Curated by Kyle J. Ridgeway, PT, DPT, CCS
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Acute Care Physical Therapy and Novel Coronavirus/COVID-19

How can acute physical therapists add value in a pandemic?
What are the current, future, and ideal roles of the PT?

COVID-19: Acute PT Resources [Public Google Folder]

April 19th: 6:05pm mountain time. The document has been reorganized including a hyperlinked table of contents and new categorical organization. Some information has been removed or condensed. The public document link remains the same. I've saved a copy of the old version here for reference. Hopefully, the new organization and formatting is easier to navigate. ~Kyle

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FOUNDATIONAL INFORMATION

UpToDate: COVID-19

- https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19
- https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-critical-care-issues
- https://www.uptodate.com/contents/covid-19-2019-novel-coronavirus-the-basics (patient/public info)
- https://www.uptodate.com/home/covid-19-access

Physiotherapy Management for COVID-19 in the Acute Hospital Setting (non United States)

- https://www.wcpt.org/sites/wcpt.org/files/files/wcptnews/images/Physiotherapy_Guideline_COVID-19_FINAL.pdf
- https://www.thoracic.org/about/ats-podcasts/physiotherapy-management-for-covid-19-in-the-acute-hospital-setting-a-conversation-with-dr-peter-thomas.php

Everybody Moves COVID-19 Resources. Johns Hopkins Activity and Mobility Promotion.
https://www.hopkinsmedicine.org/physical_medicine_rehabilitation/education_training/amp/everybodymoves/covid-resources.html

https://www.hopkinsmedicine.org/physical_medicine_rehabilitation/education_training/amp/webinars.html

https://www.wcpt.org/sites/wcpt.org/files/files/wcptnews/COVID19-Briefing-paper-2-Rehab-PT-May2020.pdf

COVID-19: Clinical Best Practices in Physical Therapy Management Webinar [March 28]

- Recording: https://register.gotowebinar.com/recording/7342833725268746509
- https://cdn.ymaws.com/www.aptahpa.org/resource/resmgr/webinars/3-28-20_Presentation_Handout.pdf

Acute Care Physical Therapy: How can we value? Webinars

- Part 1 [March 21] https://register.gotowebinar.com/recording/166466466154828299
  https://cdn.ymaws.com/www.acutept.org/resource/resmgr/uploads_for_links/3-21-20_HPA_Webinar_Recordin.pdf
- Part 2 [April 11] https://register.gotowebinar.com/recording/4558890075258839565
  https://cdn.ymaws.com/www.acutept.org/resource/resmgr/uploads_for_links/04-11-20_Webinar_Recording.pdf

Post Acute COVID-19 Exercise and Rehab (PACER) Project: Cardiovascular and Pulmonary Section

- https://www.youtube.com/playlist?list=PLne40IpTInF62gkGJYkRvty0Mzfxect2g

Physiotalks Podcast: COVID Episodes:

- https://physiotalk.co.uk/2020/03/18/covid19-chat-physiotalk-23rd-march-8pm/

Interpreting Epidemiologic Data: https://threadreaderapp.com/thread/1241089577139535874.html

COVID-19 Reminder to Reason. JAMA. https://www.nejm.org/doi/full/10.1056/NEJMp2009405?query=RP

RECENT RESOURCES

Sequelae in Adults 6 months after COVID infection. JAMA. Feb 2021
https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2776560

Association Between Early Invasive Mechanical Ventilation and Day-60 Mortality in Acute Hypoxemic Respiratory Failure Related to Coronavirus Disease-2019 Pneumonia. Critical Care Explorations. Jan 2021.
https://journals.lww.com/ccejournal/fulltext/2021/01000/association_between_early_invasive_mechanical.24.aspx

Mortality COVID-19 Requiring Mechanical Ventilation: Hidden Risk Factor
https://medium.com/@BayesianHealth/the-hidden-risk-factor-fb2383cc6c92

Risk Factors for 30 day Mortality in Nursing Home Residents with COVID. JAMA.
https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2774729

Readmission and death following hospitalization for COVID. JAMA. Dec 14, 2020.

What now for rehab professionals?
https://www.sciencedirect.com/science/authShare/S0003999320309369/20201120T020600Z/

Inflammation profiles of COVID vs Flu https://advances.sciencemag.org/content/early/2020/11/13/sciadv.abe3024.full

Reducing risk and impact of brachial plexus injuries sustained from prone positioning
https://pubmed.ncbi.nlm.nih.gov/32959717/

Characteristics of Hospitalized COVID patients readmitted to same hospital within 2 months. November 9, 2020
https://www.cdc.gov/mmwr/volumes/69/wr/mm6945e2.htm

Sedation and Analgesia in COVID ARDS. https://pubmed.ncbi.nlm.nih.gov/32675640/

Case Fatality Rates: COVID Mechanical Ventilation
https://www.atsjournals.org/doi/10.1164/rccm.202006-2405OC

https://twitter.com/ayjchan/status/1320344055230963712?s=21

COVID-19 Webcast Series. Society of Critical Care Medicine. https://covid19.sccm.org/webcast/

- Upcoming Webcasts: https://sccm.org/Education-Center/On-Demand-Webcasts

Survivorship after COVID-19 ICU stay. https://pubmed.ncbi.nlm.nih.gov/32669623/?dopt=Abstract

ICU and Ventilator Mortality Among Critically Ill Adults With Coronavirus Disease 2019. May 26.
https://pdfs.journals.lww.com/ccmjournal/9000/00000/icu_and_ventilator_mortality_among_critically_ill.95639.pdf

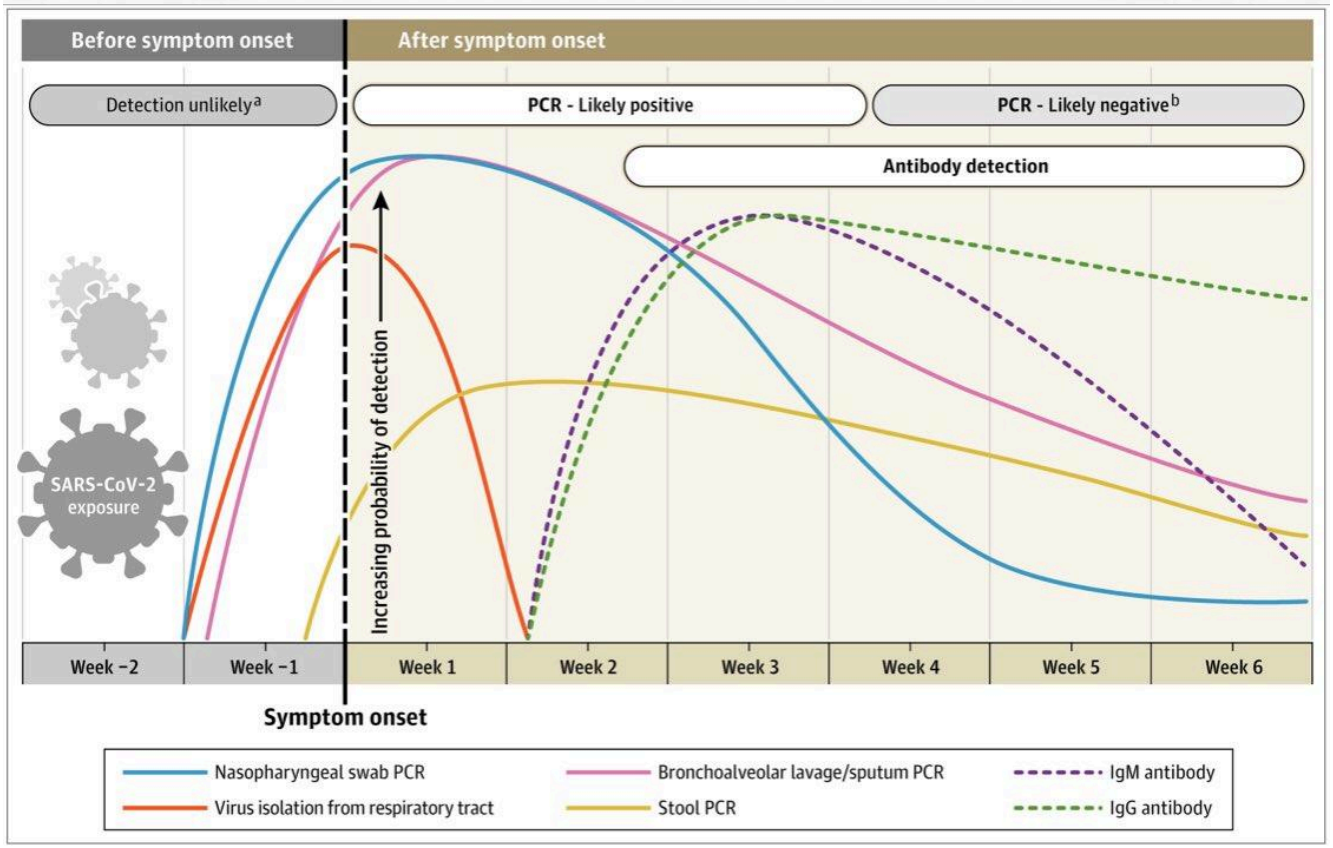
https://science.sciencemag.org/content/sci/early/2020/05/27/science.abc6197.full.pdf

Tracheostomy Guidance COVID-19. Lancet. May 15.
https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(20)30230-7/fulltext

Respiratory Parameters in COVID19: Conscious Proning Outside ICU. JAMA. May 15.
https://jamanetwork.com/journals/jama/fullarticle/2766291

Face masks in public during COVID-19 pandemic. BMJ. April 9. https://www.bmj.com/content/369/bmj.m1435

Interpreting Diagnostic Tests for SARS-CoV-2. May 3. JAMA.
https://jamanetwork.com/journals/jama/fullarticle/2765837



Respiratory Physiology of Mechanically Ventilated Patients with COVID-19. Breath Easy Podcast. American Thoracic Society.
https://www.thoracic.org/about/ats-podcasts/critical-perspective-respiratory-physiology-of-mechanically-ventilated-patients-with-covid-19.php

