

# COVID-19 Scientific Advisory Group

## Rapid Evidence Report

### Key Research Questions:

1. What are the rehabilitation needs of COVID-19 patients in ICU and in-patient hospital settings?
2. What are the appropriate rehabilitation interventions for COVID-19 patients in an ICU or in-patient hospital unit?
3. What are key rehabilitation considerations that should be included in a hospital discharge plan for a COVID-19 patient?

#### Context

- The questions were brought to SAG by the Neurosciences, Rehabilitation & Vision Strategic Clinical Network (NRV SCN).
- The need for rehabilitation post-COVID 19 is especially important for those treated in hospital, in both the intensive care units (ICU) and non-ICU acute care units. For the purposes of this review, post-acute care refers to care received after discharge from the acute care unit (ICU or non-ICU) in a hospital.
- There is an immediate need to support the inpatient facilities in ensuring that appropriate rehabilitation protocols are initiated in the COVID19 populations in the acute care settings and that rehabilitation is on-going after discharge from acute care.
- The rapid review is intended for rehabilitation health professionals and health professionals in acute care settings involved in care provision for COVID-19 patients, and to inform discussions of the COVID-19 Rehab Task Force.
- Given the paucity of evidence on the topic of rehabilitation for the critically ill COVID-19 patient, this review should be read as a “rapid guidance summary”, rather than a rapid evidence review.
- The recommendations from this review are expected to be used to guide the strategic planning of the NRV SCN’s COVID-19 Rehabilitation Task Force.

#### Key Messages from Available Guidance and Published Sources

- The rehabilitation needs of COVID-19 patients are potentially extensive and encompass physical, respiratory, cognitive, and psychological needs.
- In ICU settings specifically, Post-Intensive Care Syndrome (PICS) and physical deconditioning due to prolonged immobility are identified as requiring attention as soon as possible within the context of the acute illness.
- The immediate focus is often on the respiratory rehabilitation needs of COVID-19 patients. However, guidance, recommendations and expert opinion expressed in the available sources indicate that COVID-19 patients experience a significant non-respiratory burden requiring rehabilitation needs to be recognized and screened for during the hospital admission in both the ICU and non-ICU settings.
- Rehabilitation considerations at discharge from acute care hospitalization are challenging given the diversity and high variability of issues that may arise resulting from COVID-19 infection

and/or the ICU stay. There appears to be general consensus that critically ill COVID-19 patients will require extensive and likely prolonged rehabilitation in the appropriate setting post acute care discharge to address cognitive, psychological, and physical impairments resulting from the infection, mechanical ventilation and ICU stay.

- The potential benefits of rehabilitation for the COVID-19 patient treated in an acute care setting must also be weighed against the risk of viral transmission to rehabilitation health care providers. As noted in the [SAG COVID-19 Discharge Rapid Review](#), AHS IPC and Alberta Health guidance is that patients who are not immunosuppressed should continue to self-isolate (and hence staff should continue to use PPE) until their predominant symptoms and fever are completely resolved or until 10 days (14 days for patients returning to long term care facilities or other congregate group homes) after illness onset (whichever is longer).

### Committee Discussion

The review was discussed by the Scientific Advisory Committee on May 15, 2020. The committee reached consensus on the following guidance and practical considerations. It was acknowledged that patients with COVID-19 infections, particularly those discharged from ICUs, can have diverse rehabilitation needs relating to multi-system organ involvement including compromised respiratory dysfunction, stroke or other CNS dysfunction, but also relating to their ICU stay (eg. prolonged immobilization/prone positioning). The committee recognized the importance of this document in informing long term planning related to COVID-19 health resourcing. The committee was reminded that the recommendations from this review will serve as a starting place to guide the strategic planning of the NRV SCN's COVID-19 Rehabilitation Task Force. While there was recognition of the unique and potentially complex rehabilitation needs of patients with COVID-19, it was acknowledged that some of the rehabilitation needs would be similar to other patients requiring intensive care in hospital settings, and the guidance herein reflects that.

### Guidance

1. Systematic screening for the diverse rehabilitation needs and initiation of rehabilitation for COVID-19 patients in the acute care setting is recommended and should be based on assessment of needs which may address both respiratory function and the sequelae of COVID-19, prolonged and often isolated immobilization, as well the ICU stay itself.
2. Given the anticipated rehabilitation needs of critically ill COVID-19 patients after acute care discharge, it is strongly recommended that immediate and short-term recommendations for rehabilitation goals, interventions, and follow up are included in all discharge plans. An AHS template for patients discharged from acute care that addresses immediate needs and rehabilitation considerations should be developed, using available tools such as the Patient Oriented Discharge Summary (PODS) or Rehabilitation Prescription (Phillips et al. 2013).

### Practical Considerations

1. Access to rehabilitation services, including various allied health professionals, are variable and limited in some acute care settings in Alberta. Therefore, the focus of this review is on patient needs and rehabilitation interventions, which may be delivered by different healthcare professionals. Profession specific guidelines related to the rehabilitation of COVID-19 patients in ICU and/or non-ICU acute care settings are already available (Rehabilitation Care Alliance; Kho et al. 2020).
2. The focus of this review is on acute care, which includes both ICU and non-ICU inpatient settings. However, continuing rehabilitation on similar issues summarized in this review should be considered across care continuum – from the hospital to community settings - in order to appropriately plan and respond to a patient's on-going needs. An overall provincial strategy for

post-acute care and community rehabilitation for COVID-19 patients should be considered, including but not limited to:

- a. Discharge planning which includes recommendations for rehabilitation after hospitalization. COVID-19 patients admitted to the ICU are anticipated to have rehabilitation needs post-hospitalization. Development of clear rehabilitation care pathways guiding clinicians for the appropriate referrals to tertiary, sub-acute, outpatient and community rehabilitation programs should be considered.
  - b. A systematic, coordinated approach for longitudinal follow-up in the community by medical, allied health, mental health and primary care providers. Utilize existing models of care for potential spread and scale (e.g. ICU follow-up clinic in Calgary Zone);
  - c. Use of virtual health for continuing rehabilitation support in the community is strongly recommended, both from the patient-centred care and infection control standpoint;
  - d. Collection of outcomes data tracking the progress of COVID-19 patients longitudinally.
3. Due to the diversity of the rehabilitation issues related to COVID-19 patients, in order to facilitate the recognition of rehabilitation issues and planning of treatments by rehabilitation clinicians, consider systematic screening of rehabilitation needs on admission and on discharge from the acute care ICU and non-ICU units. Where available, acute care consultation with Physiatrists for comprehensive complex rehabilitation assessment is recommended.
  4. As with all hospitalized patients with critical illness and complex medical issues, general rehabilitation principles apply. These include, but are not limited to, personalized plans for: early mobilization, maintenance of range of motion, pressure injury prevention (Norton), assessment of communication and swallowing needs, nutritional intervention and psychosocial support.
  5. Specific treatments and treatment plans should be determined in the local context based on access to rehabilitation staff/resources, clinician experience, and the constellation and acuity of patient needs.

