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Suicide Prevention

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STATE OF THE ART
REVIEW

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Suicide Prevention

Abstract: *Suicide is a public health problem affecting people across the lifespan. It is currently the 10th leading cause of death, with rates having remained relatively flat for the past century. This article summarizes the problem of suicide and suicidal behavior along with suicide prevention efforts in the United States. Part 1 provides an overview of the epidemiology of suicide, including groups most at risk of suicide and suicidal behavior. Part 2 provides a review of common risk factors, organized by developmental life stage. A brief discussion of the lesser well-researched area of protective factors follows. Part 3 provides an overview of suicide prevention today, including the major types of prevention strategies, their successes, including means restriction, quality improvement in behavioral services, and comprehensive programs; and limitations to date, such as a lack of evidence for impact on actual deaths or behavior, small sample sizes, and low base rates. Finally, part 4 discusses challenges and future directions with an eye toward the great many opportunities that exist for prevention.*

Keywords: self-directed; violence; public health; prevention; preventive medicine; suicide

Part I: Overview

Suicide presents a major challenge to public health in the United States and around the world. In the United States, suicide has ranked among the top 12 leading causes of death since 1975.¹ In 2009, the number of deaths from suicide reached an unfortunate milestone and surpassed the number of deaths from motor vehicle crashes.² According to the most recent data, in 2011, suicide



Unofficial estimates suggest that for every suicide, there are 4 attempts among elderly people, 25 attempts among adults, and from 100 to 200 attempts among young people.



claimed the lives of 39 518 people (rate: 12.3/100 000) and was the tenth leading cause of death overall.³ This equates to 1 death from suicide every 13.3 minutes. The picture around the world shows a pervasive burden, with an overall rate of 11.4/100 000 in 2012. According to the World Health Organization (WHO), suicide is the 15th leading cause of death globally for all ages, with 803,900 deaths per year (rate: 11.4/100 000).⁴ This equates to 1 death from suicide every 40

s, and in the past 45 years, suicide rates have increased worldwide by 60%.⁵

As big a problem as suicide is, millions more people make suicide attempts and struggle with suicidal thoughts. In 2012, according to data from a national sample of emergency departments, nearly 484 000 (rate: 157/100 000) people visited emergency departments for self-harm injuries.⁶ In 2008, 1.1 million US adults (1%) self-reported a suicide attempt in the past year. Of this group,

62.3% received medical treatment and 46% were admitted to hospital. In the same year, 8.3 million adults reported serious thoughts of suicide (3.7%).⁷ According to a nationally representative sample of high school students, in 2013,

*Most self-harm is thought to be related to suicide attempts. The remainder is considered nonsuicidal self-injury (NSSI); however, we know from the research that NSSI is a risk factor for suicide.

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8% of students self-reported having attempted suicide, and 17% seriously considered suicide in the past 12 months.⁸ Unofficial estimates suggest that for every suicide, there are 4 attempts among elderly people, 25 attempts among adults, and from 100 to 200 attempts among young people.^{9,10}

Suicides, attempts, and ideation take an immense emotional, physical, and economic toll on individuals, families, and communities, inclusive of our health care system, schools, workplaces, places of worship, and beyond. By one estimate, for every death by suicide, 6 people are directly affected (ie, survivors). Based on this figure, there are an estimated 13 million survivors in the United State,¹¹ and unfortunately, survivorship itself is a risk factor for suicide.¹² This article will discuss the precursors to suicide, populations most affected, the state of suicide prevention, and successes and challenges, followed by a discussion of future directions and recommendations.

Epidemiology: Mortality

Age- and Sex-Specific Suicide Rates. Men typically comprise about 80% of all suicides; however, women outnumber men in suicide attempts by about 3:2.³ Whereas suicide prevention efforts typically focus on youth and older adults, trends in suicide rates over time depict increasing rates in the middle-age group, that is, 35 to 64 years.¹³ Over the decade 1999 to 2010, rates among this group increased by nearly 30%, from 13.7/100 000 to 17.6/100 000. The bulk of this increase occurred in the age group 50 to 59 years, which saw an increase of nearly 50%, from 20.5/100 000 in 1999 to 30.4/100 000 in 2010. Among women, rates increased nearly 60% among 60- to 64-year-olds, from 4.4/100 000 in 1999 to 7.0/100 000. Contributors to this increase may include the economic downturn because historically, the suicide rate tends to correlate with business cycles,¹⁴ a cohort effect among the “baby-boomer” generation,¹⁵ and a rise in intentional overdoses associated with increased availability of prescription opioids.¹³

Further research is needed to examine the increase in a more in depth manner.

Among people 10 to 34 years old, suicide rates changed very little over the decade 1999 to 2010: 9.2/100 000 in 1999 to 9.9/100 000 in 2010, $p < .06$. Historically, older adults have had the highest rates of suicide. However, among older adults >65 years old, rates decreased, though not significantly, from 15.8/100 000 in 1999 to 14.9/100 000 in 2010; $p < .09$.¹³ In 2010, this group represented 13% of the US population but accounted for 15.6% of all suicides.¹⁰

Race/Ethnicity-Specific Suicide Rates, 1999-2010. Rates of suicide vary dramatically by race/ethnicity across the life course. For example, among those 15 to 24 years old, in 2011, the rate of suicide among non-Hispanic, American Indian/Alaska Natives (AI/AN) was 17.7/100 000 versus 12.0/100 000 among non-Hispanic whites, and suicide was the eighth leading cause of death among AI/AN of all ages. Rates among non-Hispanic blacks, non-Hispanic Asian-Pacific Islanders (A/PI), and Hispanic youth were roughly 6/100 000 in 2011. After the age of 24 years, rates of suicide generally decrease among AI/AN and black, non-Hispanics but increase among whites, who account for the large majority of suicides: 90% in 2011. Among A/PI and Hispanics, rates decrease after 24 years and then remain fairly level until late life, when they increase again. In each of the racial and ethnic groups, suicide rates were higher for men than for women.^{3,16}

Method of Suicide. Firearms account for half of all suicides in the United States, but rates vary by sex, race/ethnicity, and age. Men use firearms more than half of the time (56%), followed by suffocation (26%) and poisoning (11%). Women are more likely to die from poisoning (37%), followed by firearms (31%) and suffocation (23%). In 2011, firearms were the leading method of suicide among whites (53.1%) and blacks (49.1%). Among Hispanics (43.4%), A/PI (48.5%), and AI/AN (43.9%), suffocation was the leading method.³ Among the middle-age

group, 35 to 64 years old, the largest increase between 1999 and 2010 took place among suffocation suicides (predominantly hanging).¹³ This is troubling, given the challenges to reducing access to this method, except among confined populations. Some facilities are restricting access through a comprehensive strategy, including training, assessment, identification, safe housing, and monitoring.¹⁷ Among youth 15 to 24 years old, firearms were the leading cause of suicide (45.0%) in 2011, followed by suffocation (39.4%). Among older adults >65 years old, firearms account for more than 71% of suicides.³

Geographical Variation. In 2011, age-adjusted suicide rates varied substantially across states, from 23.2 per 100 000 population in Wyoming to 6.8 in the District of Columbia.³ As in previous decades, age-adjusted suicide rates were the lowest in the northeast (9.8 per 100 000) and highest in the southern (12.9) and western (13.9) states. When state-specific age-adjusted suicide rates for the United States were ranked from highest to lowest, 9 of the top 10 states were located in the western region.^{*10} Reasons for differences in rates by region are unknown but hypothesized to be a result of variations in population density because low-density areas (ie., rural) are associated with greater access to firearms, more social isolation, greater distance to life-saving treatment, and

*Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

values that may enforce individualism and self-reliance versus help-seeking.¹⁸ A CDC study found that regional variation in suicide was not explained by race, ethnicity, sex, or age differences.¹⁹

Epidemiology: Morbidity

As stated, the number of suicides reflects only a small portion of the impact of suicidal behavior overall. Many more people are hospitalized for nonfatal suicidal behavior than are fatally injured, and an even greater number are treated in ambulatory settings or are not treated at all.⁸ Only within the past 20 years have nationally representative statistics been available for suicidal thoughts and behavior among persons in the United States.

The National Electronic Injury Surveillance System developed by the US Consumer Product Safety Commission was expanded in July 2000 to collect data on all types of nonfatal injuries treated in a nationally representative sample of US hospital emergency departments. In 2012, 483 596 people received care in emergency departments for nonfatal self-harm injuries (rate: 157.4/100 000), including 286 367 women (rate: 188.1/100 000) and 197 229 men (rate: 127.8/100 000). Overall, self-inflicted injury rates were highest among adolescents and young adults. The majority (54.9%) of all self-harm injuries are related to poisoning. Adults >65 years old and older contribute a much smaller proportion to the suicide morbidity burden, with a rate of self-harm injuries seen in the emergency department of 28.1/100 000 versus 173.9/100 000 in the population younger than 65 years.³ The reason for this disparity is that older adults typically use highly lethal means to attempt suicide and, therefore, have a high case fatality rate. They also tend to be more isolated and less likely to be rescued in an attempt.²⁰

Economic Burden

Using 2005 suicide data and cost estimates, including medical and work loss costs, CDC estimated a combined cost of \$55 billion.²¹ In 2011, the United

States experienced 789 580 years of potential life lost.³ Compounding these costs are the unquantifiable costs that result from emotional trauma experienced by surviving family, friends, and communities.¹¹

Part II: Risk and Protective Factor Research

Risk Factors

Suicide and suicidal behavior are complex problems and are not caused by one factor but rather influenced by multiple factors acting at multiple levels—individual, family, community, and societal—over time.²² Contributors of suicide include biological, psychological, and social factors acting more proximally to the individual and cultural, political, and economic issues operating more distally. Some of these factors, more specifically, include the following: the presence of a mental health disorder such as mood disorders, substance abuse, personality disorders, history of suicide attempts, physical illness, pain, and socioeconomic issues (eg, area poverty level and unemployment)²³; family problems such as child maltreatment or history of suicide; relationship problems such as bullying, intimate partner problems, and social isolation; and societal problems such as easy access to lethal means and stigma associated with mental illness and help seeking.²² Much of the information about risk factors for suicide comes from psychological autopsy studies, retrospective analyses of the characteristics, backgrounds, and circumstances of people who die by suicide.²⁴ These studies have advantages such as being very in depth and disadvantages such as relying on key informants who may not be reliable sources of information. Some risks vary by age, gender, and culture, whereas others are more universal.

