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SYSTEMATIC RAPID "LIVING" REVIEW ON REHABILITATION NEEDS DUE TO COVID-19: UPDATE TO MARCH 31ST 2020

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Abstract

Background. The outbreak of Covid-19 epidemics has challenged the provision of health care worldwide, highlighting the main flaws of some national health systems with respect to their capacity to cope with the needs of frail subjects. People experiencing disability due to Covid-19 express specific rehabilitation needs that deserve a systematic evidence-based approach.

Objectives. To provide the rehabilitation community with updates on the latest scientific literature on rehabilitation needs due to Covid-19. The first rapid "living" review will present the results of a systematic search performed up to March 31st, 2020.

Methods. A systematic search on PubMed, Pedro and Google Scholar was performed using the search terms: "Covid-19", "Coronavirus", "severe acute respiratory syndrome coronavirus 2", "rehabilitation", "physical therapy modalities", "exercise", "occupational therapy", and "late complications". Papers published up to March 31st, 2020, in English, were included.

Results. Out of the 2758 articles retrieved, 9 were included in the present review. Four of them are "calls for action", 3 provide recommendations about rehabilitation interventions in the acute phase, 2 address the needs of people quarantined at home or with restricted mobility due to the lockdown, and 1 provides a Core Outcome Set to be used in clinical trials to test the efficacy of health strategies in managing Covid-19 patients.

Conclusions. All selected papers were based on previous literature and not on the current Covid-19 pandemic. Main messages included: 1) early rehabilitation should be granted to inpatients with Covid-19; 2) people with

restricted mobility due to quarantine or lockdown should receive exercise programs to reduce the risk of frailty, sarcopenia, cognitive decline and depression; 3) telerehabilitation may represent the first option for people at home. Further updates are warranted in order to characterize the emerging disability in Covid-19 survivors and the adverse effects on the health of chronically disabled people.

Keywords: Covid-19; Severe Acute Respiratory Syndrome Coronavirus 2; Coronavirus; Rehabilitation; Physical and Rehabilitation Medicine; Exercise

Introduction

The recent outbreak of Covid-19 epidemics has challenged the provision of health care worldwide highlighting the main flaws of some national health systems with respect to their capacity to cope with the needs of the frailest subjects and of people with disability.

According to the European Center for Disease Prevention and Control (ECDC) report, released on April 17th, 2020,[1] the total number of diagnosed cases so far amounts to more than 2 million worldwide, including around 140,000 deaths. The greatest burden of Covid-19 infection is borne by North America and European countries, accounting, together, for 75% of cases and 86% of global mortality. Moreover, there is currently no sure indication that the peak of the epidemics was reached, in any country.

A growing number of epidemiologic reports show that the greatest mortality and morbidity risks concern frail and vulnerable people, in particular the elderly, subjects who suffer from multiple comorbidities or chronic diseases (mainly hypertension, diabetes, cardiovascular disease, chronic respiratory disease, immune compromised status). Again, in European Union/ European Economic Area Countries, 32% of the diagnosed cases have required hospitalization and the first available reports about the outcome show that mortality rate reaches 11% in this subgroup,[2] while little is known of the sequelae suffered by survivors in the short, medium and long term.

The greatest attention has so far been paid to strategies for the immediate control of contagion diffusion and acute care provision to those who become infected. Accordingly, hospital preparedness has been an absolute and immediate priority to meet the demand for care of patients with moderate or severe respiratory distress, while other contingency planning in healthcare settings (primary care and hospital settings), has been implemented, diffusely, according to ECDC guidelines.[2] The most applied approaches implied:

- Rescheduling non-urgent outpatient visits and substantially reduce the so-called “non-essential” activities (also including consultations and rehabilitation intervention delivery among these);
- Repurpose non-intensive care unit wards (including rehabilitation wards) as intensive care units (ICU);
- Restrict access to the hospital and reduce the moving of patients in the hospital;
- Avoid moving vulnerable patients within the hospital and restrict access to these patients.

