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Suicide prevention efforts in the United States and their effectiveness

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Purpose of review

Suicide is a serious public health problem in the United States, and suicide rates have been increasing for more than a decade. Rural areas are more impacted than urban areas, reinforcing that social, cultural, and economic factors contribute to risk. This article reviews recent work about these contributors to suicide and how they may inform prevention efforts.

Recent findings

Current research has shown that suicide is more than a mental health problem with a psychiatric or medical solution. Universal screening and referral by gatekeepers target a large group with a low baseline risk, and there are few treatments proven to reduce death by suicide, as well as a severe shortage of mental health providers in the United States to provide them. Instead, suicide prevention polices can target various other factors that contribute to elevated suicide risk at the population level, including reducing socioeconomic deprivation and access to firearms, both of which are often higher in rural areas. Internet-based interventions also hold promise as they are highly scalable, accessible almost anywhere, and often anonymous.

Summary

Understanding factors that increase suicide risk guide development of evidence-based policies targeted at high-risk groups. Population-level interventions should be developed in collaboration with the target audience for cultural appropriateness.

Keywords

cultural competency, firearm, lethal means, social determinants of health, suicide

INTRODUCTION

Suicide is a serious public health problem in the United States, with 48,344 Americans taking their own lives in 2018. It is a leading cause of death across all age groups, and the second most common cause among young adults ages 10 to 34 years. For each completed suicide, an estimated 29 attempts are made [1,2]. The suicide rates in the United States rose nearly 30% from 1999 to 2016 [3], and continues to increase.

However, rates of suicide are not evenly distributed across the nation. Rates in the most rural areas were higher initially in 1999 and accelerated more quickly beginning around 2007 [3]. Alaska and states in the intermountain west (Wyoming, Montana, Colorado, Idaho, Utah, and New Mexico) have the highest rates of suicide nationally, and are among the most rural [4]. This finding is corroborated by a study that looked at rates in youth from 1996 to 2010. It found higher rates of youth suicides in rural areas than in urban. This disparity increased

over the study period, and the use of firearms was more prevalent in rural areas [5].

Suicide is also unevenly distributed across demographics. The lowest rates are among Blacks, Hispanics, and Asian/Pacific Islanders, with higher rates among whites [3]. American Indian and Alaska Native people, the majority of whom live in non-

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KEY POINTS

- Suicide is a problem with psychiatric, social, economic, and cultural roots, thus prevention efforts must be accordingly broad in their approach.
- Rural areas in the United States have higher rates of suicide, likely reflecting higher rates of economic and social deprivation, and higher rates of access to firearms.
- Individual prevention efforts that provide frequent check-ins or other contact, internet-based therapy, or screening and referral to services show promise for rural areas especially those that are easily scalable and offer a degree of anonymity (iCBT).
- The efficacy of screening and referring for suicide prevention may be limited by the severe shortage of providers and facilities in rural areas.
- Lethal means safety has been consistently shown to reduce suicides and must be culturally sensitive and acceptable to the target audience: gun owners.

urban areas have the highest rates by race/ethnicity; suicide is the second leading cause of death in this group [6].

Firearms continue to be a considerable contributor to suicide rates in the United States. Age-adjusted firearm suicide rates, along with non-firearm suicides, increased almost every year during the time period of 2007 to 2018. Age-adjusted firearm suicide rates also increased with increasing county rurality, and were higher among men and older adults [7].

This overall rural–urban disparity in suicide risk in the United States likely reflects multiple cultural, social, and economic factors that contribute to suicide risk, in general. It also has important implications for prevention efforts.

EVIDENCE FOR SUICIDE PREVENTION PROGRAMS AND APPLICABILITY TO RURAL AREAS

Many of the suicide prevention programs in which we have invested heavily as a nation lack good studies supporting their efficacy, likely because of a combination of factors. First, suicide is a relatively rare event, and investigations can be difficult to design in a way that would detect a change in the outcome studied (suicide deaths).