Children/Youth. Suicide in children, particularly prior to puberty is a rare event. Researchers believe that this is related to the fact that 2 of the most common risk factors, depression and

exposure to drugs and alcohol, do not typically occur until adolescence.²⁵ However, some children of a very young age do die by suicide and may know what they are doing.²⁶ Some research suggests that it is a lack of fear about physical pain and death that enables the behavior. Indeed, in one small case-control study, researchers found that compared with nonsuicidal psychiatric inpatient comparisons, suicidal children had greater pain tolerance and engaged in more aggressive behavior. They also had more depression and were more likely to be abused or neglected compared with matched nonsuicidal peers.²⁶

Adolescents and Young

Adults. Adolescence is a time of growth characterized by biological, psychological, and social changes. It often includes risk taking and testing and pushing of boundaries as a means of seeking greater independence. One's level of success navigating adolescence affects the transition into young adulthood when new job and family responsibilities take precedence.²⁷ Suicide is uncommon in early adolescence. In 2011, suicide was the third leading cause of death among youth 10 to 14 years old and the second leading cause of death for people 15 to 24 years old. Rates varied significantly: 1.36/100 000 among 10- to 14-year-olds, 8.32/100 000 among 15- to 19-year-olds, and 13.63/100 000 among 20- to 24-year-olds.³ In 2011, more teenagers and young adults died from suicide than from cancer, heart disease, AIDS, birth defects, stroke, pneumonia and influenza, and chronic lung disease combined.³ Risk factors for suicide during adolescence and young adulthood include the following: mental illness, prior suicide attempts, hopelessness, family history of suicidal behavior, parental divorce, child maltreatment, school problems, suicide of a peer, poor problem-solving ability, easy access to lethal means, conduct disorder in male youth, troubled relationships with parents, and peer victimization.²⁸⁻³²

Special Population: Active Duty Military/Veterans

Suicide is a health issue among active duty military and veterans. In 2010, suicide was the second leading cause of death among US service members, exceeded only by war injury.³³ Factors including relationship discord, legal/disciplinary problems, financial difficulties, and health problems are thought to play a role.³⁴ Other risk factors include sexual violence³⁵ and a history of childhood trauma.³⁶ Though the US Air Force has reported success in reducing suicide rates, the effectiveness of military prevention programs has been difficult to measure.^{37,38}

The Department of Defense funds the Millennium Cohort Study,³⁹ and National Institutes of Health and the US Army fund the Army Study to Assess Risk and Resilience in Servicemembers, known as Army STARRS.⁴⁰ The former found that mental disorders such as depression and alcohol use disorders were associated with suicide. An unexpected finding was that suicide was not associated with deployment (ie, combat, duration of combat, and number of deployments were not risk factors).⁴¹ Results from Army STARRS suggest that suicide rates increased the most among the currently and previously deployed in the period 2004-2009 but also increased among the never deployed.⁴² The Department of Veterans Affairs (VA) developed data systems to increase understanding of suicide among veterans and inform the VA suicide prevention programs.⁴³ As a result of these activities, the VA was able to establish that the risk of suicide among veterans of the Vietnam War or the 1991 Gulf War, as a whole, was not significantly higher than that among nondeployed veterans or the general US population. They determined that, historically, the rates of suicide among veterans in general were lower than that of the US population, but the recent increased risk of suicide observed among Operation Enduring Freedom/Operation Iraqi Freedom (Iraq and Afghanistan wars) veterans when compared with the US population,⁴⁴ even though not statistically significant, warrants attention.

Middle-aged Adults. Middle adulthood challenges may include changes in marriage, job plateaus or shifts, children leaving home, caring for an aging parent, and change in one's own health status, such as onset of chronic illness.^{45,46} Less is known about the unique suicide-related risk factors among this age group because much of the research on suicidal behavior has focused on youth and older adults.⁴⁷ However, some risk factors include relationship problems, financial and/or job problems, alcoholism, depression, lack of connectedness, and legal difficulties.^{14,47,48} Suicide rates among working-age adults 25 to 64 years old have tended to increase during recessions and fall during times of economic expansions.¹⁴ Social norms may also play out most in this age group, with men being less likely than women to seek help for mental health and other stressors, preferring instead to handle problems on their own.^{49,50} This may

include self-medicating with drugs and alcohol. If men do seek out medical care, it is typically for physical health symptoms.⁵⁰ See Lapierre et al⁵¹ for recommendations for increasing treatment seeking among men. The social and personal costs associated with suicide in middle age are tremendous. For example, there are lost contributions to families, lost work productivity, interrupted childrearing, and disrupted marriages.

Older Adults. Older adulthood may be characterized as a time of more predictable and stable emotions; however, social roles and networks change, as does physical functioning.⁵² Among older adults, physical illness, loss, and mental illness are common risk factors in suicide. In a review of the research, between 71% and 95% of older adult suicides involved a mental health condition, most notably depression.⁵³

Although certain physical conditions have been found to be associated with suicide, including cancer and heart, and lung diseases, a more important factor may be the number of ailments versus specific types of illnesses.⁵⁴ Still other studies indicate that it is not the objective physical health condition that matters so much as the subjective sense of one's health.^{55,56} Another important risk factor for elders is a lack of social connectedness to family, friends, and community.²⁰ Practically speaking, fewer people in one's social network may indicate a lower likelihood of intervention or rescue, if an attempt is made.⁵³ A study dating back to 1971 found that older people dying by suicide were more likely to live alone compared with their peers in the community.⁵⁷ Also, access to lethal means and a greater intent to die are contributors to older adult suicide.⁵³ Recommendations for reaching older men include de-emphasizing the diagnosis of depression and accentuating the symptoms of depression and stress instead, thereby reducing shame and stigma associated with mental illness.⁵⁸ Additionally, more trained gatekeepers in the community where men interact may aid prevention.⁵¹

Protective Factors

Protective factors serve to buffer or reduce suicide risk. Protective factors may be characterized as biopsychosocial, environmental, or sociocultural. Biopsychosocial factors include, for example, genetics, personality and coping style, and interactions or relationships with others such as family and friends. Protective factor research in this area is most focused perhaps on psychological and social factors. For example, the Centers for Disease Control and Prevention identified enhanced connectedness as a strategic direction for suicide prevention.⁵⁹ Research suggests that connectedness to family, in particular, is effective at reducing suicide risk among youth.⁶⁰⁻⁶¹ Whitlock et al⁶⁴ provide a more detailed examination of connectedness pathways. Positive coping and conflict resolution skills are also

associated with reduced suicidal behavior.⁶⁵ Among depressed adolescents, research suggests that the perception of problem-solving ability and attitude toward solving problems appear to be more important than self-reported ability in predicting risk of suicidality.⁶⁶ This has implications for prevention strategies designed to enhance protective factors. Environmental factors may include policies, services, or systems or may refer to physical aspects of one's surroundings. For example, reduced access to lethal means (eg, firearms pesticide, and medication) for vulnerable populations has consistently been shown to reduce suicide.⁶⁷⁻⁶⁹ Easy access to quality clinical care⁷⁰ and insurance benefits for mental health commensurate with physical health coverage may also reduce suicide.⁷¹ Sociocultural factors may include social norms, politics, or the economy. Research here has found religion, including attendance at religious services⁷² and religious sanctions against suicide,^{65,66} to be protective. Unfortunately, protective factor research pales in comparison to risk factor research; so much more is needed. For example, we stand to learn a good deal from groups where suicide rates are relatively low—for example, among certain racial/ethnic groups.¹¹

Part III: Prevention Strategies

In 1996, the United Nations formulated official guidelines for national suicide prevention strategies that encouraged governments to take up comprehensive approaches to suicide prevention.⁷³ The United States along with a number of other countries responded. In 2012, the United States Office of the Surgeon General and National Action Alliance for Suicide prevention released the second *National Strategy for Suicide Prevention: Goals and Objectives for Action*.¹⁸⁶ This strategy takes a public health approach and, as such, recommends the following: defining the problem of suicide through surveillance or systematic collection of morbidity (attempts) and mortality

(suicide) data over time, identifying suicide risk and protective factors through research, developing and testing suicide prevention strategies, and ensuring widespread adoption of effective programs. Following the 1996 guidelines,⁷³ the Institute of Medicine published a report, *Reducing Suicide: A National Imperative*, that further organizes prevention programs and activities into 3 levels—universal, selective, and indicated—based on their focal population⁷⁴:

- Universal (U) prevention addresses the entire population, such as a school, community, or state, regardless of the level of risk of individuals within that population. Interventions may include public education campaigns, awareness programs, means restriction laws, media guidelines, and policies for crisis response. The benefit of these programs is that they affect large numbers of people and may stem the tide of suicide if implemented before risk factors associated with suicide take hold. The downside is that the program may not meet the needs of people at higher risk, and effects often take a long time to observe.
- Selective (S) interventions address at-risk groups with the goal of preventing the onset of suicidal behavior. Strategies here include screening programs (eg, depression screening), training of community members to recognize and respond to at-risk individuals (ie, gatekeeper training), and skills or support groups. The benefit of such strategies is that they are relatively easy to implement. The downside is that their intended effects on suicide and help seeking are not always observed or measured.
- Indicated (I) interventions address individuals deemed *high risk* by virtue of a prior suicide attempt or suicidal ideation. Strategies in this category may include care management for individuals discharged from inpatient facilities, psychiatric treatment, and cognitive-behavioral skills groups. The benefit

to these strategies is that they are tailored to individuals. The downside is that they do not address the root of the problem of suicide in the population.

For maximum reach and impact, states and communities may consider adopting a set of universal, selective, and indicated strategies to create a comprehensive or integrated approach to prevention.⁷⁴ In doing so, communities can stem the onset of suicidal behavior while simultaneously caring for individuals in need of treatment and follow-up. The following provides information on universal, selective, and indicated strategies as reported in the peer-reviewed literature, typically from meta-analyses and systematic reviews. For additional strategies not included, the reader may consult the Substance Abuse and Mental Health Services Administration's (SAMHSA) National Registry of Evidence-based Programs and Practices (<http://nrepp.samhsa.gov/>) and the Best Practice's Registry (<http://www.sprc.org/bpr/>), also funded by SAMHSA.

Universal Strategies

Public Education Initiatives. The first goal of the 2001 National Strategy for Suicide Prevention reads “Promote awareness that suicide is a public health problem that is preventable.”²² (p. 44) Public education initiatives are a popular way to do this. They typically seek to raise awareness in the population about suicide and its risk and protective factors, dispel myths related to suicide, change attitudes and social norms around help seeking, increase mental health literacy, and reduce stigma toward mental illness.⁷⁵⁻⁷⁷ These interventions may take the form of billboards; signs on public transportation; public service announcements via television, radio, or the Internet; and brochures and/or other traditional print materials. Campaigns may be short, single-exposure events or longer term, with greater exposure. The target population may be very general or more targeted—for instance, toward health care providers. A review of interventions targeting the general population found

that many do increase knowledge and attitudes in the short term, particularly around depression and mental illness; however, the impact on help-seeking behavior, intention to seek care, or suicidal behavior, itself, is uncertain.⁷⁶ Related to suicide specifically, assessing changes in rates is difficult given the relative rarity of these events and the large population size needed to see an effect. Two campaigns that did assess actual suicide rates over time found no significant reductions^{78,79}; however, the latter did report a significant change in number of suicide attempts.

