Adaptation of evidence-based suicide prevention strategies during and after the COVID-19 pandemic

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Suicide is preventable. Nevertheless, each year 800,000 people die of suicide in the world. While there is evidence indicating that suicide rates decrease during times of crises, they are expected to increase once the immediate crisis has passed. The COVID-19 pandemic affects risk and protective factors for suicide at each level of the socio-ecological model. Economic downturn, augmented barriers to accessing health care, increased access to suicidal means, inappropriate media reporting at the societal level; deprioritization of mental health and preventive activities at the community level; interpersonal conflicts, neglect and violence at the relationship level; unemployment, poverty, loneliness and hopelessness at the individual level: all these variables contribute to an increase of depression, anxiety, post-traumatic stress disorder, harmful use of alcohol, substance abuse, and ultimately suicide risk. Suicide should be prevented by strengthening universal strategies directed to the entire population, including mitigation of unemployment, poverty and inequalities; prioritization of access to mental health care; responsible media reporting, with information about available support; prevention of increased alcohol intake; and restriction of access to lethal means of suicide. Selective interventions should continue to target known vulnerable groups who are socio-economically disadvantaged, but also new ones such as first responders and health care staff, and the bereaved by COVID-19 who have been deprived of the final contact with loved ones and funerals. Indicated preventive strategies targeting individuals who display suicidal behaviour should focus on available pharmacological and psychological treatments of mental disorders, ensuring proper follow-up and chain of care by increased use of telemedicine and other digital means. The scientific community, health care professionals, politicians and decision-makers will find in this paper a systematic description of the effects of the pandemic on suicide risk at the society, community, family and individual levels, and an overview of how evidence-based suicide preventive interventions should be adapted. Research is needed to investigate which adaptations are effective and in which contexts.

Key words: Suicide, suicidal behaviour, mental health, COVID-19, socio-ecological model, universal prevention, selective prevention, indicated prevention

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Approximately 800,000 people die of suicide each year[1], with a rate of 10.5 per 100,000 people (males: 13.7 per 100,000; females 7.5 per 100,000)[2]. This number is underestimated, due to variations in the methods of monitoring and death registration as well as cultural factors[2]. Suicide is the second leading cause of death among people aged 15-24 worldwide, and for each death by suicide 10 to 20 suicide attempts are estimated[1,3].

It has been reported that, during times of natural disasters, war, or epidemics such as the severe acute respiratory syndrome (SARS), suicide rates may momentarily decrease[4-6]. However, after the immediate crisis has passed, suicide rates increase[4,6]. The COVID-19 pandemic poses a special challenge to people around the world, as it affects both physical and mental health[7-15], economy[16], and social life[17,18].

Physical distancing[19,20] and lockdown measures[21], work disruptions[22] and school closures[23,24] have suddenly changed social life and daily routines. A major effect of these measures has been the reduction of social contacts, with a consequent increase in social isolation and feelings of loneliness, both in turn associated with increased anxiety, depression and suicidal behaviour[25,26].

Even if some positive outcomes related to staying at home have been highlighted, such as the adoption of healthier eating habits and the increase of sleep hours[27], reports show that movement restrictions aimed to stop the spread of the virus are causing a worldwide increase in family problems and domestic violence[28,29]. A systematic review[30] documented that family conflict is the most commonly reported precipitant of suicidal acts among children. A high prevalence of domestic violence victimization has been reported among people seeking treatment for self-harm in the UK[31]. Furthermore, intimate partner violence[32] and childhood abuse and neglect[33] have been found to be associated with suicide attempts.

As a consequence of the lockdown and other public health measures implemented in many countries, a global economic crisis at least as bad as the one occurring in 2008 is expected[16]. In the European Union, the unemployment rate is predicted to rise from 6.7% in 2019 to 9% in 2020[34]. In the US, more than 20 million people lost their jobs in April 2020. The unemployment rate increased to 14.7%, while it was 3.5% in February 2020, before the spreading of the virus in the country[35].

According to the United Nations, the pandemic hit the Latin America and the Caribbean in a period in which their economy was already weak and indebted[36]. Consequently, a 3.4% increase in the unemployment rate for 2020 (from an already high 8.1% rate in 2019) is forecast, resulting in an increase of 44.7 million people in poverty or extreme poverty. Furthermore, at least 11 million people will fall into poverty across East Asia and the Pacific[37], and 27 million people will face extreme poverty in Africa[38].

There is consistent evidence of an association between economic crises and increased suicide rates, especially in high-income countries, such as those in Europe and North America[39], and among men in working age or unemployed[40]. Analyzing data between 1970 and 2007 for 26 European Union countries, it has been estimated that every 1% increase in the unemployment rate

is associated with a 0.79% rise in suicides at ages below 65, with 60 to 550 potential excess deaths[41]. An estimate of the impact of the COVID-19 recession forecasts a 3.3% to 8.4% increase in suicide rate in the US[42]. However, previous research also shows that policy responses and governmental expenditures may be able to mitigate the impact of unemployment and economic crises on suicide rates[41,43].