## Summary of Evidence

Literature for this review was collected from a database search covering OVID MEDLINE, LitCovid, PubMed, TRIP PRO, WHO COVID-19 Database, Centre for Evidence Based Medicine (CEBM), Google and Google Scholar. The search was limited by the following parameters: use of the general term rehabilitation, COVID-19 SARS-CoV-2 virus; acute settings; sub-acute and discharge.

Sixty-four articles (1 pre-print) and 12 grey literature sources were identified from the initial search. The output was cross referenced with a previous search on the topic of rehabilitation of COVID-19 patients, which was broader in scope (completed by rehabilitation team at Glenrose Rehabilitation Hospital). Six articles from a previous Knowledge Resource Service search were included in this output. After a title, abstract and paper review, 21 published articles and 6 grey literature sources were included, based on consensus of two writers. Three additional references were included based on recommendations from the reviewers.

The search was limited by the parameters of the questions – acute care settings, COVID-19, SARS-CoV-2 virus, rehabilitation interventions and needs, and discharge planning. The search was limited to publications in English. Papers that focused on health care service planning or alternative therapies/medical systems were not included. Given the paucity of research on this topic, editorials, opinion pieces, and commentary articles as well as consensus documents by reputable national and international consortiums or professional associations were included.

The evidence for this topic is primarily available in opinion pieces and guidance documents based on clinical expertise and expert opinion. No primary studies were identified that investigated rehabilitation protocols for COVID-19 patients in acute care settings. One retrospective case series (Mao et al. 2020) and one case report (Zhao, Shen et al. 2020); both sources are considered low quality evidence. Almost all documents included in this review present a well-grounded rationale for rehabilitation and/or clinical management informed by non-COVID-19 yet comparable research evidence on rehabilitation for critically ill patients.

#### *Limitations of this review*

The rapid turnaround time for this review precludes inclusion of studies on rehabilitation of critically ill patients in a broader context or drawing on other potentially comparable respiratory illness (e.g. SARS, influenza).

Given the paucity of evidence on the topic of rehabilitation for the critically ill COVID-19 patient, and specifically in the acute care setting, the recommendations rely on guidelines, expert consensus papers, and expert opinion. Therefore, this review should be read as a “rapid guidance summary”, rather than a rapid evidence review.

A number of sequelae attributed to the SARS-CoV-2 virus have been identified, including but not limited to central nervous system dysfunctions, stroke, and cardiovascular impairments. There are rehabilitation implications related to each and warrant attention. However, to address the rehabilitation needs in relation to each of these conditions is beyond the scope of this rapid review.

#### *Evidence synthesis*

### **1. What are the rehabilitation needs of COVID-19 patients in ICU and in-patient hospital settings?**

#### *Evidence from the primary literature*

No primary literature or original research was identified that addressed this question.

#### *Evidence from secondary and grey literature*

This synthesis is based on 7 “point of view” (POV) articles, 3 guidance reports, 2 commentaries, 2 editorials, 1 retrospective case series, and 1 case report. The 4 POV articles are based on real-time clinician experiences and the retrospective case series is a pre-print. Information extracted from each document is provided in Table 3a (in the Appendix section).

COVID-19 patients may have a range of rehabilitation needs based on (a) the severity of the infection caused by SARS-CoV-2; (b) manifestation of related symptoms and syndromes specific to COVID-19; and (c) the negative impact of treatment(s) and the ICU stay itself. These needs span the respiratory, physical, neurological, cognitive, and psychological health domains. Percy et al. 2020 also point out that COVID-19 patients with underlying comorbidities may experience “a more severe disease course with COVID-19”, which will have a direct impact on their rehabilitation needs and potential for recovery.

The potential rehabilitation needs of patients resulting from the COVID-19 infection include:

- Compromised respiratory function (Brugeliera *et al.* 2020; Cadra *et al.* 2020; Khan & Amatya 2020; Kiekens *et al.* 2020; Lew *et al.* 2020, Phillips *et al.* 2020; Simpson & Robinson, 2020)

- Symptoms of Acute Respiratory Distress Syndrome (Brugeliera *et al.* 2020; Simpson & Robinson, 2020; Spruit *et al.* 2020)
- Impairments or dysfunctions related to the sequelae of the SARS-CoV-2 virus infection:
  - Central nervous system dysfunctions (Brugeliera *et al.* 2020; Cadra *et al.* 2020; Lew *et al.* 2020; Phillips *et al.* 2020),
    - CRIMINE (Critical Illness Myopathy and Neuropathy) (Brugeliera *et al.* 2020; Cadra *et al.* 2020; Khan & Amatya 2020; Kiekens *et al.* 2020; Phillips *et al.* 2020)
    - Dyskinesia (Khan & Amatya 2020; Phillips *et al.* 2020)
    - Encephalopathy syndrome (Khan & Amatya 2020)
    - Headache (Mao *et al.* 2020)
    - Dizziness (Mao *et al.* 2020)
    - Impaired consciousness (Mao *et al.* 2020)
    - Ataxia (Mao *et al.* 2020)
    - Acute cerebrovascular disease (Mao *et al.* 2020)
    - Epilepsy (Mao *et al.* 2020)
    - Guillain Barre Syndrome (Zhao *et al.* 2020)
  - Cardiovascular (cardiomyopathy, myocardial infarction) (Brugeliera *et al.* 2020; Phillips *et al.* 2020; Spruit *et al.* 2020)
  - Acute kidney failure (Brugeliera *et al.* 2020; Spruit *et al.* 2020),
  - Cerebrovascular (stroke) (Phillips *et al.* 2020; Khan & Amatya 2020),
  - Liver dysfunction (Brugeliera *et al.* 2020; Spruit *et al.* 2020),
  - Peripheral nervous system (Mao *et al.* 2020)
    - Hypogeusia
    - Hyposmia
    - Neuralgia
  - Spleen dysfunction (Brugeliera *et al.* 2020)
  - Skeletal muscular symptoms (Mao *et al.* 2020)
  - Thrombosis (Khan & Amatya 2020)

The potential rehabilitation needs of patients arising from their ICU stay (i.e. prolonged immobilization/prone positioning) and the side effects of mechanical respiratory interventions may include:

- Dysphagia (Brugeliera *et al.* 2020; Cadra *et al.* 2020; Kho *et al.* 2020; Kiekens *et al.* 2020)
- Physical impairments:
  - General physical deconditioning - (ICU acquired) muscle weakness, reduced joint mobility (Brugeliera *et al.* 2020; Cadra *et al.* 2020; Kiekens *et al.* 2020; Khan & Amatya 2020; Kho *et al.* 2020; Lew *et al.* 2020; Polastri 2020; Stam *et al.* 2020; Simpson & Robinson, 2020; Phillips *et al.* 2020),
  - Pain (Cadra *et al.* 2020); neuropathic pain (Mao *et al.* 2020); neck and shoulder pain due to prolonged prone positioning (Kiekens *et al.* 2020; Kho *et al.* 2020),
  - Severe fatigue (Stam *et al.* 2020; Spruit *et al.* 2020 ; Phillips *et al.* 2020)
  - Impaired exercise tolerance (Stam *et al.* 2020); cardiovascular deconditioning (Phillips *et al.* 2020)
  - Pulmonary deconditioning (Phillips *et al.* 2020; Polastri 2020)
  - Impaired balance (Kiekens *et al.* 2020)

