NHS
The Leeds Teaching Hospitals
NHS Trust

Physiotherapy Services

COVID-19 Physiotherapy Rehabilitation Guide

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Adult Therapies

This Clinical Guideline is intended for use by healthcare professionals within Leeds unless otherwise stated. For healthcare professionals in other trusts, please ensure that you consult relevant local and national guidance

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This guidance will update regularly so please refer to the date on the front page of this e-version and do not print.

This guidance is underpinned by a sparse and developing peer reviewed evidence base. To date there has been no research to support physiotherapy management and intervention.

The process of patient assessment, analysis, clinical reasoning, MDT discussion and peer review is a critical part of physiotherapy intervention planning.

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Jargon Buster

15L Non re breathe mask	Device used to assist in delivery of higher concentrations of oxygen
A-AROM	Active Assisted Range of Motion; patient uses muscles to move joint through range of motion but requires support from therapist to assist.
ARDS	Acute Respiratory Distress Syndrome
AROM	Active Range of Motion; patient moves joint through range of movement with no assistance.
ARCU	Acute Respiratory Care Unit
Bi-level	Bi-level or BIPAP is a method of ventilation which provides inspiratory positive pressure (IPAP) when breathing in and expiratory positive pressure (EPAP) when breathing out
BP	Blood Pressure; pressure of circulating blood on the walls of blood vessels.
BDA	British Dietetic Association
Cardiac Chair position	Refers to achieving a sitting position in bed without undue strain. Provides relief to the lungs and circulatory system.
Ceiling of care	Refers to levels of care which a patient is deemed appropriate to receive. Normally 3 levels (ward based care, HDU care, ICU care).
CPAx	Chelsea Critical Care Physical Assessment Tool
CPAP	Continuous positive airway pressure: form of positive airway pressure through a ventilator, applying air pressure on a continuous basis.
CCU	Coronary Care Unit
COVID-19	An infectious disease caused by a newly discovered coronavirus in 2019.
Cuff deflation	Deflation of cuff (balloon) on a cuffed tracheostomy, to support with weaning from tracheostomy and aid vocalisation.
Dyspnoea	Shortness of breath.
EQ-5D-5L	Quality of Life outcome measure
FiO2	Fraction of Inspired Oxygen; volumetric fraction of oxygen in the inhaled gas.
HDU	High Dependency Unit - hospital setting which treats very unwell patients.
HR	Heart Rate; speed at which the heart beats
High flow oxygen therapy	Device which oxygen, compressed air and humidification are delivered at a high flow rate to support with respiratory effort.

Inotropic support	Refers to those receiving inotrope medications, which are used to support the cardiovascular system
ICU	*Intensive Care Unit* - Setting in a hospital which treats the most unwell patients.
Intubated	Tube inserted into the trachea (windpipe) for ventilation
J10	Respiratory Ward extended from ARCU
Modified Prone	An alternative achievable position to full prone e.g. like the recovery position, sat leaning forward / resting on a table
MRMI	Modified Rivermead Mobility Scale
MDT	*Multi-disciplinary team*; includes all members of the team looking after a patient's care
Nasal Cannula	Device which delivers supplementary oxygen via the nasal airway.
NG	Nasogastric tube; delivers liquid nutrition from the nose to the stomach.
NJ	Nasojejunal tube; carries delivers liquid nutrition from the nose to the jejenum (part of small intestine).
NEWS2	*National Early Warning Score;* Aids the detection of clinical deterioration in adult patients.
Nebuliser	Device used to change liquid into droplets which are small enough to inhale into the lungs (used for inhaled medications)
NIV	*Non-invasive ventilation*; method of mechanical support for breathing through a non-invasive method such as a sealed facemask sealed nasal mask or hood device.
O2	*Oxygen*
OT	*Occupational Therapist*
PROM	*Passive Range of Motion*; therapist moves the joint through range of motion with no effort from patient
PPE	*Personal Protective Equipment*
PRAFO's	*Pressure Relief Ankle Foot Orthosis* - also used to help maintain neutral range at the ankle. Used regularly for immobile patients.
SpO2	Peripheral capillary oxygen saturation - it is an estimate of arterial oxygen saturation
Prone	Lying flat on front / tummy
Purse lipped breathing	Breathing technique that consists of breathing out through tightly pursed lips to control breathing rate
Self-ventilating	Breathing without mechanical support.
Side lying	Laying on side with pillow support as far over as a patient can tolerate

SOEOB	*Sitting on Edge of Bed:* often used to describe position within rehab.
SLT	Speech and Language Therapist
Tracheostomy	An incision in the front of the neck and a tube inserted into the trachea (windpipe) to help you breathe.
Ventilated	Artificial mechanical ventilation to aid breathing
Venturi Mask	Device inserted in oxygen delivery circuit to deliver specific oxygen concentration to patients

Section 1: Background

- Purpose of this document
- The Chartered Society of Physiotherapy (CSP) position
- Pathophysiology of COVID-19
- Clinical Tools and Outcome Measures:
  - Chelsea Critical Care Physical Assessment Tool (CPAx)
  - Clinical Frailty Scale (age 65+)
  - Modified Rivermead Mobility Index (MRMI)
  - Trail Making Test
  - EQ-5D-5L
  - Audit and Research

The purpose of this document

The team who have researched, written and produced this document have done so at the request of the Head of the Physiotherapy Services at the LTHT. Our remit is to provide physiotherapists within the LTHT with a guide for the rehabilitation of people suffering from and recovering from COVID-19.

This document is the product of strong teamwork, commitment, hard work and the motivation to provide the best possible physiotherapy services for people suffering from and recovering from COVID-19.

It is underpinned by:

- The available peer reviewed evidence
- Consensus developed guidelines
- Anecdotes related to clinical practice and impact on interventions from our colleagues in China, Italy, London and Birmingham
- The clinical skills and knowledge related to assessment, analysis and the clinical reasoning of specialist physiotherapists within the fields of critical care, respiratory and medicine, complex and neurological rehabilitation - here in Leeds.
- Close and on-going clinically focussed discussions with our MDT colleagues and Physiotherapy colleagues at both local and national levels.

It is intended as:

- An aide memoire for specialist and experienced physiotherapists
- An educative and clinical guide for less experienced physiotherapists
- An educative and clinical guide for experienced physiotherapists who are working outside their usual scope of practice

Readers must remember:

- To access senior or peer support during clinical decision making if you have any uncertainty - if in doubt - ask!
- The evidence related to COVID-19 changes and develops daily, so you must always access the most recent version of this document
- Please feel confident to question and challenge the content of this document. We are all continually learning about the impact of COVID-19 on our patients and their rehabilitation requirements.

Although this document is focussed towards the delivery of the acute physiotherapy services within LTHT, the authors believe that the principles and advice can be applied in any rehabilitation setting (including the patient's home).

The Chartered Society of Physiotherapy (CSP) position

The CSP is currently working hard to support members lead and deliver the physiotherapy services for people suffering from and recovering from COVID-19. The document "Rehabilitation during and after the COVID-19 pandemic" can be accessed here (click here), the five rehabilitation 'asks' are presented below.

The five rehab asks of system leaders and policy makers

1. **Commit to the right to rehab as a fundamental** element of our health and care system.
2. **Don't leave patients behind because they are out of sight**. Where possible maintain community rehabilitation services during the pandemic to minimise negative impact on non-COVID-19 patients and to help COVID-19 patients continue to recover after discharge.
3. **Plan for the tsunami of rehabilitation need as the country recovers from the pandemic**. Commit to providing expanded high quality, multi condition community rehab services we will need.
4. **Recognise that physiotherapy is essential to treating COVID-19 now and in the long term,** and commit to training and retaining the multi-disciplinary rehab workforce we will need to deliver on-going rehab.
5. **Ensure that physios delivering rehab receive the right PPE**, particularly in high risk settings and working with highly vulnerable people.

CSP 16/04/2020

The Pathophysiology of COVID-19

COVID-19 is a novel respiratory virus which is transmitted via respiratory secretions. Either in the form of airborne droplets following coughing and sneezing - these can remain viable in the air for approximately 3 hours. Or as a surface contaminant which is then spread by touching the mucus membranes of the nose, mouth and eyes, in which case its virulence is much longer (24-72 hours dependent upon the composition of the contaminated surface).

The virus is propagated in the upper respiratory tract. With an incubation period of 1-14 days it manifests in varying degrees of severity, primarily impacting the respiratory system. For 80% of infected patients the disease will be mild with clinical features including dry cough, fever, diarrhoea, vomiting, and myalgia.

In around 20% of the infected population the virus migrates down the respiratory tract into the lungs where it replicates, causing cell damage and death which result in severe respiratory compromise in around 20% of the infected population. Further complications arise as other organs become affected, either due to disease progression within the body or an exaggerated inflammatory response leading to sepsis with associated systemic pathology (Zhao et al, 2020; Sohrabi et al, 2020).

The pathophysiology of COVID-19 is multifaceted and complex, with a heterogenous clinical presentation. It is summarised as follows:

- Virus replication within the alveoli causes cell damage leading to the release of more virus particles which infect adjacent cells, resulting in destruction of lung tissue and reduced capacity for gas exchange.
- Inflammatory response results in interstitial infiltration and consolidation of lung tissue which further impedes gas exchange.

- Endothelial cells within blood vessels suffer similar damage resulting in haemorrhage and subsequent thrombus formation. Micro-thromboemboli are a distinct feature of COVID-19 and result in impaired perfusion, necrosis, multiple organ failure, impaired gas exchange (Chen et al, 2020; Zhou, Zhang & Qu, 2020).
- The evidence suggests that COVID-19 causes specific damage to the haem component of the red blood cells, reducing the O2-carrying capacity of the blood (Wenzhang & Hualan, 2020).
- Endothelial and tissue damage within other organs depends upon the affected site e.g. the myocardium, resulting in CVS instability, or the liver, causing further coagulopathy.
- A widespread inflammatory response causes systemic hypotension, reducing perfusion to organs and peripheries and further impaired gas exchange.
- A hyper-metabolic state coupled with anaerobic respiration at tissue level results in increased lactates. Enzyme impairment due to acidosis leads to further organ failure.
- The body's attempt at repairing damaged lung tissue later in the disease process sees thickening of the pleura and bronchial walls. This leads to pulmonary fibrosis and associated problems with
  - reduced gas exchange and reduced compliance,
  - affecting weaning from ventilation
  - and later, exercise tolerance (Wu & McGoogan, 2020)

All of the above clinical features result in reduced gas exchange and consequently impaired oxygen availability to organs/muscles. The resultant hypoxia affects exercise tolerance, both globally and on a specific muscle group level. Focal tissue damage resulting from ischaemia/haemorrhage will affect both muscle and nerve cells also, in addition to the known global weakness exhibited following a prolonged period of critical illness.

A distinct feature of COVID-19 is that patients at any stage of disease severity are prone to rapid desaturation following minimal exertion. Even those patients presenting with relatively low oxygen requirements (e.g. 4l O2), can exhibit a sudden drop in saturations upon light exercise such as transferring from bed to chair. For this reason, exercise tolerance must first be assessed by a physiotherapist in this client group. This should be undertaken in a stepwise manner, commencing with very low intensity exercise or even sitting over the edge of the bed, prior to attempting a transfer. Oxygen saturations should be monitored throughout and the oxygen level titrated to maintain saturations above 92% during the activity. A non-rebreathe mask should be available in the event of an acute deterioration.

Also significant is that COVID-19 patients frequently exhibit considerable fatigue which is not exclusive to the post-viral period, or those exhibiting low oxygen levels. Again this must be taken into account when planning physiotherapy interventions, with less intense sessions over shorter timeframes being preferable.

Although there is no peer reviewed evidence examining the relationship between the virus and the neurological system; anecdotal reports of neurological impairment are emerging as those countries first affected reach the chronic stage of the disease. It is thought that COVID-19 is not confined to the respiratory tract and may cause direct neurological trauma in additional to those deficits arising as secondary complications of other organ failures (Li et al, 2020; McNamara, 2020).

Since no specific antiviral treatment has been developed as yet, healthcare provision is primarily focused around supportive care and therapy whilst the underlying disease resolves.

Clinical Tools and Outcome Measures

The AHP working group (AHP 2019) advise that appraising the impact and effectiveness of our interventions and services, and how they are perceived by the people who access them, is an integral part of professional practice. A health outcome can be defined as 'a change in the health status of an individual, group or population which is attributable to a planned intervention or series of interventions'. Clinical tools and Outcome Measures allow us to understand our patients, evaluate whether changes have occurred over time, and therefore play an important role in helping us deliver safe and effective interventions/services. They can be used to:

- Identify meaningful change for the person accessing our services
- Evaluate the effect of our interventions
- Demonstrate the impact and value of our services
- Identify areas for improvement
- Benchmark against other organisations/services/standards

Consensus agreement within the Physiotherapy services identified 5 key tools which will be used to understand both our patient's progression status and the impact of our interventions. All the outcome measures and tools that we will use have been shown to have appropriate measurement properties with the exception of the Modified Rivermead Mobility Index (MRMI). The decision to use the MRMI was taken because we have already found that it has strong clinical utility within our practice. At LTHT, future planned research has been designed to evaluate the clinical validity and reliability of the MRMI. Using the MRMI in this case will enable us to prepare pilot and feasibility work in preparation for future research.

The 'on-line stats' sheet has been altered to include an outcome measure tab that can be populated for all COVID-19 patients.

Chelsea Critical Care Physical Assessment Tool (CPAx)

Corner et al (2013) developed an assessment tool intended to measure physical morbidity within the critical care setting. The physiotherapy critical care team within the LTHT actively use this tool within the **critical care and high dependency settings**, and we advise that this is continued during our work in this current COVID-19 crisis.

The Tool can be found in appendix one or on O drive (click here), and use of the tool should be guided by members of the critical care and respiratory medicine teams

Clinical Frailty Scale (CFS)

Rockwood et al (2005) developed the CFS and determined its ability to predict death or need for institutional care for people over the age of 65. The physiotherapy team for elderly medicine within the LTHT actively use this tool within their usual practice in order to understand their patient's pre-admission frailty levels. The Tool is presented in appendix one, or on O drive (click here), and use of the tool should be guided by members of the elderly medicine team. As such it contributes to establishing appropriate goals and identification of potential care needs for a patient. The use of the scale has not been validated in patients with a learning disability. It may not help with identifying risks or establishing goals in those patients who have a long term disability. It is not a stand-alone tool; but can contribute to a holistic picture.

