NEURO INSTITUTE

Continuing Education for Rehabilitation Professionals

Rehabilitation Needs and Considerations After Prolonged Critical Care and ICU Stay for Patients with Covid-19

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NeuroRestorative's COVID-19 Response

We are committed to protecting the health and safety of the individuals we serve, our staff, and the community. Our services are considered essential, and we are taking precautions to minimize disruption to services and keep those in our care and our team members safe. In some programs, that has meant innovating our service delivery model through Interactive Telehealth Services. We provide Interactive Telehealth Services throughout the country as an alternative to in-person services. Through Interactive Telehealth Services, we deliver the same high-quality supports as we would in-person, but in an interactive, virtual format that is HIPAA compliant and recognized by most healthcare plans and carriers.

You can learn more about our COVID-19 prevention and response plan at our Update Center by visiting **neurorestorative.com**.

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Course Objectives

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1. Participants will be able to identify deficits associated with extended and complex hospitalization.
2. Participants will be able to identify rehabilitation needs related to deficits.
3. Participants will be able to identify where patients need to receive services along the continuum of care and will be able to provide education for patients and caregivers regarding the process of rehabilitation at each level.

History of Covid-19

- First case identified in December 2019 in Wuhan, China
- Known as SARS-CoV-2
- January 21 –CDC confirmed the first US coronavirus case in Washington state after travel from Wuhan, China
- January 31 – The World Health Organization declares a global health emergency. The worldwide death total had jumped to 200, and there were now 9800 cases of the infection identified.
- February 3 – US declares a public health emergency
- February 25 –CDC says Covid-19 is headed toward pandemic status
- March 11- WHO declared Covid-19 as a pandemic

CDC,2021

History of Covid-19

- March 13- President Trump declares a national emergency and implements a travel ban
- March 17 – CMS temporarily expands the use of telehealth services
- May 28 – US passes 100,000 death mark

- January 29 – According to Johns Hopkins, 101,605,084 cases of Covid-19 have been identified worldwide. The worldwide death count is 2,194,204. There have been 26,359,244 cases identified in the United States. The death count in the United States of America stands at 444,127 Americans have died from Covid-19 and/or complications of the disease.

CDC, 2021

Symptoms of Covid-19

- Symptoms of Covid-19 tend to appear between 2-14 days after exposure to the virus. People may present with mild to severe symptoms such as:
  - Fever or chills
  - Shortness of breath or difficulty breathing, cough, congestion
  - Fatigue
  - Muscle or body aches
  - Headache
  - New onset loss of taste or smell
  - Sore throat
  - Nausea, vomiting
  - Diarrhea

CDC, 2021

Classification of Covid-19

- A standard classification system for widespread implementation has not been established yet.
- Papers published out of China, Germany, and the United States have offered divisions of mild, moderate, severe, and critical illness with many overlapping criteria as of late 2020.
- Initial classifications early in the pandemic were using comparisons to SARS data.

Classification of Covid-19

- Asymptomatic or Presymptomatic Infection
  - Positive test for SARS-CoV-2 using a virologic test, but no symptoms that are consistent with Covid-19
- Mild
  - Various symptoms of Covid-19, but DO NOT have SOB, dyspnea, abnormal chest imaging
  - HR less than or equal 99
  - Sp02 greater or equal 93%
  - RR less than 22
  - Room air
- Mild-At Risk (American College of Emergency Physicians, specific)
  - HR 100-120
  - RR rate 23-28
  - NC 02 1-2L
- Moderate
  - Patients with c/o respiratory symptoms
  - Radiological evidence of pneumonia
  - HR 121 or greater

Chinese Clinical Guidance; NIH

Classification of Covid-19

- Moderate (continued)
  - Sp02 89-92%
  - RR greater or equal to 29
  - NC 02 3-4L
  - Persistent dyspnea

- Severe
  - Sp02 88% or less
  - RR 30 or greater
  - NC 02 at 5L or greater

  **bilateral pneumonia

  ** RV enlargement

  **hemoptysis

Classification Covid-19

- Critical
  - Add in the following :
    - Systolic BP at 90 or less
    - Altered consciousness
    - ARF requiring mechanical ventilation
    - Shock
    - Other organ failure
    - Decline in peripheral lymphocytes
    - Pulmonary lesions rapidly progressing

- Patients at level of mild (mild-at risk) are most likely managed at home after evaluation and observation with recommendations related to monitoring/treating their symptoms
- Patients at moderate/severe/critical level require hospitalization

Hospitalization Numbers

- 4-11% of individuals infected with SARS-CoV-2 are estimated to develop profound/severe complications requiring pulmonary support and mechanical ventilation as part of the treatment plan.
- Another 15% require acute hospitalization and pulmonary care outside of the ICU

Additional Immediate Consequences of Covid-19

- During the acute phase, approximately 36% of cases developed neurological symptoms of which 25% could be linked directly to the involvement of the central nervous system.
  - Dizziness
  - Headache
  - Impaired consciousness
  - Seizure
  - “Brain fog”

- 5.7% of severe cases suffered ischemic stroke

Lew, H., et.al.