In reviewing 14 community-based suicide prevention psychoeducational campaigns, Fountoulakis et al⁷⁵ found that these campaigns improved knowledge and attitudes; however, campaigns often failed to impact actual behavior. Campaigns also often failed to reach the targeted group. In some cases, treatment seeking actually decreased in those with depression or suicidal ideation, indicating that these groups require more tailored prevention messages.^{75,77,80} A total of 7 studies reported reduced suicide rates⁸¹⁻⁸⁷; 5 studies took place among Japanese elders with results largely confined to women.⁸¹⁻⁸⁵ Recommendations include highlighting prevention, positive action, and effective treatments and providing information on warning signs, risk factors, and protective factors. Things to avoid include normalizing suicide—for example, making it appear as a common solution to every-day stressors—or glorifying suicide.⁸⁸

Positive effects of campaigns have been associated with multipronged strategies (eg, media plus gatekeeper training), highly targeted campaigns in local areas, repeat exposure, and clear and specific messaging.⁷⁶ Assessing the needs of the population and the cultural context prior to implementation is important as is the need to consider specific indicators for evaluation purposes (eg, “How will attitudes be measured, over what period of time, and for how long?”) Other considerations include having a sound theoretical basis for the intervention and cost-effectiveness.⁷⁶

Media Reporting. Media accounts of suicide may have a positive or negative impact on behavior. A danger of media reporting is suicide contagion—the process by which one suicide facilitates the occurrence of a subsequent suicide—and should be avoided by taking care not to normalize or glorify suicide, present suicide as a common reaction to stress, or give detailed information about the means of suicide.^{89,90} In an effort to prevent contagion, the WHO and partners in the US formulated guidelines for the media on safe reporting.⁹¹ Little evaluation of such guidelines has taken place. However, an Austrian study focused on improved reporting of subway suicides showed significant success in the 4 years following the guidelines. Overall, suicides decreased by 20%, and subway suicides, specifically, decreased by 75%. Moreover, no substitution of suicide methods (eg, use of firearms in suicide versus subways) was found.⁹²

School-Based Awareness Education and Curricula. School-based awareness programs are a common prevention strategy across the United States. They typically seek to increase knowledge of suicide risk factors and warning signs, change attitudes about mental illness and help seeking, provide helping resources, and teach ways to respond to an at-risk peer.⁹³ A recent review of school-based studies, using a range of study designs and taking place between 1988 and 2011, identified 15 universal prevention programs. Programs ranged from a single session to sessions lasting up to 12 weeks.⁹⁴ The 6 studies that measured suicide ideation, attempts, and/or plans all found reductions in at least 1 suicide-related outcome. Additionally, 9 of 9 studies found improvements in knowledge, whereas 7 of 11 studies found improvements in attitudes. Another 6 of 11 studies found significant improvements in help-seeking self-efficacy. Another study not identified in the above review implemented a district-wide comprehensive program inclusive of curricula, policies, and teacher training. Over the course of 5

years, student suicides and suicide attempts in the district significantly declined.⁹⁵ Unfortunately, no comparison group was included.

Two more recent programs utilizing a randomized controlled trial design, *Sources of Strength*⁹⁶ and the *Good Behavior Game*,⁹⁷ also found positive effects. The former, a high school-based program designed to enhance protective factors among peer leaders and students, reported increased adaptive norms regarding suicide, connectedness to adults, school engagement, referral of a suicidal friend to an adult, perceptions of adult support, and acceptability of seeking help.⁹⁶ The latter, a classroom-based program for children in the first and second grades designed to reduce aggression and disruptive behavior found longitudinal effects on suicide ideation and attempts among 19- to 21-year-olds; however, in some covariate-adjusted models, the effect of the intervention on attempts did not remain significant.⁹⁷ This result holds promise for future programs focused “upstream” in childhood, with impacts over time.

A 2009 study examined 8 methodological features of school-based programs: measurement, comparison group, outcomes, educational/clinical significance, identifiable components, implementation fidelity, replication, and site of implementation. It found only weak to promising evidence based on these features, indicating that more work needs to be done to improve study quality.⁹⁸ Related to this, recommendations for school-based programs include assessing long-term knowledge, attitude, and skill-building outcomes; linking help-seeking to suicidal behavior; measuring suicidal behavior preintervention and postintervention; using common measures across programs; examining moderating variables such as gender; accounting for nesting of students within schools in analyses; considering individual versus environmental-level change targets; and emphasizing social support and school connectedness.^{93,98} A word of caution: at least 1 program found that youth who made a prior

suicide attempt were more likely to report a negative reaction to a school-based prevention program than their peers without an attempt history.⁹⁹ However, a more recent study found no iatrogenic effects in a school-based suicide prevention screening program,¹⁰⁰ though more research on the topic is recommended.⁹⁴

Restricting Access to Lethal

Means. Limiting access to lethal means of suicide is an intervention with robust supporting evidence.¹⁰¹ These interventions can typically be implemented quickly and measured relatively easily compared to other more complex approaches—for example, interventions seeking to change social norms.⁶⁷ Studies find reduced suicide rates associated with restricted access to firearms among high-risk groups,^{102,103} paracetamol (ie, Tylenol),¹⁰⁴ other medications,¹⁰⁵ toxic gas,¹⁰⁶ pesticides,¹⁰⁷ ligature points in institutional settings,^{108,109} and high places such as bridges.¹¹⁰ Moreover, restricted access often did not lead to total substitution of methods, and in cases of substitution, the case-fatality rate of substituted methods was generally lower than the original method, leading to lower suicide rates overall.^{111,112} Restricting access to lethal means may be particularly effective in preventing highly lethal and impulsive suicides.^{113,114} Long-term follow-up and assessment of confounding factors is recommended.¹⁰¹

Selective Strategies

Screening. Screening interventions seek to identify people at risk of suicide, typically through a 2-step process—completion of a brief self-report instrument assessing risk factors, usually depression, followed by an in-depth face-to-face clinical interview where needed. Screening programs typically take place in schools or physicians' offices.

Research suggests that school-based screening identifies more at-risk people than the number identified by professionals,¹¹⁵ and some programs have shown positive effects on

decreased suicide attempt rates.¹¹⁶ On the downside, school-based screening has been controversial,¹¹⁷ including concerns that screening for suicide risk will actually increase risk of the very behavior. However, existing research does not bear this out.^{100,118} Other downsides include the resource intensiveness of screening. For example, to identify all at-risk youth, a population-wide screening protocol is needed. This may stretch the capacity of mental health service personnel, who must follow up with each positively screened youth.¹¹⁹ For example, a 2013 review identified 7 programs with available referral information. Across varied populations of different ages, races, and geographic locations, referral rates ranged from 4% to 45%.⁹⁴ Additionally, resources for staff training, while taking into account staff turnover, raise the issue of cost-effectiveness.^{75,90,94} Screening programs receive less support from administrators and parents than other prevention activities such as curricula.^{95,96} Some opponents suggest that screening programs are veiled attempts to encourage psychiatric treatment and others question the need for clinically recommended treatment.¹²⁰

According to the latest US Preventive Services Task Force (USPSTF) recommendations, screening tools have limited ability to detect suicide risk in adolescents, and then only among high-risk adolescents, including psychiatric outpatients¹²¹ and potential high school dropouts.^{122,123} For adults, the USPSTF found evidence from 2 studies that screening tools can identify adults and older adults in primary care who are at increased risk of suicide, though many false positives were also identified.^{124,125} For a review of instruments for use in primary care, see O'Connor et al.¹²⁶ Overall, the USPSTF finds insufficient evidence for the balance of benefits and harms associated with screening for suicide risk in primary care.¹²⁷ However, the Task Force does recommend screening adults for depression “when staff-assisted depression care supports are in place to

assure accurate diagnosis, effective treatment, and follow-up.”^{128(p3)}

Gatekeeper Training. Gatekeeper training teaches individuals how to identify and respond to people who may be at risk of suicide.¹²⁹ Gatekeeper training is modeled on the assumptions that people at risk do show signs, will not otherwise seek help, and that treatment will be sought and is effective.¹²⁹ A recent review article found 9 high-quality peer-reviewed studies of gatekeeper training, with 7 studies assessing changes in attitudes, knowledge, and skills. Study samples ranged in size from 44 community members to 602 US Veterans Administration workers. Among the studies, 6 showed unequivocal increases in knowledge; all increased skills, self-efficacy, or intentions to help; and those that assessed attitudes, also found positive effects. Also, 6 cohort studies examined the effects of training on suicidal ideation, attempts, or suicide over time.¹²⁹ These studies included physician education programs,¹³⁰ the US Air Force,⁸⁶ and programs for aboriginal youth.¹³¹ All noted positive outcomes. The most notable and widely cited program was the US Air Force Suicide Prevention Program, a quasi-experimental cohort study with 11 components, including gatekeeper training. Compared with the 1990-1996 cohort, the 1997-2002 cohort experienced a 33% reduction in suicide along with reductions in homicide and moderate and severe family violence.⁸⁶ However, it is unclear whether these reductions related directly to the gatekeeper training.

Among school-based gatekeeper training programs, specifically, a 2013 review identified 12 gatekeeper training programs.⁹⁴ Of these, 9 found increased knowledge from pretest to posttest or compared with controls; 2 of 5 studies reported improved attitudes; 7 studies assessed confidence in dealing with suicide-related behavior or mental health issues; and all reported increases from pretest to posttest or compared with controls. Finally, only 5 of 12 studies

assessed actual behavior change, defined broadly from capability of or actually inquiring about suicidal ideation, making no-harm contracts, change in practice, help seeking, using coping resources, to identifying trusted adults. All found positive effects, though 1 study did not find an effect of training on identification of communication with at-risk students.¹³²

Although the United Nations⁷³ and others²² recommend gatekeeper training as part of a comprehensive suicide prevention program, evidence is limited as to its effectiveness across populations over time, and many programs have yet to demonstrate changes in outcomes related to actual rates of help seeking and subsequent ideation, attempts, and suicide.¹²⁹ Research indicates that gatekeeper training may be most useful in smaller communities where treatment resources are readily available and where tracking of the intervention is easier; however, this also raises the issue of privacy and confidentiality.¹⁰¹

Primary Care Education. Education for primary care providers is a subset of gatekeeper training and related to screening. It teaches physicians how to identify and treat at-risk individuals. This intervention is particularly important given the research that mental illness is underrecognized and undertreated in primary care settings¹³³ and given previous research findings that more than 75% of those who committed suicide sought contact with a primary care doctor or non-mental health care provider in the month prior to their deaths.^{134,135} A 2011 review of older adult suicide prevention programs identified 2 primary care interventions: Prevention of Suicide in Primary Care Elderly Collaborative Trial and Improving Mood: Promoting Access to Collaborative Treatment. The former trained physicians to identify and treat older adults with depression and to connect them to care managers for follow-up. The latter intervention included development of a therapeutic alliance, a personalized treatment plan, and follow-up by a depression care manager. Both studies

found lower rates of depression and suicide ideation in the experimental group compared with care as usual (CAU).^{136,137} International studies have also found increased prescription rates for antidepressants after physician education programs and reductions in actual suicides¹³⁸; however, the impact was greatest among female patients.^{130,139}

Behavioral Health Systems

Improvement. Suicide in the context of behavioral health is a risk for patients with depression and other psychiatric disorders. In 2001, the Behavioral Health Services division of Henry Ford Health System implemented a quality improvement program known as “Perfect Depression Care.” This model relied on suicide assessment for all behavioral health patients and 6 strategies for health care improvement: safety, effectiveness, patient centeredness, timeliness, efficiency, and equity. Some of the specific strategies included means restriction for patients, provider education, patient follow-up via phone calls, and patient peer support services.¹⁴⁰ Between baseline and follow-up, a period of 11 years, suicides dropped by 82%.¹⁴¹ Efforts are underway to expand this approach in other organizations and settings with an initiative called “Zero Suicide.” More information is available at www.zerosuicide.actionallianceforsuicideprevention.org

Indicated Strategies

Clinical Interventions. Though it is estimated that a majority of people who die by suicide suffer from mental disorders,¹⁴² studies also indicate that the vast majority of individuals diagnosed with mental disorders, including clinical depression, do not die by suicide but from other causes.^{143,144} However, treating mood and other psychiatric disorders can be a useful component of suicide prevention.

