

## Rehabilitation Response in Pandemics

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**Abstract:** The World Health Organization declared a pandemic due to the serious health risk posed by coronavirus disease (COVID-19). The number of infected cases is on the rise globally with escalating human, economic, and societal costs. Survivors of COVID-19 may experience a range of clinical, functional, and psychological impairments, resulting in disabilities. Many are amenable to rehabilitation intervention. The current focus of COVID-19 management is on public health measures and acute management. As patients transfer to subacute care or discharged to the community, rehabilitation services need to have a number of organizational and operational models in place to provide safe and effective care for patients and health professionals.

There is need for global action by professional organizations in developing a structured rehabilitation approach for international response to disasters, including pandemics. This report proposes development of a “Rehabilitation Response Plan” to enable the International Society of Physical and Rehabilitation Medicine, to provide crucial leadership and governance role in liaison and coordination with the World Health Organization (and other stakeholders), to provide rehabilitation input during current and future pandemics. The key considerations include following categories: governance, coordination, communication, evaluation, and care continuum. These will strengthen rehabilitation, assist in the effective delivery of services, and provide advocacy and an international coordinated perspective.

**Key Words:** Rehabilitation, Pandemic, Corona Virus Disease, Response Plan

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The novel coronavirus disease (COVID-19), a pandemic declared by the World Health Organization on March 12, 2020, presents a global challenge.<sup>1</sup> First reported in December 2019 in Wuhan, Hubei province, China, to date (as of May 6, 2020), it has spread to 212 countries and territories, with over 3.7 million confirmed cases and 258,000 deaths and still escalating.<sup>2–4</sup> The reported estimated mortality ranges between 3% to 5%, with death toll exceeding over 70,000 in the United States over 25,000 in Italy, Spain, France, and United Kingdom.<sup>2,4</sup> Economic losses are expected to reduce the global economy to under 2.5%, with predicted cost exceeding US\$1 trillion.<sup>5</sup> The disease spectrum of COVID-19 is wide: most (80%) have asymptomatic infection and mild upper respiratory tract illness (sore throat, cough, or shortness of breath), 13.8% of cases have severe disease (dyspnea, respiratory frequency  $\geq 30/\text{min}$ , and/or lung infiltrates within

24–48 hrs), and 6.1% are critical (respiratory failure, septic shock, and/or multiple organ dysfunction/failure).<sup>6–8</sup> Those requiring hospitalization present with fever, cough, dyspnea, sputum, myalgia or fatigue; approximately 42% develop serious respiratory insufficiency (oxygen therapy) and 5% require admission to the intensive care unit.<sup>6,9</sup> Most (approximately 67%) of intensive care unit–admitted patients have multiorgan failure and approximately a third have acute kidney or liver dysfunction and/or cardiac problems.<sup>10</sup>

The COVID-19 virus is highly contagious (spread via droplet transmission), and the situation is still evolving. The exact incubation period is unknown; however, based on the previous coronavirus infections, it is estimated at 4–10 days (possibly extend to 14 days).<sup>11,12</sup> Patients with COVID-19 are considered infectious while they have symptoms, with initial data from Wuhan, China, suggesting median duration of viral shedding of 20 days (interquartile range, 17.0–24.0), with longest observed duration of 37 days.<sup>13,14</sup> Period of development of immunity and reinfection is poorly understood.<sup>15</sup>

Effective vaccine or specific antiviral drugs and/or other medications are being investigated. As recommended by the WHO,<sup>2,16</sup> many governments worldwide have implemented measures to reduce the spread of disease and implemented immediate case detection, surveillance, rapid diagnosis, immediate case isolation, rigorous tracking and quarantine of close contacts, and public health prevention measures (mainly *social distancing*, personal hygiene, “self-isolation,” lockdowns, border controls, etc). These measures are proven to be effective with promising results in countries like China, South Korea, Singapore, Australia, and others.<sup>8,17,18</sup>

### PANDEMICS AND REHABILITATION NEEDS

Currently, the focus of COVID-19 management is on acute management, stopping virus transmission, and reducing morbidity and mortality. The global data reports from most affected countries (like the United States, China, Spain, and Italy) suggest that despite many deaths from COVID-19 (total global death over 126,000), a significant number of people (as of May 6, 2020, over 1.2 million people) have recovered.<sup>3,4</sup> However, limited data are available to suggest what proportion of COVID-19 patients required or will require postacute care. One recent report from the National Health Services, United Kingdom, provide anecdotal data suggesting that only 4% of COVID-19 patients will require inpatient rehabilitation and 40% will require support from health and social care.<sup>19,20</sup>