According to the World Health Organization (WHO)[44], as of August 30, 2020, there were more than 838,000 confirmed deaths worldwide attributable to COVID-19. Other analyses suggest that the real death toll of the pandemic is higher than what official statistics show[45-47]. COVID-19 deaths lead to bereavement overload, because of the frequent multiple deaths within the families, and the impossibility to visit and assist the dying person or even join the funeral or ritual ceremonies due to the prohibition of public gatherings[48]. The accumulation of deaths and the fact that COVID-19 mortality mostly affects the elderly may induce, in the society, indifference and attitudes to overlook the deep pain and distress of bereaved families, further contributing to complicate the grief.

Reports predicting a rise in suicide rates as well as in mental health problems call for appropriate actions during and after the crisis[9,49-53]. Suicide is an unnecessary death and can be prevented by using evidence-based methods[54]. However, a broad approach according to the socio-ecological model is needed[55].

The aim of this paper is to systematically evaluate the influence of the COVID-19 pandemic on risk and protective factors for suicide at the societal, community, relationship and individual levels. Adjustments of evidence-based universal, selective and indicated suicide prevention strategies are recommended to provide guidance to clinicians, public mental health professionals, politicians and decision-makers.

IMPACT OF THE COVID-19 PANDEMIC ON RISK AND PROTECTIVE FACTORS FOR SUICIDE

According to the WHO, risk and protective factors for suicidal behaviour are categorized, in line with the socio-ecological model, into four levels: society, community, relationship and individual[55].

Risk and protective factors are likely to be influenced by the COVID-19 pandemic in different ways. Some risk factors, such as a family history of suicide[55], will not be affected at all. Many modifiable risk factors may be exacerbated, leading to an increase in the risk of suicide over time[56]. The prevalence of stress, sleep disturbances, anxiety, depression, alcohol and drug abuse, with suicide as their utmost consequence, is likely to increase[17,57,58]. Financial problems and worries about the uncertain future and unemployment will also contribute to an increase in suicide rates[16,17,53].

Protective factors for suicide have been described, such as effective mental health care, strong personal relationships, a supportive social network, life skills and ability to adapt, practice of positive coping strategies, and religious or spiritual beliefs[55,59].

Protective factors may be influenced positively or negatively, depending on the economic and social actions that will be taken by politicians and decision-makers in response to the COVID-19 pandemic. Strategies may be of varying effectiveness in different regions or countries. With an adequate and effective response, the pandemic may even represent an opportunity to strengthen suicide preventive efforts[50,52].

The expected effects of the pandemic on each risk and protective factor at the society, community, relationship and individual level are summarized in Tables 1-4.

Table 1 Risk and protective factors for suicide at the societal level and possible impact (positive or negative) of the COVID-19 pandemic on these factors

	Impact of COVID-19 pandemic	
Risk factors		
Economic downturn	• Increased financial problems, unemployment, worries about the future	–
Barriers to accessing health care	• Increased pressure on health care systems	–
	• Increased delegation of resources towards the acute response to the pandemic	–
	• Decreased focus on mental health care	–
	• Reduced help-seeking due to containment measures	–
	• Reduced help-seeking due to fear of being infected	–
	• Stigma related to the infection or to mental health problems	–
Access to suicidal means	• Increased buying and stockpiling of medications or firearms	–
Inappropriate media reporting	• Speculations on the reasons for specific suicidal acts; sensationalizing of pandemic-related suicides	–
Protective factors		
Effective mental health care	• Closure or reduced activity of mental health services	–
	• Increased resources for telemedicine and digital tools	+
Legislations concerning economy and social inequalities, welfare measures, health care accessibility, national prevention programs	• Decreased emphasis on prevention programs due to the economic impact of the pandemic	–
	• Increase of government funds for health policies in general	+
	• Increase of short- and/or long-term welfare measures	+
	• Opportunities to strengthen mental health care systems	+

+ = positive impact, – = negative impact

Table 2 Risk and protective factors for suicide at the community level and possible impact (positive or negative) of the COVID-19 pandemic on these factors

	Impact of COVID-19 pandemic	
Risk factors		
Discrimination	• Deprioritization of mental health	–
Stresses of acculturation and dislocation	• Increased stress in individuals currently fleeing from conflicts or staying in refugee camps during the pandemic	–
	• Decreased effectiveness of containment measures in such settings	–
Protective factors		
Social integration, social living conditions, local prevention, rehabilitation programs	• Deprioritization of preventive activities	–
	• Opportunities to increase resources for preventive activities	+

