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Suicidal Behavior in Elders

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In the United States, as in many countries of the world, older adults are at greater risk for suicide than other age groups. This article provides an overview of suicide in later life and a foundation on which to base decisions about the design and implementation of preventive interventions. Ultimately, implementation of effective suicide prevention strategies and reduction of self-inflicted deaths by older people will depend on information obtained at each of four stages of the preventive intervention research cycle, depicted in Fig. 1. First is the definition of the scope of the problem: rates of suicide in the older population and their patterns over time and space. Second is the characterization of suicide in older adults, with particular reference to risk and protective factors. These in turn suggest potential pathogenic mechanisms and indicate where one can obtain the most efficient access to older adults at risk, or who may be targets of preventive interventions. With this information, those interventions can be designed and preliminary testing conducted for their refinement before they are implemented on a larger scale. With effective surveillance tools established to evaluate the impact of the intervention, the cycle then starts afresh.

This article first considers special challenges to suicide prevention in older adults, and then reviews the information available to inform each of these steps in the late-life suicide preventive intervention research cycle.

CHALLENGES TO LATE-LIFE SUICIDE PREVENTION

Developing suicide prevention strategies in older adults is particularly challenging because of a range of factors at the individual, provider, systems, and even social/cultural levels. To the extent that suicide prevention relies on timely and effective detection and treatment of mental disorders, older adults face multiple barriers to the acquisition of care [1]. At the service system level, discriminatory barriers still exist in access to mental health care. Medicare recipients are required to pay 50% of charges for mental health services, rather than a 20% copay for physical health conditions. Older adults tend not to use mental health services, but rather seek care from primary care providers. Affective syndromes may be milder in older adults, expressed as physical symptoms [2]. Their presentations are further complicated by comorbid medical illness and the multiple medications prescribed to treat them. Older adults are reluctant to talk about emotional problems and are less likely to report depression and suicidal ideation to others [3,4]. Although doctors see many older people in a typical primary care practice, they often lack specialized training in geriatric care, the information and decision support needed to optimize quality of care, and the time necessary to diagnose affective disorders and assess suicide risk among so many competing demands [5,6].

Consequently, fewer than half of older people with clinically significant mood disorders are diagnosed with depression in primary care, and of those, a minority undergo treatment for their illness. Among those who are treated, few receive the intervention at sufficient doses and duration to be effective [7]. Many primary care providers fear that giving the older patient a psychiatric diagnosis or referral for mental health care will be stigmatizing for the patient, and therefore avoid the issue altogether. Underlying many of these barriers is bias against aging and mental illness and promulgation of the attitude that such feelings are “normal” among older people who experience multiple losses, physical illness, and functional decline.

Characteristics of suicidal behavior in older adults also present special challenges to its prevention. Available data indicate that 8 to 40 suicides are attempted for each completed suicide in the general population [8]. In younger adult groups, that ratio may be as high as 200:1 [9]. Among older adults, however, a far higher proportion of suicidal acts are fatal; for every completed suicide, an estimated two to four attempts occur [10]. Several factors may account for this important observation. Older adults in general (and those at risk for suicide in particular) tend to be frailer, and are therefore more likely to die as a result of any self-inflicted injury. Second, older adults are more likely than younger people to live alone, and are therefore less likely to be found in sufficient time to be rescued after an attempt. Finally, older people tend to use more immediately lethal means to kill themselves than younger age groups, and also implement their suicidal acts in a manner more likely to result in death [11]. In 2004, 52% of suicides in the United States were by firearm: 57% of men and 32% of women [12]. Among those older than 65 years, however, more than 72% of suicides were by firearm. These observations indicate the importance of performing screening and assessment to identify seniors who have suicidal thoughts and implementing aggressive clinical interventions to protect and treat them. However, because of the various barriers, fewer opportunities are available to detect and treat older adults at high risk for suicide. Greater emphasis may need to be placed, therefore, on interventions to prevent the development of suicidal states.