COVID Rehab after ICU. BMJ. https://www.bmj.com/content/369/bmj.m1787

Psychology of COVID-19 Critical Care https://www.ics.ac.uk/ICS/Psychology_in_COVID-19.aspx

A Clinical Psychologist Talks About the Challenges Inside and After the ICU for COVID-19 Patients
https://html5-player.libsyn.com/embed/episode/id/14300807/theme/custom/height/90/custom-color/ea5329/menu/no/tdest_id/1899140

Information on post viral fatigue:
https://cec5c48f-2e98-4bb8-9110-208373420a79.filesusr.com/ugd/4f94c1_c7aa8bd5b9c748888a32e5e992dd323f.pdf

Fatigue Symptoms during the First Year after ARDS. *Chest*. April 15 2020.
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The Pathogenesis and Treatment of the `Cytokine Storm' in COVID-19. *J Infect* . 2020 Apr 10;S0163-4453(20)30165-1.
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https://www.nejm.org/doi/full/10.1056/NEJMp2007781

Italian Physical Therapists' Response to the Novel COVID-19 Emergency. *Phys Ther*. April 13, 2020.
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Guillain-Barré syndrome associated with SARS-CoV-2 infection: causality or coincidence? April 1, 2020. *Lancet Neurol*.
https://www.nejm.org/doi/pdf/10.1056/NEJMc2009191?articleTools=true

COVID-19 ICU PT Update. PT Pintcast. April 5, 202
https://www.ptpintcast.com/2020/04/05/covid-19-icu-pt-update-with-kyle-ridgeway/

PANDEMIC GUIDING PRINCIPLES

Centers for Disease Control and Prevention
https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html
https://www.cdc.gov/coronavirus/2019-ncov/hcp/caring-for-patients.html

1) Minimize Chance of Exposure
2) Adhere to Standard Precautions and Transmission Based Precautions
3) Precaution with Aerosol General Procedures (AGPs)
4) Train and Educate Healthcare Personal

Crisis Communication: Vivek Murthy (19th Surgeon General): Build trust
https://twitter.com/vivek_murthy/status/1244142368875581440

1) Transparent and Truthful
2) Consistent

3) Over Communicate
4) Lead with the Science (and scientists)
5) Compassionate

PRACTICE GUIDELINES: PHYSICAL THERAPY

What healthcare providers should know about about caring for patients with/suspected to have COVID-19. Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/hcp/caring-for-patients.html

Physiotherapy Management for COVID-19 in the Acute Hospital Setting (non United States)
https://www.wcpt.org/sites/wcpt.org/files/files/wcptnews/images/Physiotherapy_Guideline_COVID-19_FINAL.pdf

Operational Summary

- Limit staff exposure to COVID-19
- Meet regularly with senior staff including medical staff
- Develop logistics for screening patients without entering room (i.e. calling into room)
- Train staff in proper PPE donning/doffing including N95 fit testing
- Plan for increased PT staffing needs
- Identify staff who can deploy to higher acuity areas (ICU, COVID units)
    - Previous cardiovascular, pulmonary, and/or critical care experience
- "Staff without acute hospital or ICU training may facilitate rehabilitation, discharge pathways or hospital avoidance for patients without COVID-19"
- Identify clinical leaders with advanced ICU skills to:
    - Screen COVID-19 patients
    - Supervise and support junior staff
    - Oversee decision making for complex cases with COVID-19
- Consider increased workload of donning/doffing PPE in staffing models
- Promote debriefing and psychosocial support

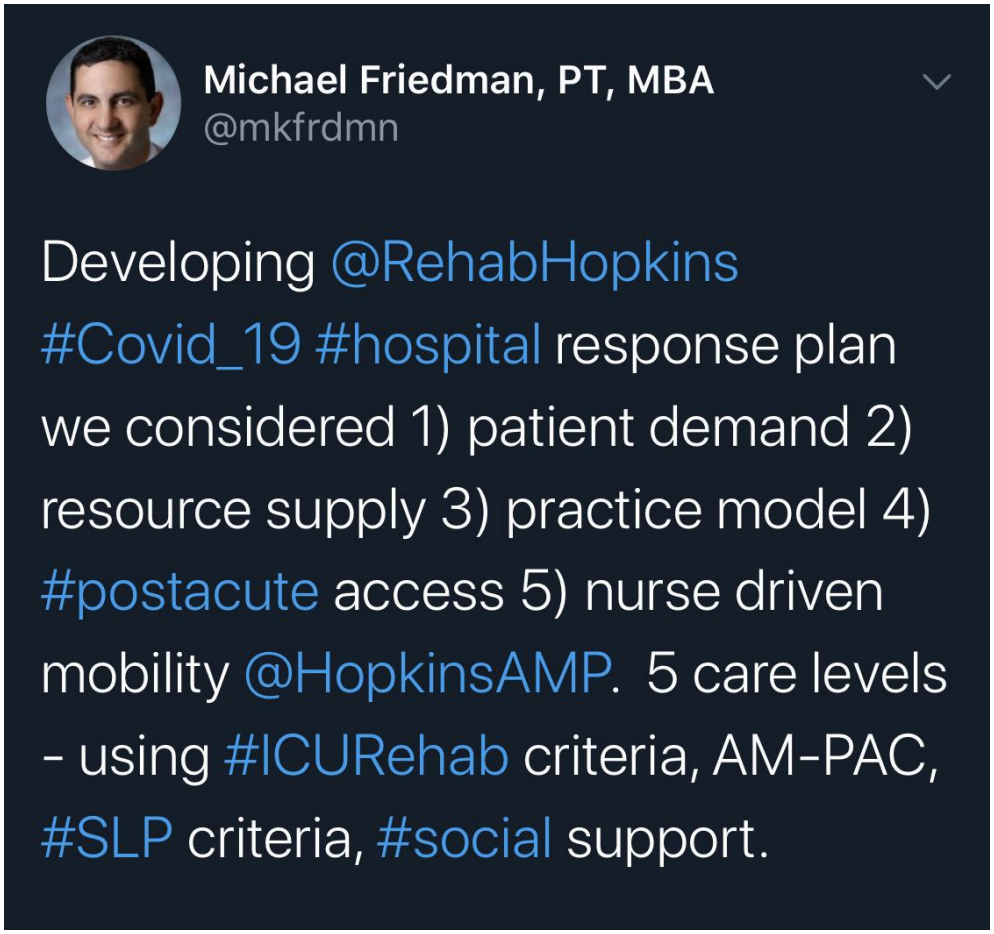
Clinical Summary

- Do not routinely enter COVID-19 rooms unless necessary
- Ensure bedside evaluation and treatment is indicated
- Understand precautions, PPE donning/doffing, and aerosolizing procedures
- Limit bedside treatment by finding alternate means of assessment, education, and recommendations
    - Recommend detailed discussion with team, nurse, patient, and family
- Constant communication and feedback: interprofessional, clinical therapists, administration

Italian Physical Therapists' Response to the Novel COVID-19 Emergency. *Phys Ther*. April 13, 2020.
https://academic.oup.com/ptj/article/doi/10.1093/ptj/pzaa060/5818364

A Position Paper of the Italian Association of Respiratory Physiotherapists (ARIR). COVID-19
https://www.monaldi-archives.org/index.php/macd/article/view/1285/1003

OPERATIONAL CONSIDERATIONS



https://twitter.com/mkfrdmn/status/1249074578162237440?s=21

- Michael Friedman
- Hopkins Activity and Mobility Promotion (AMP) Twitter
- Activity and Mobility Promotion

Questions to Guide Resource Allocation "Get 'em out, keep 'em away!"

Think outside the normal acute care PT paradigm to ask what problems patients, other clinicians, the hospital, and the healthcare system are currently facing (and likely to face) during and after the pandemic?

- How can physical therapists expedite discharge?
- Decrease healthcare access and hospital readmission?
- What can physical therapists do to address current issues and decrease their negative effect?

1) **How can PTs improve throughput?**
    - Emergency Department
    - Ventilator Liberation
    - ICU Liberation

- Hospital Length of Stay

2) **How can PTs progress patients to home efficiently and effectively?**

3) **Where are the current and potential future bottlenecks?**
   - Emergency Department
   - Intensive Care
   - Ventilators
   - Discharge to Home (functionally unable, no/limited post-acute care services)

4) **What patients generally, and what patients specifically on your service, require significant physical therapy?**

5) **If a patient will receive limited (or no) post-acute care what can you do within the hospital?**

6) **If a patient can not discharge anywhere but home, how do we maximize rehabilitation in order to progress to home and decrease length of stay?**

7) **Will COVID rule outs/positives become a significant portion of hospital admits?**
   - Burn through PPE, decrease throughput, and slow down, freeze care processes

8) **How can physical therapy contribute to maximizing physical function and physiologic resilience?**

What strategies, tactics, methods, and operations will accomplish these aims?
What novel solutions must we consider?

Daily Huddle

Constructed by Brian Hull

1) Are we providing the best possible care and frequency to expedite recovery for (listed in priority)
   ED "team" could be part of this huddle
   - All vented patients to expedite extubation
   - All non-vented ICU patients to expedite transfer from ICU
   - All floor patients to expedite discharge home or to PAC location
2) What help does your team need to accomplish all the above?
3) If all the above are met, what help can you offer?
4) What additional team floating is needed?
5) What additional floating is needed?
6) Extra help beyond that sent home or cancelled.

Additional **value focusing therapy** interventions questions:

1) Can we provide better or more complete intervention, education, and training for discharge home to prevent:
   - Readmission
   - Falls
   - Functional decline

- Factors that may increase likelihood of hospitalization
- Symptoms

2) Do we have any learning and development needs to better float clinicians?
    - Emergency Department
    - Critical Care
    - Ventilators

3) Do we need to consider more frequent (BID), longer, or more intensive sessions?

