intensive care society

proud to be the voice of critical care since 1970

Occupational therapy for COVID-19 patients in ICU and beyond

Published: August 2020

Table of Contents

Occupational therapy for COVID-19 patients in ICU and beyond

Authors

- Penelope Firshman, Clinical Lead Critical Care Occupational Therapist, King's College Hospital
- Karen Hoffman, AHP Rehabilitation Consultant, Occupational Therapist, Barts Health NHS Trust
- Andrea Rapolthy-Beck, Occupational Therapist and Doctoral Student

Acknowledgments

With special thanks to:

- Nirandeep Rehill, Public Health Specialist, UCLPartners and NIHR ARC North Thames
- Craig Brown, Imperial College Health Partners

1.0 Occupational Therapy in patients with COVID-19

As COVID-19 is a novel virus of which we have only experienced in the UK since January 2020, we do not yet fully understand the outcomes for patients. In particular, we are still to establish and identify the longer-term impacts for patients who have recovered from the virus. However, the knowledge we possess regarding recovery following critical illness from other respiratory conditions, lends substance to future rehabilitation planning [1].

A recent paper published in the American Journal of Physical Medicine and Rehabilitation [2] outlines how rehabilitation can reduce the complications from COVID-19 by:

1. Delivering interdisciplinary rehabilitation that is initiated early and continued throughout the acute hospital stay,
2. Providing patient/family education for self-care after discharge from inpatient rehabilitation at either acute or subacute settings, and
3. Continuing rehabilitation care in the outpatient setting, and at home through ongoing therapy either in-person or via telehealth.

A substantial burden of care on the recovering ICU patient relates to the deconditioning and neuromuscular weakness commonly noted. Research focused on the outcomes following critical illness pre-COVID-19 has demonstrated impairments in physical, cognitive and psychological domains which have a lasting impact on return to usual occupations and societal participation [3]. Participation is also known to impact on patients and families' quality of life, increasing the informal and formal care needs with a resultant economic impact on individuals and on the state [4]. This in turn impacts on people's social determinants of health with potential consequences on their future health and their families.

Experience of COVID-19 to date by Occupational Therapists in the UK shows that the presentation is largely similar to other patients with prolonged sedation during severe respiratory failure, however a higher number of patients need to be seen at any single timepoint. Of relevance to note is that some impairments have been heightened due to the hospital environment being even more restrictive, limitations on families visiting and the requirement for wearing of personal protective equipment (PPE).

Anecdotally, there appear to be two pathways of recovery from critical illness with COVID-19. Some patients recover quickly, are able to be nursed on a general hospital ward and are mobile and independently self-caring. Yet, it remains imperative to screen these patients as it is well known that some struggle with higher level cognition and psychological difficulties which have a significant impact on their ability to return to their previous lives, particularly returning to work. At 12 months 30-50% of adult ICU survivors have not returned to their previous employment [5], therefore best practice would require that all patients are screened and reviewed in follow up clinics to predict early impairments.

The second pathway refers to patients who have had more hypoxia, recurrent episodes, or have lasting effects from multi-organ failure and neurological injuries. This patient group wean slower, require a higher intensity of rehabilitation and may require ongoing inpatient rehabilitation. They are likely to require long-term care packages and equipment to support a safe return home. Both them and their families may experience psychological and social challenges due to the prolonged period of recovery.

Impairments that are being typically reported and treated by Occupational Therapists across the UK through the Royal College of Occupational Therapy Critical Care Forum include:

1.1 Physical effects

- Severe myopathy – particularly upper limb weakness, with some patients unable to move their arms. This is a key focus for occupational therapy as our upper limbs are fundamental to function and participation.

- Neuromuscular weakness and impairments such as critical illness polyneuropathy (CIP) due to inflammatory processes has been observed, and it is well known that this can result in ongoing dysfunction for greater than 5 years in 85% of individuals [2]. The progress during rehabilitation of improvement in movement in upper limbs indicates the impairment is potentially more related to a myopathy. However, there are also regular reports of peripheral nerve injuries which are caused by compression, oedema in limbs and are known to be more prevalent following proning positioning [6]. Nerve damage has been identified, in particular, brachial plexus injuries, but also ulnar nerve and median nerve damage as well as peroneal nerve.