Additional Immediate Consequences of Covid-19

- In mild to moderate cases, patients reported olfactory (86.6%) and gustatory (88.0%) dysfunctions.
- About 11% of patients had anosmia prior to any other clinical symptoms.
- Covid-19 has also been linked to further changes of coagulation and to inflammation-induced disseminated intervascular coagulation.

Detrimental Effect of Covid-19 on the Central Nervous System

- Four possible pathogenic mechanisms:
  - Direct viral encephalitis
  - Systemic inflammation
  - Peripheral organ dysfunction (liver, kidney, lung)
  - Cerebrovascular changes
- Any one or combination of these increases the risk for long term neurological consequences
- One-third of all hospitalized patients show evidence of cognitive and/or motor deficits
- Evidence for prospective neurological surveillance and care

Heneka, M.T., et. al.

What We Already Knew About Extended ICU and Hospitalization Pre-Covid-19 – Post ICU Syndrome

- Neuromuscular weakness and impairments occur in 50% of individuals with prolonged ICU stay due to Critical Illness Polyneuropathy (CIP).
- This can result in 85% of those individuals having some kind of ongoing dysfunction for greater than 5 years.
- Pulmonary dysfunction can be seen in up to 40% of individuals who have acute respiratory disordering requiring mechanical ventilation.
- 65% of patients needing MV for greater than 48 hours show functional deficits still at 1 year, 75% have cognitive impairment at discharge, and 25% have psychiatric issues still at 1 year (depression/PTSD common).

PICS and Covid-19 Relationship

- Early research suggests the risk for developing PICS in patients with Covid-19 is higher
  - Constraints on social support (restricted visitation)
  - Prolonged mechanical ventilation with higher amounts of sedatives used
  - Limited therapy services during and after hospitalization given the risk of disease transmission

- Emerging data shows the increased need and demand for rehabilitation throughout the continuum

Covid-19 Infection Sequelae Requiring Rehabilitation Services

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- Respiratory Sequelae
- Cognitive Sequelae, Central and Peripheral Nervous System
- Deconditioning
- Critical Illness Related Myopathy and Neuropathy (CRIMYNE)
- Dysphagia
- Joint Stiffness and Pain
- Psychiatric Problems

Respiratory Sequelae

- Comparisons of early data in the pandemic were looked at against SARS survivors with complex hospitalization to predict outcomes and they have proven similar
  - Persistent dyspnea, even at rest
  - Persistent desaturation, unable to wean O2 dependence
  - Cough
  - Lung fibrosis
  - Development of refractory pneumonias

Cognitive Sequelae

- Problems related to prolonged mechanical ventilation
  - Dizziness and headache
  - Altered level of consciousness
  - Memory deficits
  - Executive functions deficits
  - Agitation (related to sedation withdrawal)
- Problems directly or indirectly related to viral infection
  - Encephalopathy
  - Anosmia and Ageusia
  - Cerebrovascular diseases
  - Immune mediated

Deconditioning

- Immobilization
- Pulmonary dysfunction
- Myopathy
- Cardiac dysfunction
- Autonomic dysfunction

*Severity of deconditioning is one significant factor that can impact safe discharge of patient home directly from ICU/AC.

Critical Illness Related Myopathy and Neuropathy (CRIMYNE)

- Early data from France and Italy showed incidence associated with Covid-19 being mainly myopathic forms, with severe proximal muscle wasting, and less the peripheral nerve deficits with upper and lower limbs.

- Continues to be a lack of published studies at this point directly focused on Covid-19 patients, but significant studies with SARS patients. It has been hypothesized that prevalence will be consistent with widespread Covid studies.

Dysphagia

- Post-extubation dysphagia (PED) is reported in 62% of patients who have required mechanical ventilation for acute respiratory distress syndrome.
  - Mechanical causes
  - Diminished proprioception
  - Laryngeal injury

- Dysphagia and subsequent aspiration pneumonia are one the biggest reasons for re-hospitalization and mortality in patients released from the ICU.

Joint Pain and Stiffness

- Patients with extended ICU care frequently suffer from pain related to immobility.
- With Covid-19, patients both on and off mechanical ventilation are treated in prone positioning, adding to this pain and stiffness.
- High dose steroid usage has been correlated with osteonecrosis in a small percentage of patients for general extended care and can be hypothesized to also be present with Covid-19.

Psychiatric Problems

- Anxiety
- Depression
- Fear and anger
- Post-Traumatic Stress Disorder
- Delirium

*Related to situational components of isolation with Covid-19, but also effects of hypoxia, brain lesions, steroid usage, among other factors.

So How Do We Manage This From A Rehabilitation Standpoint?

- Acute Care
  - Be prepared for rapidly changing environment due to nature of Covid-19
  - Patients can be unstable and have low exercise tolerance, regardless of age – be flexible with expectations, and re-evaluate daily
  - Respiratory therapy takes primary stage at level of ICU and on the floor
  - Physical, Occupational, Speech Therapy services integrated as early as possible and continued during LOS to decrease the complications from the disease

Discharging From Acute Level of Care

- The lack of available beds and the demand on hospital systems can potentially result in premature discharge from facility.
- Suggested considerations for discharge:
  - 7 or more days out from diagnosis
  - 72 hours without fever or fever reducing medications
  - Stable RR and 02 – with or without supplemental oxygen
  - Clinical and/or radiological evidence of stability (CT-scan or lung ultrasound

Carda, S., et.al.