Pharmacotherapy. Antidepressant medications have been shown to alleviate depression and other psychiatric disorders; however, meta-analyses of randomized controlled trials,

generally, have not detected benefit for suicide or suicide attempts.^{145,146}

Although concern exists over the risk of suicide with antidepressants, Gibbons and Mann¹⁴⁷ suggest that among adults, it is inadequate treatment (psychotherapy or pharmacotherapy) that is the culprit. For example, a cohort study in the Netherlands (n = 1667) found that among primary care patients with moderate to severe major depressive disorder or anxiety, 70% and 60%, respectively, were not treated sufficiently (eg, too low a dose) with pharmacotherapy or psychological treatment.¹⁴⁸ Among youth, more study is needed to determine who may be most helped by medications. One study, the Treatment for Adolescent Depression Study, found that fluoxetine alone or in combination with cognitive behavior therapy (CBT) did reduce depression and suicidal behavior.¹⁴⁹ Positive effects have also been found for lithium. A meta-analysis of 48 randomized controlled trials comparing lithium with a placebo or other active comparators among people with unipolar or bipolar disorder found decreased rates of suicide in the lithium group.¹⁵⁰ Lithium is hypothesized to prevent relapse of mood disorders and to reduce aggression and impulsivity.¹⁵⁰ Evidence also exists for an antisuicidal effect for clozapine in schizophrenia; however, the drug includes 5 black box warnings and requires intensive monitoring.¹⁵¹

Psychotherapy. A recent review of psychotherapy trials conducted among high-risk adults found a 32% reduction in the likelihood of suicide attempts or deliberate self-harm compared with CAU. Among 9 trials conducted with high-risk adolescents, psychotherapy did not reduce attempts at 6 to 18 months of follow-up compared with CAU, and no beneficial effects were found for suicidal ideation beyond CAU.¹²³ Another recent review article examining randomized controlled trials of interventions for prevention of repeat adolescent self-harm suggested that the studies with the strongest effect on suicide attempts were integrated CBT and mentalization-based

therapy. Each had a family component and provided a large number of individual sessions.¹⁵²

Brief Interventions for Follow-up Care. People who make a suicide attempt are at increased risk of repeat attempts, particularly in the period soon after hospitalization.^{153,154} To prevent this, follow-up programs seek to help people maintain medication compliance, keep follow-up appointments, and provide support. Interventions have included simple referrals, written communication, phone contacts, or home visits with patients after inpatient hospitalization or emergency room visits for self-harm. With regard to suicidal behavior, specifically, research indicates that postcards sent to patients showing concern and inquiring about treatment follow-up did reduce suicidality; however, as the contact was reduced, the protective effect also decreased.¹⁵⁵ Another intervention targeting patients seen in an emergency department for intentional self-poisoning, utilized telephone follow-up after 1 and 3 months. The group that received 1-month follow-up calls had lower rates of repeat attempts compared with a control group that received no contact, and the group that received 3-month follow-ups only postdischarge did not differ from the control group.¹⁵⁶ Finally, an international study in several low- and middle-income countries utilized an hour-long informational video at the emergency department coupled with 9 follow-up phone calls and found decreased suicides after 18 months postdischarge compared with treatment as usual.¹⁵⁷ No differences in repeat suicide attempts were found¹⁵⁸ (see new technology for information on text messaging).

Skills Building Groups. Skills building groups typically help promote emotion regulation, coping ability, and conflict resolution; use CBT; and are led by trained clinicians. These programs may take place in outpatient or inpatient settings or in schools. The most widely recognized and evaluated CBT program focused on preventing suicide ideation and attempts is Dialectic Behavior

Therapy (DBT). Studies of DBT have found reduced ideation, attempts, and self-injury among reductions in other problem behaviors in both adults and adolescents.^{159,160} Among school programs, Project CAST (Coping and Support Training) showed sustained increases in problem-solving coping and personal control compared with a less-intensive program, C-CARE (Counselors CARE). CAST also reduced alcohol and marijuana use.¹⁶¹ Neither program, however, reduced actual suicide or attempts, but this was likely related to a lack of statistical power.

Hotlines and Crisis Centers. Suicide and crisis hotlines are one of the oldest suicide prevention interventions in the United States.¹⁶² Impact of these resources on actual suicide rates have been examined using large ecological studies comparing the suicide rates in areas with and without a crisis program or in areas before and after the introduction of a crisis program. No significant differences in suicide rates in areas with crisis centers were observed in 7 of 14 studies; however, a meta-analysis found some overall preventive effect.¹⁶³ Weak effects were noted in a more recent study examining the correlation between crisis center density and suicide rates in Canada.¹⁶⁴ A 2007 evaluation of more proximal indicators of suicide, from a subset of the National Suicide Prevention Lifeline centers, indicated significant decreases in suicidality during the course of the telephone session, with continuing decreases in hopelessness and psychological pain in the following weeks. A caller's intent to die at the end of the call was the most potent predictor of subsequent suicidality.¹⁶⁵ Further evaluation of the National Suicide Prevention Lifeline is ongoing.

Postvention. Having a friend or acquaintance attempt suicide is significantly associated with a peer's suicide ideation and behavior.¹⁶⁶ *Postvention* is the term used to describe interventions that occur in response to a suicide, typically with the goal of

preventing additional suicides or containing a potential suicide cluster. Postvention may take place with members of a family or community, such as a city, school, or workplace. In a recent review, 16 studies met inclusion criteria for quality and effectiveness. No program found evidence of a protective effect for prevention of suicide or suicide attempts; however, gatekeeper training increased knowledge of crisis intervention among school personnel; outreach at the scene of suicide encouraged survivors to attend a support group and seek help in dealing with their loss; and contact with a counselor helped reduce psychological distress in the short term.¹⁶⁷

In a review of postvention strategies following a suicide cluster, researchers found 5 published studies that identified 6 main approaches to postvention: development of a community response plan; educational/psychological debriefings; individual and group counseling to affected peers; screening of high-risk individuals; responsible media reporting of the suicide cluster; and promotion of health recovery within the community to prevent future suicides. The studies did not evaluate the overall effectiveness of different strategies.¹⁶⁸ Among those bereaved by suicide, recommendations include the need for larger and better-controlled studies along with the need to assess bereavement groups for suicide survivors versus other groups.¹⁶⁹

Integrated and Comprehensive Approaches

The most well-known program that had positive effects on rates of suicide and other violent outcomes is the US Air Force Suicide Prevention Program, which included 11 different components and included all personnel (discussed above).⁸⁶ Another example of a comprehensive program is the American Indian Natural Helper program, which found significantly reduced suicide attempts, both medically serious and nonmedically serious, in the community over time.¹⁷⁰ National, state, and local strategies for suicide prevention also

typically provide a comprehensive array of approaches for prevention. Although these strategies may be difficult to evaluate, at least one country has attempted to do so: Australia.¹⁷¹ The Valuing Young Lives comprehensive strategy includes 88 components. The evaluation reported improved capacity building among service systems, expanded training resources, and increased awareness, but no data were available related to actual improvements in the well-being of young people, including changes in suicide risk and protective factors.¹⁷¹

New Technology for Suicide Prevention

Many programs have emerged over recent years taking advantage of new technology. These programs include virtual gatekeeper training, crisis support through online chat, and telemedicine/telepsychiatry.¹⁷² Two studies utilizing text messages in place of postcard outreach with postattempt survivors found positive feedback from patients. These studies were small and need further investigation but show promise, given the ability to tailor messages, acceptability, and low cost.^{173,174} In addition, the Internet has spawned a host of online prevention education, webinars, social networks, and communities of practice. Support groups have also formed over the Internet on Facebook and other social media sites. Social media^{175,176} and Internet browsers¹⁷⁷ are also being used to track rates of suicide, suicide attempts, and risk factors. The success of these newer methods is widely unknown, though some programs have already populated sections I and II of the Best Practices Registry. The downside is that technology has also provided a platform for suicide education (ie, “how-to” methods and potential contagion¹⁷⁵) and cyberbullying.¹⁷⁸

Part IV: Challenges and Future Directions

Rates of suicide increased over the past decade. News stories telling of suicides among active military and veterans,

bullied youth, professional sports players, and celebrities, appear almost daily, yet suicide prevention efforts remain limited, particularly in comparison to other public health problems with fewer deaths (eg, hypertension, HIV/AIDS, Parkinson's disease). Why is this so and what can be done to reverse these trends?

The original National Strategy for Suicide Prevention listed improved timeliness and usefulness of national surveillance systems related to suicide as one of its goals.²² The CDC is taking steps to reach this goal. For example, it continues to expand the number of states participating in the National Violent Death Reporting System (NVDRS) nationwide. The NVDRS is a large-scale surveillance system that captures details on a variety of violent deaths, including suicides. Specifically, it collects information on decedent characteristics, the mechanism of death, and known precipitating circumstances. Data for each case are linked and come from death certificates, medical examiner/coroner reports, law enforcement, and toxicology reports. As more states become part of NVDRS, our understanding of factors contributing to suicide will improve and will, in turn, help inform prevention research, policy, and practice. Other necessary improvements include more accessible and detailed data on suicide attempts. Currently, official data include self-harm incidents seen in the emergency department, but data are classified without regard to suicidal intent, and claims data are often incompletely classified.¹⁷⁹ Because of this, along with issues of stigma and privacy concerns, the burden of the problem of suicide attempts is underestimated.⁷⁴

Suicide researchers are in the unenviable position of having to show impact of interventions on an outcome with a low base rate. For example, to show a 15% reduced rate of repeat suicide attempts, given a 2.8% chance over 8 years, would require 45 000 participants.¹⁸⁰ Although nobody is wishing for increased rates of suicide, funders want to see impact, and they want to see it in the short term. This

would be difficult enough, but add to this concerns by institutional review boards about including suicidal people in clinical trials, and the problem increases.¹⁸¹ It is no wonder that programs remain short term, unevaluated, and isolated from other related programmatic areas (eg, violence prevention). One remedy is to pool data from multiple sites to increase sample size and the ability to detect an effect.¹⁸²

Currently, many people view prevention of suicide as solely a mental health endeavor or responsibility, yet little research exists showing effectiveness of mental health treatment for suicide prevention. Furthermore, although people with depression have a 50 times greater rate of suicide than the general population, we still have no way of predicting who will die.¹⁸³ To compound the issue, treatment does not reach all who need it, and for those whom it does reach, it may not be adequate. A survey of people in 21 nationally representative samples found that 40% of suicidal people had received treatment, ranging from 17% in low-income countries to 56% in high-income countries.¹⁸⁴ Among those who received treatment, there is evidence to suggest undertreatment.¹⁸⁵ Given this scenario, the National Strategy for Suicide Prevention recommends a broader public health approach that addresses multiple risk and protective factors.¹⁸⁶

Finally, where programs and treatments have been found to be effective, there is little widespread implementation and adoption given the limited resources for suicide prevention. Enhancement of implementation entails a well-trained suicide prevention workforce, a program of research guided by clearly defined goals and programmatic gaps, along with a sustained commitment to action, particularly as related to upstream approaches that may take months if not years to show impact.

