

Pandemics and Suicide Risk

Lessons From COVID and Its Predecessors

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Abstract: In its mortality and global reach, COVID-19 is among the worst pandemics to hit the globe since the 1918 influenza. During a pandemic, it is not uncommon for deaths from suicide to be downplayed as communities respond to the immediate mortality of the disease. In this analysis, we review pandemic history to uncover its impact on suicide rates, a frequent proxy for community mental health, and whether public health responses were effective. We incorporate lessons from more than 100 years of epidemics to assess whether the current public health response can benefit from the lessons of history.

Key Words: Suicide, COVID-19, infection, mental health effects, epidemic, pandemic, psychological distress

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The COVID-19 pandemic and its resultant psychosocial effects have made a substantial impact on mental health, from increased depression and anxiety, to insomnia, and to substance use disorder. All of these are associated with increased suicide rates (Lai et al., 2020). As scholars and public health professionals review the epidemiologic consequences of the latest global pandemic, suicide remains a critical indicator of public health. Even before COVID, suicide was the 2nd leading cause of death among US adolescents and young adults and the 10th leading cause of death in the entire US population (Centers for Disease Control and Prevention [CDC], 2018). In fact, from 1999 to 2017, the US suicide rate had been increasing steadily, by 33%, 53%, and 26% among the entire population, men, and women, respectively (Hedegaard et al., 2018). According to the World Health Organization (WHO; 2020), 1.4% of global deaths are due to suicide, with approximately 80% of suicides occurring in low- and middle-income countries. Suicide was consequently the 18th cause of death globally in 2016 (WHO, 2020).

In a pandemic, factors from unemployment, alcohol use, domestic violence, financial stressors, and access to firearms join fear, uncertainty, and pandemic-related stigma to increase the likelihood of a suicide attempt, especially among vulnerable populations or people with preexisting psychiatric illness (Gunnell et al., 2020). History teaches that these psychosocial effects linger even after a pandemic subsides. This analysis reviews the effects of pandemics on suicide in the last 100 years, as well as the impact of public health interventions.

THE 1918–1919 INFLUENZA

The global 1918–1919 influenza pandemic, often incorrectly referred to as the Spanish flu, is similar in many regard to the current coronavirus pandemic. Viruses that caused both pandemics were novel and faced no immunity in the general population. Both pandemics swept quickly across Europe, Asia, and North America, with similar

transmissibility and reproductive rates (R_0) (Petersen et al., 2020). Approximately 500 million people were infected during the 1918 pandemic, with more than 50 million deaths globally, 675,000 in the United States (CDC, 2019a). In asylums, there was a significant increase in rates of first-time hospitalization, with most people suffering from some form of psychosis or other psychiatric complication (Harris, 2006; Keipińska et al., 2020; Mamelund, 2003).

Factors associated with increased suicidality at that time included social isolation, loss of relatives, and medical and psychiatric complications from the flu. Common complications included delirium, depression, psychosis, posttraumatic stress disorder (PTSD), and fear of contracting the virus (Mamelund, 2003, 2017). Reports of suicide from case reports were numerous (Byerly, 2010; Rice and Palmer, 1993; Sethi et al., 2021; Woolley, 1963). A man in Oregon reportedly shot himself in a state of delirium, whereas a physician killed himself because of depression and pain from the infection (Woolley, 1963). A camp commander at an Illinois Army facility took his own life after he witnessed the death of more than 500 soldiers under his command (Byerly, 2010).

Few published studies of suicide are available from the period. Crude rates from the US CDC (1920) and a study by Noymer and Garenne (2000) showed that suicide rates actually decreased in 1920 compared with 1910 (10.2 vs. 19 per 100,000). In 1920, suicide rates were regionally higher in western states and lower in some southern states, with the highest rate reported in California (20.1 per 100,000). In fact, Mississippi, a poor rural state, reported a lower death rate from influenza that year, potentially accounting for its lower suicide rate (CDC, 1920). Death from overall violence, which included suicide, homicide, and motor vehicle accidents, decreased by 27 per 100,000 deaths from 1917 to 1921 (Noymer and Garenne, 2000).

However, these studies did not adjust for other factors that may have reduced suicide, such as decreased alcohol consumption due to the 18th Amendment to the US Constitution (Prohibition) and the Volstead act, which enforced it. World War I (WW I), too, was unaccounted for—an event hypothesized to improve social unity and decrease suicide rates.

To examine these factors, Wasserman (1992) specifically controlled for decreased alcohol consumption and WW I. He estimated that rates of suicide actually increased by 10% (Mamelund, 2017), with most of the suicides occurring during the pandemic or shortly thereafter (Mamelund, 2003). An October 1918 study of suicide rates reported an increase in adjusted suicide rates, so that for every 100,000 deaths, there were 60 additional suicides after adjusting for seasonal patterns and variability (Roehner, 2009). Based on his data analysis, Roehner (2009) concluded that the resulting increase in suicidal rates particularly in October of 2018 was not due to chance and could reasonably be explained by the “sudden mass mortality” due to the pandemic leaving families broken and isolated, especially considering there are data supporting lower suicide rates in marital couples and larger families.