Both the direct effects of Covid-19 infection and the indirect consequences of health policies impose a heavy burden on the population subgroups with the greatest health needs, like people with disability or at risk for experiencing disability due to chronic conditions. Several International bodies have already claimed for health policies focusing not only on the acute management of Covid-19 disease, though also on prevention, interventions and care in chronically ill patients staying at home or in health care facilities, as well as in patients

suffering recent functional limitation requiring rehabilitation (or admitted to rehabilitation facilities).[3,4] There is the need for rehabilitation professionals to reorganize hospital and outpatient activities to face the following challenges:

- ensure early rehabilitation to people hospitalized for Covid-19 infection, in the recovery phase after severe respiratory failure or prolonged hospital stay;

- provide inpatient/outpatient/home rehabilitation to people experiencing functional decline after Covid-19 infection due to (mainly) neurological sequelae;

- organize safe rehabilitation environment for people with emerging disability due to any other injury or illness than Covid-19 infection;

- ensure appropriate functional monitoring and long-term care to people with chronic/progressive disability restricted at home;

- provide rehabilitation professionals with protective tools and safe work environment.

To achieve these goals, policy makers and rehabilitation community need to combine their efforts in developing evidence-based strategies. Rapid systematic reviews are a specific type of systematic reviews whose aim is to provide the knowledge synthesis in a timely manner, using a simplified process and/or omitting some information.[5] Living systematic reviews are recently emerging as a type of systematic reviews updated regularly and frequently, normally once a month.[6] The current Covid-19 emergency is the typical situation in which to apply these methodologies combined together. The European Journal of Physical and Rehabilitation Medicine, in its effort to provide the most updated news to the rehabilitation community worldwide, that include the "instant papers from the field",[7-9] decided to offer a series of rapid "living" reviews to provide the rehabilitation community (and any other stakeholder) with monthly updates on the latest scientific literature on rehabilitation needs in the Covid-19 era.

This first rapid "living" review will present the results of a systematic scientific literature search performed up to March 31st, 2020. Incoming reviews will be delivered on a monthly basis and focus on unmet needs and unanswered questions.

Methods

Design

Systematic review according to PRISMA guidelines [10].

Search Strategy

On April 4th, 2020, we searched PubMed, PEDro and Google Scholar databases for all the articles, in English language, regarding rehabilitation needs due to Covid-19, published (including Epub) from December 21st, 2019 to March 31st, 2020. The search strategy can be retrieved in Appendix 1.

Study Selection

Three authors (AdS, EA, FN) independently completed all searches and removed duplicate records.

At the first screening stage, we selected the articles based on titles and abstracts. The second and last screening stage was performed by two authors, and discrepancies and doubts were solved by a consensus with

two more authors (MGC, SN). We critically appraised the full text of each study that was included if respected one of the following inclusion criteria: 1) prevalence and characteristics of the emerging disability after Covid-19; 2) rehabilitation approaches dedicated to Covid-19 patients, regardless of setting or stage; 3) information on the organization of rehabilitation services after Covid-19; 4) impact on diseases of rehabilitative interest 5) description or hypothesis about late complications that may be of rehabilitative interest

Data Extraction

A data extraction form was created in Excel. Data were extracted by three authors (AdS, EA, FN) comprising the following data (if applicable): 1) Reference (First author/Year/Journal citation); 2) aim; 3) setting; 4) sample size; 5) population; 6) study design; 7) intervention; 8) outcomes; 9) results; 10) notes. We did not appraise the quality of included studies. The systematic review protocol is not yet registered due to the urgency, but registration of future ones is underway.

Analysis

A narrative synthesis of the selected articles was performed.

Results

Out of 2758 retrieved articles, 9 were included. Figure 1 reports all details about the study selection process.