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The postacute management and rehabilitation of the current COVID-19 survivors will be the focus in the coming months, given the range of functional, psychological, and clinical impairments reported in many patients.<sup>21,22</sup> The common manifestation of COVID-19 is characterized by mild respiratory diseases or moderate to severe pneumonia, causing acute respiratory distress syndrome and multiorgan failure.<sup>23</sup> However, emerging reports from most affected countries suggest other clinical presentation/complications, including neurologic symptoms (such as headache, dizziness, hypogeusia, and neuralgia), and complications (encephalopathy, acute cerebrovascular diseases, ataxia, epileptic manifestations, impaired consciousness, critical illness myopathy/neuropathy, skeletal muscular injury, and cognitive and psychological problems).<sup>6,24–27</sup> Previous studies in post-intensive care unit survivors report cognitive impairments (30%–80%), new physical impairments (25%–80%), and posttraumatic stress disorder in 8%–57% of patients.<sup>28</sup> Further, patients with acute respiratory distress syndrome and extended hospital stay report sleep deprivation, delirium, pain, muscle wasting, neuropathy, loss of mobility and function, and fatigue.<sup>20,28,29</sup> These issues require comprehensive longer-term interdisciplinary management, including rehabilitation.

There is evidence demonstrating beneficial effect of rehabilitation programs during disasters for reduction in disability, improve clinical outcomes and participation among survivors.<sup>30</sup> Although evidence for the effect of rehabilitation in COVID-19 population group is limited, the recent WHO guidelines for COVID-19 patients recommend active mobilization of critically ill patients when safe to do so.<sup>31</sup> Early rehabilitation intervention in the critical care environments (after comprehensive assessment by an interdisciplinary team) is safe.<sup>32</sup> A previous report of survivors of acute respiratory distress syndrome after severe influenza (H1N1) showed that exercise capacity and quality of life improved significantly after an 8-wk pulmonary rehabilitation program.<sup>22,33</sup> A similar beneficial effect of interdisciplinary approach (including physiotherapy) was reported in Ebola patients for improved physical and mental function, reduction in hospital stay, and successful community reintegration.<sup>34–36</sup>

New scientific information in COVID-19 cohort is emerging and clinical care is driven by rapidly accumulating knowledge.<sup>16,21</sup> Currently, there are limited rehabilitation-specific guidelines published for COVID-19 patients.<sup>7,37,38</sup> Various innovative approaches for rehabilitation within the context of pandemic are recommended and evaluated (such as virtual rehabilitation, telerehabilitation, smartphone apps)<sup>22,39</sup> The summary of key recommendations from these guidelines are listed in Table 1.

## A COORDINATED REHABILITATION APPROACH IN PANDEMICS

The predicted surge in discharge/transfer of the COVID-19 patients to subacute services and/or community signifies the upcoming challenges for rehabilitation facilities both in the short- and longer-term. Undoubtedly, rehabilitation professionals will play a crucial role, which will be more complex, like in any disaster situation.<sup>40</sup> There is additional burden for maintaining strict safety of staff and patients, as well as specific rehabilitation management required in the current context.

Additional staff training and education, personal protective equipment, strict hygiene and infection control, space allocation, and others, need to be addressed.<sup>41</sup> Further, provision of care and advocacy for persons with preexisting disabilities and special medical needs is essential.<sup>42</sup> Other *organizational* and *operational* challenges in rehabilitation settings have been reported in detail in previous reports.<sup>21,37</sup>