- Tremors/ ataxias are being noticed in some patients following sedation weaning and may persist until discharge. There are two types of tremors reported, an all body tremor which is most common on the ICU following sedation wean and may last a few days. Extremity tremors (which are not intention tremors), may also present. They tend to improve with weighting and last through to the ward, yet often improve by discharge anecdotally. These tremors have a marked impact on independence in activities of daily living, including adequate dietary and fluid intake.

- Fatigue is a very common impairment noted following COVID-19. It is reported by many who have the illness and remain at home, as well as those following critical illness from COVID-19. Fatigue is a well-known outcome of critical illness and can last for months to years. Notably, the fatigue following critical illness from COVID-19 appears to be more extreme and has a greater limitation on the duration of rehabilitation.

- Thirty percent of patients with COVID-19 may have a neurological diagnosis. A proportion of patients are also diagnosed with stroke and hypoxia. Yet, some demonstrate neurological presentations with no clear diagnosis/ confirmed diagnosis which impacts on their access to neurological services and subsequent early assessment and rehabilitation.

1.2 Cognitive Impairments

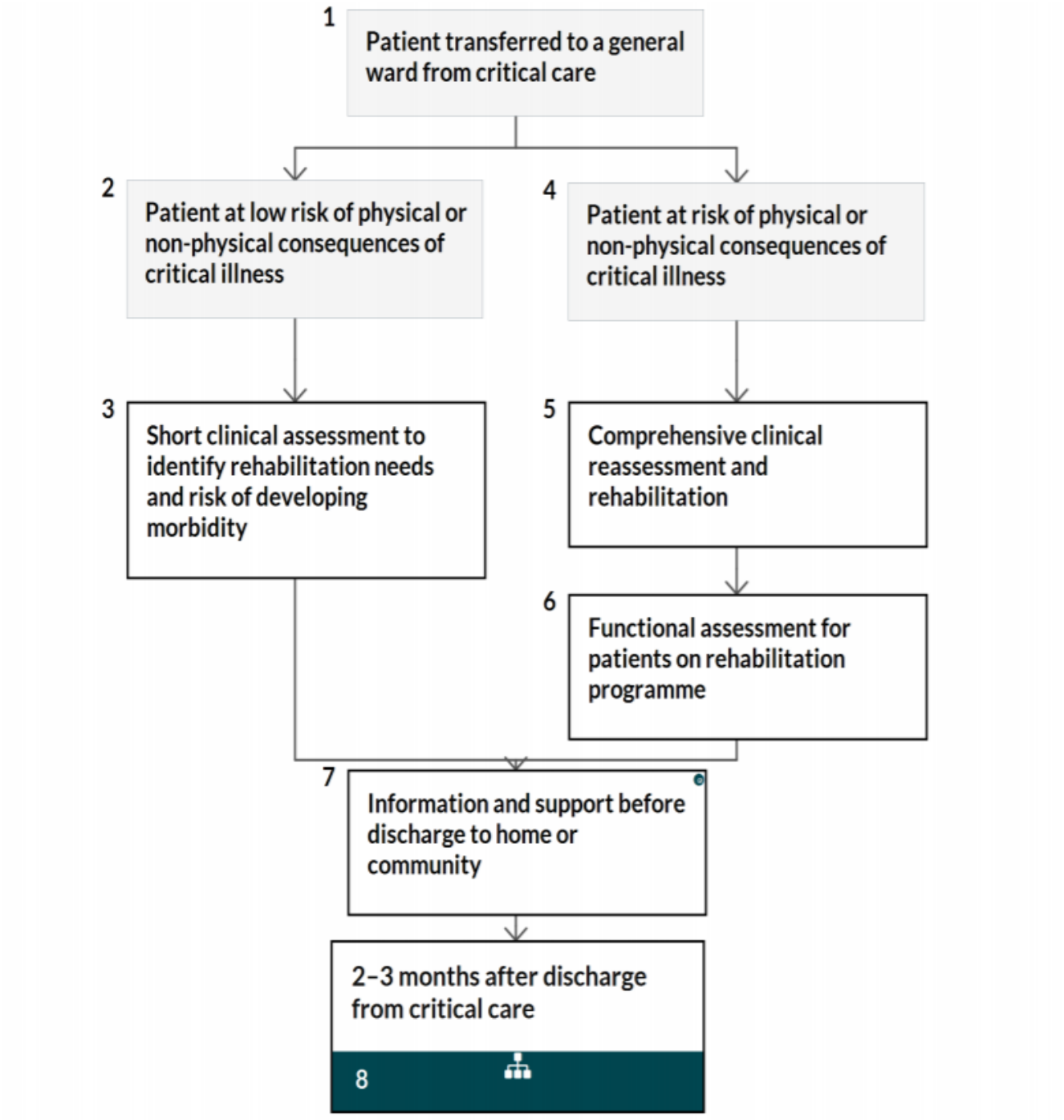
- Longer term cognitive impairment limiting problem solving
- Attention, working memory, executive function, information processing rate and speed
- Frontal deficits – presenting as disinhibition, impulsivity
- Delirium is present in 60-80% of individuals who have been critically ill with COVID-19 and is likely to have been more prevalent due to longer and deeper use of sedation, environmental challenges due to surge capacity, reduction in nursing ratios, lack of family or familiar objects and the impact of PPE on hallucinations and delusions. Delirium is independently linked to increased length of stay and long-term cognitive impairments, in particular executive function deficits [7,8].
- Anxiety is particularly prevalent. At times patients' have been agitated and misdiagnosed as presenting with delirium, when the agitation is actually related to anxiety. While delirium is highly prevalent, it is important to acknowledge the significant impact of anxiety on behavioural output in this population. Patients with COVID-19 have been noted to have heightened difficulties with anxiety, which is likely to be related to the stigma of the virus and the environmental impacts of the pandemic.