+ = positive impact, – = negative impact

Table 3 Risk and protective factors for suicide at the relationship level and possible impact (positive or negative) of the COVID-19 pandemic on these factors

	Impact of COVID-19 pandemic	
Risk factors		
Loneliness	• Increased isolation and lack of social support	–
Relationship conflict, discord, loss	• Increased conflict and discord as additional strains are put on relationships	–
	• Decreased opportunities for contact with people outside home who can provide support	–
	• Loss of significant others	–
Trauma and abuse	• Increased interpersonal violence and abuse within families or households as people are confined to their homes	–
	• Decreased access to help	–
Protective factors		
Strong personal relationships	• Reduced opportunities for communal experiences and activities	–
	• Improved relationships through new ways of connecting or having more time available to connect with other people	+
	• Improved relationships in families due to more time available to do activities together (both children and adults)	+

+ = positive impact, – = negative impact

EVIDENCE-BASED SUICIDE PREVENTION STRATEGIES DURING THE COVID-19 PANDEMIC

The universal-selective-indicated (USI) model, in which different populations are targeted depending on the level of suicide risk, is mostly used for the categorization of suicide preventive interventions[60,61].

Universal suicide preventive strategies target everyone in a defined population (e.g., a nation, a county, a local community). They are aimed at increasing awareness about suicide and mental health, removing barriers to care, promoting help-seeking behaviours and protective factors such as social support and coping skills, and mitigating the impact of economic downturns. Examples of universal interventions include awareness campaigns and educational programs, limiting access to suicide means, guidelines for responsible media reporting, and governmental measures to address economic crises.

Selective suicide preventive strategies are meant for specific groups who are at increased vulnerability for suicidal behaviour, such as people with mental health problems, alcohol and drug abusers, prisoners, victims of physical and sexual violence, members of the lesbian, gay, bisexual, transgender and queer (LGBTQ) community, migrants, and the bereaved. Screening programs in health care or other facilities, gatekeeper training for frontline helpers, psychological support and treatment of mental health problems and substance abuse in people who do not display signs of suicidality as yet, are all considered selective suicide preventive interventions.

Indicated suicide preventive strategies target high-risk individuals who are displaying signs of suicidal behaviour, and are aimed at timely and appropriately assessing and dealing with the suicide risk using case management, referral to psychiatric treatment and care, skill-building interventions and support groups.

The suicide preventive interventions proven to be most effective include: restriction of access to lethal means, policies to reduce harmful use of alcohol, school-based awareness programs, pharmacological and psychological treatment of depression, chain of care and follow-up of at-risk individuals, responsible media reporting, and policy responses to mitigate the impact of economic downturns[55,62,63]. Other interventions, such as gate-

Table 4 Risk and protective factors for suicide at the individual level and possible impact (positive or negative) of the COVID-19 pandemic on these factors

	Impact of COVID-19 pandemic	
Risk factors		
Mental disorders (anxiety, depression, post-traumatic stress disorder)	• Increased incidence of mental disorders	–
	• Worsened symptoms of existing mental disorders	–
	• Reduced treatment adherence	–
Financial problems	• Job or financial loss due to the economic crisis	–
Hopelessness	• Increased hopelessness through potential loss of friends and family, loss of job, and general uncertainty	–
Harmful use of alcohol/drugs	• Increased use of alcohol/drugs	–
Chronic pain	• Worsened chronic pain through reduced care and increased stress	–
Protective factors		
Life skills and lifestyle practice: problem solving, positive coping, ability to adapt	• Increased awareness of self-care strategies and positive coping through media and Internet support	+
	• Increased time to practice self-care	+
	• Adoption of maladaptive coping strategies (e.g., denial, self-blame)	–
Religion or spiritual beliefs	• Difficulties in participating in religious ceremonies due to containment measures	–
	• Increase in individual practice of religion or spirituality at home	+
Food and diet	• Increased opportunities for a healthier diet	+
	• Negative impact on diet through irregular eating patterns and frequent snacking	–
Physical activity	• Decreased physical activity due to containment measures	–
	• Increased physical activity due to greater availability of leisure time	+
Sleep	• Improved sleep patterns through new work routines	+
	• Poor sleep due to worries, increased anxiety and stress	–

+ = positive impact, – = negative impact

keeper training, are also theoretically valid, even if conclusive evidence of their effectiveness on reducing suicidal behaviour is not yet available[64].

All preventive strategies require adjustments and adaptation in the light of the new challenges that are posed by the COVID-19 pandemic.

Universal interventions

Mitigating the impact of unemployment, poverty and inequalities

Unemployment, poverty and inequalities represent major risk factors for suicide which are considerably exacerbated by the current global crisis. Studies from high-income countries on the association between social protection policies and suicide rates[65] show that the various policies may have a different impact.