SCOPE OF THE PROBLEM: THE EPIDEMIOLOGY OF SUICIDE IN LATER LIFE

Each year in the United States approximately 32,000 deaths result from suicide, of which more than 5000 (14%) are among people older than 65 years [12]. Fig. 2 illustrates the complex relationships among suicide risk, age, gender, and race. At each point in the life course, suicide rates are higher for men than women and for whites than non-whites. One notable exception is American Indian youth, who have higher rates of suicide than their white counterparts. The rise in suicide risk for older adults in the United States is solely accounted for by the dramatic increase in rates among older white men to 48.7/100,000, which is more than four times the nation's overall age-adjusted rate of 11.1/ 100,000.

Countries that report statistics to the World Health Organization have considerable variability in associations among age, gender, and suicide risk. Fig. 3, for example, illustrates rates reported to the World Health Organization for Canada (2002) and rural China (1999) [13]. In Canada, the highest rates are seen among young adult and middle-aged men and women, respectively. In rural China, suicide risk for men and women is comparable, with rates rising to more than 100/100,000 in the oldest age groups of both genders. These variations may reflect reporting differences among countries, but cultural factors clearly play an important role.

Suicide rates among people older than 65 years declined substantially over the 20th century, a change ascribed to improved economic well-being of seniors who have social security, Medicare legislation, improved access to health care and effective treatments for depressive illness [14], and other undetermined factors [15]. Between 2000 and 2004, that trend continued, with the overall late-life suicide rate decreasing from 15.1 to 14.3 per 100,000 [12].

Required reporting of cause of death to the Centers for Disease Control and Prevention constitutes an effective surveillance mechanism for completed suicide in the United States, but no mechanism exists for suicide attempts or ideation. Instead, epidemiologic data must be derived from population-based surveys. These studies consistently show that rates of suicidal ideation and a history of suicide attempts are lower in elders than younger adult populations [4,16]. Variation in methodology among studies, lack of standardized definitions, and few well-validated measures of suicidal ideation and behavior limit the ability to draw firmer conclusions.

The presence of a history of either suicide attempts or suicidal ideation increases risk for subsequent suicidal behavior and completed suicide in older adults, just as at earlier points in the life course [17–19]. Therefore, interventions designed to prevent suicidal ideation and behavior may be effective in reducing completed suicides. It would be a mistake, however, to assume that ideation or attempts were close proxies for suicide. Rates of ideation and attempts are far higher in younger adults and women, whereas completed suicide rates are highest in older men; approximately 75% of older adults who commit suicide have never made a prior attempt [20]. The remainder of this article, therefore, focuses on the available evidence to inform the design of preventive interventions that target completed suicide.

RISK AND PROTECTIVE FACTORS

Much of what we know about risk factors for suicide in later life is derived from “psychological autopsies” (PAs), a research method in which mental and physical health status and social circumstances are reconstructed from records and interviews with next of kin and other knowledgeable informants [21]. Findings from several PAs of older adult suicides were recently published [22–26], including a handful that used matched comparison groups [19, 27–33], allowing factors associated with suicide case status to be identified and quantified. These findings map well onto the multiaxial system of psychiatry’s Diagnostic and Statistical Manual of Mental Disorders [34], forming a framework for the subsequent discussion.

AXIS I: MAJOR PSYCHIATRIC ILLNESS

Table 1 lists the distribution of psychiatric diagnoses among older adults who committed suicide and underwent PA. Affective illness was the most common disorder, present in 54% to 87% of cases. Major affective disorder accounted for most of these affective syndromes. The prevalence of substance use disorders varied widely, from 3% to 46%, reflecting the different age groups, locations, and dates of studies; those conducted more recently and in Western countries tend to have higher rates. Primary psychotic illnesses, including schizophrenia, schizoaffective illness, and delusional disorder, play a smaller role in suicide in later life, as do anxiety disorders and other diagnoses. Overall, between 71% and 95% of elderly suicide decedents had a diagnosable Axis I condition.