Modified Rivermead Mobility Index (MRMI)

The MRMI has been tested for its stability within the acute and chronic stroke population by various research teams. It is not valid for use within the COVID-19 patient group although work done by Walsh et al (2010) suggests tentative support within a mixed patient population. We justify the use of the MRMI in this current clinical situation with the intent of establishing pilot and feasibility work for intended and planned future research. The MRMI can be found in appendix one or on O drive (click here),

Trail Making Test

The trail making test is a widely used tool that provides information on aspects of cognitive function (e.g. visual search speed, speed of processing). The test is comprised of 2 parts (A and B) both of which require the subject to move sequentially through a series of 25 target dots as quickly as possible. In part A, the targets are all numbers, so the subject simply draws a line from number to number in order (i.e. 1 - 2 - 3 - 4 - 5 etc). In part B the targets are a combination of numbers and letters so the subject is required to draw a line between sequential numbers and letters in the correct order (i.e. 1 - A - 2 - B - 3 - C - 4 - D etc.)

Because of the potential and reported impact of COVID-19 on the neurological system, we had consensus agreement that a quick test of higher level functioning might be a useful objective means of flagging patient's difficulties to other members of the MDT (especially our Occupational Therapy colleagues).

Instruction on how to use this test are available (click here) and in Appendix One. Data sheets can be accessed here (Part A, Part B).

EQ-5D-5L

The EQ-5D is a standardised questionnaire developed to measure quality of life and help inform healthcare decisions. The questionnaire has been developed by a network of international researchers and is one of the most commonly used quality of life measures across the world. It is available in over 200 languages.

The EQ-5D is a tick box questionnaire, it is sensitive enough to compare across different patient groups and different diseases. Extensive research shows it to be a robust, reliable and responsive measure.

The EQ-5D measures five different dimensions:

- Mobility
- Self-care
- Usual activities
- Pain and discomfort
- Anxiety and depression.

It also has a visual analogue scale, where people rate their overall health.

There are several version of the EQ-5D and the authors propose that we use the EQ-5D-5L - Updated version with 5 levels of severity.

The measure is free to non-commercial organisations, available in electronic and paper formats and has been validated for self-completion, interview and by proxy. A user guide can be found on the Physiotherapy O-drive (click here), a summary is presented in appendix one, “click here” for the measurement tool data sheet.

Audit and Research

Audit: In order for the physiotherapy services to evaluate how we managed during the COVID-19 crisis, it is important to keep careful outcome measurement records. This data will sit alongside health metrics.

Service evaluation: In order to understand the rehabilitation needs of people recovering from COVID-19 we need to know how many, how they are, who they are, when they went home, how long they need rehabilitation for. Outcome measures and health metrics can help us see the demand clearly, and resources can be directed as appropriate.

Research: COVID-19 is an unknown illness, as physiotherapists we are reliant on our skills of assessment, re-assessment, analysis, clinical reasoning and problem solving on a case by case basis. There is limited evidence base to draw on. By recording outcome measures now - in the future, retrospective research (including ethical approval) can ask important clinical questions, understand patient pathways, disability, and design interventions.

Section 2: Prevention and Management of Secondary Complications During Profound Illness

- Principles of rehabilitation
- Common secondary complications acquired during profound illness
- Physiotherapy intervention

Principles of Rehabilitation

For someone recovering from major trauma such as COVID-19, rehabilitation intervention can help people regain and maximise their skills and independence, including returning to work. Rehabilitation is a MDT intervention, a physiotherapist's role is to enable the patient to regain their movement and function as best as possible and support the rest of the MDT to ensure that rehabilitation is a 24 hour process.

Common secondary complications acquired during profound illness

The literature tells us to expect an additional case-load of patients with post-COVID-19 disability presenting with a wide range of problems due to cardio-pulmonary, musculoskeletal, neurological and psychological/psychiatric complications of the disease (Rawal et al 2017, Keikens et al 2020). These problems may also be compounded by de-conditioning from prolonged stays in the critical care setting. Stam et al (2020) describe the risk factors that pre-dispose to 'Post Intensive Care Syndrome:

- Duration of ICU admission
- Duration of sedation
- Duration of mechanical ventilation
- Age
- Hypoxia and hypotension
- Sepsis
- Glucose dysregulation
- Premorbid mental and physical comorbidity

The British Society of Rehabilitation Medicine (BSRM 2020) state that 'physiotherapy is emerging as an important strategy' for people with COVID-19.

NB: please take note of: **Section 4** - pathophysiology of COVID-19;

Section 5 - neurological complications that have been observed within COVID-19

This section covers, discusses and suggests physiotherapy approaches and treatment principles. These are general and not specific to COVID-19. They support the management of iatrogenic complications, related to profound and prolonged illness, that occur within the high dependency and acute hospital setting (NICE 2009, NICE 2017).

Historically we have observed the following impairments that can be acquired by our patients during periods of profound illness:

- Loss of cardio-vascular and pulmonary endurance and strength
- Loss of skeletal muscle strength and endurance
- Loss of balance orientation, especially when people are nursed on air mattresses, and are too unwell to move in bed or get out of bed.
- Loss of muscle and soft tissue length and elasticity
- Loss of joint range, everywhere, but especially:
  - fingers and hands,

- toes, feet and ankles,
- scapulae on thorax and gleno-humeral joints,
- lower C spine (increase in flexion) upper C spine (increase in extension)

- Worsening of pre-existing movement difficulties especially for people with:
  - long term neurological conditions e.g.: spasticity, fatigue, weakness, loss of neural drive
  - history of back injury

The NICE guidance *Rehabilitation after critical illness in adults* (NICE 2017) presents an overview of the possible potential complications including factors such as delirium, nightmares, nutritional deficit. These factors and others should be considered during initial and subsequent assessment. The guidance within this document is consistent with more recent publications, consensus statements, blogs (CSP 2020, Chen et al 2020, Keikens et al 2020, Thomas et al 2020), and the LTHT clinical reality statements within Section Six.

Physiotherapy intervention

Here are some suggestions of intervention that can help to a) minimise the impact of profound illness on our patient's movement, strength, balance and function; b) help to keep our patients in as good a condition as possible ready for when they are well enough to re-gain self-management of their health; c) reduce the potential of pain and discomfort secondary to stiffness and the inability to move (Iatrogenic complications).

Positioning (prone, modified prone, side lying, cardiac chair, sitting in an appropriate chair or wheelchair). Refer to section 4 for specific guidance on positioning to maximise lung ventilation and perfusion (Early physiotherapy assessment of COVID-19 guidance with particular reference to early optimisation of positioning).

The patient's comfort is also important, and a good rule of thumb is "would I feel comfortable in <u>this</u> position if I was <u>this</u> person?"

If your patient has any neurological related movement difficulties, then they may not be able to balance themselves (even in bed) so adjuncts such as pillows, rolled up towels and splints can be used to support head posture, trunk alignment, shoulder / arm / hand posture, hip, leg and foot alignment.

When someone is very unwell, they are not able to adjust their position automatically and thus become high risk of developing pressure-related skin damage, pain etc. These people may need their position altering more frequently and this should be prescribed as part of their pressure area management via the nursing staff.

Hand splints. When a person is unable to move volitionally, their hands in particular can become stiff, swollen and painful. Again, the use of a rolled up towel can support wrist and hand joints. A referral to a specialist OT for the fabrication of, or ordering of 'off the shelf' hand support should be considered. The OT will prescribe the regime of hand splint wearing.

PRAFO's are 'off the shelf' Pressure Relief Ankle Foot Orthosis, they are commonly ordered for immobile patients by the physiotherapy team, and are used to help maintain neutral range at the ankle. A common regime is two hours on and two hours off.

Specialist foot and ankle splinting. Occasionally, especially with a person who has severe and significant movement control difficulties, specialist splints can be cast using a combination of hard and

soft casting material. If you feel that your patient might benefit from this, then a referral to the Specialist Rehabilitation Teams at the LGI and SJUH would be appropriate.

Seating. Specialist seating can be accessed for people who require more physical support than a 'normal' ward armchair. Either via the physiotherapy teams, e.g. REA Azalea, or via the ward team hire of specialist armchairs from 1st Call Mobility.

'Hands on' treatment. Within clinical practice and experience, we have found the following treatment interventions helpful to reduce the risk of iatrogenic complications.

- Fingers and hands.
    - Passive and accessory movement on a daily basis
    - Click here for a short video showing how to mobilise a hand
    - Use of resting splints if indicated
- Toes, feet and ankles
    - Passive and accessory movements on a daily basis
    - Click here for a short video showing how to mobilise toes and feet
    - Use of resting splints such as PRAFOS if indicated
- Scapulae on thorax and gleno-humeral joints
    - Mobilise the patient's scapulae on their thorax at each physio intervention (be aware - protect potentially unstable gleno-humeral joints)
    - Take gleno-humeral joints through range at each intervention (within normal alignment/ movement)
- Lower C spine (increase in flexion) upper C spine (increase in extension)
    - Ensure good neck alignment and head support during positioning. For profoundly unwell people, stiffness in these areas has a profound impact on their future standing and walking ability, balance and pain.
- Rolling in bed
    - Whenever possible, engage the patient in active rolling. The action of rolling accesses core activity at pelvis, thorax and head
    - The rule of thumb movement process is:
        - Both knees bent
        - Roll knees
        - Follow with eyes head and trunk
        - Follow with a reach
- Sitting on the edge of bed
    - A therapeutic sit on the edge of the bed is a standard intervention across all of our services, and specific handling skills are required to do this safely. Here are some tips to reduce the challenge for the patient, and to reduce the therapeutic handling risk for tired therapists.
        - PLAN - Make sure the physio/staff team and the patient understand the order of movement before you start. The *process of movement plan* should be a result of assessment of patient ability (physical and cognitive), skin integrity, drain and drip care, skill mix.
        - Use a hoist to get into the sitting position, once in position - leave it there to help de-weight the patient. De-weighting can be reduced as the patient becomes more active. This is good if your patient is anxious, the hoist makes them feel safe.

        - If the patient has complex or unpredictable movement difficulties make sure this treatment is done with knowledgeable staff otherwise this is of high therapeutic handling risk.
        - If your patient is able, facilitate or enable them to be as active as possible
        - Pat slide from an air mattress to a plinth, it's easier for the patient to sit on a plinth. A double plinth is easier for a physio to work from; single plinths can sometimes be too narrow to facilitate movement easily.
- Exercise prescription
    - Once a patient is able to re-gain even a small amount of self-management, they should be given an exercise programme specific to their movement ability and rehabilitation needs. Be aware that they may have a lack of cognitive functioning that impacts on their ability to exercise independently (NICE 2020).

Section 3: Critical Care and Respiratory Rehabilitation

- Pathophysiology of COVID-19, key points to remember
- COVID-19 Phases and Physiotherapy Intervention
- Considerations for treating Phase 1: Acute Patients and Phase 2: Critical and
- Considerations for treating Sub-Acute Recovery Phase Patients
- Early physiotherapy assessment of COVID-19 guidance with particular reference to early optimisation of positioning

Pathophysiology of COVID-19: key points to remember

- Patients may or may not be short of breath.
- Many patients seem to require low levels of oxygen at rest and then exhibit acute and severe desaturation on mobilising, even just transferring from bed to chair. Physiotherapists must advise the MDT of this anomaly and proceed with caution
- Exercise tolerance should be assessed initially for very low levels of functional activity, Ensure necessary safety precautions are in place beforehand, e.g. O2 saturation monitoring throughout, non-rebreathe mask, oxygen supply ready for use.

COVID-19 Phases and Physiotherapy Intervention

This section identifies the point in which patients are presenting in the acute hospital setting with COVID-19 and what physiotherapy intervention is deemed appropriate at that time.

The basis of this section is developed from information acquired from Thomas et al (2020), Vitacca et al (2020) and our current clinical reality and experience of those being treated for COVID-19 at LTHT.

This section concludes with a description of the clinical reality with patients who are COVID-19 positive, resident on the Respiratory Rehabilitation Unit at LTHT.

COVID-19 patients do not consistently present the same - therefore **2 acute phases and 1 recovery phase** have been identified with stages in each phase, to aid clinical decision making and treatment at that point in their COVID-19 presentation. See chart on next page.

NOTE: COVID-19 patients will not pass through all the phases and stages in their COVID-19 presentation. It is regularly experienced that these patients can rapidly deteriorate and/or improve.

ACUTE COVID-19 Presentation (2 Phases)

Phase 1 - Acute

Stage 3 - Patients on acute ward environment on maximal oxygen therapy (60% FiO2 venturi mask - 15L non-rebreathe mask)

Stage 2 - Patients on acute ward environment on Venturi mask (28% / 35% / 40% FiO2) oxygen therapy

Stage 1 - Patients on acute ward environment on <5L oxygen via nasal cannula or facemask

Phase 2 - Critical

Stage 3 - Patients on maximal level of critical care support - intubated and ventilated

Stage 2 - Patients supported with non-invasive ventilation within the ICU setting

Stage 1 - Patients requiring high levels of oxygen therapy within the ICU setting, those in ICU who are COVID-19 positive but it is not primary cause for ICU admission and those requiring CPAP NOT within the ICU setting

SUB-ACUTE COVID-19 Presentation

Sub-Acute Recovery Phase

Stage 3 - Patients weaning from ventilator support with globally acquired weakness requiring specialised maximal physiotherapy input (assistance of 3+ therapists)

Stage 2 - Patients weaning from ventilator or oxygen support with significant functional deficit requiring specialised physiotherapy input (assistance of 2+ therapists)

Stage 1 - Patients with mild to moderate functional deficit requiring physiotherapy input (assistance of 1-2 therapists)

Note: This is a new disease where there is currently limited evidence base regarding the impact COVID-19 will have on our patients physically and emotionally. It is an ever changing picture currently with patients being variable in their presentation. These guidelines will be reviewed and updated as new information becomes available.