PUBLIC HEALTH INTERVENTIONS IN THE 1918 PANDEMIC

Several public health interventions were critical to the United States' 1918 response. These included making influenza a notifiable condition for public health officials, banning social gatherings, closing

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schools and other public places, isolating and quarantining ill individuals, staggering business hours, and emphasizing mask ordinances and health education (Bootsma and Ferguson, 2007; Hatchett et al., 2007). However, interventions generally lasted only 2 to 8 weeks and were followed in some cities by a second infective wave that tended to be greater than the first. Extending interventions for a longer period would likely have resulted in a more significant decrease in mortality (Bootsma and Ferguson, 2007; Hatchett et al., 2007).

Bootsma and Ferguson modeled historical data to determine whether variation in timing and type of public health intervention across 23 US cities influenced the pattern of the epidemic and its mortality. Not only did they find that states that implemented interventions earlier had lower mortality, but also, they identified social distancing and an organized public health intervention as the strategies most significantly associated with reduced mortality (Bootsma and Ferguson, 2007).

Bootsma and Ferguson (2007) also found that San Francisco, Milwaukee, St. Louis, and the state of Kansas were able to reduce transmission the most, by about 30% to 50%. All these jurisdictions implemented the closing of schools and public places relatively early. There were mask ordinances and antisputting laws in San Francisco and Kansas, respectively, the latter intervention reminiscent of common 19th century efforts against tuberculosis.

Similarly, a study of 17 US cities reported that early implementation of multiple interventions was significantly associated with lower mortality rates—up to 50% lower—compared with cities that implemented interventions later or did not intervene at all (Hatchett et al., 2007). In New York City, officials enforced timely mandatory isolation and quarantine, placing it among the cities with one of the lowest death rates on the East Coast. In Philadelphia, the Liberty Loan Drive famously held a parade on September 28, 1918, to show support and raise money for WW I, gathering a substantial crowd of about 200,000 people. This event caused one of the worst mortality rates in the country, with all the beds in the city's 31 hospitals filled and approximately 45,000 people infected within a week (Markel et al., 2007). Invoking sociologist Emile Durkheim's theory that suicide is largely the result of social disorganization (Durkheim, 1951; JSTOR Daily, 2019), contemporary observers may see a connection between the pandemic and social isolation, loss of loved ones, disruption of daily activities, and financial stress, which resulted in the social dysregulation that increased suicide risk during this period.

THE ASIAN FLU PANDEMIC OF 1956–1958

The Asian flu pandemic began in 1956 in Guizhou province in China and was thought to have originated from waterfowl. It largely affected vulnerable populations like school-age children, pregnant women, and the elderly. In the United States, the disease infected about a quarter of the population, or 45 million people (Henderson et al., 2009). Despite being a less severe pandemic than the 1918 flu, it nonetheless had a fatality rate of 0.13% and killed 1 to 2 million people worldwide. The CDC estimates that 116,000 people died in the United States (although only 6000 deaths were reported at the time) (CDC, 2019d; Perl, 2019). The mortality rate was 10-fold higher than the well-known H1N1 pandemic of 2009, with rates higher in developing countries in Latin America compared with Europe and the United States (Viboud et al., 2016).

Data on mortality, including suicide, is relatively scarce from this pandemic because the disease was less prevalent in developed nations. Moreover, unlike earlier pandemics, a vaccine was developed early and may have resulted in significant mitigation (Little, 2020). This in turn may have resulted in stable suicide rates. Minor suicide upticks were reported in a long-term trend analysis of 1950s rates in England, but this was not clearly attributed to the pandemic (Thomas and Gunnell, 2010).

The public's perception of the pandemic was that the illness was not as severe as reported, with the government apparently downplaying the seriousness of the disease (Honigsbaum, 2020). This approach may

have resulted in less widespread panic and psychosocial stress at the expense of the measures that may have been used to reduce the transmission and mortality of the illness.

PUBLIC HEALTH INTERVENTIONS FOR THE ASIAN FLU PANDEMIC

The United States' public health response was muted during the 1957 pandemic. Epidemiologists struggled to identify whether the 1957 virus was a strain of the 1918 virus or a novel infection entirely (Honigsbaum, 2020). However, proactive efforts by Dr Maurice Hillman at Walter Reed Medical Center yielded conclusive evidence that the virus was indeed a new strain and suggested that a new vaccine be developed immediately (Little, 2020). However, his concern was taken lightly by health officials, including even Thomas Francis, who led the military's prominent Influenza commission. In his biography, *Vaccinated: One Man's Quest to Defeat the World's Deadliest Diseases*, Hillman reported being called "crazy" at the time. He nonetheless circumvented the agency responsible for vaccine development by sending viral samples to six pharmaceutical companies and instructing chicken farmers directly not to kill their roosters because they would be needed for vaccine development (Little, 2020; Zeldovich, 2021).

