



Disability through COVID-19 pandemic: neurorehabilitation cannot wait

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COVID-19 pandemic is strongly impacting all domains of our healthcare systems, including neurorehabilitation. In Italy, the first European country to be affected, medical activities were postponed to allow shifting of staff and facilities to intensive care, with neurorehabilitation limited to time-dependent diseases [1], including COVID-19 complications [2,3]. Hospital access to people with chronic neurodegenerative conditions such as multiple sclerosis, movement disorders or dementia, more at risk of serious consequences from the infection [4], has been postponed. Patients also seek hospital care less, with over 50% reduced stroke admissions from

an Italian survey [5], possibly in fear of being infected or being denied seeing their families after being hospitalized. This situation can be bearable only for a short time, as any initial freezing reaction to a danger.

After about 2 months from the first European national lockdown, in Italy (March 10), it has become evident that COVID-19 will still be circulating for months, until the epidemic becomes self-limited or effective vaccines become available. Specific actions and adaptive strategies need to be taken to at least grant a restoration of the previous level of healthcare activities, safely. Neurorehabilitation for COVID-19 patients should also begin in the intensive care unit, fostering recovery and weaning and allowing their prognosis to be improved, admitting the right patient at the right moment in their recovery pathway. Neurorehabilitation cannot be further delayed even for people with disabilities from chronic progressive diseases, requiring constant monitoring and care.

With the reopening of productive activities, increased neurorehabilitation needs are being faced, not only as a consequence of prolonged immobilization and acute neurological complications from COVID-19, but also by mitigation healthcare and civil measures (e.g. the reduction of physical activity from government decrees, the postponement of already scheduled medical interventions, reduced management of medical conditions with expected increased incidence of complications, e.g. cardiovascular) [2–4].

Telerehabilitation platforms for physical, language and cognitive rehabilitation, exergaming, allowing remote supervision and collection of patient-reported outcomes [6] should be offered, including personnel training, also keeping in mind the drawbacks (Table 1). Some clinical events, disease progression or treatment side effects can go undetected. Severely disabling symptoms such as spasticity and imbalance cannot be fully taken care of remotely with audiovisual interactions (computers, iPads or virtual reality 3D visors), without any physical intervention. Robotic-based and exoskeleton interventions will need to be

implemented more efficiently [7], not only for rehabilitation centres to limit patient–physiotherapist interactions, but also for at-home use to limit risks from travelling and patient-to-patient proximity. Neurorehabilitation centres will need to consider SARS-CoV-2 screening, searching for fever or respiratory symptoms, and performing oro-pharyngeal swabs and/or serological tests to identify asymptomatic individuals according to local regulations [8].

Physical distancing, separate pathways for COVID-19 positive and negative patients, and adequate personal protection equipment (PPE) will continue.

Rehabilitation facilities will need to offer larger common spaces, or reduce patients' simultaneous occupancy with longer waiting lists and/or longer opening hours, also to allow sanitization of medical equipment and common areas multiple times per day.

Forbidding access to visitors or strongly limiting their access to hospitals not only has had a terrible psychological impact on severely ill patients [9] but is going to limit the occasions for fruitful interactions amongst patients, caregivers and operators in rehabilitation settings. PPE, such as surgical or FFP2/FFP3 masks, gloves, protective gowns, goggles and/or face shields, should be considered in the light of national/local recommendations. Wearing a mask may be cumbersome for disabled patients, particularly during effortful physical activities. Masks may also limit specific interventions, such as logopaedic exercises requiring imitation of the operator. Again, technology may help, but may not be enough. The COVID-19 pandemic is also stealing away our faces as a means of emotional communication and empathy, so relevant in the process of healing. Protections alternative to masks must be further explored, such as face shields or transparent panels proposed for intubation [10], but can make the difference also for softer activities such as neuropsychological testing, psychological support, or logopaedic and language training.

Finally, the closure of schools may deprive disabled children of dedicated personalized teaching activities in a social

Table 1 Neurorehabilitation in the COVID-19 world: current challenges and actions to minimize COVID-19 risks in different settings of neurorehabilitation, and possible drawbacks to be overcome before continuing on previous healthcare activities.

Challenge	Actions	Drawbacks
Reduce inpatient and outpatient visits	Telerehabilitation and teleconsultations	To be made widely available Not feasible for complex diseases or severe symptoms Periodic in-person assessments needed
Outpatient and day service	Screening for body temperature and active respiratory symptoms SARS-CoV-2 oro-pharyngeal swab and/or serological testing, according to local regulations Physical distancing	Asymptomatic patients are missed To be made widely available Reduced number of simultaneous treatments Longer opening hours Caregivers and visitors not allowed to access
Inpatient	Appropriate personal protective equipment for operators and patients Screening for body temperature and active respiratory symptoms SARS-CoV-2 oro-pharyngeal swab and/or serological testing on admission, according to local regulations Separate pathways	To be made available at population level Asymptomatic patients are missed To be made widely available To be considered within hospital reorganization plans
Staff and patients' protection	Personal protective equipment Robot-assisted neurorehabilitation Contact tracing apps	To be made widely available To be made widely available Depending on national regulations
Patients with active COVID-19 infection	NeuroCOVID-19 wards and/or COVID-19 hospitals	To be made widely available

and stimulating environment, and a higher price will be paid by all in the future. A massive investment is needed to develop dedicated facilities, human and technological resources to overcome and limit the risks that disabled children become neglected and isolated.

If proper action is taken now to grant equal opportunities to neurorehabilitation care, no matter what the event causing disability, this emergency will produce long-term healthcare positive effects able to prevent, or at least promptly counteract, future outbreaks or their consequences.

Disclosure of conflicts of interest

The authors declare no financial or other conflicts of interest.

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