

Acute Care Rehab for Patients Diagnosed with COVID-19

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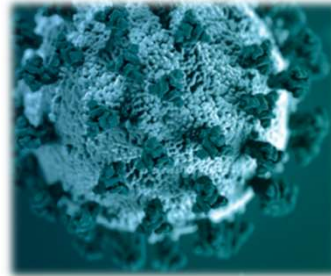
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Learning Objectives

- Identify physiological effects of COVID-19 and understand progression of the disease process
- Identify different oxygen support systems and their effects on therapeutic intervention
- Identify discipline specific assessment and evaluation strategies to apply to patients with COVID-19
- Discuss discipline specific skilled intervention techniques for patients with COVID-19
- Identify supplemental resources that support treatment of patients suffering from COVID-19 (eg. VTE CPG)

What is COVID-19?

- *“COVID-19 is a new disease, caused by a novel (or new) coronavirus that has not previously been seen in humans. Because it is a new virus, scientists are learning more each day. Although most people who have COVID-19 have mild symptoms, COVID-19 can also cause severe illness and even death.”¹*
- We know this. But how does it work?



Stage 1: Invasion^{2,3}

- Spike protein on the outside of the virus
- Spike protein binds to the ACE-2 receptors on the epithelial cells
- This begins the invasion of the host cell

Stage 2: Asymptomatic Phase^{2,3}

- Through respiratory aerosols, COVID-19 typically binds to the nasal epithelial cells
- Virus replicates and propagates
- Infects ciliated cells in the conducting airways

Stage 3: Infection of Upper Respiratory Tract^{2,3}

- Virus migrates from the nasal epithelial cells to the upper respiratory tract via the conducting airways
- During this stage, immune response activates
- For most patients, this immune response is enough to contain the spread of the virus!

Stage 4: Lower Respiratory Tract and Acute Respiratory Distress Syndrome (ARDS)^{2,3}

- Virus travels and infects the alveolar cells
- The infected cells release cytokines (“cytokine storm”) and attract inflammatory cells (increased immune response)
- The sequestered inflammatory cells cause diffuse alveolar damage, and this eventually leads to ARDS

How COVID-19 Affects the Whole Body^{4,5}

COVID-19's damaging effects on the body

Growing evidence suggests that the coronavirus, mostly known to cause respiratory illness, can also affect many of the body's primary organs.

Heart

Doctors have reported inflammation to the heart and damage to the muscle. Some patients have died from severe heart attacks.

Blood vessels

Blood clotting in major arteries and veins has been reported. Clots can break off and damage multiple organs by stopping blood flow.

Kidneys

Many COVID-19 patients suffer serious kidney damage and require dialysis.

Brain

People with COVID-19 have had strokes and seizures. Some have reported confusion or delirium. Not directly involving the brain but a central nervous issue: Many patients have reported losing their sense of smell.

Lungs




The virus can cause pneumonia, in which the lungs become inflamed and fill with fluid. Patients may require ventilation. As the infection progresses, the virus can cause serious lung damage, which can be fatal.




Intestines

Roughly 20% of patients report diarrhea as an early symptom. The virus has been found in the lower intestinal tract of some patients.

