

COVID-19 and its consequences on mental health (Review)

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Abstract. As one year is approaching since the beginning of the Coronavirus disease 2019 (COVID-19) pandemic, it is important to acknowledge the detrimental effect that it is having on mental health at the individual, societal and public health levels. The current review presents the direct and indirect psychological impact of COVID-19 on the general public, as well as on vulnerable groups, including the elderly, the young, healthcare professionals, people with pre-existing mental health issues, those infected by COVID-19, homeless people and refugees. Important findings are discussed in the present review, including the social stigma in older people associated with portraying COVID-19 as the disease of the elderly, and the limited psychological impact of COVID-19 in the severely mentally ill, alongside the response of the mental healthcare systems globally to this unparalleled public health crisis. The important lessons to be learnt so far can help formulate indi-

vidual mental health recommendations, as well as improved intervention and prevention public health strategies.

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1. Introduction

On March 11 2020, the World Health Organization (WHO) characterized the Coronavirus disease 2019 (COVID-19) caused by the novel severe acute respiratory syndrome

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Abbreviations: ACE2, angiotensin-converting-enzyme 2; COVID-19, coronavirus disease 2019; HCP, health care professional; ICU, intensive care unit; MNS services, mental, neurological and substance use services; PTSS, post-traumatic stress symptoms; SARS-CoV-1/2, severe acute respiratory syndrome coronavirus-1/2; WHO, World Health Organization

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coronavirus-2 (SARS-CoV-2) as a pandemic (1). SARS-CoV-2 constitutes a zoonotic virus that can be transmitted from animals, such as bats, to humans and, once adapted to do so, between humans via airborne droplets and aerosols. Due to the fact that SARS-CoV-2 spike protein exhibits high binding affinity for angiotensin-converting-enzyme 2 (ACE2) receptors that are highly expressed in the respiratory tract, particularly in epithelial lung cells, COVID-19 may lead to atypical pneumonia with rapid respiratory deterioration. ACE2 receptors can also be traced in mucosal intestinal cells, endothelial cells of veins and arteries including heart cells, epithelial renal and cerebral neuronal cells, thus explaining COVID-19 extra-pulmonary symptoms, such as diarrhea, nausea and vomiting, chest pain and heart failure, renal injury, headache and confusion. COVID-19 risk is higher among frail elderly subjects, especially males, with a previous history of diabetes and hypertension treated with ACE inhibitors and angiotensin II type-I receptor blockers, as these drugs increase ACE2 receptors' expression (2).

Although psychiatric and neuropsychiatric clinical manifestations of COVID-19 are well-established (3) and insight into potential infectious and post-infectious pathogenetic mechanisms linking SARS-CoV-2 to acute and long term neuropsychiatric complications is continuously updated (4), it is the direct and indirect psychological and social effects of the ongoing COVID-19 pandemic, comprising the most prolonged global crisis since World War II (5,6), together with the subsequent disruptions of mental, neurological and substance use (MNS) services (7) that mainly compromise public mental health. Very recent meta-analytic data exhibited that mental health problems are common in different populations with an overall pooled prevalence of depression, anxiety, distress, and insomnia 31.4, 31.9, 41.1 and 37.9%, respectively. In regards with population subgroups, patients with noninfectious chronic disease (such as cancer or diabetes) had the highest prevalence of depression of all groups, and high rates of anxiety and distress. In addition, people who were quarantined, patients suspected of COVID-19 infection, and physicians and nurses had high prevalence of depression, anxiety, distress and insomnia (8).

