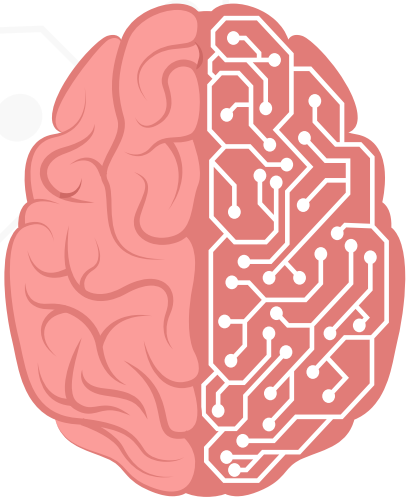
June 19, 2020



Neurological and neuropsychic rehabilitation of COVID-19 patients in intensive care Department

Prof. Leila Akhmadeeva, MD, PhD, PsyM
Bashkir medical University, Ufa, Russia

Wee all know that

COVID-19 exists

And can cause different problems in different organs, including brain

Critical care in ICU can save lives

But both those who survive and those who work there need special attention

Rehabilitation is important

And should be interdisciplinary and started early

WHO

In 2017, the WHO had already noted ‘**substantial and everincreasing unmet need** for rehabilitation services worldwide’

World Health Organization. Rehabilitation, 2030. Available: https:// www.who.int/disabilities/care/rehab-2030/en/ [Accessed 10 April 2020].

My mission today is

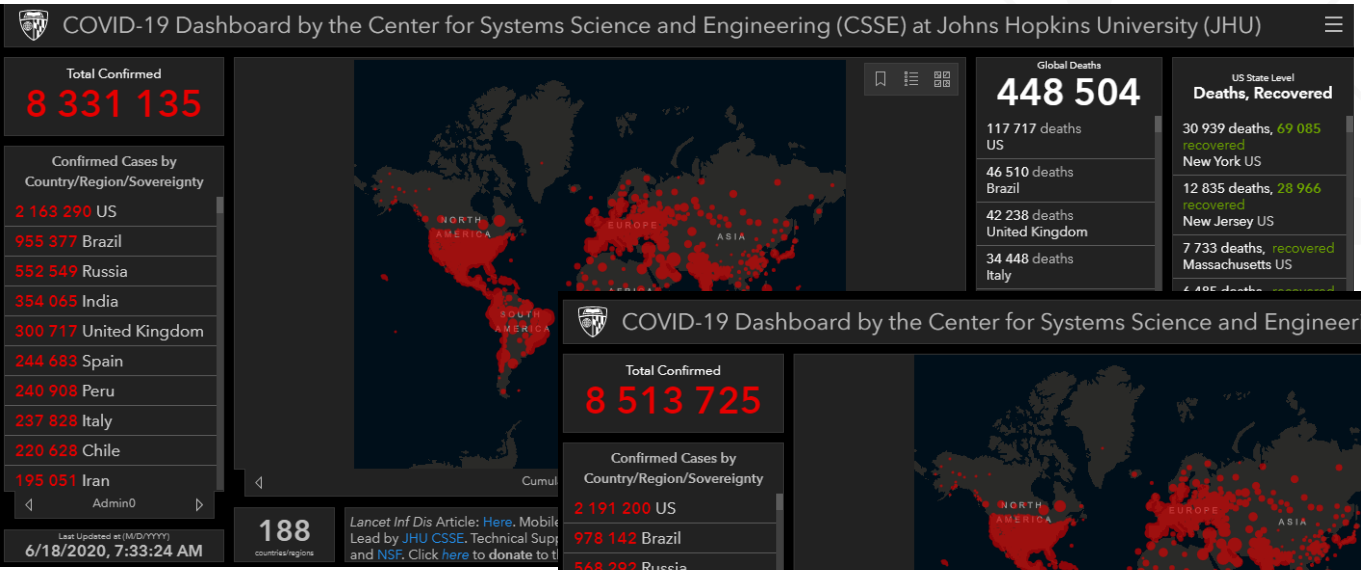
to raise the awareness about neurological manifestations and complications of COVID-19 and share some data from the most recent literature about neurological and psychological rehabilitation of patients with COVID-19 in ICU

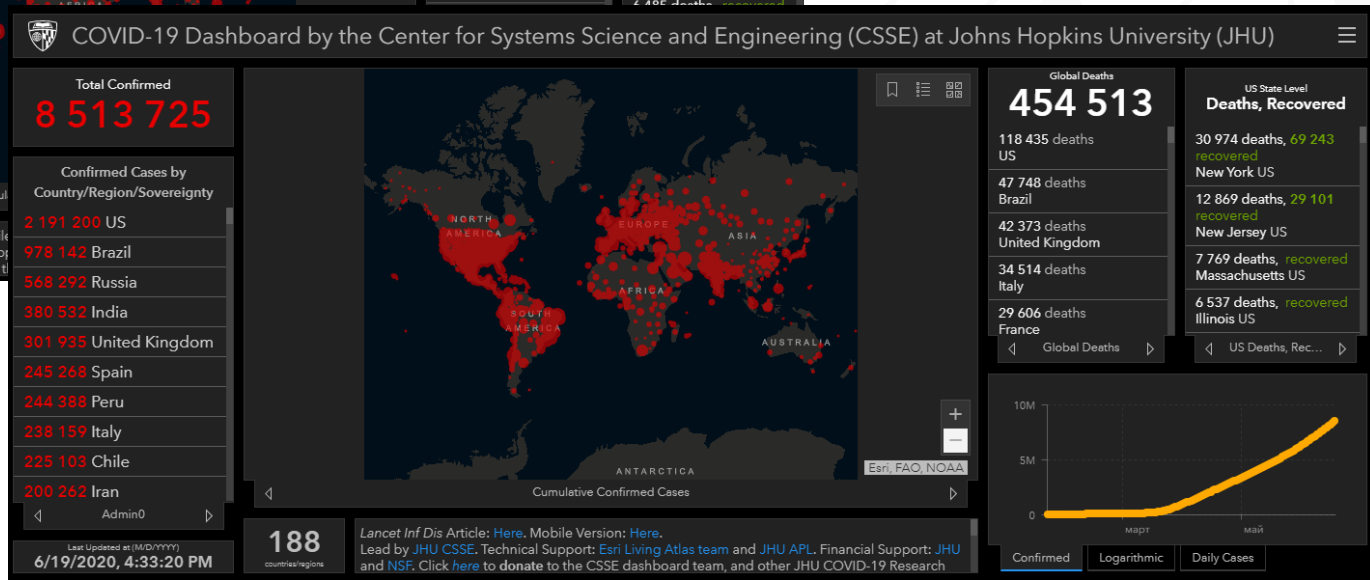
to bring attention and awareness to the fact that in ICU not just patients with COVID-19 need professional rehabilitation, but also their carers (**family members and *health care professionals***)

