

COVID-19 in Developing Countries: A Rehabilitation Perspective

The last two decades have had an increase in infectious diseases and pandemics.^[1] Most recently, Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2), now known as coronavirus disease 2019 (COVID-19), was declared a pandemic by the World Health Organisation (WHO) on March 11, 2020.^[2] To date (as of April 21, 2020) there are over 2.4 million confirmed cases, more than 170,000 fatalities and over 620,000 people “recovered” from this disease.^[3,4] Economic losses expect to reduce the global economy to under 2.5%, with predicted cost exceeding US\$1 trillion.^[5] The COVID-19 disease pattern and the situation are still evolving, majority (80%) have asymptomatic infection, 13.8% have severe disease and rest are critical.^[6-8] COVID-19 is a highly contagious multi-system disease, which presents with a range of functional, psychological and clinical impairments (respiratory, neurological, cardiovascular, etc.).^[9-11] The estimated incubation period is reported to be between 4–10 days (possibly extend to 14 days).^[12,13] Many patients may be asymptomatic and may still have the virus, and are considered infectious with median duration of viral shedding of 20 days (Interquartile range: 17–24 days), with longest reported observed duration of 37 days.^[14-16] Further, emerging reports indicate that some COVID-19 patients may test positive again after initial negative test.^[17]

After the first detection of COVID-19 in Wuhan, China (December 2019), the pandemic rapidly spread to other parts of the world. The WHO reports over 205 countries or territories currently have confirmed cases.^[3,4] Current demographic and epidemiological trend suggest COVID-19 is spreading extensively in the low-and middle-income countries (LMICs) around the world.^[18,19] Despite drastic preventive and public health measures taken by these countries, in many LMICs the spread has reached the 3rd stage of the transmission cycle (i.e. community transmission) and projected to escalate in the coming days and weeks [Table 1]. As of April 19, 2020, there are nearly 23,000 confirmed cases, with over 1200 deaths and 1225 new cases in Africa; over 38,000 confirmed cases, and over 12,000 reported new cases in Asia.^[4,8] The figures specifically from LMICs underestimate the true prevalence and incidence due to limitations of surveillance and/or testing facility and capacity.^[18]

The COVID-19 pandemic has tested the resilience of robust health systems of most developed countries, like US, France, Italy, Spain, United Kingdom (UK), etc. The challenges to contain and manage this pandemic will overwhelm the healthcare systems and economies of most developing countries, as many LMICs are currently struggling to cope with the 1st and 2nd pandemic transmission cycles and the higher transmission stages will be beyond their capacity [Table 1].

Many LMICs struggle economically and politically, despite their best efforts any preparedness for a disaster maybe inadequate.^[18,23] The COVID-19 pandemic poses a major threat to many LMICs healthcare models, which are fragile, often have limited resources and many depend on international aid to provide routine care.^[24] The International Monetary Fund (IMF) predicts a bleak growth forecast in response to COVID-19 for many countries (both developed and developing); which is creating havoc on global economy.^[25] For many LMICs, tourism, labour market and manufacturing are the key sources of revenue. These predominantly import-driven economies with huge trade deficits will face the most hardship.

There is currently no effective or specific medication regime or vaccine to treat COVID-19 and most treatments are symptomatic and supportive. Globally, including LMICs, public health measures to reduce the COVID-19 transmission have been implemented, these include: immediate case detection, surveillance, rapid diagnosis and immediate case isolation, rigorous tracking and quarantine of close contacts, and public health prevention measures (social distancing, personal hygiene, lock-downs, border controls, etc.).^[3,26] Although countries like China, Korea, Singapore, Australia, New Zealand etc., have reported effective flattening of the epidemic curve, implementation of such measures are challenging for most LMICs.^[8,27,28] The management of COVID-19-related impairments (respiratory dysfunction, functional/psychological, neurological and cerebrovascular manifestations and others), will be challenging for most LMICs healthcare systems.^[9,29-31] Further, post-intensive care unit outcomes of patients from previous reports suggest cognitive impairment occurs in 30%–80%, new physical impairments in 25%–80%, posttraumatic stress disorder (PTSD) in 8%–57% of patients.^[32] Those with Acute Respiratory Distress Syndrome (ARDS), (common in critical COVID-19), and prolonged hospital admission may develop sleep deprivation, delirium, pain, muscle wasting, neuropathies, loss of mobility, loss of function and weakness.^[32-34] Ability to provide treatment for these will be beyond capacity of many LMICs (personal communication: Pakistan, India, Mongolia, Indonesia, Nepal etc). Many patients will require rehabilitation and longer-term care (within hospital or in the community).^[9] One report from the National Health Services, UK (COVID-19 Hospital Discharge Service requirements March 19, 2020) suggests 40% of patients will require support from health and social care, and 4% inpatient rehabilitation.^[34,35] Rehabilitation is an expensive service, with emphasis on the longer-term care of patients throughout the care continuum, from acute settings to community. Despite limited data in COVID-19, the previous pandemics such as influenza (H1N1) and Ebola showed beneficial effect of interdisciplinary rehabilitation in improved