Department and Director Considerations

Constructed by Matthew Gallagher, PT, DPT, MBA Director of Rehabilitation Services and Rheumatology at University of Colorado Hospital

- Emergency Planning and Leadership Structure
- Governance of Information and Communication
- Change Management
- Resource Management
- Self Care

1) Emergency planning/leadership structure
    - Creating/solidifying leadership structures so that
        - Defined roles and responsibilities
        - Redundancies in place so that initiatives are process dependent, not person dependent (in case someone gets sick, or needs to take a break)
        - New information is able to be accepted, interpreted, and assigned/delegated as appropriate

2) Governance of information/communication
    - What is the “source of truth” regarding information
    - Streamlining information flow so there is one entity that delivers information to a department, and this information is valid and current
    - Developing a cadence of messaging, preferably multi-modal and redundant with live communication and written communication
    - Managing conflicting messages and interests that other news/information sources provide and staff will introduce into the setting

3) Change management
    - Supporting teams in their work when there is incomplete or evolving information
    - Maintaining foundational values and adherence to mission despite the changing landscape
    - Ensuring there is human connection with staff and understanding that we are living in the gray as opposed to black/white

4) Resource management
    - Identifying current staff and supply resources in preparing for a surge in volumes

- Identifying back-up/potential staff and supply resources for emergency situations
- Investing in necessary training so that current staff and back-up/potential staff are able to step in and be a valuable addition to the team if/when the situation rapidly changes and their support is needed
- Making sure that all the non-COVID patients continue to receive the resources and intervention they deserve to improve their function

5) Self-care
   - Building a structure so that staff can take breaks and not always be "on"
   - Leading by example in regards to self-care
   - "Filling your cup" by engaging in activities/interests outside of professional role

Ethics: Considerations and Resources

Compiled by Maureen Coco, UCSF

- Patient Centered vs. Population Centered
- PPE Utilization and Shortages
- SLP Service Delivery Considerations in Health Care During Coronavirus/COVID-19 https://www.asha.org/SLP/healthcare/SLP-Service-Delivery-Considerations-in-Health-Care-During-Coronavirus/
- Optimizing PPE Supply: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html
- Managing PPE Shortages: https://www.jointcommission.org/en/standards/standard-faqs/critical-access-hospital/infection-prevention-and-control-ic/000002271/
- Preparing Workplaces: https://www.osha.gov/Publications/OSHA3990.pdf
- Healthcare Rights and Responsibilities. WHO. https://www.who.int/docs/default-source/coronaviruse/who-rights-roles-respon-hw-covid-19.pdf?sfvrsn=bcabd401_0
- Hastings Center: Ethics Resources https://www.thehastingscenter.org/ethics-resources-on-the-coronavirus/ https://www.thehastingscenter.org/ethicalframeworkcovid19/
- Ethical Framework for Health Care Institutions and Guidelines for Institutional Ethics Services Responding to the Novel Coronavirus Pandemic https://www.thehastingscenter.org/ethicalframeworkcovid19/

CLINICIAN SUPPORT AND CONSIDERATIONS

That discomfort you are feeling is grief. *Harvard Business Review*. March 23, 2020. https://hbr.org/2020/03/that-discomfort-youre-feeling-is-grief

Crisis not a time to give in depth psychological intervention to staff. Focus on basic needs: food, hydration, rest, supplies. Take care of psychological needs of patients and family. https://twitter.com/DrMeganHoseyPhD/status/1245720449046241282

Understanding and Addressing Sources of Anxiety Among Health Care Professionals During the COVID-19 Pandemic. *JAMA*. April 7, 2020. https://jamanetwork.com/journals/jama/fullarticle/2764380

Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ*. March 26, 2020. https://www.bmj.com/content/368/bmj.m1211

EVALUATION ESCALATION

Link to Evaluation Escalation Public Google Document

Guiding Questions Throughout Process

1) Is this patient mobilizing successfully? Why not?
2) Does this patient *require* therapist evaluation and/or treatment to progress? discharge?
3) Does a therapist need to see this patient today, never, or later?

4) Which discipline should own management?
5) What is the lowest possible frequency and minimalist follow up plan that is still effective?
6) What detailed recommendations and education can I provide to the team, nurse, and patient?

Assessing the need for bedside evaluation and treatment

- Current clinical and medical status: oxygen demand, symptoms
- Current functional and mobility status
- Previous level of function, age, length of stay
- Comorbid and chronic medical conditions potentially impacting function
- Current medical status, likely response to medical treatment, possible sequelae of medical treatment
- Likelihood of natural improvement vs. risk of serious decline
- Rehospitalization risk

Determine patients previous and current functional and mobility status in order to determine if this patient can discharge and/or requires further therapist evaluation or treatment

Evaluation Escalation

At each time point consider "Do I have enough information to make recommendations and sign off?"

1. Chart review
2. Discussion with team "what is the clinical question or concern?"
3. Discussion with nurse: function, mobility status, concerns. “What barriers and issues are limiting mobility?”
4. Call into room to talk with patient
    - Call family/social support as able
5. Call into room while nurse or other clinician is in room to guide assessment
6. Evaluate and treat at bedside

GENERAL CLINICAL CONSIDERATIONS

Novel Barriers

constructed by Kenny Venere

- Risk and Reward: What value can we provide and when is bedside intervention worth the risks?
    - Exposure?
    - Spread?
    - PPE Utilization?

- Pandemic Culture: FEAR
    - Less guiding evidence
    - More system and personal stress and strain
    - More conversative management? Increased sedation, less mobility, lack of historic success cases to drive decisions

- Novel Illness
    - COVID-19 patients *potentially* decompensate more quickly
    - Observations and communications reveal longer course of intubation and increased need for deep sedation

Guiding Questions

1) Is this patient mobilizing successfully? Why not?
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5) What is the lowest possible frequency and minimalist follow up plan that is still effective?
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Logistical Considerations

- Supplemental Oxygen Utilization During Physical Therapy Interventions. Official Guidelines from the Cardiovascular and Pulmonary Section. http://cardiopt.org/pdf/pubs/Supplemental_Oxygen.pdf

Aerosol Generating Procedures (AGPs)

https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html
https://www.cdc.gov/coronavirus/2019-ncov/hcp/caring-for-patients.html
"Some procedures performed on patients with known or suspected COVID-19 could generate infectious aerosols. In particular, procedures that are likely to induce coughing (e.g., sputum induction, open suctioning of airways) should be performed cautiously and avoided if possible"

Physiotherapy Management for COVID-19 in the Acute Hospital Setting (non United States)
https://www.wcpt.org/sites/wcpt.org/files/files/wcptnews/images/Physiotherapy_Guideline_COVID-19_FINAL.pdf
"Strongly recommended that airborne precautions are utilized during *respiratory* physiotherapy interventions."
"...physiotherapists are likely to be in close contact with the patient e.g. for mobilisation, exercise or rehabilitation interventions that require assistance. In these cases, consider use of a high filtration mask (e.g. P2/N95). Mobilisation and exercise may also result in the patient coughing or expectorating mucous."

- Coughing
    - Position > 6 feet away (outside "blast zone")
    - Patient catch cough in tissue
    - Hand hygiene after
    - If patient unable, assist in above

- Given the possibility for cough and/or increased O2 flow during activity and mobility I would consider airborne precautions for all patients on oxygen or with continued cough. Initiate discussion with your department and infectious disease team regarding likelihood and risk of aerosolization during PT treatments. We currently are

adhering to airborne precautions during PT for all COVID-19 cases. Can also consider placing a surgical mask over patient/oxygen device as PPE supplies and local policy/procedure allows. -Kyle Ridgeway, DPT, CCS

https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html
https://www.cdc.gov/coronavirus/2019-ncov/hcp/caring-for-patients.html
"Some procedures performed on patients with known or suspected COVID-19 could generate infectious aerosols. In particular, procedures that are likely to induce coughing (e.g., sputum induction, open suctioning of airways) should be performed cautiously and avoided if possible"

Variation in Aerosol Production Across Oxygen Delivery Devices in Spontaneously Breathing Human Subjects.
https://www.medrxiv.org/content/10.1101/2020.04.15.20066688v1

- No difference between room air, 6L, 15L heated high flow regardless of coughing
- Done in healthy human subjects
- Research done to facilitate use of high flow oxygen given recommendations to avoid despite evidence outside COVID that can be important treatment for respiratory failure

Airborne spread of infectious agents in the indoor environment. Review. American Journal of Infection Control. 2016.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7115322/

Cough can potentially aerosolize and droplets can travel 5-6 feet

If performed, the following should occur:

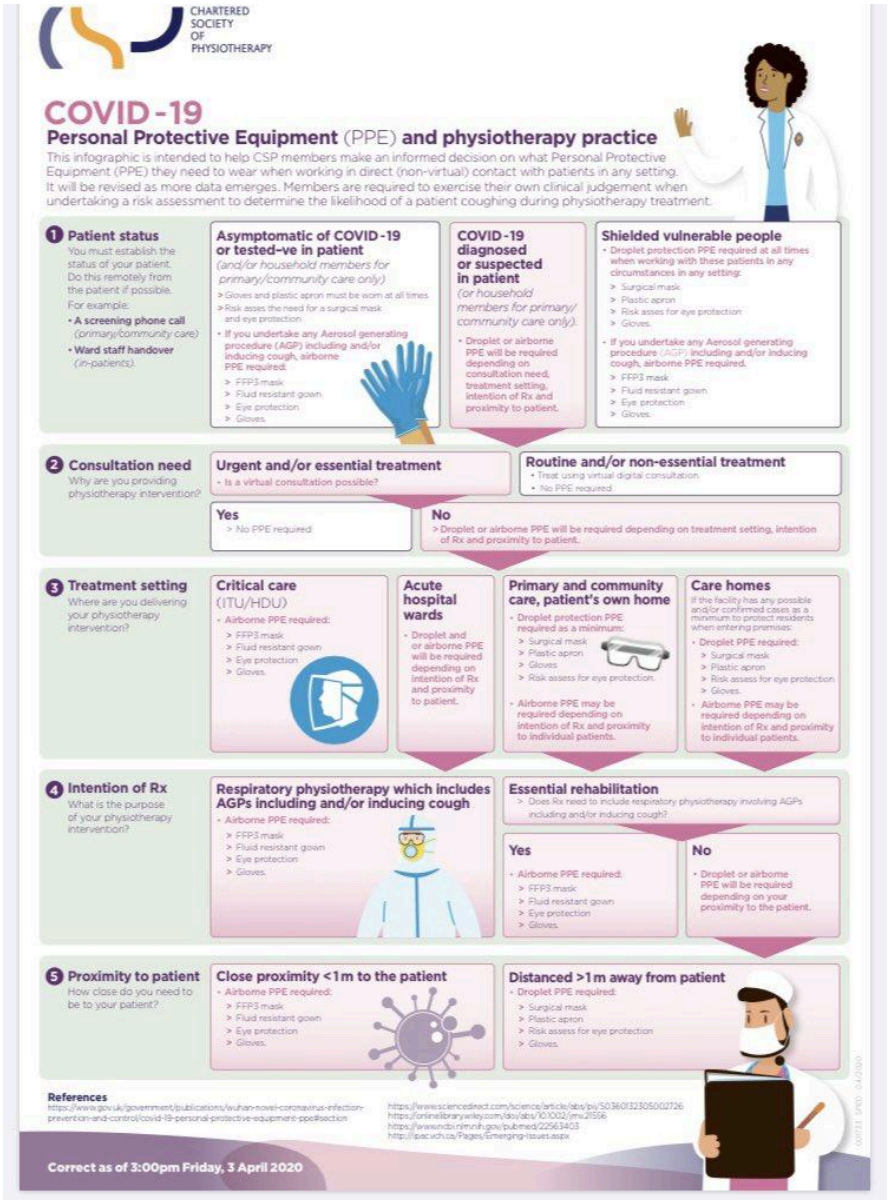
- HCP in room should wear an N95 or higher-level respirator, eye protection, gloves, and a gown.
- Number of HCP present during the procedure should be limited to only those essential for patient care and procedure support. Visitors should not be present for the procedure
- AGPs should ideally take place in an Airborne Infection Isolation Room AIIR
    - Formerly, negative pressure isolation room, an AIIR is a single-occupancy patient-care room used to isolate persons with a suspected or confirmed airborne infectious disease.
- Clean and disinfect procedure room surfaces promptly"

Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. *PLoS One*. 2012;7(4):e35797. doi:10.1371/journal.pone.0035797
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3338532/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3338532/pdf/pone.0035797.pdf

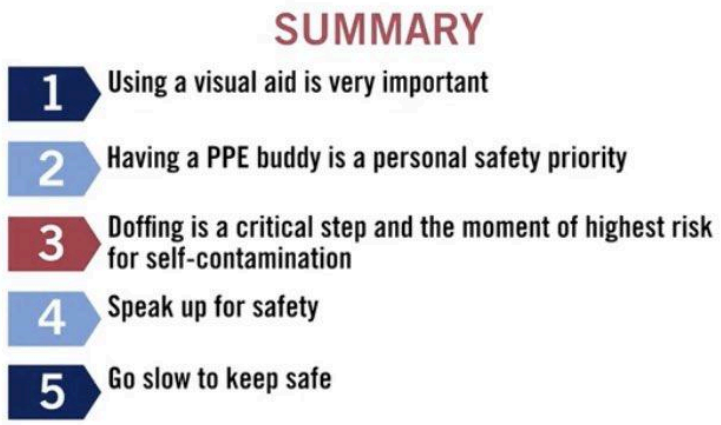
Transmission Potential of SARS-CoV-2 in Viral Shedding Observed at the University of Nebraska Medical Center
https://www.medrxiv.org/content/10.1101/2020.03.23.20039446v2

Personal Protective Equipment (PPE) Considerations

Refer to recommendations from professional organizations as well as local policy and procedure



Keeping yourself safe with PPE: https://youtu.be/PsFGhvlhbXs



KEEPING YOURSELF SAFE DURING THE COVID-19 PANDEMIC - Making the best use of PPE

Physiotherapy Management for COVID-19 in the Acute Hospital Setting (non United States)
https://www.wcpt.org/sites/wcpt.org/files/files/wcptnews/images/Physiotherapy_Guideline_COVID-19_FINAL.pdf
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Airway Clearance Considerations
Refer to aerosol generating procedures information
Remember COIVD-19 is NOT a fundamentally secretion producing disease process (it's ARDS, Pulm Edema) and COVID-19 itself is not an indication for airway clearance.
https://www.facebook.com/groups/344427919049715/permalink/1571343023024859/
"The best airway clearance technique is activity and exercise. Get up and move!" -Richard Severin:

- The sympathetic response from exercise dilates the airways and the variation of tidal volumes and pressures that occur during exercise help mobilize secretions
- If you are unable to move, consider airway clearance techniques that are active and independent. These include active cycle breathing (ACBT) & oscillatory post expiratory devices (OPEP) such as the acapella youtu.be/XvorhwGZGm8
- If all that fails then consider passive techniques like postural drainage & manual airway clearance. These are the lowest priority interventions for most people and are hold overs from a time when people were confined to bed rest when they were sick & stayed in hospital for weeks!

Other Considerations During Treatment

- Make all these people more than COVID patients. Megan Hosey, PhD. Rehabilitation Psychologist https://twitter.com/drmeganhoseyphd/status/1249369958292881408?s=21
- Not Dying Alone — Modern Compassionate Care in the Covid-19 Pandemic. *N Engl J Med*. April 14, 2020. https://www.nejm.org/doi/full/10.1056/NEJMp2007781
- Crisis not a time to give in depth psychological intervention to staff. Focus on basic needs: food, hydration, rest, supplies. Take care of psychological needs of patients and family.
- https://twitter.com/DrMeganHoseyPhD/status/1245720449046241282
- Adjusting Palliative Care Practices for Pandemic. https://www.contagionlive.com/news/adjusting-palliative-care-practices-for-a-pandemic

CRITICAL CARE (ICU) & MECHANICAL VENTILATION CLINICAL CONSIDERATIONS

"Early physical therapy and active mobility is not about time, it's about *timing*." -Kyle J. Ridgeway, PT, DPT, CCS

- Pandemic principles as foundation: contain, limit exposure, preserve PPE, address bottlenecks
- ABCDEF Bundle, ICU Liberation, and Post Intensive Care Syndrome as guiding constructs
- Use what you know! ARDS, mobility guidelines, published research, and institution specific protocols
- Understand *basic* clinical course and pathophysiology of COVID19
- Collaborate with multidisciplinary team on logistics, communication, and general approach
- Apply information within context of your current local environment and historic practices/programs
- Utilize general principles, but assess each patient and case individually
- Critical Care Resource & Reference List: http://www.mobilization-network.org/Network/Publications_files/List%20of%20Current%20Literature-2020-02-18.docx

General Resources

- ABCDEF Bundle Overview https://www.icudelirium.org/medical-professionals/overview
- Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults. *Crit Care*. 2014 https://pubmed.ncbi.nlm.nih.gov/25475522/
- ICU Liberation. Society of Critical Care Medicine https://www.sccm.org/ICULiberation/ABCDEF-Bundles
- Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU (PADIS) https://www.sccm.org/Research/Guidelines/Guidelines/Guidelines-for-the-Prevention-and-Management-of-Pa

- ICU Acquired Weakness: Implications for PTs https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3513482/
- Nomenclature for acute cog changes and delirium https://link.springer.com/article/10.1007/s00134-019-05907-4
- Psychology of COVID-19 Critical Care https://www.ics.ac.uk/ICS/Psychology_in_COVID-19.aspx

Patients with COVID19 develop viral pneumonia and those requiring critical care usually have hypoxemic respiratory failure and acute respiratory distress syndrome (ARDS). Of those requiring ICU care, most will require mechanical ventilation.

Observation and data from case series suggest *on average*:

- Longer course of mechanical ventilation (1-2 weeks) and ICU length of stay (2-3 weeks)
- Prone position ventilation is common
- Deep sedation may be required during early course
- Some require vasopressors
- Increased mortality with increased age

Utilize knowledge surrounding ARDS generally, course of COVID19 specifically, and individual presentation of each patient. Assess patient level variables surrounding prognosis, readiness for PT, and possible benefit vs. risk of bedside PT intervention.

Physical Therapy Consultation Considerations

Generally, **consider PT consultation** when: stable vent settings, RASS consistently -2 to +1, hemodynamically tolerating spontaneous awakening trial, and hemodynamically tolerating routine care (turning, oral care, suction, chair position)

Consider Consultation: Activity and mobility could assist in ventilator liberation

- Respiratory: Stable vent settings/oxygen demand
- Cardiovascular: At MAP goal on stable dose of vasoactives
- Hemodynamically appropriate and tolerating awakening
- Cognition: RASS consistently -2 to +1
- Other considerations
    - Significant physical weakness in awake and cooperative patient
    - Inability or difficulty weaning mechanical ventilation
    - ICU LOS and/or mechanical ventilation > 7 days
    - Nursing unable to progress mobility post extubation

Consider Holding Consultation: Early in course, deep sedation, poor prognosis, likely to progress with nurse led mobility

- Respiratory: High settings, up-trending, decompensation with routine care/coughing
- Cardiovascular: Not at MAP goal, increasing vasoactives, decompensation with routine care
- Hemodynamically inappropriate for awakening or ordered for deep sedation RASS –4 to -5
- Cognition: RASS consistently –3 to -4 or +2 to +4
- Poor or unknown prognosis
- Older age with high likelihood of poor outcome or death
- Other considerations
    - Adequate physical strength

- ICU LOS/Intubation < 4 days
- Nursing able to progress mobility

Outcomes of 1591 Patients Infected With SARS-CoV-2 Admitted to ICUs of the Lombardy Region, Italy. *JAMA.* Published online April 6, 2020. https://jamanetwork.com/journals/jama/fullarticle/2764365

- Mechanical Ventilation: 88%
- Non-invasive Ventilation: 11%
- Mortality: 26%
  - Age > 64: 36%
  - Age < 64: 15%

"5 weeks after the first admission in ICU, the majority of the patients (58%) were still in the ICU, 16% of the patients had been discharged from the ICU, and 26% had died in the ICU. The death rate was higher among those who were older. However, these outcome data should be interpreted with caution because most patients were still hospitalized in the ICU and the minimum follow-up was 7 days; in particular, the mortality rate could eventually be higher."