8,513,725

https://coronavirus.jhu.edu/map.html

https://coronavirus.jhu.edu/map.html

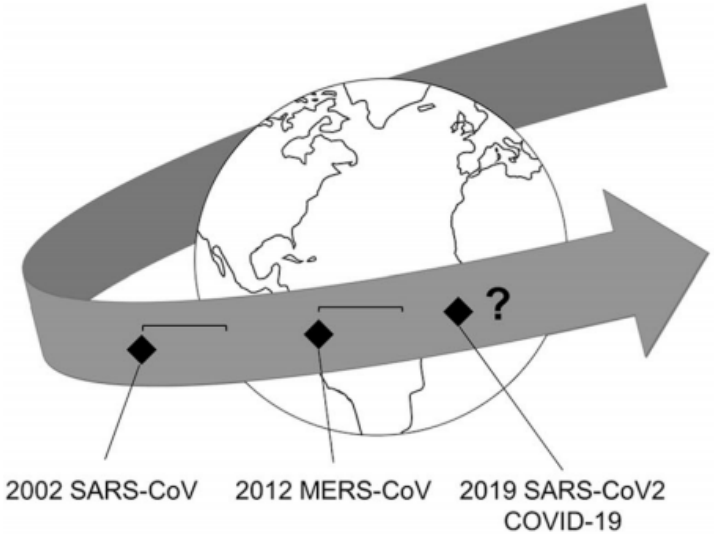




Different organs can be affected in COVID-19.

Nervous system is one of them.

Analysis of the situations with previous coronaviruses



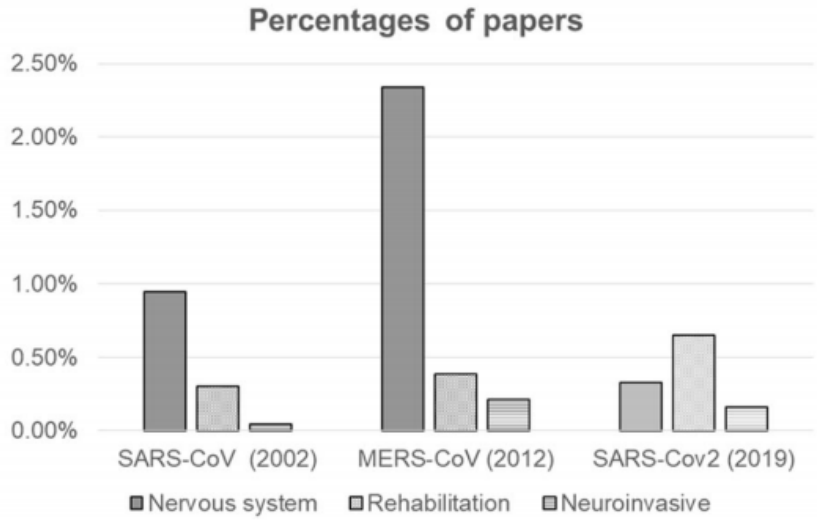


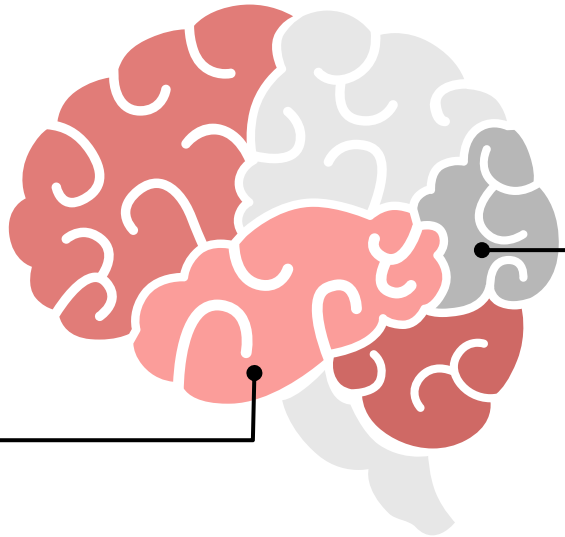
FIGURE 1 In the left panel, a schematic representation of the timeline indicating the year of discovery of the three viruses considered in the paper. The short horizontal lines show the time period considered for the literature review. The question mark indicates the evolving situation of the SARS-CoV-2. In the right panel, the results of the literature research. The colors of the histograms about the SARS-CoV-2 are softer because the results are partial, for the ongoing situation. COVID-2019, coronavirus disease-2019; MERS-CoV, Middle East respiratory syndrome coronavirus; SARS-CoV, severe acute respiratory syndrome coronavirus

Coraci D. et al. Global approaches for global challenges: The possible support of rehabilitation in the management of COVID-19. DOI: 10.1002/jmv.25829

Now.

S. Sylvester Msigwa, Y. Wang, Y. Li, X. Cheng, The neurological insights of the emerging coronaviruses, Journal of Clinical Neuroscience (2020), doi: https://doi.org/10.1016/j.jocn.2020.06.006

Unlike the previous emerging coronaviruses (ECoVs) which neurological complexities were uncommon, with neurological features exhibition at 14-25 days post-onset, yet with critical outcomes exhibiting > 50% mortality in central nervous (CNS) presenting pathologies.



The COVID 19 neurological consequences occur more frequently *even in mild cases*, presenting with CNS involvement in up to 25%, musculoskeletal and peripheral manifestation(PNM).