Active labour market policies, including job search assistance, job training and subsidized employment, have a positive impact on health and quality of life[66]. More specifically, at the individual level, job search assistance programs with a psychological component, such as improving self-confidence and self-efficacy, have been found to exert positive effects on mental health, such as reduced depression, anxiety and distress symptoms. At the national level, increases in government spending on active labour market policies have been shown to reduce the effect of unemployment on suicide rates[41,67,68]. It has been calculated[41] that, for each US$10 per person increased investment in these policies, the effect of unemployment on suicides was reduced by 0.038%. In another study, it has been reported that the same amount of increased spending would correspond to a 0.026% decrease in male suicide rate[67]. If spending for active labour market policies were higher than US$190 per person per year, rises in unemployment would have no effect on suicide rates[41]. These findings advocate for specific governmental actions.

In the US, the maximum allowable unemployment benefit was found to be associated with a reduced impact of economic downturns on suicide rates[69]. Similarly, in European countries, the unemployment protection system was reported to mitigate the negative impact of unemployment on suicide rates[70]. In this context, the adoption of policies related to universal basic income (UBI) during and in the aftermath of the COVID-19 pandemic could significantly decrease its social and psychological costs. UBI is defined as "a periodic cash payment unconditionally delivered to all on an individual basis, without means-test or work requirement"[71]. Interventions which unconditionally provided substantial cash transfers to individuals or families have been found to have positive effects on educational participation and on some health outcomes, including mental health[72,73]. In Indonesia, a cash transfer program providing between $39 and

$220 per person annually was found to reduce the yearly suicide rate by 0.36 per 100,000 people, corresponding to an 18% decrease[74].

Housing loss may represent a significant trigger for suicidal crisis. For example, eviction- and foreclosure-related suicides doubled between 2005 and 2010, during the US housing crisis[75], and significantly contributed to the increase of suicide rates[76]. Housing interventions, such as relocating disadvantaged people to less deprived areas or improving physical housing conditions, are reported to be successful in reducing mental health problems[77]. Policies to subsidize housing costs have been used during the pandemic in some countries and their effect on mental health should be evaluated.

Restricting access to lethal means of suicide

There are few reliable data on suicide methods. One global overview[78] showed several differences in preferred suicide means between countries and even between different regions in the same country, with hanging, self-poisoning and firearms as the most frequently used methods. A recent systematic review[79] of 16 studies confirmed that hanging (81.3%), firearms (56.3%), poisoning/overdose (43.7%) and jumping from a height (18.7%) are the most common reported suicide methods.

In most European countries, hanging is reported to be the predominant method of suicide. Pesticide self-poisoning accounts for around 20% of suicides globally and 48.3% of those in low- and middle-income countries in the Western Pacific region[80]. Firearms account for 50.5% of suicide deaths in the US, followed by suffocation (28.6%) and self-poisoning (12.9%)[81]. Although jumping from a height is a relatively uncommon method of suicide in most countries, it plays an important role in urban settings such as Hong Kong, Singapore, Luxembourg and Malta[78,82,83], and is considered a highly lethal method[84].

Restricting access to lethal means of suicide entails various points of application, such as limitations in the size of packs of medications, use of antidepressants which are not dangerous in overdose, safety procedures and safer room design for hospitals and prisons (e.g., not wearing belts or shoes with laces, minimizing the number of suspension points available for hanging), more stringent firearm regulations, installation of barriers and safety nets at jumping sites, and limitation of access to highly lethal pesticides[62,85]. The effectiveness of these strategies is supported by robust evidence[63]. Planned suicidal acts may be delayed if people are precluded from implementing the chosen method, increasing the chance of suicide prevention[86]. Moreover, in impulsive suicidal acts, people tend to use the most readily accessible method. If there are no lethal methods available, the suicidal crisis may pass or the use of a less lethal method may result in non-fatal outcomes.

During the COVID-19 pandemic, policies restricting the access to suicidal means should be reinforced. It is possible that an increase of stockpiling of medications occurs in order to prepare for a possible shortage[87]. Furthermore, an increased purchasing of firearms due to worries about an increase in crime generated by the pandemic may take place[88,89].

Governments, at the national and regional level, are advised to restrict and increase monitoring of sales of lethal means for suicide, such as firearms and pesticides. Additionally, temporary restrictions on the amount of some medications (e.g., analgesics) bought per person should be considered. Public awareness strategies and policies to ensure or reinforce safe storage of firearms and medications at home as well as pesticides at warehouses are of importance[90]. Public awareness should be increased by informing about the significance of reducing access to lethal means of suicide[49].

Policies to reduce harmful use of alcohol

Evidence exists that alcohol use is associated with increased risk of suicidal behaviour[91-93]. Reducing harmful use of alcohol through policies and interventions has been shown to reduce suicide rates effectively[94,95], especially for males. The best example was probably the restructuring of the former Soviet Union (*perestroika*), when heavy restrictions of alcohol use were introduced: between 1984 and 1990, suicide rates decreased for males by 32%, in comparison with 8% in Europe[96].