Despite the challenges, there is some good news related to surveillance, evidence-based practices, theory development, stigma reduction, resources, policy advances, and broad partnerships with renewed commitment. As mentioned

above, efforts to reduce lag time in reporting of mortality data is under way.¹⁸⁷ Systems such as NVDRS are providing more information about suicides than ever before, as evidenced by success stories¹⁸⁸ and publications.^{189,190} We have seen evidence of suicide reductions in clinical care. Training primary care doctors to recognize and treat depression has been found to be effective among older adults and among men. Changing media reporting practices has shown reduced rates of suicide by train in Vienna. Creating barriers on bridges, switching to catalytic converters, detoxifying domestic gas, and reformulating and locking up pesticides have all reduced the rates of suicide at home and abroad. Community-based programs such as that implemented by the Air Force brought down rates of suicide and other violent deaths; dialectical behavior therapy, lithium, postcard interventions, and chains-of-care, all have some evidence to suggest that they can reduce rates of suicidal behavior among those at high risk.

Ways of thinking about suicide, both scientifically and in the general population, have seen advances. For example, new theory has emerged, including Joiner's oft-cited Interpersonal Theory of Suicide¹⁹¹ and O'Connor's Integrated Motivational-Volitional Model of Suicidal Behaviour.¹⁹² Connectedness and related constructs, such as social support, social networks, and belongingness have become nearly universal in studies and surveys¹⁹³⁻¹⁹⁵ and on health-related Web sites¹⁹⁶ and blogs.¹⁹⁷ Though more work is needed to improve attitudes about people with mental illness, mental health literacy and attitudes toward help seeking for mental illness have improved.¹⁹⁸

Commitment to suicide prevention at the national level has also expanded. Funding by the Departments of Defense has increased exponentially,⁴⁰ and President Obama's budget requests to Congress for FY14 and FY15 recommended \$10 million for gun violence research and increased funding for the national implementation of NVDRS. Additionally, the 2008 Mental

Health Parity and Addiction Equity Act¹⁹⁹ is set to be fully carried out. Finally, in 2012, the National Action Alliance for Suicide Prevention, a broad public-private partnership, led a renewed effort for suicide prevention in the United States through shepherding of the National Strategy for Suicide Prevention.¹⁸⁶ The Action Alliance also created a prioritized national research agenda to substantially reduce the burden of suicide.²⁰⁰

Finally, other once seemingly intractable problems have found a home in public health prevention, including motor vehicle crashes, HIV/AIDS, and smoking. Public health interventions addressing these problems took years to take hold and overcame immense stigma and political opponents. Suicide can do the same.

What We Can Do

There is much that we, as health professionals and as a society can do to prevent suicide. First, we can widely promote the message that suicide is preventable and work to reduce stigma associated with mental illness and help seeking. Although many prevention efforts currently do this, more can be done to change prevailing attitudes that if someone is suicidal there is nothing to be done.²⁰¹ In reality, the urge to die is often impulsive and short lived.^{202,203} We can strive to change social norms, systems (eg, separation of mental and physical health care systems), practices (eg, screening, patient-provider interfaces), and policies concerning help seeking, particularly among males.²⁰⁴ We may expand engagement with at-risk and high-risk populations in the community (eg, the criminal/legal system, schools, substance abuse treatment centers) and not expect that they will show up in doctors' offices. We may reach out and ensure inclusion of survivors and those with lived experience in all suicide prevention efforts and work to bring others into the fold to take up advocacy and investment in suicide prevention in both the public (local, state, and federal levels) and private sectors. The public health and mental health communities can continue to engage in coordinated

and collaborative efforts along with researchers in violence and unintentional injury (eg, prescription drug overdose). Other partners may include those groups with a focus on connectedness, such as chronic disease researchers, where social support has long been reported to affect mortality.²⁰⁵ According to De Leo et al,²⁰⁶ increasing protective factors may do more to prevent suicide than decreasing risk factors. The private sector, most notably the workplace, is a partner that has historically been less involved; however, we know that millions of dollars are lost each year as a result of absenteeism and presenteeism (ie, being at work but not being productive because of distraction) related to depression²⁰⁷ and mental illness, let alone suicide and suicidal behavior. Medical providers and hospice workers can also play a role in improving pain management and palliative care; faith-based communities can help decrease stigma and promote help seeking; and police and first responders have an important role in knowing how best to identify and respond to at-risk individuals, as do practitioners working with juveniles and incarcerated populations.

Methodologically, we may benefit from improved data collection, including coordinating surveys, improving measures, and making boiler plate language easily available for IRBs when issues or concerns arise related to fears of liability or iatrogenic effects of interventions and surveys. To combat the low-base-rate dilemma, researchers recommend the dynamic-waitlist and multitrial follow-up²⁰⁸ study design to increase power. Greater attention to factors more distal to suicide (eg, child maltreatment, parental mental illness) or what is known as the population approach is critical to stemming the tide of new cases of suicide.¹⁸³ We know that a whole host of adverse childhood experiences are associated with suicide attempts.²⁰⁹ Preventing these events from occurring may ultimately reduce suicide, especially in the context of other improvements. Related to this, improving the social determinants of health may

also help improve outcomes of suicide and associated risk factors—for example, employment and education opportunities.^{14,210} Finally, doing more to promote what's worked and encouraging innovation through new technology is recommended.²¹¹ Together, with full knowledge, cooperation, and good science and clinical care, we can reverse the tide of suicide and raise the health and well-being of all.

Authors' Note

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. [AJLJM](#)

References

- Centers for Disease Control and Prevention. *Ten Leading Causes of Death in the United States, 1975*. Atlanta, GA: Public Health Service; 1978.
- Rockett IR, Regier MD, Kapusta ND, et al. Leading causes of unintentional and intentional injury mortality: United States, 2000-2009. *Am J Public Health*. 2012;102:e84-e92.
- Centers for Disease Control and Prevention. Web-Based Injury Statistics Query and Reporting System (WISQARS). <http://www.cdc.gov/injury/wisqars/>. Accessed September 2, 2014.
- World Health Organization. Preventing Suicide: A Global Imperative. Geneva, Switzerland. 2014. http://www.who.int/mental_health/suicide-prevention/world_report_2014/en/.
- World Health Organization. Suicide prevention (SUPRE). http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/. Accessed October 15, 2013.
- Logan J, Crosby A, Ryan G. Nonfatal self-inflicted injuries among adults aged >65 years: United States, 2005. *MMWR Morb Mortal Wkly Rep*. 2007;56:989-993.
- Crosby AE, Han B, Ortega LAG, Parks SE, Gfroerer J. Suicidal thoughts and behaviors among adults aged ≥18 years: United States, 2008-2009. *MMWR Surveill Summ*. 2011;60(no. SS-13):1-22.
- 1991-2013 High school youth risk behavior survey data. <http://nccd.cdc.gov/YouthOnline/>. Accessed September 2, 2014.
- Crosby AE, Cheltenham MP, Sacks JJ. Incidence of suicidal ideation and behavior in the United States, 1994. *Suicide Life Threat Behav*. 1999;29:131-140.
- McIntosh JL, Drapeau CW; for the American Association of Suicidology). *U.S.A. Suicide 2010: Official Final Data*. Washington, DC: American Association of Suicidology; 2012.
- Crosby AE, Sacks JJ. Exposure to suicide: incidence and association with suicidal ideation and behavior: United States, 1994. *Suicide Life Threat Behav*. 2002;32:321-328.
- Nanayakkara S, Misch D, Chang L, Henry D. Depression and exposure to suicide predict suicide attempt. *Depress Anxiety*. 2013;30:991-996.
- Centers for Disease Control and Prevention. Suicide among adults aged 35-64 years: United States, 1999-2010. *MMWR Morb Mortal Wkly Rep*. 2013;62:321-325.
- Luo F, Florence CS, Quispe-Agnoli M, Ouyang L, Crosby AE. Impact of business cycles on US suicide rates, 1928-2007. *Am J Public Health*. 2011;101:1139-1146.
- McIntosh JL. Generational analyses of suicide: baby boomers and 13ers. *Suicide Life Threat Behav*. 1994;24:334-342.
- Crosby AE, Ortega L, Stevens MR. Suicides: United States, 2005-2009. *MMWR Morb Mortal Wkly Rep*. 2013;62(suppl 3):179-183.
- Hayes LM. National and state standards for prison suicide prevention: a report card. *J Correct Health Care*. 1996;3:5-38.
- Hirsch JK. A review of the literature on rural suicide: risk and protective factors, incidence, and prevention. *Crisis*. 2006;27:189-199.
- Centers for Disease Control and Prevention. Regional variations in suicide rates: United States, 1990-1994. *MMWR Morb Mortal Wkly Rep*. 1997;46:789-793.
- Conwell Y, Van Orden K, Caine ED. Suicide in older adults. *Psychiatr Clin North Am*. 2011;34:451-468, ix.
- Department of Health and Human Services. *Cost of Injury Reports*. Rockville, MD: DHHS; 2005.
- Department of Health and Human Services. *National Strategy for Suicide Prevention: Goals and Objectives for Action*. Rockville, MD: DHHS; 2001.
- Rehkopf DH, Buka SL. The association between suicide and the socio-economic characteristics of geographical areas: a systematic review. *Psychol Med*. 2006;36:145-157.
- Hawton K, Appleby L, Platt S, et al. The psychological autopsy approach to studying suicide: a review of methodological issues. *J Affect Disord*. 1998;50(2-3):269-276.
- Joiner TEJP, Ribeiro JDBA. Assessment and management of suicidal behavior in children and adolescents. *Pediatr Ann*. 2011;40:319-324.
- Rosenthal PA, Rosenthal S. Suicidal behavior by preschool children. *Am J Psychiatry*. 1984;141:520-525.
- Cicchetti D, Rogosch FA. A developmental psychopathology perspective on adolescence. *J Consult Clin Psychol*. 2002;70:6-20.
- Gould MS, Greenberg TED, Velting DM, Shaffer D. Youth suicide risk and preventive interventions: a review of the past 10 years. *J Am Acad Child Adolesc Psychiatry*. 2003;42:386-405.
- Beautrais AL. Child and young adolescent suicide in New Zealand. *Aust NZ J Psychiatry*. 2001;35:647-653.
- Brent DA. Risk factors for adolescent suicide and suicidal behavior: mental and substance abuse disorders, family environmental factors, and life stress. *Suicide Life Threat Behav*. 1995;25(suppl):52-63.
- Rotheram-Borus MJ, Trautman PD, Dopkins SC, Shrout PE. Cognitive style and pleasant activities among female adolescent suicide attempters. *J Consult Clin Psychol*. 1990;58:554-561.
- Burton CM, Marshal MP, Chisolm DJ, Sucato GS, Friedman MS. Sexual minority-related victimization as a mediator of mental health disparities in sexual minority youth: a longitudinal analysis. *J Youth Adolesc*. 2013;42:394-402.
- Armed Forces Health Surveillance Center. Deaths while on active duty in the U.S. Armed Forces, 1990-2011. *MSMR*. 2012;19(5):2-5.
- Black SA, Gallaway MS, Bell MR, Ritchie E. Prevalence and risk factors associated with suicides of army soldiers 2001-2009. *Mil Psychol*. 2011;23:433-451.
- Walsh K, Koenen K, Cohen G, et al. Sexual violence and mental health symptoms among national guard and reserve soldiers. *J Gen Intern Med*. 2014;29:104-109.
- Sareen J, Henriksen CA, Bolton S-L, Afifi TO, Stein MB, Asmundson GJG. Adverse childhood experiences in relation to mood and anxiety disorders in a population-based sample of active military personnel. *Psychol Med*. 2013;43:73-84.
- Knox KL, Pflanz S, Talcott GW, et al. The US Air Force suicide prevention program: implications for public health policy. *Am J Public Health*. 2010;100:2457-2463.
- O'Neil M, Peterson MS, Low A, et al. *Suicide Prevention Interventions and Referral/Follow-Up Services: A Systematic Review*. Washington, DC: Department of Veterans Affairs; 2012.
- Smith TC. The US Department of Defense Millennium Cohort Study: career span and beyond longitudinal follow-up. *J Occup Environ Med*. 2009;51:1193-1201.