Table 1: COVID-19 transmission stages^[8,20-22]

Transmission stages	Description
Stage 1: First appearance of disease	Introduction of disease by people with a travel history to an infected area. Persons need containment and source tracing to limit disease spread. The number of infected persons is low
Stage 2: Local transmission	This develops from individuals with a travel history to an infected area, and/or direct contact with an infected person. The virus spreads from infected individuals onto immediate family, neighbourhood and people in close vicinity. Transmission is monitored by contact tracing, social isolation of persons with symptoms, strict screening measures and lockdown efforts
Stage 3: Community transmission	Occurs when tracing the source of infection is unclear and it spreads in the public, with random individuals developing the disease. Disease containment measures, contact tracing and isolation to stop transmission cycle becomes more challenging. Large-scale geographical lockdowns are implemented
Stage 4: Widespread outbreak (epidemic)	Widespread outbreak of disease in the region with rapid increase in case numbers and disease-related deaths

physical and mental function, reduction in hospital stay, and improved reintegration of patients into community.^[36-39]

Another crisis from this pandemic is likelihood of spreading into the crowded refugee camps, slums and war-affected areas, where many public health and preventive measures are difficult to implement.^[18,23] According to the United Nations High Commissioner for Refugees (UNHCR), there were more than 79.5 million forcibly displaced people worldwide, including 26 million refugees and 4.2 million asylum-seekers.^[40] Many are located in developing countries like Bangladesh, Pakistan, Sudan, Uganda and others.^[40] The refugees and displaced populations are already at risk of complex physical, mental and social problems, which contribute to poor health outcomes and impede successful social integration.^[41] Recent media reports (CNN, Al Jazeera April 2020) report concern of COVID-19 spread into refugee camps (in Syria, Bangladesh) and highlights the challenges regarding implementing public health measures, overcrowding conditions and lack of food and medical supplies etc. Further, the IMF and United Nations (UN) (April 20, 2020) declared major threat famine in North Africa affecting millions of people due to lack of food crops related to drought and war, and disrupted supply chains due to border closures because of COVID-19. Others, like South Africa are actively planning COVID-19 surveillance and community response from their past experience in handling HIV situations (CNN 29 April 2020). COVID-19 will further put to test the governing bodies due to existing poverty, fall in humanitarian assistance (due to lockdowns, border closures, etc.) and economic/financial hardship (e.g. unemployment). Various media (CNN, BBC and Al Jazeera, 28 and 29th April 2020) reported civil unrest and public demonstrations (e.g. in Lebanon, Libya and elsewhere), mass public protests about lack of food supplies and unemployment compounded by the COVID-19 situation.

In the last two decades, the developing world have witnessed many epidemics such as SARS, Middle Eastern Respiratory Syndrome, H1N1 influenza, Zika and Ebolavirus, etc., [List of global epidemics in last two decades and their impact are summarised in Table 2]. The strain on public healthcare systems from such epidemics have exposed the vulnerabilities and under-preparedness of many healthcare organisations around the world.^[1] Earlier in the 58th World Health Assembly (2005),

the WHO urged all member states to develop and implement national pandemic preparedness plans to mitigate the health impact, and social and economic effects of a pandemic.^[42] However, 15 years later, the level of preparedness varies amongst countries, with many LMICs lagging behind due to financial and technical resource constraints.^[43]

In the current COVID-19 pandemic, most attention is mainly on public health measures and acute hospital care. Many LMICs have not yet considered nor prepared for postacute care, including rehabilitation. As patients recover and are discharged to either home or transferred to postacute care services, the role of rehabilitation will be crucial. The WHO and global healthcare authorities recognize the importance of rehabilitation-inclusive disaster management plans for continuity of sustainable and comprehensive care in both acute stages and the long-term.^[44-46] Previous reports in disaster settings outline the lack of comprehensive rehabilitation-inclusive management plans and coordination amongst the responsible agencies and stakeholders, as key barriers for comprehensive care delivery.^[47,48] However, in many LMICs, rehabilitation is not yet viewed as a mainstream part of the healthcare system, and the health sector is focused mainly on acute care.^[49-51] With this new pandemic at the doorstep, the upcoming challenges and complexity for the healthcare sector at large are daunting.

