SPECIAL COMMUNICATION

"Rehabilitation Research Framework for Patients With COVID-19" Defined by Cochrane Rehabilitation and the World Health Organization Rehabilitation Programme

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Abstract

The coronavirus disease 2019 (COVID-19) pandemic resulted in a surge of research activity. Since its outset, efforts have been made to guide the rapid generation of research in medicine. There are gaps in some areas of rehabilitation research for patients with COVID-19. The development of a specific research framework might serve to help monitor the status of research (mapping), shape and strengthen research by pointing to under-investigated areas, and promote rehabilitation research in this context. This article introduces and discusses the COVID-19 Rehabilitation Research Framework (CRRF) and presents the methodology used for its development.

The questions have been developed among the World Health Organization (WHO) Rehabilitation Programme, Cochrane Rehabilitation, and the experts of its Rehabilitation−COVID-19 Evidence-based Response Action International Multiprofessional Steering Committee. The framework is divided into 2 parts and includes 20 questions organized in 4 groups: epidemiology, and evidence at the micro- (individual), meso- (health services), and macro- (health systems) levels.

The CRRF offers a comprehensive view of the research areas relevant to COVID-19 and rehabilitation that are necessary to inform best practice and ensure rehabilitation services and health systems can best serve the population with COVID-19. The collaboration between Cochrane Rehabilitation and the WHO Rehabilitation Programme in establishing the CRRF brought together perspectives from the health systems, health management, and clinical evidence. The authors encourage researchers to use the CRRF when planning studies on rehabilitation in the context of COVID-19.

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The coronavirus disease 2019 (COVID-19) pandemic resulted in surge of research as the world sought to understand the disease and its prevention and treatment.[1,2] The vast scale of the emergency and its immense health, social, and economic accelerated research to an unprecedented pace[3]; the availability of COVID-19 evidence expanded from observational studies in the early phases of the pandemic to clinical trials and systematic reviews in a matter of months.[4] However, the field of rehabilitation, which is highly relevant to the care of patients with COVID-19, has lagged behind during the emergency.[5] Only limited high-quality evidence has emerged thus far compared with other medical fields.[6,7] Of further concern are the persistent gaps in specific areas of rehabilitation research to guide clinical care and service organization for patients with COVID-19.[6,7] It is evident that both greater

advocacy and support for rehabilitation research relating to COVID-19 are required, as well as stronger coordination to ensure that all areas of enquiry are addressed.[8,9]

Since the outset of the COVID-19 emergency, efforts have been made to guide the rapid generation of research, including through instruments such as the World Health Organization (WHO) Global Research Roadmap, COVID-19 Evidence Network to Support Decision-making Network,[10] and COVID-19 Research Coordination and Learning partnership.[11] The focus of such initiatives, however, has been on slowing the spread of the virus and developing therapeutics and vaccines, leaving a chasm of direction for research related to the short- and long-term effect of the virus on functioning, as well as rehabilitation interventions and services.[12] Cochrane Rehabilitation, the international body focusing on evidence dissemination[13] and growth[14,15] for rehabilitation, recognized the need for a structured framework for COVID-19 rehabilitation research. It joined efforts with the WHO Rehabilitation Programme to produce the COVID-19 Rehabilitation Research Framework (CRRF). The CRRF presents the scope and areas of research enquiry that need to be addressed to build a comprehensive evidence base for clinical care, service organization, and health system strengthening to meet the needs of patients with COVID-19. Research frameworks have long been used by scientific communities to reflect consensus on research priorities,[16-18] direct research funding,[19,20] and drive research efforts[21,22] for entire sectors[23,24] or specific topics and subspecializations, including in rehabilitation.[25-28] Reflecting these traditional functions, the CRRF has the following specific aims: (1) monitor the status of rehabilitation research for COVID-19 by mapping emerging evidence to research areas and priorities; (2) shape and strengthen research activity regarding rehabilitation in the context of COVID-19 by setting out priority domains of research; and (3) promote rehabilitation research in the context of COVID-19 by highlighting the underinvestigated areas and gaps in literature.

This article presents the methodology used to develop the CRRF, discusses how emerging evidence maps to the CRRF, and proposes how it can be best operationalized to meet its intended aims.

Methods

The CRRF was developed through a progressive consensus building approach from June 5-26, 2020.

