute Care treatment : Part-II

Disease Complications

Post-Acute Care Treatment

Endocrine

- ▶ New or worsening control of existing DM
- ▶ Thyroid dysfunction
- ▶ Bone demineralization



- ▶ Nursing services and clinical dietetics engagement for glycemic and nutritional management

Nutrition

- ▶ Catabolic muscle wasting
- ▶ Short term dysphagia
- ▶ Appetite loss up to anorexia



- ▶ Nursing services and clinical dietetics engagement for nutritional management and skin condition assessment
- ▶ Physical and Occupational Therapy to restore stamina and physical function
- ▶ Activities of Daily Living (ADLs) support

Skin

- ▶ Risk for skin breakdown at multiple body sites



- ▶ Nursing services, Clinical Dietetics, Physical and Occupational Therapy intervention involving longer term wound care treatment to heal FAPU's and restore MASD areas

PAC settings have been at the forefront in skin care practices development and treatment.

Long-Term Complications & Post-Acute Care

COVID-19 effects on institutional care delivery

Surge Care Effects & Complications

- ▶ COVID-19 created never before experienced levels of acute caregiver staffing scarcity resulting in less effective routine skincare prevention practices causing an increased incidence of facility acquired pressure ulcers (FAPU) and moisture associated skin damage (MASD) in COVID-19 patients.
- ▶ Surge care personal protective equipment (PPE) scarcity along with testing scarcity then resulted in multi-vector infection pathways as facilities were unable to effectively manage contact tracing and vector surveillance for staff and patients (moving across various stages of quarantine to isolation) settings.

Delivering Post-Acute Care with high infection control mitigation interventions in place

- ▶ Centers for Medicare and Medicaid Services (CMS) and Centers for Disease Control and Prevention issued multiple waves of infection control guidance, new regulatory requirements, and operations waivers
- ▶ Vector management controlling the movement of potentially infected people
- ▶ Surface contact and ventilation system spread control
- ▶ PPE utilization
- ▶ Personal hygiene/grooming practices to minimize the spread of airborne or skin-to-skin viral transfer

Post-Acute Care Rehabilitation

An interdisciplinary approach

Rehabilitation programs require an interdisciplinary team providing a comprehensive program with a full range of services focusing on two fundamental areas:

1 Pulmonary Rehabilitation
Treatment component that addresses medical/pulmonary functions due to respiratory failure and ventilator/trach weaning.

2 Physical Rehabilitation
Treatment component that addresses physical functions due to neurological, musculoskeletal, and cardiac impairments.

Source: Post-Acute COVID-19 Neurological Syndrome: A New Medical Challenge. Domenico Nuzzo, Sonya Vasto, Luca Scalisi, Salvatore Cottone, Gaetano Cambula, Manfredi Rizzo, Daniela Giacomazza, Pasquale Picone, *J Clin Med*. 2021 May; 10(9): 1947