Acute Respiratory Distress Syndrome (ARDS)

- Acute respiratory distress syndrome: the Berlin Definition. *JAMA*. 2012. https://pubmed.ncbi.nlm.nih.gov/22797452/
- American Thoracic Society Clinical Practice Guideline: Mechanical Ventilation ARDS. https://www.thoracic.org/statements/resources/cc/ards-guidelines.pdf
- https://www.readcube.com/articles/10.1007/s00134-020-06307-9
- Fatigue Symptoms during the First Year after ARDS. Chest. 2020. Online April 15 2020. https://www.sciencedirect.com/science/article/abs/pii/S0012369220306863
- Functional disability 5 years after acute respiratory distress syndrome. *N Engl J Med*. 2011. https://pubmed.ncbi.nlm.nih.gov/21470008/

Intensive Care Unit Acquired Weakness (ICU-AW)

ICU Acquired Weakness (ICUAW) is a syndrome of generalized limb weakness that develops while the patient is critically ill and for which there is no alternative explanation other than critical illness itself. Patients with an average Medical Research Council muscle strength score (MRC strength sum score) average of less than 4/5 across muscle groups as tested by manual muscle testing are clinically considered as having ICUAW. Normally, 3 paired UE (shoulder abduction, elbow flexion, wrist extension) and LE (hip flexion, knee extension, dorsiflexion) are used which corresponds to a 0-60 scale.

Two Scores of < 48/60 separated by at least 24 hours are indicative of ICU-AW in an awake and cooperative patient with no other explanation for weakness

- An official American Thoracic Society Clinical Practice guideline: the diagnosis of intensive care unit-acquired weakness in adults. Am J Respir Crit Care Med. 2014 Dec 15;190(12):1437-46 http://www.ncbi.nlm.nih.gov/pubmed/25496103

- A framework for diagnosing and classifying intensive care unit-acquired weakness. Crit Care Med. 2009 Oct;37(10 Suppl):S299-308 http://www.ncbi.nlm.nih.gov/pubmed/20046114
- ICU-acquired weakness. Intensive Care Med. 2020 Feb 19. doi: 10.1007/s00134-020-05944-4. https://www.ncbi.nlm.nih.gov/pubmed/32076765
- UpToDate: Neuromuscular Weakness Related to Critical Illness: https://www.uptodate.com/contents/neuromuscular-weakness-related-to-critical-illness
- Review of Critical Illness Myopathy and Neuropathy. *The Neurohospitalist*. 2017;7(1):41-48. doi:10.1177/1941874416663279.
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5167093/
- Clinical review: intensive care unit acquired weakness. 2015 *Critical Care / The Society of Critical Care Medicine*, *19*, 274.
- Clinical review: intensive care unit acquired weakness. *Crit Care* 19, 274 (2015) https://ccforum.biomedcentral.com/articles/10.1186/s13054-015-0993-7

Post Intensive Care Syndrome (PICS)

- UpToDate: Post Intensive Care Syndrome. https://www.uptodate.com/contents/post-intensive-care-syndrome-pics
- Improving long-term outcomes after discharge from intensive care unit: report from a stakeholders' conference. *Crit Care Med*. 2012. https://pubmed.ncbi.nlm.nih.gov/21946660/
- Exploring the scope of post-intensive care syndrome therapy and care: engagement of non-critical care providers and survivors in a second stakeholders meeting. *Crit Care Med*. 2014. https://pubmed.ncbi.nlm.nih.gov/25083984/
- Impairments Associated With Post-Intensive Care Syndrome: Systematic Review Based on the World Health Organization's International Classification of Functioning, Disability and Health Framework. *Phys Ther*. 2018. https://pubmed.ncbi.nlm.nih.gov/29961847/
- Patient handout on post intensive care syndrome: https://www.atsjournals.org/doi/pdf/10.1164/rccm.2018P15
- Patient Centered Info. SCCM https://www.sccm.org/MyICUCare/THRIVE/Post-intensive-Care-Syndrome
- Consideration of potential for post intensive care syndrome. Jack Iwashyna https://twitter.com/iwashyna/status/1246807517340020736?s=21

Outcomes After Critical Illness and Acute Respiratory Distress Syndrome

- Outcomes After Critical Illness and Surgery: Publications https://www.hopkinsmedicine.org/pulmonary/research/outcomes_after_critical_illness_surgery/oacis_publications.html
- Improving Long Term Outcomes: Research Tools https://www.improvelto.com/
- Understanding patient outcomes after acute respiratory distress syndrome: identifying subtypes of physical, cognitive and mental health outcomes. *Thorax*. 2017. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5690818/
- Fatigue Symptoms during the First Year after ARDS. Chest. 2020. Online April 15 2020. https://www.sciencedirect.com/science/article/abs/pii/S0012369220306863
- The RECOVER Program: Disability Risk Groups and 1-Year Outcome after 7 or More Days of Mechanical Ventilation. *Am J Respir Crit Care Med*. 2016. https://pubmed.ncbi.nlm.nih.gov/26974173/

- Long-term complications of critical care. *Crit Care Med*. 2011. https://pubmed.ncbi.nlm.nih.gov/20959786/

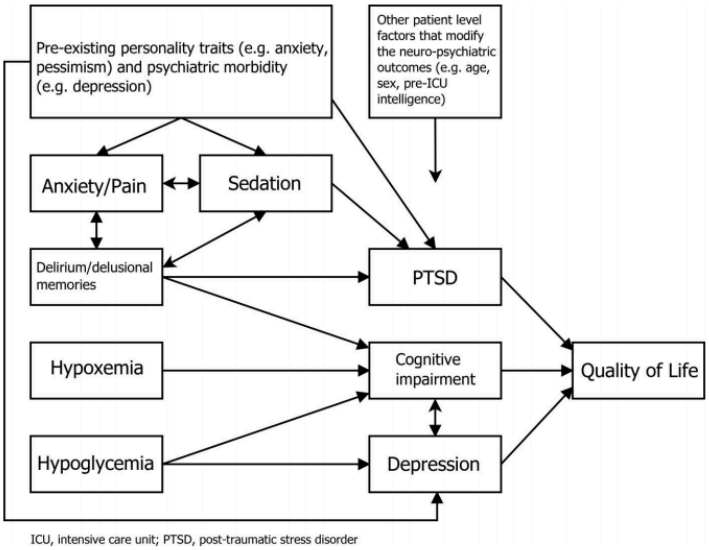
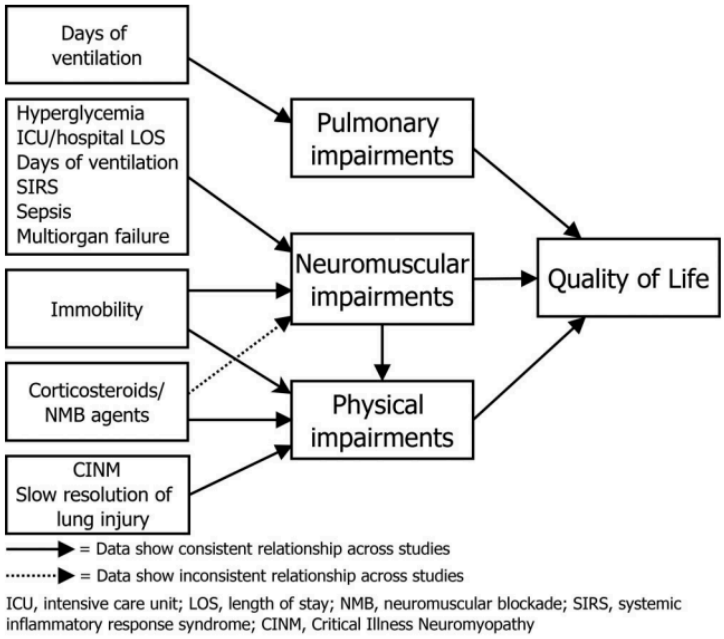


Figure 2. Patient and ICU risk factors for long-term neuropsychiatric complications.



- Improving Long-Term Outcomes After Sepsis. *Crit Care Clin*. 2018. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5708876/
- Functional disability 5 years after acute respiratory distress syndrome. *N Engl J Med*. 2011. https://pubmed.ncbi.nlm.nih.gov/21470008/
- Long-term cognitive impairment and functional disability among survivors of severe sepsis. *JAMA*. 2010. https://pubmed.ncbi.nlm.nih.gov/20978258/

PRONE POSITIONING

Critical Care: Mechanical Ventilation and ARDS

- UpToDate: Prone Positioning: https://www.uptodate.com/contents/prone-ventilation-for-adult-patients-with-acute-respiratory-distress-syndrome
- Prone Positioning in Severe Acute Respiratory Distress Syndrome. *N Engl J Med*. 2013 https://www.nejm.org/doi/full/10.1056/nejmoa1214103 (video included)
- Intensive Care Society. Guidance for Proning in Adult Critical Care. 2019. https://ficm.ac.uk/sites/default/files/prone_position_in_adult_critical_care_2019.pdf
- What are the recommendations for proning in patients with COVID-19 and how early should proning be instituted? Society of Critical Care Medicine: Webcast. https://www.sccm.org/COVID19RapidResources/Resources/What-are-the-recommendations-for-proning-in-these
- Rehab based prone team https://www.ncbi.nlm.nih.gov/pubmed/32691056?dopt=Abstract
- Prone Position and Brachial Plexus Injuries https://www.rnoh.nhs.uk/application/files/6715/8834/4124/Proning_advice_and_pathway_for_COVID19_patients.pdf

Conscious Proning: Non-ventilated patients

See patient information and handouts section for proning handouts and education

- Guidance for conscious proning: Intensive Care Society https://www.ics.ac.uk/ICS/Pdfs/COVID-19/Guidance_for_conscious_proning.aspx
- Awake Proning Demonstration: Video. https://www.youtube.com/watch?v=EuWshgeW8JY
- COVID Awake Repositioning/Proning Protocol (CARP)
- What are the recommendations for proning in patients with COVID-19 and how early should proning be instituted? Society of Critical Care Medicine: Webcast. https://www.sccm.org/COVID19RapidResources/Resources/What-are-the-recommendations-for-proning-in-these
- Efficacy and Safety of Prone Positioning Combined with HFNC or NIV in ARDS: Prospective Cohort. *Crit Care*. 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6993481/
- Prone Positioning Combined with High-flow Nasal Cannula in Severe Non-infectious ARDS. *Crit Care*. 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7092599/
- Simple positioning and proning guidelines: https://emcrit.org/wp-content/uploads/2020/04/COVID-CARP-Protocol-postable.pdf