Journal of Neurology
https://doi.org/10.1007/s00415-020-09986-y

LETTER TO THE EDITORS

Mixed central and peripheral nervous system disorders in severe SARS-CoV-2 infection

H. Chaumont[1,2,3] · A. San-Galli[1] · F. Martino[2,4] · C. Couratier[1] · G. Joguet[5] · M. Carles[2,4] · E. Roze[3,6] · A. Lannuzel[1,2,3,7]

Received: 3 June 2020 / Revised: 5 June 2020 / Accepted: 8 June 2020

Dear Sirs,

We report four cases of severe COVID-19 in male patients aged 50–70 with the combination of central and peripheral nervous system disorders occurring unexpectedly late after the first symptoms. Patients had comorbidities and were admitted for acute respiratory distress syndrome due to a proven SARS-CoV-2 infection. All required mechanical ventilation [8]. Like in most of the viral infections that involve nervous system, these manifestations occurred within the first ten days after infectious symptoms. Further away from the onset of the disease, when sedation and neuromuscular blocker were withheld, 67% of the patients with severe COVID-19 develop encephalopathy including prominent agitation, confusion and corticospinal tract signs [9].

In our cases neurological manifestations were detected

Neurological manifestations.

Studies from the current pandemic are accumulating and report COVID-19 patients presenting with dizziness, headache, myalgias, hypogeusia and hyposmia, but also with more serious manifestations including **polyneuropathy, myositis, cerebrovascular diseases, encephalitis and encephalopathy**.

However, discrimination between causal relationship and incidental comorbidity is often difficult.

Severe COVID-19 shares common risk factors with cerebrovascular diseases, and it is currently unclear whether the infection per se represents an independent stroke risk factor.

Tsivgoulis G. et al. Neurological manifestations and implications of COVID-19 pandemic. Ther Adv Neurol Disord 2020, Vol. 13: 1–14 DOI: 10.1177/ 1756286420932036

01.

Measurement needed: A core set of measures needs to be adopted to monitor the health and functional outcomes for COVID-19 and other patients at risk for functional decline and to assess the quality, availability and accessibility of services today and as our nations recover

Prvu Bettger J, Thoumi A, Marquevich V, et al. COVID-19: maintaining essential rehabilitation services across the care continuum. BMJ Global Health 2020;5:e002670. doi:10.1136/ bmjgh-2020-002670

02.

Particularly relevant to the COVID-19 era is the prevention and management of malnutrition and dysphagia in patients post-extubation from mechanical ventilation in ICUs.

The prevalence of post-extubation dysphagia (PED) is variable between 3 and 63% with increased rates of pneumonia, reintubation, ICU readmission, and increased hospital mortality

- Fritz, M.A., Howell, R.J., Brodsky, M.B. *et al.* Moving Forward with Dysphagia Care: Implementing Strategies during the COVID-19 Pandemic and Beyond. *Dysphagia* (2020). https://doi.org/10.1007/s00455-020-10144-9
- Skoretz SA, Flowers HL, Martino R. The Incidence of Dysphagia Following Endotracheal Intubation: A Systematic Review. Chest. 2010;137(3):665–73. https://doi.org/10.1378/chest.09-1823.

03.

Morbidity and disability are not an inevitable union. Even when organic brain damage cannot be prevented or cured altogether, neurorehabilitation as a specialized form of rehabilitation care can effectively (while most frequently not completely) reduce the burden of disability by promoting functional recovery, compensation of body dysfunction, and/or adaptations, e.g., by the provision of adaptive technology.

Platz T and Sandrini G (2020) Specialty Grand Challenge for NeuroRehabilitation Research. Front. Neurol. 11:349. doi: 10.3389/fneur.2020.00349

PreCOVID findings.

Chimatiro GL, Rhoda AJ. Scoping review of acute stroke care management and rehabilitation in low and middle-income countries. BMC Health Serv Res. (2019) 19:789. doi: 10.1186/s12913-019-4654-4

Neurorehabilitation

is mostly structured as a multiprofessional physician-led team approach to health care and has been shown to reduce disability effectively

Rehabilitation effectively reduce disability

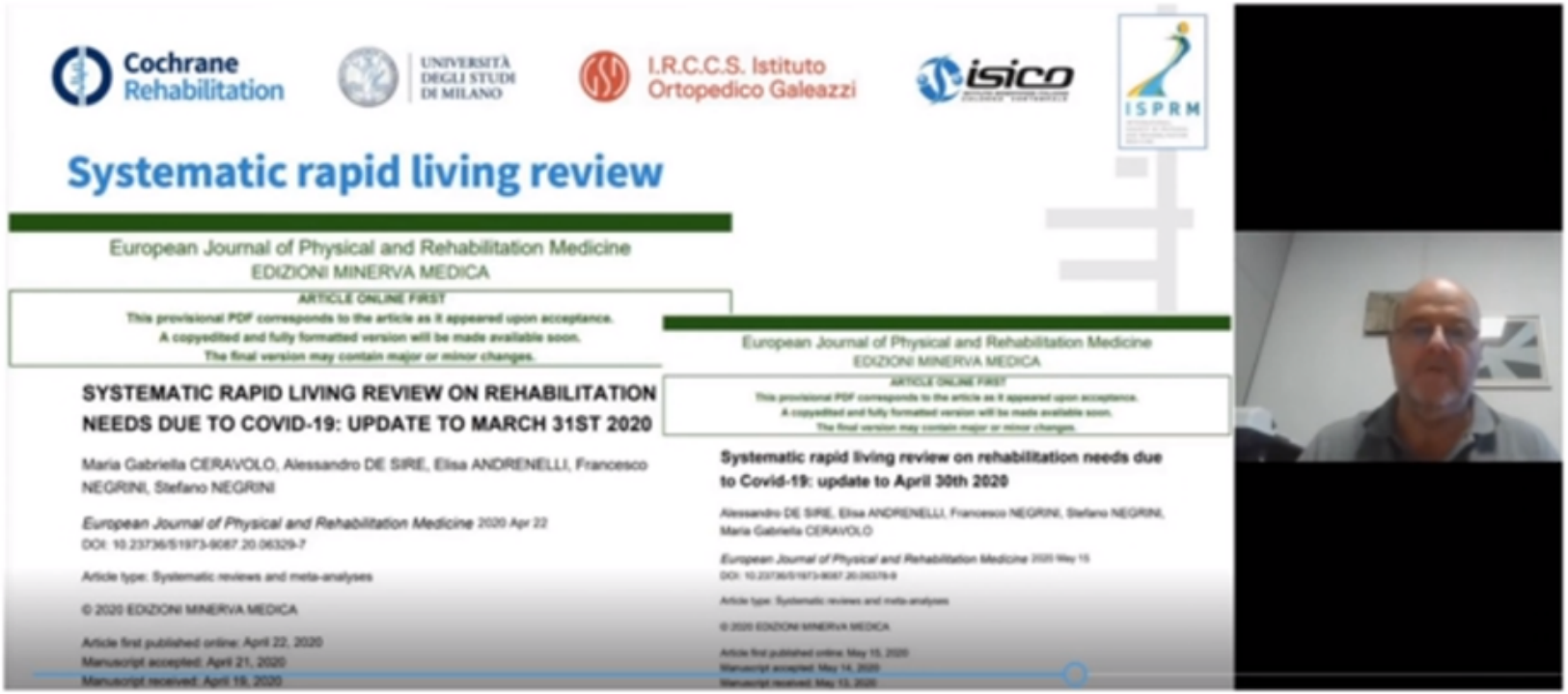
with better structure and processes of care such as the availability of multidisciplinary stroke care units, patients were more likely to be alive, independent, and living at home 1 year after stroke

