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Home Health PT Implications for Patients with COVID-19

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Presenter Disclosures

- Financial:
  - Rachel Botkin and Pamela Bartlo received an honorarium for this course.
- Non-financial:
  - *Pam* is the Vice President of the Cardiovascular and Pulmonary Section of APTA. The Section sponsored and created extensive content related to COVID-19 care. Pam helped create and presented 2 webinars/presentations related to COVID-19 care. She did not accept payment for either one.
  - *Rachel* serves on the Cross-Sectional COVID-19 Task Force for Outcome Measures and personally helped create and disseminate the Core Set of Outcome Measures for the Patient with COVID-19. She did not accept payment for this.

CONTINUED

Disclosures Cont'd

- **Content Disclosure:** This learning event does not focus exclusively on any specific product or service.
- **Sponsor Disclosure:** This course is presented by PhysicalTherapy.com.

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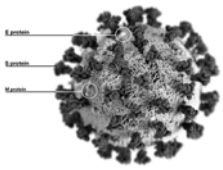
Learning Outcomes

After this course, participants will be able to:

1. Explain symptoms and presentation of the patient with COVID-19 in the home health setting.
2. Identify physical assessment strategies to quantify deficits and strengths in body functions, based on likely symptom manifestation, record review and subjective history including application and interpretation of appropriate tests and outcome measures and necessary precautions for patients with COVID-19.
3. Develop a comprehensive plan of care for a patient in home health with COVID-19.

Symptoms and Characteristics of Patients with COVID-19 in the Home Health Setting

Pamela Bartlo



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Corona Virus Classification

- Corona viruses (CoVs): a large family of single-stranded RNA viruses
  - MERS (Middle East Respiratory Syndrome - 2012)
  - SARS (Sever Acute Respiratory Syndrome - 2003)
- There's a crown-like appearance due to spikey glycoproteins on the outside (more on this in a minute)

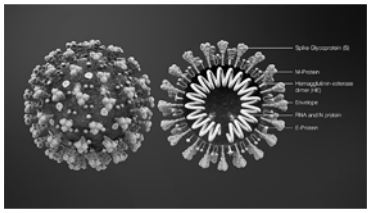


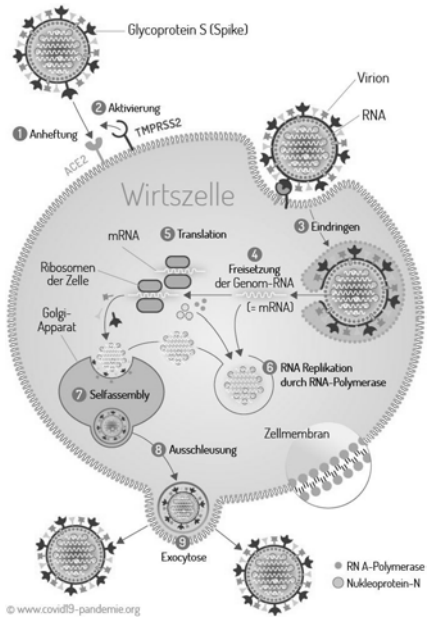
Image: https://www.scientificanimations.com / CC BY-SA (https://creativecommons.org/licenses/by-sa/4.0)

Corona Viruses

- Estimates suggest that 2% of the population are healthy carriers of a CoV
  - Estimated CoVs are responsible for about 5% to 10% of all acute respiratory infections
- CoVs can cause common colds and upper respiratory infections, even in immunocompetent individuals.
- In immunocompromised subjects and the elderly, lower respiratory tract infections can occur too.[9]

COVID-19 (SARS-CoV-2)

- Most current strain of the virus started in Wuhan, China in December 2019.
- Glycoproteins on outside of virus attach to angiotensin converting enzyme (ACE 2) receptors[9,35]
- The ACE 2 brings coronavirus into pneumocyte cells
- Triggers
  - Synthesis and release of more COVID-19 virus back into blood stream
  - Inflammatory responses to virus: clotting factors, etc.
  - Immune system increase: WBC, prostaglandins, leukotrienes, etc.

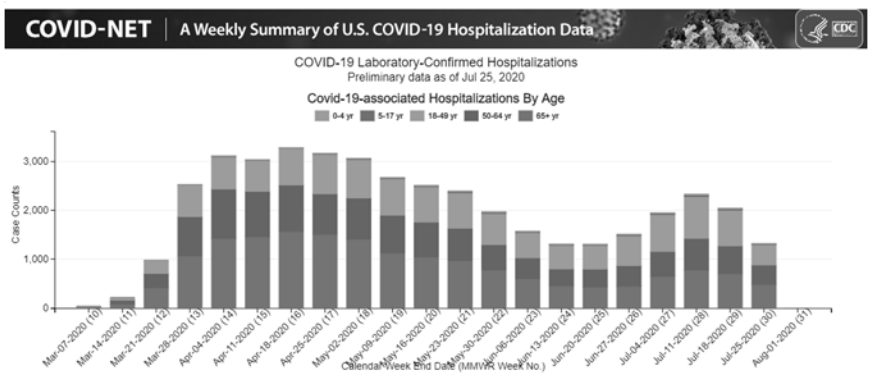


Impact of COVID-19

- Greatest impact is pulmonary system although will also impact: GI, musculoskeletal, neurological and indirectly the integumentary system.[15,32]
- Pulmonary Impact: causes fluid to build up between alveoli and capillary in interstitial space.
- Fluid causes problems with gas exchange.
- As virus progresses, get inflammation inside alveoli too – thus fluid is like a pulmonary edema progressing to ARDS

Characteristics of People With COVID-19

- Slightly more men than women: CDC as of July 25, 2020 showed around 51% more men.[11]
- Age: ranges for incidence rate.
- Hospitalization rates changed in June
  - Prior to June: 65+ age group had highest rate of hospitalization.
  - June 13- July 18 18-49 y/o group had highest rate with 65+ right behind.
  - July 25th week flipped back, but these two groups remain higher than other groups including 50-64 y/o group



Age	0-4 yr	5-17 yr	18-49 yr	50-64 yr	65+ yr	Total
2020	238	338	12328	12142	17357	42403

The Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization Surveillance Network (COVID-NET) hospitalization data are preliminary and subject to change as more data become available. In particular, case counts and rates for recent hospital admissions are subject to lag. As data are received each week, prior case counts and rates are updated accordingly.