2. Impact of COVID-19 pandemic on mental health of the general population

Even though COVID-19 is the third major coronavirus outbreak over the past 20 years that has had substantial socio-economic impact, it is the first in the 21st century to affect countries across all continents except Antarctica (2). Distress, uncertainty and unpredictability due to lack of endpoint of the COVID-19 pandemic while treatment is still not in sight, have led to the emergence of mental health issues, such as panic, anxiety and depression (9) and in combination with treatment delays of serious chronic diseases have led to triggering of somatic symptoms and exacerbation of common pathologies (10-12). Moreover, repeated media images of severely ill people, dead bodies and coffins and knowledge that people may not be able to say goodbye to their dying loved ones have magnified social distress (13). Apart from that, the unfamiliarity with strict quarantine measures (14) that infringe on personal freedoms (15,16) combined with the widening

economic crisis and unemployment mainly affecting those with informal, daily wage jobs, which include a substantial proportion of the workforce in lower-income countries (17), have resulted in various deleterious ways of coping with daily stressors, such as alcohol, drug and tobacco abuse, potentially addictive behaviours, such as online gaming and gambling, and rise in rates of domestic violence and sexual abuse (18,19).

3. Impact of COVID-19 pandemic on mental health of the elderly

Mental health problems and, especially, depressive symptoms are common in the elderly (20,21). Due to the fact that in the COVID-19 era mental health care provision has shifted to tele-medicine this age group seems to be disproportionately affected as most elderly individuals not only have limited access or lack ability to use smart phones and internet services, but also due to ongoing mass quarantines and public transport restrictions cannot reach their outpatient clinics in order to obtain their monthly prescriptions (22). This results in perception of lack of treatment and exacerbation of pre-existing psychiatric symptoms. Apart from that, the burden of social isolation is worsened when hospitalization is required, as most hospitals in affected areas do not allow visitors (19). Likewise, older adults without pre-existing psychiatric disorders appear extremely susceptible to develop mental health issues as, especially those with underlying health conditions, comprise the most vulnerable age group for life-threatening complications and death from COVID-19, thus are currently extremely worried about being infected with the virus and not having access to appropriate care (13). Rather disturbingly, public media have portrayed COVID-19 as a disease of the elderly leading to social stigma, negative stereotypes and age-based discrimination against older individuals with outcomes ranging from increased isolation to violations to their right to health and life on an equal basis with others, causing additional distress not only to them but also to their family and caregivers (23).

In regards with the relation of mental illness and morbidity and mortality of COVID-19 infection in elderly populations, a study in Caucasian older patients with COVID-19 showed that functional decline was an independent risk factor and a strong predictor of mortality (24), while meta-analytic data showed that dementia in older adults is associated with an enhanced risk of mortality from COVID-19 infection (25). It is also important to consider the psychological impact of hospital stay in elderly COVID-19 intensive care unit (ICU) survivors discharged alive, which has been associated with cognitive impairment and poor mental health outcomes, while the patient's family members, especially the older ones, appear to also suffer significant psychological repercussions (26).

4. Impact of COVID-19 pandemic on mental health of children, adolescents and young people

Due to their rapidly developing and sensitive to environmental adversities brain architecture, children's mental health development appears extremely vulnerable in the COVID-19 era, as children are exposed to chronic stress conditions, such as forced isolation from peers due to social distancing and shelter at home laws and worries about the health and financial

status of their relatives (19). Moreover, due to the fact that most mental health conditions develop during adolescence and young adulthood, individuals in these age groups also appear susceptible to developing mental health symptoms due to ongoing stressors, such as school and university closures, loss of routine and social connection and diminishment of economic prospects (13). Loneliness, specifically, is strongly associated with mental health problems, such as depression symptoms in girls and social anxiety in boys. Moreover, the length of loneliness appears to be a predictor of future mental health problems as children who had experienced enforced isolation or quarantine were five times more likely to require mental health service input and experienced higher levels of posttraumatic stress. This is of particular relevance in the COVID-19 context, as politicians in different countries consider the length of time that schools should remain closed and the implementation of social distancing within schools (27). Finally, mental health risks secondary to COVID-19 are expected to disproportionately affect children and adolescents who are already disadvantaged, such as those with intellectual disabilities who already struggle to understand environmental cues and may struggle to appreciate the need for current restrictions, thus exacerbating their agitation and anxiety (19).

