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COVID-19 AND INTRINSIC CAPACITY

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Abstract: The SARS-CoV-2 infection is particularly associated with negative outcomes (i.e., serious disease, death) in frail older people, independently of where they live. Furthermore, the period of pandemic (with its lockdowns, social distancing, fragmentation of care…) has significantly changed the environment in which older people live. It is likely that, when the pandemic will be over, an acceleration of the aging process will be observed for many persons, independently of whether they have been infected or not by the SARS-CoV-2. The World report on ageing and health, published by the World Health Organization, proposes the concept of intrinsic capacity (i.e., the composite of all the physical and mental capacities of the individual) as central for healthy ageing. The routine assessment of biological age through constructs such as intrinsic capacity might have allowed a better understanding of the functional trajectories and vulnerabilities of the individual, even during a catastrophic event as the one we are currently living. In the present article, we describe how COVID-19 has affected the persons' intrinsic capacity, and how the wide adoption of the intrinsic capacity model may support the modernization of our systems and bring them closer to the individual.

Key words: Aging, public health, healthcare, geriatrics, frailty.

Data suggest so far that COVID-19 is associated with particularly unfavorable outcomes when infecting frail older people, independently from where they live (1). Unfortunately, the impact of the COVID-19 pandemic on older people may extend beyond directly related morbidity and deaths, to also include a negative influence on pre-existing clinical conditions and geriatric syndromes (2). The burden of the pandemic on older people is therefore likely underestimated by official statistics which almost exclusively focus on mortality and number of infected persons.

The World report on ageing and health, published by the World Health Organization (WHO), attempted to frame health in the second half of life from a functional, rather than a disease perspective. Central to this healthy ageing model is the concept of intrinsic capacity - all the individual level attributes that contribute to the functional ability that enables well-being in older age (3).

Further research has quantified the concept of capacity, demonstrated it to be a powerful predictor of subsequent care dependence and suggested a possible structure. This proposed structure included five sub-domains that provide a practical framework for its assessment and clinical implementation: cognitive, psychological, sensory, locomotor and "vitality" (4). Assessment of these overt and underlying capacities can guide preventive and therapeutic interventions that are 1) tailored to the person's needs, priorities, and values, and 2) able to overcome limiting paradigms (e.g., chronological age, diseases).

One application of the intrinsic capacity construct is for implementation in primary and community care, and WHO has released guidelines on the integrated care of older people that is based on this framework (5). Nevertheless, the healthy ageing model was also developed to facilitate the monitoring of health trajectories along the life course and across the multiple care settings as a multidimensional measurable marker of biological age.

Inevitably, the dramatic scenario of the COVID-19 pandemic has resulted in a shifting of health system priorities towards combatting the immediate threat from the virus, leaving at the margins the broader implications of strategies put in place to combat the spread of the virus (6). Moreover, responding quickly to the virus in the face of very limited data has necessarily relied on crude risk assessments to guide clinical care, and these assessments have driven many critical (and ethically fraught) choices (7). For example, several groups have been suggested to be at higher risk, including older people (defined by chronological age) and people with preexisting morbidities. Where an individual falls in relation to these categories has informed clinical responses, and sometimes the allocation of resources such as intensive care and ventilators.

Yet, this categorization probably does not capture the true underlying vulnerability of an individual and is somewhat duplicative. For example, chronological age is a poor approximation for biological age which more directly reflects the immune and other changes that make an individual more susceptible to a poor COVID-19 prognosis. Moreover, since multiple morbidity is directly related to both chronological and biological age, vulnerability scores that include both age and multiple morbidity are somewhat illogical.

If broad data had been available on biological age or intrinsic capacity it may have overcome these limitations by helping to better consider individual vulnerability per se, independently of his/her chronological age. Such a multidimensional evaluation of the aging person based on their level of functioning might have better supported clinicians in the allocation of the scarce resources.

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Beyond the clinical care of individuals contracting COVID-19, this period of crisis (with its lockdowns, social distancing, fragmentation of care…) has significantly changed the environment in which older people live, generally for the worse, even among those who have not been infected by the SARS-CoV-2. This in no way questions the importance or appropriateness of these responses, which have been crucial in flattening the epidemics evolution. However, it is important to acknowledge and measure the inadvertent consequences of this public health action. These environmental shifts have likely been particularly detrimental for the frailest individuals, those who already experience the vicious cycle of the disabling cascade.

To explore how these impacts might be considered, we briefly describe how COVID-19 has been posing a threat for older people (both infected and not by the SARS-CoV-2), organizing the discussion according to the five-domain structure of intrinsic capacity.

Locomotion

One major impact of the lockdowns is to substantially limit the possibility of movement. The situation for older persons who have not directly experienced the SARS-CoV-2 infection has not been easy. Being closed at home with very limited possibility of moving outside can accelerate age-related skeletal muscle decline (e.g., sarcopenia), exposing the individual to the risk of increasing disability and care dependence. For example, older people who were previously able to maintain a barely sufficient level of physical activity thanks to the support of an external caregiver are likely to have faced a vicious cycle of sedentariness negatively impacting on their locomotor capacity.

The maintenance of an adequate level of physical activity is crucial. For older people living at home, there is the possibility of participating in programs of adapted physical exercise aimed at preventing functional decline. An example can be found in the material produced by the Vivifrail project (8). The use of technologies might also help at limiting these negative spirals of inactivity, although it cannot be overlooked the difficulties that older people may have at having access and using them.