Racial Impact of COVID-19

- Still not enough data yet. Data we have shows higher rates among people of color.[19]
- Black Americans disproportionally affected. They represent about 13% of the population in the states reporting racial/ethnic information, yet they account for about 34% of total Covid-19 deaths in those states.[16]
- Black Americans and Latinx Americans have highest rate of hospitalizations.[10]

Data for Patients with COVID-19 at Home (No hospital admission)

- We have almost NO DATA
- Over 4.6 Million cases of COVID-19 since start of tracking in Feb/March
- Currently around 1500 people in hospitals.
- So where are the rest??????
- Obviously, some already healed, some no symptoms, etc.
- Many are in sub-acute rehabs and home health

Initial Patient Symptom/Presentation

General Initial Symptoms[9,13]

- **Fever**, **malaise**, **dry cough**, headache, dyspnea
- Some with GI issues: abdominal pain, diarrhea, appetite loss, nausea and vomiting
- Vitals: Increased RR, HR, and BP
- CT scan: like pneumonia, but with abnormal findings
  - Inflammatory infiltrations
  - Patchy or segmental GGOs (ground glass opacities)
  - Multiple lobes in bilateral lungs (pneumonia more unilateral)

Image above by mohamed Hassan from Pixabay

Q1

COVID 19 Symptoms in Home Health

- Nothing specific as to differences in symptoms for patients in home health.
- Newly diagnosed COVID-19: should have similar to previous slide
- Continuum of care after hospitalization for COVID-19: ask pt about symptoms and limitations to assess which system(s) involved the most and to what degree

Categorization of COVID-19 Cases[9,31]

- Mild (80%): no or mild respiratory impairment OR *moderate respiratory impairment, but still not enough to require hospitalization*.
- Severe (15%): dyspnea, hypoxia, >50% lung involvement on imaging within 24-48 hrs, respiratory frequency ≥ 30/min, blood oxygen saturation (SpO2) ≤ 93%, PaO_2/FiO_2 ratio <300
- Critical (5%): respiratory failure, shock, or multiorgan dysfunction (MOD) and/or failure (MOF)

Complications from COVID-19

- Pulmonary impairments:
  - Severe decrease endurance.
    - *Even if pt wasn't in hospital – they can present with poor endurance*
    - *Worse than other pts that have been in the ICU*
  - Fibrotic changes that may be long term[26] (unknown still)
  - Poor oxygenation
- Possible Cardiac involvement[32]
  - Arrhythmia
  - Cardiac insufficiency
  - Ejection fraction decline
  - Severe myocarditis with reduced systolic function

Q2

Complications Cont'd

- Circulatory system[7,40]
  - DVT, intravascular coagulation, thrombotic events
- Neurological system[32]
  - Acutely: headaches, disturbed consciousness, seizures, absence of smell and taste, and paresthesia
  - Appears that COVID-19 can increase risk of CVA
- Organ involvement
  - Usually kidneys or liver due to COVID progression, meds in ICU, or cytokine storm if survived

Complications Cont'd

- Critical illness polyneuropathy (CIP): sensory and motor neuropathy seen in COVID[21,25,33]
- PICS (Post Intensive Care Syndrome) and/or ICUAW (ICU Acquired Weakness)
  - See my other COVID talk for more info
- Cognitive impairment
  - Usually due to prolonged ICU stay, sedation, etc.
- Skin integrity
  - Due to lack of mobility in hospital. Screen for skin issues and then treat as needed

Evaluation of Patient with COVID-19

- Due to the multi-system involvement, important to eval all systems.
- Check vitals and subjective symptoms
- Endurance testing, *auscultation of lungs*
- Check strength (including signs of atrophy) & ROM
- Eval mobility, amb, stairs, etc.
- Balance, cognition, coordination, other neuro screening
- Skin integrity assessment

Q3

CONTINUED

Primary Goals of Home Health PT for Patient with COVID-19

- Due to complications and disease presentation, primary goals of home health rehab are:
  - Endurance
  - Strengthening
  - Independence
  - Safety

Image by KateCox Pixabay

Q4

CONTINUED

COVID-19 Recovery

- Most pts will recover
- Most will have some of the system impairments during home health PT
- See Rachel's portion for further info on evaluation and intervention

Precautions for the Therapist

Pamela Bartlo

General Precautions For All Patients

- Wear appropriate PPE for that pt – discussed more
- Wear a mask (cloth or surgical is fine for pts that don't have COVID-19)
- Social distance from other family/caregivers in the home
- Distance from pt as able

Image: CCO public domain

Surfaces

- Try not to touch any surface entering/leaving the house or room without gloves or other protective barrier in place. (Includes pushing door open with arm, moving something aside with leg, etc.)
- Time virus is alive on surfaces[39]
  - Soft surfaces: shorter time alive (≈ 2-5 hrs), but tougher to clean
  - Hard surfaces: 24 hrs-5 days alive, but easier to clean
- Use bleach-based cleaning solution or other anti-microbial disinfectant

Image by Emily May on Flickr

Screening

- Important for PTs/PTAs to be screened each day.
  - May be just taking own temp and answering questions about symptoms
  - Your agency already has plan in place
- Screen pts prior to seeing them – see next slide
- Others in the house – see slide
- Thomas reference has some good guidelines for which patients with COVID-19 to treat and some PPE guidelines[36]

Screening of Patients

Image by Clker-Free-Vector-Images from Pixabay

- Ask pt if they've had any signs or symptoms of a respiratory infection, such as a **fever**, cough, shortness of breath, or sore throat.
- In past 14 days, have they had contact with someone with or under investigation for COVID19, or are ill with respiratory illness.
- **Temperature monitoring –** up to your agency
- CDC guidelines for treating pts in the home: https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-home-care.html

Screening of Pts Cont'd

- You may or may not be the screener in your agency
- Administration or intake personnel
  - They may decide ahead of time if your agency has compacity to treat pt with COVID
- Case administrator (provider that opens case): RN, PT, etc.
  - Does the pt meet criteria for treatment, etc.
- Health care provider
  - Is pt appropriate for therapy that date

Contact with patient with (+) COVID-19 When can they go outside/leave house?[13]

- Contact with pt should be in full droplet/airborne PPE for as long as your agency/facility recommends. This may vary or change as we learn more about how long the patient is contagious. This point, there's just not enough data. Viral shedding at least 10 days.
- These are guidelines for pt going out of their house or for us to D/C use of PPE…
  - If the pt won't be re-tested, then
    - At a minimum, it should be at least ***10 days*** after symptoms first appeared (PPE probably for longer still)
    - AND at least 24 hours (that is one full day of no fever without the use medicine that reduces fevers)
  - If the pt will be re-tested, then
    - Once they no longer have a fever (without the use medicine that reduces fevers)
    - AND other symptoms have improved (for example, when their cough or shortness of breath have improved)
    - AND they received two negative tests in a row, 24 hours apart.
- *No definite answer on when pt is no longer contagious.*
  - Studies show pt can shed virus for up to 30 days, but may not be contagious
  - Some sources saying patient may be a carrier for up to 6-8 weeks

Screening of Others in the House

- Usually you can't ask them the screening questions.
- Instead, just keep social distance
- If info is volunteered to you by pt or family, use your agencies protocol
  - Meaning if the pt tells you their daughter tested (+) and is isolating in the house in another room, check with your agency for their protocol

PPE Recommendations

To protect yourself and then also others

Don/Doff PPE

- Don and Doff PPE away from the patient environment.
  - HH: outside if possible. Otherwise, just inside pt's door at least 6-10' from pt
- Follow procedures
  - Key points when donning PPE: all skin at wrists is covered, N95 mask seal is intact (take a couple breaths in/out to seal it), ensure gown is tied tight enough
  - Key points when doffing PPE: take gown down from shoulders first, gloves inside out, hand hygiene A LOT t/o, store mask correctly if re-using
  - Mask storage: make sure straps do NOT touch the inside of the mask, store in a clean open container (possibly a paper bag), record length of use and discard after recommended wear time
- Greatest risk of spread of disease is during doffing process

PPE Recommendations

- Patient is (+) for COVID-19
  - Gown, gloves, glasses/face shield, **N95 mask**, surgical mask over N95 (since N95 will be re-used)
- Patient is not being tested for COVID-19 (general home health pt)
  - Gloves, surgical mask/cloth mask