The mild public health response from the US and UK governments was evident in the absence of strong public health advocacy for face masks, quarantines, border checks, social isolation measures, closure of schools and businesses, and discouragement of large gatherings (Henderson et al., 2009; Honigsbaum, 2020). Not surprisingly, school absenteeism increased, with some areas reaching absences of almost 43%, most likely because of the virus' mild flu-like symptoms and the related fear of contracting it (Henderson et al., 2009). Even though there was increased absenteeism at work, industrial activities remained steady and the economy was not significantly affected.

Hospitals did report an increased number of admissions, but these were not considered "more serious illness than other types of flu," and indeed, US hospital beds did not reach capacity (Henderson et al., 2009). The most successful large-scale intervention was almost certainly the recognition of the need for a vaccine, which was available by the time the virus arrived in the United States (Little, 2020).

THE HUMAN IMMUNODEFICIENCY VIRUS/ACQUIRED IMMUNODEFICIENCY SYNDROME PANDEMIC, 1981–PRESENT

The human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) outbreak of the 1980s resulted in one of the longest pandemics in human history. The virus has infected 75 million people and resulted in 32 million deaths worldwide (UNAIDS, 2020). HIV/AIDS has been diagnosed in every country in the world and there is yet no effective cure. Current medications do substantially reduce the burden of the disease and extend the life span of people living with HIV/AIDS (often known by the acronym PLWHAs). What used to be a death sentence has become a survivable condition. However, despite improving attitudes toward PLWHAs, stigma persists, as does AIDS' status as a multisystemic, multiorgan disease that causes chronic morbidity. Indeed, neuropsychiatric manifestations like HIV-associated dementia, motor/cognitive disorder, and secondary opportunistic infections may leave survivors feeling depressed, hopeless, and suicidal (Dubé et al., 2005; Evans et al., 2002).

Suicide is among the top 10 causes of death among those living with HIV/AIDS, with rates reported between 4% and 8.5% (Croxford et al., 2017b; Lewden et al., 2005; Nishijima et al., 2020). Factors responsible for increased suicide rates range from psychiatric morbidity and chronic pain to secondary manifestations of the disease and medication nonadherence. Intravenous drug use, feelings of stigmatization, depression, low self-esteem, decreased quality of life, despair, social isolation, and loss of finances, insurance, and employment augment

the risk (Ferlatte et al., 2017; Gurm et al., 2015; McDaniel et al., 2000; Ruffieux et al., 2019; Wang et al., 2018; Zarei and Joulai, 2018). The unique role of sex, transmissibility among men having sex with men, and multiple losses among one's social group only add to the disease burden. There are nonetheless opportunities to intervene early because the highest suicide risk occurs in the first year after diagnosis. Psychosocial factors and the general lack of early access to mental health services appear to be highly significant in this pandemic (Croxford et al., 2017a).

In the early years, suicide rates were quite high. In 1985, a New York study that compared suicide rates among PLWHAs and the general population reported that affected men were 36 times more likely than other men aged 20 to 59 years and 66 times more likely than men in the general population to commit suicide (Marzuk et al., 1988). With the improvement in survival and public health interventions like education, targeted research, improved access to care, clean needle programs, and specialized mental health services, the trend has improved over time (Gurm et al., 2015; Ruffieux et al., 2019).

More recently, one study found no difference in suicide rates among white women with HIV/AIDS and the general population, whereas suicide rates in men were now twice that of the general population (Croxford et al., 2017a). Data from the research collaborative North American Aids Cohort Collaboration on Research and Design have shown that suicide rates among black men with HIV/AIDS are now similar to that of the general population, although not to that of white men (Althoff et al., 2019; Croxford et al., 2017a). The unique nature of this pandemic, one not spread by respiratory droplets, may complicate the conclusions drawn from the epidemic, but taking recent data together, it appears that rates of suicide have decreased over time in individuals with HIV/AIDS and that public health initiatives contributed meaningfully to the decline.

PUBLIC HEALTH INTERVENTIONS IN HIV/AIDS

Specific public health interventions provide better access to services and improve the mental health care of PLWHAs. Opioid use is a common comorbidity and appears to be one of the most common means of suicide (Gurm et al., 2015). Some cities have offered clean needle programs and supervised settings to prevent overdose and the transmission of disease (Gurm et al., 2015). The recognition that mental health, especially substance use treatment, is of increased consequence in PLWHA bolsters the provision of early access to mental health services, reducing suicide rates and improving medication adherence (Gurm et al., 2015). Studies from Canada to Australia have shown that increasing mental health services to PLWHAs—including opioid use treatment—decreases both overdoses and mortality (Walsh et al., 2014; Wood et al., 2008).