- Joint stiffness (Cadra et al. 2020)
- Limited ability to do activities of daily living (ADL) (Kiekens et al. 2020)
- Restrictive lung disease (Phillips et al. 2020)
- Psychiatric or psychological disorders (Brugeliera et al. 2020; Cadra et al. 2020; Khan et al. 2020; Kho et al. 2020; Lew et al. 2020; Stam et al. 2020; Phillips et al. 2020)
  - Anxiety
  - Depression
  - PTSD
  - Stress
- Cognitive impairments (Carda et al. 2020; Khan & Amatya 2020; Kho et al. 2020; Kiekens et al. 2020; Lew et al. 2020; Simpson & Robinson, 2020; Stam et al. 2020; Phillips et al. 2020)
  - Memory deficits
  - Executive function deficits
  - Confusion
  - Delirium

This constellation of complications is also related to ICU stay specifically and identified as PICS (Post-Intensive Care Syndrome) (Phillips et al. 2020; Stam et al. 2020).

The above stated rehabilitation needs of critically ill COVID-19 patients have been described in cited sources specific to acute care settings; however, they are not limited to the acute care context and most require attention post discharge (Stam et al. 2020; Thorton 2020). Several authors identified the key rehabilitation needs of the COVID-19 patient in an acute care setting to be physical deconditioning, respiratory impairments and compromised cognitive functioning (Brugleria et al. 2020, Carda et al. 2020; Lew et al. 2020; Kiekens et al. 2020; Yu et al. 2020). Given the potential complexity of how a critically ill COVID-19 patient presents and how potential underlying issues that may manifest due to the impact of the virus, the potential rehabilitation needs may be quite extensive and variable across individuals.

Initiation of rehabilitation earlier rather than later is recommended to prevent long term complications associated with the various impairments and sequelae associated with COVID-19, and to reduce the overall burden of disability (Lew et al. 2020; Khan et al. 2020; Philips et al. 2020; Yu et al. 2020). Stam et al. (2020) also stressed that longer ICU stays (Cadra et al. 2020; Kiekens et al. 2020; Spruit et al. 2020), which are more common for COVID-19 patients, are associated with higher risks of longer-term complications. This further emphasizes the necessity to address, if not initiate, rehabilitation needs, in acute care. Simpson and Robinson (2020) comment that rehabilitation of the critically ill patient will require integration along the continuum of care, which may be initiated in acute care, with the overarching goal of minimizing long-term disability.

Although the rehabilitation needs of COVID-19 patients are potentially extensive and early rehabilitation interventions are likely beneficial (Lew et al. 2020; Stam et al. 2020; Philips et al. 2020; Yu et al. 2020), several authors (Cadar et al. 2020; Kiekens et al. 2020; Yu et al. 2020) comment that rehabilitation in the acute context may be limited. This concern relates to the patient's weakness and instability, that it may place too much demand on the patient (required exertion for rehabilitation), and that rehabilitation may interfere with medical treatment focused on life preservation (Borg & Stam, 2020).

## 2. What are the appropriate rehabilitation interventions for COVID-19 patients in an ICU or in-patient hospital unit?

### *Evidence from the primary literature*

No primary literature or original research was identified that addressed this question. There are no published papers that recommend intervention based on published clinical trials applying rehabilitation interventions specifically to COVID-19 patients.

### *Evidence from secondary and grey literature*

This synthesis is based on 7 reports that provide guidance and/or practice recommendation, 5 POV articles, 1 position paper, 1 editorial, and 1 letter to the editor. Information extracted from each document is provided in Table 3b (in the Appendix section). Seven of the sources use expert consensus and/or real-time clinical experience, and all draw on previously published literature describing interventions for patients with acute respiratory distress syndrome and post-ICU syndrome to describe essential rehabilitation for acute care patients.

Particular attention is paid to early intervention, with opportunities to triage into post-discharge pathways (Phillips et al. 2020). Most papers also suggest that intervention for acute care patients needs to consider comorbidities.

The primary rehabilitation interventions recommended for COVID-19 patients in ICU and acute care focuses on:

- Respiratory functioning, for example, positioning( Lazzeri et al, Arch Chest Dis 2020 recommends limiting maneuvers that interfere with positive end expiratory pressures as well as monitoring side effects of prolonged prone positioning), airway clearance, weaning from mechanical ventilation (Ajimsha et al. 2020; Brugliera et al. 2020; Lazzeri et al. 2020; Polastri 2020; Pedersini et al. 2020; Thomas et al. 2020; Vitacca et al. 2020; Yu et al. 2020; Zhao et al. 2020)
- Physical deconditioning, for example, passive, active, resisted ROM and mobilization and strength training for peripheral muscle weakness (Ajimsha et al. 2020; Brugliera et al. 2020; Lazzeri et al. 2020; Polastri 2020; Pedersini et al. 2020; Simpson & Robinson, 2020; Spruit et al. 2002; Thomas et al. 2020; Vitacca et al. 2020; Yu et al. 2020, Zhu et al. 2020)
- Urgent sequelae associated with COVID-19 including for example, dysphagia and cognitive and psychological issues, and more generally, the prevention of complications secondary to prolonged immobilization and sedation (Alberta Health Services; Brugliera et al. 2020; Carda et al. 2020; Kho et al. 2020; Lazzeri et al. 2020; Simpson & Robinson, 2020; Spruit et al. 2002; Zhao et al. 2020; Zhu et al. 2020)

Almost all papers addressing rehabilitation in acute care include attention to safety and risk associated with providing care for COVID-19 patients in this setting, with recommendations for reorganization of services (including tele-rehabilitation) to reduce virus exposure for clinicians.

### 3. What are key rehabilitation considerations that should be included in a hospital discharge plan for a COVID-19 patient?

#### *Evidence from the primary literature*

No primary literature or original research was identified that addressed this question. Further there is no research evidence to regarding outcomes of acute or sub-acute rehabilitation interventions for the COVID-19 patient population. Spruit et al. 2020 indicated that the benefits of early physical rehabilitation post-ICU discharge are unclear.

#### *Evidence from secondary and grey literature*

The available information on the key hospital discharge considerations for rehabilitation needs of post-acute COVID-19 patients is limited. This synthesis is based on 3 POV articles, 2 guidance reports, 1 commentary, 1 letter to the editor, and 1 position paper. Two of the POV articles and the position statement are based on real-time clinician experiences. Information extracted from each document is provided in Table 3c (in the Appendix section).