40. Heeringa SG, Gebler N, Colpe IJ, et al. Field procedures in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Int J Methods Psychiatr Res.* 2013;22:276-287.
41. LeardMann CA, Powell TM, Smith TC, et al. Risk factors associated with suicide in current and former US military personnel. *JAMA.* 2013;310:496-506.
42. Schoenbaum M, Kessler RC, Gilman SE, et al. Predictors of Suicide and Accident Death in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS): Results From the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry.* 2014;71(5):493-503.
43. Bagalman E. Suicide prevention efforts of the Veterans Health Administration (R42340). <http://www.fas.org/sgp/crs/misc/R42340.pdf>. Accessed September 2, 2014.
44. Kang HK, Bullman TA. Is there an epidemic of suicides among current and former U.S. military personnel? *Ann Epidemiol.* 2009;19:757-760.
45. Lachman ME. Development in midlife. *Annu Rev Psychol.* 2004;55:305-331.
46. Phillips JA, Robin AV, Nugent CN, Idler EL. Understanding recent changes in suicide rates among the middle-aged: period or cohort effects? *Public Health Rep.* 2010;125:680-688.
47. Maris RW. Suicide prevention in adults (age 30-65). *Suicide Life Threat Behav.* 1995;25:171-179.
48. Hu G, Wilcox HC, Wissow L, Baker SP. Mid-life suicide: an increasing problem in U.S. Whites, 1999-2005. *Am J Prev Med.* 2008;35:589-593.
49. Galdas PM, Cheater F, Marshall P. Men and health help-seeking behaviour: literature review. *J Adv Nurs.* 2005;49:616-623.
50. Möller-Leimkühler AM. Barriers to help-seeking by men: a review of sociocultural and clinical literature with particular reference to depression. *J Affect Disord.* 2002;71(1-3):1-9.
51. Lapierre S, Erlangsen A, Waern M, et al. A systematic review of elderly suicide prevention programs. *Crisis.* 2011;32:88-98.
52. Charles ST, Carstensen LL. Social and emotional aging. *Annu Rev Psychol.* 2010;61:383-409.
53. Conwell Y, Duberstein PR, Caine ED. Risk factors for suicide in later life. *Biol Psychiatry.* 2002;52:193-204.
54. Juurlink DN, Herrmann N, Szalai JP, Kopp A, Redelmeier DA. Medical illness and the risk of suicide in the elderly. *Arch Intern Med.* 2004;164:1179-1184.
55. Kaplan G, Barell V, Lusky A. Subjective state of health and survival in elderly adults. *J Gerontol.* 1988;43:S114-S120.
56. Conwell Y, Thompson C. Suicidal behavior in elders. *Psychiatr Clin North Am.* 2008;31:333-356.
57. Barraclough BM. Suicide in the elderly: recent developments in psychogeriatrics. *Br J Psychiatry.* 1971;(suppl 6):87-97.
58. Hinton L, Zweifach M, Oishi S, Tang L, Unttzer J. Gender disparities in the treatment of late-life depression: qualitative and quantitative findings from the IMPACT trial. *Am J Geriatr Psychiatry.* 2006;14:884-892.
59. Centers for Disease Control and Prevention. *Strategic Direction for the Prevention of Suicidal Behavior: Promoting Individual, Family, and Community Connectedness to Prevent Suicidal Behavior.* Atlanta, GA: Department of Health and Human Services; 2009.
60. Resnick MD, Harris IJ, Blum RW. The impact of caring and connectedness on adolescent health and well-being. *J Paediatr Child Health.* 1993;29(suppl 1):S3-S9.
61. Kaminski JW, Puddy RW, Hall DM, Cashman SY, Crosby AE, Ortega LAG. The relative influence of different domains of social connectedness on self-directed violence in adolescence. *J Youth Adolesc.* 2010;39:460-473.
62. King CA, Merchant CR. Social and interpersonal factors relating to adolescent suicidality: a review of the literature. *Arch Suicide Res.* 2008;12:181-196.
63. Eisenberg ME, Resnick MD. Suicidality among gay, lesbian and bisexual youth: the role of protective factors. *J Adolesc Health.* 2006;39:662-668.
64. Whitlock J, Wyman PA, Moore SR. Connectedness and suicide prevention in adolescents: pathways and implications. *Suicide Life Threat Behav.* 2014;44:246-272.
65. Sadowski C, Kelley ML. Social problem solving in suicidal adolescents. *J Consult Clin Psychol.* 1993;61:121-127.
66. Becker-Weidman EG, Jacobs RH, Reinecke MA, Silva SG, March JS. Social problem-solving among adolescents treated for depression. *Behav Res Ther.* 2010;48:11-18.
67. Florentine JB, Crane C. Suicide prevention by limiting access to methods: a review of theory and practice. *Soc Sci Med.* 2010;70:1626-1632.
68. Hawton K, Bergen H, Simkin S, Wells C, Kapur N, Gunnell D. Six-year follow-up of impact of co-proxamol withdrawal in England and Wales on prescribing and deaths: time-series study. *PLoS Med.* 2012;9:e1001213.
69. Lester D, Abe K. The effect of restricting access to lethal methods for suicide: a study of suicide by domestic gas in Japan. *Acta Psychiatr Scand.* 1989;80:180-182.
70. Sakinofsky I. The current evidence base for the clinical care of suicidal patients: strengths and weaknesses. *Can J Psychiatry.* 2007;52(6, suppl 1):7S-20S.
71. Lang M. The impact of mental health insurance laws on state suicide rates. *Health Econ.* 2013;22:73-88.
72. Kleiman EM, Liu RT. Prospective prediction of suicide in a nationally representative sample: religious service attendance as a protective factor. *Br J Psychiatry.* 2014;204:262-266.
73. World Health Organization. *Prevention of Suicide: Guidelines for the Formulation and Implementation of National Strategies.* New York, NY: United Nations; 1996.
74. Goldsmith SK, Pellmar TC, Kleinman AM, Bunney WE, eds. *Reducing Suicide: A National Imperative.* Washington, DC: National Academies Press; 2002.
75. Fountoulakis KN, Gonda X, Rihmer Z. Suicide prevention programs through community intervention. *J Affect Disord.* 2011;130(1-2):10-16.
76. Dumesnil H, Verger P. Public awareness campaigns about depression and suicide: a review. *Psychiatr Serv.* 2009;60:1203-1213.
77. Goldney RD, Fisher IJ. Have broad-based community and professional education programs influenced mental health literacy and treatment seeking of those with major depression and suicidal ideation? *Suicide Life Threat Behav.* 2008;38:129-142.
78. Paykel ES, Hart D, Priest RG. Changes in public attitudes to depression during the Defeat Depression Campaign. *Br J Psychiatr.* 1998;173:519-522.
79. Lehfeld H, Althaus DA, Hegerl U, Ziervogel A, Niklewski G. Suicide attempts: results and experiences from the German competency network on depression. *Adv Psychosom Med.* 2004;26:137-143.
80. Goldney RD, Fisher IJ, Wilson DH, Cheok F. Mental health literacy of those with major depression and suicidal ideation: an impediment to help seeking. *Suicide Life Threat Behav.* 2002;32:394-403.
81. Ono Y, Awata S, Iida H, et al. A community intervention trial of multimodal suicide prevention program in Japan: a novel multimodal community intervention program to prevent suicide and suicide attempt in Japan, NOCOMIT-J. *BMC Public Health.* 2008;8:315.