5. Impact of COVID-19 pandemic on mental health of health care professionals (HCPs)

During the COVID-19 outbreak, frontline HCPs in hospitals and long-term care facilities are at a significant risk of adverse mental health outcomes as they have been confronted with mounting challenges that have not been faced before (28). Extreme workloads, shortages of protective equipment or their extensive use (29), lack of disaster training and difficult decisions potentially resulting in deaths that might not have occurred under normal circumstances, fear of becoming infected or spread infection to their relatives, witnessing patients' deaths, separation from families and stigmatization by their communities (30) have resulted in high rates of anxiety, depression, insomnia, distress, somatization and obsessive-compulsive symptoms (31,32) and increased risk of developing post-traumatic stress disorder and posttraumatic stress symptoms (PTSS) (33). Nurses are more vulnerable compared to doctors. Additional work related factors that increase psychological adverse outcomes include forced redeployment to look after affected patients, being less experienced, in part time employment, or in increased contact with affected patients. Personal risk factors, such as staff with children at home or infected family members, female gender, single or social isolation or comorbid physical or psychiatric disorders further compromise HCPs' mental health in the COVID-19 era (34).

6. Impact of COVID-19 pandemic on mental health of people with pre-existing mental health conditions

Patients with pre-existing mental health issues appear extremely vulnerable to relapsing during the COVID-19 pandemic, as SARS-CoV-2 can exacerbate underlying psychiatric symptoms, such as anxiety, depression, panic, delirium, psychosis and suicidality. Moreover, patients with serious psychiatric disorders, such as schizophrenia,

who are commonly socioeconomically disadvantaged, are further compromised by stay-at-home orders and subsequent reduced access to employment opportunities, thus worsening their economic distress (19). However, at a time when they are suffering more distress, mentally ill patients experience significant reductions in availability of care. More specifically, according to a recent WHO assessment, COVID-19 pandemic has resulted in significant disruptions of MNS services, such as school and work-related mental health programs, services for children, adolescents and older adults, interventions for caregivers, psychotherapy/counselling/psychosocial interventions, home or community outreach services, critical harm reduction services, mental health interventions during antenatal and postnatal period, suicide and overdose prevention and management programs, opioid agonist maintenance treatment of opioid dependence and management of emergency MNS manifestations (6). Finally, immature discharge from psychiatric units may lead to relapse, suicidal behavior, anxiety, depression and post-traumatic incidents, including insomnia (18).

7. Impact of COVID-19 pandemic on individuals with and without mental disorders prior to COVID-19 pandemic

So far, most evidence on the impact of the COVID-19 pandemic on individuals with and without preexisting mental health conditions is based on cross-sectional and not on longitudinal studies with comparable prepandemic information. Among the few conducted longitudinal studies, McGinty *et al* (35) and Pierce *et al* (36) reported a rise in psychological distress among US and UK adults, respectively, in the COVID-19 compared to the pre-COVID-19 era. Furthermore, Pan *et al* utilizing longitudinal data from three existing Dutch psychiatry case-control cohorts, including people with and without mental health disorders (depressive, anxiety, or obsessive-compulsive disorders) revealed that the levels of depressive symptoms, anxiety, worry, and loneliness increased in people with no or less severe mental health disorders during the COVID-19 pandemic (37). In contrast, changes of symptom levels were minimal or even negative in individuals with the most severe and chronic mental health disorders. Similarly, Pinkham *et al* could not find significant changes in mood experiences, psychotic symptoms or sleep duration among participants diagnosed with severe mental illnesses, such as schizophrenia or schizoaffective disorder or bipolar disorder (I or II) with or without psychotic features or major depression with psychotic features in the COVID-19 era. Rather surprisingly participants reported a significant increase in well-being post-pandemic onset (38). Thus, from the aforementioned studies, it seems that patients with pre-existing mental health issues coped remarkably well in the COVID-19 pandemic. As potential explanations of these findings, it has been suggested that with transmission mitigation strategies in place, individuals with severe mental health disorders might experience some sense of relaxation as their world and habits became more in sync with the quarantined society. Moreover, staying at home could help them build a structured and fixed daily routine, which has been expressed as a preferable setting to provide a feeling of safety (37). Furthermore, there are factors that seem to offer protection against the detrimental effects of stress. This has