Sources: Chronicle research, Getty Images

The Chronicle

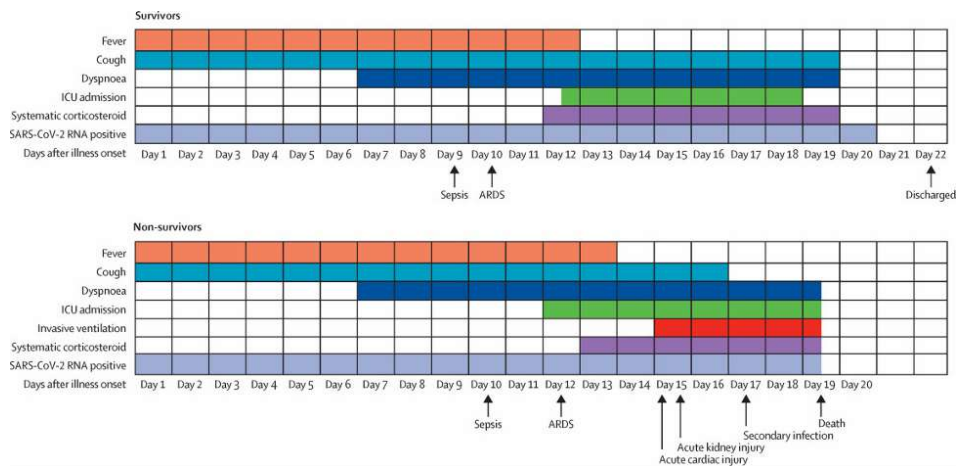
Device	Flow Rate in Liters Per Minute (l/m)	Fraction of Inspired Oxygen (FiO ₂)	
Nasal Cannula	1-6	24-44%	
Oxymizer	6-12	52-82%	
OxyMask	1-15	24-90%	

Device	Flow Rate in Liters Per Minute (l/m)	Fraction of Inspired Oxygen (FiO ₂)	
Non Rebreather Mask	15	100%	
High Flow Nasal Cannula (HFNC)	10-70	30-100%	
CPAP and BiPAP	Provides positive airway pressure support CPAP helps improve oxygenation BiPAP helps with respiratory distress or shortness of breath		

Good Oxygen Saturation (SpO2) Waveform



Symptom Trajectory of COVID Disease Process^{6,7}



Categories of COVID-19⁸

- **Asymptomatic or Presymptomatic Infection:**
 - Test positive for SARS-CoV-2 using a virologic test
 - No symptoms consistent with COVID-19
- **Mild Illness:**
 - Positive for various signs and symptoms of COVID-19 (e.g., fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell)
 - NO shortness of breath (SOB), dyspnea, or abnormal chest imaging

Categories of COVID-19⁸

- **Moderate Illness:**
 - Evidence of lower respiratory disease during assessment or imaging
 - $SpO_2 \geq 94\%$ on room air
- **Severe Illness:**
 - $SpO_2 < 94\%$ on room air
 - Respiratory frequency > 30 breaths/min
 - Lung infiltrates $> 50\%$
 - $PaO_2/FiO_2 < 300$ mm Hg
- **Critical Illness:**
 - Respiratory failure
 - Septic shock
 - Multiple organ dysfunction



Addressing Patients with Severe COVID-19

- Multi-systems affected
- Chart reviewing a patient with severe COVID-19
- Multi-disciplinary collaboration



OT – Implication for Patients with Severe COVID-19⁹

Table 2. Stages of COVID-19—What to Expect

	Clinical Features	Client Factors/Needs
Stage 1: Early Symptoms Mild Disease	Fatigue, shortness of breath, fever *Pre-hospital/hospital admission	Fall risk Risk for readmission Community supports for successful shelter at home
Stage 2: Respiratory Distress Moderate Disease	Hospitalization Hypoxia, on supplemental oxygen Support medical therapy	Prevent physical deconditioning Functional endurance Mental health Occupational deprivation
Stage 3: Respiratory Failure Severe Disease	Intensive care unit (ICU) admission Mechanical ventilation Sedation, paralytics, proning AARDS-like presentation Vent weaning	ICU-acquired weakness Delirium Physiologic tolerance for gentle mobilization Monitor for further decompensation
Stage 4: Post-Acute Care Recovery Recovery from severe disease	Post-intensive care syndrome Physical, cognitive, and psychological dysfunction Post-acute care rehabilitation	Post-intensive care syndrome ICU-acquired weakness Vent/O2 weaning Cognitive impairment Posttraumatic stress disorder, anxiety disorders