Considerations for treating Phase 2: Critical Patients and Phase 1: Acute Patients

Usual physiotherapy procedures and interventions are **high risk** and should be provided **very cautiously** as they can cause further loading of the respiratory system **exposing the patient to an increased risk of distress and deterioration.**

- This includes treatments aimed at promoting airway clearance and the reduction of dyspnoea such as purse-lipped breathing.
- This includes the maintenance or recovery of functional activities such as transfers and mobilisation and training of the skeletal muscle such as strengthening exercises.

- Patients who are too unwell or too unstable to receive rehabilitation intervention need to be reassessed as appropriate.

Clinicians need to be sufficiently skilled to treat and rehabilitate those in the Phase 2 : Critical or Phase 1: Acute (appropriate cardiovascular and/or respiratory physiotherapy experience is recommended).

It is our role as physiotherapists to **offer support and guidance to nursing staff and the wider MDT** who are managing these patients. These staff members may be involved in the mobilisation of patients, which as above, could increase risk of deterioration for the patient.

Optimum positional therapy (prone, seated, semi-orthopneic) with close monitoring is indicated to improve the ventilation/perfusion ratio and to prevent damage from immobilisation

- It should be considered early when patients show signs of clinical deterioration.
- It can be effective in the treatment of symptoms (improving oxygenation, SpO2 and reduce respiratory rate) and patients should be closely monitored throughout to assess their clinical response to this intervention
- See optimum positioning guidelines

Oxygen therapy is regularly used throughout the treatment of those with COVD-19 to help with desaturation episodes and reduce work of breathing. For full guidance of using Oxygen with COVID-19 patients, please click here.

Airway clearance should be clinically indicated and risk assessed on a case by case basis.

- We must review the risk of contamination exposure for ourselves vs. benefit of airway clearance for the patient.
- The appropriate PPE must be used for aerosol generating procedures
- All efforts should be made to reduce the risk of exposure to ourselves including using sputum pots with lids which are disposable to help prevent spread of the virus.
- Use of nebulisers and high flow oxygen therapy should be discussed with a senior physiotherapist or medical staff - if it's deemed essential aerosol generating precautions should be used. If deemed unnecessary, nebulisers and high flow oxygen should be avoided (Thomas et al 2020)

For any physiotherapy intervention in Phase 2: Critical and Phase 1: Acute, we must monitor patients response throughout the intervention.

- Monitor clinical parameters such as SpO2, O2 levels required, respiratory rate, HR, BP and work of breathing.
- Consider if your patient requires additional oxygen prior to any intervention to aid recovery or prevent deterioration.

Objective evaluation of rehabilitation intervention is considered beneficial in order to assess and monitor the effect of rehabilitation

- See section 2 for information related to Clinical Tools and Outcome Measures.

Phase 1- Acute

NOTE: COVID-19 patients will not pass through all the phases and stages in their COVID-19 presentation. It is regularly experienced that these patients can rapidly deteriorate and/or improve.

Location:
Acute Wards Bed Base

Hospitalised patients with mild to moderate disease may benefit from Respiratory Rehabilitation as it can help improve physical capacity, emotional symptoms and quality of life *(at least potentially)* (Vitacca et al 2020)

Comprehensive assessment should take place prior to any intervention and stability of the patient should be established. Seek support from medical staff should you require this.

COVID-19 patients are at risk of deterioration with increased exertion

- ***Consider their resuscitation status.***
- ***Consider the environment you are treating this patient in - is there someone else to help if required, do you have access to oxygen (wall or portable cylinder), do you have access to a non-rebreathe oxygen mask?***
  - Considerations: Monitor SpO2, BP, HR throughout intervention

Stage 3

Presentation:
- Maximal O2 therapy (60% Fio2 - 15L non-rebreathe mask)
- Possible ceiling of care ward based
- Consider escalation to critical care
- High NEWS score (7 and above)

Physiotherapy Intervention:
- Titrating oxygen therapy
- Optimal positioning - see guidance below
- PROM
- PRAFO's
- Airway clearance (when clinically indicated and risk assessed)

Stage 2

Presentation:
- On certain % of O2 (on 28%, 35%, 40% Fio2 via venturi mask)
- Possible ceiling of care ward based
- Increasing NEWS

Physiotherapy Intervention:
- Titrating oxygen therapy
- Optimal positioning see guidance below
- Functional movement within the tolerance of the patient
- Airway clearance (when clinically indicated and risk assessed)

Stage 1

Presentation:
- On <5L O2 (nasal cannula or face mask)
- Stable or reducing NEWS

Physiotherapy Intervention:
- Titrating oxygen therapy
- Optimal positioning - see guidance below
- Functional movement
- Airway clearance (when clinically indicated and risk assessed)

NOTE: COVID-19 patients will not pass through all the phases and stages in their COVID-19 presentation. It is regularly experienced that these patients can rapidly deteriorate and/or improve.

Physiotherapy interventions implemented after **thorough assessment by a Senior Respiratory Physiotherapist and a discussion with MDT**

Considerations for physiotherapy intervention:

- Cardiovascular stability
- Inotropic support
- Level of Fio2 support
- Neurological status

Stage 3

Presentation:

- Intubated
- Sedated + Ventilated
- Paralysed

Physiotherapy Intervention:

- Optimise respiratory support
- Titrate O2
- Optimal Positioning
- PROM
- PRAFO's
- Airway clearance (when clinically indicated and risk assessed)

Stage 2

Presentation:

- Intubated (lightly sedated - waking from sedation)
- Patient with Tracheostomy with bi-level or CPAP support
- Non-intubated - CPAP or NIV within ICU setting

Physiotherapy Intervention:

- Optimise respiratory support
- Titrate O2
- Optimal Positioning
- PROM
- A-AROM
- PRAFOs
- Airway clearance (when clinically indicated and risk assessed)
- Consider first sit
- Consider cuff deflation/laryngeal weaning - discuss with MDT

Stage 1

Presentation:

- Maximal O2 therapy in ICU setting
- CPAP (not within critical care - possible ceiling of care)
- Patient with Tracheostomy with oxygen support
- COVID-19+ve but different primary pathology causing ICU admission

Physiotherapy Intervention:

- Titrate O2
- Optimal Positioning
- PROM
- A-AROM
- PRAFOs
- Airway clearance (when clinically indicated and risk assessed)
- Consider first sit

Considerations for treating Sub-Acute Recovery Phase Patients

Those with an acute COVID-19 event may present with disability and functional damage similar to patients recovering from ARDS

Recovery time is variable depending upon the degree of respiratory failure and the associated physical and psychological dysfunction developed (Vitacca et al 2020), e.g.:

- Physical dysfunction such as:
  - global and peripheral muscle weakness and deconditioning
  - critical illness acquired myopathy, neuropathy
  - encephalopathy
  - central pontine myelinolysis
  - stroke
  - Guillain Barré syndrome
- Psychological impact such as:
  - anxiety
  - depression
  - sense of abandonment
  - post-traumatic stress disorder

Physical rehabilitation is recommended for patients who are weaned or had prolonged weans from mechanical ventilation and/or oxygen (Vitacca et al 2020)

- To improve their physical status
- To correct the motor and cognitive effects of prolonged immobilisation in the intensive care area or ward environment

Patients who are too unwell or too unstable to receive rehabilitation intervention should be reassessed daily.

The intensity, timing and modality of rehabilitation must be tailored to the individual patient's needs - in particular for those with comorbidities such as obesity, frailty, diabetes, other respiratory conditions and long term neurological conditions. These patients will take a longer period or may never be able to return to their former functional level.

Consider referral to other specialties to support with other aspects of rehabilitation; such as dietitians, speech and language therapists occupational therapists, specialist rehabilitation team, post critical care rehabilitation team and psychology team.

Objective evaluation of rehabilitation intervention is considered beneficial in order to assess and monitor the effect of rehabilitation (Vitacca et al 2020) - see section 2 for information related to Clinical Tools and Outcome Measures.

Gradual increase of load based exercise regimes whilst monitoring subjective symptoms (such as breathlessness and fatigue levels) are recommended to aid recovery back to a good level of function

During their in-patient stay, daily patient counselling and education are indicated for all those receiving rehabilitation (Vitacca et al 2020).

Patients discharged home or to other facilities in the community should receive guidance on how to cope and progress with physical activity

We may be asked to support the care for COVID-19 patients who are nearing the end of their life. Clinical guidelines have been produced by the Palliative Care Team and are accessible on the LTHT intranet.

Sub-Acute Recovery Phase

Location: ICU, HDU, ARCU & J10, CCU, Acute Ward bed base, Neurological Rehabilitation Units,

Following the Critical and/or Acute Phases of COVID-19, individuals may present with varying levels of disability and functional changes. These Sub-Acute Phase stages identify the level of disability in those requiring rehabilitation.

A patient's appropriateness for rehabilitation should be reviewed on a daily basis *(check observations/NEWS score including temperature, SpO2, FiO2, respiratory rate, work of breathing, fatigue levels and cough)*

COVID-19 Patients are at risk of deterioration with increased exertion

- ***Consider their resuscitation status.***
- ***Consider the environment you are treating this patient in - is there someone else to help if required, do you have access to oxygen (wall or portable cylinder), do you have access to a non-rebreathe oxygen mask?***

Rehabilitation should be considered carefully if observations are altered from normal parameters and discussed with a senior physiotherapist or medical staff if required.

Stage 3

Presentation:

- Weaning from ventilator support
- Tracheostomy weaning
- Step down from ICU/HDU
- Global weakness - largely dependent for all cares
- Initiation of early rehab - consider neurological rehabilitation
- May be NG/NJ fed or currently requiring medical input

Physiotherapy Intervention:

- Optimise respiratory support
- Titrate O2
- Manage tracheostomy weaning, secretion load and phonation
- Airway clearance (when clinically indicated and risk assessed)
- Consider specialist referrals
- Positioning
- Cardiac chair position
- First sit assessment
- SOEOB
- PROM & A-AROM
- Graded sit to stand
- PRAFO's
- Identify seating and transfer method

Stage 2

Presentation:

- Weaning ventilator or respiratory support
- Largely Self-Ventilating
- Significant Functional Deficit
- May require Neurological specific rehabilitation
- Severe or moderate functional deficit but identified as medically optimised for discharge - may require Neurological rehabilitation Unit

Physiotherapy Intervention:

- Optimise respiratory support
- Titrate O2
- Airway clearance (when clinically indicated and risk assessed)
- Positioning
- Appropriate seating established
- SOEOB
- Graded sit to stand
- A-AROM
- AROM
- Identify seating and transfer method

Stage 1

Presentation:

- Clinically stable
- Low NEWS score
- Based within ward environment
- May be nearing medically optimised for discharge from hospital with identified rehab goals
- Moderate to mild functional deficit - may require community rehabilitation services (such as Community Care Bed or Neighbourhood Team)

Physiotherapy Intervention:

- Airway clearance (when clinically indicated and risk assessed)
- AROM strengthening exercises
- Reconditioning with specific aids (e.g. pedals)
- Mobilisation (transferring and mobilising)
- Increase exercise tolerance through mobilisation with aid/support from therapists.

NOTE: COVID-19 patients will not pass through all the phases and stages in their COVID-19 presentation. It is regularly experienced that these patients can rapidly deteriorate and/or improve.

Early physiotherapy assessment of COVID-19 guidance with particular reference to early optimisation of positioning

This guidance is based on early clinician experiences and anecdotal evidence from multiple sources UK, Europe, and Worldwide. It sits within the larger document *COVID-19 Physiotherapy Rehabilitation Guide. 24/04/2020,* both documents will be up-dated in-line with each other.

We will continually review and update this advice as we learn about the physiology of COVID-19; it is currently consistent with the presentation of **Type 1 Respiratory Failure**.

People with COVID-19 have a variety of potential treatment / management pathways and many may be at differing points in their disease process, this will direct the interventions that Physiotherapists will consider.

Dr Elliott, Consultant Physician in Respiratory Medicine at LTHT has developed '*COVID -19 CPAP first draft guidelines'* (in print). Within this document, the use of Prone or Optimal Positioning is advised as treatment as appropriate.

NOTE: People with COVID-19 who are receiving O2 therapy are likely to have significant physiological and / or pathological impairment, they may not have capacity to respond positively to increase load (exertion) on their respiratory system

Sitting out/mobilising needs to be directed with caution; evaluation of response to movement both positive and negative is required and communicated clearly within the MDT.

The flow diagram below relates to early guidance for a Physiotherapist's review for optimal positioning. Early use of optimal positioning can have a positive effect on patient's physiology and gas exchange and should be considered as a treatment choice not just as a rescue therapy.

The rationale of Optimal Positioning

Positioning patients in either a prone or modified prone position such as forward lean sitting or side lying with quarter turn prone can achieve improvements in gas exchange by a variety of mechanisms:

- Reduction of chest wall compliance by 'fixing' the anterior thorax can enhance pulmonary compliance
- Reduction of intra-abdominal pressure to enable greater lung expansion
- More even distribution of ventilation, rather than the typical 'apical' distribution. Perfusion is greatest in the dependent lung. Therefore, proning results in greater matching of ventilation with perfusion.
- Improved drainage of secretions
- The above benefits result in lower levels of O2 being needed. Oxygen in high concentrations/over prolonged periods causes inflammation of the airways which can make respiratory symptoms worse.

Considerations when using Optimal Positioning:

- There have been some cases of patients developing pressure damage whilst being ventilated in a prone position.