How to Prone: Guidance and Checklists

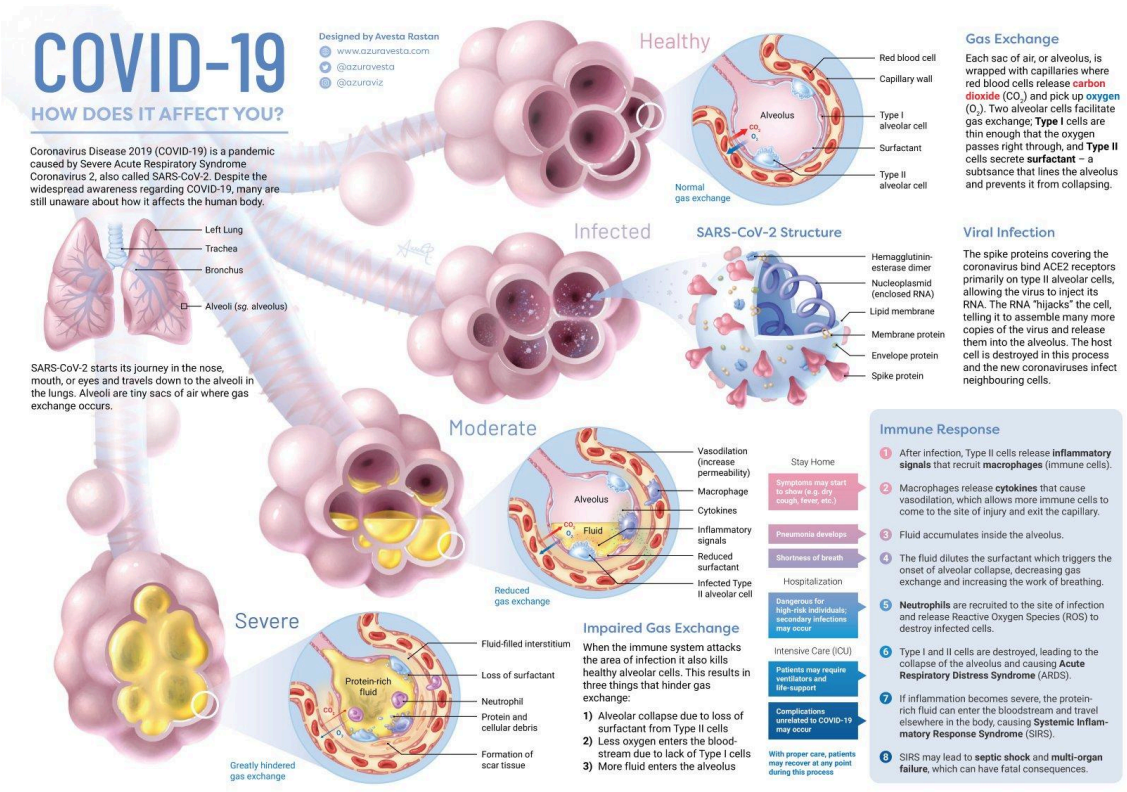
- Rehab based prone team https://www.ncbi.nlm.nih.gov/pubmed/32691056?dopt=Abstract
- Video: How to prone. Severe ARDS and Mechanical Ventilation. *N Engl J Med.* https://www.youtube.com/watch?v=E_6jT9R7WJs
- TikTok Proning Video: https://twitter.com/mamadoctorjones/status/1246703678532259840?s=21

- Guidance for Proning in Adult Critical Care. Intensive Care Society. 2019. https://ficm.ac.uk/sites/default/files/prone_position_in_adult_critical_care_2019.pdf
- Guidance for conscious proning: Intensive Care Society. 2020 https://www.ics.ac.uk/ICS/Pdfs/COVID-19/Guidance_for_conscious_proning.aspx

PATIENT INFORMATION AND HANDOUTS

COVID-19 General

- UpToDate: Patient and Public Information. https://www.uptodate.com/contents/covid-19-2019-novel-coronavirus-the-basics
- Clinical Questions About COVID-19. Centers For Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/hcp/faq.html
- British Psychological Society: https://www.bps.org.uk/responding-coronavirus
- https://twitter.com/azuravesta/status/1248288124104564737?s=21



Delirium

- Activities for patients: https://drive.google.com/drive/mobile/folders/1w765ihIU7LCynTG3fnI8clkhmrJ6XDXq?usp=sharing
- Information on Delirium: https://www.icudelirium.org/patients-and-families/overview

Post Intensive Care Syndrome (PICS)

- What is PICS? https://www.atsjournals.org/doi/pdf/10.1164/rccm.2018P15
- https://www.sccm.org/MyICUCare/THRIVE/Post-intensive-Care-Syndrome
- Critical Care Recovery Resources http://www.criticalcarerecovery.com/
- https://sepsistrust.org/get-support/resources/

Self-Proning and Positioning

Proning and Repositioning (developed by Maria Atienza, PT. Elmhurst Hospital. NY)

- English PDF Handout
- Spanish PDF Handout
- Simple Chinese PDF Handout

Repositioning and Rolling: English and Spanish:
https://emcrit.org/wp-content/uploads/2020/04/Self-Proning-Positioning_Eng-n-Spanish.pdf

NEW ROLES, PARADIGMS, AND TRAINING

- Rehab based prone team https://www.ncbi.nlm.nih.gov/pubmed/32691056?dopt=Abstract
- Physical Therapy in the Emergency Department. American Physical Therapy Association https://www.apta.org/EmergencyDepartment/
- Prehabilitation could save lives in a pandemic. British Medical Journal Blog. https://blogs.bmj.com/bmj/2020/03/19/julie-k-silver-prehabilitation-could-save-lives-in-a-pandemic/
- Role of Physical Therapists in Reducing Hospital Readmissions: Optimizing Outcomes for Older Adults During Care Transitions From Hospital to Community. *Phys Ther*. 2016 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4992143/
- Understanding the Relationship Between Physical Therapist Participation in Interdisciplinary Rounds and Hospital Readmission Rates: Preliminary Study. *Phys Ther*. 2016 https://pubmed.ncbi.nlm.nih.gov/27197828/
- Rethinking Hospital-Associated Deconditioning: Proposed Paradigm Shift. *Phys Ther*. 2015. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4556957/
- International PT Response: Disaster phases, COVID-19 Epidemiology, Past Disaster Experiences. APTA Facebook Live. https://m.facebook.com/story.php?story_fbid=10159468464403294&id=89822773293
- Hopkins Activity and Mobility Promotion https://www.hopkinsmedicine.org/physical_medicine_rehabilitation/education_training/amp/ https://www.johnshopkinssolutions.com/solution/amp/activity-mobility-promotion-amp-icu/

Rapid Retraining Approach

By John Corsino

- https://johncorsino.wordpress.com/2020/03/25/rapid-retraining/

https://twitter.com/Mvmnt_Is_Med/status/1242799835218149377

- Make it easier for trainee
- Assess: what they know, how to best deploy, how much support required
- Decide where to target and utilize resources you have (med-surg, ED, etc)
- Break down tasks, emphasize purpose,
- Use new resources to perform lowest acuity, simplest clinical work
- Focus on key points and asking why are we doing X?

Critical Care and Respiratory

- Supplemental Oxygen Utilization During Physical Therapy Interventions. Official Guidelines from the Cardiovascular and Pulmonary Section. http://cardiopt.org/pdf/pubs/Supplemental_Oxygen.pdf
- Critical Care for Non-ICU Clinicians. Society for Critical Care Medicine https://www.sccm.org/covid19
- Ventilator Basics: https://www.youtube.com/watch?v=D5d4_sUbRew and https://pulmtom.com/
    - Simplified Mechanical Ventilation Explanation: https://www.atsjournals.org/doi/abs/10.34197/ats-scholar.2020-0041VO
- Pulmonary, Ventilators, and ARDS https://www.aacn.org/education/online-courses/covid-19-pulmonary-ards-and-ventilator-resourceshttps://c.aar
- Minimum standards for physiotherapists in critical care
    - Australia and New Zealand: https://pubmed.ncbi.nlm.nih.gov/27259819/
    - United Kingdom: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6475988/
- Project Xtreme: c.org/resources/sns_vent_training/resources/01-project-xtreme-model-for-health-professionals.pdf