Images by (far left) *Sgt. Dommnique Washington),* (middle) : Vivien Rolfe flickr, and (far right) Khawaja Masud from Pixabay

Q5

N95 Mask Use

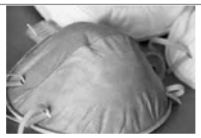


Image by: *(CDC/ Debora Cartagena)*

- N95 masks should be worn with all patients with COVID-19 for at least 10 days after onset of symptoms or (+) diagnosis
- My recommendation is to go as long as you can with an N95 with them, but it will be based on agency
- Resources that show that PT is similar to an AGP (aerosol generating procedure)[1,36,37]
- Will help justify N95 masks if needed
  - Need to be fit tested
  - Make sure to get good seal each time you use it

Re-use of N95

- Can re-use N96 masks for up to 8 hrs of wear.[12]
- Stored in open paper bag
- Make sure straps don't touch the inside of the mask
- Careful with don/doff that you don't touch anything "dirty" to inside of mask
- Sterilization of masks for re-use:
  - Ultraviolet germicidal irradiation – good evidence
  - Vaporous hydrogen peroxide – good evidence
  - Microwave, moist heat, autoclave – all mixed evidence

Washing/Care of PPE

- Have had therapists tell me they only get 1-2 gowns
  - Not recommended to re-use of disposable gowns
  - If you have to re-use gowns, ask for a surgical gown, preferably 2-3 so you can launder them between uses
- Glasses
  - Disinfect inside of lens first, then outside
  - Let dry for FULL KILL TIME
  - Then can use water to wash off any streaks
- Gloves – never re-use

CONTINUED

Safety with Masks

- Surgical mask is fine for pts that aren't COVID-19 (+) or to wear over an N95 mask, but they are NOT good enough on their own for a pt with (+) COVID-19.
- **When treating a pt that is COVID-19 (+), you NEED an N95 or higher barrier mask during contagious/viral shedding period.**
- Remember do NOT touch the facemask while wearing it. If you do, perform hand hygiene. This goes for surgical and N95 masks.

CONTINUED

Equipment Management

Stethoscopes, BP cuffs, Bags, Weights, Computers, Equipment

- **Leave anything in your car that you can.**
- Bags, equipment: bring something with you to set things down on
  - Piece of tarp, newspaper, plastic.
  - Have a bag to put that tarp in as you leave or dispose of newspaper at pt's house
  - Wrap tarp/plastic with "dirty" side into itself and then place in the bag
  - At home: take it out and clean/disinfect it then leave for several hrs. or days as able
- Sanitize anything else used with agency approved cleaner (bleach/alcohol)
- Pulse ox: mixed info depending on your pulse ox.

CONTINUED

Precautions for the Patient

Pamela Bartlo

Scheduling

- May or may not be handled by you
- Schedule most “at risk” pts on one day or early in the day
- Schedule pts with COVID-19 towards end of day or all on one day
- Clean equipment well and don’t use between pts if you don’t need to

Scheduling Cont'd

- Patients with COVID-19: see least amount of times per week and treat telehealth (if able)
  - Not always realistic if pt has safety and mobility goals and needs PT assistance to perform them, you have to see them in person
- Schedule around pt fatigue, environmental temp fluctuations, etc. as much as possible

Energy Conservation

Image by Olga Mur from Pixabay

- Typically with restrictive lung disorders (like ARDS) you want pt to be as active as possible
- With COVID-19 we want activity, however, pt's dyspnea and fatigue are continuing for weeks after initial symptoms and hospitalization
- So, need to teach pt energy conservation techniques to go with HEP too.
  - Home set up, spacing out activities, equipment or O_2 as needed, minimize stairs/reaching/bending, breaks as needed

Pt Education

- Educate pt that their endurance may cause them to feel mod to severe exertion with activities that used to be daily tasks. i.e. getting the mail, going upstairs
- For their safety, they need to monitor exertion levels and modify activity as needed.
- Good to use Exertion Scale(s)

RPE and Dyspnea

Borg RPE

Dyspnea Scale

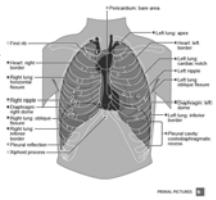
0 No dyspnea
1 Mild, noticeable
2 Mild, some difficulty
3 Moderate difficulty, but can continue
4 Severe difficulty, cannot continue

Borg Modified Dyspnea Scale

PPE Protection

- Both therapist and pt should wear masks t/o in home treatment
- Pt should wash hands immediately after finishing with PT for the day
- Remind them about social distancing and avoiding crowds outside of the home

General Note about O_2



- Many, if not most, pts with COVID-19 will require supplemental O_2 for post-acute rehab.
- Goal is to wean them down and off O_2 as able.
- Will need to watch O_2 saturations closely
  - Preliminary observations showing saturations may under-represent PaO_2 levels
- Although not specific to COVID-19, the Practice Guidelines on Supplemental O_2 will be a great resource for you.[20]

CONTINUED

General Considerations

- Supplemental O_2
  - Did pt use O_2 prior to COVID-19?
    - Will use equal to, if not more now. May desaturate more now.
  - What have they used since hospital?
    - Try to wean pt off O_2 over a few days/weeks. You want an O_2 titration order.
  - Example:

Supplemental Oxygen

Oxygen Use:

- ☐ Continuous for all activity and at rest
- ☐ During activity only
- ☐ While sleeping
- ☐ As needed

Oxygen Prescription

- ☐ Pt is prescribed _____ L O2 delivery via _____.
- ☐ PT may titrate supplemental O2 between _____ L O2 and _____ L O2 to maintain oxygen saturations above 90%.

CONTINUED

Safety

Image by: OpenClipart-Vectorys from Pixabay

- Goes along with independence
- Assess safety concerns: mobility, endurance, balance, cognition, strength, etc. Address specific pt concerns.
- Teach pt self-monitoring of vital signs and other symptoms
- Used standardized tests as able
- Interprofessional collaboration as able
- Our job to still keep pt safe since they may be at lower functional levels than we're used to seeing in home

CONTINUED

Evaluation Strategies

Rachel Botkin

Medicare requirement for skilled therapy

To qualify for the Medicare home health benefit, beneficiary must

- Be confined to the home
- Under the care of a physician
- Receiving services under a POC established and periodically reviewed by a physician
- Be in need of skilled nursing care on an intermittent bases or PT or SLP; or
- Have a continuing need for OT

CMS Benefit Manual, chapter 7, part 30

Chapter 7, part 40.2.1 General Principles Governing Reasonable and Necessary PT, SLP, and PT

Therapy services shall be of such a level of **complexity** and **sophistication** or the **condition of the patient** shall be of such that services required can only be safely and effectively performed only by a therapist.

Services that do not require the performance or supervision of a therapist are **NOT** skilled and are not considered reasonable or necessary for therapy services, even if they are performed or supervised by a qualified professional.