Second, many programs focus on gatekeeper training (GKT) and subsequent referral of people at risk into a system of care. This requires extensive training of gatekeepers, retention and utilization of the information taught, and a system which has the capacity to accept and treat the referred patients.

There is little support for their efficacy in the United States as the intervention is aimed at a large group of people with a low base rate of suicide. Trained gatekeepers have few opportunities to use their skills, which then degrade over time. One potential way to address this is to identify and train gatekeepers who are motivated to voluntarily acquire such training and focus on training those who work with a higher risk segment of the public [8].

A systematic review of the long-term efficacy of such programs was conducted and 23 articles met the following inclusion criteria: studies involved a suicide-specific program intervention, and pre-training, post-training, and follow-up training must have been delivered to general members of the community. Knowledge of how to identify an at-risk individual and intervene was the most continuous outcome measured in the included GKT evaluations (78%), followed by self-efficacy (70%). Behavioral intention and attitude towards suicide risk assessment and intervention were measured in 35% and 29% of the included articles, respectively. The highest rates of improvement were seen on measures of knowledge and self-efficacy, though these both decreased over time, with less impact on provider attitudes. The improved knowledge and self-efficacy, however, did not translate well to a change in behavior (i.e. more interventions). The authors conclude that GKT may have a larger impact on behavior if it can change the attitudes of the provider in addition to increasing their knowledge and self-efficacy [8].

These types of approaches have been shown to be promising for reducing suicides in the US military as well as in other nations [9,10]. However, another shortcoming of their use for the general population of the United States is that once people at risk are identified, there is often not a coordinated system of care to respond to their needs. Due to lack of provider availability, fragmented systems of care, and lack of insurance coverage, referrals to services often do not translate to receiving services. This problem may be even further exacerbated in rural areas, where mental health professionals are in dire shortage. Additionally, the ‘rugged individualism’ mentality in many such areas may decrease people’s willingness to access care when it is available.

A third factor may be the overall lack of effective treatments. Despite 1 in 10 Americans taking them, there is no evidence that antidepressants like SSRIs reduce suicide. Lithium and clozapine have been shown to reduce suicides in bipolar disorder and schizophrenia, respectively [11,12]. However, these disorders are relatively rare, and while they each carry an elevated risk of suicide, they constitute only a small number of people over all who end their lives.

One treatment that has been shown to be effective in reducing suicidal thoughts and behaviors is cognitive behavioral therapy (CBT). CBT, including a specific subtype called dialectical behavioral therapy (DBT), is a structured, manualized therapy practice that requires consistent engagement for multiple weeks. Access to long-term weekly therapy can be a barrier to many patients for financial and logistical reasons, and therapists are often in short supply. However, internet-based cognitive behavioral therapy (iCBT) shows promise in reaching a larger audience, particularly in rural areas where the few mental health providers may be long distances away.

One recent meta-analysis examined six unique randomized clinical trials of 1567 participants. Eligible RCTs used internet-based self-help interventions (ISIs) that directly targeted suicidal ideation, were primarily delivered online, and were based on psychological elements. Additional inclusion criteria included control groups receiving usual treatment, placebo, no intervention, active or passive treatment, or a wait-list group. All eligible studies had to report a quantitative measure of a suicide-specific outcome. Individuals who met a threshold measure of suicidality participated in an online program that targeted suicidal ideation or behaviors with a psychological framework.

Two of the treatments in the analysis were 'guided', meaning part of the program was administered by a therapist, whereas the rest were entirely online. The treatments consisted largely of homework modules that focused on anxiety reduction, mood regulation, and modification of automatic thoughts. The authors found that participants in the iCBT interventions showed significantly reduced suicidal ideation after intervention compared with controls [13[■]]. An Australian meta-analysis of self-guided digital interventions targeted at reducing suicidality found a similar reduction in suicidal ideation [14[■]]. These trials did not measure a reduction in suicide deaths overall.

Unguided iCBT programs show particular promise as they are highly scalable to reach large numbers of people with suicidal ideation, thus are feasible, low-risk, economical interventions even with a high number needed to treat (NNT). Additionally, people with suicidal ideation may be more likely to accept anonymous, online interventions than in-person care. This may be an especially important approach in rural communities with few providers [13[■]].