OT – Assessment Strategies⁹

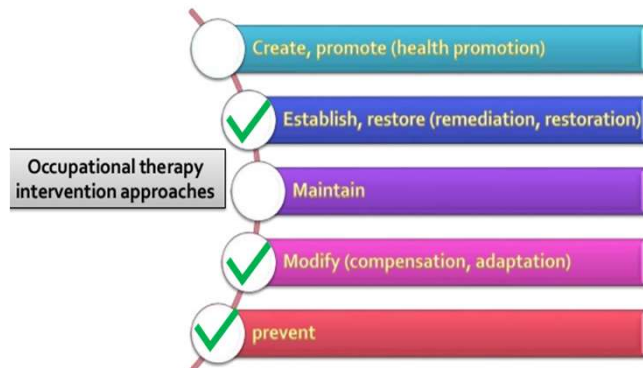
- Chart Review Tips
- Level 1 assessment/engagement
 - Sensory stimulation
- Outcome Measures
 - AMPAC
 - RASS
 - CAM-ICU

Reference to *Early Mobility Exclusion Criteria and Their Applicability to Level 1 emerging 2 Patient Population*

EXCLUSION CRITERIA FOR ENGAGEMENT <u>AND</u> MOBILITY	EXCLUSION CRITERIA FOR MOBILITY
Acute seizure activity	RASS < 2- or > 2+
Unstable spinal cord injury/ unstable spine	Thrombolytic Therapy
Sustained ICP greater than 20 mmHg	FIO2 ≥ 80% or PEEP > 10
Physician Order for flat bed rest (For Neuro Patient)	Bilevel with low PEEP > 10
Evidence of acute MI	Femoral Sheath
Unstable acute arrhythmia	APRV ventilation mode
Cardiovascular instability	Unstable fractures
Fluctuating Neurological Status	Bilevel with low PEEP > 10
Neuromuscular Blockade	Baseline Bedbound
Unstable Chest / Open Abdomen	IABP
<u>RASS -4 or -5 without sedation</u>	High dose pressors preventing patient position changes

OT – Intervention Techniques^{7,9,10}

- Restore/modify/prevent
 - Critical care myopathy
 - Delirium/cognitive impairments
- Establish
 - Tolerance to gentle mobilization and positioning
- Prevent
 - Physical and cognitive decompensation



OT – Sensory Assessment/Engagement



OT – Examples of Goals

OT - Patient will demonstrate a generalized/localized movement ***% of the time when presented with {*auditory, olfactory, proprioceptive, tactile, vestibular, and visual*} stimulus.

OT – Patient with complete rolling R<>L in bed with {*assist level*} assistance in preparation for bed level toileting/bathing tasks.

OT- Patient will demonstrate initiation/participation with familiar ADL activity when presented with self-care objects with {*assist level*}/ cues/facilitation to promote independence with ADL routine.

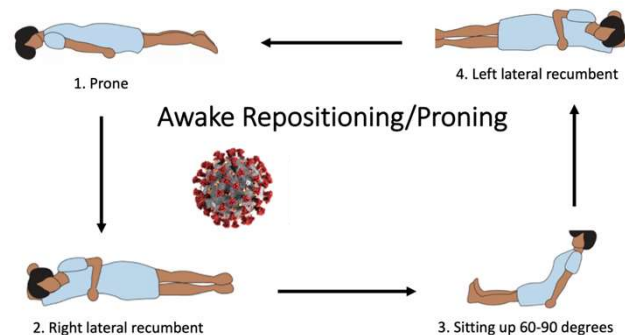
PT – Implication for Patients with Severe COVID-19¹¹

- These patients are really sick!
- What are the goals of care at this stage?
- Think about the phase of COVID
 - Acute versus subacute



PT – Assessment Strategies

- Remember to look at trends!
- Repositioning or proning?
 - Response to changes in position or movement
- What medications are the patients on?
- Collaboration is key!



PT – Intervention Techniques¹²

- Bed in chair position with neutral pelvis to avoid sacral sitting
- Considerations:
 - Incremental changes
 - Vitals
 - Mentation



PT – Intervention Techniques¹¹

- Simulated side-edge position



PT – Intervention Techniques¹¹

- Semi-prone position



PT – Intervention Techniques

- Bed level leg presses
 - Bed in reverse-trendelenberg
 - Utilize friction reducing devices (FRDs)



PT – Examples of Goals

- PT – Patient will tolerate HOB > 50 degrees for greater than 5 minutes with less than 50% verbal cuing for appropriate respiratory technique.
- PT – Patient will transfer into simulated side-edge position with minimal assistance and less than 25% verbal cuing to maintain RR below 25 breaths/minute.
- PT – Patient will indicate any dyspneic symptoms greater than 50% of the time throughout 2 consecutive PT sessions.