Defining of the first set of questions

The process was based on a first set of questions developed by the first author (S.N.). This initial list was based on a document developed with the WHO Rehabilitation Programme and Cochrane Rehabilitation for a previous project to map evidence on telemedicine. This version included 3 areas (evidence at micro-

[individuals], meso- [health services], and macro- [health systems] levels), with 4 questions each. The list was revised in discussion with the authors, which resulted in an additional area (epidemiology) and in the addition of a series of other questions for existing areas.

Survey

The updated list was disseminated using Survey Monkey online software.[a] Participants included the 13 members of the International Multiprofessional Steering Committee, which was convened by Cochrane Rehabilitation for the Rehabilitation−COVID-19 Evidence-based Response (REH-COVER) Action (table 1). Collectively, the International Multiprofessional Steering Committee represents 8 professional areas of rehabilitation as well as an infectious diseases specialist, 4 WHO world regions, both high- and low-middle income countries, and the WHO Rehabilitation Programme. Participants were given 7 days to respond, with 1 reminder sent. The survey instrument used closed binary answers, and free text boxes were provided for suggestions on each list items, as well as the overall framework. Participants were asked to report about missing areas and/or the redundancy of questions.

Final consensus

The results were analyzed and discussed among the authors. Two new questions were added based on the feedback received. The final list of questions was synthesized and grouped by topic area. The list was then further divided into 2 thematic parts. This version was submitted to the International Multiprofessional Steering Committee for suggestions and eventual approval. Final fine-tuning by the authors resulted in the CRRF presented here.

Results

The response rate to the first survey was 85%, whereas the final survey for refinement and approval achieved a response rate of 100%.

The CRRF comprises 2 parts. Part I, "Scope of rehabilitation research enquiry" (table 2), proposes that rehabilitation research enquiry in the context of COVID-19 needs to:

- address limitations of functioning (disability) of rehabilitation interest (LFRI), defined according to the International Classification of Functioning, Disability, and Health,[12] namely impairments, activity limitations, and participation restrictions;
- include different populations;
- relate to the phases of rehabilitation (acute, postacute, permanent, late onset); and
- have relevance to different country settings (based on World Bank income classification).

Part II, "Areas of rehabilitation research enquiry and associated questions" (table 3), includes proposed questions, grouped as follows:

- Epidemiology: the LFRI, their clinical presentation, prevalence, natural history, and determining factors.

List of abbreviations:

COVID-19	**coronavirus disease 2019**
CRRF	**COVID-19 Rehabilitation Research Framework**
LFRI	**limitations of functioning of rehabilitation interest**
RCT	**randomized controlled trial**
REH-COVER	**Rehabilitation−COVID-19 Evidence-based Response**
WHO	**World Health Organization**

Table 1　International Multiprofessional Steering Committee of the REH-COVER Action of Cochrane Rehabilitation

Member	Area of Expertise	Organization	Country
Carlotte Kiekens	Physical and rehabilitation medicine	Codirector Cochrane Rehabilitation	Belgium
Chiara Arienti	Osteopathy and methodology	Coordinator Cochrane Rehabilitation	Italy
Maria Gabriella Ceravolo	Physical and rehabilitation medicine	Member	Italy
Pierre Côté	Chiropraxis and methodology	Member	Canada
Anne Cusick	Occupational therapy	Member	Australia
Francesca Gimigliano	Physical and rehabilitation medicine	Cochrane Rehabilitation	Italy
Allen Heinemann	Psychology	Member	United States
Jody-Anne Mills	Occupational therapy	Representative World Health Organization Rehabilitation Programme	Australia
Farooq Rathore	Physical and rehabilitation medicine	Representative Low-middle income countries	Pakistan
Marco Rizzi	Infectious diseases	Member	Italy
Geert Verheyden	Physical therapy	Member	Belgium
Margaret Walshe	Speech and language therapy	Member	Ireland
Stefano Negrini	Physical and rehabilitation medicine	Director Cochrane Rehabilitation	Italy

- Micro-level (individual): the types of outcomes, interventions efficacy, harms, and cost-effectiveness.
- Meso-level (health services): accessibility to services, workforce/technology requirements, and changes of their provision because of the pandemic.
- Macro-level (health systems): the need, financing and regulation of services, health systems requirements, and changes because of the pandemic.