The WHO global strategy to reduce the harmful use of alcohol identified ten areas for national action: leadership, awareness and commitment; health services' response; community action; drink-driving policies and countermeasures; availability of alcohol; marketing of alcoholic beverages; pricing policies; reducing the negative consequences of drinking and alcohol intoxication; reducing the public health impact of illicit alcohol and informally produced alcohol; and monitoring and surveillance[97].

Psychosocial crises boosted by the COVID-19 pandemic, such as family conflicts, unemployment and financial problems, may trigger alcohol abuse, that in turn enhances suicidal risk by increasing impulsivity, aggressiveness, loneliness and hopelessness[98].

Governments, at the national and regional level, are encouraged to monitor the consumption of alcohol during the pandemic; increase public awareness about the negative outcomes of alcohol use; defuse the myth that alcohol consumption may protect from COVID-19 infection[99]; and restrict availability if necessary.

Increasing follow-up consultations of individuals at risk for alcohol abuse, promotion of safe drinking[49], and online tools for monitoring alcohol intake may counteract the increase of harmful alcohol use.

Public awareness about mental health and suicide

Over the last decades, public attitudes have changed, showing improved mental health literacy and higher acceptance of professional help for mental health problems[100]. This is most probably at least in part due to international, national and local mental health awareness campaigns. Nevertheless, a similar improvement has not been observed in stigma and discrimination related to mental health problems[100,101].

As a result of the increasing concerns for the mental health consequences of the COVID-19 pandemic, international organizations, such as the WHO[102] and the United Nations[103], and national and local authorities[104,105] are releasing resources and guidelines for the promotion of mental health and raising awareness about the potential increase of mental health problems and suicide during the pandemic.

Besides increasing mental health knowledge and literacy, key aspects of suicide prevention resources should empower the general population with coping skills by providing useful advice, promoting help-seeking behaviour and making information available about where to get help.

School-based interventions

Young people are a vulnerable group for risk of suicide. Suicide is the second leading cause of death worldwide among the 15-24 year old[1]. Evidence suggests that 13.4% of children and adolescents have a diagnosed mental disorder[106]. A much higher proportion reports mental health symptoms such as depression or anxiety (30.4% and 23.3%, respectively)[107,108].

Strong evidence for the effectiveness of school-based interventions has been shown in increasing help-seeking behaviour[109,110], enhancing awareness about mental health and risk and protective factors for suicide[110-113], and decreasing the incidence of suicide attempts and severe suicidal ideation[111,113].

During the COVID-19 pandemic, schools have frequently been closed or physical attendance has substantially decreased, which has been reducing or completely stopping school-based mental health interventions[23,24,114]. Schools have a major role in children and adolescents' social development. During the pandemic, peer relationships, which are important to foster autonomy and independence in adolescence, are substantially affected. The increased use of social media, substituting real-life peer relations, may result in pathological Internet use[115], a higher risk of cyberbullying[116] and other negative health outcomes, such as anxiety, depression and suicidality[117]. Feelings of anxiety and distress may also arise as a consequence of the uncertainty about final exams and future school re-opening.

Governments, at the national and regional level, are encouraged to resume school-based interventions as soon as schools re-open. Availability of online resources for youth mental health, such as helplines and information about how to get support, should be increased. Additionally, teachers and parents are advised to discuss the pandemic and feelings about it with children and adolescents.

Responsible media reporting

Irresponsible media coverage may promote suicidal behaviours in recipients by sensationalizing suicide or paying unproportioned attention to spectacular suicides[118,119]. However, protective effects may be established through responsible reporting of suicide as well as public education[63,120].

Basic principles of responsible media reporting include avoiding to sensationalize or normalize suicide, especially when reporting celebrity suicides, limiting the description of methods and locations, avoiding to show photos, videos and social media links, and providing information about the effectiveness of suicide prevention and where to get help[121].

During the COVID-19 pandemic, specific additional considerations should be made when reporting increased suicide risk, suicide rates, or an individual suicide, especially if it is related to the pandemic[122]. In this sense, oversimplifications of the issue and speculations on what is the reason of the specific suicidal act should be avoided. Instead, the public should be informed about the complexity of suicidal behaviour, in which biological, psychological, social and environmental factors interplay, and about preventive and treatment possibilities.

During the pandemic, it is advised to raise awareness of journalists about existing WHO guidelines for responsible media reporting[121], and develop and disseminate locally adapted guidelines to reduce sensationalizing of suicide, especially if pandemic-related[49,122].

The time spent on media to search for information may increase significantly during crisis events, and this increased media exposure has been shown to enhance distress. Thus, it is recommended to limit media exposure during the pandemic[123].