- When deciding if a patient is appropriate for proning, whether the patient has an NG/NJ feed should be considered. It is not a contraindication to feeding, but the BDA advises stopping the feed before moving into and out of prone position then re-starting when safe to do so. Ensuring that the bed angle is at least 30 degrees (due to risk of aspiration in prone position) is also important. Discuss with dietitians for advice.
- Not all people with COVID-19 will be 'responders'. If beneficial effects are not identified after a trial of optimal positioning then usual care and positioning should be continued. As with all interventions, the patient's response should be recorded and fed back to the MDT.
- Patients with restricted joint mobility, obesity or pregnancy may still benefit from optimal positioning. The benefits are not limited to prone position. The different options should be explored as part of the assessment process. Surgical wounds, drains, fractures, pressure areas etc. will impact upon whether prone positioning is feasible or how it may be modified to be achievable.
- Patients, therapy and ward staff will require on-going support and guidance to be able to continue to manage themselves or their patients in an 'optimised position plan'.
- Some patients will require prompting and or support to comply with and achieve optimal positioning.
- Delirious patients and elderly patients may require more support with optimal positioning.
- Other members of the MDT (including nursing staff, AHPs and Doctors) may require support in the management of people with COVID-19. This management pathway is different to normal practice. *('Normal' practice of sitting patients out / mobilising them and weaning off O2 must be adapted for COVID-19 patients; they have been shown to be variable and can clinically deteriorate quickly).*
- Physiotherapists have assessment, clinical reasoning and problem solving skills that are well placed to guide the team when patients are ready to be progressed physically. Of course, regular assessment and re-assessment is key.
- SPACES (Sharing Patient Assessments Cuts Exposure for Staff) principles should be considered (click here). These are a standardized approach to the management of ward care. They are based on the principles of "Maximum patient contact - minimum staff exposure". They can help keep staff safe and reduce PPE use. It is for everyone working on a ward with suspected or proven COVID-19 cases, and particularly for multi-professional teams. Physiotherapists should consider what *extra* they can offer during their intervention and contact with patients and help reduce multiple entries into rooms for "standard" procedures such as observations and assessments.

Guidance for the use of Prone or Optimum Positioning for the respiratory management of people with COVID-19

Therapists who are working with patients who have COVID-19 should follow this early guidance in order to assess a **self-ventilating conscious** patient's suitability and their response to Optimal Positioning (OP).

When to commence OP

Early!!

Commence when a patient suspected or confirmed COVID-19 fulfils any of below criteria:

- On 2Lpm O2 or above
- Respiratory Rate is 25 or above
- Oxygen saturations below 92% (note: SpO2 will be set at target 92%> unless otherwise specified)

Cautions to consider prior to OP:

- Have they just eaten?
- Do they have any joint restrictions?
- Obesity or pregnancy?
- Any MSK injury or recent abdominal surgery?
- Pressure areas?
- Patient mobility and co-operation?

Not Appropriate →

If not appropriate for OP

Discuss with senior physiotherapist or medical staff for alternative appropriate interventions

Appropriate ↓

Commence OP

This can include

- Full prone
- Side lying with pillow support as far over prone as a patient can tolerate
- Sat over the edge of the bed forward lean positioning / arms resting on a table
- Explain rationale, procure extra pillows if required.

Measure the effectiveness of OP:

- Monitor oxygen saturations (SpO2) improvement (usually occurs within 15minutes)
- Monitor their respiratory rate (it should decrease if effective)
- Ask the patient - has their breathlessness improved?

Not Effective →

If OP is not effective:

- **Stop assessment**
- **Ensure patient comfortable**
- **Discuss with senior physiotherapist or medical staff for appropriate alternative interventions**

Effective ↓

How long do you continue with OP?

- Aim **1 hour for full assessment** of response (either positive or no change)
- If positive effect **aim for as long as possible - 4 hours +**
- Monitor patients tolerance throughout
- Titrate down oxygen requirements as able.

Note: Patients on ITU that are intubated and sedated are being 'proned' for up 16 hours with good effect.

PRONE POSITIONING

- Pillows placed under pelvis, upper chest and head, arms in ‘swimmer’ position. Head turned to side.
- Check monitoring of patient, placement of lines/ventilator/oxygen.
- Ensure expiratory port on ventilator tubing (if using) is not obstructed.

SIDE LYING ON PILLOWS

- Pillows placed lengthways under one side and under head, bent knee to aid maintenance of position

SUPPORTED SITTING POSITIONING

Pillows behind head, knees and under arms can help decrease work of breathing and manage breathlessness

FORWARD LEAN POSITIONING

Section 4: Neurological Rehabilitation

- COVID-19 and the neurological system
- The impact of concurrent illness on people with long term neurological conditions (Stroke, CP, MS, MND, SCI, PD)
- Principles of Neurological Assessment
- Principles of treatment approach for people with neurological impairment.

COVID-19 and the neurological system

Although there is no peer reviewed evidence which examines the relationship between the virus and the neurological system; anecdotal reports of neurological impairment are emerging as those countries first affected reach the chronic stage of the disease.

Micro-thromboemboli are a distinct feature of COVID-19 and result in impaired perfusion, necrosis, multiple organ failure, impaired gas exchange (Chen et al, 2020; Zhou, Zhang & Qu, 2020). The resultant hypoxia affects exercise tolerance, both globally and on a specific muscle group level. Focal tissue damage resulting from ischaemia/haemorrhage will affect both muscle and nerve cells also, in addition to the known global weakness exhibited following a prolonged period of critical illness.

It is thought that COVID-19 is not confined to the respiratory tract and may cause direct neurological trauma in additional to those deficits arising as secondary complications of other organ failures (Li et al, 2020; McNamara, 2020).

Stam et al (2020) describe impairments of post-intensive care syndrome which are thought likely to affect people with COVID-19 who have been ventilated - this suggestion is supported by the BSRM (2020). Therefore we should be prepared to expect impairment related to:

Cognition	Memory	Attention
Visuo-spatial awareness	Psychomotor	Impulsivity
Psychiatric illness	Anxiety	Depression
Post-traumatic stress disorder	Physical impairments	Dyspnea/Impaired pulmonary function
Pain	Sexual dysfunction	Impaired exercise tolerance
Neuropathies	Muscle weakness/Paresis	Severe fatigue

Mao et al (2020) found that the more severe manifestations of COVID-19 were more likely to acquire neurological damage.

We have heard anecdotally from our colleagues both internationally and nationally; that those people who have survived COVID-19, and have been so ill that they required ventilation and sedation, are at high risk of developing the following neurological conditions:

- ICU Acquired Weakness
  - Critical Illness Polyneuropathy (CIP)
  - Critical Illness Myopathy (CIM)
- Central Pontine Myelinolysis
- Guillainn Barré Syndrome (GBS)
- Encephalopathy
- Hypoxic Brain Injury
- Stroke

In depth information related to the pathology of these conditions can be found in Appendix Two.

The impact of concurrent illness on people with long term neurological conditions (Stroke, CP, MS, MND, SCI).

The Association of British Neurologists (2020) has produced some general guidance for people with long term neurological conditions. They acknowledge that whilst some neurological conditions and treatments will increase the risk of complicated COVID-19 most people will not be at greater risk than the general population.

Patient groups at no greater risk include

- Conditions that do not affect swallow, breathing or immune system are not at increased risk of COVID-19.
- Mild to moderate forms of Parkinson's disease, Multiple Sclerosis and Epilepsy.

Patient groups at increased risk of complicated COVID-19

- Conditions such as pulmonary sarcoidosis and vasculitis where the neurological condition is part of a multisystem disorder.
- Motor neurone disease and some myopathies associated with bulbar weakness, respiratory muscle weakness or cardiac involvement.
- Patients on immunotherapies may be at increased risk but the risk is currently unknown, patients are strongly advised not to discontinue immunotherapies.

The effect of COVID-19 on the physical function of people with long term neurological conditions is currently unknown. Whilst it could be predicated that this patient group will have more complex rehabilitation needs, we just do not know. The extent of rehabilitation needs is likely to be variable and dependent on the extent of impairment pre COVID-19 and the severity of infection suffered.

Principles of Neurological Assessment

The purpose of a neurological assessment is to collect information both subjective and objective to analyse the patient's impairment, loss of function and disability; support treatment planning and goal setting and determine the most effective physiotherapy intervention.

This is not a definitive guide, it should be used according to how your patient presents. The patient may or may not be conscious, they may not be able to communicate, they may have pre-existing neurological impairment (this will present differently and be more evident in an acutely unwell person). The patient may have pre-existing neurological impairment plus new impairment caused by the impact of COVID-19 illness.

From experience, we strongly suggest that the impact of the effects of reduced capacity to challenge, weakness, fatigue, physiological instability etc caused by COVID-19 will be greater in this patient population.

Ask for help from senior staff, or from the Complex Rehabilitation Teams if you are on SJUH or LGI sites (Refer to Section 7).

A neurological physiotherapy assessment guide is available in Appendix Three

Principles of treatment approach for people with neurological impairment.

Patients should be treated on an individual basis to assess for underlying neurological deficits. These are likely to become more apparent as patients become more alert and their movement and function returns. Refer to Section 6 - the Clinical Reality within LTHT

Physical demand and recovery from COVID-19.

Symptoms of COVID-19 such as increased fatigue, increased shortness of breath and cardiovascular instability are all limitations to rehabilitation and MUST to be taken into consideration during rehabilitation of patients with neurological diagnoses.

Therapists should closely observe their patient's when beginning rehabilitation, for responses to both respiratory and movement challenge. The advice from Section Four of this document is important. Be aware that people with neurological diagnoses (both newly acquired and pre-morbid to COVID-19 infection) may respond to challenge with seizures and fluctuation in consciousness level. In addition this patient group may have a neurological cause of decreased respiratory function alongside the damage caused by COVID-19.

It is important to monitor SaO2 levels and monitor patients' work of breathing when engaging in physiotherapy.

Neurological physiotherapy treatment guidelines for people recovering from COVID-19 who have neurological impairment.

Note the guidance in Section Four. Monitoring of SaO2 will give you objective information about your patient's tolerance to the challenge of your physiotherapy intervention.

Each patient should be assessed and re-assessed on a case by case basis. Ensure that you communicate well to the rest of the MDT using both verbal communication and the use of the handover system / patient white boards.

Exercise tolerance and challenge is a vital consideration - how much physiotherapy intervention can the patient tolerate on a daily basis? What other physical activity are they participating in (OT, SLT, functional activities with the nursing team)?

Consider how you will manage your patient's cognitive, communication, mood or behaviour difficulties. How will you engage them and motivate them to work within their rehabilitation programme?

The table on the next page gives some broad guidance for physiotherapy intervention; support should always be accessed from specialist neurological physiotherapists.

Soft tissue Management:	• Maintain alignment- joint mobility and soft tissue length in feet/hands/trunk. (See Section Three)
Feet:	• Consider footwear, supporting surface, orthotics (PRAFO's) (See section Three)
Hands:	• Consider liaising with the OT's for splinting. • Hand hygiene - wash while mobilising if necessary. • Mobilisation of the hand and wrist (see Section Three)
Trunk:	• Consider the postural support. • Mobilisation of the trunk on a background of pelvic alignment and stability.
Postural management:	• Have a planned approach encompassing all activities which act on a patient's posture and function. • Consider - alignment, seating type, mattress, pressure area care, function, safety, sitting tolerance, transfers, any restrictions eg orthopaedic surgical external fixation of fractures. • Postural positioning in bed eg. supine, side lying, head support, mechanical bed positioning options. • Graded exposure to gravity eg - supine to reclined supported sitting- supported sitting- unsupported sitting- perch sitting- supported standing to standing with an aid. • Consider if may benefit from tilt table.
Seating:	• Consider- arm chair- wheelchair- tilt in space supportive chair. • There are a supplies of wheelchairs and cushions: • In ward C1store room near the physio gym • At SJUH in the care of the medical, respiratory and elderly teams - discuss with senior staff • At LGI in the care of the MTC, neurology and neuro-surgery teams - discuss with senior members of staff • Consider ordering a wheelchair / cushion from wheelchair services for long term use • Consider ordering a wheelchair / cushion for short term loan from LCES.
Transfers:	• Identify method of transfer. • Free standing hoist, tracking hoist, Sara flex & Sara stedy (stand aids)
Mobility:	• Assess if able to move away from transfers • Appropriate walking aids • The need for assistance / supervision • Consider distance/tolerance
Stairs:	• Consider home environment / D/C destination • Liaise with OT's.

Discharge destination / rehabilitation pathway:	• Communicate with all of the MDT, • Consider future rehabilitation needs • Make appropriate referrals

Section 5 - The clinical reality, reflections and experience at LTHT

- **Respiratory Rehabilitation at SJUH**
- **Elderly Medicine Unit at SJUH**
- **Medical wards at SJUH**
- **LGI (section to be populated)**
- **Regional Complex Rehabilitation Unit at CAH**

The clinical reality with patients who are COVID-19 positive, resident on the **Respiratory Rehabilitation Unit at SJUH**.

General Observations:

At any part in their pathway as an inpatient**, people suffering from and recovering from COVID-19 can change quickly.** They can change from requiring low oxygen needs (1-2LO2) to high (60% Fio2 or 15L non re-breathe mask) within an hour.

Patients MAY respond to support in optimising their position, support with pillows:

- To reduce work of breathing
- For gas exchange / recruitment.

Respiratory rate measurement needs to be done accurately because this is a good indicator of clinical deterioration. **Tip**: if patients have a TV in their room use this as your timer (as often there is not a clock) to avoid using your personal phone as a stopwatch.

Patients are often scared and anxious, they benefit hugely if you can spend time with them.

If their degree of SOB is distressing for the patient, discuss within the MDT. Medication can be administered to help alleviate this symptom - this can sometimes lead to an improvement in respiratory rate and O2 saturation levels.

Patients recovering from COVID-19 are very weak and deconditioned. They fatigue very quickly - much more rapidly than you would normally expect within pulmonary rehabilitation. Clinical reasoning and on-going observations are critical in order to safely 'challenge' these patients.

Nutritional support is vital (click here and here for more information). Loss of lean body mass (LBM) is common in these patients due to a number of nutrition related factors and the impact of the acute illness. Nutrition support alongside physiotherapy interventions is vital in rehabilitation of patients with COVID-19 to support minimising further LMB loss and provide sufficient strength/energy to partake in physiotherapy interventions.

The patient's **pre-morbid frailty** level (see clinical frailty scale) and other co-morbidities MUST be considered prior to assessment for any intervention, and within re-assessment during your intervention.

Support of nursing staff and other members of the MDT

- Our colleagues may not feel confident when moving and assessing patients because of the complications of COVID-19 - they require our knowledge, skills and support.
- Our colleagues are extremely busy, and as a result patients may be nursed in bed and are at risk of developing secondary complications. Our knowledge and skills can provide support.
- The 'normal rehabilitation pathway' of sitting patients out / mobilising them to support weaning off O2 may not apply to people with COVID-19 as they are at high risk of rapid clinical deterioration if this approach is taken.
- Physiotherapists are well placed to guide when patients are ready to be progressed physically, through regular reassessment, analysis and clinical reasoning.