Clarke DJ. The role of multidisciplinary team care in stroke rehabilitation. Prog Neurol Psychiatry. (2013) 17:5–8. doi: 10.1002/pnp.288

Evidence

A Cochrane review with a meta-analysis including 21 randomized controlled trials (RCTs) with a total of **39,994** participants showed a reduced rate of death or institutionalized care (odds ratio, OR 0.78, 95% CI 0.68–0.89) and death or dependence (OR 0.79, 95% CI 0.68–0.90) after multi-disciplinary stroke unit care compared to care in general wards post stroke *without significantly increasing length of stay, and independent of age, sex, or stroke severity*

Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke. Cochrane Database Syst Rev. (2013) 2013:CD000197. doi: 10.1002/14651858.CD000197.pub3


Cochrane Rehabilitation
UNIVERSITÀ DEGLI STUDI DI MILANO
I.R.C.C.S. Istituto Ortopedico Galeazzi
isico
ISPRM
Systematic rapid living review
European Journal of Physical and Rehabilitation Medicine
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SYSTEMATIC RAPID LIVING REVIEW ON REHABILITATION NEEDS DUE TO COVID-19: UPDATE TO MARCH 31ST 2020
Maria Gabriella CERAVOLO, Alessandro DE SIRE, Elisa ANDRENELLI, Francesco NEGRINI, Stefano NEGRINI
European Journal of Physical and Rehabilitation Medicine 2020 Apr 22
DOI: 10.23736/S1973-9087.20.06329-7
Article type: Systematic reviews and meta-analyses
© 2020 EDIZIONI MINERVA MEDICA
Article first published online: April 22, 2020
Manuscript accepted: April 21, 2020
Manuscript received: April 19, 2020
European Journal of Physical and Rehabilitation Medicine
EDIZIONI MINERVA MEDICA
ARTICLE ONLINE FIRST
This provisional PDF corresponds to the article as it appeared upon acceptance.
A copyedited and fully formatted version will be made available soon.
The final version may contain major or minor changes.
Systematic rapid living review on rehabilitation needs due to Covid-19: update to April 30th 2020
Alessandro DE SIRE, Elisa ANDRENELLI, Francesco NEGRINI, Stefano NEGRINI, Maria Gabriella CERAVOLO
European Journal of Physical and Rehabilitation Medicine 2020 May 15
DOI: 10.23736/S1973-9087.20.06378-9
Article type: Systematic reviews and meta-analyses
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Article first published online: May 15, 2020
Manuscript accepted: May 14, 2020
Manuscript received: May 13, 2020

COVID-19 – ICU - neurology

Patients infected with COVID-19 often require stays of 10 or more days in the intensive care unit , and many experience acute respiratory distress syndrome requiring mechanical ventilation, which usually requires sedation, and sometimes, neuromuscular blockade.
These factors are likely to increase the burden of PICS among COVID-19 survivors; indeed, recent estimates indicate ***at least 40%*** *of COVID-19 survivors have prolonged and significant neurological deficits such as fatigue or weakness after hospital discharge.*

1. Arentz M, Yim E, Klaff L, et al. Characteristics and outcomes of 21 critically Ill patients with COVID-19 in Washington State. JAMA. 2020.
2. Grasselli G, Zangrillo A, Zanella A, et al. Baseline characteristics and outcomes of 1591 patients infected with SARS-CoV-2 admitted to ICUs of the Lombardy Region, Italy. JAMA. 2020.
3. Richardson S, Hirsch JS, Narasimhan M, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. JAMA. 2020.
4. Mao L, Jin H, Wang M, et al. Neurologic manifestations of hospitalized patients with Coronavirus Disease 2019 in Wuhan, China. JAMA Neurol. 2020.

COVID-19 – ICU - rehab

- The Awakening and Breathing Coordination, Delirium monitoring/ management and Early exercise/mobility (ABCDE) bundle is critical to reducing the adverse consequences of critical illness. The **early** exercise and mobility component of this bundle is especially important in ameliorating the negative impact of ICU stays on physical function.
- *Use of rehabilitation services within many ICUs has substantially* ***decreased*** *to preserve dwindling supplies of personal protective equipment and protect rehabilitation staff from prolonged exposure in close proximity to infected patients.*
- Being unable to provide this critical treatment for vulnerable patients in ICU is likely to negatively impact recovery.