Discharging From Acute Level of Care

- Clinicians throughout the continuum need to verify the stability of patients as they transition to their particular level of care – although patients can still rapidly change their clinical condition beyond the acute level of care.

Where Are Covid-19 Patients Going?

- Acute Rehabilitation Facility
- Skilled Nursing Facility
- Outpatient Therapy Services
- Home Health Services
- Home

- 20% of patients recovering from Covid-19 will need rehabilitation according to data published in the April 2020 Journal of Rehabilitation Medicine, and it is anticipated that this statistic continues to hold true nearly one year later.

Facility Based Rehabilitation of Specific Problems

- Respiratory and Physical Therapy
  - Working in conjunction to address
    - Exercise Training
      - Endurance training
      - Strength training
    - Breathing Training
      - Pursed-Lip Breathing
      - Diaphragmatic Control Techniques
      - Thoracic Expansion Techniques
      - Thoracic Muscle Training

Facility Based Rehabilitation of Specific Problems

- Occupational Therapy
  - Completion of activities of daily living such as bathing, grooming, dressing
  - Positioning for maximum respiratory functioning
  - Energy conservation for completion of these tasks
  - Communication/Cognitive management to increase social participation
  - Adaptive equipment and modifications to the environment to increase independence
  - Transitions back to all identified life roles: spouse, parent, employee, etc.

Facility Based Rehabilitation of Specific Problems

- Speech Language Pathology
  - Dysphagia
    - Related to post-extubation, tracheostomy, deconditioning, respiratory status
  - Communication
    - Related to post-extubation, tracheostomy/speaking valve, neurological changes (i.e., aphasia secondary to CVA)
  - Cognitive changes – “brain fog”, memory, reasoning, problem solving. Deficits from CVA and Anoxic Brain Injury

Psychological/Counseling Services

- The pandemic has had a significant impact on the mental health of everyone since the onset in early 2020.
- Anxiety, depression, loneliness rank high on the list of reported complaints for both individuals who have and have not suffered from Covid-19
- Elderly, being at higher risk and thus more isolated during this time, are already at high risk of these conditions without Covid-19 as a factor
- Ongoing anxiety and post-traumatic stress disorder have been frequently reported complaints in patients who have recovered

Rehabilitation of Patients Via Home Health Services

- Only 1 in 10 Covid-19 patients are discharged home with recommendations for follow up home care services when coming directly from acute care
- Addressing all the previously discussed areas of deficit, in the home setting
- Therapists become also the “eyes and ears” of nurses in this environment due to the fact visits may occur from only one discipline per day
- A review of OASIS data from 1409 patients who received care in New York City showed 94% were discharged on average at 32 days with statistically significant improvement across all variables

Discharge to Home and Recommendations for Follow-Up

- Many patients are discharged directly home from acute stay, but continue to have difficulties with the described deficits.
- Opportunity presents itself to us as rehabilitative specialists to provide education to the community based physicians caring for these patients describing the benefits of therapy as patients return to these providers with ongoing symptom and complaints:
  - Primary care providers
  - Pulmonologists
  - Cardiologists

Telehealth and Covid-19

- Telehealth rehabilitative services have emerged as an efficacious and efficient mode of service delivery during the pandemic.
- Some disciplines have been able to provide services in this manner, but changes in regulations for most all healthcare services allowed access to this during 2020.
- A huge benefit to telehealth as been the ability of patients in rural areas or without consistent access to transportation the ability to receive quality and timely services.
- It has provided a pathway for comprehensive medical services and multi-disciplinary rehabilitation.

Follow-Up Support for Patients

- One year into Covid-19, we are still uncertain of the long term impact of the disease on patients ranging from mild to critical cases. Opportunities for research with individuals who have suffered from the disease are prevalent as we strive to provide the best care for patients. The landscape of the disease is hopefully changing as reliable vaccinations have emerged and are being administered around the world.

Follow-Up Support for Patients

- Leeds Teaching Hospitals Trust (LTHT), one of the largest trust hospitals in Europe, has developed a one of a kind study using a telephone tool to follow up with post-discharge Covid-19 patients to track new, ongoing, or now resolved symptoms and direct them back to the appropriate pathway for care if a need is identified. It was completed between 29 and 71 one days post-discharge. A tool of this manner could be easily replicated in a more simplistic manner to track and identify ongoing needs with patients longer term.

Follow-Up Support for Patients

- We as rehabilitative specialists have the opportunity to provide ongoing support to the families and caregivers as they move through the continuum.
- In addition to patients who have co-morbidities, many patients were perfectly healthy prior to Covid-19 diagnosis and need additional education and support about resources available in the community and transition to home, including DME, home care assistance, home respiratory service, etc. Many “never dreamed” they would be in the condition they are left in following this illness.

Questions?

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