BACKGROUND INFO ON ELEVATION IN RURAL AREAS

One recent cross-sectional study examined adult suicide rates by county in the United States and

how they changed during 1999 to 2016. For the purposes of this study, rural–urban continuum codes (RUCC) were condensed to the following four categories: large metropolitan counties, small metropolitan counties, micropolitan counties, and rural counties. They also created indices for societal factors known to contribute to suicidal ideation at an individual level. These included a deprivation index, which took into account level of education, unemployment rates, income, poverty, and use of public assistance; a social capital index, which took into account arts, nature, and sports facilities, and civic, social, and religious organizations; and a social fragmentation index that took into account number of renters, housing turnover, and single residents. They also measured age, sex, race/ethnicity, number of veterans, amount of health insurance coverage, and number of gun retailers in each county.

The authors found an increase in suicide rates in all county types, and with the greatest and most rapid increase in more rural counties. The regions with the highest rates were the intermountain west, Appalachia, and the Ozarks. An increase in county-level suicide rates was also associated with higher deprivation, higher social fragmentation, lower social capital, higher availability of gun shops, and a greater proportion of veterans and an uninsured population residing within a county. Increases in the presence of gun shops had a stronger association on the increase in suicide rate in urban counties than it did in rural ones, though in general, more gun shops were associated with more suicides [15[■]].

OTHER RISK FACTORS

Suicide is commonly perceived as a psychiatric problem, and solutions are sought through mental health avenues. However, there is little evidence to support such a one-dimensional approach. Psychiatric disorders are not more prevalent in rural areas of the United States [16]. Therefore, other factors that vary between rural and urban areas, including those discussed in Steelsmith, *et al.* (2019), must contribute to the higher rates of suicide.

Access to care

One possible contributor is lack of access to mental health services. Although the prevalence of mental health disorders may not be higher in rural areas, access to practitioners is much more limited. In rural US counties, there are approximately 2.2 psychiatrists per 100 000 people, in contrast to 612 psychiatrists per 100 000 people in New York [17[■]]. Eighty percent of rural counties have no psychiatrist at all,

and 94% have no community mental health facilities [18,19]. This means that not only is it difficult for residents to access treatment for disorders that increase their risk of suicide, there are few hospitals for them to go to in times of suicidal crises.

One study examined behavioral health treatment capacity (measured by behavioral health workers) over time and across the United States, and compared it with changes in firearm suicide rates. Using the state-year as the unit of analysis, authors gathered data from five nationally representative health and labor surveys to construct a state-year panel of repeated cross-sections for the 50 states and the District of Columbia. The final data set covered three-time intervals, 2005, 2010, and 2015 with 153 state-level observations. Number of firearm suicides, obtained from WISQARS, was the primary dependent variable. Measured per state-year, the annual behavioral health workforce size was the primary explanatory variable of interest. This measure was composed using occupational codes (e.g. clinical, counseling, and school psychologists or substance abuse and behavioral disorder counselors) from the Bureau of Labor Statistics Occupational Employment Statistics program. Additionally, study authors examined the annual number of outpatient substance use treatment facilities using data from National Survey of Substance Abuse Treatment Services. They concluded that for every 10% increase in the mental health workforce, there was a 1.2% reduction in firearm suicides, the most common method of suicide in the United States. Given the difficulties in achieving that scale of workforce increase, they suggest that focusing on reducing high-risk people's access to firearms would be a more immediate and more economical approach [20¹¹].

A meta-analysis of 14 brief suicide prevention interventions indicated some promise for reducing future attempts. Of these 14 articles, 7 were analyzed for subsequent suicide attempts, 9 for linkage to follow-up care, and 6 for depressive symptoms at follow-up visits. The interventions analyzed included four main components: brief contact (telephone calls, handwritten notes, text messages), care coordination (scheduling follow-up outpatient mental health appointments), safety planning, and other brief therapies. Validated patient self-reporting and medical record review were used to measure subsequent attempts and linkage to follow-up care. Pooled data showed that such brief interventions reduced number of subsequent suicide attempts and increased contact with follow-up care, though no effect was seen on the third outcome studied, depressive symptoms. Two of the studies took place outside the United States, four were in the

Veteran's Administration, and three were in a pediatric setting. The settings are significant, as connecting patients at risk with providers and mental health systems was a primary strength of the interventions, and these connections may be more readily accessible to those populations than to the general adult population of the United States [21¹²].