1. Marra A, Ely EW, Pandharipande PP, Patel MB. The ABCDEF bundle in critical care. Crit Care Clin. 2017;33(2):225–243.
2. J.R. Falvey and L.E. Ferrante. Flattening the disability curve: Rehabilitation and recovery after COVID-19 infection. / Heart & Lung 00 (2020) 12 https://doi.org/10.1016/j.hrtlng.2020.05.001 0147-9563

Outcomes

- Neuromuscular weakness and impairments occur in up to 50% of all individuals who have prolonged ICU stays due to critical illness polyneuropathy, which can result in ongoing dysfunction for greater than 5 years in 85% of individuals.
- For individuals who require artificial respiration on a ventilator for >48 hours, 65% will continue to have functional deficits at 1 year, 75% will have cognitive impairment at time of hospital discharge and 45% at 1 year, and more than **25%** will have significant psychiatric issues related to their illness, including major depression and posttraumatic stress disorder in the first year after discharge.
- **Thus, in addition to pulmonary rehabilitation, survivors of COVID-19 may require long term cognitive and physical rehabilitation, especially those who develop central nervous system dysfunction from ischemia.**

1. Desai SV, Law TJ, Needham DM: Long-term complications of critical care. Crit Care Med 2011; 39:371–379
2. Helms J, et al. Neurologic Features in Severe SARS-CoV-2 Infection [published online ahead of print, 2020 Apr 15]. N Engl J Med. 2020;10.1056/NEJMc2008597. doi:10.1056/NEJMc2008597
3. Lew H.L. The War on COVID-19 Pandemic: Role of Rehabilitation Professionals and Hospitals. American Journal of Physical Medicine & Rehabilitation Articles Ahead of Print DOI: 10.1097/PHM.0000000000001460

USA

Physicians, psychologists and therapists across the nation's rehabilitation system have already begun working to initiate ICU-based rehabilitation care for individuals with COVID-19 and are developing programs, settings and specialized care to meet the short- and long-term needs of these individuals. We believe the **complications from COVID-19 can be reduced 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.

Lew H.L. The War on COVID-19 Pandemic: Role of Rehabilitation Professionals and Hospitals. American Journal of Physical Medicine & Rehabilitation Articles Ahead of Print DOI: 10.1097/PHM.0000000000001460

France:
reorganizing rehab units

The goal of the specific organisation we describe is to allow for early patient discharge from the ICU and increase ICU admission capacity over time during the COVID-19 crisis.

Fig. 2. Picture of a double room fully equipped for ventilator-dependent patients within the rehabilitation department. 1: level-3 life support ventilator; 2: non-invasive continuous monitoring; 3: flow meters for perfusion; 4: nutrition pump for enteral feeding; 5: lift and harness for bed-to-chair transfers.

Levy J, et al. A model for a ventilator-weaning and early rehabilitation unit to deal with post-ICU impairments following severe COVID-19. Ann Phys Rehabil Med (2020), https://doi.org/10.1016/j.rehab.2020.04.002

Canada

WHO Emergency Medical Team minimum standards recommend **that rehabilitation is a core component of patient-centered care** in responding to disasters, with minimum standards recommended with regard to staffing, equipment, and space. It is thus important that **rehabilitation providers develop plans to receive large numbers of patients** from acute care facilities, possibly directly from the ICU. Rehabilitation professionals and facilities will play an important role in helping speed the recovery of those survivors with residual impairments post-ICU, but also a critical role in providing an appropriate outlet **for acute services**, creating space for newly affected patients to receive the acute care they need. Rehabilitation should be routinely incorporated into pandemic response plans early on, rather than in retrospect, only after widespread disability becomes apparent.

ANALYSIS & PERSPECTIVE

Rehabilitation After Critical Illness in People With COVID-19 Infection

Robert Simpson, PhD, MBChB, and Larry Robinson, MD

Abstract: The current COVID-19 pandemic will place enormous pressure on healthcare systems around the world. Large numbers of people are predicted to become critically ill with acute respiratory distress syndrome and will require management in intensive care units. High levels of physical, cognitive, and psychosocial impairments can be anticipated. Rehabilitation providers will serve as an important link in the continuum of care, helping move patients on from acute sites to eventual discharge to the community. Likely impairment patterns, considerations for healthcare practitioner resilience, and organization of services to meet demand are discussed. Innovative approaches to care, such as virtual rehabilitation, are likely to become common in this environment.

Key Words: COVID-19, Coronavirus, Acute Respiratory Distress Syndrome, Pandemic

(*Am J Phys Med Rehabil* 2020;99:470–474)

Currently, there are no known effective treatments for COVID-19 infection specifically; general measures recommended are supportive.[1] Given that COVID-19 is a novel coronavirus, where etiopathology remains incompletely understood,[1] it is important to note that current approaches to care described in this article are based on treatments extrapolated from diverse underlying health conditions. However, this is a rapidly evolving literature. The World Health Organization is coordinating the five-treatment arm "solidarity" trial, testing remdesivir, lopinavir/ritonavir, lopinavir/ritonavir plus interferon β, and chloroquine. For the critically ill with COVID-19–associated ARDS, supportive management at present means[5]:

- Conservative intravenous fluids
- Empirical intravenous antibiotics for suspected bacterial coinfection

China

A comprehensive document with 46 statements are presented, including protection of medical personnel, etiological treatment, diagnosis and **treatment of** tissue and organ **functional impairment**, **psychological interventions**, immunity therapy, nutritional support, and transportation of critically ill COVID-19 patients. Among them, 5 recommendations were strong (Grade 1), 21 were weak (Grade 2), and 20 were experts' opinions. A strong agreement from voting participants was obtained for all recommendations

Shang *et al. Ann. Intensive Care* (2020) 10:73
https://doi.org/10.1186/s13613-020-00689-1

Annals of Intensive Care

REVIEW Open Access

Check for updates

Management of critically ill patients with COVID-19 in ICU: statement from front-line intensive care experts in Wuhan, China

You Shang[1], Chun Pan[2], Xianghong Yang[3], Ming Zhong[4], Xiuling Shang[5], Zhixiong Wu[6], Zhui Yu[7], Wei Zhang[8], Qiang Zhong[9], Xia Zheng[10], Ling Sang[11], Li Jiang[12], Jiancheng Zhang[1], Wei Xiong[1], Jiao Liu[13] and Dechang Chen[13*]

Contraindications & Indications for rehab at ICU.