As two authors clearly state, our understanding of COVID-19, and its rehabilitation implications, is incomplete as has only been studied over the last three months (Phillips et al. 2020; Sheehy 2020). Another paper speaks to the historical lack of appropriate rehabilitation for post-ICU patients, who often have high rehabilitation-related needs (Thorton 2020). These papers do suggest rehabilitation as part of the discharge plan process. Individualized assessments are required to address patients' continuing rehabilitation needs as first identified in the acute setting, and then reassessed and redressed at discharge and in the discharge plan (Brugliera et al. 2020; Kiekens et al. 2020; Phillips et al. 2020; Sheehy 2020; Spruit et al. 2020; Thorton 2020). Phillips et al. (2020) suggest using a Rehabilitation Prescription to identify rehabilitation needs and how they will be addressed after discharge, facilitating the development of a recovery pathway, instead of segmented therapies that are context dependent.

As outlined above (Q1), the rehabilitation intervention needs of critically ill COVID-19 patients are likely complex, long term, and span respiratory, mobility, functional, cognitive and psychological impairments that will likely require support from diverse rehabilitation disciplines (including physiatry, respiratory therapy, physiotherapy, occupational therapy, psychology, psychiatry, social work, speech language pathology and nursing) (Brugliera et al. 2020; Kiekens et al. 2020; Phillips et al. 2020; Sheehy 2020; Stam 2020; Thorton 2020; Vitacca et al. 2020). In addition to functional needs, Phillips et al. (2020) also identified that assistance with ADLs, assessment of the home environment and social re-integration supports will likely be required. Lastly, at time of discharge, patients and caregivers should be informed about the potential consequences after ICU stays, and the long duration of effects on functioning and quality of life (Stam 2020; Vitacca et al. 2020).

#### **Evolving Evidence**

There is currently no evidence regarding rehabilitation of COVID-19 patient in the acute care setting. More broadly, in the post-acute stage of rehabilitation, one clinical trial was identified aiming to assess a 6-week exercise program for COVID-19 who were recruited in the hospital setting (Liu et al. 2020). However, there appears to be significant research activity in this area. A review on physical exercise in relation to COVID-19 by the Oxford COVID-19 Evidence-Based Medicine Group (McCall et al. 2020) states that since the COVID-19 outbreak, 585 clinical trials on physical exercise for addressing COVID-19 symptoms have been registered (clinicaltrials.gov). During the search process for this review, the KRS librarian identified (through the TRIP Pro database) that there are several systematic reviews on rehabilitation and COVID-19 in progress with the earliest publication date expected to be June 2020. As

such, the body of research evidence in the area of physical rehabilitation, and likely rehabilitation more broadly given the complex sequelae possible for COVID-19 patients, will likely evolve and emerge. An update of this review may be warranted.

Date question received by advisory group: May 4, 2020

Date report submitted to committee: May 15, 2020

Date of first assessment: May 19, 2020

### Authorship and Committee Members

The review was written by Ania Kania-Richmond, Cyndie Koning, and Kiran Pohar Manhas. It was scientifically reviewed by Chester Ho (external reviewer), Christopher Grant (external reviewer), Ming Chan (external reviewer), Adalberto Loyola Sanchez (external reviewer) and Stephanie Plamondon (external reviewer). The full Scientific Advisory Group was involved in discussion and revision of the document: Braden Manns (co-chair), Lynora Saxinger (co-chair), John Conly, Alexander Doroshenko, Shelley Duggan, Nelson Lee, Elizabeth MacKay, Andrew McRae, Jeremy Slobodan, James Talbot, Brandie Walker, and Nathan Zelyas.

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# COVID-19 Scientific Advisory Group

## Rapid Evidence Report

### Appendix

#### List of Abbreviations

ADL: Activity of Daily Living

AHS: Alberta Health Services

ARDS: Acute Respiratory Distress Syndrome

COVID-19: Coronavirus Disease-2019

ICU: Intensive Care Unit

PODS: Patient Oriented Discharge Summary

POV: Point of View

SAG: Scientific Advisory Group

KRS: Knowledge Resource Services

PICS: Post Intensive Care Syndrome

#### Expanded Evidence Synthesis

##### Methods

###### Literature Search

A literature search was conducted by Nicole Loroff from Knowledge Resources Services (KRS) within the Knowledge Management Department of Alberta Health Services. KRS searched databases for articles published from 2019 and included: OVID MEDLINE, LitCovid, PubMed, TRIP PRO, WHO COVID-19 Database, Centre for Evidence Based Medicine (CEBM), Google and Google Scholar.

Briefly, the search strategy involved combinations of keywords and subject headings including:

- "COVID-19" OR coronavirus OR "corona virus" OR "SARS-COV-2" OR "severe acute respiratory syndrome"
- Rehabilitation OR Allied Health Personnel OR Allied Health Occupations OR rehab\* or physio or physiotherap\* or physical therap\* or allied health or PT
- Hospital\* OR Intensive Care Units OR Inpatients or Hospitalization OR acute or acute care or postacute or inpatient\* OR in-patient\* OR hospital\* OR intensive care or ICU)
- Patient Discharge OR discharg\* OR post-discharg\* OR postdischarg\* OR post discharg\*

Articles identified by KRS in their search were screened by two writers by title, abstract and full paper against the inclusion/exclusion criteria listed in Table 1 below. 64 published articles and 12 grey literature sources were identified by KRS with references and abstracts provided for further review. 47 published articles (2 were included that were initially identified as grey literature sources) and 9 grey literature sources were excluded from the review in accordance with the inclusion/exclusion criteria stated below. Two literature sources were identified outside of the literature search. Three additional sources were identified by the reviewers. The final number of included published articles was 21 and 6 grey literature sources.

Other information to consider including:

-the published and grey literature included in this review (or guidance summary) was not critically appraised as it is considered to be low quality evidence overall. No primary literature or systematic reviews were identified that directly addressed. Almost all sources are opinion pieces or guidance documents which draw on non-COVID-19 protocols and/or research.

**Table 1.** Inclusion and exclusion criteria for results of the literature search

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> <li>- Acute setting</li> <li>- Hospitalization</li> <li>- Critical illness/severe</li> <li>- COVID-19</li> <li>- Rehabilitation needs (patient), professions, interventions</li> <li>- Rehabilitation needs post-discharge</li> <li>- Not restricted to age-defined populations</li> <li>- Any jurisdiction</li> <li>- 2019 to present (focus on COVID-19 outbreak)</li> <li>- All published documents (grey and academic sources)</li> <li>- English language only</li> <li>- All publication status: Pre-print, ahead of print, accepted, published</li> </ul>	<ul style="list-style-type: none"> <li>- Article is not from a credible source (author or publisher)</li> <li>- Non-COVID-19 conditions (SARS, ARDS)</li> <li>- Focused on treatment of a symptom or syndrome but not in context of the COVID-19 patient (e.g. dysphagia, delirium)</li> <li>- Article focused on health services organization; resource allocation</li> <li>- Exclusive focus on rehabilitation professions rather than rehabilitation interventions</li> <li>- Alternative therapies/medical systems</li> </ul>

*Critical Evaluation of the Evidence*

The published articles included in this review (or guidance summary) in response to the 3 questions include:

Nine “point of view” articles were included (1 was a pre-print and 4 were e-published ahead of print), 8 practice recommendation/guidance reports were included (1 was a pre-print and 1 was e-published ahead of print) from reputable sources, 2 letters to the editor (1 was e-published ahead of print), 2 commentaries, 2 editorials, 2 position papers from reputable sources, 1 retrospective case series, and 1 case report. With the exception of one source (location: Qatar), the included literature is based in contexts (Europe, North America, and China) considered relevant to the Alberta context and COVID-19 response.

