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Role of physical and rehabilitation medicine in the aftermath of SARS-CoV-2 disease

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Introduction-Aim

- Gather on-field information :
 - In-patient management in rehabilitation centres
 - Clinical evolution of covid-19 patients and possible deficiencies
 - Physiotherapy management in the acute and post-acute phase
- Literature review :
 - Impact of ICU hospitalisation and post-intensive care syndrome (PICS)
 - Outcome of patients with acute respiratory distress syndrome (ARDS)
 - Sars-CoV and Mers-CoV epidemic
- Analyse local in-hospital statistics about covid-19 patients
- Suggest a global patient assessment and a rehabilitation decision algorithm to best match their needs



In-patient management

- Challenges

- Vulnerable in-patients
- Physical or cognitive impairment limiting social distancing and contact precautions
- Proximity in between patients and the different health-care professionals
- Shared equipment and therapeutic/leisure premises

- Adaptations

- Early discharge of in-patient to limit infection risk and free up hospital beds for post-acute covid-19 patients
- Prohibiting visiting time and home returns on weekends
- Personal protective equipment training for the health-care professionals
- Creations of Covid-19 isolation area
- Organization of the workforce into teams that will manage Covid-19 versus non-infectious patients



Pulmonary rehabilitation

- Review

- Rare and limited patchy, peripheral pulmonary fibrosis on imaging after 1 year
- Normalisation of lung volume and diffusing capacity during the first year
- The cardiorespiratory endurance (6MWT, mMRC dyspnea) quickly improves in the first year but stays below the lower limit of normality after 5 years.

⇒ In the post-acute phase, restrictive syndrome results from both pulmonary alterations and respiratory muscle weakness

⇒ On the long-term, cardiorespiratory limitations are multifactorial including dyspnea and muscle weakness

- Acute phase

- Rare exudative pneumonia or mucous hypersecretion : respiratory physiotherapy on a case by case evaluation
- Avoid increasing respiratory work

- Post-acute phase

- Respiratory physiotherapy : Airway clearance
Lung volume and capacity restitution
- Respiratory muscle training: Aerobic and resistance training ± specific inspiratory muscle training (*IMT Threshold*)
Perceived exertion ≤ 3 on the Borg Scale



Post Intensive Care Syndrome - PICS

- Review :

- ICU has an impact on long-term morbidity and mortality after 6-8 days
 - ICU acquired weakness (ICUAW) : 46-100% prevalence
 - Limited handgrip strength and MRC sum score < 48
 - Swallow disorders : 3-84% prevalence
 - PICS {
 - Cognitive impairment
 - Psychological issues
 - ICUAW : ranges from muscle atrophy to critical illness polyneuropathy (CIP) /myopathy (CIM)
- ⇒ Usually 2/3 of ICU in-patients develop PICS with 65-80% of them having a mild impairment allowing home return
- ⇒ CIM has a better prognosis with faster and complete recovery rather than CIP in which a motor deficiency persists in 25-50% of the patients
- ⇒ Early mobilisation is associated with shorter duration of stay, improved functional status at discharge and at 6 months

- ICU stay of Sars-CoV-2 infected patients are marked by longer duration of stay and mechanical ventilation

- Data from the *CHU de Liège* on the 11th of may : 441 patients and 100 (22,7%) went to ICU
 - 74,3% needed mechanical ventilation with a mean of 18 days, **20 % of them had MV ≥ 28 days**
 - 25 patients stayed more than 7 days : 9 (36%) returned home
 - 11 (44%) were transferred to rehabilitation centre
 - 5 (20%) were still in acute hospitalisation



Interprofessional patient assessment

Functional status

- Prior functional status
- Autonomy loss in basic activities of daily living (ADLs) ? (ambulating, feeding, dressing, personal hygiene, continence, toileting)
- *Barthel Index, Katz Index, FIM*

Neurologic and locomotor status

- Sensory-motor deficit ? Joint stiffness ?
- Seated and standing balance. Walking.
- Psychomotor disadaptation syndrome ?
- *MRC-SS, Jamar dynamometer, BBS, TUGT, Tinetti,...*

Respiratory status

- Oxygen dependence? Effort-related hypoxemia
- Mucous hypersecretion? Efficient cough ?
- Comorbidities (COPD,..) and cardiorespiratory endurance
- *Pulmonary Function Testing, mMRC dyspnea, 6MWT,...*