- Following SPACES principles (see appendices) we must consider what extra we can offer in our intervention with a patient requiring full FFP3 PPE. These will help reduce multiple entries into rooms for "standard" procedures such as observations and assessments, overall reducing staff exposure

Current clinical reality and experience of those being treated for COVID-19 at LTHT

Rehabilitation / Mobilisation:

A cautious approach, with close monitoring, needs to be taken with people recovering from COVID-19

Patients may have stable NEWS and O2 requirements (<5 litres). They may appear to be progressing into their post-recovery phase. Yet when they are moved or transferred they have **a poor cardiovascular response.**

Patient's physiological response needs to be measured and monitored throughout every physiotherapy intervention.

Function - break down into bite sized pieces e.g.:

- Look at their response to rolling and repositioning.
- 1st goal may be to tolerate sit on edge of bed with forward lean recovery over a table.
- 2nd goal may be to stand for 2mins with assistance of 2 and so on;
- Progressing to safe transfers with nursing staff.

Initial assessment - Two therapists should be present. Patients recovering from COVID-19 have an unpredictable presentation. They may also be suffering from delirium, vacant episodes, diarrhoea and pain.

Consider pre-oxygenation and/or **oxygen for recovery**. When titrating oxygen needs monitoring closely - for example at 15mins, 30mins and 1 hour intervals.

People with COVID-19 are at risk of deterioration with increased exertion

Consider:

- **Their resuscitation status.**
- **The environment you are treating this patient in**
- **Is there someone else to help if required**
- **Do you have access to oxygen (wall or portable cylinder)**
- **Do you have access to a non-rebreathe oxygen mask?**

Remember: Patients need to rest regularly, do activity in short bursts, require reassessment and repetition, carryover can be poor, they may not be able to progress at each session.

The clinical reality with patients who are COVID-19 positive, resident on the **Elderly Medicine Unit at SJUH.**

Within the Elderly Medicine Physiotherapy Team at SJUH, special considerations are being made because COVID-19 can give atypical symptoms in older people - especially frail older people.

Patients with suspected COVID-19 are usually triaged on the presence of recognised symptoms: fever; cough; dyspnoea; fatigue and possible loss of smell/taste.

Our dietetic colleagues suggest that a number of frail older people may already be malnourished on admission to hospital; therefore nutrition continues to be an important factor in their rehabilitation and their ability to partake in physical interventions

As yet, no actual research, but evidence based on multinational frontline experience suggests that patients with COVID-19 can slip through the triage net and end up on 'cold' Care of Older People wards.

Dr Tarun Solanki (2020) quotes Toronto's Geriatric programs typical symptoms:
Only 20-30%, of elderly patients with infection, present with fever. • Atypical symptoms include delirium (hypo- and hyperactive), falls, generalised weakness, fatigue, functional decline, conjunctivitis, anorexia, headache, runny/blocked nose, chest pain, haemoptysis, D&V and abdominal pain. • Tachypnoea, delirium, unexplained tachycardia or reduced BP may be presenting symptoms. • Threshold for temperature should be lower ie: 37.5°0C, or a raise of 1.5°0C above normal patient. • Atypical presentation may be due to several factors: physiological changes with age, comorbidities and patients' potential inability to provide a clear history. • Older age, frailty and increasing comorbidities will increase the probability of an atypical presentation. • Older adults may present with mild symptoms which are disproportionate to the severity of their illness.

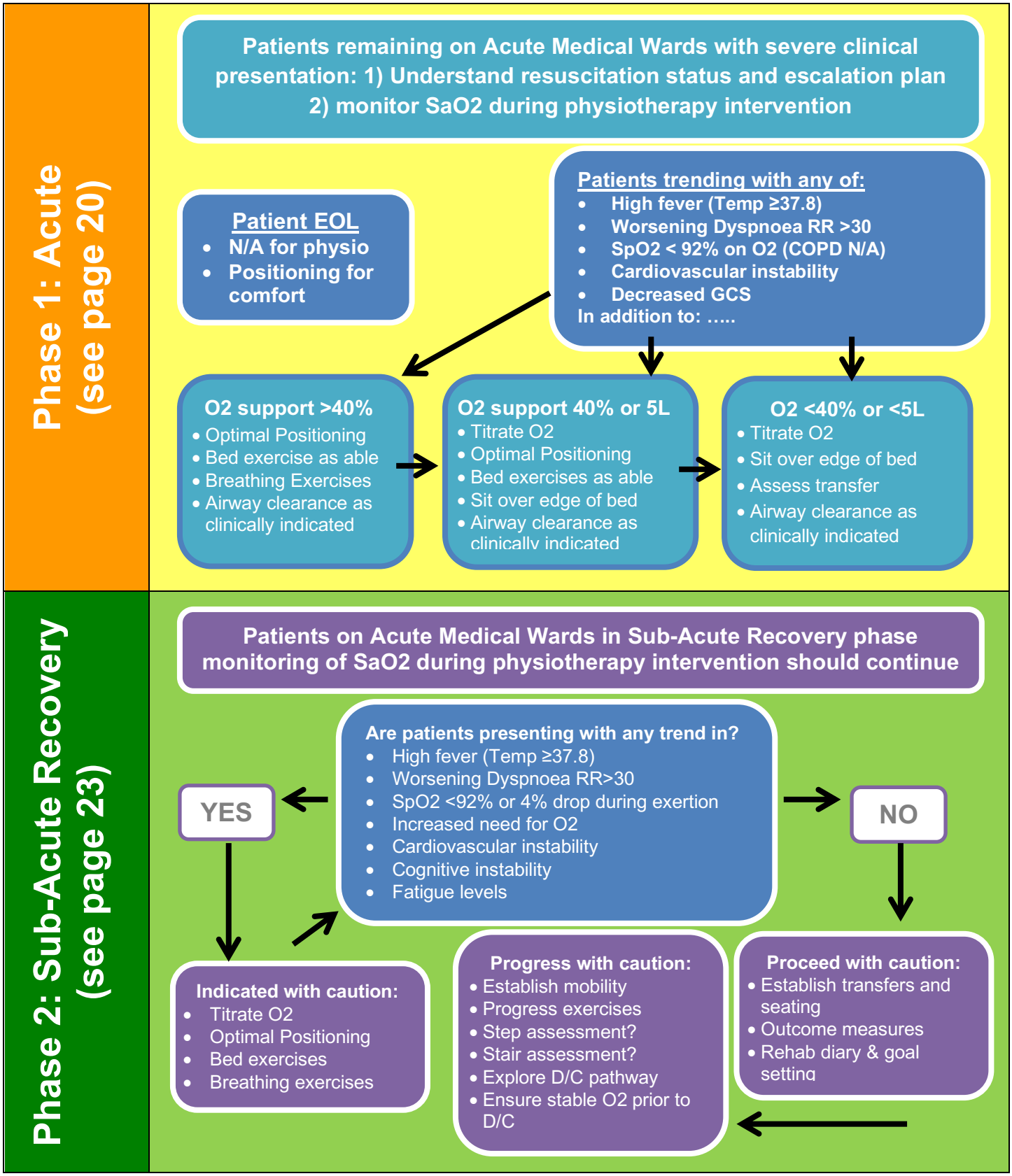
The majority of patients admitted into the elderly medicine services present with a clinical frailty scale of 5 or above. Any illness in a frail patient is often associated with step-ward deterioration in their physical health.

COVID-19 is known to put significant strain on the cardio-respiratory system. A small amount of movement might put a disproportionate strain on already compromised systems. Our patients may struggle to recover from this.

Patients need to be individually and holistically monitored (this can be done remotely) to determine optimal time for intervention (BMJ 2020).

This elderly medicine rehabilitation pathway can be found as a diagram on the Physiotherapy O drive (click here).

The clinical reality on the **Acute Medical Wards** at LTHT - Guidelines for treating the COVID-19 patient



The clinical reality with patients who are COVID-19 positive, resident on newly developed **COVID-19 wards at the LGI**

There have been a high volume of patients (21 patients on a 25 bed ward), with a cohort of frail elderly patients, with multiple comorbidities including falls, many admitted from care homes. The presentations of COVID-19 symptoms are very mixed:

- **1st group.** These patients have minimal respiratory symptoms requiring low levels of O2 support.
  - They have a more generalised picture of fatigue, cognitive decline, reduced nutritional intake. Includes elderly people who have fallen and sustained fractures requiring surgery.
  - Their post-operative rehabilitation is considerably slower than 'normal pathway' secondary to fatigue.
- **2nd group.** These patients decline quickly from a respiratory support point of view. They often have rapid requirements of 15L oxygen via a non-re-breathe mask within 24-48 hours of their admission.
  - They can have multi system compromise, with acute kidney injury, reduced arousal levels, and reduced nutritional intake. These patients can be difficult to manage from an optimal positioning/proning point of view, they have joint range reduction risk, confusion and agitation. They respond slowly to intervention and we have seen cases with multiple small pulmonary emboli.
  - However, we have had some success using the optimal positioning guidance (Section Four) in reducing patient's respiratory rate and work of breathing. The impact of this can take between 30-60 minutes, and gives patients a "break" from a supportive symptom management point of view.
  - Respiratory rate is a difficult, less reliable sign of deterioration in this cohort at times. Delirium affects respiratory rate. Some patients seem to have minimal if no physiological response/compensation to very low PaO2. That is, they can present with no change in heart rate or respiratory rate when recording SaO2 of 70% or 90%.

Does pre-oxygenation give a false positive picture of the impact of our intervention?

i.e. was it the positioning change or pre-oxygenation that reduced respiratory rate and work of breathing?

It would seem sensible clinical reasoning to use pre-oxygenation with a patient who is mobilising and has previously been established as prone to exercise induced anoxia. However, this may cloud the assessment of impact of intervention if used before initial assessment of optimal positioning.

The clinical reality with patients who are COVID-19 positive, resident on the **Regional Complex Rehabilitation Unit, Chapel Allerton Hospital, LTHT**.

The Unit has had an in-hospital outbreak of COVID-19, and 13 of 30resident patients became ill and tested positive, they have suffered from a variety of symptoms. Prior to catching the virus, the patients presented as:

- 4 with a traumatic brain injury
- 1 with hypoxic brain injury
- 4 with spinal cord injury
- 1 with stroke
- 1 with sub-arachnoid haemorrhage
- 1 with central pontine myelinolysis plus critical care neuropathy.

The patient's pre COVID-19 physical function varied from being mobile with supervision to hoist dependent and mainly nursed in bed. Their communication ability varied from normal communication to no ability to communicate.

How the patients presented	What we found
All presented with a variety of symptoms that led to being swabbed including pyrexia, cough, sickness and diarrhoea, general malaise, episodes of postural hypotension. All eventually had a pyrexia at some point in their disease process (i.e. in the 14 days from swab). Some had mild symptoms, 2 had significant symptoms but stayed onsite as were not for escalation, 2 were transferred to main site for symptom management but did not require respiratory support other than O2 therapy, 1 sadly passed away. All ill patients were reviewed daily, sometimes face to face, always using electronic patient records. Physiotherapy intervention was offered to those who had News score below 2 (non pyrexial, not tachypnoeic, SaO2 within range) and if they were able to communicate that they felt well enough to participate. For those patients who were unable to communicate their ability to participate, a clinical decision was made based on their News scores over time and their current clinical presentation.	All patients were able to participate in some form of physiotherapy (with the exception of the patient who passed away). All were only able to tolerate short and low level sessions, and experienced post intervention fatigue. All sessions were delivered with caution. All patients had 'days off physiotherapy' because they felt unwell or had a high News score. Less than half were able to tolerate a 'normal' physiotherapy session by day 14 post symptom onset. Following advice from the respiratory physiotherapy teams within the LTHT: Any patient with pyrexia - however mild was not given a physiotherapy session as this was deemed active disease process 1 patient returning to the rehabilitation unit (after their acute illness necessitated a transfer to the respiratory wards), has lost significant strength. It is predicted that they will take at least 2 further weeks from day 16 post symptom onset to return to their pre illness level. This is a patient with significant complex movement impairment and was only just able to stand pre COVID-19 illness.

Section 6: Rehabilitation Pathways

- **The Critical Care Rehabilitation Team**
- **The Complex Rehab Team at SJUH**
- **The Complex Rehab Team at LGI**
- **Complex Rehabilitation Unit at CAH**
-
- **Leeds Community Neurological Rehabilitation Teams**
- **Neighbourhood Teams / CCB / D2A**

Critical Care Rehabilitation Team (CCRT) - SJUH only

This team was originally set up by Adult Critical Care Services to support patients following a period on Critical Care. During COVID-19, their inclusion criteria have changed to include every patient that 'steps down' from the Critical Care settings. The team complete an initial assessment which aims to highlight any physical and/or psychological impact on patient's following their stay in the Critical Care setting. If it is identified that the patient can benefit from input by the team, then the team will continue to review and support their recovery as needed on an individualised basis.

The team expects that there may be added impact on their patient's psychological wellbeing during the COVID-19 crisis; so if further input is needed patients are generally referred to Liaison Psychology Team.

The CCRT aim to support the ward MDTs to help patient's achieve their rehabilitation goals; and also to improve their functional independence prior to discharge from hospital.

The CCRT attend the monthly follow up clinic run at SJUH, which reviews patients approximately 6 months after discharge from hospital. Currently, the follow up clinic has been cancelled because of COVID-19, however, the CCRT will be involved once this is back up and running to review post COVID-19 patients.

The complex rehab team at SJUH

The team comprises Clinical Specialists in Occupational Therapy (Chris Walshaw) and Physiotherapy (Denise Ross) and a Consultant Physician (Steve Halpin) and Speciality Registrar in Rehabilitation Medicine. We provide an in-reach support service for patients: who have acquired a neurological condition during their hospital stay; were admitted with acute illness and have a long term neurological condition or were admitted with a neurological diagnosis.

The level of support provided by the clinical specialist physiotherapist is dependent on the needs of the patient, the ward that the patient is resident on and the skills and knowledge of the physiotherapy team. Each case is assessed on an individual basis.