Access to health care

Appropriate and accessible care for mental disorders, substance use, and physical illnesses is effective in reducing suicide risk[55,124]. Due to increased pressure on the health care system during the COVID-19 pandemic, an adequate care for mental disorders may be deprioritized. An additional reduction in access is likely due to closed practices and increased sick-leave of mental health care professionals.

The mental health problems and suicidal behaviour of frontline health care professionals, first responders (e.g., ambulance operators) and other health care workers may increase due to their crucial role during the pandemic, associated with high stress[5,17,125-129].

Actions are required to provide financial support to mental health services, ensure accessibility, increase staff, develop digital services, and provide tools for self-care online. Moreover, the local health care systems are encouraged to plan and adjust resources to maintain or improve treatment and follow-up of patients with mental disorders, and adopt and reinforce the use of telemedicine[52,130].

Selective interventions

Gatekeeper training

Gatekeeper training is a widely used strategy to reduce suicide risk[64], even if supportive evidence for its effectiveness mostly

comes from uncontrolled studies[131]. It entails training of key people, such as teachers, first responders, or human resource managers, to identify suicidal individuals and refer them to appropriate services[55,64].

Most of the already trained gatekeepers probably belong to frontline responders (e.g., general practitioners, nurses, officers) and, for this reason, they are full-time involved in the emergency battle against the virus or even sick themselves. On the other hand, gatekeepers belonging to the general population (e.g., religious officials, teachers) may be prevented to identify and interact with suicidal individuals due to lockdown measures. Furthermore, a decrease in the availability of gatekeepers may be the result of paused or reduced gatekeeper training during the COVID-19 pandemic.

During the pandemic, continued training online or in person, in line with local regulations about appropriate physical distance, should be ensured. Also, actions to increase the number of volunteers to participate in the programs is advised. Successful examples of the adaptation of standard gatekeeper training to the current situation are the Alliance Project[132] and the Zero Suicide Alliance[133], that are offering brief online trainings. The Mental Health First Aid[134] is an Australian gatekeeper training evolved into global initiatives, and now organizes online courses. It proved to be effective in improving knowledge, attitudes and helping behaviours towards adults with mental health problems[135].

Interventions for vulnerable groups

Individuals with psychiatric conditions are recognized as those most severely impacted by the psychosocial effects of the pandemic[136-138] and, due to the existing association between psychiatric disorders and health risk behaviours (e.g., smoking, obesity, alcohol use, low adherence to precautionary measures), they are also at increased risk of infection and its complications. Outreach interventions and a closer follow-up of patients with severe psychiatric disorders may allow to enhance treatment adherence and to timely identify and intervene on psychiatric emergencies. The creation of online networks may provide adequate social support and mitigate the temporary unavailability of community services.

Besides increasing the unemployment rate[42,139], the current global crisis is exacerbating existing socio-economic inequalities. Indeed, migrants, different cultural and ethnic minorities as well as socio-economically disadvantaged groups have been found to be less able to adhere to "stay at home" recommendations[140] and, consequently, to be more affected by the virus[141-143]. These groups largely overlap with those at increased risk for suicide.

Specific interventions are needed for these vulnerable populations aimed at increasing access to health care and reducing socio-economic inequalities through labour and welfare policies. Reinforcing crisis helplines may be also pivotal to timely identify and intervene on emerging psychosocial crises potentially leading to suicidal behaviour.

Another important effect of this global crisis is the increase in domestic and intimate partner conflicts and violence[29]. Public health actions to prevent domestic violence are needed and should be adapted to the current situation[144]. Surveillance methods through text messages, hidden smartphone notifications or other methods that allow victims of domestic violence to safely ask for help should be used. Police and health records can be linked according to local legislation to timely identify individuals at risk. Adequate surveillance should be ensured through routine inquiries and remote consultation with the health care system. To mitigate and prevent the negative mental health impact, victims of domestic and intimate partner violence should be referred to online or in person evidence-based interventions, such as those based on cognitive behavioural therapy[145].

COVID-19 patients[10,146] and frontline health workers[147,148] are also particularly vulnerable to negative psychological outcomes. Therefore, interventions to increase mental health awareness, promote effective coping skills, reduce primary and secondary post-traumatic stress disorder (PTSD) symptoms and decrease social isolation should be implemented. Mental health screenings and assessments should be scheduled, and referral to evidence-based treatments be ensured.

Bereavement from COVID-19 may be very challenging[149-152]. Traumatic death, a lack of preparation for the death, and low social support[153,154] have been described as risk factors for complicated grief, which in turn results in increased risk for suicidal behaviours, independently from other psychiatric disorders such as major depressive disorder and PTSD[155,156].