Cognitive status

- *MoCA, MMSE,...*

Psychological status

- Anxiety, depression, post traumatic stress disorder ?
- *HADS, MIFS,...*

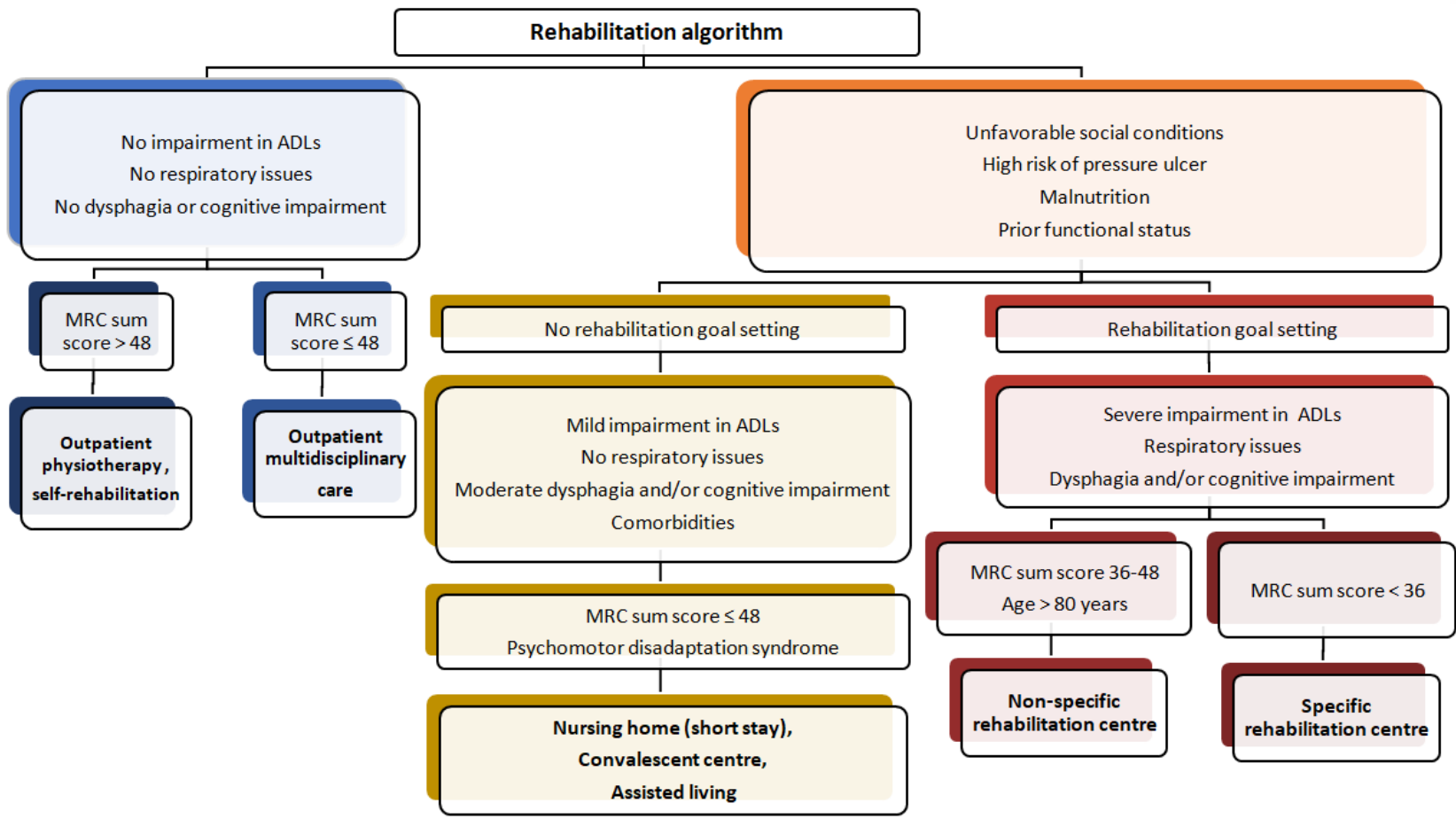
Nutritional status

- Swallow disorder?
- Denutrition? Weight loss $\geq 5\text{kg}$ or $\geq 5\%$ body mass ?
- $\text{BMI} \leq 19\text{kg/m}^2$ or $\text{BMI} \geq 35\text{kg/m}^2$
- *MNA Mini, Blood biology (albumin, prealbumin, iron,...) logopedic screening, Nasofibroscope*

Skin status

- Pressure ulcer ?
- *Braden, Norton,...*

Social conditions





Conclusions

- Severe Sars-CoV-2 infections present an extended period of ICU stay which can exceed 4 weeks of mechanical ventilation in some cases.
- As of now, we don't have enough data to predict specific long-term impairments. However, based on the existing knowledge of ARDS and the information gathered on-field so far, we can assume that the Sars-CoV-2 pandemic will be responsible for :
 - ICU acquired weakness (ICUAW), post-ICU and/or psychomotor disadaptation syndrome.
 - Swallow disorders secondary to the extended orotracheal intubation.
 - Breathing disorders resulting from both the infection itself and the ICU stay, linked to the mechanical ventilation and the muscle weakness.
- Once they pass the acute stage, the patients will require specific, personalized and multidisciplinary rehabilitation.