Life threatening conditions (when the aim at the moment is just to stay alive)

All the conditions at any stage (with a trained interdisciplinary team)

Journal of Physiotherapy 66 (2020) 73–82

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION

Journal of PHYSIOTHERAPY

journal homepage: www.elsevier.com/locate/jphys

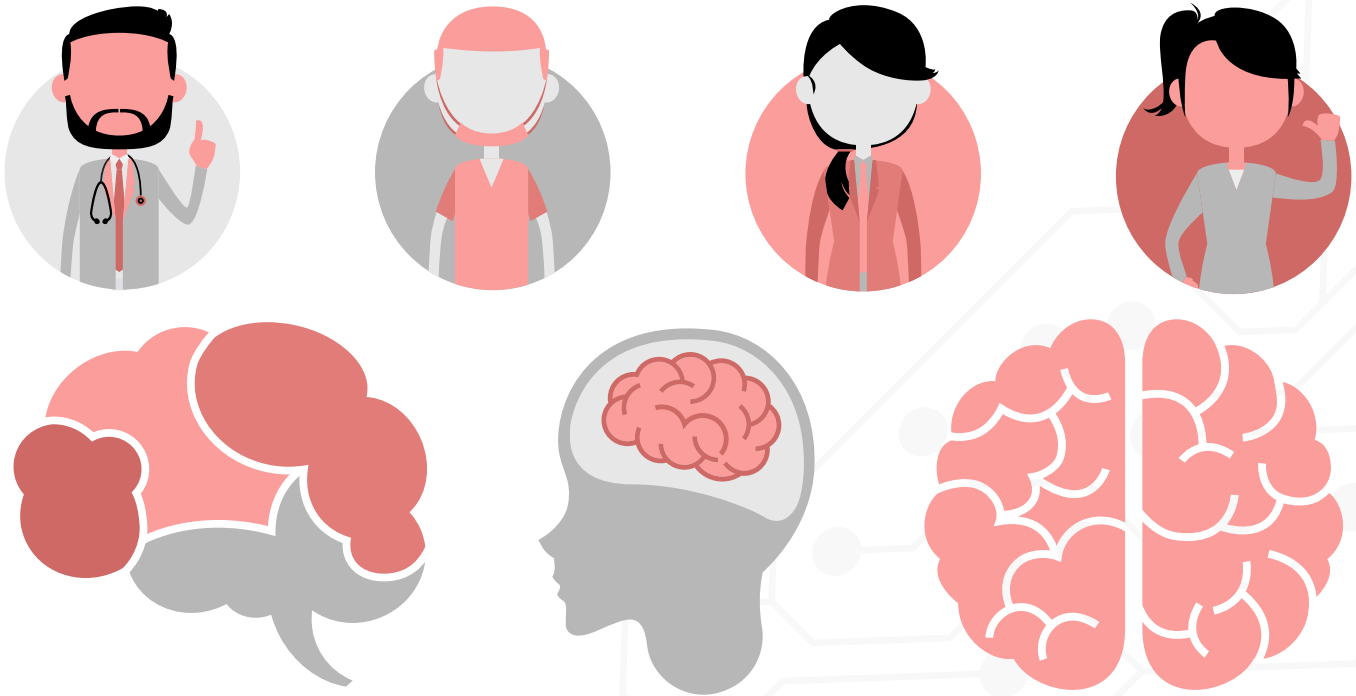
Invited Topical Review

Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations

Peter Thomas [a], Claire Baldwin [b], Bernie Bissett [c,d], Ianthe Boden [e], Rik Gosselink [f,g], Catherine L Granger [h], Carol Hodgson [i], Alice YM Jones [j,k], Michelle E Kho [l,m,n], Rachael Moses [o], George Ntoumenopoulos [p], Selina M Parry [q], Shane Patman [r], Lisa van der Lee [s]

[a] Department of Physiotherapy, Royal Brisbane and Women's Hospital, Brisbane, Australia; [b] Caring Futures Institute, College of Nursing and Health Sciences, Flinders University, Adelaide, Australia; [c] Physiotherapy, University of Canberra, Australia; [d] Physiotherapy Department, Canberra Hospital, Canberra, Australia; [e] Physiotherapy Department, Launceston General Hospital, Launceston, Australia; [f] Department of Rehabilitation Sciences, KU Leuven, Belgium; [g] Department of Critical Care, University Hospitals Leuven, Leuven, Belgium; [h] Department of Physiotherapy, The University of Melbourne, Australia; [i] Australian and New Zealand Intensive Care Research Centre, Monash University, Melbourne, Australia; [j] School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, Australia; [k] Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney, Sydney, Australia; [l] School of Rehabilitation Science, McMaster University, Hamilton, Canada; [m] St Joseph's Healthcare, Hamilton, Canada; [n] The Research Institute of St Joe's, Hamilton, Canada; [o] Physiotherapy, Lancashire Teaching Hospitals, Preston, United Kingdom; [p] Physiotherapy, St Vincent's Hospital, Sydney, Australia; [q] Department of Physiotherapy, The University of Melbourne, Melbourne, Australia; [r] School of Physiotherapy, The University of Notre Dame Australia, Perth, Australia; [s] Physiotherapy Department, Fiona Stanley Hospital, Perth, Australia

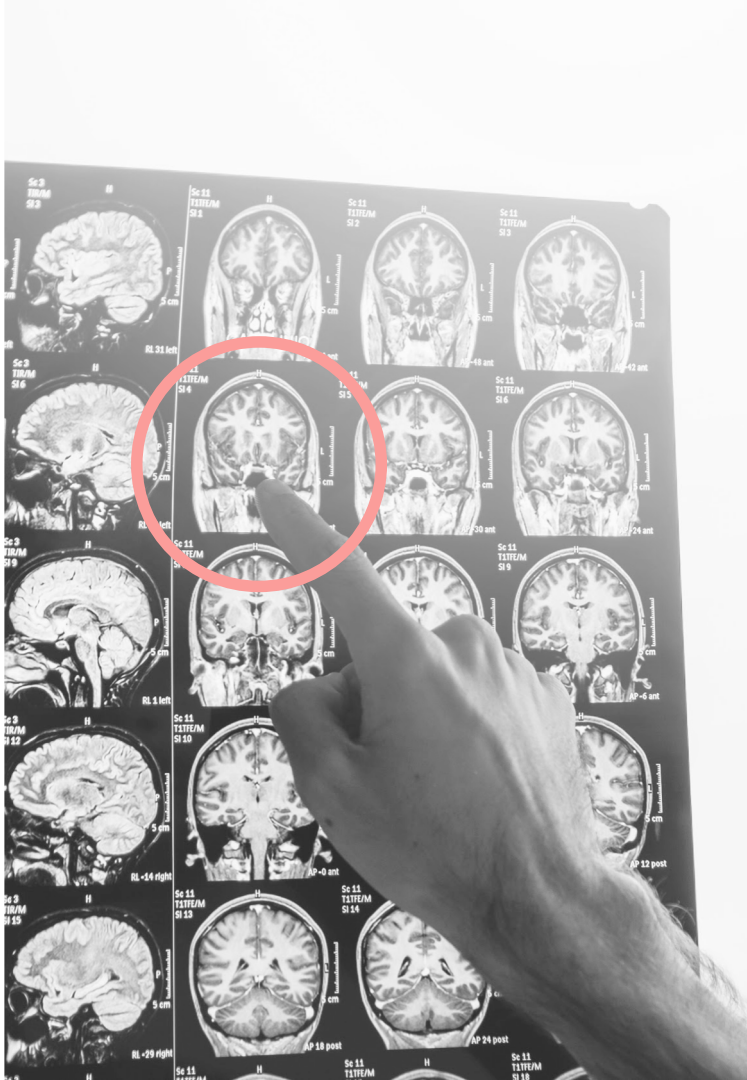
Neuroprotection ⟷ Multidisciplinary Team.