The current COVID-19 related complexity and magnitude of problems confronting health systems, underline need for an urgent structured approach for a global coordinated and collaborative response.^[52,53] Therefore, COVID-19 initiatives by the WHO, UN and others, have set standards for healthcare authorities and local governing bodies for response to this pandemic.^[26,27] Published guidelines/protocols suggest appropriate and timely rehabilitative care of COVID-19 patients during their stay in hospital and after discharge.^[7,12,54] These Guidelines highlight on the need for a comprehensive short and long-term rehabilitative care of COVID-19 patients.^[54] However, the challenges for the rehabilitation community, specifically in LMICs are more complex, where rehabilitation services are either limited or still are in infancy stage.^[49-51] The health care system faces additional burden due to increased care demand from both new COVID-19 patients and existing patients. Many

Table 2: Major global epidemics in last two decades (2000-2020) and its impact

Emerging pathogen, year	Impact	WHO's response	Countries affected	Comments/implications
SARS (SARS-CoV) 2003	8422 cases, 916 deaths	Response coordination and GOARN comprising 115 national health services, academic institutions, technical institutions, and individuals	32 countries affected, mainly China, Hong Kong, Canada, Singapore, Taiwan and Vietnam	Respiratory droplets transmission WHO estimate case fatality Ratio: 0%-50% with an overall estimate of case fatality of 14%-15%
H1N1 influenza 2009	526,060 cases 6770 deaths	Declared PHEIC on April 25, 2009 Declared Global pandemic on July 1, 2009 and postpandemic on August 10, 2010	Reported in 206 countries, mainly in East Asia, South East Asia and 21 African countries	Global influenza strategy 2019-2030 launched on March 11, 2019
MERS-CoV 2012	2494 cases, 858 deaths	PHEIC not declared, the WHO Emergency Council heightened sense of concern September 3, 2015	Reported in 27 countries in Middle East, North Africa, Europe, USA and Asia mainly in Saudi Arabia, Oman, South Korea	Developed roadmap for specific diagnostics, therapeutics and vaccine in 2015
Ebola 2014	28,652 suspected cases, 15,261 laboratory confirmed cases, 11,325 deaths	Declared PHEIC on August 8, 2014	10 countries affected mainly Guinea, Sierra Leone, Liberia, Mali, Nigeria	Transmission through direct contact with blood, secretions, organs or other bodily fluids of infected person, with surfaces; case fatality rate 50%, varied 25%-90%
Zika 2015	Ongoing	Declared PHEIC on February 8, 2016	Reported in 86 countries mainly in Africa, the Americas, South-East Asia and Western Pacific	Autochthonous mosquito-borne transmission
Covid-19 (SARS-CoV-2) 2019	Over 2.4 million confirmed cases, 165,000 deaths (as of 21 April, 2020)	Declared PHEIC on January 30, 2020 and Global Pandemic on March 11, 2020	205 countries affected mainly in China, Italy, Spain, France, UK, USA. Infected cases increasing in many LMICs	Mainly droplets and transmission by contact with contaminated surfaces (fomites) No Vaccine, specific medications yet

Chattu and Yaya 2020,^[1] WHO Emergencies: Disease Outbreaks.^[56] LMICs: Low-and middle-income countries, MERS-CoV: Middle Eastern Respiratory Syndrome Coronavirus, PHEIC: Public Health Emergency of International Concern, SARS-CoV: Severe acute respiratory syndrome coronavirus, GOARN: Global Outbreak Alert and Response Network, WHO: World Health Organisation

developing countries report availability of limited COVID-19 testing kits/facilities, personal protective equipment (PPE) to protect the front-line workers. In the midst of this pandemic, many developing countries (such as Pakistan, India, Nepal) are taking initiatives and approaches for self-sufficiency, such as setting up factories to prepare PPE, repairing broken and disused ventilators (Pakistani engineers), recycling and sterilizing equipment as able. Common Rehabilitation-related organisational and operational issues are listed in recently published reports for patient management and remodelling the existing services.^[9,54]

The world governing bodies such as (WHO, UN, UNHCR, etc.) can have important input from the International Society of Physical and Rehabilitation Medicine (ISPRM) (and its subcommittees: Disaster Rehabilitation Committee (DRC), WHO-ISPRM Liaison Committee) for rehabilitation-related, effective and coordinated medical guidance in this pandemic. The ISPRM can organise and coordinate rehabilitation efforts

through its 77 national societies (NS) (>35,000 members) in all WHO regions, (Americas Asia-Oceania, Europe and Eastern Mediterranean, Africa). In line with the WHO's "*Rehabilitation 2030: A call for action*," the ISPRM and the WHO have a common objective in building and strengthening rehabilitation capacity for improved service provision and governance.^[55] Innovative successful and effective rehabilitation-inclusive management will depend on the strong governance form the global healthcare authorities, and the capacity and willingness of countries to build systematic preparedness systems for effective services for this population.