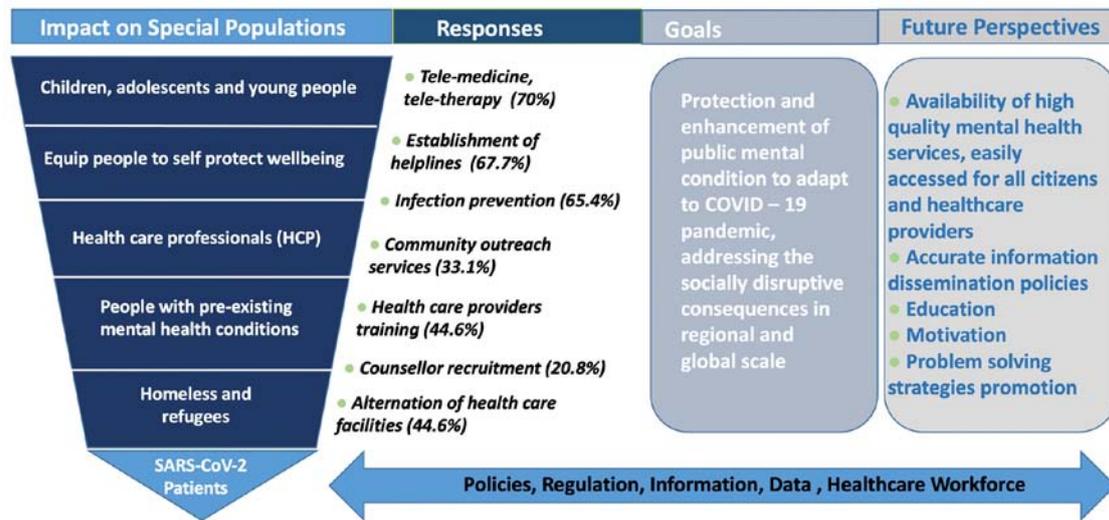


Figure 1. COVID-19 recovery framework, perspectives and recommended actions. COVID-19, coronavirus disease 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus-2.

been termed ‘resilience’, i.e., the ability to maintain or quickly recover mental health during and after times of adversity (9).

8. Impact of COVID-19 pandemic on mental health of people who have been infected with SARS-CoV-2

Physical isolation from family members or loved ones during quarantine or hospital stay can produce psychological instability among people infected with SARS-CoV-2 (18). Moreover, high rates of PTSS are evident among patients that have recovered from COVID-19 and were discharged from hospital (39). Apart from that, those admitted in ICUs often experience post-intensive-care syndrome that manifests with cognitive, psychological, and neurological symptoms or dysexecutive syndrome after ICU discharge (40). Furthermore, in a recently published study the risk of depression was higher among COVID-19 patients (41). This could be due to the coronavirus affecting the brain directly or indirectly by inducing a massive cytokine response harming the brain (3). Finally, based on prior experience with SARS-CoV-1 infection where rates of depression were higher 1 month and 1 year after recovery, huge after-wave of patients suffering from depression are expected in case of COVID-19, as well (42).

9. Impact of COVID-19 pandemic on mental health of homeless people and refugees

Homeless people and refugees most often live in environments that are conducive to a disease epidemic, such as COVID-19, as they stay in congregate living settings, such as shelters, halfway houses, encampments or abandoned buildings and lack regular access to basic hygiene supplies or showering facilities. Moreover, many of them suffer from chronic mental and physical conditions, engage in high rates of substance abuse and have less access to health care. Although large prospective studies are missing, their increased risk of COVID-19 infection seems to generate high levels of stress that could exacerbate existing mental health conditions or induce new ones (43,44).