After survival.

While considerable attention has been paid to survival rates among the rapidly increasing population of patients infected with COVID-19, a second crisis is emerging—the challenge of managing the high disability burden associated with ICU survivorship

Grabowski DC, Maddox KEJ. Postacute care preparedness for COVID-19: thinking ahead. JAMA.

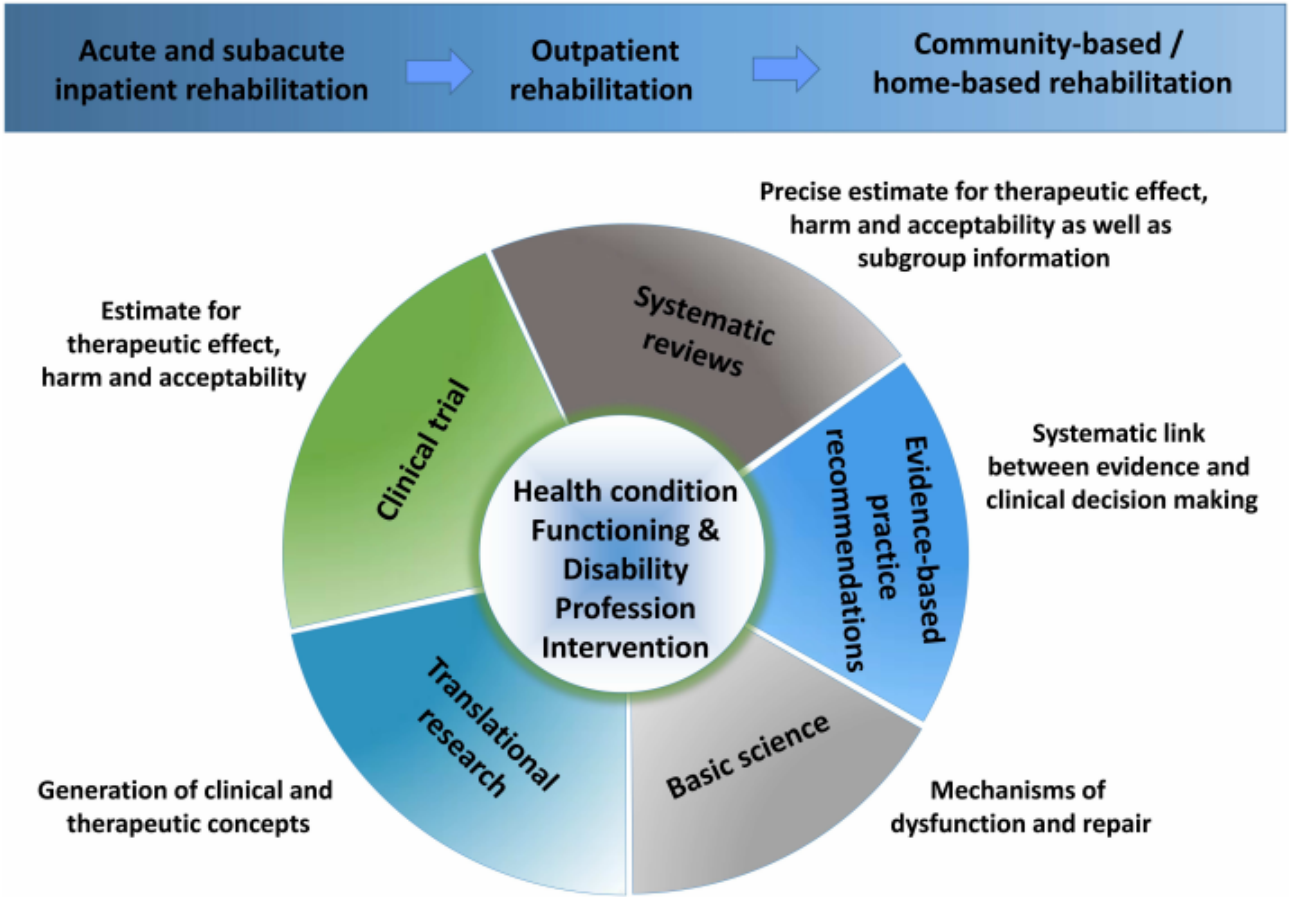


Discussion Summary.

ICU survivors, especially those who are mechanically ventilated, often suffer from **new or worsening impairments** in physical function, cognitive function, and/or emotional health collectively known as post-intensive care syndrome (PICS)

- Elliott D, Davidson JE, Harvey MA, et al. Exploring the scope of post-intensive care syndrome therapy and care: engagement of non-critical care providers and survivors in a second stakeholders meeting. Crit Care Med. 2014;42 (12):2518–2526.
- Harvey MA, Davidson JE. Postintensive care syndrome: right care, right now... and later. Crit Care Med. 2016;44(2):381–385.
- Ohtake PJ, Lee AC, Scott JC, et al. Physical impairments associated with post-intensive care syndrome: systematic review based on the world health organization's international classification of functioning, disability and health framework. Phys Ther. 2018;98(8):631–645.