All the selected articles concern emerging rehabilitation needs due to Covid-19 pandemics. Seven papers focus on specific needs of Covid-19 patients, while 2 studies consider the increased health risks of quarantined people and subjects restricted at home due to the lockdown. Advice for health care concerns different settings, including acute care wards (n=7), inpatient rehabilitation facilities (n=6), outpatient rehabilitation services (n=5), and home environment (n=7). The geographical areas represented in authors' affiliations correspond to countries plagued by Covid-19 outbreak as first or in a massive way: in fact, 3 articles come from China, 3 from Italy and 2 from the United States. Table I summarizes the features and main contents of the 9 selected articles.

The papers can be grouped into 4 different content categories. The first group is mainly composed of Calls for action, or alerts for the rehabilitation professionals about how to face the Covid-19 challenge.[7,11,13,18] These papers provide general advice[7,11,13] or very detailed prescriptions[18] about *what to do* to limit infection spread and reorganize inpatient rehabilitation activities to increase capacity in acute hospitals. McNeary et al.[18] also alarm on the expected sequelae of prolonged prone positioning during mechanical ventilation, like posterior reversible encephalopathy syndrome, critical illness myopathy/neuropathy, with plantar flexion contractures and wounds. Patients may suffer severe respiratory impairment and may not be able to tolerate intensive therapies.

The second group is represented by papers giving recommendations about specific interventions to be delivered in the acute phase of Covid-19 infection.[14,17] Cui H-T et al.[14] review the indications of Traditional Chinese Medicine (TCM), advising the use of TCM decoctions as a means to reduce fever, cough, expectoration, fatigue and difficulty with breathing in Covid-19 patients. Acupuncture, moxibustion and Tai-Chi are also considered useful approaches in people with mild symptoms. Lazzeri et al.[17] deliver specific indications to physical therapists about the management of patients affected by Covid-19 in acute wards, with a focus on subjects with respiratory failure.

The third group addresses the needs of people quarantined at home or with restricted mobility due to the lockdown.[12,15] While Chen et al.[12] focus on healthy subjects recommending them to stay active in order to

preserve the immune response and protect against the infection, Jiménez-Pavón et al.[15] consider the needs of older people, underlining that a proper exercise program may counteract the negative consequences of chronic diseases, thus reducing the risk of frailty, sarcopenia, and dementia, and preventing the psychological effects of quarantine. Both papers agree on the content of the rehabilitative program, which should include aerobic, resistance, balance, coordination and mobility training.
Finally, a single paper by Jin et al.[16] provides the results of a consensus process with two Delphi surveys, concluding for the adoption of a Core Outcome Set. This Set consists of eight different outcome measures, to be used in clinical trials in order to test the efficacy of health strategies in the acute or rehabilitation phases, in subjects with different severity degrees of Covid-19 infection. Pulmonary function is the preferred outcome to test rehabilitation intervention.

Discussion

This is the first systematic review of scientific literature concerning rehabilitation needs due to Covid-19 epidemics and has been performed as a rapid "living" review to be followed in the next future by new monthly updates.
Albeit we used multiple combinations of terms to perform a systematic search of the main medical databases, only a few papers resulted to meet the inclusion criteria up to March 31st, 2020. Most papers exploited available expertise to alert rehabilitation professionals about the need for reorganizing inpatient and outpatient services to ensure patient and staff safety, whereas a couple of articles focused on the risks for health due to mobility restriction rules imposed on older people or people with chronic conditions. None of the selected papers is based on direct observation, nor presents results of actual clinical trials. Papers with real-life experiences on Covid-19 are utterly needed to guide rehabilitation treatments, and the instant papers proposed by the European Journal of Physical and Rehabilitation Medicine can help in this regard.[7-9]

The main messages in the literature up to March 31st, 2020 are listed below:
- *for people hospitalized due to Covid-19 infection:* ensuring the adequate interventions in the acute wards, adopting shared strategies performed by a multidisciplinary team, monitoring patients' clinical condition carefully after a postural change, as this event can affect suddenly patients' ability to exchange gas, reducing unnecessary manoeuvres, and checking for side effects determined by prolonged prone position during ventilation; moreover, passive mobilization should be performed as early as possible to avoid immobilization sequelae and organize job activities so to limit the risk of personnel contamination as much as possible.