The quality of the research cited in the documents was not appraised given the types of sources that were included in this review. With the exception of reports that draw on clinical experience and real-time observations in COVID-19 health provision, almost all sources extrapolate from non-COVID-19 protocols and/or research. The overall quality of the available sources is considered low.

*Search Strategy*

**Search Strategy**

Breakdown of where results were sourced, including both published and grey lit (76 total):

MEDLINE (via OVID) = 13

PubMed = 24

TRIP Pro = 3

LitCOVID, WHO, and other vendor resources = 19

Google/Google Scholar = 11

Gleaned from previous searches = 6

Database(s): **Ovid MEDLINE(R) and In-Process & Other Non-Indexed Citations and Daily** 1946 to May 08, 2020

**Table 2: Search Strategy:**

#	Searches	Results
1	exp Coronavirus/ or exp Coronavirus Infections/ or coronaviru*.mp. or "corona virus*".mp. or ncov*.mp. or n-cov*.mp. or "novel cov".mp. or COVID-19.mp. or COVID19.mp. or COVID-2019.mp. or COVID2019.mp. or SARS-CoV-2.mp. or SARSCoV-2.mp. or SARSCoV2.mp. or SARSCoV19.mp. or SARS-Cov-19.mp. or SARSCov-19.mp. or SARSCoV2019.mp. or SARS-Cov-2019.mp. or SARSCov-2019.mp. or "severe acute respiratory syndrome coronaviru*".mp. or "severe acute respiratory syndrome cov 2".mp. or "2019 ncov".mp. or 2019ncov.mp.	22741
2	exp Rehabilitation/ or exp Allied Health Personnel/ or exp Allied Health Occupations/ or (rehab* or physio or physiotherap* or physical therap* or allied health or PT).mp.	678614
3	exp Hospitals/ or exp Hospital Departments/ or Intensive Care Units/ or Inpatients/ or Hospitalization/ or (acute or acute care or postacute or inpatient* or in-patient* or hospital* or intensive care or ICU).mp.	4027207
4	1 and 2 and 3	111
5	limit 4 to english language	96
6	limit 5 to yr="2020 -Current"	28
7	Patient Discharge/ or (discharg* or post-discharg* or postdischarg* or post discharg*).mp.	264725
8	6 and 7	5
9	1 and 2 and 7	15

**PubMed**

#	Searches	Results
1	"coronavirus"[MeSH Terms] OR "coronavirus infections"[MeSH Terms] OR "coronaviru*"[Title/Abstract] OR "corona virus"[Title/Abstract] OR "ncov*"[Title/Abstract] OR "n cov*"[Title/Abstract] OR "novel cov"[Title/Abstract] OR "COVID-19"[Title/Abstract] OR "COVID19"[Title/Abstract] OR "COVID-2019"[Title/Abstract] OR "COVID2019"[Title/Abstract] OR "SARS-CoV-2"[Title/Abstract] OR "SARSCoV-2"[Title/Abstract] OR "sarscov2"[Title/Abstract] OR "SARSCoV19"[Title/Abstract] OR "sars cov 19"[Title/Abstract] OR "severe acute respiratory syndrome cov 2"[Title/Abstract] OR "2019 ncov"[Title/Abstract] OR "2019ncov"[Title/Abstract] OR "severe acute respiratory disease"[Title/Abstract]	29609
2	"rehabilitation"[MeSH Terms] OR "allied health personnel"[MeSH Terms] OR "allied health occupations"[MeSH Terms] OR "rehab*"[Title/Abstract] OR "physio"[Title/Abstract] OR "physiotherap*"[Title/Abstract] OR "physical therap*"[Title/Abstract] OR "allied health"[Title/Abstract] OR "PT"[Title/Abstract]	583411
3	"hospitals"[MeSH Terms] OR "hospital departments"[MeSH Terms] OR "intensive care units"[MeSH Terms] OR "inpatients"[MeSH Terms] OR "hospitalization"[MeSH Terms] OR "acute"[Title/Abstract] OR "acute care"[Title/Abstract] OR "postacute"[Title/Abstract] OR "inpatient*"[Title/Abstract] OR "in-patient*"[Title/Abstract] OR "hospital*"[Title/Abstract] OR "intensive care"[Title/Abstract] OR "ICU"[Title/Abstract]	3965056
4	1 and 2 and 3	109
5	limit 4 to english language	97
6	limit 5 to yr="2020 -Current"	50
7	"patient discharge"[MeSH Terms] OR "discharg*"[Title/Abstract] OR "post discharg*"[Title/Abstract] OR "postdischarg*"[Title/Abstract] OR "post discharg*"[Title/Abstract]	268888
8	6 and 7	9
9	1 and 2 and 7	18

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**Table 3a – Data extract from literature to relevant to question 1: *What are the rehabilitation needs of COVID-19 patients in ICU and in-patient hospital settings?***

Source	Type	Date	Guidance
Brugliera et al.	Letter to Editor	14- Apr-2020	This letter to the editor outlines the syndromes and symptoms that have been associated with COVID-19. Two distinct phases are identified: the first phase, where patient needs are primarily focused on the respiratory system. The second phase where needs extend due to issues arising in relation to a prolonged ICU stay. Physical, neuromotor, and cognitive needs of COVID-19 patients are identified. Specifically, the infection results in a negative impact on respiratory function. Prolonged bed rest and required isolation may result in limited mobility, resulting in physical deconditioning (muscle weakness; retraction; articular limitation) and balance disorders. Swallowing functions may be compromised due to need for mechanical ventilation, leading to the development of dysphagia. Cognitive function may be impacted due to anoxic damage. Psychological well being may be negatively impacted by the experience of the disease and ICU stay, leading to anxiety, depression, PTSD.
Cadra	POV	10-Apr-2020	The guidance document is based on clinical experiences in Italy and informed by research on other conditions (e.g. SARS, encephalitis). Patient needs are associated with resulting sequelae ( <i>consequences</i> ) of COVID-19, which depend on the severity of the disease and effected organ systems. In severe acute stages, rehabilitation may not be indicated. Key areas that require attention are respiratory function, central nervous system related issues, cognitive impairment, physical deconditioning, CRIMYNE, dysphagia, joint stiffness and pain, and psychiatric problems. Overall, rehabilitation needs of COVID-19 patients are related to addressing and minimizing potential disability.
Khan	Commentary	9-Apr-2020	Authors site that reports from China, Italy, Spain and South Korea indicate the common respiratory symptoms but also more complex clinical presentations that include physical, cognitive, neurological impairment. More severe cases have also been associated with increased likelihood of cerebrovascular events, impaired consciousness and muscle injuries. The diversity and complexity of symptoms and their combined presentation at the individual level has significant rehabilitation implications. The authors also state that early rehabilitation intervention reduces the disability burden.
Kiekens	POV	15-Apr-2020	The article provides a summary of a webinar presented by the Italian Society of Physical and Rehabilitation Medicine, primarily based on clinical experiences. Rehabilitation needs of patients in acute care settings are related to (physical) weakness, fatigue, joint stiffness, dysphagia, and impaired functioning, related to