Prior level of Function

- Be specific.
- What device?
- Household vs community ambulator for what distance? At what speed?
- Driver?
- Recreation? Hobbies? Exercise?
- Eval needs to show a difference between PLOF and CLOF. If CLOF is similar to PLOF, not skilled
- Did they receive help with mobility/ADL's
- Paint the picture of who this person was and how they spent their time prior to the event for which you are evaluating and treating them

CONTINUED

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Vital Signs

Be aware of pharmacological impact on VS

Know APTA, AACVR, ACSM parameters

Q7

	Don't Start Exercise If:			Terminate Exercise If:		
Variable	ACSM	AACVPR	APTA	ACSM	AACVPR	APTA
Pulse Rate	120 bpm		<40 bpm, >130 bpm	Post CABG, 30 bpm above rest Post MI – 20 bpm above rest	Post CABG 30 bpm above rest Post MI 30bpm above rest	Med/Surg >130 bpm
Respirations			>30 /min			Inability to converse
SBP	>200 mm Hg		>250 mm Hg	>220 mm Hg	10 mm Hg drop	>250 mm Hg, 10 mm Hg drop
DBP	>110 mm HG	>110 mm Hg	>120 mm Hg	>110 mm Hg	>110, Hg	>120 mm Hg
SpO2	<88% (request supplemental O2)		<85% (request supplemental O2)	Titrate to maintain >/= to 90%		Change from rest of 3-5% (document)
Fever			>100 degrees			
Ejection Fraction		<50% (ECG monitoring if available)				
Arrhythmias	30% of complexes in 1 min		>6/min	30% of complexes in 1 min		>6/min
RPE				13	13	

The American Geriatrics Society (AGS) Beers Criteria® for Potentially Inappropriate Medication (PIM)- 2019 Update[8]

- "Warning light" that should prompt close review and monitoring of a medication
- Closely assess patients for potential adverse effects of Beers list medications, keeping in mind that many effects may be subtle yet important.
- Useful tool for engaging patients and caregivers in discussion about their medications.
- Can start a larger conversation about effectiveness, adverse effects, cost, adherence, and goals of care for the patient's entire medication regimen.
- We are important partners in identifying, addressing, and educating patients about potential problems with AGS 2019 Beers Criteria medications.

Outcome Measures

Rachel Botkin

Outcome Measure Collection

Important component of PT practice

- direct management of individual patient care
- opportunity to collectively compare care and determine effectiveness.

Common language

- evaluate the success of physical therapy interventions
- provide a basis for comparing outcomes related to different intervention approaches.

Best clinical practice

- Can determine which intervention approaches comprise best clinical practice if we measure outcomes among patients with the same relevant components of body function and structures, activity, and participation.

For patients who are unable to do activity but have a goal and the capacity to achieve it, a baseline score of 0 should be documented.

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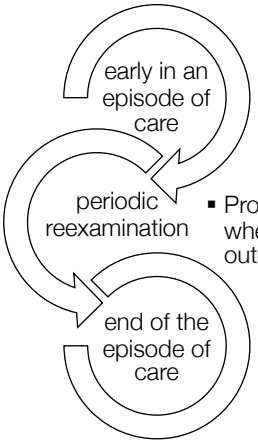
Timing of Outcome Measure Collection



- Establishes the baseline status of the patient and provides a means to quantify change in the patient's functioning
- Provides information about whether predicted outcomes are being realized
- Measures the outcomes of the physical therapy services

Q9

CONTINUED

Best Practice

Choose appropriate outcome measures to assess on eval and set goals related to MCID or MDC.

Retest at 30-day mark or discharge (whichever comes first)

Continue retesting at 30-day intervals

PT Assistants can and should complete on visit prior to reassessment or discharge

Outcome Measure Recommendations[24]

- APTA's academies and sections formed the Cross-Academy/Section COVID-19 Core Outcome Measure Task Force to identify a core set of outcome measures for patients diagnosed with COVID-19, across the continuum of care and in all settings. A core set of outcome measures aids in describing the trajectory of recovery from COVID-19 and facilitates research initiatives.

- Perform an individualized safety screening based on the patient's severity of illness, past medical history, and current situation before performing core outcome measures.
  - Cardiovascular risk status prior to exercise and endurance testing, using a weighted risk-factor calculator, such as the American College of Cardiology ASCVD Risk Estimator Plus. http://tools.acc.org/ASCVD-Risk-Estimator-Plus/#!/calculate/therapy/
  - Venous thromboembolism disease.
  - Cognitive function to ensure that a patient can understand the directions of other screens and core outcome measures.

Monitor the patient's vital signs throughout examination and intervention due to the high prevalence of cardiorespiratory complications for this patient population.

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Core Set of Outcome Measures

- Cognition: Saint Louis University Mental Status examination (SLUMs).
- Quality of Life: EQ-5D-5L
- Strength: Medical Research Council Sum Score (MRC-SS).
  - Provide raw score for UE/LE
- Function: Short Physical Performance Battery (SPPB)
  - Provide raw score for gait speed
  - Provide raw score for the 5 Times Sit-to-Stand Test
- Endurance: 2-Minute Step Test.

Q6

CONTINUED

Saint Louis University Mental Status Exam (SLUMS)

- 30-point, 11 question screening questionnaire that tests orientation, memory, attention, and executive function, with items such as animal naming, digit span, figure recognition, clock drawing and size differentiation.
- Clinician-administered
- Takes approximately 7 minutes to complete
- Maximum score is 30 points,
- Cut-off scores for dementia or mild neurocognitive impairment are based on the education level of the patient (high school and above or less than high school).

SLUMS

Diagnosis	Norm	Cut-off score
Older Adults	23.85	25.5 - MCI for high school educated 23.5 – MCI for <high school; 21.5- dementia for high school educated 19.5 – dementia for <high school

EQ-5D-5L

- 5 dimensions:
  - Mobility
  - Self-care
  - Usual activities
  - Pain/discomfort
  - Anxiety/depression.
- Each dimension has 5 levels:
  - No problems
  - Slight problems
  - Moderate problems
  - Severe problems
  - Extreme problems
- The patient is asked to indicate his/her health state by ticking the box next to the most appropriate statement in each of the five dimensions.
- This decision results in a 1-digit number that expresses the level selected for that dimension. The digits for the five dimensions can be combined into a 5-digit number that describes the patient's health state.

EQ VAS

- The EQ VAS records the patient's self-rated health on a vertical visual analogue scale, where the endpoints are labelled 'The best health you can imagine' and 'The worst health you can imagine'.
- The VAS can be used as a quantitative measure of health outcome that reflect the patient's own judgement.

https://euroqol.org/eq-5d-instruments/eq-5d-5l-about/

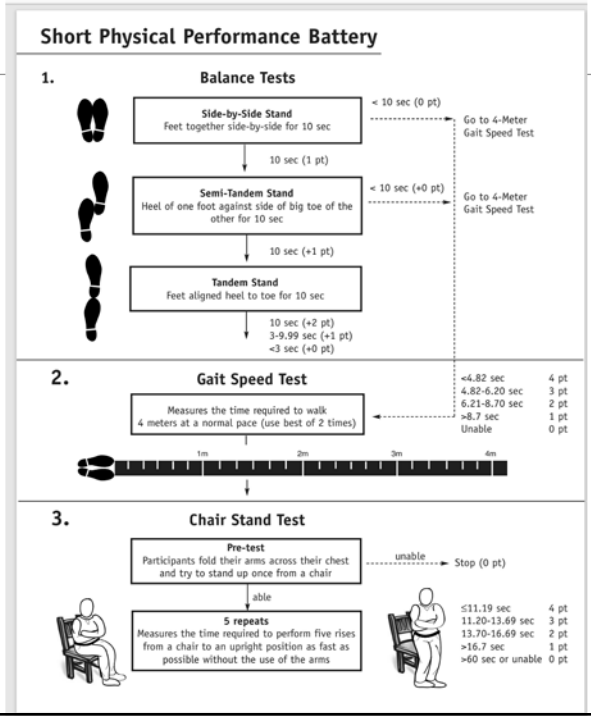
MRC-SS[14]