- *for people quarantined at home or with restricted mobility due to the lockdown:* ensuring the provision of proper exercise programs to reduce the risk of frailty, sarcopenia, dementia, and to prevent the psychological effects of quarantine. A multicomponent rehabilitative program, including aerobic, resistance, balance, coordination and mobility training exercises, for 5-7 days/week, at moderate intensity, is advised to maintain an adequate health status in older people.

- *tele-rehabilitation approaches are welcome* as they represent the first option for people capable of exercising at home under the guidance of rehabilitation professionals.

- *job activities should be re-organized* both in inpatient and outpatient facilities to ensure patient and staff safety and limit the spread. To this aim, routine cleaning and disinfection procedures should be applied, early detection of suspect cases, social distancing, suspension of unnecessary interventions (e.g. music therapy, groups rehabilitation) should also be pursued.

The main limitation of this first rapid "living" review is the short time window considered for the literature search. The short time elapsed from the start of epidemics is likely the main reason why no properly designed study has so far reported the prevalence and characteristics of the emerging disability in people recovering

from Covid-19 infection, on late complications of rehabilitative interest or on the efficacy of rehabilitation interventions delivered to Covid-19 patients in any disease stage. Moreover, information is still missing about the adverse effects on the health of chronically disabled people, determined by the suspension of regular functional monitoring and rehabilitation delivery.

Further updates are warranted in order to answer these questions.