			prolonged immobilization in prone positions. Patients rehab needs are also dependent on potential complications related to infection (e.g. respiratory distress, hypoxia).
Lew	POV	2020	The article discusses the short term rehabilitation needs of COVID-19 patients in the acute care setting and the importance of initiating rehabilitation protocols in the acute setting to reduce potential complications or poor outcomes in the long term. In the acute care context, “debility, the ICU stay and use of ventilation supports will lead .... to physical, cognitive and psychological deficits”. The authors emphasize the need to initiate addressing these deficits through rehabilitation interventions at the acute stage and continuity post-discharge.
Polastri	Editorial	2020	Even though there is a paucity of evidence on physiotherapy (rehabilitation) modalities for COVID-19 patients, the author identifies that COVID-19 patients admitted to acute or critical care units will require physical rehabilitation to restore physical function due to the required bed rest and mechanical ventilation procedures.
Simpson	POV	2020	Given the evolving knowledge base specific to COVID-19, the author extrapolates knowledge from other health conditions to discuss potential rehabilitation needs of critically ill COVID-19 patients. It is anticipated that these patients will develop acute respiratory distress syndrome (ARDS) and numerous physical, cognitive and psycho-social impairments. Rehabilitation needs in the physical domain include muscular strengthening and addressing related issues such as a contractures and postural instability. In the cognitive domain, delirium is a major concern. Other cognitive impairments include memory, attention, and executive function. The psychosocial domain requires attention specific to depression, PTSD, anxiety, and needs of the family/caretakers.
Stam	Commentary	2020	The authors highlight some of the key rehabilitation needs of critically ill COVID-19 patients, which are primarily related to the consequences associated with an ICU stay and treatment of severe respiratory illness. The authors specifically highlight the CRIMINE and Post Intensive Care Syndrome (PICS), which is a constellation of cognitive, physical, and psychiatric impairments. The authors also comment that length of stay in the ICU is associated with a higher risk for developing longer term physical, cognitive and psychological complications
Yu	POV	2020	The article outlines the rationale for early rehabilitation intervention in context of the needs of critically ill COVID-19 patients. Primary rehabilitation goals should aim to support restoration of the respiratory system and regaining physical conditioning and independence, as well as preventing or reducing

			generalized muscle weakening. More broadly, early rehabilitation is described as an essential aspect of a multidisciplinary approach in the management of critically ill patients, recognized to prevent complications and promote and/or improve system functioning.
GREY LITERATURE			
Philips	Practice recommendations	27-Apr-2020	The report prepared on behalf of the British Society for Rehabilitation Medicine, stresses the importance of rehabilitation in the recovery pathway of critically COVID-19 patients and suggests that it should be initiated ideally during intensive care. The range and individualized nature of rehabilitation needs are also highlighted, given the diversity of presentations reported in COVID-19 patients. At this time, there is some knowledge about the range of potential symptoms, complications and early disability, however little is known about the potential long term consequences and needs of COVID-19 patients.
Kho	Practice recommendations	24-Apr-2020	The guidance for rehabilitation professions elucidates the needs of critically ill COVID-19 patients in an acute care setting that may benefit from rehabilitation interventions. This includes cognitive impairments, specifically delirium; limited physical abilities; psychological distress; dysphagia.
Spruit	Practice recommendations	3-Apr-2020	Authors describe a number of symptoms and syndromes evident in the clinical presentation of critically ill COVID-19 patients: ARDS, fatigue, acute kidney impairment, cardiac injury, and liver dysfunction. There is also a higher risk of vascular inflammation, myocarditis, and cardiac arrhythmias, the authors suggested is associated with the inflammatory state provoke by COVID-19.

**Table 3b – Data extract from literature to relevant to question 2: *What are the appropriate rehabilitation interventions for COVID-19 patients in an ICU or in-patient hospital unit?***

Source	Type	Date	Guidance
Ajimsha et al.	Practice recommendations *not peer reviewed/not published	23-Apr-2020	Focuses on acute care physiotherapy practice, including an algorithm for screening and management addressing different types of COVID-19 patients (e.g., ventilated or not). Intervention recommendations address complications of prolonged recumbent positioning, ROM activities, positioning, facilitating oxygenation, improving lung capacity, and progressive strengthening and mobilization.

			Recommendations address therapeutic best practice in respiratory interventions, mobilization interventions, infection control practices, and activities that are specifically contraindicated for COVID-19 patients in the acute phase of illness.
Brugliera et al.	Letter to Editor	14- Apr-2020	This letter outlines the need to address rehabilitation related to respiratory, infective or neurological issues along with potential sequelae such as bedsores, peripheral muscle weakness, articular limitations, balance/postural disorders, and physical deconditioning requiring a multidisciplinary approach, particularly for patients with co-morbid presentations. In the acute phase, early respiratory management is recommended including “management of non-invasive ventilation, frequent changes of posture, passive mobilization, positional therapy...” In addition, the author suggests that neuromotor rehabilitation; therapy aimed at reducing post-intubation iatrogenic dysphagia; and addressing alterations in cognitive function should be considered.
Cadra	POV	10-Apr-2020	General goals of rehabilitation is to reduce disability; recognizing that rehabilitation for patients with lung fibrosis secondary to acute respiratory distress (ARDS) is challenging (previously established treatment for ARDS is recommended. For patients who may have neurological sequelae, bedside screening of executive functioning and memory is recommended. Critical illness myopathy and neuropathy related manifestations (e.g., severe muscle wasting and polyneuropathy) need to be considered but these authors do not provide specifics on intervention. Screening for post-extubation dysphagia is considered mandatory The authors recommend that psychiatric problems be addressed by improved communication and screening for depression, for both staff and patients (tele-consulting is recommended). The authors recognize that the role of PT in acute-care units and ICU may be limited for patients with severe/critical COVID-19 and recommend the use of tele-rehab to minimize exposure risk.
Lazzeri	Position statement	2020	Recommendations focus on specific management based on level of care required, monitoring clinical condition after postural changes, watching for side effects from prolonged prone position, early passive mobilization and risk/safety guidance for clinicians. Directions are given specific to non-invasive ventilatory support and invasive mechanical ventilation. Specific procedures that should not be applied in the acute phase are outlined. Suggestions are given for side effects related to rehabilitation including, for example, pressure ulcers, facial/periorbital oedma, and brachial