Post-Acute Care Rehabilitation

Pulmonary Rehabilitation

**Lung Expansion &
Respiratory/Breath Support**

Secretion Mobilization

Ventilator/Trach Weaning

**Passy-Muir® One Way
Speaking Valve**

Energy Conservation

**Arterial Blood Gases
(Pulse Oximeter)**

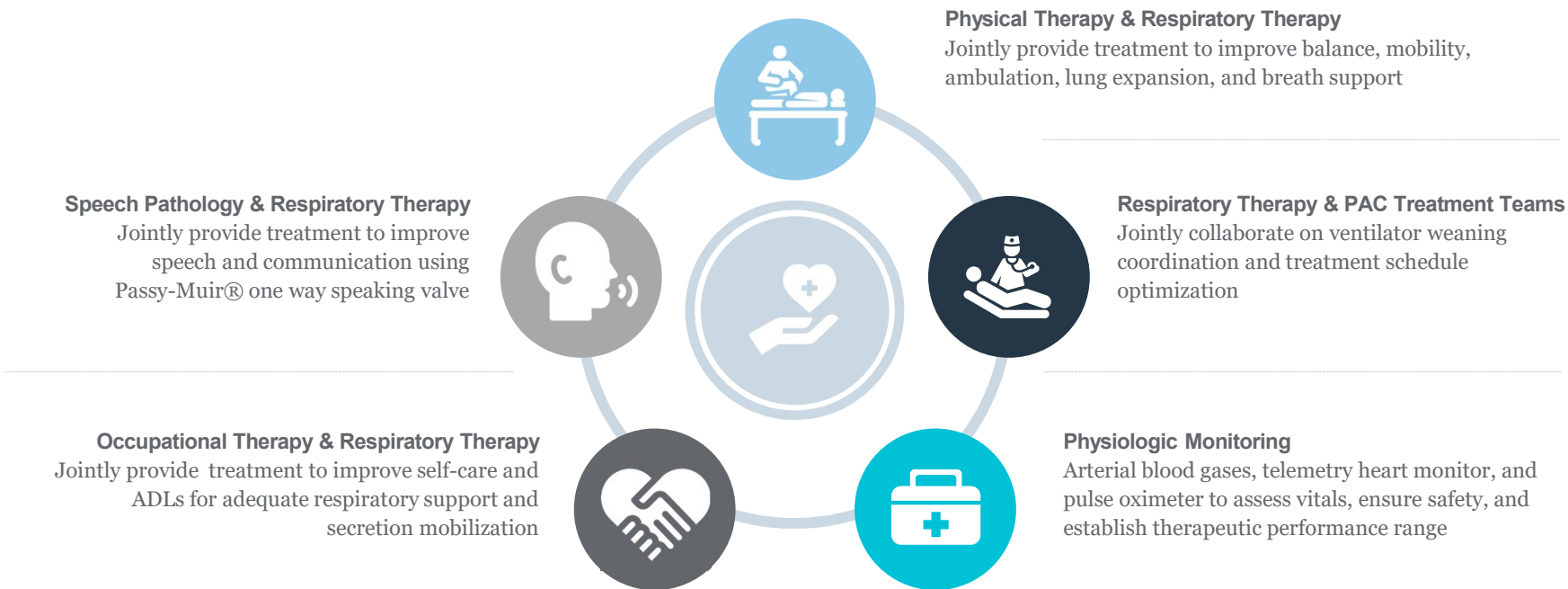
Post-Acute Care Rehabilitation

Physical Rehabilitation



Post-Acute Care Rehabilitation

Interdisciplinary treatment examples



Sources:

- 1) The COVID-19 Rehabilitation Pandemic. Sarah De Biase, Laura Cook, Dawn A Skelton, Miles Witham, Ruth Ten Hove; *Age Aging*. 2020 May 29; afaa 118
- 2) Considerations for Postacute Rehabilitation for Survivors of COVID-19. Travis Sanchez, Gunther Eysenbach; *JMIR Public Health Surveill*. 2020 Apr-Jun; 6(2): e19462
- 3) Rehabilitation of a Post-Intensive Care Unit Patient After Severe COVID-19 Pneumonia; Mothi Babu Ramalingam, Youyi Huang, Peter A.C. Lim; *American Journal of Physical Medicine & Rehabilitation*. 2020; 99: 12

Post-COVID-19 Syndrome Post-Acute Care Patient Profile

CARE Tool

	Upon PAC Admission	Upon PAC Discharge
Average score	38	61
Assistance Level of Function:	Maximum	Contact Guard/Touch

CMG GG/H subscale walk included, 16 subset, maximum score potential 96

Source: <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Post-Acute-Care-Quality-Initiatives/CARE-Item-Set-and-B-CARE>

Post-Acute Care Rehabilitation

6 Minute Walk Test (6MWT)

The 6MWT is well-known evaluation tool used in clinical and research environments.

- ▶ Relatively brief and easy to administer measure of walking function
- ▶ Used as an indirect measure of cardiopulmonary function
- ▶ Record distance walked during 6 minutes
- ▶ ~177 ft. = Minimally Clinically Important Difference (MCID) for individuals with pulmonary disease



Source: American Physical Therapy Association, <https://www.apta.org/patient-care/evidence-based-practice-resources/test-measures/6-minute-walk-test-6mwt-applied-to-patients-who-have-had-lower-extremity-total-joint-replacement>

Post-Acute Care Rehabilitation

6MWT performance in national cohort of long-term acute care hospital patients post-COVID

	Upon PAC Admission	Upon PAC Discharge
Mean 6MWT Distance	33 ft.	213 ft.
Median	0 ft.	44 ft.

- ▶ **By discharge, ~1/3 patients displayed improvements in 6MWT distance that exceeded the MCID threshold**
- ▶ **Despite improvements, many had lingering deficits expected to hinder community integration**

Source: Burnfield JM, Votto JJ, Hays A, Stuart M, Lewis LL, Prettyman E, Makam A. Six Minute Walk Test changes during long-term acute care hospital rehabilitation for patients post COVID-19. In review, ACRM 98th Annual Conference.

Post-COVID Syndrome Patients Served Overview

Madonna Rehabilitation Hospital Study

Total Patients Served <i>(May 2020 – May 2021)</i>	189
Average Patient Age <i>(range 29-92)</i>	64
Average Length of Patient Stay	23 days
Discharge Disposition	
Directly to community	46%
Transfer back to acute care	22%
Skilled Nursing Facility	18%
Other	14%

Case Management – COVID cases

Navigating a long COVID case through Post-Acute Care settings

With the injured worker in mind

Ensure injured workers with altered mental status COVID “fog brain” symptoms are actively engaged in cognitive stim services.

Obtain pre-injury medical records to assist in determining baseline and exacerbation of symptoms.