International communities have found that the development of highly effective antiretroviral treatments with less toxicity and increased tolerability increases longevity, reduces the fear associated with the disease, and improves the quality of life (Gurm et al., 2015). Partnerships between government agencies and private pharmaceutical manufacturers appear critical to these advances. In addition, social acceptance of the disease has improved, so that stigma and social isolation are reduced (Gurm et al., 2015).

One large randomized clinical trial that used mobile health technology to deliver cognitive behavioral therapy (CBT) to an outpatient group of 300 HIV/AIDS patients with depression showed a reduction in suicide ideation and suicide attempts at 6-month follow-up (Li et al., 2019). Other studies have used brief intervention techniques like brief psychosocial intervention and compassion-focused therapy for recently diagnosed individuals and found a reduction in suicidal ideation (Govender et al., 2014; Ogueji and Okoloba, 2020).

These approaches use manualized therapies to target specific thoughts and behaviors. The brief psychosocial intervention, for example,

comprises a 1-hour session administered after a positive HIV test and provides mental health resources, addresses distressing psychosocial and interpersonal factors, and explores potential risk factors for suicide. Compassion-focused therapy reduces mental pain and self-harm by replacing it with compassionate thoughts through mindfulness and imagery. However, the extent to which these interventions decrease actual suicide rates remains an area for future research. Current studies nonetheless highlight the significance of early screening for suicidality and early interventions that provide access to life-saving mental health services.

THE H1N1 SWINE FLU PANDEMIC OF 2009–2010

The H1N1 influenza pandemic was the fourth influenza pandemic of the past 100 years. In the United States, it began in California in April 2009 and, over a year, resulted in 60.8 million infections, 274,304 inpatient admissions, and 12,469 deaths in the United States (CDC, 2019b, 2019c). The exact number of global deaths has been difficult to ascertain, but it was estimated to be as little as 151,000 to up to half a million deaths, with most of these occurring in adults younger than 65 years (CDC, 2019b). It bears many similarities to the 1957 Asian flu pandemic in terms of its seasonal pattern, disease transmission, and the clinical characteristics of patients (Cowling et al., 2010; Henderson et al., 2009).

Certain factors were identified as potentially responsible for worsening mental health outcomes during the pandemic. Specifically, severe disease complications, the lack of effective treatment and vaccine in the initial stages, stigma, conflicting health information from the media, and the isolative ramifications of social distancing led to increased confusion, anxiety, depression, and absenteeism from work (Coughlin, 2012; Cowling et al., 2010; Earnshaw and Quinn, 2013; Luyt et al., 2012; McCauley et al., 2013). The influenza virus itself has been implicated in neuroinflammation or damage to brain tissue, resulting in neuropsychiatric symptoms that could present with suicidal behavior (Jung et al., 2021). The role of oseltamivir, a common treatment at the time, did raise some concerns for increased suicidality but has not been rigorously connected to it (Harrington et al., 2018). Early studies from case reports and observational studies using data from the US Food and Drug Administration's Adverse Event Reporting System showed an increased risk of neuropsychiatric events including suicide, but this was not the case in later studies with improved methodologies (Harrington et al., 2018).

Even though the magnitude of the 2009 influenza pandemic and its mortality were not as great as previous pandemics, suicidality did increase in some studies (Jung et al., 2021; Reeves et al., 2012). A 13-year longitudinal study based on data from South Korea's CDC found a significantly higher risk of suicide after influenza-like illness only in 2009, but not in other years (Jung et al., 2021). A similar relationship was not observed between influenza and nonsuicide death.

In the United States, suicide rates were on the rise during the time, possibly because of the economic recession; there was an excess of 1580 suicides per year between 2008 and 2010 (Reeves et al., 2012). However, unemployment alone was estimated to account for only one-third of the increase (Reeves et al., 2012). An Illinois case control study using data from 2009 to 2013 found no association between influenza infection and suicide-related events in children younger than 18 years (Harrington et al., 2018). However, one major caveat was this study's retrospective nature and the possible underreporting of suicides because the study relied on insurance claims rather than health services data (Harrington et al., 2018). Nonetheless, rates of suicide were significantly lower compared with the HIV/AIDS and 1918 pandemics. H1N1 was notably less lethal and did not create as significant psychosocial stressors. Consequently, it is likely that the 2009 pandemic did not instill the same sense of fear, hopelessness, and social deprivation that was present during other pandemics.