Discussion

The COVID-19 pandemic has led to new challenges for the rehabilitation research community. This article introduces the CRRF developed by Cochrane Rehabilitation and the WHO Rehabilitation Programme and reports the methods followed to develop it. The aims of the CRRF align with the mandate of Cochrane Rehabilitation to identify, summarize, and make current evidence on rehabilitation in the context of COVID-19 available in an accessible way to researchers, practitioners, policy makers, and consumers. It also further supports the strategic priority of the WHO Rehabilitation Programme to shape the research agenda. In this pandemic, stakeholders, including the general public, have been highly sensitive to the growing scientific knowledge on COVID-19. For example, as the pandemic has progressed, there has been increasing interest in the longer-term health effect of COVID-19 (so-called long-COVID[29]), a topic that has been largely neglected by research to date.

The CRRF seeks to be inclusive of all the knowledge needs related to rehabilitation in the context of COVID-19.

The CRRF has already demonstrated its value regarding its first aim, helping to monitor the status of rehabilitation research for COVID-19 by enabling the mapping of emerging evidence to research categories. It has achieved this in the context of the work undertaken by the REH-COVER Action, with the production of rapid living systematic reviews on rehabilitation and COVID-19 updated[6,7] on a monthly basis[30-35] (fig 1), where the CRRF serves as the framework to classify each article. A summary of the rapid

Table 2　First part of the COVID-19 rehabilitation research framework (CRRF): scope of rehabilitation research enquiry

COVID-19 Rehabilitation Research Framework Part I. Scope of Rehabilitation Research Enquiry	
LFRI	Activity limitation(s)
	Impairment(s)
	Participation restriction(s)
	The general term LFRI includes these terms (for their definition, refer to the WHO International Classification of Functioning, Disability, and Health)
COVID-19 phases of care	Acute: LFRI during COVID-19 infection
	Postacute: LFRI continuing from the acute phase of COVID-19 and its treatment
	Permanent: LFRI unresolved or not solvable, and causing a new health condition
	Late onset: LFRI appeared as a consequence of COVID-19 but after the end of the acute phase
Populations	People with a preexisting health condition
	People with disability and/or experiencing disability at the time of infection
Country economic context	High-income countries
	Low- and middle-income countries

Table 3 Second part of the COVID-19 rehabilitation research framework (CRRF): areas of rehabilitation research enquiry and associated questions

COVID-19 Rehabilitation Research Framework
Part II. Areas of Rehabilitation Research Enquiry and Associated Questions

1. Epidemiology of LFRI due to COVID-19	
1.1	What are the LFRI?
1.2	Which is the clinical presentation (sign, symptoms, diagnostic examination) of the LFRI?
1.3	What is the prevalence of the LFRI?
1.4	What is the natural history of the LFRI?
1.5	What are the determining factors of the LFRI and how do they influence possible changes of the LFRI? Including the following:
1.5.1	Demographics
1.5.2	Health
1.5.3	Etiology
1.5.4	Acute treatment
2. Evidence on rehabilitation for lfri due to COVID-19 at the individual level (microlevel)	
2.1	What is the evidence on the type of outcomes for LFRI? (ie, outcomes to be considered when treating LFRI)
2.2	What is the evidence on the effect of interventions for LFRI?
2.3	What is the evidence on adverse effects/harms/disadvantages of interventions for LFRI?
2.4	What is the evidence on the cost-effectiveness of interventions for LFRI?
3. Evidence on rehabilitation for lfri due to COVID-19 at the service level (meso-level)	
3.1	What is the evidence on accessibility (availability, access, utilization) to services for LFRI due to COVID-19?
3.2	What is the evidence on workforce and/or technology requirements for addressing LFRI due to COVID-19?
3.3	What is the evidence on changes to the provision of rehabilitation services as a consequence of the pandemic?
4. Evidence on rehabilitation for lfri due to covid-19 at the system level (macro-level)	
4.1	What is the evidence on the need for services for LFRI due to COVID-19?
4.2	What is the evidence on the financing of services for LFRI due to COVID-19?
4.3	What is the evidence on health systems requirements for LFRI due to COVID-19?
4.4	What is the evidence on the regulation of delivery of services for LFRI due to COVID-19?
4.5	What is the evidence on changes in the health systems related to rehabilitation as a consequence of the pandemic?