Finally, the previously described impact of the pandemic in increasing social isolation and loneliness becomes particularly concerning when considering older people. A recent study[157] reported that being 59-80 years old was significantly associated with higher levels of depression, anxiety and PTSD symptoms during the pandemic, compared to the younger age groups. Phone calls and online platforms may represent valuable instruments to mitigate the sense of loneliness and social isolation, even if there might be disparities in access to or literacy in digital resources among older people[158].

Indicated interventions

Treatment of mental disorders

Strong evidence for the effectiveness of pharmacological and psychological treatment of psychiatric disorders in order to reduce suicidal behaviour exists[55,63,159-163]. National and regional pharmaco-epidemiologic studies show a protective effect of the prescription of antidepressants on suicide[164]. Antidepressants have been reported to decrease suicidal thoughts and behaviours in adult and geriatric patients[165,166]. Literature consistently reports anti-suicidal effects of lithium, both in clinical samples and in the general population[167,168]. Other mood stabilizers, such as valproate, lamotrigine and carbamazepine, may also have an anti-suicidal effect[169]. It has been reported that second-

generation antipsychotics are effective in reducing suicidal risk in patients with schizophrenia[170-172]. Promising results[173,174] are reported for the use of ketamine: a single infusion was found to rapidly reduce suicidal thoughts, within one day and for up to one week, in depressed patients with suicidal ideation[175], but long-term effects are not yet evaluated.

Among psychotherapies, individual cognitive behavioural therapy has been reported to significantly reduce suicidal thoughts and behaviour compared to treatment as usual[162,176]. In a recent meta-analysis[177], dialectical behaviour therapy was found to be effective in reducing suicidal behaviour and re-attempt, especially in females with borderline personality disorder. Brief interventions, focused on the identification of warning signs, coping skills and available social support, professional help and crisis planning, have been shown to be effective in preventing suicidal thoughts and behaviour[178,179]. The brief intervention and contact (BIC) implemented in the WHO Multisite Intervention Study on Suicidal Behaviours (SUPRE-MISS) randomized controlled trial showed a significant decrease in suicide after 18-month follow-up in comparison with treatment as usual[180].

During the COVID-19 pandemic, containment measures affect treatment availability, as practices and other psychiatric services may be closed[181]. A worsening of symptoms of mental disorders – such as anxiety, depression and PTSD – among psychiatric patients, and an increase in mental health disorders in the general population, including first responders, may occur[13,14,17,49,182]. Consequently, suicidal behaviour may increase[9].

Due to the likely rise in mental disorders, mental health care providers are advised to continue treatment and assessment in person (if possible) or online and increase assessment of at-risk individuals[49]. The local and national health care systems are encouraged to offer guidelines for remote assessment of mental disorders and suicide risk. Since untreated individuals have a higher risk of suicide[55,183], appropriate care should be provided for anxiety, depressive and PTSD symptoms, alcohol and drug abuse, psychotic and other psychiatric disorders. Furthermore, online interventions to manage psychiatric symptoms should be offered.

Chain of care and follow-up

Chain of care is an integrated model in which the effectiveness of care is ensured by the overall coordination between different services and activities[184]. In this model, primary care, hospitals and community services are linked and integrated through local agreements to create pathways for the identification, treatment and management of specific disease or long-term conditions.

A continuous and functioning chain of care, with adequate follow-up of patients, has been shown to be effective in reducing suicide for at-risk individuals[63,180]. Due to the increasing demands on health care systems during the COVID-19 pandemic, a disruption of the chain of care and delayed follow-up of psychiatric patients is likely to occur, with potential negative effects on suicide risk.

Critical in continuity of care is the promotion of treatment engagement. Providing patients with psychoeducation regarding the importance of follow-up treatment and an outpatient appointment within the first week after discharge[185,186] are recommended strategies for engaging suicidal individuals. Post-discharge follow-up contacts, including phone calls, postcards, letters and technology-based methods (e.g., e-mails and texting) have showed promising results in enhancing treatment adherence and reducing suicidal behaviour[187,188].

Appropriate actions are required to develop new helplines and reinforce the existing ones for suicidal patients and individuals affected by the pandemic and to increase the training of volunteer workers in mental health. The use of telemedicine appears to be critical in maintaining an effective chain of care surrounding suicidal patients.

TELEMEDICINE DURING THE COVID-19 PANDEMIC

During the ongoing pandemic, mental health care faces significant challenges related to staff shortages, decrease of resources, and the risk of health care services becoming hotspots for contagion. Telemedicine is one of the best tools to tackle these challenges and simultaneously address the expected increase in demand for mental health care.

Telemedicine is defined as the remote delivery of health care with the aid of technology[189]. It usually includes two-way audio and video remote communication[190] between patients and health care professionals. However, other forms, such as self-help applications or websites, may support the tele-mental health care and offer additional opportunities for treatment[191].