The WHO recognizes the importance of rehabilitation-inclusive disaster management plans for continued sustainable and comprehensive care in both acute stage and longer-term.<sup>43</sup> There is a consensus among healthcare authorities for global action by professional organizations to work toward developing a structured rehabilitation approach for a coordinated international response to disasters, including pandemics.<sup>40,42,44,45</sup> In the current pandemic, as the epidemiologic peak shifts toward the low- and middle-income countries, the risks posed by this virus are higher for millions of people living in poverty in crowded environments, refugee camps, and others.<sup>46</sup> The challenges associated with virus containment are more significant, as measures such as social distancing are difficult to implement, with increased risk of community transmission.<sup>46</sup> Many developing countries do not have well-developed rehabilitation services or rehabilitation-inclusive disaster-response management systems.<sup>30</sup> The current travel restrictions, border control, and lockdowns in place can limit humanitarian assistance and delivery of essential medical supplies to vulnerable populations (personal communication National Societies of India, Pakistan, Nepal, etc). Initiatives by the WHO and United Nations (UN) in publishing guidelines/strategies are useful in setting standards for healthcare authorities to respond to the current pandemic.<sup>16,17,47</sup>

The WHO provides a focal point for the coordination of pandemic management, ensuring synergies in coordinated care among member states and systems and deployment of Emergency Medical Teams (EMTs) if required. It recommends implementation of the “six building blocks” to develop and strengthen a systematic, sustainable healthcare system, namely, service delivery; health workforce; information; medical products, vaccines, and technologies; financing; and leadership and governance (stewardship).<sup>48</sup> It recognizes rehabilitation as part of universal health system and coverage for incorporation into the national healthcare systems.<sup>43,48</sup> In line with the WHO’s “Rehabilitation 2030: A Call for Action” and the UN agenda of Sustainable Development Goals, the International Society of Physical and Rehabilitation Medicine (ISPRM) recognizes that building and strengthening rehabilitation capacity requires a skilled rehabilitation workforce, for improved service provision and governance.<sup>49</sup> The ISPRM provides a leadership (and governance) role within the field of rehabilitation medicine as an independent nongovernmental organization. Specifically, the ISPRM Disaster Rehabilitation Committee (DRC) and ISPRM-WHO Liaison Committees have an important role in education, organization, and coordination of rehabilitation needs and response by its member National Societies (NSs) within the ISPRM.

Presently, the ISPRM (and DRC) is in a unique position to lead and facilitate liaison/coordination of its 77 NSs (with >35,000 members) for delivery of evidence-based rehabilitation input in the midst of COVID-19 pandemic. The key objectives are to strengthen and deliver rehabilitation services from an international coordinated perspective, which may include (but not limited to) the following<sup>8,16,47</sup>:

**TABLE 1.** Rehabilitation pathways for COVID-19 patients<sup>7,37,38</sup>

Rehabilitation Pathways	Recommendations
Recovery	<ul style="list-style-type: none"> <li>• Rehabilitation personnel should be part of the acute COVID-19 response team</li> <li>• Rehabilitation programs to be delivered by a coordinated interdisciplinary team of rehabilitation professionals (led by a rehabilitation medicine physician)</li> <li>• Rehabilitation should start as early as possible with input from other medical specialties</li> <li>• A rapid access acute rehabilitation program to provide early intervention with an opportunity for further triage into postacute pathways in the health network</li> <li>• Recovered patients should have access to community rehabilitation services in a timely manner</li> <li>• Patients with complex needs (or slower trajectory toward recovery) should receive specialist rehabilitation, for longer periods</li> </ul>
Infection control	<ul style="list-style-type: none"> <li>• Provision of separate rehabilitation services for both COVID-19 patients (positive and negative) be made available</li> <li>• Staff involved in face-to-face care have access to PPE</li> <li>• Stringent safety and cleaning procedures as recommended</li> <li>• Public health safety measures on the service (social distancing, hygiene, restriction in visitors, etc)</li> </ul>
Assessment and prescription	<ul style="list-style-type: none"> <li>• Individual rehabilitation needs and goals of care be recorded, clinical assessment and recommendations noted before transfer to other facilities or discharge into community</li> <li>• Rehabilitation medicine physicians to assist in diagnosis, management, and prognostication of patients with complex needs and direction for appropriate clinical pathways</li> <li>• Rehabilitation programs to include exercise, activities of daily living practice, emotional/mental support, education, information, and equipment/assistive devices</li> <li>• Careful consideration made before rehabilitation program prescription (stable clinical presentation with stable respiratory and hemodynamic function, and those with preexisting disabilities, etc)</li> <li>• Best decision-making opportunities provided to all patients for appropriate neuropsychological and end-of-life care</li> <li>• Provide adequate education/information and training for patients (carers/family)</li> </ul>
CBR and community reintegration	<ul style="list-style-type: none"> <li>• Patients should have access to supported discharge and community reintegration programs</li> <li>• Ongoing specialist rehabilitation or generalist ambulatory rehabilitation services in the community for those in need</li> <li>• Integrated care planning for those with longer-term care needs</li> <li>• Supportive care from community-based organizations for patients with long-term disability requiring on-going support as appropriate</li> <li>• Care continuum and surveillance from specialist rehabilitation teams for patients with life-long complex disability</li> </ul>

CBR, community-based rehabilitation; COVID-19, coronavirus disease 2019; PPE, personal protective equipment.