References

1. European Centre for Disease Prevention and Control report April 17th, 2020 Available at: https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide
2. European Centre for Disease Prevention and Control. Coronavirus disease 2019 (COVID-19) in the EU/EEA and the UK – eighth update. Stockholm: ECDC; 8 April 2020. Available at: https://www.ecdc.europa.eu/en/publications-data/rapid-risk-assessment-coronavirus-disease-2019-covid-19-pandemic-eighth-update
3. WHO. Disability considerations during the COVID-19 outbreak. Available at: https://www.who.int/who-documents-detail/disability-considerations-during-the-covid-19-outbreak
4. American Academy of Physical Medicine & Rehabilitation. COVID-19 statement from the AAPM&R Board of Governors from March 20. Available at: https://www.aapmr.org/docs/default-source/news-and-publications/academy-statement---covid-19-final.pdf?sfvrsn=d58a5f7c_0
5. Tricco AC, Langlois EV, Straus SE, editors. Rapid reviews to strengthen health policy and systems: a practical guide. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.
6. Elliott JH, Turner T, Clavisi O, Thomas J, Higgins JP, Mavergames C, Gruen RL. Living systematic reviews: an emerging opportunity to narrow the evidence-practice gap. PLoS Med. 2014 Feb 18;11(2):e1001603. doi: 10.1371/journal.pmed.1001603.
7. Negrini S, Ferriero G, Kiekens C, Boldrini P. Facing in real time the challenges of the Covid-19 epidemic for rehabilitation. Eur J Phys Rehabil Med. 2020 Mar 30. doi: 10.23736/S1973-9087.20.06286-3.
8. Boldrini P, Kiekens C, Bargellesi S, Brianti R, Galeri S, Lucca L, et al. First impact on services and their preparation. "Instant paper from the field" on rehabilitation answers to the Covid-19 emergency. Eur J Phys Rehabil Med. 2020 Apr 8. doi: 10.23736/S1973-9087.20.06303-0.
9. Kiekens C, Boldrini P, Andreoli A, Avesani R, Gamna F, Grandi M, et al. Rehabilitation and respiratory management in the acute and early post-acute phase. "Instant paper from the field" on rehabilitation answers to the Covid-19 emergency. Eur J Phys Rehabil Med. 2020 Apr 15. doi: 10.23736/S1973-9087.20.06305-4.
10. Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. BMJ 2009;339:b2535, doi: 10.1136/bmj.b2535
11. Boldrini P, Bernetti A, Fiore P; SIMFER Executive Committee and SIMFER Committee for international affairs. Impact of COVID-19 outbreak on rehabilitation services and Physical and Rehabilitation Medicine (PRM) physicians' activities in Italy. An official document of the Italian PRM Society (SIMFER). Eur J Phys Rehabil Med. 2020 Mar 16. doi: 10.23736/S1973-9087.20.06256-5
12. Chen P, Mao L, Nassis GP, Harmer P, Ainsworth BE, Li F. Coronavirus disease (COVID-19): The need to maintain regular physical activity while taking precautions. J Sport Health Sci. 2020 Mar;9(2):103-104. doi:10.1016/j.jshs.2020.02.001
13. Choon-Huat Koh G, Hoenig H. How Should the Rehabilitation Community Prepare for 2019-nCoV? Arch Phys Med Rehabil. 2020 Mar 16. pii: S0003-9993(20)30153-2. doi: 10.1016/j.apmr.2020.03.003
14. Cui H-T, Li Y-T, Guo L-Y, et al. Traditional Chinese medicine for treatment of coronavirus disease 2019: a review. Traditional Medicine Research 2020, 5 (2): 65–73; doi: 10.12032/TMR20200222165
15. Jiménez-Pavón D, Carbonell-Baeza A and Lavie C.J. Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people, Progress in Cardiovascular Diseases (2020), https://doi.org/10.1016/j.pcad.2020.03.009
16. Jin X, Pang B, Zhang J, Liu Q, Yang Z, Feng J, et al. Core Outcome Set for Clinical Trials on Coronavirus Disease 2019 (COS-COVID). Engineering (Beijing). 2020 Mar 18. doi: 10.1016/j.eng.2020.03.002
17. Lazzeri M, Lanza A, Bellini R, Bellofiore A, Cecchetto S, Colombo A, et al. Respiratory physiotherapy in patients with COVID-19 infection in acute setting: a Position Paper of the Italian Association of Respiratory Physiotherapists (ARIR). Monaldi Arch Chest Dis. 2020 Mar 26;90(1). doi: 10.4081/monaldi.2020.1285
18. McNeary L, Maltser S, Verduzco-Gutierrez M. Navigating Coronavirus Disease 2019 (Covid-19) in Physiatry: A CAN report for Inpatient Rehabilitation Facilities. PM R. 2020 Mar 20. doi: 10.1002/pmrj.12369