- Strength measure widely used to diagnose intensive care unit-acquired weakness (ICU-AW), which is defined as an MRC-SS <48.
- 30 points for UE- shoulder abduction, elbow flexion, wrist extension
- 30 points for LE- hip flexion, knee extension, ankle dorsiflexion
- For video instruction:
  - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3169254/

SPPB (Short Physical Performance Battery)

- Developed by the National Institute on Aging as an assessment of lower body functioning in older adults
- The preferred option for use in clinical trials to characterize frailty by the European Medicines Agency.
- Can identify the increased vulnerabilities that are characteristic of physical frailty
- Has predictive validity for falls, disability, decline in ADLs, increased health care utilization hospitalization, institutionalization, and death.
- It has been tested for validity and reliability in diverse populations.
- 3 components to address lower body strength, self-selected walking speed, and balance and is scored on a scale from 0 to 12, with lower scores indicating greater functional impairment.
- The NIH has provided open access to download the contents of a training CD that includes comprehensive instructions on the administration of the battery, safety tips, a scoring sheet, and background information on publications that support the methodology.

Image from open access downloadable CD https://www.nia.nih.gov/research/labs/leps/short-physical-performance-battery-sppb



Equipment needed

- Test chair, stopwatch, walking path that accommodates 4 meters and path acceleration and deceleration
- May use an assistive device for walking/gait speed portion
- May use arms in chair stand if unable to perform with arms folded at chest

SPPB (Short Physical Performance Battery)

Population	Cut-off score	MCID	Goal Example
Community dwelling older adults	Frailty: Frail: ≤6, pre-frail: 7–9, non-frail: 10–12 Falls: ≤6 = associated with a high falls Hospitalization: <4 at hospital discharge had greater risk of re-hospitalization or death compared to "good" scores (8–12) Re-hospitalization and length of stay were inversely associated with SPPB score Score of <8- poor physical performance	1.0	Pt will improve their SPPB score from 6/12 to 7/12 to demonstrate a clinically important difference in functional mobility and reduced fall risk.

Instructions for 2-minute Step Test

- Take resting vital signs.
- Have patient/client stand next to a wall.
- Measure the height of the iliac crest and knee joint space and mark it on the wall.
- Then place a piece of tape on the wall half the distance between the two.
- Instruct the patient, on the signal "go," to begin stepping (not running) in place, raising each knee to the mark on the wall, for as many times as possible in the 2-minute period.
- Only count the number of times the right knee reaches the required height. That is the score.
- At the end of the test, provide a cooldown by asking the patient/client to walk slowly for a minute.
- Perform one trial.
- Take post-exercise vital signs.

2-minute step test

- A person with impaired balance may use upper extremity support for stability. Note this modification in your documentation.
- If the proper knee height cannot be maintained, ask the participant to slow down or stop until they can regain the proper form, but keep the stopwatch running
- Wall space, stopwatch, tape

Normative Values 2 MST[30]

Normative Values for 2MST		
Age	# Steps (Women)	# Steps (Men)
60 - 64	75-107	87-115
65 - 79	73-107	86-116
70 - 74	68-101	80-110
75 - 79	68-100	73-109
80 - 84	60-90	71-103
85 - 90	55-85	59-91
90 - 95	44-72	52-86

*Range of scores between the 25% and 75% percentiles

Social Determinants of Health

1. Housing instability
2. Food insecurity
3. Transportation needs
4. Utility needs
5. Interpersonal safety- physical, emotional, financial

Unfavorable socio-economic circumstances can lead to

- Increased health risks
- Chronic disease burden
- Possible disability
- Increased risk of developing chronic conditions
- Reduce a person's ability to manage these conditions
- Increase the cost of health care to an individual
- Avoidable health care utilization

Visit Frequency

- No published guidelines for this
- PDGM under CMS does not dictate how many visits a beneficiary can receive
- Use your clinical judgment based on
  - Prior level vs current level of function
  - Activity tolerance
  - # of other disciplines involved, appointments that patient has

Goal Setting

- Overall goals are to
  - PREVENT COMPLICATIONS
  - MINIMIZE IMPAIRMENTS
  - MAXIMIZE FUNCTION
- Goals Must
  - Be functional- If the goal is to increase strength, what will the strength allow the pt to do?
  - Be measurable- use quantitative tests/measures and use normative values or MCID for goal
  - Be related to patient's prior level of function
  - Have time frame
  - Be meaningful to the patient
    - Pain- don't choose an arbitrary number. ask the patient on eval what their pain goal is or what would be a tolerable level of pain for them
    - Goal can be to reduce need for AD

Interventional Strategies

Rachel Botkin

Cardiopulmonary[29]

Image by Mohamed Hassan from Pixabay

- Cardiorespiratory fitness training can improve level of disability, walking speed, walking capacity and capacity cardiorespiratory fitness during or immediately after training. (high level evidence)

CONTINUED

Exercise Prescription[2]

	Frequency	Intensity	Time	Type
Older Adults	>5days/week for moderate >3days/week for vigorous intensity; 3-5 days/week for combination of moderate and vigorous intensity	On a scale of 0-10 for level of physical exertion, 5-6 for moderate, 7-8 for vigorous	30-60 min/day for moderate; 20-30 of vigorous, may be accumulated in b9uts of at least 10 minutes each	anything
Pulmonary Disease	At least 3-5 days/week	Moderate to vigorous intensity (RPE of 4-6 on Borg 10-point scale)	20-60 minutes/day at moderate to high intensity as tolerated. If not achievable, >20 minutes of exercise interspersed with intermittent exercise rest periods of lower intensity work or rest	Walking, stationary cycling, upper body ergometry

Q10

CONTINUED

Flexibility/ROM

Teach proper positioning for

- Tone normalization
- Prevention of contractures
- Reduction of risk of skin breakdown

CONTINUED

Exercise Prescription Cont'd[2]

	Frequency	Intensity	Time	Type
Older Adults	>2 days/week	Stretch to the point of feeling tightness or slight discomfort	Hold stretch for 30-60 seconds	Any physical activities that maintain or increase flexibility using slow movements that terminate in static stretches for each muscle group rathe than rapid ballistic movements
Pulmonary Disease	2-3 days/week with daily being most effective	Stretch to the point of feeling tightness or slight discomfort	10-30sec hold for static stretching 2-4 repetitions for each exercise	Static, dynamic, and/or PNF stretching

CONTINUED

SITTING/ STANDING BALANCE

- If patient has difficulty sitting, practicing reaching beyond arm's length while sitting with supervision/assistance should be undertaken.[38]
- Standing balance training should be intense enough to be challenging and without hand support when possible
  - practice of functional tasks
  - weight-shifting in standing
  - over-ground walking training.
  - Can use gaming (Wii Fit) and/or Tai Chi

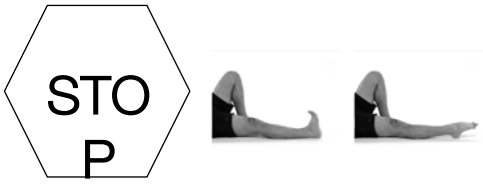
- While few adverse events are reported in the literature, care should be taken to minimize the risk of falls during balance training.