The team's input not only supports treatment interventions, but also access to on-going rehabilitation pathways. For example out of area repatriation, local rehabilitation pathways, referrals to the regional unit for complex rehabilitation based at Chapel Allerton Hospital in Leeds.

It is easy to refer a patient to the team, either by email directly to Denise Ross (denise.ross@nhs.net), email the team (leedsth-tr.neuro_rehab_sjuh@nhs.net) or via the regional referral to rehabilitation medicine system. Click here.

Who you could refer to the team?

Patient **currently an in-patient** on any ward at SJUH	Patient admitted to SJUH **because of a neurological diagnosis** e.g. stroke, spinal cord injury, head injury	Patient admitted to SJUH because of an acute illness or injury and has a **pre–existing neurological condition** (e.g. MS, CP, MND, PD),	Patient is profoundly unwell and **develops a neurological condition** during their hospital stay (e.g. stroke, CIN, CPM)

The kind of problems that we could support you and your patient with:

Your patients' movement control, joint range, cognition or perceptual function is compromised	Your patient is likely to have had a period of enforced bed rest or inactivity because of current illness	Your patient requires intervention for spasticity management	Your patient has on-going complex neurological rehabilitation needs	Your patient has other complex rehabilitation problems - we are happy to support and advise

The complex rehab team at LGI

This team provides clinical and pathway support for people with complex rehabilitation needs at the LGI. The team is comprised of a Consultant Physician in Rehabilitation Medicine (Matthew Smith) a Specialist Registrar in Rehabilitation Medicine, a Clinical Specialist Occupational Therapist (Lyndsay McLean) and Clinical Specialist Physiotherapists Maddy Kenny and Claire Hammond.

The level of support provided by the clinical specialist physiotherapist is dependent on the needs of the patient, the ward that the patient is resident on and the skills and knowledge of the physiotherapy team. Each case is assessed on an individual basis.

The team's input not only supports treatment interventions, but also access to on-going rehabilitation pathways. This might include out of area repatriation, local rehabilitation pathways or referrals to the regional unit for complex rehabilitation based at Chapel Allerton Hospital in Leeds.

If there is a patient who has complex rehabilitation needs, and you would like to refer them either to the whole complex rehab team or just physiotherapy please contact: matthewsmith@nhs.net .

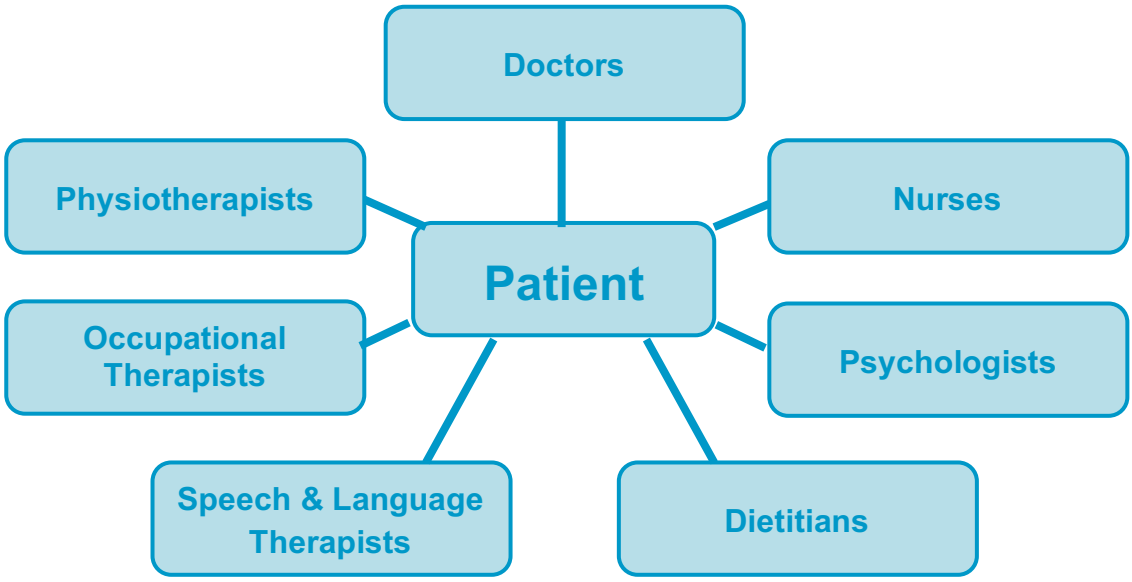
Complex Rehabilitation Unit at Chapel Allerton Hospital

Ward 1 is a regional neuro-rehabilitation in-patient ward. It specialises in the rehabilitation of patients with a wide range of neurological conditions such as acquired brain injury, spinal cord injury, multiple sclerosis and stroke to name a few. Many of the patients will have complex presentations.

The Team

There is a large multi-disciplinary team to support the patients with their recovery. All members of the team use a collaborative approach to treating the patients to ensure the best outcomes possible. Weekly multi-disciplinary meetings and regular goal setting and family meetings occur to make sure this happens.

The team includes;



The Role of Physiotherapists

There is a large team of physiotherapists working within the MDT, physiotherapists will assess patients arriving on the ward and formulate a treatment plan, treatments may include postural management, tonal management, assessing for seating, improving postural and limb activity, re-learning correct patterns of movement and increasing independence with transfers and mobility. The ultimate aims of the treatments are to maximise the functional abilities of the patient in the safest way possible.

The physiotherapy team work closely with other members of the multi-disciplinary team often completing treatment sessions jointly to ensure treatments are as effective as possible.

Referral Process and Contact Information

To refer a patient to Ward One they must;

- have complex rehabilitation needs
- be medically fit to transfer to the receiving unit
- have both the potential to respond to and actively participate in their rehabilitation.
- All patients in Leeds must be screened by the LGI or SJUH rehabilitation team.
- If you wish to discuss a referral with one of the Ward One physiotherapists please contact **Karen Wood (Physiotherapy team lead)** on 0113 3924582.

The Independent Sector in Leeds

To free up as much capacity as possible, on 24 March 2020, NHS England and NHS Improvement, in collaboration with the independent sector (IS) healthcare providers reached a national agreement to provide additional inpatient capacity as part of the response to COVID-19.

LTHT has worked in collaboration with Spire Leeds Hospital and Nuffield Health Leeds Hospital to establish what additional capacity can be provided.

The provision of available beds change according to both National and Local priorities

For an update on the current situation please contact Russell Welburn Clinical Physiotherapy Manager for Neurosciences. Russell.welburn@nhs.net

Leeds community neurological rehabilitation teams

The Community Neurology Teams are multidisciplinary and provide rehabilitation for adults with neurological conditions. They normally have 4 different teams. Referral guidance can be found in Appendix Five

The Community Neurological Rehabilitation Team: Rehabilitation in a community setting.

During the COVID-19 pandemic they are operating slightly differently.

The team continue to accept referrals, however they are prioritising essential visits and all other referrals are being placed on hold.

The prioritisation criteria are based on the rehabilitation needs to keep patients safe at home and prevent hospital admission.

- Repeated falls and no recent intervention
- Cognition, environment, impacting on ability to function safely (imminent danger)
- Patient highly vulnerable (risk to patient safety/risk of hospital admission) due to the above with lack of family/carer support around patient.
- Significant anxiety/low mood which makes you concerned for the patients safety

The team is also accepting referrals for rapid response aiming to support hospital discharge. Patients must meet the following criteria:

- Neurological condition
- Leeds GP
- Not requiring Neighbourhood Team support worker calls
- Can be made safe with few visits (approximately 3 visits)

If you wish to make a referral of discuss if you feel a patient is appropriate then please contact:

Team Address: Community Neurological Rehabilitation Service St Mary's Hospital Green Hill Road Leeds LS12 3QE	
Email contact	**Telephone**
communityneurologyservices@nhs.net	**0113 855 5082**
Ram Krish (clinical lead physiotherapist)	**07904 570356**

The Community Stroke Team:
Provide multidisciplinary rehabilitation to people who have suffered a stroke on discharge from hospital. This is a 7 day service.

The Community Neurological Rehabilitation Centre:
Regional unit providing MDT rehab either as an in-patient or day service.

The Community Neurological Discharge Team:
Supported discharge for patients with traumatic brain injury

Neighbourhood Teams / CCB / D2A

Referral to these teams are as normal i.e. via the ward D/C teams following MDT assessments and discussion

CCB is considered if:

- patients are deemed to need supportive or rehabilitation pathways
- patients have a vulnerable family member at home, CCB should be utilised to avoid putting the vulnerable person at risk

CCB are requesting patients have a negative swab or 7 days post initial +ve swab

Patients need to be able to maintain their SaO2% on RA during exertion i.e. doing stairs, before deemed appropriate for D/C

Section 7: Resources

- Resources
- Reference List

Resources

BTS, RCN, RCP (2020) ADD SPACES To your COVID ward care approach. BTS, RCN, RCP (2020) ADD SPACES To your COVID ward care approach_Poster.
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European Respiratory Society - COVID-19 and Rehabilitation blog click here
Guidance on Escalation of Respiratory Support in Patients with COVID-19 click here Guidance on Oxygen Therapy for Patients with COVID-19 click here
Rehabilitation with COVID-19: Italian guidance. Click here
LTHT - Dr Elliott, Consultant Physician in Respiratory at LTHT 'COVID -19 CPAP first draft guidelines' (in print)
Leeds Library Services: https://www.leedslibraries.nhs.uk/covid-19-coronavirus/
LTHT: Emotional reactions in patients - click here
Mind: Mindfulness exercises and tips - click here Psychology Tools: Living with worry and anxiety amidst global uncertainty – click here Mind: Psychological wellbeing during coronavirus - click here
NHS England & NHS Improvement Speciality Guides click here
National Institute for Health and Care Excellence (2019) Delirium: Prevention, diagnosis and management (GC103) click here
National Institute for Health and Care Excellence (2009): Rehabilitation after critical illness in adults Clinical guideline [CG83] click here
Oxford muscle grading scale: click here
Royal College of Occupational Therapy COVID-19 resource page: click here
STARS – stroke core competencies training. Stroke Association – information and leaflets for patients.
Stepdown of infection control precautions and discharging COVID-19 patients: click here
COVID-19: Supporting your recovery: Lancashire Teaching Hospitals on-line course click here

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Section 8: Appendices

1. Outcome Tools and Measures
2. Pathology of Neurological Conditions
3. Neurological Physiotherapy Assessment Guide
4. Community Neurological Rehabilitation Service Referral Form

APPENDIX ONE: Outcome Tools and Measures

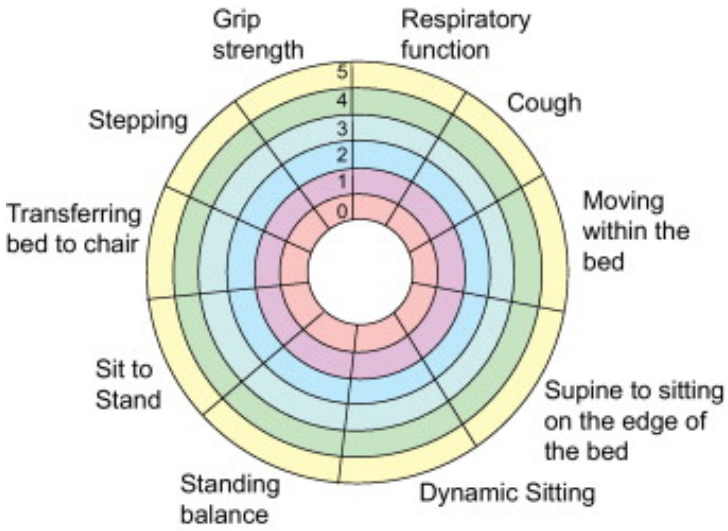
- The CPAx
- The Clinical Frailty Scale
- Modified Rivermead Mobility Index
- Trail Making Test
- EQ-5D-5L

Chelsea Critical Care Physical Assessment Tool (CPAx)

Aspect of Physicality	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Respiratory Function	Complete ventilator dependence. Mandatory breaths only. May be fully sedated/ paralysed.	Ventilator dependence. Mandatory breaths with some spontaneous effort.	Spontaneously breathing with continuous invasive or non-invasive ventilatory support.	Spontaneously breathing with intermittent invasive or non-invasive ventilatory support Or continuous high flow oxygen (>15litres).	Receiving standard oxygen therapy (<15 litres).	Self-ventilating with no oxygen therapy.
Cough	Absent cough, may be fully sedated or paralysed.	Cough stimulated on deep suctioning only.	Weak ineffective voluntary cough, unable to clear independently e.g. requires deep suction.	Weak, partially effective voluntary cough, sometimes able to clear secretions e.g. requires yanker suctioning.	Effective cough, clearing secretions with airways clearance techniques.	Consistent effective voluntary cough, clearing secretions independently.
Moving Within the Bed e.g. rolling.	Unable, maybe fully sedated/ paralysed.	Initiates movement. Requires assistance ≥ 2 people (maximal).	Initiates movement. Requires assistance≥1 person (moderate).	Initiates movement. Requires assistance 1 person (minimal).	Independent in ≥3 seconds.	Independent in <3 seconds.
Supine to Sitting on the Edge of the Bed.	Unable/ Unstable.	Initiates movement. Requires assistance ≥ 2 people (maximal).	Initiates movement. Requires assistance≥1 person (moderate).	Initiates movement. Requires assistance 1 person (minimal).	Independent in ≥3 seconds.	Independent in <3 seconds.
Dynamic Sitting (i.e. when sitting on the edge of the bed/unsupported sitting)	Unable/ Unstable	Requires assistance ≥2 people (maximal).	Requires assistance≥1 person (moderate).	Requires assistance 1 person (minimal).	Independent with some dynamic sitting balance, i.e. able to alter trunk position within base of support.	Independent with full dynamic sitting balance, i.e. able to reach out of base of support.