- Encourage member societies to implement and support measures to minimize transmission to contain infection
- Upskill/educate rehabilitation staff, prepare rehabilitation services for COVID-19 related care as per recommendations
- Provide updates on best evidence care to minimize mortality and morbidity for COVID-19-related care
- Provide alternative sustainable methods of service delivery for consideration (such as Telemed, social media platforms, etc) and longer-term care processes for community integration
- Engage, empower workforce and public—including safety during and post COVID-19
- Encourage rehabilitation staff mental-health support networks, as they care for COVID-19 patients
- Advocacy and inclusion of persons with disabilities for empowerment and participation during the pandemic
- Information, translation platforms and knowledge dissemination for members

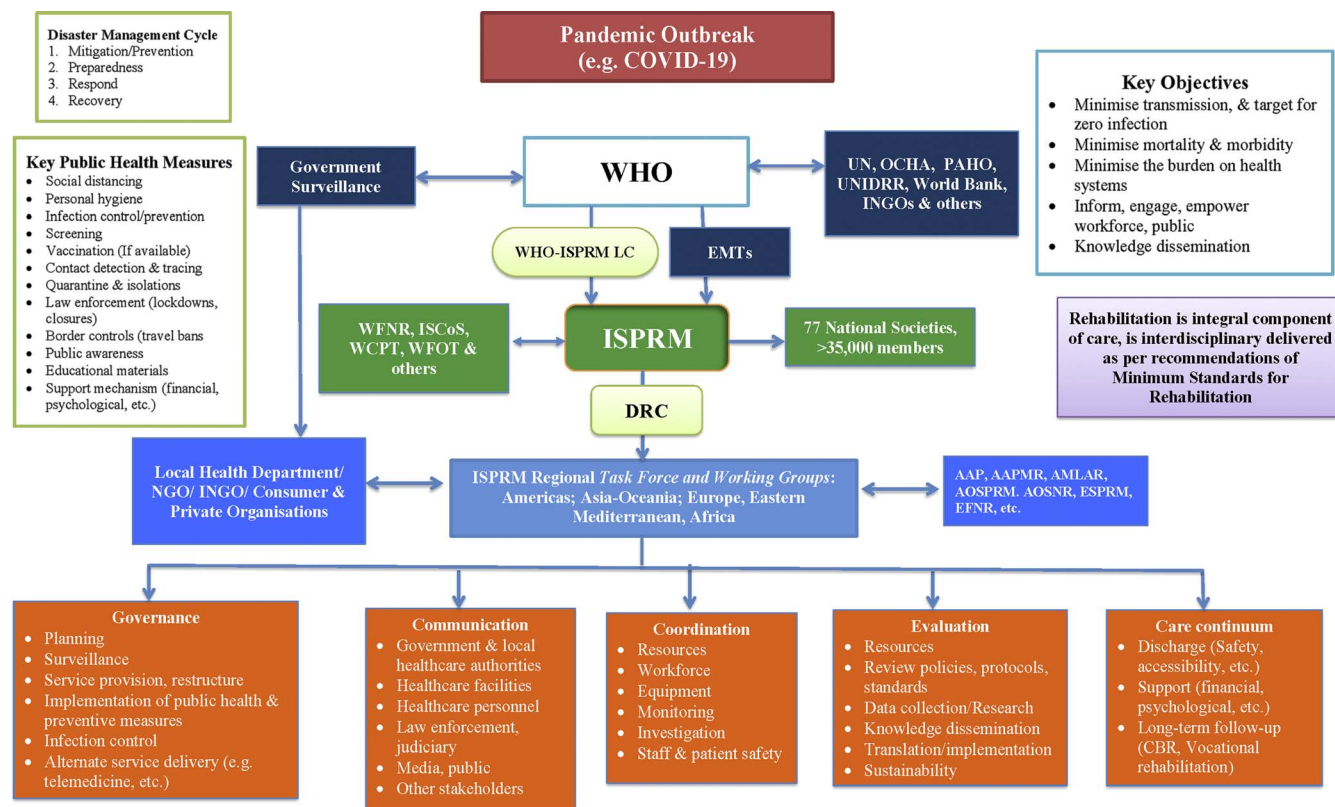
Ideally, the ISPRM (Central) and DRC should establish the “Regional Task Force” and/or “Working Groups” in the ISPRM regions (namely, Americas, Asia-Oceania and Europe, Eastern Mediterranean, Africa). Although ISPRM cannot implement the suggested measures or rehabilitation care models locally, it can provide virtual guidance and share up-to-date information to guide the rehabilitation professionals through the Regional Task Force, who can direct the NSs in their region. The ISPRM has already established dedicated COVID-19 resource