Transfer Training

- For patients who have difficulty in standing up from a chair, practice of standing up should be undertaken.[18,27]
- The specific type of physical therapy intervention selected probably makes little or no difference to the improvement in time taken to sit-to-stand (or sit-to-walk).
- Feedback on the number of repetitions per session/day, and time to complete a specific number of sit-to-stands may help to motivate patients and provide a measure of change.
- Document if patient used hands or not

Strength Training

DO NOT UNDERDOSE



Exercise images courtesy of Physiotec

Exercise Prescription Cont'd[2]

	Frequency	Intensity	Time	Type
Older Adults	>2 days/week	Light (40-50% of 1RMax) for beginners Progress to moderate to vigorous intensity (60-80% of 1 Rmax); or Moderate (5-6) to vigorous (7-8) on 0-10 intensity scale	8-10 exercises involving major muscle groups; 1-3 sets of 8-12 reps each	Progressive weight training or weight-bearing calisthenics, stair climbing, and other strengthening activities that use the major muscle groups
Pulmonary Disease	2-3 days/week	Strength 60-70% of 1Rmax for beginners; >80% for experiences Endurance <50% of 1RMax	Strength: 2-4 sets of 8-12 reps each Endurance: <2 sets with 15-20 reps each	Free weight or body weight exercises

HOW TO ESTABLISH 1 REP MAX

- 80% of 1 RM equates to 10 repetitions, where form deterioration is observed in the last 1 to 2 repetitions.
- 60% of 1 Rep max is the MINIMAL overload necessary for strengthening in untrained individuals[3]
  - Equates to 15 repetitions at RPE of 12-13
  - You can use a load JUST below 60% to teach good form and motor learning of the movement (aim for 15-20 reps for 1 week) then increase to AT LEAST 60% pf 1RM
  - Can fill milk jugs with water or sand, use bands, kettlebells, weighted vest

Q8

Strength Training

- Use RPE or assess the maximum number of repetitions that it takes the patient to fatigue (look for poor form, compensatory strategies, or incomplete range of motion) Appropriate number of reps is determined based on intensity and patient effort and form, not a target named by the clinician
- Allow 24-48 hours rest in between sessions for the SAME muscle group. If seeing the patient on back to back days, perform strength training with different muscle groups
- Can add power component once patient can achieve 2 sets of a movement with good form and no pain at 60% 1RM. Teach them to move quickly through concentric phase and slowly and controlled through eccentric with initial loads of 20% of 1RM increasing toward 60%
- Be specific and functional- rising from surfaces of different heights, foot tapping on various height steps, stepping up and over steps, stooping, kneeling, and reaching

Top image by Furim from Pixabay
Bottom image by Jill Rose from Pixabay

Intensity changes

- Continually reassess the 1RM (baseline strength) and progress
  - Increase reps or resistance (E.g. If patient can complete 12-15 reps of an exercise with good form and level of resistance, resistance/load should be increased 2-10% and clinician reassesses appropriate # of repetitions)
  - Can also perform more sets or add another exercise for the same muscle group

CONTINUED

Physical Activity Guidelines

CONTINUED

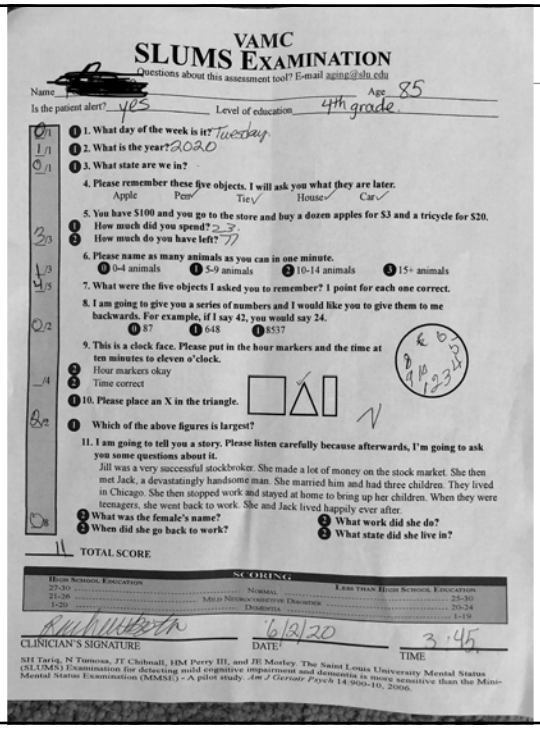
Case Study

Rachel Botkin

CONTINUED

- Date of evaluation: June 2, 2020
- 85-year-old Somali woman hospitalized 4/26 with COVID-19 and intubated in ICU for 14 days then step-down unit then discharged home 5/27.
- She has had 2 negative COVID tests prior to discharge home.
- I have very little documentation from her acute stay (which is typical since I do not work for a hospital-based home health company).
- PMHx- type 2 DM
- PLOF- indep with home and community mobility without AD, walked to corner store, cooked/cleaned for herself. did not drive. Has lived in States for 20 years. Speaks some English. No hx of falls

- Vital Signs at rest- BP 115/72, pulse 65 bpm, RR 16/min, SpO2 of 97% on room air.
- New onset of BLE pain 4/10
- Mod A with bed mobility, transfers
- Amb 15' w/ CGA and 2 wheeled walker
- Has half flight of stairs to exit apartment building
- Completed Core set which took 45 minutes. A lot of that time to language translation needing to occur, especially with the EQ5D and SLUMS
- Recommended frequency of 3w2, 2w5 but insurance approved 1w7.
- Treatment to include transfer/bed mobility/gait training, standing balance, teaching of HEP/energy conservation strategies, stairs.
  - daily walking, stair climbing, standing ther ex with high reps and no resistance yet, sit to stand from dining room chair with minimal UE support



VAMC
SLUMS EXAMINATION

Questions about this assessment tool? E-mail aging@slu.edu

Name [redacted] Age 85

Is the patient alert? yes Level of education 4th grade

0/1 1. What day of the week is it? Tuesday
1/1 2. What is the year? 2020
0/1 3. What state are we in?
4. Please remember these five objects. I will ask you what they are later.
Apple Pen✓ Tie✓ House✓ Car✓
5. You have $100 and you go to the store and buy a dozen apples for $3 and a tricycle for $20.
3/3 How much did you spend? 23
How much do you have left? 77
6. Please name as many animals as you can in one minute.
1/3 0 0-4 animals 1 5-9 animals 2 10-14 animals 3 15+ animals
4/5 7. What were the five objects I asked you to remember? 1 point for each one correct.
0/2 8. I am going to give you a series of numbers and I would like you to give them to me backwards. For example, if I say 42, you would say 24.
0 87 1 648 1 8537
9. This is a clock face. Please put in the hour markers and the time at ten minutes to eleven o'clock.
1/4 2 Hour markers okay
2 Time correct
1/2 10. Please place an X in the triangle.
1 Which of the above figures is largest?
11. I am going to tell you a story. Please listen carefully because afterwards, I'm going to ask you some questions about it.
Jill was a very successful stockbroker. She made a lot of money on the stock market. She then met Jack, a devastatingly handsome man. She married him and had three children. They lived in Chicago. She then stopped work and stayed at home to bring up her children. When they were teenagers, she went back to work. She and Jack lived happily ever after.
0/3 2 What was the female's name?
3 When did she go back to work?
2 What work did she do?
3 What state did she live in?
11 TOTAL SCORE

SCORING

High School Education	Normal	Less than High School Education
27-30		25-30
21-26	Mild Neurocognitive Disorder	20-24
1-20	Dementia	1-19

CLINICIAN'S SIGNATURE [redacted] DATE 6/2/20 TIME 3:45

SH Tariq, N Tumosa, JT Chibnall, HM Perry III, and JE Morley. The Saint Louis University Mental Status (SLUMS) Examination for detecting mild cognitive impairment and dementia is more sensitive than the Mini-Mental Status Examination (MMSE) - A pilot study. *Am J Geriatr Psych* 14:900-10, 2006.