2.0 Recommendations for practice

NICE CG83[9] and Tan et al [10] outline the assessments and support that need to be offered to patients during each phase from ICU inpatient to discharge and follow up. Below are two figures outlining the different phases. Some patients may require a more comprehensive assessment if they are deemed to be at risk.

Additionally, Gosselink et al [11] provides a helpful metric for assessment and intervention both in intensive care and once on the ward. Further detail can be found in Stevens et al *'Textbook of post ICU medicine'*, Chapter 45, p507[1]. In the same chapter Gosselink proposes an example of the 'Start to Move' protocol from the University of Leuven. This protocol outlines how to progress a patient through physical rehabilitation that can be used by OT's PT's and nurses.

Figure 1. NICE CG83 Assessment when transferred to ward



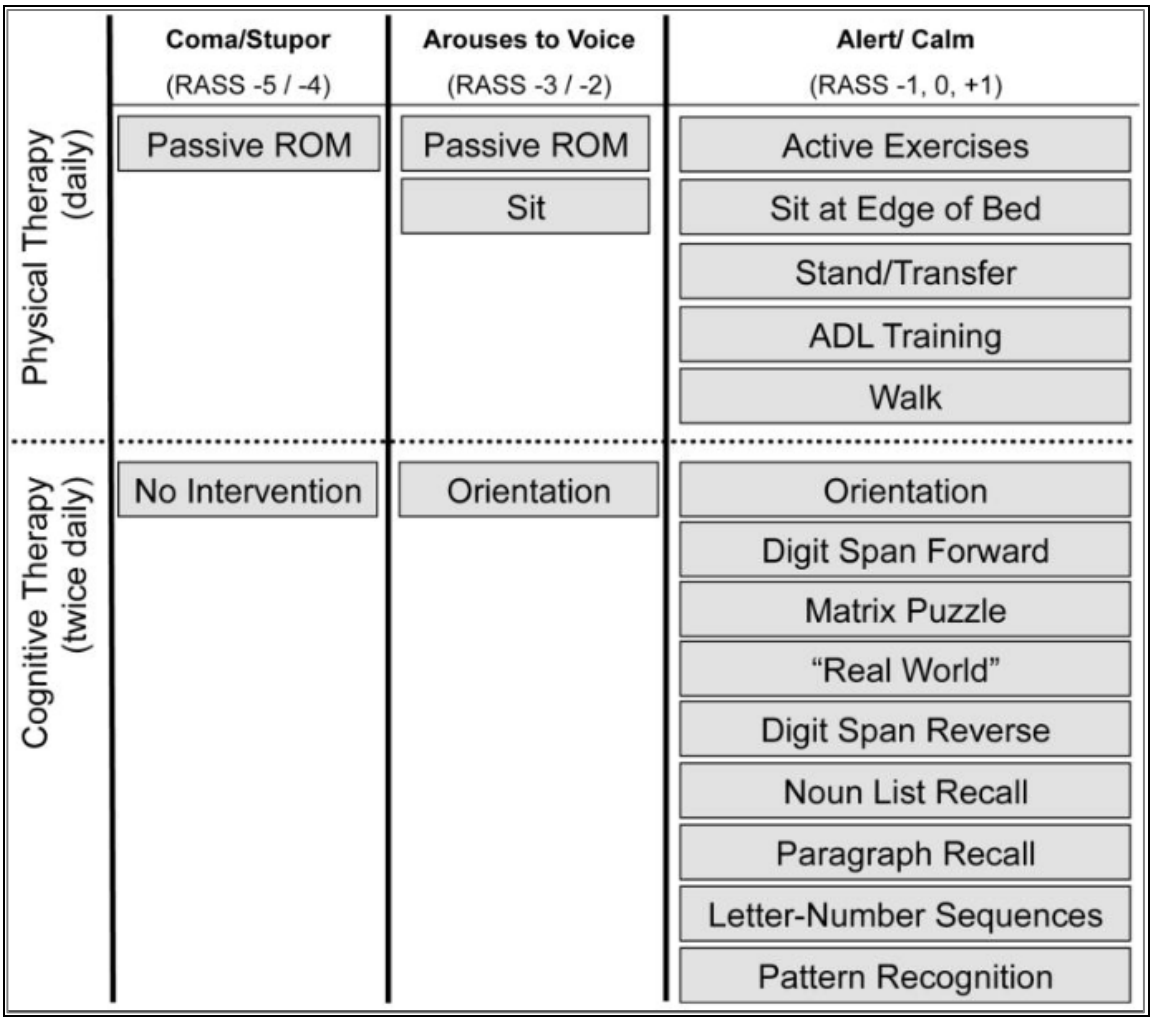
2.1 Intervention Timing

Patients should be assessed as early as possible on ICU by an occupational therapist. As sedation is being weaned, occupational therapy can commence, with bed-based assessments and interventions. This early assessment approach should gather information about the patient, their family structure and relationships, their baseline occupational abilities, their home environment and social set-up and supports. Occupational therapists should then complete a thorough assessment reviewing physical, cognitive and psychological components to establish the rehabilitation plan, including patient driven goals. Much research has been published since the development of the NICE Rehabilitation after Critical Care (CG 83)[9] in 2009 highlighting the importance, safety and efficacy of early mobilisation during the ICU stay[12] and the use of Neuro Muscular Electrical Stimulation (NMES) to prevent ICU Acquired Weakness (ICUAW)[13].

Occupational therapy assessment should include a comprehensive physical assessment to review range of movement, muscle strength using the MRC Scale and the Modified Ashworth Scale for tonal changes. Patients should be mobilised early on both in bed, hoisted out into wheelchairs and stood on tilt tables [14]. Occupational therapists should liaise closely with the MDT to determine when the patient is ready to sit out and asses for and provide suitable pressure care management and seating systems.