10. How mental healthcare systems responded to the COVID-19 crisis

Mental Healthcare systems have been facing unprecedented challenges during the pandemic. A recent survey by the World Health Organisation reported that COVID-19 has disrupted or halted critical mental health services in 93% of countries worldwide while the demand for mental health is increasing (45). The WHO survey which was conducted in 130 countries globally highlighted disruptions in mental health services for vulnerable people (such as children and adolescents, older adults, antenatal services), in psychotherapy, critical harm reduction, opioid maintenance treatment and emergency services. WHO also reports that providing personalised medicine and crisis support during the COVID-19 era is far more difficult in larger mental health institutions, than in community settings, which in turn increases the risk of inequity of care in people with psychosocial and intellectual disabilities (46).

In order to overcome MNS service disruptions, most countries (70%) utilized tele-medicine /tele-therapy in order to replace in person consultations, 67.7% established helplines for mental health and psychosocial support, 65.4% specific measures for infection prevention and control in mental health services, while 44.6% trained COVID-19 health care providers in basic psychosocial skills, 44.6% discharged or redirected patients to alternate health care facilities 33.1% utilized home or community outreach services and 20.8% recruited counselors (6). Moreover, concerning HCP many hospitals utilized caregiver support strategies, such as providing a place of rest in order to isolate staff from family, developing video records to share with family, training on personal protective equipment, provision of security to manage agitated/aggressive patients and leisure activities (19).

COVID-19 crisis is an opportunity not only to identify system failures but also to improve and build health care systems that operate better during crises. On a healthcare policy level it is important to ensure clarity of communication between authorities and the public (including services users) and provide clear procedures to safeguard psychological well

being from the challenges arising from the pandemic and the impact of social distancing and isolation measures. Finally, it is time that countries respond with increased funding and staff capacities regarding (the chronic underfunded) mental health services, especially given the anticipated increased pressure in the near future on national and international mental health services (45).

11. Future perspectives

Although COVID-19 pandemic initially resulted in approximately 1,000 new COVID-19-related listings per week on the PubMed.gov website (47), very few studies have addressed the practical matter of how psychiatric care should change as a consequence of the ongoing mental health tsunami (4,18). WHO has recently published operational guidances in order to maintain essential health services with specific focus on the younger, the elderly and those suffering from MNS disorders (48). Moreover, in a recent policy brief by the United Nations on the topic COVID-19 and the need for action on mental health it was recommended that a whole-of-society approach should be applied in order to promote, protect and care for mental health, widespread availability of emergency mental health and psychosocial support should be ensured and recovery from COVID-19 pandemic should be supported by building mental health services for the future (23). Apart from that, it is advised that governments and health officials must provide accurate information on the state of the pandemic, refute rumors in a timely manner, and reduce the impact of misinformation on the general public's emotional state. These high level activities result in a sense of public security and potential psychological benefits (49). Finally, six important roles for the psychiatrists have been identified: a) education of the public about the common psychological effects of a pandemic, b) motivating the public to adopt strategies for disease prevention and health promotion, c) integrating their services with available health care, d) teaching problem-solving strategies to cope with the current crisis, e) empowering patients with COVID-19 and their caregivers, and f) provision of mental health care to healthcare workers (50,51). Fig. 1 summarizes the responses of mental healthcare systems to the enormous mental health implications caused by COVID-19, alongside the public health goals and future perspectives.

12. Conclusion

COVID-19 pandemic has changed our lives dramatically. This unprecedented in size and duration and still ongoing global biothreat, which affects us all regardless of skin color, ethnicity and wealth (52), has already had a tremendous impact on mental health of the general population, but most importantly on the psychological well-being of vulnerable groups, such as the mentally ill, frontline healthcare workers, the younger, the elderly and the most socioeconomically deprived. It is of utmost importance to acknowledge these consequences on the most exposed, as well as the huge strain on mental healthcare, and to identify healthcare system vulnerabilities during times of crisis. Given the probability of future COVID-19 waves and potentially future pandemics, it is critical for policy makers to ensure that clear guidelines, effective communication

channels and proactive protocols are prepared now to help alleviate the consequences of the pandemic crisis and the subsequent restrictive measures, so as to prevent the mental health tsunami in sight; all this while maintaining focus on person-centered and compassionate care (46).

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