Date	6/2/20	7/1/20 (visit #4)	7/20/20 (visit #8)
SLUMS	11 (dementia)- 4th grade education and language barrier		
EQ-5D-5L – 10 minutes (d/t language barrier and multiple explanations for how to complete)	22332, 35% on VAS	22322, 45% on VAS	23322, 80% on VAS
MRC-SS – 3 ½ minutes to complete	18/30 UE, 18/30 LE (36/60 indicating ICU acquired weakness)	28/30 UE, 27/30 (55/60)	30/30 UE, 30/30 LE (60/60)
SPPB – 6 minutes to complete	3/12 Balance 2, Gait 1, Chair Stand 0	9/12 Balance 4, Gait 4, Chair Stand 1 (29 seconds for 5xSTS)	9/12 Balance 4, Gait 4, Chair Stand 1 (28 sec for 5xSTS)
2 min Step Test- 5 minutes with set up and instruction	19 and unable to complete test	46	54

30-day reassessment 7/1/2020

- She is still having memory issues and disturbed sleep which she states were not issues prior to her illness and ICU stay.
- Her subjective report is that the 2-minute step test is quite difficult. On eval, she was not able to complete the 2 minutes due to dyspnea and pain in her BLE. Today she was able to complete it with encouragement.
- I attribute a lot of her improvement to her high prior level of function and natural recovery process after an acute illness.
- Pt indep with sit to stand and toilet transfers and SBA for shower
- Stair negotiation with step to pattern heavy use of railing and CGA
- Increased gait speed from 0.58 ft/sec to 2.34 ft/sec and amb in apartment without AD

60-day recert 7/20/20

- Pain is unchanged in BLE
- Sleep is still disturbed
- Mod I for bed mobility and all transfers including floor which is meaningful to her for praying
- Gait has advanced to walking in hallway of apartment building without AD.
- Not yet achieved PLOF and is still homebound

Thoughts/observations/challenges

- I had to register with euro QOL to get a Somali language version of the EQ5DL but was told by pt and family that there are many dialects and the official translation did not “make sense to them.”
- PPE used is surgical mask, face shield, and shoe covers due to patient’s custom to not wear shoes in the home.

Questions

CONTINUED

Resources (besides references)

- Academy of Acute Care – COVID-19 resources at https://www.acutept.org/page/COVID19
- APTA COVID-19 Resources: http://www.apta.org/Coronavirus/
- Cardiovascular and Pulmonary Section of APTA – COVID-19 resources at http://cardiopt.org/resources-covid-19.php.
- CDC COVID-19 website: https://www.cdc.gov/coronavirus/2019-nCoV/index.html
- COVID-19 Resources: Public Google doc curated by Kyle Ridgeway https://docs.google.com/document/d/16UrBoE0YLikWaXgdUpmO01oO2NTo5fr-_gkN3EyDvr0/edit?ts=5e751903#heading=h.phszscnq02r7.

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Resources Cont'd

- Geriatric Academy - COVID-19 resources at https://geriatricspt.org/practice/covid-19.cfm
  - Includes a delirium fact sheet
- Home Health Section of APTA – COVID-19 resources at https://aptahhs.memberclicks.net/coronavirus--information-for-providers
- PACER Project lectures (Post-Acute COVID-19 Exercise & Rehabilitation) https://www.youtube.com/channel/UCJR0p2186h3OYPfnavgjfHQ/videos Not all there yet. Will be 15-17 in total.

CONTINUED

References

1. American Physical Therapy Association. Taking Precautions for Mobility and Exercise as Potential Aerosol-Generating Procedures. https://www.apta.org/patient-care/public-health-population-care/infectious-disease-control/precautions-mobility-exercise-potential-aerosol-generating-procedures. Published June 22, 2020. Accessed August 10, 2020.
2. American College of Sports Medicine. *ACSM's Guidelines for Exercise Testing and Prescription*. Philadelphia, Lippincott Williams & Wilkins, 2000.
3. Avers D, Brown M. White paper: Strength training for the older adult. *J Geriatr Phys Ther*. 2009;32(4):148-158.
4. Bartlo P, Bauer N. Pulmonary Rehabilitation Post-Acute Care for COVID-19. Post-Acute COVID-19 Exercise and Rehabilitation (PACER Project). Published April 24, 2020 at https://www.youtube.com/watch?v=XjY_7O3Qpd8. Accessed 8/1/2020.
5. Bednarek M, Miller K, Bartlo P, Johanson M, Pollok T, Chimenti C, Botkin R. *Physical Therapy Considerations of COVID-19 in the Post-Acute Setting*. Presented April 18, 2020 at https://cdn.ymaws.com/www.acutept.org/resource/resmgr/uploads_for_links/04-18-20_Webinar_Recording.pdf. Accessed 8/1/2020.

CONTINUED

References Cont'd

6. Berlinger N, Wynia M, Powell T, et al. Ethical Framework for Health Care Institutions Responding to Novel Coronavirus SARS-CoV-2 (COVID-19) Guidelines for Institutional Ethics Services Responding to COVID-19 Managing Uncertainty, Safeguarding Communities, Guiding Practice. The Hastings Center, March 16, 2020 at https://www.thehastingscenter.org/ethicalframeworkcovid19/. Accessed 7/24/2020.
7. Bikdeli B, Madhavan MV, Jimenez D, et al. COVID-19 and Thrombotic or Thromboembolic Disease: Implications for Prevention, Antithrombotic Therapy, and Follow-Up: JACC State-of-the-Art Review. *J Am Coll Cardiol*. 2020;75(23):2950-2973. doi:10.1016/j.jacc.2020.04.031
8. By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. *J Am Geriatr Soc*. 2019;67(4):674-694. doi:10.1111/jgs.15767
9. Cascella M, Rajnik M, Cuomo A, et al. Features, Evaluation and Treatment Coronavirus (COVID-19) [Updated 2020 Apr 6]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK554776/. Accessed 5/4/2020.

CONTINUED

References, Cont'd

10. Centers for Disease Control and Prevention. Coronavirus Disease 2019 (COVID-19) *Age-adjusted COVID-19-associated hospitalization rates by race and ethnicity, COVID-NET, March 1 – July 25, 2020*. https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html Updated July 25, 2020. Accessed August 5, 2020.
11. Centers for Disease Control and Prevention. Coronavirus Disease 2019 (COVID-19) *Characteristics of COVID-19 Associated Hospitalizations. March 1 – July 25, 2020*. https://gis.cdc.gov/grasp/COVIDNet/COVID19_5.html. Updated July 25, 2020. Accessed August 5, 2020.
12. Centers for Disease Control and Prevention. Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings. https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html. Page reviewed on March 27, 2020. Accessed August 5, 2020.
13. Centers for Disease Control (CDC): When You Can be Around Others After You Had or Likely Had COVID-19 https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/end-home-isolation.html. Updated August 4, 2020 Accessed August 5, 2020.