An informal vision screen should also be completed to enable therapy to progress, with a full visual history. Cognition should be assessed informally at this stage through function (behavioural observation to stimuli) and orientation questions [7]. The orientation-log can be commenced as appropriate and progressed to the cognition-log as the patient improves. Delirium should be tracked using the validated CAM-ICU [7]. Mood and anxiety should be reviewed using a Visual Analogue Scale (VAS), particularly the faces anxiety scale, which has been validated for ICU, and should be used when appropriate, based on communication abilities. Brummel et al demonstrated that it is feasible and safe to combine physical and cognitive therapy early on in ICU [15,16].

Figure 2: Occupational Therapy input in relation to RASS scores



Pain should also be reviewed and addressed as appropriate prior to each occupational therapy intervention. However, this is often completed earlier by nursing staff and lends support to therapy adaptation and grading. Fatigue should also be monitored using a VAS scale.

For patients who are slow to wake following weaning of sedation, informal behavioural response monitoring should begin immediately through the use of checklists and symptom responses. Formal monitoring through administration of the Wessex Head Injury Matrix (WHIM) or the Coma Recovery Scale-Revised (CRS-R) can start at a time when the patient is felt to be medically stable.

2.2 Step down / Transfer from ICU

NICE CG83 Quality Standards [2] state that adults at risk of morbidity have a formal handover of care, including their agreed individualised structured rehabilitation programme, when they transfer from critical care to a general ward. This should include the ongoing treatment plan and any patient driven goals.

Patients should be reassessed within 48 hours of step-down from ICU and the rehabilitation plan reviewed.

On step-down to the ward, a Modified Barthel Index (MBI) should be completed to monitor the trend of progress in function and establish clear goals for maximising safety for discharge planning.

Core cognitive, physical and functional assessments should be regularly re-administered as per guidelines, to identify changes in performance and recovery that influence goal setting and discharge planning.

2.3 On the ward

Further comprehensive physical, cognitive and mood assessments can be completed on the ward when appropriate, to establish clear discharge goals relating to rehabilitation or community support.

Cognition can be screened through administration of the Montreal Cognitive Assessment (MoCA) or the ACE-iii. Executive function should also be assessed through paper based informal and formal assessments in addition to functional tasks when able. The choice of cognitive assessment may be limited by the hospital access and could include The Behavioural Assessment of Dysexecutive Function (BADS) or the Brannigan Executive Dysfunction Test. Components of the Cognitive Assessment of Minnesota (CAM), in particular the scenario problem solving challenge, provide a brief alternative for screening of executive functioning.

Physical assessments as outlined above, should be completed, which include more endurance-based activities (relating to purposeful occupation based tasks) and community mobility.

Close liaison with the family will be important to ensure a thorough handover and two-way communication between families and therapy team, optimising future goal planning and participation. Families often find the step-down from ICU to the ward challenging and it is important to offer them the appropriate support for ongoing collaboration.

2.4 Preparation for discharge and follow up

Adults who were in critical care and at risk of morbidity are given information based on their rehabilitation goals before they are discharged from hospital [9,17]. Adults who stayed in critical care for more than 4 days and were at risk of morbidity have a review 2 to 3 months after discharge from critical care.

Needham et al [18] conducted an ICU stakeholder meeting in 2012 where three major themes emerged. Those included (1) raising awareness and education, (2) understanding and addressing barriers to practice, and (3) identifying research gaps and resources. The term Post Intensive Care Syndrome was agreed upon as the recommended term to describe new or worsening problems in physical, cognitive, or mental health status arising after a critical illness and persisting beyond acute care hospitalization. The term could be applied to either a survivor or family member. Improving care for intensive care survivors and their families requires collaboration between practitioners and researchers in both the inpatient and outpatient settings [18]. The importance of providing patient and family education, coordinating community resources including referring to other healthcare team members, and community-based rehabilitation service options was also emphasised in a more recent study published in 2020[19].

