



ASSESSMENT OF POTENTIAL COVID-19 DISEASE SEVERITY RISK BASED ON DISABILITY

A DOCUMENT BEST SUITED TO A CLINICAL/MEDICAL AUDIENCE.

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Introduction

The current document aims to explore the potential of certain disabilities to contribute towards an unfavourable Covid-19 disease evolution.¹ To this end, the following list of disability types is formed.

It is emphasized that this text is based on broad clinical expertise and not necessarily Covid-19 specific data as the latter is still scarce. The reader must also bear in mind that medical diagnosis and disability do not axiomatically coincide, hence this risk estimation is built solely upon disability archetypes and is inherently generic. Manifestly, if there is a chronic condition (accounted as a risk factor)² which is either caused by or exists in parallel with the disability, then overall risk should be regarded as a combination of all contributors. It must be stressed that the term “higher risk” is not invariable; in this regard some conditions are considered to increase risk moderately (e.g. diabetes), while others are associated with more pronounced risk elevations (e.g. immunosuppression).³

Spinal cord injury

The group of athletes who fall under this category of disability is wide and varied. Thus, the risk is not homogeneous across the group as it may correspond to a significant extent, to the level of the spinal cord lesion. It is generally accepted that those with higher lesions have a greater baseline risk of developing respiratory complications mainly because of the subsequent mobility restriction of the thoracic cage.⁴ Moreover, spinal cord injury is independently associated with comorbidities such as diabetes type II and cardiovascular disease.^{5,6} There is also autonomic disturbance and a suboptimal immune response in some individuals which is associated with higher spinal cord injuries,^{7,8} which might add to the overall risk.

Covid-19 specific information: So far, to our knowledge, there are limited published case reports of individuals with SCI (most frequently at the cervical level). In general, these individuals developed Covid-19 disease with favourable evolution. Fever was the most consistent initial symptom, followed by fatigue. Of note, dyspnea and cough were reported in less than half of the individuals. Finally, although severity of the disease was equal or greater compared to general population severity scores, none of the affected individuals with SCI required mechanical ventilation support at any point.^{9,10} Nevertheless, further data from a pool of US veterans show 2.4x higher case-fatality rate among those with SCI (19%) compared to the overall US veteran population enrolled (7.7%). The reader should bear in mind though that calculated Covid-19 case-fatality values at this point most probably overestimate the true fatality rate (in any population tested). Unaccounted asymptomatic cases and individuals with mild disease who happen not to get tested will inevitably result in biased samples and consequently dis-analogous rates.¹¹

There are to our knowledge, no studies that have evaluated potential droplet/airborne spread of virus with respect to athletes using racing chairs or hand-cycles in pack-like situations for example track or marathon endurance races. Thus, increased spread in these situations remains hypothetical in nature.

Neuromuscular disorders

This is a vast group of different conditions which includes neuronopathies, neuropathies, dysfunction of the neuromuscular junctions, or the skeletal muscles. The main factors that increase risk are potential involvement of the heart muscle, which is the case in numerous types of muscular dystrophy¹² and involvement of the inspiratory, expiratory and/or pharyngeal musculature.^{13,14} It is worth noting that baseline requirement of nocturnal ventilatory support is considered by itself a red flag that might justify a fair level of vigilance.¹⁴⁻¹⁶ Notwithstanding, the majority of the above high risk subpopulation is not expected to develop life-threatening complications in the context of Covid-19 infection.¹³

Covid-19 specific information: So far, to our knowledge, there are no published clinical data for this group of disabilities.

Skeletal dysplasia

This is another heterogeneous group, comprised of heritable conditions that could pose additional risk to some of the affected individuals. Main concerns being potential involvement of the heart in some conditions (e.g. osteogenesis imperfecta)^{17,18} and altered chest wall mechanics. The latter can be the result of impaired thoracic cage development, or/and significant kyphoscoliosis leading to restrictive lung disease.¹⁹ Again, impacted nocturnal ventilation could be the only sign of an otherwise unappreciated impairment of respiration.²⁰ In addition, prevalence of hypertension (an important comorbidity) might be higher in this subpopulation compared to age-adjusted non-disabled controls.²¹

Covid-19 specific information: So far, to our knowledge, there are no published clinical data for this group of disabilities.

Cerebral palsy

This is a group of non-progressive neurodevelopmental disorders which are expressed with significant variability. Valid concerns arise when oropharyngeal, respiratory and other trunk muscles are affected, resulting in weakness and/or incoordination of the respiratory and swallowing apparatuses.^{15,22} Moreover, in some severely affected individuals, hampered development of the thoracic cavity secondary to pronounced muscle tone asymmetries might lead to restrictive lung impairment.²² Frequent coexisting conditions that may further imperil respiration status or/and complicate Covid-19 illness are sleep apnea,²³ epilepsy, cognitive

impairment,²⁴ gastro-oesophageal reflux,²⁵ bronchopulmonary dysplasia (history of pre-term birth),²² circulatory diseases and malignancy.²⁶

Covid-19 specific information: There is data showcasing that in certain age groups (<74 years of age) Covid-19 case-fatality rate is higher for people with intellectual and developmental disability (cerebral palsy included) compared to those without. There are no significant differences from 75 years of age and older.²⁷

Traumatic Brain Injury

Because of the high-level complexity of the brain, head trauma with residual neurologic deficit is a profoundly diverse group. Rationale is the same in this subpopulation as well, with risk concerns being dominant in severely affected individuals whose respiratory and swallowing coordinating functions are impaired.¹⁵

Covid-19 specific information: So far, to our knowledge, there are no published clinical data for this group of disabilities.

Limb deficiency

The nature of these disabilities exerts no direct effect on vital organ function. Consider, though, that lower limb amputations might be associated with greater overall cardiovascular risk.^{28,29} Local and systemic hemodynamic changes,²⁹ increased sympathetic activity,³⁰ insulin resistance³¹ and increased coagulability²⁸ have all been implicated to some extent in the increased prevalence of cardiovascular disease often calculated in subpopulations of leg amputees.^{28,29} Accordingly, proximal and bilateral versus distal and unilateral amputations intensify the aforementioned mechanisms.²⁹ Even so, potential severe covid19-illness with respect to disability remains a far-off prospect.

Covid-19 specific information: So far, to our knowledge, there are no published clinical data for this group of disabilities.

Intellectual impairment

The great challenge in this heterogeneous group is probably proper implementation of prevention measures (distancing, cough etiquette, hand hygiene). Consider nonetheless that pneumonia³² and cardiovascular disease³³ mortality rates are most possibly higher in this group compared to general population. Data also describe the probably higher prevalence of asthma, gastro-oesophageal reflux and epilepsy in this group.^{34,35} Despite not posing direct threat, these factors should be taken into account in the context of an infectious respiratory disease. It must also be acknowledged that the likelihood of undetected underlying health conditions might be increased in this subpopulation.

Covid-19 specific information: See cerebral palsy section²⁷

Visual impairment

In this group the primary issue is also prevention measures and most notably physical distancing,³⁶ particularly in the subgroup of athletes making use of guides. When it comes to severity of Covid-19 illness no additional risk is expected to be associated with the disability itself.

Covid-19 specific information: So far, to our knowledge, there are no published clinical data for this group of disabilities.

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