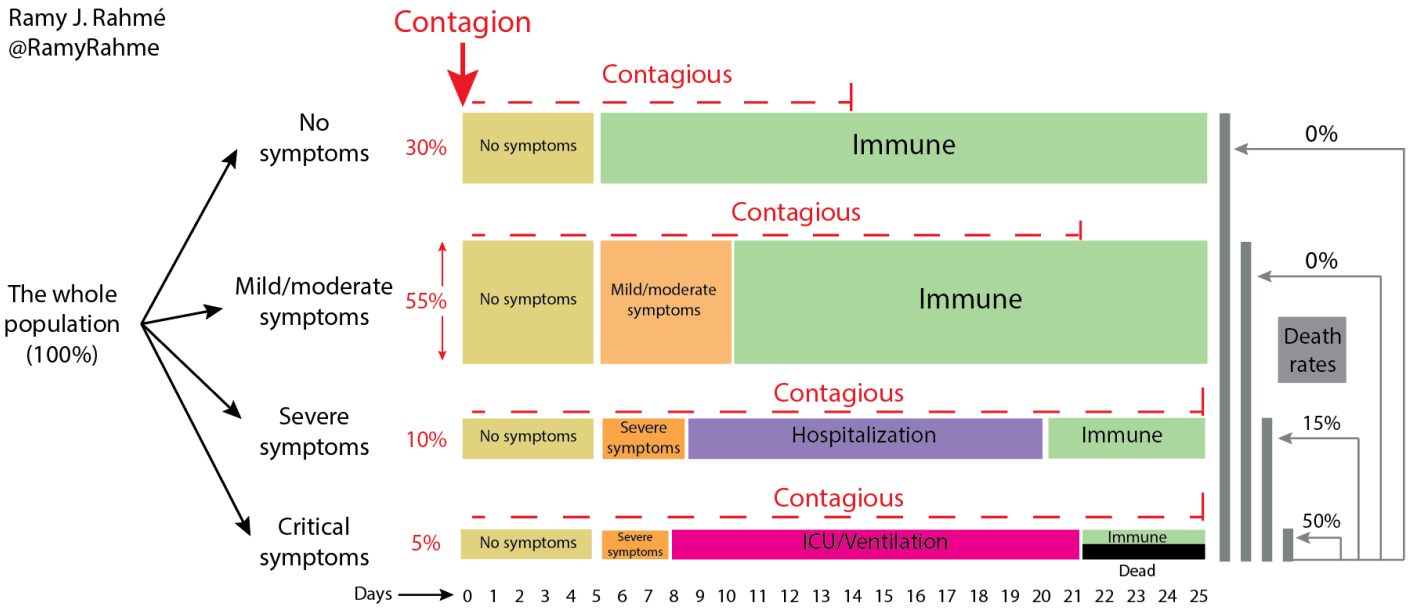
POST ACUTE CARE CONSIDERATIONS

- The Essential Role of Home- and Community-Based Physical Therapists During the COVID-19 Pandemic. April 17, 2020. https://academic.oup.com/ptj/article/doi/10.1093/ptj/pzaa069/5820965
- Home and Community-Based Physical Therapist Management of Adults With Post-Intensive Care Syndrome. April 13. Phys Ther. https://www.ncbi.nlm.nih.gov/pubmed/32280993?dopt=Abstract
- For Survivors of Severe COVID19, beatring the virus is just the beginning https://www.sciencemag.org/news/2020/04/survivors-severe-covid-19-beating-virus-just-beginning
- We need a Nightingale model for rehab after covid-19

- https://www.hsj.co.uk/commissioning/we-need-a-nightingale-model-for-rehab-after-covid-19-/7027335.article
- Post acute care preparedness: https://jamanetwork.com/journals/jama/fullarticle/2763818
- Decreased therapy utilization may leave seniors at risk https://homehealthcarenews.com/2020/03/dropping-therapy-utilization-may-leave-seniors-at-risk-during-covid-19-crisis/
- Home Health Rehabilitation Utilization Among Medicare Beneficiaries Following Critical Illness. March 18, 2020. https://onlinelibrary.wiley.com/doi/abs/10.1111/jgs.16412
- The Novel Coronavirus (COVID-19): Making a Connection between Infectious Disease Outbreaks and Rehabilitation: https://www.utpjournals.press/doi/pdf/10.3138/ptc-2020-0019
- A psychiatric services response to the COVID-19 crisis: https://www.kevinmd.com/blog/2020/03/a-psychiatric-services-response-to-the-covid-19-crisis.html

COVID-19: INFORMATION AND RESOURCES

- https://ncov2019.live/
- New England Journal of Medicine: https://www.nejm.org/coronavirus
- COVID Hospitalization Data: https://covidtracking.com/data/
- University of Virginia: COVID-19 Surveillance Dashboard: https://nssac.bii.virginia.edu/covid-19/dashboard/
- Lessons learned from 25,000 cases. Wuhan. Harvard. https://drive.google.com/file/d/14tGJF9tdv4osPhY1-fswLcSlWZJ9zx45/view
- Centers for Disease Control and Prevention. Coronavirus (COVID-19) https://www.cdc.gov/coronavirus/2019-ncov/index.html https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html https://www.coronavirus.gov/
- What healthcare providers should know about about caring for patients with/suspected to have COVID-19. Centers for Disease Control and Prevention https://www.cdc.gov/coronavirus/2019-ncov/hcp/caring-for-patients.html
- The Coronavirus Outbreak. The New York Times https://www.nytimes.com/news-event/coronavirus
- National Institutes of Health https://www.nih.gov/health-information/coronavirus
- American Physical Therapy Association: Novel Coronavirus http://www.apta.org/Coronavirus/



References:
1. The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. Lauer SA et al. Ann Intern Med. 2020 Mar 10.
2. Impact of non-pharmaceutical interventions (NPIs) to reduce COVID19 mortality and healthcare demand. Neil M Ferguson et al. Imperial College COVID-19 Response Team. 16 March 2020.
3. Viral dynamics in mild and severe cases of Covid-19. Yang Liu et al. The Lancet, March 19, 2020.

https://twitter.com/ramyrahme/status/1244088504818204674?s=21

note: some data and clinicians feel there is group with mild to moderate symptoms who appear stabilized on hospital floor who decompensate after initial improvements

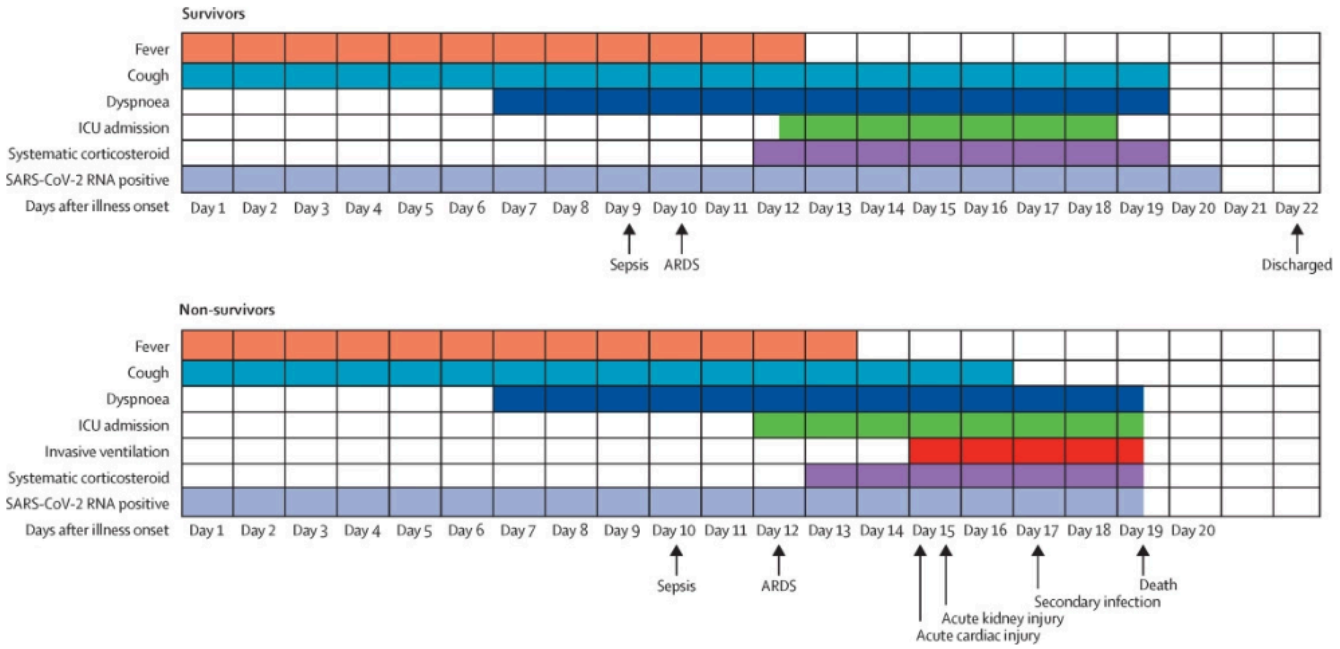


Figure 1 Clinical courses of major symptoms and outcomes and duration of viral shedding from illness onset in patients hospitalised with COVID-19

Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet*. 2020. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30566-3/fulltext

The Pathogenesis and Treatment of the `Cytokine Storm' in COVID-19. *J Infect* . 2020 Apr 10;S0163-4453(20)30165-1. https://pubmed.ncbi.nlm.nih.gov/32283152/

Explanation of COVID-19 associated respiratory failure as ARDS. Fast Literature Assessment and Review (FLARE). https://mailchi.mp/e10a89ac5988/tz4idnzryr-4388986?e=067eb3a1b5

COVID-19: not your typical ARDS? https://www.medpagetoday.com/infectiousdisease/covid19/86046

COVID Research Papers
https://m.box.com/shared_item/https%3A%2F%2Fucsf.box.com%2Fs%2F2laxq0v00zg2ope9jppsqtnv1mtxd52z

Outcomes

- Clinical Characteristics of Covid-19 in New York City. Retrospective Case Series of 393 patients. *N Engl J Med*. April 17, 2020. https://www.nejm.org/doi/full/10.1056/NEJMc2010419
- Outcomes of 1591 Patients Infected With SARS-CoV-2 Admitted to ICUs of the Lombardy Region, Italy. *JAMA.* April 6, 2020. https://jamanetwork.com/journals/jama/fullarticle/2764365
- Outcomes of 1591 Patients Infected With SARS-CoV-2 Admitted to ICUs of the Lombardy Region, Italy. *JAMA.* April 6, 2020. https://jamanetwork.com/journals/jama/fullarticle/2764365
- Covid-19 in Critically Ill Patients in the Seattle Region — Case Series. March 30, 2020. https://www.nejm.org/doi/full/10.1056/NEJMoa2004500?query=featured_home

- Characteristics and Outcomes of 21 Critically Ill Patients With COVID-19 in Washington State. *JAMA.* March 19, 2020. https://jamanetwork.com/journals/jama/fullarticle/2763485
- Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*. 2020 https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2930566-3

Social Determinants

- COVID deaths by race: state level data. APMR Research Lab
- https://www.apmresearchlab.org/covid/deaths-by-race#reporting
- COVID 19 and racial/ethinic minority groups. CDC. https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/racial-ethnic-minorities.html
- Social factors associated with COVID-19 deaths. California Department of Public Health https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/Race-Ethnicity.aspx
- COVID-19 exacerbating inequalities in the US. Lancet. April 18, 2020 https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30893-X/fulltext
- COVID-19 and the impact of social determinants of health. Lancet. May 18, 2020 https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(20)30234-4/fulltext