3.0 Outcome measures

The correct and timely use of outcome measures to guide future planning and participation remains pivotal to an individual's recovery journey. In an effort to better document the burden of Post Intensive Care Syndrome (PICS) Denehy and Elliott [20] published strategies for post ICU rehab as an outcome of the stakeholder meeting. These strategies helped guide the development of the Healthy Aging Brain Care Monitor Self Report assessment (HABC-M SR). This is a 27-item questionnaire that evaluates cognitive, functional, and psychological domains to evaluate Post Intensive Care Syndrome (PICS). It has recently been validated and has potential as a screening tool to rapidly assess the wide range of symptoms seen in both patients and family members with possible PICS[21] . An example of the tool can be found here: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6687461/figure/F1/

In addition, there is a wide variety of additional commonly used outcome measures as summarised in figure 4 below [1,22].

Figure 4. Summary of generic and disease-specific measures of impairment, functional status, and HRQoL that have been used in adult critical care (intensive and high dependency) survivors

Stevens R, Hart N, Herridge M. Textbook of Post-ICU Medicine: The Legacy of Critical Care: Oxford University Press; 2014. 624 p.

Measure of impairment	Measure of physical functional status	Measures of mental functional status	Measures of neuropsychological functioning	Measures of recovery	Measures of HRQoL
Respiratory volumes	Katz's ADL index	POMS	Trailmaking Tests A and B	GOS	SIP
Respiratory flow	Karnofsky index	CES-D scale	WCST	Return to work	PQOL
Carbon monoxide diffusing capacity	Barthel Index	HADS	Weschler Memory Scale	Residence	NHP
Visualization of the upper airway	Activity levels	BDI	Benton's test for visual retention	Degree of recovery	SF-36
Hepatic, renal, and haematological measures	Functional state measures	IES	MMSE	Productivity	Rosser's disability and distress categories
	NYHA functional class		PASAT		Spitzer's QoL index and uniscale
	ATS respiratory disease questionnaire		Communication level		PGWB
	Walk test				Fernandez's questionnaire

Key: ADL, activities of daily living; NYHA, New York Heart Association; ATS, American Thoracic Society; POMS, profile of mood states; CES-D, Center for Epidemiology Studies Depression Scale; HADS, Hospital Anxiety and Depression Scale; BDI, Beck Depression Inventory; IES, Impact of Event Scale; WCST Wisconsin Card Sorting Test; MMSE, Mini-mental State Examination; PASAT, Paced Auditory Serial Addition Test; GOS, Glasgow Outcome Scale; SIP, Sickness Impact Profile; PQOL, Perceived Quality of Life Scale; NHP, Nottingham Health Profile; SF-36, Short-form 36; PGWB, Psychological General Well-Being Index.

Data from Hayes, J.A., Black, N.A., Jenkinson, C. ET AL (2000). Outcome measures for adult critical care: a systematic review, Health Technical Assess. 4(24): 1-111.

4.0 Rehabilitation Co-ordinators

The importance of rehabilitation pathway coordinator or key working is discussed by Hoffman et al in Stevenson [1] Chapter 45. This not only ensures that the patient is not lost to follow up but also ensures good communication to all involved. The value of neuro navigators, trauma nurse coordinators and rehabilitation coordinators has recently been highlighted as part of the Major Trauma Networks and a similar coordinated approach will be beneficial for this patient group.

Figure 3. Key components of a rehabilitation coordinator [1]

Stevens R, Hart N, Herridge M. Textbook of Post-ICU Medicine: The Legacy of Critical Care: Oxford University Press; 2014. 624 p.

In the acute hospital and ICU	On discharge	Follow-up
• Improve the present uncoordinated referral system for the therapy services • Coordinate therapy in the acute bed by good communication systems, regular meetings, handovers, and sharing of information • Develop and implement rehabilitation policies for the hospital • Establish a designated multidisciplinary team for injury patients • Perform and monitor regular use of outcome assessment • Plan treatment with agreed goals in the acute hospital with patients and therapists	• Find the appropriate setting for transfer or discharge from the acute hospital • Perform an assessment and arrange treatment plans prior to discharge for the patient to take with him on transfer to his next hospital or centre without delay • Coordinate timing and content of discharge reports – medical, nursing, therapists, and planned rehabilitation • Establish a database of all available specialist centres for rehabilitation in the district where the patient comes from	• Improve referral systems to rehabilitation centres or community care • Establish and maintain continuing care by GP or community • Continue 3- and 6-monthly outcome assessments for research purposes as well as practical care • Establish a central point where patients and their carers can refer to if they experience problems after discharge from the acute hospital • Maintain a follow-up service to remedy problems after discharge due to inadequacies of provision in the community