living systematic review can be accessed at Cochrane Rehabilitation website (https://rehabilitation.cochrane.org/covid-19/reh-cover-rapid-living-systematic-reviews). The CRRF was also used to establish an interactive evidence map published in the Cochrane Rehabilitation website[37] (fig 2), which is offered as a powerful tool to the rehabilitation community to identify and navigate the emerging evidence. The evidence mapping to the CRRF has revealed that, as of October 31, 2020, most research focuses on epidemiology, and there are almost no high-quality study designs on any of the CRRF questions (table 4). For most of the questions at the micro- (individual) level, randomized controlled trials (RCTs) constitute the highest evidence level.[38] At the meso- and macro-levels (health services and systems levels, respectively), however, prospective observational (benchmarking) trials are the most feasible and appropriate.[39] Because it may take some time until we have high quality RCTs, we need to make sure that in the
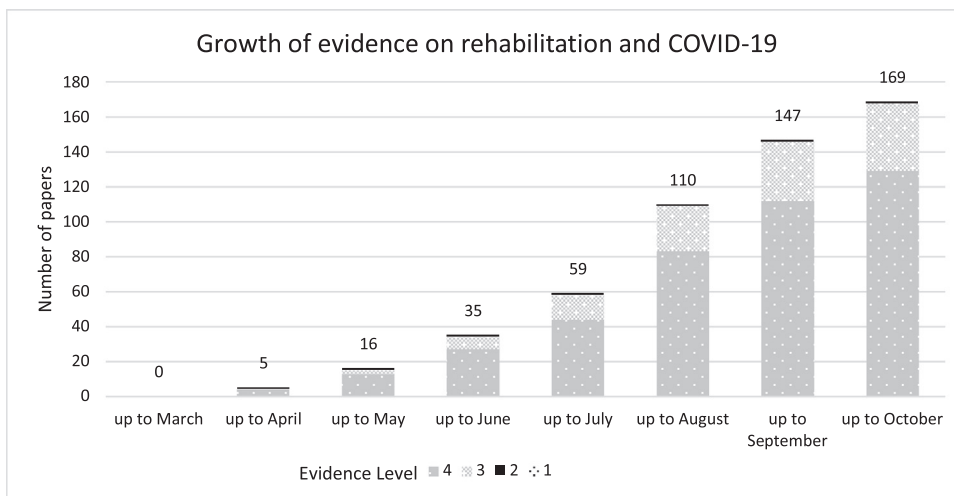
Fig 1 Growth of evidence on rehabilitation and COVID-19 based on the monthly living systematic review conducted by the Steering Committee,[6,7,30-35] following the Oxford Centre for Evidence-Based Medicine level of evidence levels of evidence,[36] where level 1 is the strongest and level 4 is the lowest.
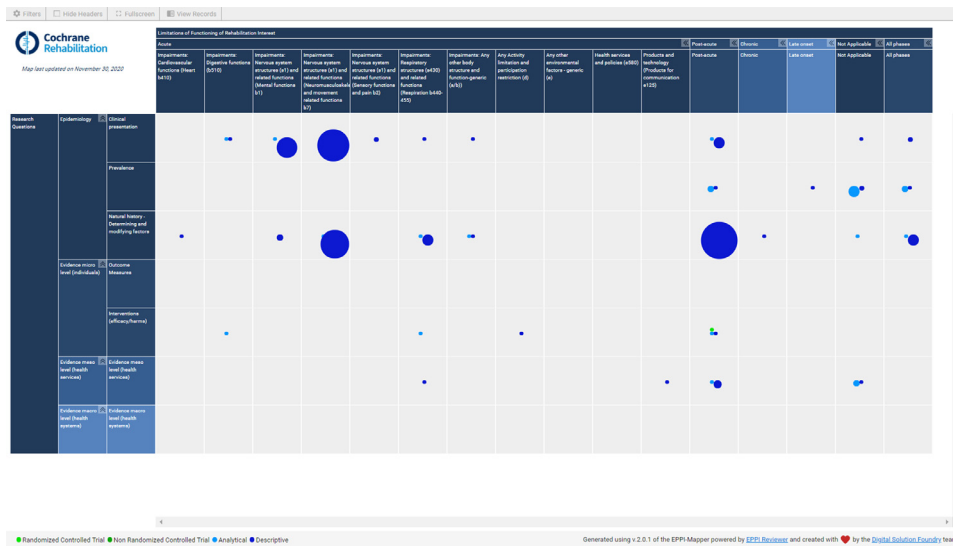
Fig 2 This figure represents the evidence mapping on rehabilitation and COVID-19 based on the monthly living systematic review conducted by the Steering Committee.[6,7,30-35] The map gathers in a single view the quantity of information in the literature and its distribution according to the CRRF. All details of the map can be seen on the Cochrane Rehabilitation website at the link https://rehabilitation.cochrane.org/covid-19/reh-cover-interactive-living-evidence. The columns include the LFRI divided in the different COVID-19 phases of care and populations according to Part I of the CRRF (see table 1), and the rows include the research questions of Part II of the CRRF (see table 2). In each resulting square, 4 circles represent the quality of evidence (1 per color: RCT, non-RCT, analytical, descriptive studies) and the number of studies (the bigger the circle, the more studies). Clicking on the circles, it is possible to "explode" the information and retrieve all single articles with related information.

meantime knowledge and evidence are gathered with this kind of studies. Evidence coming from them will build knowledge useful to design RCTs.