On the other hand, people with COVID-19, especially those who required hospitalization, may be forced to prolonged immobility. In this case, the skeletal muscle decline due to inactivity is further accentuated by the inflammatory cascade, triggering a highly catabolic condition responsible for a wasting syndrome. This scenario is not uncommon, given the current state of hospitals wards that are frequently understaffed and limited in their rehabilitation services. Moreover, the hospital reorganizations required everywhere for isolating cases and the need of adopting preventive measures against the high contagiousness of the SARS-CoV-2 have contributed at reducing the availability of physical activity during the hospital stay.

Cognition

The isolation of older people represents a major risk factor for cognitive decline mainly because of 1) lack of cognitive stimulation, and 2) onset of depressive symptoms. Memory clinics and networks dedicated to people with cognitive conditions have also been temporarily closed during this time of emergency. This has added a significant burden to people, especially to frail individuals and their families/caregivers (9). Again, technologies have come to help in many cases by creating channels of communication among the person, his/her relatives, and the healthcare professionals.

The newly developed COVID-19 hospital units are designed to isolate infected patients. Such isolation is particularly deleterious for older people, especially those presenting cognitive impairment. It is not surprising that the incidence of delirium in these units is reported as extremely high, even if often underdiagnosed (10). The incorrect management of delirium (potentially with the abuse of antipsychotic medications) may facilitate the individual's cognitive decline and negatively influence his/her health status.

Psychological

The COVID-19 pandemic has substantially modified our lives and daily routines. It has obviously impacted on people's mood, sometimes triggering subclinical psychological fragilities. It is not surprising the increased demand for mental health services to support people under psychological distress (11).

Many people have perceived the high vulnerability of our nature, a perception that has been enhanced by social isolation and loneliness. Depression and anxiety may directly affect COVID-19 patients, challenged in their lives by the disease. However, these conditions may also appear in their relatives and caregivers who may empathically participate to the suffering of their loved ones. The psychological issues are further accentuated by the unnatural separation of patients from their families because of the need of isolating infected persons. The difficulty visiting sick relatives at the hospital, the inability to farewell the deceased with a funeral, the continuous suspicion that the virus might be hidden behind a hug or a handshake, are but a few examples showing the enormity and absurdity of the current situation. Our way of living has been drastically altered by the coronavirus, and these changes are likely to dramatically influence our psychological profiles for a significant period. Also in this case, technologies might come to help (12). Our connected world may provide alternatives for facilitating the continuation of our social life.

Sensory

Sensory impairments are highly prevalent in older people and affect the individual's quality of life (4). As

above-mentioned, the new scenario caused by the COVID-19 pandemic has suspended outpatient activities, reducing the possibility of correcting sensory deficits as vision and/or hearing loss. This might have contributed at reducing functions in other domains of intrinsic capacity (e.g., reduced mobility because of fear of falling, depression due to worsened connection with the surrounding environment, cognitive decline for the accentuated isolation…).

Interestingly, the COVID-19 units are also clinical settings particularly challenging for older persons, especially for those with sensory deficits. The need of wearing masks, visors, and other personal protective equipment generates a barrier complicating the communication between the person and the healthcare professionals, transforming the setting of care into a sterile, unnatural world.

Vitality

Vitality has been proposed as the domain capturing the underlying physiologic changes that accompany biological ageing and that ultimately become expressed in the more overt capacities discussed previously (13). As outlined above, many of these, particularly immune and inflammatory changes, are likely to be the true drivers of individual vulnerability to COVID-19 (14, 15). These inflammatory and immunomodulatory mechanisms are frequently advocated as areas of special interest in the study of the coronavirus dynamics, often suggested as possible targets of intervention (16). It is also worth noting that one of the conditions shown to increase vulnerability to COVID-19 is cardiovascular disease (17), which often has an inflammatory basis.

However, COVID-19 infection, especially in its worst clinical manifestations, may threaten the capacity to maintain the optimal homeostatic equilibrium and itself directly impacts on these biological reserves. Malnutrition is a common and dangerous complication of COVID-19 infection in older patients (18) because 1) already frequently neglected and underestimated in normal times, and 2) nested in the vicious cycle of a disease characterized by an inflammatory cascade (19). One common consequence is deterioration into the onset of a wasting syndrome.

The aging individual isolated at home may also experience other losses in the vitality domain because the lockdowns may prevent him/her from regularly accessing nutritious food. Psychological disorders caused by the isolation may alter the sleep patterns and be responsible for fatigue and muscle exhaustion (20).

Conclusions

When the pandemic will be over, we will probably find out that the COVID-19 infection has had and will have a strong impact on the aging of our populations. Independently of whether the person has been infected or not by the SARS-CoV-2, we will likely observe that, for many people, this period saw an acceleration of our aging. This phenomenon is likely to be most obvious in older people (21).

In the future, routine assessment of biological age through constructs such as intrinsic capacity might allow a better understanding of the functional trajectories and vulnerabilities of the individual, even during catastrophic events as the one we are currently experiencing. A better understanding during the pandemic of an individual's intrinsic capacity trajectory may have guided clinical decision making and suggested targets for interventions.

The COVID-19 outbreak has caused a general disruption of our lives, but also of many care services. The negative consequence of the pandemic will come to be evident especially in those countries where health and social care services are weaker and not adequately integrated. In this context, it is encouraging to see how this crisis has allowed some countries to strengthen exchanges across geriatric services (22, 23) and promoted the adoption of novel technologies (24). In the post pandemic world, the wide adoption of the intrinsic capacity model may support the modernization of our systems and bring them closer to the individual (25, 26). It may also help prepare us for the next pandemic. Above all, it will be important that medicine and healthcare come back as soon as possible to orient around the individual status and vulnerabilities of each person.

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