			plexus injury. Safety considerations are outlined to reduce clinician risk.
Polastri	Editorial	2020	Author draws a parallel to patients with acute respiratory distress syndrome and suggests that mobilisation can be a viable intervention but that elucidation is required for frequency, type and intensity of motor exercises, helping to determine specific algorithms for treatment. Reference is made to the position paper from the Italian Association of Respiratory Therapists (see Lazzari et al., 2020)
Pedersini	POV	Accepted April 2, 2020	Guidance provided is general: Respiratory physical therapists may focus on providing care related to non-invasive mechanical ventilation, respiratory fatigue, complications of prolonged immobility, prone positioning, weaning from mechanical ventilation, and assisting in return to functional ADL. These authors also refer to the specifics outlined in the Lazzeri article.
Simpson	POV	2020	Guidance focuses on acute respiratory distress syndrome and the sequelae associated with post-ICU syndrome. Focus on intervention is on early minimization of disabling effects of impairments, with consideration for short and long term trajectories. Rehabilitation in ICU focuses, for example, on screening for delirium and passive and active mobilization. Rehabilitation in acute care may focus, for example, on the distress associated with acute disablement, enabling self-care, collaborative goal setting and communication with family. This paper also provides guidance on specialty rehabilitation units, prehabilitation, and methods of providing intervention outside of inpatient stays.
Thomas	Practice recommendations	2020	In addition to workforce planning and preparation recommendations and guidelines for whom physiotherapists (PT) should treat, this paper also includes specific screening guidelines for PT related referral for respiratory intervention (e.g., airway clearance techniques, non-invasive ventilation and inspiratory positive pressure breathing, techniques to facilitate secretion clearance), as well as mobilization and exercise (e.g., ROM, bed mobility, sit to stand). Suggestions for mobility and exercise equipment are given to address safety and risk. They suggest that the focus of PT is on early rehabilitation to limit the severity of ICU-acquired weakness.
Yu	Opinion paper	2020	These authors recommend early rehabilitation to prevent complications, promote weaning from mechanical ventilation, maintain and improve system function, improve prognosis, quality of life and return to daily activities. They suggest that this is “achieved by the reduction of patient’s dependency on the ventilator, reduction of secretion

			retention, atelectasis and pneumonia, maintenance or recruitment of lung volume, improvement of regional or global ventilation and compliance, improvement of ventilation/perfusion match, reduction of airway resistance and work of breathing, and optimization of oxygenation,” while also addressing preservation and improvement of respiratory and peripheral muscle strength.
Zhao	Practice recommendations	2020	This guideline document systematically addresses the basic principles of respiratory rehabilitation focusing on ameliorating dyspnea, alleviating anxiety and depression, reducing complications, preventing and improving dysfunction, reducing morbidity, preserving function and improving quality of life. This guidelines suggests that early respiratory rehabilitation is not recommended for critically ill patients. Their approach for patients in isolation, aimed at reducing usage of protective equipment, includes educational videos, self-management booklet and remote consultation. For milder presentations in acute care (called cabin hospitals) patient education, exercise/activity recommendations and psychological interventions are recommended. The authors include specific criteria for inclusion in exercise activities. Primary interventions for “respiratory rehabilitation include airway clearance, breathing control, physical activity and exercise.” Specific activities are suggested for each of these interventions. For critically ill patients addresses positioning management, early mobilization, and respiratory management, again with specific recommendations on timing of intervention and when early rehabilitation should be discontinued.
Zhu	Letter to editor	Apr 2020	Although this letter describes only a single patient, the author clearly describes 4 essential components of the rehabilitation process in ICU. These include postural change and prone positioning, respiratory training to restore respiratory muscle strength and lung volume, early mobilization to address ICU-acquired weakness and improve respiratory function and psychological intervention (addressing anxiety and depression) and sleep promoting measures. Early pulmonary rehabilitation was considered essential in addressing the pulmonary fibrosis. The letter includes a summary based on time progression of the ICU stay and when interventions were initiated.
GREY LITERATURE			
AHS	Guidance document	7-May-2020	Specific recommendations are given for allied health to address triage, intervention options (including assessment, diet modifications, and treatment)

Kho	Practice recommendations	24-Apr-2020	<p>This summary document provides general guidelines on the provision of rehabilitation for patients with COVID-19, including specifics related to procedures that require airborne precautions, induce sputum (e.g., respiratory physiotherapy, swallowing and speech assessments and some ADLs). A summary of occupational therapy roles in acute care includes: “prevention, detection, and monitoring of delirium; assessment and management of impairments in physical and cognitive functioning; optimize bed and seating positioning using pressure relief principles (e.g., mattress); assessment and management of ADLs to encourage early mobilization; provision of assistive devices for ADLs, communication, seating and mobility; consider and assess mental health and emotional coping strategies for patients. For a summary of physical therapy recommendations the authors refer to the document by Thomas, et al. A summary of speech-language pathology in acute care includes: “assessment and management of dysphagia post-extubation; assessment and management of dysphagia upon decompensation; assessment and management of dysphagia upon respiratory compromise; assessment of basic cognitive and communication functions; provision of primarily low-tech AAC equipment that can be discarded after use.”</p>
Phillips	Guidance report	27-Apr-2020	<p>Authors suggest that rehabilitation is a critical component of the acute care pathway for COVID-19 patients, recommending that rehabilitation occur as early as possible (preferably while the patient is in the ICU) and that a coordinated effort needs to focus on both the physical and neurological sequelae. They also suggest that intervention take into consideration, for example, premorbid functional abilities and comorbidities.</p>
Spruit	Practice recommendations	3-Apr-2020	<p>This point form document summarizes the main COVID-19 and comorbid symptoms that should be considered for hospitalized patients. Citing the WHO, this group recommends active mobilization of critically ill patients, when it is safe to do so. Citing Thomas et al., they recommend the use of clinical practice guidelines for respiratory physiotherapy in acute care. Other interventions are focused on additional sequelae of COVID-19 post-ICU. The authors also outline specifics related to what is not known about COVID-19 patients which may be relevant for rehabilitation.</p>

Vitacca	Position statement	8-Mar-2020	<p>It is important to note that this Italian position paper defines respiratory therapy broadly to include “exercise training, education, and behavioral modification designed to improve the physical and psychological condition of people with respiratory disease.” They suggest that therapy be delivered in three phases (assessment, intervention, re-assessment) with “particular attention to the state of consciousness, respiratory, cardiological, motor function, and quality of life”, tailored to individual needs. <u>Acute phase (very severe respiratory condition)</u>: Specific interventions (and when to withdraw interventions) suggest procedures aimed at, for example, reducing dyspnea, tracheobronchial clearance, training of skeletal muscles, etc. Airway clearance techniques are not recommended during the acute phase in patients without major bronchial obstruction. The authors suggest that “frequent changes of posture, passive mobilization and/or muscular electrical stimulation should be planned in the unconscious patient.” They also recommend positional therapy with close monitoring. Acute phase (severe condition): Authors suggest monitoring of clinical conditions and specific physical activities related to disability prevention. In addition, organizational changes to support rehabilitation are recommended.</p>
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**Table 3c – Data extract from literature to relevant to question 3: *What are key rehabilitation considerations that should be included in a hospital discharge plan for a COVID-19 patient?***