At this time of global emergency, specifically in LMICs, some rehabilitation perspectives need to be considered, including (but not limited to):

- In liaison with the WHO, other key governmental and nongovernmental organisations (NGOs), active engagement of ISPRM (and subcommittees) is needed for the global initiative in pandemic management

- The ISPRM (and DRC) need to establish strong governance and leadership role and work with its regional task force from the member NS and relevant stakeholders
- Effective action-oriented collaboration and coordination is required between ISPRM, all NS and regional PRM societies, and stakeholders (international NGOs, NGOs, other health professional societies, disability advocacy and consumer organizations, government ministries and institutions, political parties, organisations, mass media and community groups)
- Encourage the local NS to liaise with health authorities to evaluate existing national epidemic/pandemic (or disaster) response plan, map rehabilitation facilities and strengthen/expansion potential of these services to meet needs of patients
- Develop a clear communication strategy to provide up-to-date information to guide the rehabilitation and other healthcare professionals (ISPRM has already established dedicated COVID-19 resource centre and special interest group, and running educational webinars (<https://www.isprm.org/>) and the DRC is circulating information to all members)
- Develop rehabilitation-inclusive action plan and recommend a best practices approach (based on evidence to date) for prevention/mitigation, preparedness, response, recovery and long-term care for COVID-19 survivors
- Strengthening capacity of its workforce, train, educate and foster environment of empowerment of local service providers
- Collaborate with NS, Government and local healthcare authorities to raise awareness to reinforce public health measures-social distancing, self-isolation, hygiene measures, optimizing physical and nutritional health
- Engage, empower workforce, encourage public and private healthcare partnerships
- Invest in disaster planning and management including pandemics, using NS and provide access to rehabilitation and assistive technology, sustainable infrastructure, support services and education/research as able
- Consider impact of contagion and psychosocial vulnerability (stress, PTSD, etc.) in frontline health workers and staff, their safety and wellbeing
- Develop accessible e-learning education and training modules (e.g. on PPEs, infection control, social distancing and space allocation, rehabilitation methods, etc.)
- Establish online tele-rehabilitation platform clinics (via ZOOM, Skype, smartphone apps, etc.) with experts to provide expert advice/consultations to the rehabilitation professionals in LMICS as required
- Guide and contribute to the NS for development of standards regarding resources workforce, equipment, staff and patient safety in pandemics
- Specific targeted awareness and control programs in vulnerable population cohorts, such as refugee site, slums, conflict affected area, etc.
- Financial support and fund raising (if possible) to support rehabilitation efforts
- Foster research, access to data and translation for evidence-based practices
- Active participation and inclusion of patients and community advocacy groups for disability planning and public awareness
- Develop rehabilitation-related IT-support systems, community-based rehabilitation (and vocational programs) for survivors as able
- Recognize social and cultural barriers within different settings for effective pandemic management and planning

The COVID-19 pandemic is an unprecedented public health emergency stressing healthcare systems globally. Many LMICs struggle to provide routine medical care, as COVID-19 spreads, there is urgent need to adapt quickly to the influx of additional infected patients requiring complex care, which will likely overwhelm the health systems and capacity.^[18,23] Issues impacting LMICs include: geo-political and social challenges associated with strict border control, social distancing and hand hygiene measures; disruption in routine available medical care, and essential healthcare supplies. Routine health programs (e.g. immunisation and infectious disease control such as HIV, Ebola, Malaria etc.) may be disrupted. Access to the healthcare services, including rehabilitation services, alternative service delivery methods (such as home-based rehabilitation, telerehabilitation) may be limited by lack of equipment (PPEs, internet, computers etc.).

Medical rehabilitation is an integral component of any disaster management plan. The ISPRM (and DRC) can be the key players to assist WHO and facilitate coordination and collaboration with its NS for efforts towards delivery of evidence-based rehabilitation-inclusive management of COVID-19 patients. A proactive “shared” effort is required by global, regional and local rehabilitation authorities for effective response measures (strengthening preparedness and management), as the risks inherent from this pandemic in LMICs are more apparent than ever.

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