Comprehensive neuro-psych evaluation with potential for longer-term counseling therapy with long-COVID injured workers displaying any continued PTSD symptoms.

Facilitating virtual family engagement wherever possible to support injured worker’s life balance. Family support is paramount.

With the Post-Acute Care facility in mind

Post-acute care may be required to fully evaluate and manage long term deficits, particularly in areas where resources are limited.

Communicate information needs, early and often. Ensure the facility provides rehab plan, goals, and timeline.

Case managers serve as conduit between facility and family, particularly when visitation is limited.

Share best practices regarding facility and case management engagement.

COVID-19 Case Studies

Long-Term COVID Case #1

Background

- ▶ 50's-year old male (CA)
- ▶ Date of loss 11/15/20, date of referral 11/30/20
- ▶ Emergency Department Nurse
- ▶ Presented to ED with fatigue, shortness of breath, cough, and fever
- ▶ Comorbidities include obesity BMI 30+
- ▶ Diagnosis: COVID-19, pneumonia, acute respiratory distress
- ▶ Long COVID symptoms included oxygen dependency, generalized debility resulting in inability to perform ADLs
- ▶ Compensability not questioned

Paradigm Actions

- ▶ Referred during acute care stay while receiving mechanical ventilation and antibiotic therapy support. Reviewed medical records and proposed plan of care.
- ▶ IW required sequential PAC provider types with long COVID health trajectory.
- ▶ Delivered options for initial PAC Long Term Acute Care Hospital (LTCH) for ventilation weaning.
- ▶ Transferred to LTAC 11/20/21 – 58 days. Vent weaning completed.
- ▶ Coordinated inpatient rehab facility 1/29/21.

Current Status

- ▶ High motivation to achieve PLOF and RTW.
- ▶ IW discharged to home with family on 2/16/21.
- ▶ Able to perform ADL's, Home Health short-term, and discontinued oxygen therapy.
- ▶ Cost of care impact 19% below recommended allowable LTCH charges (\$97,480.00) or \$2,377.00/day.

Long-Term COVID Case #2

Background

- ▶ 50's-year old female (CA)
- ▶ Date of loss 4/1/20, date of referral 8/26/20
- ▶ Environmental Services Tech
- ▶ Knee fracture with surgical repair and positive COVID test secondary to ED evaluation
- ▶ Diagnosis: Patella fracture, COVID-19 with ARDS, Renal disease Stage 4 to 5, dysphagia, Stage-III wounds
- ▶ Long COVID symptoms included altered mental status with PTSD, O2 dependency, tube feeding, facility acquired pressure ulcers (FAPU) in acute care and dialysis
- ▶ Compensability not questioned

Paradigm Actions

- ▶ Client engaged Paradigm PAC four months post initial hospitalization and after placement in Skilled Nursing Facility setting.
- ▶ PAC's expertise sought for recommendations regarding cost containment and potential need for next phase PAC providers.
- ▶ Engaged the provider, reviewed plan of care and cost.
- ▶ New cost of care agreement finalized with PAC planning for post SNF services.

Current Status

- ▶ IW remains in SNF, currently receiving dialysis PT/OT
- ▶ Treatment goals included continued success with wound closure for FAPU's to "healed" status, return to oral nutrition intake, complete ADL self performance, and PTSD triggers resolved with referral for outpatient services
- ▶ Plan is for discharge to home once final goals met
- ▶ Cost of care impact 20% below recommended allowable (\$24,000+/month) or \$811/day.

Long-Term COVID Case #3

Background

- ▶ 60's-year old female (PA)
- ▶ Date of loss 5/14/20, date of referral 8/24/20
- ▶ Office/Clerical
- ▶ Lower leg fracture treated surgically with community acquired COVID-19 infection diagnosed in ED
- ▶ Diagnosis: COVID-19, generalized muscle weakness, anorexia, stage III wounds, anxiety
- ▶ Progression to long COVID health states included slow healing facility acquired pressure ulcers, complicated by malnourishment and generalized anxiety
- ▶ Compensability not questioned

Paradigm Actions

- ▶ Paradigm's client executed the referral after 60 day stay in a SNF setting for long COVID health states.
- ▶ PAC's expertise sought for recommendations regarding cost containment. Also to assess potential next phase PAC providers.
- ▶ Engaged the provider, reviewed proprietary clinical/cost of care comparables to the injured worker's treatment trajectory.
- ▶ New cost of care agreement finalized with PAC planning for post SNF services.

Current Status

- ▶ Injured worker's long COVID health states required with wound treatment, multi-disciplinary therapy to restore physical function and improved nutrition intake.
- ▶ IW discharged to home on 6/18/21 initially with HHA assistance and wound care.
- ▶ Has progressed to perform all ADL's and self care.
- ▶ Cost of care impact 11.6% below recommended allowable (\$12,759.15).

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\$27M

Distributed in
scholarship dollars

8,000+

Scholarships awarded

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