Figures and Tables

Figure 1. Prisma Flow Diagram illustrating the outcome of the screening process

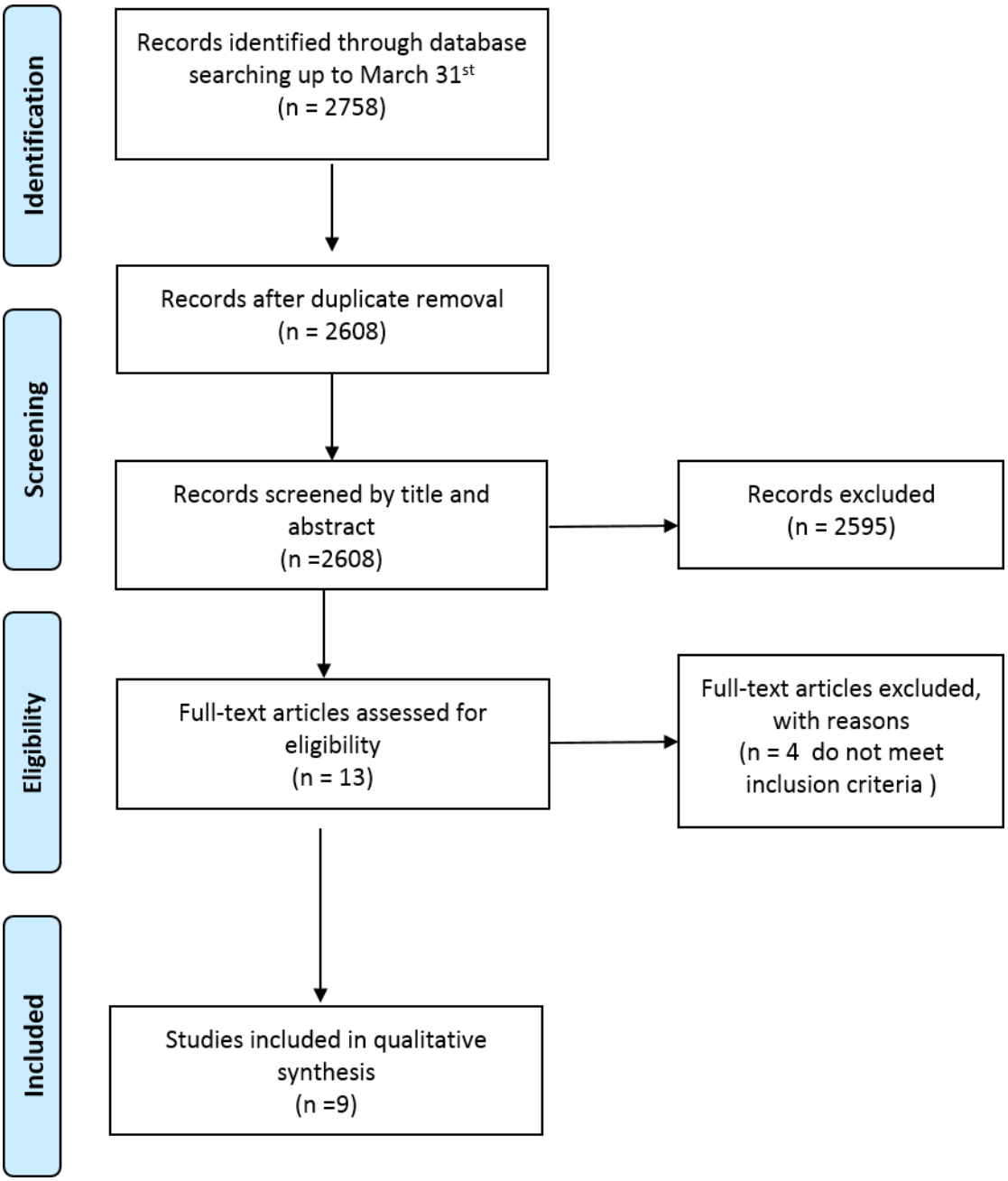

Table I. Features and main content of the 9 articles included in this rapid review of rehabilitation needs due to Covid-19 outbreak. Publication window: up to March 31st, 2020.