Although the value of the CRRF toward aim 1 has already been demonstrated through its use by the REH-COVER Action, in publishing the CRRF to a wider audience the authors intend to enable it to also achieve aims 2 and 3. The first step to shaping rehabilitation research activity (aim 2) is making researchers aware of the CRRF through this article, and a dissemination effort by Cochrane Rehabilitation and the WHO Rehabilitation Programme through various media will extend its reach to the widest possible audience. The CRRF will continue to be used by the 2 bodies in the context of their work, promoting the framework among global scientific and professional societies within and beyond the rehabilitation community. For example, the continuing process of

evidence mapping through the REH-COVER Action living rapid systematic reviews[6,7] and their dissemination will further increase awareness of the CRRF among researchers and draw attention to areas requiring greater attention. This in turn plays an important role in driving planning and directing funding related to COVID-19 and rehabilitation research.

The CRRF has important implications for research and contributes to improved clinical practice. Mapping research to the CRRF, as conducted by Cochrane Rehabilitation, makes apparent what research topics are well addressed and which are neglected. This helps to drive researcher efforts[21,22] and guides editors' decisions.

According to the current status of rehabilitation research (see table 3), greater research is needed cross all areas of enquiry. Epidemiology is become better understood, but greater efforts should be directed toward individual (micro) level studies to provide

Table 4 Summary of the distribution of current COVID-19 evidence[6,7,30-35] across the framework area of enquiry and associated questions and levels of evidence quality following the oxford centre for evidence-based medicine levels of evidence,[37] where level 1 is the strongest and level 4 is the lowest. microlevel: individuals; meso-level: health services; macro-level: health systems.

Question by Framework Area of Enquiry*	No. of Publications Per Evidence Quality Level				
	1	2	3	4	Total, n (%)
Epidemiology					
1.1 Clinical presentation	0	0	3	50	53(31)
1.2 Prevalence	0	0	13	6	19(11)
1.3 Natural history1.4 determining and modifying factors	0	0	15	58	73(43)
Micro-level					
2.2 Interventions (efficacy)2.3 interventions (harms)	0	1	4	4	9(5)
Meso-level	0	0	5	10	15(9)
Macro-level	0	0	0	0	0
Total, n (%)	0	1(1)	40(24)	128(76)	169(100)

* Because of the paucity of articles on many questions, the authors resumed the questions according to the reported categories. There are currently no publications addressing the questions not included.

more reliable knowledge to clinicians and practitioners. Service and health systems research is the least developed area of research but is likely to expand at a later stage when comparisons between comparing different providers and countries becomes possible. In some respects, the pandemic is also offering an exciting perspective for this latter field of research.

Study limitations

Some limitations should be considered. At this stage, the International Multiprofessional Steering Committee was only professional and did not include patient, family members, and representatives from consumer organizations. Although the Advisory Board of Cochrane Rehabilitation includes these groups, they did not exist yet when we developed the International Multiprofessional Steering Committee in May 2020; for this reason, at the time when the study was conducted, they have not been yet included. Consensus from a larger and more diverse group could strengthen the credibility of the CRRF. However, with this publication the authors call for suggestions and feedback to improve the framework. Feedback can be provided through letters to the journal or writing directly to Cochrane Rehabilitation and/or the corresponding author.

Conclusions

The CRRF offers a comprehensive view of the research areas relevant to rehabilitation in the context of COVID-19 that is necessary to inform best practice and ensure rehabilitation services and health systems can best serve the population with COVID-19. It is particularly relevant because it is inclusive of health systems, services, and clinical evidence, which was facilitated by the collaboration between Cochrane Rehabilitation and the WHO Rehabilitation Programme. The CRRF is a reference framework for researchers when planning and reporting studies on rehabilitation in the context of COVID-19. Moreover, future meta-studies can be based on the CRRF to classify and properly summarize primary research articles.

Supplier

a. SurveyMonkey; SVMK Inc.

Keywords

COVID-19; International Classification of Functioning, Disability and Health; Rehabilitation

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