5.0 Fitting with existing hospital pathways

The Intensive Care Society and the Faculty of Intensive Care Medicine published the second addition of 'G*uidelines for the provision of intensive care services'*[23]. This clearly outlines the need for Occupational Therapy within and after intensive care. Unfortunately, many hospitals still do not have access to occupational therapy input in critical care. The Royal College of Occupational Therapy outlines where occupational therapists can get involved in the rehabilitation of patients in intensive care as well as patients those who were diagnosed with COVID-19 throughout the recovery pathway '*A quick guide for occupational therapists: Rehabilitation for people recovering from COVID-19'*[24] and can be accessed here: https://www.rcot.co.uk/files/guidance-quick-guide-occupational-therapists-rehabilitation-people-recovering-COVID-19-2020

The document outlines some of the impairments that patients will experience. It describes where OT's can intervene along the recovery pathway to optimise long term functional recovery.

Figure 5. Impairments affecting COVID-19 patients where OT's can intervene

RCOT. A quick guide for occupational therapists: Rehabilitation for people recovering from COVID-19. London: Royal College of Occupational Therapy; 2020.

Musculoskeletal/Physical	
• Overwhelming fatigue • Muscle deconditioning • Global muscle weakness • Neuropathy	• Reduced range of movement in upper limb • Upper limb oedema • Pain and discomfort • Changes to vision, and sight loss
Cardiopulmonary	
• Breathlessness • Limited exercise tolerance • Postural hypotension • Rapid oxygen desaturation during exertion	• Dysfunctional breathing patterns • Hyperventilation • Continued cardiac issues e.g. atrial fibrillation and arrhythmias
Communication	
• Post intubation swallowing and feeding needs (dysphagia) • Speech difficulties (dysarthria and dysphasia)	• Difficulty using alternative communication aids due to cognitive and musculoskeletal impairments
Neurological	
• Reduced wakefulness • Impaired consciousness • Ongoing delirium • Severe attention deficits and poor concentration • Visuospatial • Agitation, pacing and 'wool picking'	• Disorientation • Executive dysfunction • Critical illness neuropathy / myelopathy • Impulsivity • Disinhibition • Reduced working memory and no memory of admission
Psychological	
• Loss of confidence and trust in own body • Fear – particularly when waking in an environment of personal protective equipment (PPE) • Loss of dignity and control • Anxiety, panic attacks • Low mood, depression	• Grief • Problems with body image, related to treatment • Reduced grounding in own experiences • Exacerbation or relapse of existing mental health conditions • Post traumatic stress disorder (PTSD)

The Textbook of Post-ICU Medicine remains a useful reference point outlining life after ICU including the families' perspective, neuromuscular disorders and therapeutic and rehabilitation strategies.