There are several advantages of expanding telemedicine in mental health care. First, psychiatric diagnosis and treatment constitute a reasonable setting for telemedicine because they are conducted through interviews as opposed to physical assessment[192]. Second, costs of telemedicine may be lower compared to traditional mental health care[193,194]. Third, other barriers of traditional approaches to mental health care, such as stigma, are reduced[194,195]. The potential to increase care has also been recognized for suicide prevention efforts[196,197].

Barriers that limit the use of telemedicine include the lack of access to the Internet[198], the required electronic devices, or the technological capabilities of recipients, especially individuals in old age or with serious mental health illnesses[199]. The coverage of telemedicine through insurances may be limited[200], and integration into the health care systems is required to ensure the broad availability of digital medical services to the population[201,202].

Legal and ethical challenges are related to the storage and sharing of sensitive personal data, security of the communication with patients, privacy for the patient at the location where the remote consultation is held, and difficult choices in situations in which a traditional in-person visit is required to achieve the best treatment effects[191,196]. The remote management of patients with acute suicide risk poses very significant ethical questions and should be managed by involving the family and the

social network. Direct communication with emergency services should be available when the attempts to motivate the suicidal person to seek help are unsuccessful. Legal regulation for telemedicine is missing in most countries and is urgently required.

There is some evidence for the effectiveness of technology-enhanced suicide preventive interventions[203]. Unguided digital self-management interventions have shown to reduce suicidal ideation and suicide-related symptoms in individuals with severe psychiatric difficulties[194] or self-harm[204], while others showed reductions of suicidal ideation, but not of self-harm or attempted suicide, compared to wait-list controls or self-management interventions[205-207]. Technology-enhanced suicide preventive interventions may be more effective in younger people, due to their higher acceptance and affinity with technology[208]. Brief texting contact has shown potential to reduce re-attempt after a suicide attempt through initiating contact with crisis support[209].

The agreement of psychiatric diagnoses between in-person and telemedicine assessment appears to be high, indicating its potential utility[210]. Additionally, telepsychiatry has been found to be cost-effective[211] and appears to be useful as crisis intervention[212]. Hence, various advantages of implementing telemedicine and some evidence for its use in suicide prevention are available. Due to the limited methodologies used in previous studies about telemedicine[205], more high-quality research is required.

During the COVID-19 pandemic, it has become apparent that a large number of visits can be managed on distance[213], that the infrastructure for telemedicine is widely available[213,214], and that the pandemic itself represents an opportunity to expand the use of telemedicine[215]. It has been reported that telepsychiatry may be efficient to screen for mental health symptoms in COVID-19 patients and to optimize treatment[216], or that online assessments are helpful prior to appointments and as follow-up[217]. Continued care is, thus, enabled in a time when the health care systems are overwhelmed[218].

Existing and additional challenges to utilizing telemedicine in mental health care have become apparent as well. New protocols for assessment and therapy must be established quickly[213,217]. Privacy, confidentiality and access issues remain[217]. Quiet places and headphones are required and, in case of limited privacy, yes/no questions should be adopted[217]. These issues may affect certain people more than others. For example, lower socio-economic status may result in smaller living spaces and consequently reduced privacy. Lack of access to electronic devices may occur for elderly patients[217]. Disabilities and technology illiteracy pose a major obstacle to access[219,220]. Social aspects of traditional medical approaches are lost with telemedicine, and this may be a significant problem for some categories of psychiatric patients[221].

The continued evaluation of telemedicine is essential. The infrastructure requires improvement and growth to counter the unique challenges during the pandemic in the short term. The prospect to sustain these changes in the long term and improve care[222,223] is a valuable opportunity that should guide the efforts of policy-makers. Even though evidence for telemedicine designed specifically for suicide prevention is limited, some advantages have already been highlighted[197,203].

CONCLUSIONS

The continued and strengthened implementation of suicide preventive measures during and after the COVID-19 pandemic is of global importance. Suicide prevention should be a priority for policy-makers and health care professionals alike and should not be postponed while facing this pandemic. This paper aims at informing the scientific community, health care professionals, policy-makers and politicians about plausible adaptations and/or reinforcements of evidence-based suicide preventive strategies, which should be undertaken due to the severe impact of the pandemic on everyday life.

The analysis of risk and protective factors shows that most of them are affected and the pandemic may have both positive and negative impacts. However, the negative effect appears to be greater. Thus, the foreseen increase of mental health issues and suicides[9,13-15,17,49-53,224] is likely to happen.

Selecting suicide prevention strategies based on strong evidence remains essential throughout this crisis. However, we face unique challenges due to the need of urgent measures and lack of evidence that indicates how interventions should be adapted. The adaptations and reinforcements may be more effective in some regions or countries compared to others, due to differences in local suicide rates, interventions already in place, the status of the local health care and mental health care system, or local and national policies. Confirmatory research is needed to investigate which adaptations are effective taking the different cultural, economic and health care context into account.

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