SLP – Implication for Patients with Severe COVID-19¹³

- What's your role?
 - Communication
 - Delirium
 - Reducing risk for long-term cognitive deficits
 - Swallowing



SLP – Cognitive-Communication (Cog-Comm) Assessment Strategies^{5,14}

- Initiating cognitive-communication evaluations when *moderately or lightly sedated*
- Check chart for RASS and CAM-ICU
- What is most valuable to patient at this stage?
 - Focus on early communication/delirium prevention

SLP – Cog-Comm Intervention Techniques^{5,15}

- Training communication methods with patients
- Providing education to caregivers
- Orientation
 - Calendars, visual aids
 - Journaling
- Safety in hospital



SLP – Examples of Cog-Comm Goals

- SLP - Patient will demonstrate auditory comprehension with basic yes/no questions with 90% accuracy and minimal cues.
- SLP - Patient will effectively use augmentative communication tool to communicate wants and needs with 90% accuracy with moderate cues.
- SLP - Patient will score a 25 or above on two separate administrations of the O-Log.

SLP – Swallowing Assessment Strategies^{16,17}

- Bedside evaluation vs instrumental study
 - When is the right time?
- Considerations:
 - What's their alertness?
 - How long were they intubated?
 - What does their voice sound like?
 - Were they prone?
 - How much O2 is required post-extubation?
 - How are their lungs on imaging?
 - Is there a risk for re-intubation?
 - What's their nutrition status like?



SLP – Considerations for HFNC and Swallowing^{18,19}

- Airflow rate
- Medical stability, FiO₂
- Respiratory rate
- Mental status
- Physical status
- Secretion management
- Oral hygiene



SLP – Swallowing Intervention Techniques

- If completed, instrumentals should be used to guide treatment for pharyngeal deficits
- What can you target without objective view?
 - Oral care
 - Oral deficits
 - Generalized weakness
 - Ice chips/sips of water
 - Daily re-assessment



SLP – Examples of Swallowing Goals

- SLP - Patient will complete tongue base and laryngeal elevation exercises with moderate cues.
- SLP - To demonstrate understanding of relevant dysphagia topics, patient will provide teach-back of key teaching points related to swallowing strategies, diet recommendations, risks of aspiration and aspiration pneumonia, and oral care recommendations with minimal cues.

Addressing Patients with Moderate COVID-19

- Multi-systems affected
- Chart reviewing a patient with moderate COVID-19
- Multi-disciplinary collaboration



OT - Implication for Patients with Moderate COVID-19⁹

Table 2. Stages of COVID-19—What to Expect

	Clinical Features	Client Factors/Needs
Stage 1: Early Symptoms Mild Disease	Fatigue, shortness of breath, fever *Pre-hospital/hospital admission	Fall risk Risk for readmission Community supports for successful shelter at home
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OT – Assessment Strategies

- Disease Trajectory/Trends
- Symptom management
- Outcome Measures
 - AMPAC
 - RASS
 - CAM-ICU
 - BORG-RPE/Modified BORG
 - Breathlessness scale

Modified BORG		Breathlessness Scale
No effort	0	No breathlessness at all
Very, very light	0.5	Very, very slight
Very light	1	Very slight
Light Exertion	2	Slight breathlessness
Moderate	3	Moderate
Somewhat intense	4	Somewhat severe
Intense exertion	5	Severe breathlessness
	6	
Very intense exertion	7	Very severe breathlessness
	8	
Very, very intense exertion	9	Very, very severe breathlessness
Maximal exertion	10	Maximal breathlessness