82. Oyama H, Fujita M, Goto M, Shibuya H, Sakashita T. Outcomes of community-based screening for depression and suicide prevention among Japanese elders. *Gerontologist*. 2006;46:821-826.
83. Oyama H, Goto M, Fujita M, Shibuya H, Sakashita T. Preventing elderly suicide through primary care by community-based screening for depression in rural Japan. *Crisis*. 2006;27:58-65.
84. Oyama H, Koida J, Sakashita T, Kudo K. Community-based prevention for suicide in elderly by depression screening and follow-up. *Community Ment Health J*. 2004;40:249-263.
85. Oyama H, Watanabe N, Ono Y, et al. Community-based suicide prevention through group activity for the elderly successfully reduced the high suicide rate for females. *Psychiatry Clin Neurosci*. 2005;59:337-344.
86. Knox KL, Litts DA, Talcott GW, Feig JC, Caine ED. Risk of suicide and related adverse outcomes after exposure to a suicide prevention programme in the US Air Force: cohort study. *BMJ*. 2003;327:1376.
87. De Leo D, Buono MD, Dwyer J. Suicide among the elderly: the long-term impact of a telephone support and assessment intervention in northern Italy. *Br J Psychiatry*. 2002;181:226-229.
88. Suicide Prevention Resource Center. *Safe and Effective Messaging for Suicide Prevention*. Watertown, MA: SPRC; 2011.
89. Chambers DA, Pearson JL, Lubell K, Brandon S, O'Brien K, Zinn J. The science of public messages for suicide prevention: a workshop summary. *Suicide Life Threat Behav*. 2005;35:134-145.
90. Gould MS, Jamieson P, Romer D. Media contagion and suicide among the young. *Am Behav Sci*. 2003;46:1269-1284.
91. Department of Mental Health and Substance Abuse, World Health Organization, ed. *Preventing Suicide: A Resource for Media Professionals (Updated)*. Geneva, Switzerland: WHO; 2008.
92. Sonneck G, Etzersdorfer E, Nagel-Kuess S. Imitative suicide on the Viennese subway. *Soc Sci Med*. 1994;38:453-457.
93. Cusimano MD, Sameem M. The effectiveness of middle and high school-based suicide prevention programmes for adolescents: a systematic review. *Inj Prev*. 2011;17:43-49.
94. Robinson J, Cox G, Malone A, et al. A systematic review of school-based interventions aimed at preventing, treating, and responding to suicide-related behavior in young people. *Crisis*. 2013;34:164-182.
95. Zenere FJ III, Lazarus PJ. The decline of youth suicidal behavior in an urban, multicultural public school system following the introduction of a suicide prevention and intervention program. *Suicide Life Threat Behav*. 1997;27:387-402.
96. Wyman PA, Brown CH, LoMurray M, et al. An outcome evaluation of the Sources of Strength suicide prevention program delivered by adolescent peer leaders in high schools. *Am J Public Health*. 2010;100:1653-1661.
97. Wilcox HC, Kellam SG, Brown CH, et al. The impact of two universal randomized first- and second-grade classroom interventions on young adult suicide ideation and attempts. *Drug Alcohol Depend*. 2008;95(suppl 1):S60-S73.
98. Miller DN, Eckert TL, Mazza JJ. Suicide prevention programs in the schools: a review and public health perspective. *School Psychol Rev*. 2009;38:168-188.
99. Shaffer D, Vieland V, Garland A, Rojas M, Underwood M, Busner C. Adolescent suicide attempters: response to suicide-prevention programs. *JAMA*. 1990;264:3151-3155.
100. Gould MS, Marrocco FA, Kleinman M, et al. Evaluating iatrogenic risk of youth suicide screening programs: a randomized controlled trial. *JAMA*. 2005;293:1635-1643.
101. Mann JJ, Apter A, Bertolote J, et al. Suicide prevention strategies: a systematic review. *JAMA*. 2005;294:2064-2074.
102. Loftin C, McDowall D, Wiersema B, Cottey TJ. Effects of restrictive licensing of handguns on homicide and suicide in the District of Columbia. *N Engl J Med*. 1991;325:1615-1620.
103. Kapusta ND, Etzersdorfer E, Krall C, Sonneck G. Firearm legislation reform in the European Union: impact on firearm availability, firearm suicide and homicide rates in Austria. *Br J Psychiatry*. 2007;191:253-257.
104. Hawton K, Townsend E, Deeks J, et al. Effects of legislation restricting pack sizes of paracetamol and salicylate on self poisoning in the United Kingdom: before and after study. *BMJ*. 2001;322:1203-1207.
105. Kruesi MJ, Grossman J, Pennington JM, Woodward PJ, Duda D, Hirsch JG. Suicide and violence prevention: parent education in the emergency department. *J Am Acad Child Adolesc Psychiatry*. 1999;38:250-255.
106. Kreitman N. The coal gas story: United Kingdom suicide rates, 1960-71. *Br J Prev Soc Med*. 1976;30:86-93.
107. Gunnell D, Eddleston M, Phillips MR, Konradsen F. The global distribution of fatal pesticide self-poisoning: systematic review. *BMC Public Health*. 2007;7:357.
108. Gunnell D, Bennenwith O, Hawton K, Simkin S, Kapur N. The epidemiology and prevention of suicide by hanging: a systematic review. *Int J Epidemiol*. 2005;34:433-442.
109. National Action Alliance for Suicide Prevention, Youth in Contact with the Juvenile Justice System Task Force, Public Awareness and Education Workgroup. *Need to Know: A Fact Sheet Series On Juvenile Justice—Juvenile Detention and Secure Care Staff*. Washington, DC: National Action Alliance for Suicide Prevention, Youth in Contact with the Juvenile Justice System Task Force, Public Awareness and Education Workgroup; 2013.
110. Beautrais AL, Gibb SJ, Fergusson DM, Horwood LJ, Larkin GL. Removing bridge barriers stimulates suicides: an unfortunate natural experiment. *Aust N Z J Psychiatry*. 2009;43:495-497.
111. Sarchiapone M, Mandelli L, Iosue M, Andrisano C, Roy A. Controlling access to suicide means. *Int J Environ Res Public Health*. 2011;8:4550-4562.
112. Miller M, Azrael D, Barber C. Suicide mortality in the United States: the importance of attending to method in understanding population-level disparities in the burden of suicide. *Annu Rev Public Health*. 2012;33:393-408.
113. Hawton K. Studying survivors of nearly lethal suicide attempts: an important strategy in suicide research. *Suicide Life Threat Behav*. 2001;32(1, suppl):76-84.
114. Simon OR, Swann AC, Powell KE, Potter LB, Kresnow MJ, O'Carroll PW. Characteristics of impulsive suicide attempts and attempters. *Suicide Life Threat Behav*. 2001;32(1, suppl):49-59.
115. Shaffer D, Scott M, Wilcox H, et al. The Columbia Suicide Screen: validity and reliability of a screen for youth suicide and depression. *J Am Acad Child Adolesc Psychiatry*. 2004;43:71-79.
116. Aseltine RH Jr, DeMartino R. An outcome evaluation of the SOS Suicide Prevention Program. *Am J Public Health*. 2004;94:446-451.
117. Scherff AR, Eckert TL, Miller DN. Youth suicide prevention: a survey of public school superintendents' acceptability of school-based programs. *Suicide Life Threat Behav*. 2005;35:154-169.
118. Robinson J, Pan Yuen H, Martin C, et al. Does screening high school students for psychological distress, deliberate self-harm, or suicidal ideation cause distress—and is it acceptable? *Crisis*. 2011;32:254-263.

119. Horowitz LM, Ballard ED, Pao M. Suicide screening in schools, primary care and emergency departments. *Curr Opin Pediatr.* 2009;21:620-627.
120. Lenzer J. Controversial mental health program closes down. *BMJ.* 2012;345:e8100.
121. Holli MM, Pelkonen M, Karlsson L, et al. Detecting suicidality among adolescent outpatients: evaluation of trained clinicians' suicidality assessment against a structured diagnostic assessment made by trained raters. *BMC Psychiatry.* 2008;8:97.
122. Thompson EA, Eggert LL. Using the suicide risk screen to identify suicidal adolescents among potential high school dropouts. *J Am Acad Child Adolesc Psychiatry.* 1999;38:1506-1514.
123. O'Connor E, Gaynes BN, Burda BU, Soh C, Whitlock EP. Screening for and treatment of suicide risk relevant to primary care: a systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med.* 2013;158:741-754.
124. Heisel MJ, Duberstein PR, Lyness JM, Feldman MD. Screening for suicide ideation among older primary care patients. *J Am Board Fam Med.* 2010;23:260-269.
125. Olsson M, Weissman MM, Leon AC, Sheehan DV, Farber L. Suicidal ideation in primary care. *J Gen Intern Med.* 1996;11:447-453.
126. O'Connor E, Gaynes B, Burda BU, Williams C, Whitlock EP. *Screening for Suicide Risk in Primary Care: A Systematic Evidence Review for the U.S. Preventive Services Task Force.* Rockville, MD: Agency for Healthcare Research and Quality; 2013.
127. LeFevre ML. Screening for suicide risk in adolescents, adults, and older adults in primary care: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2014;160:719-726.
128. Preventive Services Task Force; Agency for Healthcare Research Quality, ed. *The Guide to Clinical Preventive Services 2012: Recommendations of the U.S. Preventive Services Task Force.* Washington, DC: US Department of Health and Human Services; 2012.
129. Isaac M, Elias B, Katz LY, et al. Gatekeeper training as a preventative intervention for suicide: a systematic review. *Can J Psychiatry.* 2009;54:260-268.
130. Rutz W, Knorrning LV, Wålander J. Long-term effects of an educational program for general practitioners given by the Swedish Committee for the Prevention and Treatment of Depression. *Acta Psychiatr Scand.* 1992;85:83-88.
131. Clifford AC, Doran CM, Tsey K. A systematic review of suicide prevention interventions targeting indigenous peoples in Australia, United States, Canada and New Zealand. *BMC Public Health.* 2013;13:463.
132. Wyman PA, Brown CH, Inman J, et al. Randomized trial of a gatekeeper program for suicide prevention: 1-year impact on secondary school staff. *J Consult Clin Psychol.* 2008;76:104-115.
133. Goldman LS, Nielsen NH, Champion HC. Awareness, diagnosis, and treatment of depression. *J Gen Intern Med.* 1999;14:569-580.
134. Lee HC, Lin HC, Liu TC, Lin SY. Contact of mental and nonmental health care providers prior to suicide in Taiwan: a population-based study. *Can J Psychiatry.* 2008;53:377-383.
135. Luoma JB, Martin CE, Pearson JL. Contact with mental health and primary care providers before suicide: a review of the evidence. *Am J Psychiatry.* 2002;159:909-916.
136. Alexopoulos GS, Reynolds CF III, Bruce ML, et al. Reducing suicidal ideation and depression in older primary care patients: 24-month outcomes of the PROSPECT study. *Am J Psychiatry.* 2009;166:882-890.
137. Unützer J, Tang L, Oishi S, et al. Reducing suicidal ideation in depressed older primary care patients. *J Am Geriatr Soc.* 2006;54:1550-1556.
138. Rihmer Z, Belso N, Kalmar S. Antidepressants and suicide prevention in Hungary. *Acta Psychiatr Scand.* 2001;103:238-239.
139. Oyama H, Sakashita T, Ono Y, Goto M, Fujita M, Koida J. Effect of community-based intervention using depression screening on elderly suicide risk: a meta-analysis of the evidence from Japan. *Community Ment Health J.* 2008;44:311-320.
140. Hampton T. Depression care effort brings dramatic drop in large HMO population's suicide rate. *JAMA.* 2010;303:1903-1905.
141. Coffey CE, Coffey MJ, Ahmedani BK. An update on perfect depression care. *Psychiatr Serv.* 2013;64:396.
142. Cavanagh JT, Carson AJ, Sharpe M, Lawrie SM. Psychological autopsy studies of suicide: a systematic review. *Psychol Med.* 2003;33:395-405.
143. Harris EC, Barraclough B. Suicide as an outcome for mental disorders: a meta-analysis. *Br J Psychiatry.* 1997;170:205-228.
144. Druss BG, Zhao L, Von Esenwein S, Morrato EH, Marcus SC. Understanding excess mortality in persons with mental illness: 17-year follow up of a nationally representative US survey. *Med Care.* 2011;49:599-604.
145. Gunnell D, Saperia J, Ashby D. Selective serotonin reuptake inhibitors (SSRIs) and suicide in adults: meta-analysis of drug company data from placebo controlled, randomised controlled trials submitted to the MHRA's safety review. *BMJ.* 2005;330:385.
146. Khan A, Khan S, Kolts R, Brown WA. Suicide rates in clinical trials of SSRIs, other antidepressants, and placebo: analysis of FDA reports. *Am J Psychiatry.* 2003;160:790-792.
147. Gibbons RD, Mann JJ. Strategies for quantifying the relationship between medications and suicidal behaviour: what has been learned? *Drug Saf.* 2011;34:375-395.
148. Bet PM, Hugtenburg JG, Penninx BWJH, Balkom AV, Nolen WA, Hoogendijk WJG. Treatment inadequacy in primary and specialized care patients with depressive and/or anxiety disorders. *Psychiatry Res.* 2013;210:594-600.
149. March JS, Silva S, Petrycki S, et al. The Treatment for Adolescents With Depression Study (TADS): long-term effectiveness and safety outcomes. *Arch Gen Psychiatry.* 2007;64:1132-1143.
150. Cipriani A, Hawton K, Stockton S, Geddes JR. Lithium in the prevention of suicide in mood disorders: updated systematic review and meta-analysis. *BMJ.* 2013;346:f3646.
151. Meltzer HY, Alphas L, Green AI, et al. Clozapine treatment for suicidality in schizophrenia: International Suicide Prevention Trial (InterSePT). *Arch Gen Psychiatry.* 2003;60:82-91.
152. Brent DA, McMakin DL, Kennard BD, Goldstein TR, Mayes TL, Douaihy AB. Protecting adolescents from self-harm: a critical review of intervention studies. *J Am Acad Child Adolesc Psychiatry.* 2013;52:1260-1271.
153. Christiansen E, Jensen BF. Risk of repetition of suicide attempt, suicide or all deaths after an episode of attempted suicide: a register-based survival analysis. *Aust N Z J Psychiatry.* 2007;41:257-265.
154. Owens D, Horrocks J, House A. Fatal and non-fatal repetition of self-harm: systematic review. *Br J Psychiatry.* 2002;181:193-199.
155. Motto JA, Bostrom AG. A randomized controlled trial of postcrisis suicide prevention. *Psychiatr Serv.* 2001;52:828-833.
156. Vaiva G, Vaiva G, Ducrocq F, et al. Effect of telephone contact on further suicide attempts in patients discharged from an emergency department: randomised controlled study. *BMJ.* 2006;332:1241-1245.