center and a Special Interest Group where members can join and share their experiences (<https://www.isprm.org/>). Furthermore, the DRC is actively circulating up-to-date information to all members via e-mails and social media portals. The Regional Task Force should collaborate with the individual NSs in the region to ascertain rehabilitation needs for COVID-19 and provide evidence-based resources and assist as able.

This report proposes a rehabilitation response plan to enable ISPRM working through its NSs and regional task force, to provide the crucial leadership and governance role in liaison/coordination with the WHO and other relevant stakeholders, during the current and future pandemics. This plan extends the ISPRM Disaster Rehabilitation Response Plan<sup>45</sup> and recommends a rehabilitation-inclusive pandemic management approach. The potential roles for key considerations for ISPRM in pandemics can be broadly explained in five different categories (listed below). A detailed systemic pathway of coordination of the ISPRM and the DRC is provided in Figure 1. This approach considers ongoing overarching principles and health/humanitarian response plans put forward by the WHO, UN, and other agencies. It also takes into account the current operational constraints due to movement restrictions and supply chain disruption worldwide.

## Governance

The ISPRM supports the WHO (and other organizations) in the global initiative in pandemic management, using a



**FIGURE 1.** Systemic collaboration and coordination pathway of the ISPRM and DRC to facilitate rehabilitation relief response in pandemics. AAP, Association of Academic Physiatrists; AAPMR, American Academy of Physical Medicine and Rehabilitation; AMLAR, Latin American Society of Physical and Rehabilitation Medicine; AOSPRM, Asia Oceania Society of Physical and Rehabilitation Medicine; AOFNR, Asia Oceania Federation of NeuroRehabilitation; CBR, community-based rehabilitation; COVID-19, coronavirus disease 2019; DRC, Disaster Rehabilitation Committee; EFNR, European Federation of NeuroRehabilitation Societies; EMT, emergency medical team; ESPMR, European Society of Physical and Rehabilitation Medicine; INGO, international nongovernmental organization; ISCoS, International Spinal Cord Society; ISPRM, International Society of Physical and Rehabilitation Medicine; NGO, nongovernmental organization; PAHO, Pan American Health Organization; WCPT, World Confederation of Physical Therapy; WFOT, World Federation of Occupational Therapists; WFNR, World Federation of NeuroRehabilitation; UN, United Nations; UNDRR, United Nations Office for Disaster Risk Reduction; WHO, World Health Organization; WHO-ISPRM LC, WHO ISPRM Liaison Committee.

pragmatic approach so all parties share responsibility and participate. Many developing countries with limited rehabilitation capacity and basic service delivery will face challenge to prevent spread of disease and postacute care and also provide health services to the general population. The ISPRM and NS can develop rehabilitation-inclusive action plan and best-practices approach for prevention/mitigation, preparedness, response, recovery, and longer-term care. The ISPRM Regional Task Force should provide advice and information on action, training activities, assessment, and planning for longer-term outcomes after severe COVID-19 infection. Particular attention should be given to published policies and practices (from WHO and key organizations),<sup>47</sup> so services can allocate equitable and transparent allocation of scarce medical resources for best possible evidence-based patient care. Special consideration should be given to the safety and well-being of frontline health workers and staff, as they carry the greatest risk of exposure.<sup>11</sup>

**Coordination**

Strong leadership and collaboration/coordination should include all NS and regional physical and rehabilitation medicine societies, international nongovernmental organizations/nongovernmental organizations, disability advocacy and

consumer organizations, media, and others. The ISPRM, with global-level organizations (WHO, UN etc), should support NS coordinating structures and incorporate rehabilitation-inclusive pandemic plan into emergency management plans for facilities in affected regions. The development of a central coordinating mechanism standard may not be possible given the heterogeneous healthcare systems and varying pandemic severity around the world; however, a platform could allow sharing of different approaches from various organizations, for appropriate approaches. The ISPRM Regional Task Force should liaise with local NSs at field level for support and information.