Firearms

Access to firearms is an important independent risk factor for suicide. Firearms are used in less than 10% of suicide attempts but more than half of completed suicides. This is largely because of the high-case fatality rate of guns: approximately 90% of attempts made with a firearm are fatal, compared with less than 5% of overdose attempts [22¹³].

States with higher rates of firearm ownership and fewer regulations governing firearms have higher suicide rates, though this relationship may not be causal [23]. However, one study showed that after other factors were accounted for, the presence of a firearm in the home increased the risk of suicide of one of the household members by a factor of 3.2 [24]. Another study found that this relationship between firearm ownership and suicide was twice as strong among adolescents as it was for adults [25¹⁴].

LETHAL MEANS ACCESS REDUCTION

As the multiple contributing factors to suicidality can be difficult to identify and address before a person makes an attempt, one of the most effective ways to reduce suicide is to ensure that any attempts made will not be lethal. Various strategies can be employed to put time and distance between a person at risk of suicide and their firearms. These range from temporary, voluntary relinquishment to involuntary removal and purchase prohibition. Known as lethal means restriction or lethal means safety, decreasing people's access to methods of suicide with high fatality rates has been shown to be an effective method of suicide prevention at the individual level.

One study used population and firearm data from the US Census to derive a simulated US national sample of firearm-owning households where youth reside. They conducted a Monte Carlo simulation, a quantitative risk analysis technique, using 2015 data on youth (0–19 years of age) firearm suicide and unintentional injury. Study authors created a death indicator variable equal to the number of observed 2015 youth firearm suicides ($n = 1017$) and youth unintentional firearm deaths ($n = 100$). They used this modeling to test a hypothetical intervention, safe storage of firearms in the

home, then estimated the reduction in youth firearm suicide and unintentional death by firearm if firearms in the home had been stored locked and unloaded by adults in the households. Findings from the modeling suggest that if 20% of households locked all household firearms, then youth firearm deaths (which are mostly suicides) would decline by up to 32%. This study underscores the importance of discussing safe storage of firearms in the home with parents [26¹¹].

Counseling patients about access to lethal means is often framed within the context of healthy lifestyle advice, much as pediatricians might counsel about car seats, swimming pools or bicycle helmets. However, there are some significant differences. Firearms are viewed by many as more than just a tool; they are also symbolic for many owners. Firearms are an important part of their identity and represent values like freedom, independence, and the ability to keep themselves and their family safe. Understanding this is crucial for providers who wish to advise about safe storage or other risk-reducing interventions.

One study assessed the relationship between reasons for firearm ownership and the belief that firearms contribute to suicide risk, the willingness to safely store or remove firearms to reduce that risk, and storage methods. Researchers asked a sample of 300 American firearm owners (53.0% men; 82.3% white; $M_{\text{age}} = 36.11$, age range = 20–69 years) to complete an online survey. Self-protection was the most commonly cited reason for ownership, reported by 65.3% of survey respondents. Approximately 19% reported owning a gun for hunting or other recreational purposes [27¹²]. This finding is consistent with that of a second study, which showed that recreational gun ownership in the United States has decreased over the last two decades, while ownership for self-protection has increased and is now the most common reason [28¹³].

The first study also found that overall, few gun owners believed that firearm ownership and storage practices were linked to suicide risk. This belief was significantly lower among those who owned a gun for protection compared with those who owned for other purposes. Those who owned for protection were also less willing to engage in lethal means safety practices, such as storing firearms securely or removing them from the home, and were more likely to store their guns loaded [27¹²].