Source	Type	Date	Guidance
Brugliera et al.	Letter to Editor	14- Apr-2020	<p>This letter to the editor speaks to the range of symptoms and sequelae associated with infection with SARS-COV-2. The author argues that rehabilitation needs continue after acute care discharge. Discharge may be to a tertiary care centre if patients continue to experience respiratory or motor issues, while COVID-19 patients with few or minor sequelae may continue with home or outpatient rehabilitation, mainly aimed at motor skill restoration and psychological recovery promotion. The rehabilitation program should be personalized to patients and may include: aerobic exercise; strength training; static and dynamic balance training; bronchial clearance techniques; evaluation of the Activities of Daily Life; and/or neuropsychological training.</p>
Kiekens	POV	15-Apr-2020	<p>Article provides a summary of a webinar presented by the Italian Society of Physical and Rehabilitation Medicine, primarily based on clinical experiences. The authors call for continued contact and communication with discharged COVID patients (to they do not feel abandoned). Discharge preparation should consider the relatively long</p>

			length of stay in ICU for some COVID patients (as in Italy), with the sequelae from lengthy immobilization and many hours in prone position. Problems to consider at discharge include severe muscle weakness and fatigue, joint stiffness, dysphagia, (neuro)psychological problems, impaired functioning concerning mobility, activities of daily living and work.
Sheehy	POV	8-May-2020	The author of this viewpoint paper rightly recognizes that our understanding of COVID-19 is incomplete as it has only been studied over the last three months. This viewpoint article tackled the rehabilitation needs of survivors of COVID-19. Much written on COVID-19 is based on expert opinion, not direct observation of actual patient trajectories. The author pulls from another ICU-related condition, sepsis, to expect that 30% of patients hospitalized required facility-based care post-acute discharge and another 20% required home health care. Post-acute rehabilitation at home is recommended where possible to promote isolation and minimize risk of disease spread. This requires enhanced homecare and available outpatient rehabilitation. Telerehabilitation may be considered. Assessment and treatment could be synchronous or asynchronous. Post-acute rehabilitation include respiratory rehabilitation. This may include inspiratory muscle training (if inspiratory muscles are weak); deep, slow breathing; thoracic expansion; diaphragmatic breathing; mobilization of respiratory muscles; airway clearance techniques, and positive expiratory pressure devices. Mobility and functional rehabilitation needs should be assessed. In-patient rehabilitation could be provided by physiotherapists (mobilization, muscle strengthening, aerobic reconditioning and balance), occupational therapists (instrumental activities of daily living guidance), speech-language pathologists (treat dysphagia and voice impairments), and psychologists or social workers (depression, anxiety or PTSD). The author suggest where this inpatient rehabilitation could be provided at home at an equivalent level, then it should be.
Stam	Commentary	14-Apr-2020	The authors of this commentary call for recognition of the consequences from severe respiratory illness and the secondary disabilities from (prolonged) intensive care treatments, including critical illness polyneuropathy (CIP), critical illness myopathy (CIM): both as part of the Post Intensive Care Syndrome (PICS). Patients experiencing CIP suffer from decreased exercise capacity, disability and compromised quality of life for months even years after intensive care. These are issues that must be considered in discharge planning. Patients and caregivers should be informed on consequences after ICU stays, and the long-duration of limitations in functioning. At discharge, adequate screening for PICS by a GP or multi-professional team may be in order; some patients will be discharged to tertiary rehabilitation as an adequate resource for the surge in rehabilitation needs post-COVID-19.
Thorton	POV	6-May-2020	This opinion paper speaks about the historical lag in getting post-ICU patients the rehabilitation care that they require. They suggest that as COVID-19 patients who were ventilated are discharged from hospital, a

			<p>“tsunami of rehabilitation needs” will follow. At the time of publication, the NHS was developing COVID-19 recovery plans. The author suggests that COVID-19 survivors will require more psychological support than typical ICU patients (due to higher levels of “survivor’s guilt” and post-traumatic stress disorder). Post-acute discharge into the community requires general practitioner involvement and awareness. The author calls for communication and clarity on the longstanding physical, psychological and cognitive sequelae requiring rehabilitation post-discharge. The paper includes three case studies of successful, cost-efficient post-ICU follow-up and rehabilitation. These cases include a rehabilitation group, a follow-up clinic (with consultant and physiotherapy) and an outpatient clinic (offering physiotherapy, psychology, aid with memory, and ENT treatment).</p>
GREY LITERATURE			
Joint statement	Position paper		
Phillips	Guidance report	27-Apr-2020	<p>The report prepared on behalf of the British Society for Rehabilitation Medicine outlines considerations for on-going rehabilitation post-charge to include the physical, cognitive, and psychological needs associated with the ICU stay and the direct impact of the virus. It is anticipated that critically ill COVID-19 patients will likely have on-going complex rehabilitation needs post-discharge. In addition to functional needs, assistance with ADLs, assessment of the home environment and social re-integration supports will likely be required. A Rehabilitation Prescription may be used to identify rehabilitation needs and how they will be addressed after discharge, facilitating the set up of a recovery pathway instead of segment therapies that are context dependent.</p>
Spruit	Practice recommendations	3-Apr-2020	<p>The authors suggest that at discharge, an individualized rehabilitation assessment of rehabilitation needs should be completed that incorporates immediate and short-term needs. Rehabilitation professionals may provide input on triaging of patients to the appropriate services post-discharge. Follow ups post-charge are also recommended to reassess the on-going rehabilitation needs of patients and adjust rehabilitation plans or services accordingly.</p>
Vitacca	Position statement	8-Mar-2020	<p>Joint statement from Italian Thoracic Society, Italian Respiratory Society, and Association for the Rehabilitation of Respiratory Failure. Recommendations during the post-acute phase include recognition that post-acute COVID-19 infection, patients may present with disability, functional damage, reduced participation and deterioration in quality life following discharge (short and long term). Patients with comorbidities will take longer to recover post-discharge. The authors recommend daily protocols to evaluate clinical parameters (likely only if discharge to tertiary care). Weaning of oxygen therapy is indicated. Reconditioning interventions are indicated for weaned patients and those with prolonged weaning from mechanical ventilation and oxygen use. Patients discharged to isolation should receive rehabilitation via</p>

			<p>telehealth. Patients discharged home or to other facilities in community should receive indications on how to cope with physical activity, which must be closely monitored regarding function, capacity and participation when patient is no longer infectious. As soon as possible (pre/post discharge), patients should get assessed on balance, function, exercise capacity, and oxygenation response during effort and night-time. Further support post-discharge includes chest physiotherapy and psychological support.</p>
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