157. Fleischmann A, Bertolote JM, Wasserman D, et al. Effectiveness of brief intervention and contact for suicide attempters: a randomized controlled trial in five countries. *Bull World Health Organ*. 2008;86:703-709.
158. Bertolote JM, Fleischmann A, De Leo D, et al. Repetition of suicide attempts: data from emergency care settings in five culturally different low- and middle-income countries participating in the WHO SUPRE-MISS Study. *Crisis*. 2010;31:194-201.
159. Linehan MM, Comtois KA, Murray AM, et al. Two-year randomized controlled trial and follow-up of dialectical behavior therapy vs therapy by experts for suicidal behaviors and borderline personality disorder. *Arch Gen Psychiatry*. 2006;63:757-766.
160. Lynch TR, Trost WT, Salsman N, Linehan MM. Dialectical behavior therapy for borderline personality disorder. *Annu Rev Clin Psychol*. 2007;3:181-205.
161. Eggert LL, Thompson EA, Herting JR, Nicholas IJ. Reducing suicide potential among high-risk youth: tests of a school-based prevention program. *Suicide Life Threat Behav*. 1995;25:276-296.
162. Litman RE, Farberow NL, Shneidman ES, Heilig SM, Kramer JA. Suicide-prevention telephone service. *JAMA*. 1965;192:21-25.
163. Lester D. The effectiveness of suicide prevention centers: a review. *Suicide Life Threat Behav*. 1997;27:304-310.
164. Leenaars AA, Lester D. The impact of suicide prevention centers on the suicide rate in the Canadian provinces. *Crisis*. 2004;25:65-68.
165. Gould MS, Kalafat J, HarrisMunfakh JL, Kleinman M. An evaluation of crisis hotline outcomes part 2: suicidal callers. *Suicide Life Threat Behav*. 2007;37:338-352.
166. Crepeau-Hobson MF, Leech NL. The impact of exposure to peer suicidal self-directed violence on youth suicidal behavior: a critical review of the literature. *Suicide Life Threat Behav*. 2014;44:58-77.
167. Szumilas M, Kutcher S. Post-suicide intervention programs: a systematic review. *Can J Public Health*. 2011;102:18-29.
168. Cox GR, Robinson J, Williamson M, Lockley A, Cheung YT, Pirkis J. Suicide clusters in young people: evidence for the effectiveness of postvention strategies. *Crisis*. 2012;33:208-214.
169. McDaid C, Trowman R, Golder S, Hawton K, Sowden A. Interventions for people bereaved through suicide: systematic review. *Br J Psychiatry*. 2008;193:438-443.
170. May PA, Serna P, Hurt L, Debruyen LM. Outcome evaluation of a public health approach to suicide prevention in an American Indian tribal nation. *Am J Public Health*. 2005;95:1238-1244.
171. Mitchell P. *Valuing Young Lives: Evaluation of the National Youth Suicide Prevention Strategy*. Victoria, Australia: Australian Institute of Family Studies; 2000.
172. Hailey D, Roine R, Ohinmaa A. The effectiveness of telemental health applications: a review. *Can J Psychiatry*. 2008;53:769-778.
173. Berrouiguet S, Gravey M, Le Galudec M, Alavi Z, Walter M. Post-acute crisis text messaging outreach for suicide prevention: a pilot study. *Psychiatry Res*. 2014;217:154-157.
174. Chen H, Mishara BL, Liu XX. A pilot study of mobile telephone message interventions with suicide attempters in China. *Crisis*. 2010;31:109-112.
175. Ruder TD, Hatch GM, Ampanozi G, Thali MJ, Fischer N. Suicide announcement on Facebook. *Crisis*. 2011;32:280-282.
176. Jashinsky J, Burton SH, Hanson CL, et al. Tracking suicide risk factors through Twitter in the US. *Crisis*. 2014;35:51-59.
177. Gunn JF III, Lester D. Using Google searches on the Internet to monitor suicidal behavior. *J Affect Disord*. 2013;148:411-412.
178. Daine K, Hawton K, Singaravelu V, Stewart A, Simkin S, Montgomery P. The power of the web: a systematic review of studies of the influence of the internet on self-harm and suicide in young people. *PLoS One*. 2013;8:e77555.
179. Patrick AR, Miller M, Barber CW, Wang PS, Canning CF, Schneeweiss S. Identification of hospitalizations for intentional self-harm when E-codes are incompletely recorded. *Pharmacoepidemiol Drug Saf*. 2010;19:1263-1275.
180. Gunnell D, Frankel S. Prevention of suicide: aspirations and evidence. *BMJ*. 1994;308:1227-1233.
181. Fisher CB, Pearson JL, Kim S, Reynolds CF. Ethical issues in including suicidal individuals in clinical research. *IRB*. 2002;24(5):9-14.
182. Hegerl U, Wittenburg L, Arensman E, et al. Optimizing suicide prevention programs and their implementation in Europe (OSPI Europe): an evidence-based multi-level approach. *BMC Public Health*. 2009;9:428.
183. Caine ED. Forging an agenda for suicide prevention in the United States. *Am J Public Health*. 2013;103:822-829.
184. Bruffaerts R, Demyttenaere K, Hwang I, et al. Treatment of suicidal people around the world. *Br J Psychiatry*. 2011;199:64-70.
185. Kessler RC, Merikangas KR, Wang PS. Prevalence, comorbidity, and service utilization for mood disorders in the United States at the beginning of the twenty-first century. *Annu Rev Clin Psychol*. 2007;3:137-158.
186. Department of Health and Human Services, Office of the Surgeon General, National Action Alliance for Suicide Prevention. *2012 National Strategy for Suicide Prevention: Goals and Objectives for Action*. Washington, DC: DHHS; 2012.
187. The National Association for Public Health Statistics and Information Systems Electronic Death Registration Systems Project. <http://www.naphsis.org/Pages/ElectronicSystems.aspx>.
188. Centers for Disease Control and Prevention. NVDRS Data supports suicide prevention for older adults. 2014. <http://vetoviolence.cdc.gov/success/stories/suicide/oregon%20older%20adult%20success%20story.pdf>. Accessed September 2, 2014.
189. Huguet N, McFarland BMP, Kaplan MD. A comparison of suicides and undetermined deaths by poisoning among women: an analysis of the National Violent Death Reporting System [published online July 10, 2014]. *Arch Suicide Res*. doi:10.1080/1381118.2014.915275.
190. Niederkrotenthaler T, Logan JE, Karch DL, Crosby A. Characteristics of U.S. suicide decedents in 2005-2010 who had received mental health treatment. *Psychiatr Serv*. 2014;65:387-390.
191. Van Orden KA, Witte TK, Cukrowicz KC, Braithwaite SR, Selby EA, Joiner TE Jr. The interpersonal theory of suicide. *Psychol Rev*. 2010;117:575-600.
192. O'Connor RC, Platt S, Gordon J, eds. *International Handbook of Suicide Prevention: Research, Policy, and Practice*. Chichester, UK: John Wiley; 2011.
193. Van Orden KA, Stone DM, Rowe J, McIntosh WL, Podgorski C, Conwell Y. The Senior Connection: design and rationale of a randomized trial of peer companionship to reduce suicide risk in later life. *Contemp Clin Trials*. 2013;35:117-126.
194. Czyz EK, Liu Z, King CA. Social connectedness and one-year trajectories among suicidal adolescents following psychiatric hospitalization. *J Clin Child Adolesc Psychol*. 2012;41:214-226.
195. Logan JE, Crosby AE, Hamburger ME. Suicidal ideation, friendships with delinquents, social and parental connectedness, and differential associations by sex: findings among high-risk pre/early adolescent population. *Crisis*. 2011;32:299-309.

196. Centers for Disease Control and Prevention. School connectedness. <http://www.cdc.gov/healthyyouth/adolescenthealth/connectedness.htm>. Accessed September 2, 2014.
197. Block P. The real solution to the health care debate? Connectedness. http://www.huffingtonpost.com/peter-block/health-care-debate_b_840847.html. Accessed September 2, 2014.
198. Schomerus G, Schwahn C, Holzinger A, et al. Evolution of public attitudes about mental illness: a systematic review and meta-analysis. *Acta Psychiatr Scand*. 2012;125:440-452.
199. Mental Health Parity and Addiction Equity Act, Pub L No. 110-343, 122 Stat 3765.
200. Claassen CA, et al. Reducing the burden of suicide in the u.s.: the aspirational research goals of the national action alliance for suicide prevention research prioritization task force. *Am J Prev Med*. 2014;47:309-314.
201. Miller M, Azrael D, Hemenway D. Belief in the inevitability of suicide: results from a national survey. *Suicide Life Threat Behav*. 2006;36:1-11.
202. Hawton K. Restriction of access to methods of suicide as a means of suicide prevention. In: Hawton K, ed. *Prevention and Treatment of Suicidal Behavior: From Science to Practice*. Oxford, UK: Oxford University Press; 2005: 279-291.
203. Schneidman ES. *The Suicidal Mind*. New York, NY: Oxford University Press; 1996.
204. Hammer JH, Vogel DL, Heimerdinger-Edwards SR. Men's help seeking: examination of differences across community size, education, and income. *Psychol Men Masculinity*. 2013;14: 65-75.
205. Berkman LF, Syme SL. Social networks, host resistance, and mortality: a nine-year follow-up study of Alameda County residents. *Am J Epidemiol*. 1979;109: 186-204.
206. De Leo D. Struggling against suicide: the need for an integrative approach. *Crisis*. 2002;23:23-31.
207. Stewart WF, Ricci JA, Chee E, Hahn SR, Morganstein D. Cost of lost productive work time among US workers with depression. *JAMA*. 2003;289:3135-3144.
208. Brown CH, Wyman PA, Brinales JM, Gibbons RD. The role of randomized trials in testing interventions for the prevention of youth suicide. *Int Rev Psychiatry*. 2007;19:617-631.
209. Dube SR, Anda RF, Felitti VJ, Chapman DP, Williamson DF, Giles WH. Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study. *JAMA*. 2001;286: 3089-3096.
210. Goldman-Mellor SJ, Caspi A, Harrington H, et al. Suicide attempt in young people: a signal for long-term health care and social needs. *JAMA Psychiatry*. 2014;71: 119-127.
211. Jashinsky J, Burton SH, Hanson CL, et al. Tracking suicide risk factors through twitter in the US. *Crisis*. 2014;35:51-59.