Standing Balance	Unable/ unstable/ bedbound.	Tilt table or similar	Standing hoist or similar.	Dependant on frame, crutches or similar.	Independent without aides.	Independent without aids and full dynamic standing balance, i.e. able to reach out of base of support.
Sit to Stand (Starting position: ≤ 90 degrees hip flexion)	Unable/ Unstable.	Sit to stand with maximal assistance e.g. standing hoist or similar.	Sit to stand with moderate assistance e.g. 1-2 people.	Sit to stand with minimal assistance e.g. 1 person.	Sit to stand independently pushing through arms of the chair.	Sit to stand independently without upper limb involvement.
Transferring from Bed to Chair.	Unable/ Unstable.	Full hoist.	Standing hoist or similar.	Pivot transfer (no stepping) with mobility aid or physical assistance	Stand and step transfer with mobility aid OR physical assistance	Independent transfer without equipment.
Stepping	Unable/ Unstable.	Using a standing hoist, or similar.	Using mobility aids AND assistance > 1 person (moderate).	Using mobility aid AND assistance 1 person (minimal).	Using mobility aid OR assistance 1 (minimal).	Independent without aid.
Grip Strength (predicted mean for age and gender on the strongest hand.)	Unable to assess.	< 20%	< 40%	< 60%	< 80%	≥80%

This is how the results of the CPAx are presented, and the changes to the individual patient's status can be compared.



The CPAx outcome presentation

The Clinical Frailty Scale

1. **Very Fit** - People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age	7. **Severely Frail** - Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).
2. **Well** - People who have no active disease symptoms but are less fit than category 1. Often, they exercise or are very active occasionally, e.g. seasonally.	8. **Very Severely Frail** - Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.
3. **Managing Well** - People whose medical problems are well controlled, but are not regularly active beyond routine walking	9. **Terminally Ill** - Approaching the end of life. This category applies to people with a life expectancy <6 months, who are not otherwise evidently frail
4. **Vulnerable** - While not dependent on others for daily help, often symptoms limit activities. A common complaint is being "slowed up", and/or being tired during the day.	**Scoring frailty in people with dementia** The degree of frailty corresponds to the degree of dementia. Common symptoms in **mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal. In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting. In **severe dementia**, they cannot do personal care without help.
5. **Mildly Frail** - These people often have more evident slowing, and need help in high order IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.	
6. **Moderately Frail** - People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.	

MODIFIED RIVERMEAD MOBILITY INDEX

please note O2 requirements and FiO2 during test

0 - Unable to perform

1 - Assistance of 2

2 - Assistance of 1

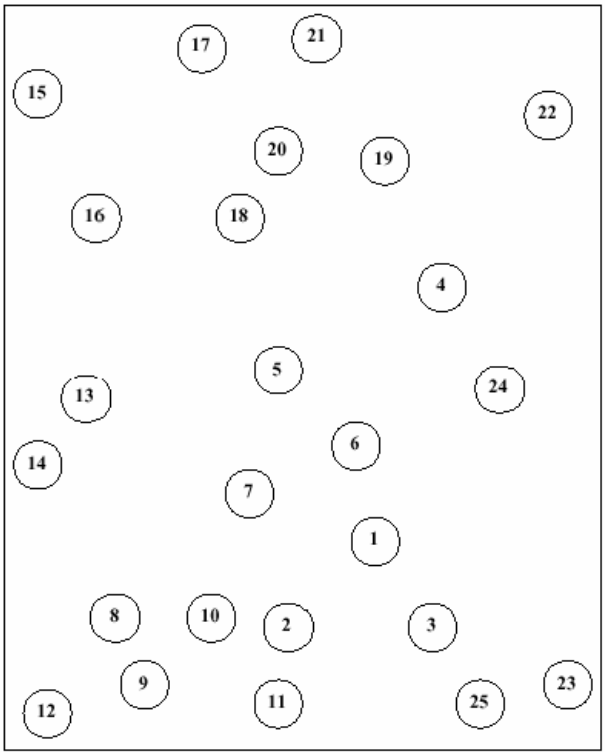
3 - Supervision or verbal cues

4 - Requires an aid or appliance

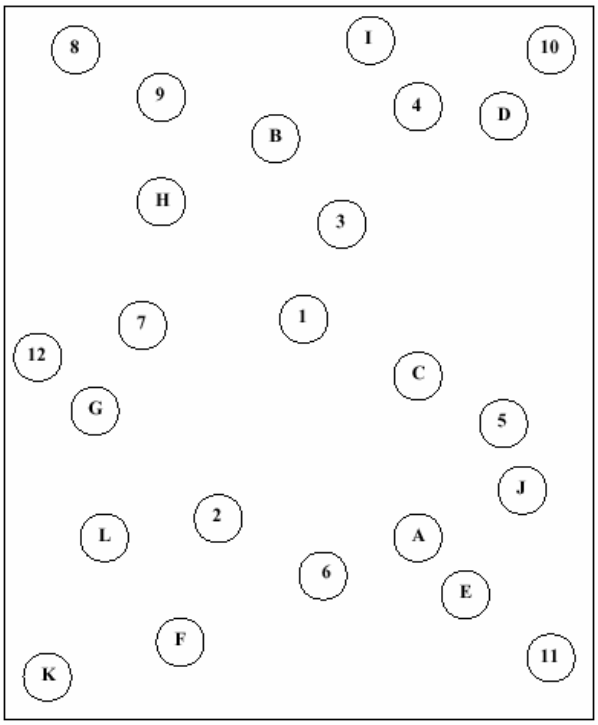
5 - Independent

Task	**Instructions**	**Date**	**Date**	**Date**
Turning over	**Turning over from back to their unaffected side**			
Lying to sit	**Sit up on the edge of the bed from unaffected side**			
Sitting balance	**Sit on the edge of bed for 10 seconds**			
Sitting to stand	**Stand up from the chair (patient takes less than 15 seconds)**			
Standing	**Standing for 10 seconds**			
Transfers	**Transfer from bed to the chair and back**			
Walking	**Walking 10 meters**			
Stairs	**Going up and down stairs**			
	Total	**/40**	**/40**	**/40**

Trail Making Test



Trail Making Test part A: the patient joins the dots from 1 to 25. Record the time



Trail Making Test part B: the patient joins the dots from 1 to 13 and A to L, alternating between numbers and letters. Record the time.

Normative values for the Trail Making Test			
	Average	**Deficient**	**Rule of Thumb**
Trail A	29 seconds	> 78 seconds	Most in 90 seconds
Trail B	75 seconds	> 273 seconds	Most in 3 minutes

EQ-5D-5L

Under each heading, please tick the ONE box that best describes your health TODAY.	
MOBILITY I have no problems in walking about ☐ I have slight problems in walking about ☐ I have moderate problems in walking about ☐ I have severe problems in walking about ☐ I am unable to walk about ☐	**SELF-CARE** I have no problems washing or dressing myself ☐ I have slight problems washing or dressing myself ☐ I have moderate problems washing or dressing myself ☐ I have severe problems washing or dressing myself ☐ I am unable to wash or dress myself ☐
USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities) I have no problems doing my usual activities ☐ I have slight problems doing my usual activities ☐ I have moderate problems doing my usual activities ☐ I have severe problems doing my usual activities ☐ I am unable to do my usual activities ☐	**PAIN / DISCOMFORT** I have no pain or discomfort ☐ I have slight pain or discomfort ☐ I have moderate pain or discomfort ☐ I have severe pain or discomfort ☐ I have extreme pain or discomfort ☐
ANXIETY / DEPRESSION I am not anxious or depressed ☐ I am slightly anxious or depressed ☐ I am moderately anxious or depressed ☐ I am severely anxious or depressed ☐ I am extremely anxious or depressed ☐	On a separate page, a visual analogue scale from 1 (the worse health imaginable) to 100 (the best health imaginable) is used. The person is asked to mark an X on the scale to indicate how their health is TODAY

APPENDIX TWO: Pathology of neurological conditions:

- ICU Acquired Illness
- Central Pontine Myelinolysis (CPM)
- Guillain Barré Syndrome (GBS)
- Encephalopathy
- Hypoxic Brain Injury
- Stroke

ICU Acquired Weakness

- Critical Illness Polyneuropathy (CIP)
- Critical Illness Myopathy (CIM)

These are common complications of critical illness that frequently occur together. These conditions cause weakness of limb and respiratory muscles, and consequently increase morbidity and mortality, and impede recovery.

These conditions affect 'activities of daily living' (everyday tasks such as bathing, dressing, eating, leisure activities and participation in family life). Recovery takes weeks or months. When CIM/P is severe, there may be little or no recovery.

People receiving mechanical ventilation or with an increased risk of developing multi-organ failure, the risk of developing CIP or CIM is about 30%. The risk increases up to 50% in people with acute respiratory distress syndrome (Hermans et al 2008).

The muscle weakness associated with these conditions can prolong the need for supported ventilation and delay weaning from a ventilator. In turn, this can mean a longer stay in the ICU and in hospital, and slower rehabilitation.

It is increasingly recognized that muscle atrophy, CIP, and CIM are not necessarily distinct entities but likely are an overlapping spectrum triggered by an acute inflammatory response, often occurring simultaneously thus the term ICU Acquired Weakness (ICU-AW) is often used.

Because of these two conditions, muscles are inactive, and our patients suffer from associated loss of muscle strength and endurance.

Critical Illness Polyneuropathy (CIP)

This is characterized by a symmetrical, distal sensory-motor axonal polyneuropathy affecting limb and respiratory muscles, as well as sensory and autonomic nerves. Despite abnormal nerve conduction study (NCS) results, histologic analysis of sensory nerves in patients with CIP generally appear normal early in the course of illness, with axonal degeneration evident only late in the course.

Critical Illness Myopathy (CIM)

This is characterized by limb and respiratory muscle weakness with retained sensory function. Electrophysiology testing demonstrates reduced compound muscle action potential amplitudes with preservation of sensory responses.

Risk Factors for CIP and CIM

- Sepsis
- Systemic inflammation
- Poor glycaemic control
- Steroid treatment
- Neuromuscular blocking agents
- Immobility
- Malnutrition
- Female gender

Clinical Features

- Onset typically 1 week into ICU admission
- Bilateral deficits which can be asymetrical
- Mostly proximal weakness
- Reflexes present, though diminished
- Nerve conduction studies -
    - CIP shows sensorimotor axonopathy with decreased compound muscle action potentials and sensori nerve active potentials
    - CIM shows reduced amplitude and increased duration of compound muscle action potentials

Central Pontine Myelinolysis

Central pontine myelinolysis (CPM) is a neurological condition involving severe damage to the myelin sheath of nerve cells in the Pons (a nucleus within the brain stem).

CPM presents most commonly as a complication in the treatment of patients with profound hyponatremia and is caused due to the rapid correction of low blood sodium levels. CPM may also occur in patients prone to hyponatraemia such as severe liver disease (e.g., cirrhosis) and Alcoholism.

COVID-19 patients are at higher risk of CPM especially if they require intubation and critical care input as hyponatremia is the single most frequent electrolyte disturbance encountered in the intensive care unit (ICU) affecting as many as 24.5 % of the patients (Rafat, 2015).

Symptoms of CPM

CPM is characterized by acute paralysis, dysphagia (difficulty swallowing), dysarthria (difficulty speaking) and other neurological symptoms.

Symptoms depend on the regions of the brain involved. Prior to its onset, patients may present with the neurological signs and symptoms such as nausea and vomiting, confusion, headache and seizures.

These symptoms may resolve with normalisation of the serum sodium concentration. Three to five days later, a second phase of neurological manifestations occurs correlating with the onset of myelinolysis. Observable symptoms may include seizures, disturbed consciousness, gait changes, and decrease respiratory function.

Additional symptoms often occur in the next one to two weeks, many of which affect movement. These include:

- Muscle weakness
- Impaired sensation
- Poor balance
- Delayed or poor reflexes and responses
- Tremors

In about 10% of people with CPM, extrapontine myelinolysis (EPM) is also found. In these cases symptoms of Parkinson's disease may be generated.

Guillain Barré Syndrome (GBS)

Toscano et al (2020) report on several significant case studies of people who have developed GBS during the COVID-19 illness.

GBS can be sub divided into distinct pathophysiological diseases: Acute inflammatory demyelinating polyradiculopathy (AIDP), Acute motor and sensory axonal neuropathy (AMSAN), and Acute motor axonal neuropathy (AMAN).

Acute inflammatory demyelinating polyradiculopathy (AIDP) is distinguished by a patchy distribution of demyelination throughout the peripheral nervous system. AIDP is characterised by damage to the plasmalemma of Schwann cells and is the most common form of GBS (Nakano & Kanda 2016).

Acute motor and sensory axonal neuropathy (AMSAN), and Acute Motor Axonal Neuropathy (AMAN) demonstrates primary axonal degeneration throughout the peripheral nervous system, particularly at spinal nerve roots and is characterised by an immune attack at the Nodes of Ranvier (Nakano & Kanda 2016).

In most cases of GBS, patients report recent infectious symptoms with neurological symptoms developing between 3 days to 6 weeks post infection. The majority of patients will present will ascending bilateral weakness, normally starting distally. There can also be cranial nerve involvement and 25% of patients will experience respiratory compromise requiring mechanical ventilation (Head & Wakerley 2016). Diagnosis is normally aided by lumbar puncture and or nerve conduction studies. There are two main treatments that can aid with recovery, these are Plasmapheresis and Infusions of Immunoglobulins.

GBS patients can often require prolonged weaning times if they have been mechanically ventilated due to weakness throughout their respiratory system and these patients will commonly have a tracheostomy to aid this weaning process and rehabilitation.

The degree of paralysis can vary greatly on a patient by patient basis, with some patients experiencing complete initial paralysis requiring hoisting and others experiencing mild global weakness.

Fatigue is a significant symptom in this patient group and can have an impact on initial respiratory weaning and also on rehabilitation throughout their recovery.

Therefore various aspects of movement can be affected and patients may present with impairments in : The ability to move in bed, rolling, lie to sit, sit to stand, gait, balance, co-ordination, reach and grasp, facial movements, and the ability to perform all ADL's independently.

The combination of COVID-19 and GBS is likely to be devastating, and the rehabilitation for these patients may take varying degrees of input and time ranging from weeks to years depending on their level of impairment (NINDS 2020, Toscano et al 2020).