References

1. Stevens R, Hart N, Herridge M. Textbook of Post-ICU Medicine: The Legacy of Critical Care: Oxford University Press; 2014. 624 p.
2. Lew HL, Oh-Park M, Cifu DX. The War on COVID-19 Pandemic: Role of Rehabilitation Professionals and Hospitals. Am J Phys Med Rehabil. 2020.
3. Aitken LM, Macfarlane B, Chaboyer W, Schuetz M, Joyce C, Barnett AG. Physical Function and Mental Health in Trauma Intensive Care Patients: A 2-Year Cohort Study. Crit Care Med. 2016;44(4):734-46.
4. Hill AD, Fowler RA, Pinto R, Herridge MS, Cuthbertson BH, Scales DC. Long-term outcomes and healthcare utilization following critical illness--a population-based study. Crit Care. 2016;20:76.
5. Dowdy DW, Eid MP, Sedrakyan A, Mendez-Tellez PA, Pronovost PJ, Herridge MS, et al. Quality of life in adult survivors of critical illness: a systematic review of the literature. Intensive Care Med. 2005;31(5):611-20.
6. Carod-Artal FJ. Neurological complications of coronavirus and COVID-19. Rev Neurol. 2020;70(9):311-22.
7. Pandharipande PP, Girard TD, Ely EW. Long-term cognitive impairment after critical illness. N Engl J Med. 370. United States2014. p. 185-6.
8. Álvarez EA, Garrido MA, Tobar EA, Prieto SA, Vergara SO, Briceño CD, et al. Occupational therapy for delirium management in elderly patients without mechanical ventilation in an intensive care unit: A pilot randomized clinical trial. J Crit Care. 2017;37:85-90.
9. Rehabilitation after critical illness [CG83]. National Institute of Health and Care Excellence, NICE: London; 2009.
10. Tan T, Brett SJ, Stokes T. Rehabilitation after critical illness: summary of NICE guidance. Bmj. 2009;338:b822.
11. Gosselink R, Needham D, Hermans G. ICU-based rehabilitation and its appropriate metrics. Curr Opin Crit Care. 2012;18(5):533-9.
12. Sosnowski K, Lin F, Mitchell ML, White H. Early rehabilitation in the intensive care unit: an integrative literature review. Aust Crit Care. 2015;28(4):216-25.
13. Puthucheary Z, Rawal J, Ratnayake G, Harridge S, Montgomery H, Hart N. Neuromuscular blockade and skeletal muscle weakness in critically ill patients: time to rethink the evidence? Am J Respir Crit Care Med. 2012;185(9):911-7.
14. Bourdin G, Barbier J, Burle JF, Durante G, Passant S, Vincent B, et al. The feasibility of early physical activity in intensive care unit patients: a prospective observational one-center study. Respir Care. 2010;55(4):400-7.
15. Brummel NE, Girard TD, Ely EW, Pandharipande PP, Morandi A, Hughes CG, et al. Feasibility and safety of early combined cognitive and physical therapy for critically ill medical and surgical patients: the Activity and Cognitive Therapy in ICU (ACT-ICU) trial. Intensive Care Med. 2014;40(3):370-9.
16. Brummel NE, Jackson JC, Girard TD, Pandharipande PP, Schiro E, Work B, et al. A combined early cognitive and physical rehabilitation program for people who are critically ill: the activity and cognitive therapy in the intensive care unit (ACT-ICU) trial. Phys Ther. 2012;92(12):1580-92.
17. Thornton J. COVID-19: the challenge of patient rehabilitation after intensive care. Bmj. 2020;369:m1787.

18. Needham DM, Davidson J, Cohen H, Hopkins RO, Weinert C, Wunsch H, et al. Improving long-term outcomes after discharge from intensive care unit: report from a stakeholders' conference. Crit Care Med. 2012;40(2):502-9.
19. Smith JM, Lee AC, Zeleznik H, Coffey Scott JP, Fatima A, Needham DM, et al. Home and Community-Based Physical Therapist Management of Adults With Post-Intensive Care Syndrome. Phys Ther. 2020.
20. Denehy L, Elliott D. Strategies for post ICU rehabilitation. Curr Opin Crit Care. 2012;18(5):503-8.
21. Wang S, Allen D, Perkins A, Monahan P, Khan S, Lasiter S, et al. Validation of a New Clinical Tool for Post-Intensive Care Syndrome. Am J Crit Care. 2019;28(1):10-8.
22. Hayes JA, Black NA, Jenkinson C, Young JD, Rowan KM, Daly K, et al. Outcome measures for adult critical care: a systematic review. Health Technol Assess. 2000;4(24):1-111.
23. of TF, Medicine IC. Guidelines for the Provision of Intensive Care Services. 2019.
24. RCOT. A quick guide for occupational therapists: Rehabilitation for people recovering from COVID-19. London: Royal College of Occupational Therapy; 2020.