CONTINUED

References Cont'd

14. Ciesla N, Dinglas V, Fan E, Kho M, Kuramoto J, Needham D. Manual muscle testing: a method of measuring extremity muscle strength applied to critically ill patients. *J Vis Exp*. 2011;(50):2632. Published 2011 Apr 12. doi:10.3791/263.
15. Connors JM, Levy JH. COVID-19 and its implications for thrombosis and anticoagulation. *Blood*. 2020;135(23):2033-2040. doi:10.1182/blood.2020006000
16. Cooper LA. *State COVID-19 Data by Race Q&A*. Johns Hopkins University of Medicine Coronavirus Resource Center. https://coronavirus.jhu.edu/data/racial-data-transparency. Accessed August 5, 2020.
17. Engel H. Providing Physical Therapy During the COVID-19 Pandemic. Post-Acute COVID-19 Exercise and Rehabilitation (PACER Project). Published April 26, 2020 at https://www.youtube.com/watch?v=jnJ2R5Ec-gY. Accessed 5/4/2020.
18. French B, Thomas LH, Coupe J, et al. Repetitive task training for improving functional ability after stroke. *Cochrane Database of Systematic Reviews* 2016, Issue 11. Art. No.: CD006073. DOI: 10.1002/14651858.CD006073.pub3.

CONTINUED

References Cont'd

19. Garg S, Kim L, Whitaker M, et al. Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019 — COVID-NET, 14 States, March 1–30, 2020. *MMWR Morb Mortal Wkly Rep*. ePub: 8 April 2020.
20. Hillegass E, Fick A, Pawlik A, Crouch R, Perme C, Chandrashekar R, McNamara SB, Cahalin LP. Supplemental Oxygen Utilization During Physical Therapy Interventions. *Cardiopulm Phys Ther J*. June 2014;25(2):38-49.
21. Herridge MS, Moss M, Hough CL, Hopkins RO, Rice TW, Bienvenu OJ, Azoulay E. Recovery and outcomes after the acute respiratory distress syndrome (ARDS) in patients and their family caregivers. Intensive Care Med. 2016 May;42(5):725–738. doi: 10.1007/s00134-016-4321-8.
22. Interim Guidance for Implementing Home Care of People Not Requiring Hospitalization for Coronavirus Disease 2019 (COVID-19). Updated 2/12/20. https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-home-care.html. Accessed 4/15/20.

CONTINUED

References Cont'd

23. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med*. 2020;382(13):1199-1207.
24. Martin R, Botkin R, Campbell A, et al. COVID-19 Core Outcome Measures: APTA Academies and Sections Consensus Statement. https://www.apta.org/your-practice/outcomes-measurement/covid-19-core-outcome-measures#. Updated 6/29/2020. Accessed August 5, 2020.
25. McNeary L, Maltser S, Verduzco-Gutierrez M. Navigating coronavirus disease 2019 (Covid-19) in physiatry: a CAN report for inpatient rehabilitation facilities. *PM R*. 2020 May;12(5):512–515. doi: 10.1002/pmrj.12369.
26. Polak SB, Van Gool IC, Cohen D, von der Thüsen JH, van Paassen J. A systematic review of pathological findings in COVID-19: a pathophysiological timeline and possible mechanisms of disease progression [published online ahead of print, 2020 Jun 22]. Mod Pathol. 2020;1-11. doi:10.1038/s41379-020-0603-3
27. Pollock A, Baer G, Campbell P, et al. Physical rehabilitation approaches for the recovery of function and mobility following stroke. Cochrane Database Syst Rev. 2014;2014(4):CD001920. Published 2014 Apr 22.

CONTINUED

CONTINUED

References Cont'd

28. Pollok T, Tompkins J, Engel H, Perme C, Ramsey S, Hillegass E, Campbell A. *COVID-19: Clinical Best Practices in Physical Therapy Management.* Recorded March 28, 2020 at https://cdn.ymaws.com/www.acutept.org/resource/resmgr/uploads_for_links/3-28-20_HPA_Webinar_Recordin.pdf. Accessed 4/5/2020.
29. Riebe, D., Ehrman, J. K., Liguori, G., Magal, M., & American College of Sports Medicine (Eds.). (2018). *ACSM's guidelines for exercise testing and prescription*. Wolters Kluwer.
30. Rikli RE, Jones CJ. Functional fitness normative scores for community residing older adults ages 60-94. Journal of Aging and Physical Activity. 1999; 7: 160-181.
31. Ridgeway K, Hull B, Coco LM, Corcoran JR. *Acute Care Physical Therapy and COVID-19: How Can We Add the Greatest Value? Part 2.* Recorded April 11, 2020 at https://cdn.ymaws.com/www.acutept.org/resource/resmgr/uploads_for_links/04-11-20_Webinar_Recording.pdf. Accessed 5/3/2020.

CONTINUED

References Cont'd

32. Sheehy LM. Considerations for Postacute Rehabilitation for Survivors of COVID-19. *JMIR Public Health Surveill*. 2020;6(2):e19462. Published 2020 May 8. doi:10.2196/19462.
33. Shepherd S, Batra A, Lerner DP. Review of critical illness myopathy and neuropathy. Neurohospitalist. 2017 Jan;7(1):41–48. doi: 10.1177/1941874416663279.
34. Spruit MA, Holland AE, Singh SJ, Troosters T, et al. Report of an Ad-Hoc International Task Force to Develop an Expert-Based Opinion on Early and Short-Term Rehabilitative Interventions (After the Acute Hospital Setting) in COVID-19 Survivors (version April 3, 2020).
35. Tepper S, Wruble E, Stewart E. Anatomy, Histology and Pathophysiology of COVID-19. Post-Acute COVID-19 Exercise and Rehabilitation (PACER Project). Published April 10, 2020 at https://www.youtube.com/watch?v=W7bAfww8lWo. Accessed 4/16/2020.

CONTINUED

References Cont'd

36. Thomas P, Baldwin C, Bissett B, et al. Boden I, Gosselink R, Granger CL, Hodgson C, Jones AYM, Kho ME, Moses R, Ntoumenopoulos G, Parry SM, Patman S, van der Lee L (2020): Physiotherapy management for COVID-19 in the acute hospital setting. Recommendations to guide clinical practice. Version 1.0, published 23 March 2020.
37. Thomas P, Baldwin C, Bissett B, et al. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. *J Physiother*. 2020;66(2):73-82. doi:10.1016/j.jphys.2020.03.011
38. Veerbeek JM, van Wegen E, van Peppen R, et al. *What is the evidence for physical therapy poststroke? A systematic review and meta-analysis*. PLoS One. 2014;9(2):e87987. Published 2014 Feb 4. doi:10.1371/journal.pone.0087987
39. WebMD Medical Reference Reviewed by Nazario B *How Long Does the Coronavirus Live on Surfaces?* https://www.webmd.com/lung/how-long-covid-19-lives-on-surfaces Reviewed August 05, 2020. Accessed August 6, 2020.

CONTINUED

References Cont'd

40. Wichmann D, Sperhake JP, Lütgehetmann M, et al. Autopsy Findings and Venous Thromboembolism in Patients With COVID-19 [published online ahead of print, 2020 May 6]. *Ann Intern Med*. 2020;M20-2003. doi:10.7326/M20-2003.