OT – Intervention Techniques^{9,10}

- Restore/modify/prevent
 - Physical deconditioning
 - Delirium/cognitive impairments
 - PTSD/anxiety disorders
- Restore/maintain
 - Functional endurance within ADL routine
- Promote/maintain
 - Mental health
- Prevent
 - Occupational deprivation



OT – Examples of Goals

- OT – Patient will complete grooming routine a sit/stand level with <25% verbal cueing to identify need for seated rest break to improve safety within ADL routine.
- OT – Patient will independently identify and implement 2 coping strategies/techniques to manage stress/anxiety to promote improved quality of life.
- OT – Patient will appropriately implement optimal breathing techniques with minimal cueing to improve functional endurance within ADL routine.

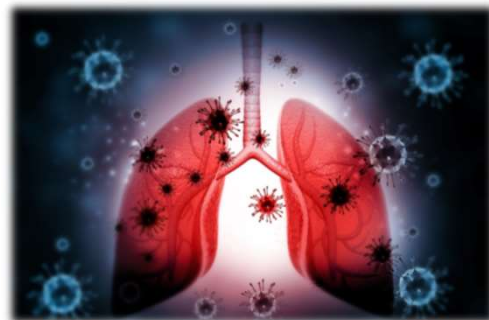
PT – Implications for Patients with Moderate COVID-19

- Acuity of COVID-19 diagnosis
 - Admitted with moderate COVID-19 symptoms?
 - Transferred to step-down from ICU?
- Review COVID-19 journey
 - Symptoms
 - Oxygen support
 - Treatment process



PT – Assessment Strategies

- **Moderate illness:** “...evidence of lower respiratory disease...”
 - Monitoring of vitals
- Start basic...work their way up!
- Responses to movement
 - Incremental movements



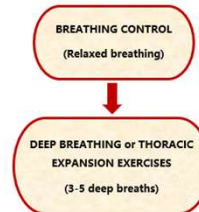
PT – Intervention Techniques^{11,20,21}

- Rolling in bed using bed rails
 - Dissociative movements
 - Lateral chest expansion
 - Dependent lung down concept



- Breathing control exercises with bed in upright position
- Deep breathing

Steps of Active Cycle of Breathing Technique

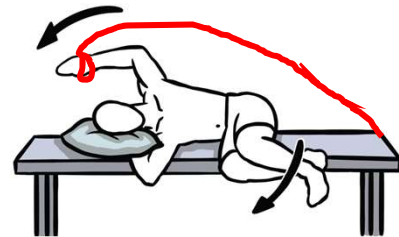


PT – Intervention Techniques²¹

- Thoracic expansion
 - Cues and resistance
 - Postural recovery as needed



- Resistance band chest expansion exercises



PT – Intervention Techniques^{12,22}

- Resistance band full body exercises
 - UE and LE involvement
 - Sync with appropriate breathing technique

- Functional endurance training
 - 5 Times Sit to Stand
 - 2-Minute Step Test



PT – Examples of Goals

- PT – Pt will demonstrate understanding of modified BORG scale during functional activity with less than 25% verbal cuing.
- PT – Pt will perform thoracic expansion exercises with minimal assist in order to improve breathing pattern and maximize respiratory capacity for progression of functional activity.
- PT – Pt will achieve upright, sitting posture without back support with stand by assist for greater than 10 minutes while demonstrating optimal breathing technique.

SLP – Implications for Patients with Moderate COVID-19

- Acuity level
 - Still multiple systems affected
- Where are they in the recovery process?



SLP – Cog-Comm Assessment Strategies and Intervention Techniques^{5,23}

- Delirium prevention/management
 - Training precautions
 - Can help facilitate communication with family/friends outside of hospital
- Cognitive stimulation
 - TV, reading materials, word puzzles
- More comprehensive assessment
 - Subjective and objective measures



SLP – Swallowing Assessment Strategies and Intervention Techniques¹⁶

- Instrumental swallow studies
 - Initial or repeat
- Breathing/swallowing coordination
- Generalized weakness, poor appetite
 - Energy conservation strategies
 - Dietician referral



SLP – Examples of Goals

- SLP – Patient will score a 25 or above on the Cog-Log prior to discharge from speech therapy.
- SLP – To demonstrate understanding of relevant speech therapy topics, patient will provide teach-back of key teaching points related to delirium prevention strategies with min cues.
- SLP – Patient will tolerate upgrade of liquid trials to thin without overt or clinical signs or symptoms of aspiration via instrumental assessment.
- SLP – Patient will demonstrate use of energy conservation strategies when swallowing with minimal cues.