**Communication**

The ISPRM (and DRC) should communicate regularly to guide NS in managing rehabilitation resources and management structures at a higher level in pandemics. In collaboration with the government (and local healthcare authorities), it can raise awareness to reinforce public health measures (social distancing, hygiene measures, optimizing physical and nutritional health, etc).<sup>11,16,47</sup> It can provide guidance based on scientific principles for types of rehabilitation services needed and their organization. This also applies to relevant stakeholders, including law enforcement and judiciary, media, public and others.

The ISPRM (and DRC) should have effective communication platforms for consistent and timely messages to engage members and the community effectively. Development of online training modules (and e-platform) will be a step in the right direction (eg, on personal protective equipment, infection control, social distancing and space allocation, telerehabilitation, etc). New technology platforms (eg, Internet, smartphones, podcasts) are efficient in mass communication in emergencies.

## Evaluation

Because of the complexity of the COVID-19 pandemic, speed of transmission, and difficulty in projecting health models at country level, rehabilitation facilities should have a plan in place for surveillance and evaluation system, so services can adopt and adjust as required.<sup>11</sup> The provision of education and training programs for safety of rehabilitation personnel, patients (and families) and basic prevention control measures are a priority in current pandemic. A contingency plan is needed that identifies the safety of patients and staff, staffing prioritized based on critical needs and health status, functional limitations, and essential facility operations.<sup>16</sup> These plans should be transparent and effectively communicated to all staff and evaluated regularly for long-term sustainability.<sup>2</sup> All facilities should be encouraged to collect data and disseminate their experience and findings/knowledge regarding the impact, course, and outcomes of COVID-19 and rehabilitation approach.<sup>47</sup> Such scientific evidence will facilitate better understanding of disease and inform future decision making regarding rehabilitation for survivors.

## Care Continuum

The provision for improved access to information and essential health services for patients discharged to the community is essential and those most vulnerable referred for ongoing health care, follow-up, and social services.<sup>2,11</sup> Those medically ready and safe to return to community should be discharged earliest possible.<sup>11</sup> At discharge, an individual assessment of rehabilitation should be documented, for immediate needs (eg, safe mobility, symptom control (dyspnea, fatigue, pain), need for supplemental oxygen, adequate nutrition, psychological/social supports, and occupational needs (assistive devices, return to work)).<sup>50</sup> The treatment of the emotional and psychological impact of COVID-19 should be addressed.<sup>11,47</sup> Community-based rehabilitation and longer-term support (vocational/avocational, caregiver support, disability management) should be provided as required. Regular follow-up and evaluation should be initiated consistently with local practice, within local cultural boundaries. Pandemic planning should also address psychosocial support needs (specifically stress and posttraumatic stress disorder) for the healthcare staff.<sup>11</sup>

The COVID-19 pandemic is an unprecedented public health emergency affecting all countries, with major implications for achievement of the UN 2030 Agenda (and Sustainable Development Goals). It has overwhelmed the medical capacity of many developed western countries with advanced medical infrastructure (Asia, Europe, and America). Consequences will be dire, as it spreads to underresourced developing countries (and populations) with fragile healthcare systems and limited medical capacity (including rehabilitation services).

The role of ISPRM in pandemics is key to facilitate a collaborative rehabilitation-inclusive management approach of the COVID-19 patients working through its NSs, and with the WHO and UN. Early rehabilitation can enhance functional and cognitive capacity and improve overall quality of life. There is a clear mandate for all actors (and stakeholders) in pandemic management for a “shared” responsibility to act quickly, efficiently, and effectively. The proposed rehabilitation response plan for the ISPRM suggests a comprehensive model for coordination with relevant stakeholders to provide evidence-based rehabilitation services in current and future pandemics.

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