PUBLIC HEALTH INTERVENTIONS IN THE 2009 SWINE FLU PANDEMIC

In the early 2000s, both the WHO and European Union encouraged general prevention measures against flu viruses, including handwashing, respiratory hygiene, and social distancing (Crosier et al., 2015). Social media and traditional news media like TV and print were essential in disseminating public health information. In Europe, however, reports of uncoordinated intervention, inadequate involvement of policymakers, and a lack of an “emergency mindset” did adversely affect the emergency response (Crosier et al., 2015).

In Italy, England, and Hungary, for example, the public's attitude was not assessed to determine the nature and content of the health information that should be disseminated—a strategy endorsed by public health officials (CDC, 2019c). Indeed, there was no effort in these countries to target specific public health messages to specific communities (Crosier et al., 2015). There seemed to be a concerted lack of interest in evaluating the effectiveness of public health campaigns (Crosier et al., 2015). As in 1957, the single most effective intervention was the early development and administration of the H1N1 vaccine, which became available in September of 2009 (CDC, 2019c).

In the United States, a 2010 report by the National Biodefense Science Board, a prominent federal advisory group, provided recommendations to the US Department of Health and Human Services (HHS) for integrating mental health services into disaster preparedness and mitigation efforts (Pfefferbaum et al., 2012). Its recommendations included providing access to early mental health intervention, especially to vulnerable populations in emergency departments. Recommendations extended to educating and training health care workers on the need to address mental health needs during a pandemic, paying attention to the delivery and content of public health messages utilizing varied platforms and appropriate terminologies, and emphasizing that vulnerable populations may be at higher risk for serious outcomes and require more mental health support.

THE CORONAVIRUS PANDEMIC, 2019–

As of June 2021, the COVID-19 pandemic had infected 181 million people globally, and 33.6 million people in the United States. Approximately 604,000 US deaths have occurred among 3.93 million worldwide. The psychological sequelae for survivors and their families are significant. Fear of death, decreased quality of life, medical complications like stroke, and compromised respiratory function among survivors create recognizable stress and fear (Gavriatopoulou et al., 2020). Patients with preexisting mental illness, their family members, and health care workers alike are all vulnerable to deteriorating mental health (Sher, 2020).

A CDC computer-based survey of 5412 individuals in June 2020 found significantly higher reports of suicidal thoughts in the past 30 days among young adults 18 to 24 years old, minority groups, essential workers, unpaid adult caregivers, and individuals already receiving treatment for depression, anxiety, and PTSD (Czeisler et al., 2020). Indeed, the overwhelming number of COVID cases had already led to the shutdown and restructuring of certain mental health services (Bojdani et al., 2020). Some programs in hard-hit areas closed, whereas others provided their services remotely (Bojdani et al., 2020; Dickson, 2020). Subsequently, a prominent review in the *Journal of the American Medical Association* using CDC data found a 5.6% decrease in suicide deaths between 2019 and 2020, although the data were not yet analyzed by vulnerable groups (Ahmad and Anderson, 2021).

At one time during the pandemic, New York City had to close down or repurpose 542 psychiatric beds and 403 drug treatment and rehabilitation beds (Ramachandran, 2020). In Kingston, New York, for example, there were concerns that some bed closures may have contributed to the notable rise in opioid related deaths and suicide rates (Ramachandran, 2020). Such drastic moves led to a strain on available mental health services and accusations of premature discharge.

The Wall Street Journal reported the poignant story of a former community health worker and another patient recounting their suicide attempts by overdose after they were discharged from the hospital (Ramachandran, 2020). Similarly, the grandparents of a 24-year-old teacher diagnosed with schizoaffective disorder and opioid use felt that their granddaughter was prematurely discharged when she was found dead from a heroin overdose (Ramachandran, 2020).

Although remote technologies used throughout the pandemic clearly decreased exposure to the virus, decreased costs, and provided long-distance mental health support, the technologies may actually be a barrier to those who fear for their privacy or who have difficulty accessing Internet services (Batra et al., 2020). Studies do underscore the similarity of telepsychiatry and in-person outcomes, from quality of care to patient satisfaction (Sharp et al., 2011; Sunjaya et al., 2020; Zaylor et al., 2001). Tellingly, US telehealth services have advanced considerably during the pandemic, probably because the technology has long been available and underutilized (Severe et al., 2020). In recognition of its utility, the easing of telehealth restrictions across state lines and improved insurance coverage have increased telehealth's versatility (Severe et al., 2020). A recent survey by the American Medical Association (2020), for example, reported that 75% of health care providers were satisfied with the quality of care they provided using telehealth service during COVID-19. In fact, nationwide US surveys reported that 60% to 65% of patients would like to continue with telehealth services even after the pandemic is over (Harmony Healthcare, 2020; Healthcare Financial Management Association, 2020).