N.	Authors, Journal, Year	Aim of the study	Study population or target population	Study setting or target setting	Country or geographical area involved	Main content
1	Boldrini P, et al. Eur J Phys Rehabil Med. 2020.[11]	To provide national recommendations on the rehabilitation care considering the Covid-19 outbreak in Italy.	Covid-19 patients, any subject in need of rehabilitation interventions and rehabilitation professionals.	Acute care wards, inpatient and outpatient rehabilitation facilities, and home environment.	Italy.	The SIMFER provided recommendations for care of Covid-19 patients (ensuring the adequate interventions in acute care, inpatient rehabilitation settings, outpatient and home-based rehabilitation settings), protection of patients and professionals (preventing the spread of the infection), and activation of a remote support service of "tele-rehabilitation-medicine" (providing information and advice to persons with disabling conditions).
2	Chen P, et al. J Sport Health Sci. 2020.[12]	To provide recommendations on the prevention of complications due to quarantine/ prolonged mobility restriction.	People quarantined at home or with restricted mobility due to the lockdown.	Home-based setting.	China.	There is a strong health rationale for continuing physical activity at home to stay healthy and maintain immune system function in the current risky environment. Physical training at home should include strengthening and balance exercises, stretching or a combination of these.
3	Choon-Huat Koh G & Hoenig H. Arch Phys Med Rehabil. 2020.[13]	To alert and provide advice to the rehabilitation community so that it understands what to do to face the Covid-19 pandemics	Covid-19 patients, any subject in need of rehabilitation interventions and rehabilitation professionals.	Acute care wards, inpatient and outpatient rehabilitation facilities, and home environment.	Singapore / United States of America (USA).	Rehabilitation patients are at higher risk of severe and fatal Covid-19 infection. Practical advices include: - continuation of home exercises last prescribed and continued attendance at rehabilitation centres if well but with stepped-up infection control measures such as patient screening for fever and flu symptoms at the entrance. - tele-rehabilitation is the first option for people capable of performing rehabilitation at home with guidance from PRM specialists. -fever and flu symptoms should be monitored for patients who need centre-based or inpatient rehabilitation, to separate the well from the unwell; symptomatic patients should be quarantined and tested for coronavirus, and isolated and treated if positive.
4	Cui H-T, et al. Trad Med Res. 2020.[14]	To summarize the Covid-19 pathogenesis, clinical outcomes, and current applications of traditional Chinese Medicine (TCM) for the treatment of Covid-19.	Covid-19 patients.	Acute care wards, inpatient and outpatient rehabilitation facilities, and home environment.	China.	The use of TCM decoctions is recommended as a means to reduce fever, cough, expectoration, fatigue and difficulty with breathing in Covid-19 patients.
5	Jiménez-Pavón D, et al. Prog Cardiovasc Dis. 2020.[15]	To promote physical activity and exercise in order to counteract the mental and physical consequences of Covid-19 quarantine in older people.	People quarantined at home or with restricted mobility due to the lockdown.	Home-based setting.	Spain.	A proper exercise program might counteract the negative consequences of several diseases (diabetes, hypertension, cardio-vascular diseases, respiratory diseases), to reduce the risk of frailty, sarcopenia, and dementia, and to prevent the psychological effects of quarantine. A multicomponent rehabilitative program, including aerobic, resistance, balance, coordination and mobility training exercises, for 5-7 days/week, at moderate intensity, could maintain an adequate health status in older people.
6	Jin X, et al. Engineering. 2020.[16]	To develop a Core Outcome Set for clinical trials on Covid-19 (COS-Covid).	Covid-19 patients.	Acute care wards, inpatient and outpatient rehabilitation facilities, and home environment.	China.	The COS-Covid consists of 8 different outcome measures to be used in the different scenarios of Covid-19 infection: 1. time to 2019-nCoV RT-PCR negativity (mild, ordinary and severe cases) 2 clinical symptom score (ordinary cases) 3 length of hospital stay (ordinary and severe cases) 4 composite events ((total number of patients diagnosed cases)