This study highlights the importance of culturally specific counseling about lethal means safety with firearm owners. Clinicians should first establish the context of why they are initiating such a conversation, and that it is about health and safety, not politics. They should then seek to understand

the reasons the person owns firearms, and the meaning of guns to them. Then they should take a collaborative, tailored approach that respects the needs and belief system of the person at risk.

One survey-based study sought to determine, which culturally specific suicide prevention messages would be more effective at restricting firearm access during suicidal crises for those who are politically conservative, champion gun rights, and live in rural areas. The authors conducted focus groups and interviews with rural gun owners to help them craft a culturally appropriate message about suicide prevention and firearm access. Results showed that gun owners, especially those individuals who strongly identified as conservatives and advocated for gun rights, were most impacted by culturally-specific messaging on voluntarily reducing firearm access, compared to other interventions. Therefore, it is essential to use a culturally specific framework for public health messaging to reach at-risk populations when promoting firearm restriction for suicide prevention. [29¹⁴].

In order to study firearm-specific lethal means safety interventions, a pilot RCT enrolled 96 college students between 18 and 31 years of age who had a history of suicidal ideation and were familiar with firearms. Each was randomized to one of four different psychoeducation-based interventions. Interventions varied in the level to which they appealed to fear and in their emphasis on temporariness. The four intervention groups were as follows: group 1 (low fear/low temporariness), group 2 (low fear/high temporariness), group 3 (high fear/low temporariness), and group 4 (high fear/high temporariness). All four intervention approaches in the study were rated by participants as acceptable but those in groups that focused on temporariness rather than fear, especially in group 2 (low fear/high temporariness), reported significantly greater intentions to limit access to firearms for safety purposes. This finding suggests that interventions emphasizing the temporary nature of separation from firearms creates more acceptable messaging for people at risk [30¹⁵].

The importance of culturally competent approaches to suicide prevention reaches beyond messaging lethal means safety for gun owners. Suicide has social, biological, and cultural origins, and just as the contributors are heterogenous and situational, so should be the solutions. Approaches tailored for urban LGBTQ+ youth will not likely have the same impact on older white men in rural areas. Research on suicide prevention programs for Native America communities and veterans supports the importance of culturally tailored interventions [31,32].

CONCLUSION

People arrive at the decision to end their life for a variety of reasons and over a variety of timeframes. Reducing suicide is a problem with diverse solutions; there is no one-size fits-all intervention that will be effective across broad demographics, geographic areas, and risk factors. Although focusing efforts on risk factors like substance use disorders, depression, poverty, and social disconnectedness is laudable, solutions will be difficult, expensive, and delayed. Restricting people's access to lethal means, regardless of what causes their suicidality, is a proven method for reducing deaths by suicide. This is particularly true for firearms, which cause over half the suicide deaths in this country, particularly in rural areas. Messages about putting time and distance between an at-risk person and their guns must be culturally tailored and appropriate. Internet-based CBT may also be a feasible intervention in areas with severe shortages of mental health providers.

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Conflicts of interest

There are no conflicts of interest.

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- of special interest
- ■ of outstanding interest

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This study showed that internet-based cognitive therapy (iCBT) significantly reduced suicidal ideation after intervention, suggesting it as an effective and highly scalable treatment option that can reach communities with shortages of mental health providers and other resources. Additionally, its anonymity may appeal to certain cultural groups.

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This study analyzed the association of firearm ownership and suicide between adolescents and adults resulting in two times stronger association of firearm ownership and suicide among adolescents relative to adults. Alternately, policies mandating safe firearm storage was associated with reduced firearm suicide in adolescents. This highlights access to firearms in the home is a risk factor for suicide, especially among adolescents. If firearms are in the home, the risk of suicide can be reduced by safely storing all firearms.

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This randomized control trial examined the acceptability and efficacy of lethal means safety interventions by examining different methods that varied by level of fear appeals and emphasis on temporariness. Participants in the group that emphasized low fear and high temporariness reported the highest likelihood of following recommendations. In order to gain buy-in from firearm owners, interventions should deemphasize fear and emphasize temporariness.

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