At the same time, several well-reported events underscore the terror caused by the current pandemic. A COVID diagnosis was the final straw for a 66-year old man with throat cancer; he hanged himself immediately after being diagnosed with the infection (Moore and Bensimon, 2020). In Illinois, a man shot his girlfriend and then turned the gun on himself because of fear of the virus. Both tested negative at autopsy (Garger, 2020). The suicide of New York City emergency physician Lorna Breen was a heartbreaking example of a provider and COVID survivor who took her life shortly after returning to work (Rosner and Sheehy, 2020). A 23-year-old emergency medical technician in New York likewise committed suicide because of the cumulative trauma of taking care of COVID patients (Rosner and Sheehy, 2020). Neither clinician had a history of mental illness but had been telling friends and family about their distress on the front lines.

As in the 2009 Swine flu pandemic, there have been concerns about increased risk of suicide because COVID-19 can cause long-term neuropsychiatric manifestations from neuroinflammation. Neurocognitive deficits were found in 73% of patients who developed acute respiratory distress syndrome and persisted for up to 2 years in 47% of patients with acute respiratory distress syndrome (Sher, 2021). Indeed, neurological complications including headaches, dizziness, seizures, as well as physical symptoms such as pain, cough, and fatigue may persist beyond the acute phase of the illness. Like SARS-COV1, SARS-COV2 increases the risk of developing psychological sequelae, including neurocognitive impairment, anxiety, PTSD, and depression, with rates of PTSD (33%) and depression (43%) much higher among patients treated in the intensive care unit (Sher, 2021). Because chronic pain, seizures, and untreated neurological and psychological sequelae are all risk factors for suicide, monitoring, continuous surveillance, and prompt intervention for neuropsychiatric complications beyond the acute phase of the illness remain important.

Recent surveys in China and the United States show that 35% and 45% of the population, respectively, have reported psychological distress from the pandemic (Panchal et al., 2020; Qiu et al., 2020). This includes fear of contracting the virus, fear of isolation, financial difficulties, and bereavement from the loss of a friend or relative (Ahmed et al., 2020; Hao et al., 2020; John et al., 2020a; Xiao et al., 2020). Consequently, reports of depression, anxiety, insomnia, domestic violence, anger and impulsivity, and alcohol use have been increasing (Czeisler et al., 2020; Lai et al., 2020; Li et al., 2020). These factors independently worsen suicide rates.

A US market research firm noted a jump in annual alcohol sales—a marker for certain mental health outcomes—by 55% at the end of March 2020. There was a related increase in overall 2020 sales by 243% (Associated Press, 2020). Firearms purchases, too, increased by 85% in March of 2020, compared with March of the previous year (Small Arms Analytics, 2020), an alarming increase for an instrument frequently used in suicide. These findings underscore the presence of psychological distress.

Data on suicide rates by geographical location have been more equivocal. John et al. reviewed five studies that utilized statistical modeling to identify the potential impact of the pandemic on suicide rates (two US, one Swiss, one Canadian, and one international). The studies made different assumptions but focused mainly on unemployment rates and the impact of physical distancing. The models predicted a rise in suicide rates by 1% globally and 145% in Switzerland (John et al., 2020a). Similarly, data from a nationwide CDC survey in June 2020 reported an increased prevalence of suicidal thoughts in the previous 30 days compared with 2018 (10.7% vs. 4.3% in 2018) (Czeisler et al., 2020).

However, in France, a study of emergency psychiatric consultations during the first few weeks of lockdown noted a 45% decrease in psychiatric visits overall and a 42% decrease in suicide attempts compared with 2019 (Pignon et al., 2020). A time-series analysis in Queensland, Australia, that followed suicide rates from 2015 to 2020 found no increase in suicide rates for 7 months following the declaration of a state of emergency in February 2020 (Leske et al., 2021). In the United States during the March and April lockdowns, data from various emergency departments in the Midwest found that suicidal thoughts decreased by 60% compared with the same period in 2019 (Smalley et al., 2021).

Although rates of suicide have also been decreasing in countries like Norway, there was a notable turnaround in Japan reflecting what the authors described as an initial “honeymoon period” (John et al., 2020b). Longitudinal follow-up will be required to ascertain the true effects there and elsewhere (John et al., 2020b). Taken together, several local influences may be at play, including factors like mortality, level of preparedness, membership in a vulnerable group, varying pandemic effects in different countries, the stage of the pandemic in relation to the time the study was conducted, and the prevalence of predisposing factors.

PUBLIC HEALTH INTERVENTION IN THE CORONAVIRUS PANDEMIC

The US Substance Abuse and Mental Health Services Administration, a leader in public sector efforts, has provided specific mental health guidelines to address the pandemic, particularly tips for quarantine. These range from psychoeducation on symptoms of stress and anxiety, how to advocate for and obtain relevant information, to the importance of seeking help from employers and health care professionals and maintaining face-to-face connection through social media platforms (Substance Abuse and Mental Health Services Administration, 2020). In line with the findings of increased suicidal ideation, the CDC also provided recommendations for improving mental health outcomes, including (1) identifying populations at risk and improving their access to mental health services (e.g., by expanding telepsychiatry); (2) reducing economic hardship and improving social connectedness and racial equality; (3) improving communication strategies that promote emotional well-being; (4) designing screening instruments that identify trauma and facilitate early intervention; (5) routinely evaluating suicidal ideation, substance abuse, and psychological distress; and (6) addressing mental health disparities and bolstering support systems for mental health consequences (Czeisler et al., 2020).