Encephalopathy

Encephalopathy is an umbrella term for diffuse brain disease and can have many causes including: Infection, metabolic or mitochondrial dysfunction, brain tumour, increased intercranial pressure, chronic progressive trauma, poor nutrition or lack of oxygen or blood flow to the brain (NINDS 2019).

The underlying pathology of Encephalopathy is different dependent on the type of encephalopathy. According to Healthline Media (2005-2020), some of the major types are:

Chronic Traumatic Encephalopathy: Repeated head injuries, often with a delayed onset years after the injuries.

Glycine Encephalopathy: Changes to the genes that lead to a deficiency in the breakdown of glycine.

Hashimotos Encephalopathy: Exact cause is unknown, thought to relate to autoimmune process.

Hepatic Encephalopathy: Exact cause is unknown, normally caused by a toxin build up.

Hypertensive Encephalopathy: sudden hypertensive episode in a chronically hypertensive patient.

Hypoxic ischemic Encephalopathy: Hypoxic Brain injury.

Toxic-metabolic encephalopathy: Acute organ failure, sepsis, dehydration.

Infectious encephalopathies: Often caused by infection such as Chicken pox, herpes simplex virus.

Uremic encephalopathy: Acute Kidney Injury or Chronic Kidney Failure.

Wernicke Encephalopathy: Lack of vitamin B1, can be common in alcohol use disorder.

Treatment is driven by the type of encephalopathy and will usually focus on treating the underlying illness/disease that has caused the encephalopathy. Encephalopathy will often cause alterations in: cognition, memory, personality, lethargy and the patient can present with a progressive loss of consciousness (NINDS 2019).

Other symptoms can include: myoclonus, muscle atrophy and weakness, seizures, swallowing and/or speech impairments (NINDS 2019).

This patient group can have very variable movement impairments dependent on the type of encephalopathy and should be treated on a patient by patient basis with an awareness of their altered cognitive state during rehabilitation.

Hypoxic Brain Injury

Hypoxic brain injury happens as a result of deprived blood supply to the brain, resulting in global ischemic damage. There can be many causes of this (Headway 2020), some of these include: Cardiac arrest, respiratory arrest, severe asthma attack or anaphylaxis, complication of general anaesthetic, smoke inhalation, carbon monoxide poisoning

In a circulatory arrest, the extent of the ischemic damage, the severity of neurological deficit and the length of recovery are linked to the length of the circulatory arrest. 15 minutes of circulatory arrest can result in damage to 95% of brain tissue.

Commonly affected areas of the brain are the hippocampus (resulting in memory impairment) and the cerebellum (causing an ataxic presentation); this is thought to be due to higher metabolic rates and oxygen demand (Busl & Greer 2010).

There is a difference between a *purely hypoxic* event and a *circulatory hypoxic* event with different pathology and prognosis. Pure hypoxic brain damage does not commonly lead to severe brain damage as long as circulation is preserved, despite initially having a more severe presentation, these patients have a higher chance of survival and neurological recovery (Busl & Greer 2010). This is because hypoxia causes increased partial pressures of CO2, reducing pH. Cerebral autoregulation then results in an increase in cerebral blood flow thus preserving circulation to the brain. Examples of pure hypoxic damage are typically caused by airway obstruction, airway trauma or anaphylaxis. In circulatory arrest the nutritional supply from the blood is compromised and leads to an accumulation of toxins resulting in increased swelling and associated damage.

Common symptoms of hypoxic brain injury (Headway 2020):

- Ataxia
- Balance impairments
- Weakness – may be global or more focal.
- Impaired memory
- Aphasia
- Executive functioning impairments
- Changes to personality and mood

Hypoxic brain injury patients may have movement impairments associated with body schema and midline orientation and apraxia requiring MDT rehabilitative input.

Within the early stages in a critical care setting this may present with issues within movement including rolling, transfers, seating requirements, and the ability to participate in any form of ADL including eating and drinking, washing and dressing.

Stroke

The World Health Organisation define a stroke as 'rapidly developing clinical signs of focal or global disturbance of cerebral function with symptoms lasting 24 hours or longer or leading to death with no apparent cause other than of vascular origin'. The onset of a stroke is sudden and effects are normally evident immediately. Symptoms depend on which part and how much of the brain is affected. The two major categories of stroke are ischemic, the most common (85%) and haemorrhagic (15%).

Ischemic strokes:
These are caused by a blockage in a blood vessel which then decreases the blood supply to an area of the brain. This means vital oxygen and nutrients are unable to get to parts of the brain, causing brains cells to either get damaged or die. Blockages may be due to thrombosis (blood clot formed locally), embolism (blood clot coming from elsewhere in the body) or systemic hypoperfusion. They can be further classified using the Bamford Classification (Parmar 2018) as seen in the table below.

Total anterior circulation infarct (TACI)	Partial anterior circulation infarct (PACI)	Lacunar infarct (LACI)	Posterior circulation infarct (POCI)
Must have all three of the following: • Unilateral weakness and/ or sensory deficit • Hemianopia • Higher dysfunction (e.g. speech)	Two out of three of TACI and / or Higher dysfunction alone	One of the following: • Pure motor stroke • Pure sensory stroke • Sensory-motor deficit only • Ataxic hemiparesis	One of the following: • Isolated hemianopia • Brainstem signs (e.g. vertigo) • Bilateral motor/ sensory deficit • Cerebellar ataxia

When appropriate, treatment options include a clot-busting drug (thrombolysis) or extraction of the clot (thrombectomy), both are time dependent. Without these treatments the clot naturally breaks up within days to weeks. Medications may be given to assist and prevent the risk of a further stroke.

Haemorrhagic strokes:
Haemorrhagic strokes occur when a blood vessel in the brain ruptures. The bleeding causes pressure to build increasing swelling and leading to decreased blood supply to surrounding tissue eventually causing cell death. As well as drug management, occasionally neurosurgical interventions are required such as a craniotomy where any blood is removed and burst blood vessels are repaired. There are two types of haemorrhagic strokes: Intracerebral haemorrhage - bleeding within the brain. Subarachnoid haemorrhage - bleeding on the surface of the brain.

Transient ischemic stroke:
When symptoms of a stroke resolve within 24 hours it is known as a transient ischemic stroke (TIA). This is caused by the blood supply to the brain being interrupted for a short period of time only. People who have TIA's are at high risk of going on to have a stroke.

How is a stroke diagnosed?
An early CT scan is used to determine the type of stroke which is important as the treatments and drug management are very different. Haemorrhages will show up immediately, but ischemic strokes might not. An MRI might also be performed as they are more detailed and might find smaller strokes missed on a CT scan. Because abnormalities do not always show up on a brain scan a patient may be treated as having a stroke based on history and symptoms despite having normal imaging.

What are the main risks for in-hospital stroke?

Risk factors for in-hospital strokes include fever, unstable diastolic blood pressure, dehydration, decreased mobility and leukocytosis. Patients with in-hospital stroke often experience more severe strokes. This may be because of higher rates of comorbidities and a longer time to recognise stroke symptoms and get brain imaging.

Symptoms of stroke

The FAST campaign is used to help anyone spot the signs of a stroke.

Face - Can they smile or is one side of the mouth drooping?

Arm weakness - Can the person raise both arms? Is one weak?

Speech - Is their speech slurred?

Time - to call 999. Symptoms can vary massively depending on the area affected. This may range from motor and sensory deficits to cognitive, speech and or visual impairments.

Physiotherapists are constantly assessing and re assessing motor function and functional ability. This means they may often be the first people to spot signs of a stroke.

Motor: Hemiplegia is a common stroke symptom, particularly evident in the upper and lower limbs. It can range from only very mild weakness to severe with no movement at all. Often trunk control is impaired so this can decrease sitting balance and might present as a patient leaning to one side in their chair. Due to weakness a patient might overuse their non-affected side to compensate. High tone or spasticity is another symptom which, if poorly managed, can lead to long-term complications.

Sensory: As with motor deficits, sensory symptoms are normally unilateral. A patient may report changes or decreased sensations in limbs often with associated weakness. Signs when completing function tasks include inattention to one side of the body or neglect. For example, not using a limb to complete dressing. When mobilising a steppage gait might not only be due to compensating for any weakness in dorsiflexors but also used to increase sensory feedback. In severe cases patients may 'push' to the effected side due to lack of sensation and altered midline perception.

Vision: While physiotherapists would not routinely complete any formal visual assessment, signs that might indicate a stroke include a visual inattention. For example, a patient ignoring people and objects on one side when mobilising.

Balance and co-ordination: Symptoms that may indicate a stroke include limb dyspraxia or an ataxic gait. Many factors including decreased coordination and muscle strength can lead to poor balance and high risk of falling in stroke patients.

Other symptoms: Some other indications of a stroke include problems swallowing (dysphagia), speech disturbance, for example receptive and/ or expressive dysphasia, or dysarthria and changes in cognition.

If you notice any signs that may be suggestive of a stroke let the medical team looking after the patient know immediately as time is critical for the treatment of a stroke. It is important to note past medical history as conditions such as infection or pain can worsen residual symptoms from previous stroke for example, weakness or spasticity.

APPENDIX THREE: Neurological physiotherapy assessment guide

Subjective Assessment

History of Presenting Condition:	Diagnosis/ Presenting condition: • COVID-19 – date of onset? Symptoms? Medical input? • Any new neurological conditions/ presentations? • Patient reported symptoms/ problems • Specific investigations - scans/ Imaging • Previous therapy input • Medical management – any treatment that might mean not appropriate to assess or would indicate a moderated assessment • Clinical Frailty Scale if over 65 years
Past Medical History:	Previous neurological conditions? Other comorbidities
Social History:	Type of accommodation Adaptations/ equipment Stairs Support - Family? Care support package Interests/ Hobbies / Employment?
Baseline Functional/ Mobility level:	'Normal' movement ability / sensory / cognitive impairment / functional difficulties / mobility ability - inside and outside Use of walking aids? Other equipment? Orthotics? Seating? Clinical Frailty Scale MRMI Trail Making Test
Objective Assessment	
Your first assessment of a person with COVID-19 and who has a history of neurological impairment or has potential to have acquired a new neurological illness should **always** include 2 therapists. Refer to the respiratory guidance in Section 4. If your patient is sat out of bed you may wish to start your assessment there. For more dependant patients' initial parts can be completed with the patient lying in bed and then sat on the edge of bed with assistance. Use your clinical judgement and ask for help if you are unsure	

Observations:	Refer to Section 4 for respiratory assessment and guidance. Note that people who have or who are recovering from COVID-19 can be extremely variable and unstable. What is your patient's general posture and alignment, do they have noticeable neglect?
Movement:	Assess through handling, be aware of unstable shoulders, painful stiff joints, shortened stiff and painful soft tissues. Comment on upper/ lower limbs, trunk and pelvis, head and neck, scapula stability or stiffness • Low tone (feels weak, heavy, floppy) describe as mild/moderate/severe • Any subluxation of shoulders? • High tone (feels stiff, rigid, shortened) describe as mild/moderate/severe • Any clonus? • Mid-line, does the patient know where 'middle' is? Are they retropulsed in sitting, sit to stand, standing? Do they attempt to push themselves to one side? • Over-activity? Inattention/ Neglect? • Associated reactions - spastic patterning in response to being moved or patients own movement.
Strength / ROM:	Use Oxford grading scale grading from 0 to 5 (see resource section). Be as specific as possible. Include both sides of the body. E.g. Right lower limb: Hip flexion _/5, Hip abduction _/5, Knee extension _/5, Knee flexion _/5, Ankle dorsiflexion _/5, Ankle plantar-flexion _/5 Comment on any decreased range of movement and suggest why - e.g. limited due to weakness?/ soft tissue shortening?/ pain? …
Sensation:	Light touch - Assess sides of the body separately and together to look out for any inattention. Vision - any hemianopia?, nystagmus?
Co-ordination:	Heel-shin / Finger-nose / Rapid alternating movement of hand pro to supination Compared right and left (Not suitable to complete if denser weakness on one side.)
Balance:	Sitting - independent? Maintaining midline? Ability to complete functional tasks? Standing – independent? Ankle strategy present?

Mobility:	Transfers • Mobility within bed (ability to roll?) • Bed to chair / chair to bed transfers • Any equipment required? • Assistance? How much? Gait, comment on: • Stride length/ Foot clearance/ Heel strike/ wide base gait? • Assistance required / any walking aids / orthosis / specialist shoes?
Other:	Vision - look for any obvious inattention Any comments on cognition/ attention/ communication Outcome measure – note CPAx, MRMI, Trail Making Test,

APPENDIX FOUR: Community Neurological Rehabilitation Services Referral Form

NHS
Leeds Community Healthcare
NHS Trust

COMMUNITY NEUROLOGICAL REHABILITATION SERVICES

REFERRAL FORM

Referral Form for Rapid response telephone referral to CNRT only
(to be completed by the Triage coordinator)

Patient Details

Surname:	**Title: Mr ☐ Mrs ☐ Ms ☐ Miss ☐**
Forename(s):	**NHS No:**
Address: **Postcode:**	**Date of birth:**
	Next of kin: **Relationship:** **Telephone No:**
Telephone Number:	
Referrer Details:	
Any other service involved or referred to:	

Does the patient have a Leeds GP? **Yes ☐** **No ☐**

Does the patient have a neurological condition? **Yes ☐** **No ☐**

For consideration as a priority
(to support hospital discharge or prevent admission or reduce imminent risks) (*tick that is applicable)*

- ☐ Repeated falls and no recent intervention
- ☐ Cognition, environment, impacting on ability to function safely (imminent danger)
- ☐ Patient highly vulnerable (risk to patient safety/risk of hospital admission) due to the above with lack of family/carer support around patient.
- ☐ Significant anxiety/low mood which is makes you concerned for the patient's safety

Medical History

Diagnoses (neurological and others, including date of onset):	**Goal/s**
Are there any potential risks for a home visit or any issues to highlight before we arrange an initial assessment?	
Was the patient tested for COVID–19? If yes, what was the result? Any symptoms at present?	
Any other information:	

Please return referral and copies of relevant discharge summaries/clinic letters etc. to:

Community Neurological Rehabilitation Service

St Mary's Hospital, Green Hill Road, Leeds LS12 3QE

Tel: 0113 855 5082 **Email**: communityneurologyservices@nhs.net