Sequelae

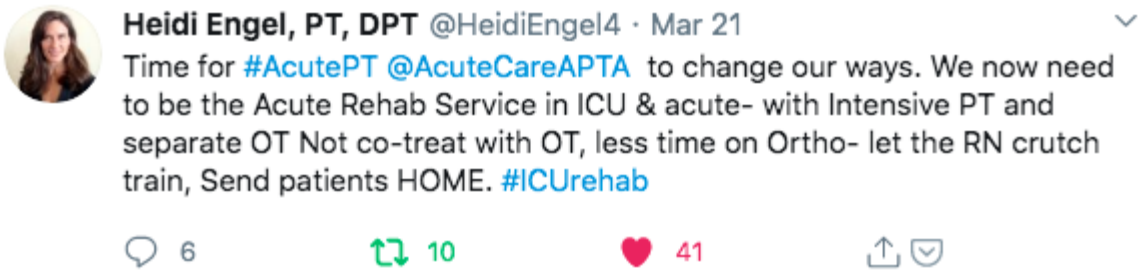
- Neurological features of severe COVID. France. April 15, 2020. https://www.nejm.org/doi/full/10.1056/NEJMc2008597
- Guillain-Barré syndrome associated with SARS-CoV-2 infection: causality or coincidence? April 1 2020. *Lancet Neurol*. https://www.nejm.org/doi/pdf/10.1056/NEJMc2009191?articleTools=true
- Neurologic Manifestations of 214 Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China. *JAMA Neurol.* April 10, 2020. https://jamanetwork.com/journals/jamaneurology/fullarticle/2764549
- COVID-19–associated Acute Hemorrhagic Necrotizing Encephalopathy: CT and MRI Features. *Radiology*. March 31, 2020. https://pubs.rsna.org/doi/10.1148/radiol.2020201187

Clinical Practice Guidelines and Protocols

- https://www.covid19treatmentguidelines.nih.gov/introduction/
- Brigham and Women's Hospital COVID Protocols: https://www.covidprotocols.org/
- University of Washington COVID-19 Resources: https://covid-19.uwmedicine.org/Pages/default.aspx
- Australian Clinical Practice Guidelines: https://covid19evidence.net.au/
- Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected. WHO. March 13, 2020 https://apps.who.int/iris/bitstream/handle/10665/331446/WHO-2019-nCoV-clinical-2020.4-eng.pdf
- COVID Critical Care Guidelines. Society of Critical Care Medicine. https://www.sccm.org/getattachment/Disaster/SSC-COVID19-Critical-Care-Guidelines.pdf?lang=en-US https://sccm.org/Research/Guidelines/Guidelines/Surviving-Sepsis-Campaign-Guidelines-on-the-Manag
- Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 https://link.springer.com/article/10.1007/s00134-020-06022-5

- Management of Critically Ill Adults With COVID-19. JAMA
  https://jamanetwork.com/journals/jama/fullarticle/2763879

INSIGHTS AND RECOMMENDATIONS



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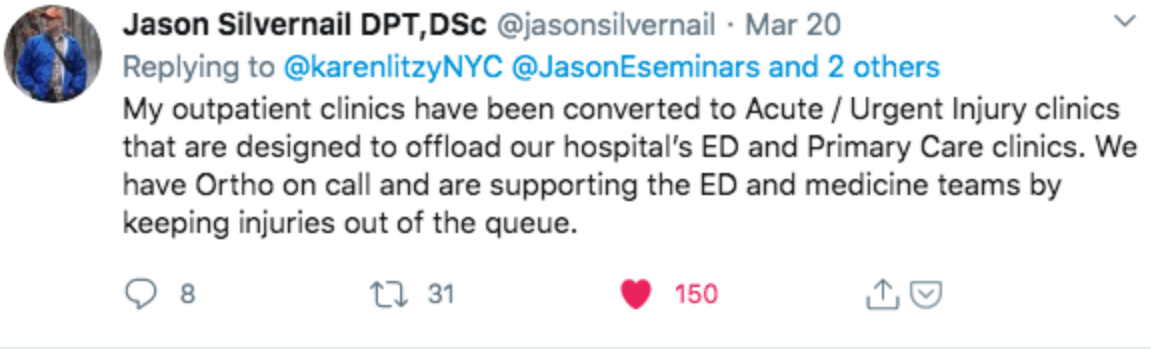

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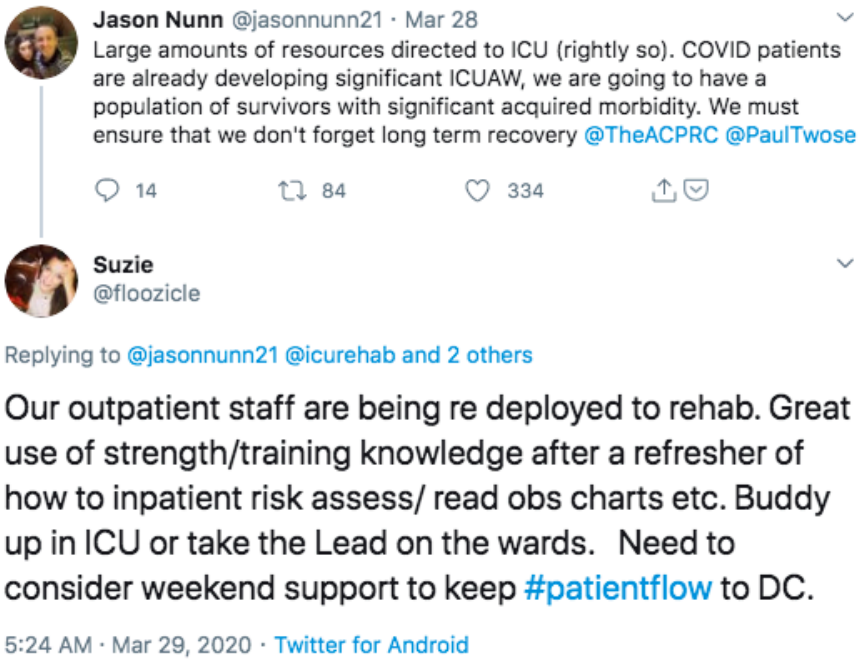

https://twitter.com/floozicle/status/1244223812847239169

Twitter To Follow

- Coronavirus Experts List compiled by @EpiEllie
- @iwashyna Pulmonary and Critical Physician. Researcher. Michigan
- @DrSamuelBrown Pulmonary and Critical Care Physician. Researcher
- @NAChristakis Yale Physician and Professor
- @medicalaxioms Hospitalist at Denver Health Medical Center
- @Bob_Wachter Chair, Dept of Medicine at UCSF

Insights and Discussion from Social Media

- Teamwork on front lines: https://twitter.com/deenakcosta/status/1248267071072411648?s=21
- Consideration of potential for post intensive care syndrome: https://twitter.com/iwashyna/status/1246807517340020736?s=21
- Vent management in severe ARDS COVID https://twitter.com/nialldferguson/status/1249484866971938819?s=21
- Australian Physio Explains Up Training and Triage https://twitter.com/haineskimberley/status/1240785380393156608?s=21
- Experience of COVID Symptoms (from an MD) https://threadreaderapp.com/thread/1239587299136098305.html
- Patient perspective of hospitalization and COVID https://twitter.com/clementychow/status/1242840461724680194?s=21
- Insight From Wuhan Physicians https://twitter.com/DrSamuelBrown/status/1239555630970499072

- Physio: https://twitter.com/bprob/status/1239154525400948737?s=20
- https://twitter.com/theblondemd/status/1242957139125157894?s=21
- https://twitter.com/sanjum/status/1249374580831064072
- https://twitter.com/drsamuelbrown/status/1243205534917881856?s=21
- https://twitter.com/nachristakis/status/1243883141900763137?s=21

COVID APPLICABLE CEUs

APTA Learning Center: COVID-19 Relevant Content. FREE CEUs. http://learningcenter.apta.org/COVID19

https://learningcenter.apta.org/student/Catalogue/CatalogueCategory.aspx?id=dcbae4dc-1a13-42ff-b9da-7ba7a62162e9

APTA Learning Center: Free CEUs.
http://www.apta.org/PTinMotion/News/2020/04/03/LearningCenterFreeCourses/?fbclid=IwAR3HYIHSVSadnvInFAC3zWh2g90y786MhA2tWl7Y8zEWTFWyyF7y1wrsu6M

PODCASTS AND WEBINARS

COVID-19: The Domino Effect. Walking Away from ICU Podcast. March 24, 2020
https://anchor.fm/restoringlife/episodes/Episode-33-COVID19--The-Domino-Effect-ebtfpr

Physiotherapy Management for COVID-19 in the Acute Hospital Setting (non United States)

- https://www.wcpt.org/sites/wcpt.org/files/files/wcptnews/images/Physiotherapy_Guideline_COVID-19_FINAL.pdf
- https://www.thoracic.org/about/ats-podcasts/physiotherapy-management-for-covid-19-in-the-acute-hospital-setting-a-conversation-with-dr-peter-thomas.php

COVID-19: Clinical Best Practices in Physical Therapy Management Webinar [March 28]

- Recording: https://register.gotowebinar.com/recording/7342833725268746509
- https://cdn.ymaws.com/www.aptahpa.org/resource/resmgr/webinars/3-28-20_Presentation_Handout.pdf

Acute Care Physical Therapy: How can we value? Webinars

- Part 1 [March 21] https://register.gotowebinar.com/recording/166466466154828299
  https://cdn.ymaws.com/www.acutept.org/resource/resmgr/uploads_for_links/3-21-20_HPA_Webinar_Recordin.pdf
- Part 2 [April 11] https://register.gotowebinar.com/recording/4558890075258839565
  https://cdn.ymaws.com/www.acutept.org/resource/resmgr/uploads_for_links/04-11-20_Webinar_Recording.pdf

Post Acute COVID-19 Exercise and Rehab (PACER) Project: Cardiovascular and Pulmonary Section

- https://www.youtube.com/playlist?list=PLne40IpTInF62gkGJYkRvty0Mzfxect2g

Physiotalks Podcast: COVID Episodes:

- https://physiotalk.co.uk/2020/03/18/covid19-chat-physiotalk-23rd-march-8pm/

Frontlines of COVID-19: Italy. March 21, 2020. http://pedsintensiva.libsyn.com/22-the-frontlines-of-covid19