International and US experts have also provided guidance for combatting the increased suicide risk among vulnerable groups (Gunnell et al., 2020; Leane et al., 2020; Sher, 2020). Because elders and individuals in

nursing homes are especially vulnerable, there are specific psychotherapies designed for their use. Zeppegno et al. (2019) are among those studying various interventions for the elderly. For example, Problem Adaptation Therapy uses a problem-solving strategy alongside a compensatory strategy (e.g., signs, labels, and electronic devices to compensate for cognitive impairment) and environmental modifications to help treat depressive symptoms, whereas Supportive Therapy for Cognitively Impaired Older Adults utilizes Rogerian techniques like empathic listening, encouragement, and understanding (Zeppegno et al., 2019).

Suicide prevention helplines can incorporate psychosocial support and brief counseling to ease the use of mental health facilities already strained by underfunding (De Leo et al., 2002). Easy access to telepsychiatry services is already a focus of US federal efforts to improve their use (Centers for Medicare and Medicaid Services, 2020). Providing inexpensive improved access to Internet hotspots and expanding telehealth resources by limiting restrictions across state boundaries are essential elements of these efforts, especially in rural areas.

Public health research during pandemics also emphasizes the control of specific risk factors. First of all, reducing access to firearms occurs through one program called Counseling on Access to Lethal Means (CALM). Among suicidal patients with access to lethal means admitted to an urban US emergency department, 75% of those completing CALM reported having a specific plan for locking up their weapon at discharge (Mueller et al., 2020). Second, reducing alcohol use can be linked to providing information on safer drinking and access to resources for alcohol use disorder. In line with this approach, the US Preventive Services Task Force recommends the Screening Brief Intervention and Referral for Treatment for alcohol use disorder, a tool associated with a reduction in alcohol consumption in both primary care and emergency care patients (Kelly-Weeder et al., 2011). Third, reducing financial strain and domestic violence by government intervention and services to victims of domestic violence is an acknowledged suicide-prevention strategy. A systematic review of randomized clinical trials supported CBT and community-based advocacy and counseling programs for victims of domestic violence. Brief psychosocial intervention was not effective (Eckhardt et al., 2013).

Lastly, efforts have been made to reduce irresponsible media reporting (Moutier, 2020). In September 2019, the WHO published specific guidelines for reporting and portraying suicide in the media and telecommunications industry (WHO, 2019). These focused on use of appropriate language, avoiding extreme graphic scenes, displaying positive narratives that demonstrate protective factors such as resilience, valuing support systems and how to access them, and inviting the opinion of suicide prevention experts, mental health professionals, and individuals with lived experience (WHO, 2019).

Despite these many efforts, commentators report that more could have been done during the current pandemic. Responses were delayed and politicized in the United States and elsewhere. The US Assistant Secretary for Preparedness and Response, Dr Robert Kadlec, delayed convening a planning meeting with stakeholders for example. Whistleblower Rick Bright of the HHS and head of the Biomedical Advanced Research and Development Authority was fired for demanding that billions of dollars be invested in the development of vaccines and therapeutics (Office of Special Counsel, USA, 2020). Indeed, HHS delayed briefing the president on the significant threat of the pandemic (Office of Special Counsel, USA, 2020). In addition, the pandemic protocol provided by the previous administration’s National Security Council Directorate for Global Health Security and Biodefense was ignored. Previous experience dealing with H1N1 and Ebola could have been put to good use (*The Washington Post*, 2020).

Nonetheless, once the first case of COVID-19 appeared in the United States on January 20, 2020, the CDC was able to develop and obtain Emergency Use Authorization for diagnostic testing (*The New York Times*, 2020b). But a problem with one of the test components suspended ongoing efforts. This too delayed screening and tracking (*The New York*

Times, 2020b). The lack of collaboration with private laboratories and with the WHO, which could have bolstered testing, worsened this setback (*The New York Times*, 2020b).

It was not until Feb 26, 2020, that US testing was allowed to continue at full speed. By the end of the year, it was still not sufficiently available to meet public demand (*The New York Times*, 2020b). Moreover, a shortage in the supply of essential personal protective equipment and testing swabs recurred with every surge. Because most N95 masks in the United States are imported, access to supplies slowed as nations stockpiled their resources (Cohen and van der Meulen Rodgers, 2020). Health care workers were forced to use expired and makeshift masks and improvised gowns and face shields as a result. In the absence of a coherent national response, individual states were left bidding against each other in the open market. The spread of misinformation about therapeutics, especially hydroxychloroquine, only added to the chaotic response (*The New York Times*, 2020a).