Neurorehabilitation research perspectives



Platz T and Sandrini G (2020) Specialty Grand Challenge for NeuroRehabilitation Research. Front. Neurol. 11:349. doi: 10.3389/fneur.2020.00349

My mission today was

to raise the awareness about neurological manifestations and complications of COVID-19 and share some data from the most recent literature about neurological and psychological rehabilitation of patients with COVID-19 in ICU

to bring attention and awareness to the fact that in ICU not just patients with COVID-19 need professional rehabilitation, but also their carers (**family members and *health care professionals***)

Health care professionals

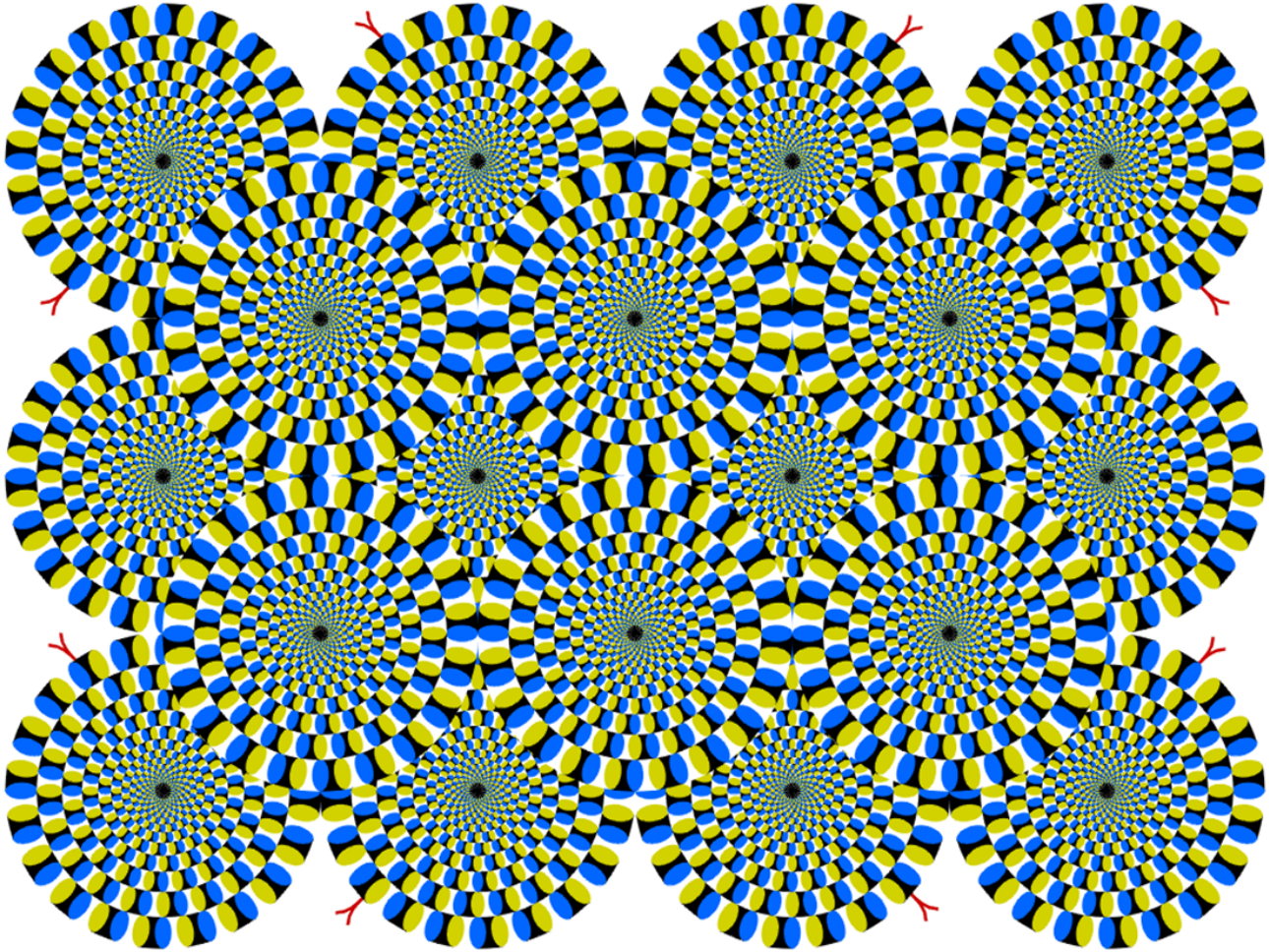
(results of unpublished survey in Russia:
about 500 000 health care workers were offered to fill the questionnaire online,
812 responders)

- Anxiety – 48.8%
- Depression – 57.7%
- Poor sleep – 37.4%
- Higher risks in young professionals working in “red zones”
- Psychological support needed – 87.4%
- Would like to get
    - professional psychological support – 38.8%
    - short psychological trainings in groups before the shift – 35.5%

Bachilo E.V., 2020 (presented at All-Russia conference in Saratov on June 3, 2020)

A Picture Is Worth a Thousand Words.

http://www.ritsumei.ac.jp/~akitaoka/index-e.html Akiyoshi KITAOKA, Professor, Psychology, Ritsumeikan University, Osaka, Japan



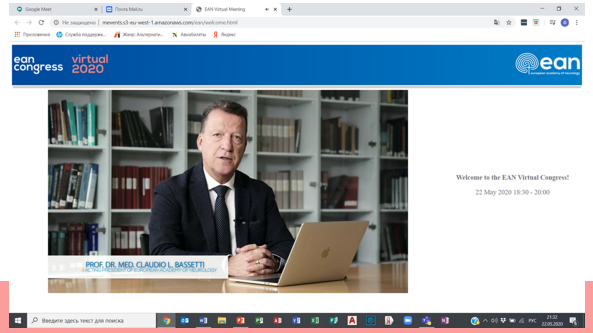
Conclusions.

Nothing very special to COVID-19 in terms of methods and techniques in rehabilitation in ICU is invented so far

Multidisciplinary/Interdisciplinary teams of professionals should work in ICUs and start rehabilitation early: it's safe and effective

Rehabilitation is a hard but rewarding job – it works in all the patients regardless their age and sex, but education matters!

Take care of yourselves: both physically and psychologically



Discussion

la@ufaneuro.org
www.ufaneuro.org