						5 PaO2/FiO2, (severe cases) 6 duration of mechanical ventilation, (severe cases) 7 all-cause mortality (critical cases) 8 pulmonary function (rehabilitation phase)
7	Lazzeri M, et al. Arch Chest Dis. 2020.[17]	To share information with physical therapists involved in the management of patients affected by Covid-19 in acute stages, worldwide.	Covid-19 patients.	Acute care setting.	Italy	The following advices are given to physical therapists involved in the management of patients affected by Covid-19 in acute stages: - to monitor the clinical condition closely and prepare early for invasive mechanical ventilation; - to consider the feasibility of each treatment, based on available equipment, and adopt shared strategies performed by a multidisciplinary team; - to monitor patients' clinical condition carefully after a postural change, as this event can affect suddenly patients' ability to exchange gas; - to reduce any unnecessary manoeuvre, particularly procedures that can generate a reduction in the positive end-expiratory pressure and lead to lung de-recruitment; - to check for side effects determined by prolonged prone position during ventilation; - to perform passive mobilization as early as possible to avoid immobilization sequelae; - to limit bronchial hygiene techniques to selected cases; - to reduce unnecessary manoeuvres, particularly procedures that can generate droplets/aerosol; - to organize job activities so to limit the risk of personnel contamination as much as possible
8	McNeary L, et al. PM R. 2020.[18]	To develop a Conditions Actions Needs (CAN) report for Inpatient Rehabilitation Facilities.	Covid-19 patients.	Acute care and inpatient rehabilitation settings.	USA.	The CAN model is important to prepare for emergency situations, including the Covid-19 pandemic. Rehabilitation services must prioritize patients and staff safety.
9	Negrini S, et a. Eur J Phys Rehabil Med. 2020. [7]	To define a call for action about the need of timely answers for clinical questions to PRM clinicians.	Covid-19 patients, any subject in need of rehabilitation interventions and rehabilitation professionals.	Acute care, inpatient rehabilitation, outpatient rehabilitation, and home-based settings.	Italy.	The EJPRM will provide provisional but immediate responses to PRM community. Because of the urgent need of timely answer, they will publish a collection of "instant papers", regarding the result of the webinars about the first clinical experiences in Italy and trying to give crucial fast answers to PRM clinicians.

PRM= Physical and Rehabilitation Medicine; RT-PCR = reverse transcriptase-polymerase chain reaction; PaO2/FiO2= ratio between partial pressure of oxygen in arterial blood and fraction of inspired oxygen; EJPRM= European Journal Physical Rehabilitation Medicine

Figures and Tables

Figure 1. Prisma Flow Diagram illustrating the outcome of the screening process.

Table I. Features and main content of the 9 articles included in this rapid review of rehabilitation needs due to Covid-19 outbreak. Publication window: up to March 31st, 2020.

Appendix 1.

We performed the search on PubMed database through Medical Subject Headings (MeSH) terms by the following strings: 1) (covid-19) AND "Rehabilitation"[Mesh]; 2) (coronavirus) AND "Rehabilitation"[Mesh]; 3) (covid-19) AND "Physical Therapy Modalities"[Mesh]; 4) (coronavirus) AND "Physical Therapy Modalities"[Mesh]; 5) (covid-19) AND "Exercise"[Mesh]; 6) (coronavirus) AND "Exercise"[Mesh].

Moreover, we performed a search on PubMed database through Supplementary Concept terms by the following strings: 1) (respiratory rehabilitation) AND "severe acute respiratory syndrome coronavirus 2" [Supplementary Concept]; 2) (physical therapy) AND "severe acute respiratory syndrome coronavirus 2" [Supplementary Concept]; 3) (physical exercise) AND "severe acute respiratory syndrome coronavirus 2" [Supplementary Concept]; 4) (physical activity) AND "severe acute respiratory syndrome coronavirus 2" [Supplementary Concept]; 5) (occupational therapy) AND "severe acute respiratory syndrome coronavirus 2" [Supplementary Concept]; 6) (rehabilitation) AND "Covid-19" [Supplementary Concept]; 7) (respiratory rehabilitation) AND "Covid-19" [Supplementary Concept]; 8) (physical therapy) AND "Covid-19" [Supplementary Concept]; 9) (physical exercise) AND "Covid-19" [Supplementary Concept]; 10) (physical activity) AND "Covid-19" [Supplementary Concept]; 11) (occupational therapy) AND "Covid-19" [Supplementary Concept]; 12) (functional recovery) AND "Covid-19" [Supplementary Concept]; 13) (complications) AND "Covid-19" [Supplementary Concept], (sequelae) AND "Covid-19" [Supplementary Concept].

Lastly, we performed a search on PEDro and Google Scholar databases by the following strings: “Rehabilitation AND Covid-19” OR “Rehabilitation and Coronavirus” AND “Late complications AND Covid-19” OR “Late complications AND Coronavirus”.