Addressing Patients with Mild COVID-19

- General signs and symptoms of COVID-19
- Remember COVID-19 trajectory
- Evaluation vs screen



OT – Implication for Patients with Mild COVID-19⁹

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	Clinical Features	Client Factors/Needs
Stage 1: Early Symptoms Mild Disease	Fatigue, shortness of breath, fever *Pre-hospital/hospital admission	Fall risk Risk for readmission Community supports for successful shelter at home
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OT – Assessment Strategies and Intervention Techniques^{9,10}

- Maintain/modify/prevent
 - Home modifications
 - Energy conservation strategies
 - Occupational deprivation
- Promote
 - Community/social support
- Outcome measures
 - AMPAC
 - BORG RPE/modified BORG
 - Breathlessness scale



OT – Examples of Goals

- OT – Patient will independently identify 2-3 sources of community support in preparation for safe/successful discharge home.
- OT – Patient will employ at least 3 energy conservation principles (use of BORG RPE, pursed lip breathing, seated/standing rest breaks, pacing) within self-care and functional mobility tasks without cues to facilitate increased safety with ADL/iADL routines.

PT – Implication for Patients with Mild COVID-19

- What symptoms are these patients experiencing?
 - New acute diagnosis versus re-admission for previous diagnosis
- Typically these patients do not experience SOB
 - Regardless, important to monitor vitals!

PT – Assessment Strategies

- Determine need for PT
 - Goals of care
 - Acute symptoms vs acute on chronic
 - Co-morbidities
- Previous living situation



PT – Intervention Techniques²⁴

- Skilled functional mobilization
- Endurance training
- Diaphragmatic breathing
- Ambulation and stair simulation



PT – Examples of Goals

- PT – Pt will ambulate 30' x3 attempts with supervision while demonstrating pursed lip breathing with less than 25% verbal cuing.
- PT – Pt will negotiate curb step x5 times with Modified BORG scale of less than 6 for safe re-entry into home.
- PT – Pt will teach back diaphragmatic breathing to this therapist with less than 50% cuing for correct technique.

SLP – Implication for Patients with Mild COVID-19^{13,25}

- May see high level cognitive deficits
 - Complaints of “brain fog”
- Complaints of dysphagia
- Risk for re-admission
- Long-term considerations



Key Points

- Close and consistent monitoring of vitals
- Multi-disciplinary collaboration
- Working as a therapy team
 - Communication
 - Staggering sessions
 - Dove tail sessions
- Each patient is unique!



Supplemental Resources

The screenshot shows the OhioHealth Rehabilitation Services website. The navigation bar includes 'Care Connect', 'Departments', 'IS SharePoint', 'PMO Sites', and 'eSource SharePoint Help'. A search bar is on the right. The main content area features a 'Welcome to Rehabilitation Services' banner, a 'Clinical Programs' section with icons for Ortho, Neuro, Cardiac, Critical Care, General Medicine, Oncology, and Trauma, and a 'COVID Therapist Resources' link highlighted with a red circle. Below this are sections for 'ANNOUNCEMENTS', 'Articles', 'Team Information', and 'Helpful Links'.

Reiteration of learning objectives

- Identify physiological effects of COVID-19 and understand progression of the disease process
- Identify different oxygen support systems and their effects on therapeutic intervention
- Identify discipline specific assessment and evaluation strategies to apply to patients with COVID-19
- Discuss discipline specific skilled intervention techniques for patients with COVID-19
- Identify supplemental resources that support treatment of patients suffering from COVID-19 (eg. VTE CPG)

Questions?

Reach out to these folks!

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