At the same time, countries like South Korea (with an admittedly more communitarian culture) were proactive in tracking and implementing strict quarantines (Kang et al., 2020; Lee and Lee, 2020). South Korea quickly manufactured rapid test kits and implemented nationwide COVID-19 testing (Kang et al., 2020). Mobile GPS technology aided contact tracing and identified exposed citizens (Lee and Lee, 2020). South Korea specifically implemented booth and drive-through testing to limit spread in health care workers (Kang et al., 2020; Lee and Lee, 2020).

New Zealand was also able to control viral spread by enhancing its epidemic surveillance. By April 2020, New Zealand had reduced the time from onset of symptoms to notification from 9.7 days to 1.7 days and was able to isolate people an average of 2.7 days before illness onset (Robert, 2020). Officials also realized that most transmission chains were from imported cases, with the highest incidence in tourist areas. They quickly closed their borders in March 2020, with only a handful of confirmed cases across the country (Brookings, 2021; Robert, 2020). New Zealand eliminated spread of the virus in May and reopened the country in June (Brookings, 2021). Even after subsequent outbreaks, New Zealand has been able to maintain a relatively low number of cases owing to the strict rapid implementation of public health measures (Brookings, 2021). As of May 2021, New Zealand has recorded approximately 2600 cases and only 26 deaths.

Contemporary modeling techniques indicate that the impact of different public health interventions such as school and business closure, avoidance of large gatherings, and stay-at-home orders were effective at reducing the spread of the virus. However, these measures were not applied equally in specific countries (Brauner et al., 2021). South Korea, for example, implemented a stay-at-home order on February 23, 2020, relatively earlier than most other countries, including middle-income jurisdictions like Brazil and Puerto Rico (Pirkis et al., 2021). Like the United States, the Brazilian government did not appear sufficiently politically motivated to implement public health measures quickly.

A study that compared suicide rates among 21 countries from April 1 to July 31, 2020, found higher rates of suicide in Brazil compared with pre-COVID (January 1 to March 31, 2019), although the finding was not statistically significant (relative risk [RR], 1.78; 95% confidence interval [CI], 0.80–3.97) (Pirkis et al., 2021). However, the only jurisdictions with a significantly higher risk of suicide during the pandemic were Puerto Rico (RR, 1.29; 95% CI, 1.05–1.58), Japan (RR, 1.05; 95% CI, 1.04–1.07), and Vienna, Austria (RR, 1.31; 95% CI, 1.08–1.59). There was a nonsignificant increase in suicide rates in New Jersey in the primary analysis (RR, 1.13; 95% CI, 0.99–1.28), but the suicide rate was notably higher in a supplementary analysis (RR, 1.18; 95% CI, 1.05–1.34) (Pirkis et al., 2021).

Countries like South Korea and New Zealand with early interventions did not witness an increased risk of suicide (Pirkis et al., 2021). Indeed, in a more recent study in South Korea, the authors did not find a significantly increased risk for suicide during COVID-19 versus pre-COVID

periods (Lee et al., 2021). However, this does not imply that only early implementation of public health measures accounted for low suicide risks: history has shown that other societal factors, including economic/financial stress, the public's response to the pandemic, and general psychological impact, are equally important.

CONCLUSION

Different pandemics across time vary in their effects on suicide risk factors, while public health interventions offer a well-established repertoire for protecting the public. Overall, suicide rates appear higher when a pandemic is associated with a rapid increase in mortality, social stigma, and a decreased quality of life—as in the 1918 influenza and AIDS epidemics.

The persistent COVID-19 pandemic is second only to the 1918 flu in its mortality, and public health responses vary widely (Petersen et al., 2020). Poor political will, lack of coordinated effort, and partial implementation of public health recommendations play a clear role in encouraging the further spread of the virus. Unlike previous pandemics, however, the availability of efficacious vaccines (Pfizer, 2020) is promising and can augment time-tested strategies like masking, distancing, and hand-washing. Modern strategies like telemedicine and targeted therapies for mental health increasingly enhance access, screening, assessment, and support. Conducting virtual group therapy sessions, Internet-based CBT, and individually tailored programs that provide Internet-based social activities or just communicating with family members virtually have been shown to improve mood, anxiety, and feeling of loneliness in elderly and socially isolated individuals (Gorenko et al., 2021). Consistent implementation of public health measures that train health care workers to conduct early screening and intervention for mental health conditions, improve access to rehabilitation services for alcohol and opioid use, and implement supports during quarantine remain critical interventions that reduce both the spread of infection and subsequent suicide rates.

DISCLOSURE

The authors declare no conflict of interest.

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