Table 2 lists results from case-control psychological autopsy (PA) studies for which the inclusion of a demographically matched comparison group enables calculation of odds ratios, which indicate the strength of association between major psychiatric illnesses and suicide in older adults. The odds of a subject in these studies having any Axis I diagnosis was between 44 and 113 times higher among older suicides than matched controls [27,28,31]. The association with mood disorders, and major depression in particular, was especially high. The lower (but still significant) odds ratio for any mood disorder reported by Harwood and colleagues [32] is easily explained by the greater likelihood of affective illness in the population of older adults who died of natural causes in the hospital that they selected for comparison.

Two of the four studies that examined diagnoses of substance use disorder found a significant association with suicide case status, and one of two studies reported a significant relationship

between anxiety disorders and suicide in older adults. Similarly, schizophrenic spectrum disorders were significantly associated with suicide in two of three studies, although at low odds ratios.

The devastating effects of dementia on patient and family and its close association with mood disorders, suicidal ideation, and suicide attempts all suggest that risk for suicide is high in people with the disease. However, of four case-control studies that attempted to diagnose dementia or delirium using the PA method, only one reported a significant association. Harwood and colleagues [32] found that dementia/delirium had a protective effect (odds ratio <1.0). This counterintuitive finding likely reflects the special characteristics of their comparison group, because hospitalized patients who die of natural causes are more likely to be cognitively impaired before death than those commit suicide and were not hospitalized. Until further research can address this critical question, optimal clinical practice should assume that any older adult with dementia or delirium is at increased risk for suicide.

AXIS II: PERSONALITY TRAITS AND DISORDERS

Investigators have long noted associations between late-life suicides and traits such as timidity and shy seclusiveness [35], hostility, and a rigid, independent style [35,36]. Only one case-control PA study examined whether personality disorders elevate risk in this age group. Harwood and colleagues [32] found that levels of anankastic (obsessional) and anxious traits significantly distinguished suicides from natural deaths, but personality disorder per se did not.

Using an informant-report version of the NEO Personality Inventory, Duberstein and colleagues [37] also examined personality traits in individuals older than 50 years who committed suicide and a matched, living comparison group [38]. Of the five domains of personality measured (neuroticism, extroversion, openness to experience [OTE], agreeableness, and conscientiousness), high neuroticism and low OTE distinguish the groups. Low OTE is associated with muted affective and hedonic responses, a constricted range of interests, and a strong preference for the familiar over the novel. These investigators posit that patients who have low OTE are at risk for suicide because they are less well-equipped socially and psychologically to manage the challenges of aging and more likely to not be recognized as being in distress and in need of intervention [39].

Hopelessness, shown by Beck and colleagues [40,41] to be a significant predictor of suicidal ideation, intent, and eventual suicide in mixed-age samples, may have special relevance in elderly individuals [42,43], including as a trait characteristic or marker of suicide risk. Szanto and colleagues [44] have shown that hopelessness remains significantly elevated after resolution of major depression in older adults who have a lifetime history of suicide attempts. Hopelessness, therefore, may have specific implications in designing preventive interventions using cognitive behavioral strategies, although their relevance and applicability to suicide and older adults remains largely unexplored.

AXIS III: PHYSICAL ILLNESS

Because physical illnesses are so common in older adults, the relative risk for suicide associated with them, and their usefulness in identifying any individual in need of acute intervention, is low. Furthermore, the association between physical illnesses and suicide in later life could be partly explained by the mediating effect of depression (physical illness causes depression and depression increases risk for suicide).

Studies linking death records with disease registries have found significant associations between suicide and HIV/AIDS, Huntington's disease, multiple sclerosis, renal disease, peptic ulcer disease, spinal cord injury, and systemic lupus erythematosus [45]. Studies have also

found consistent associations between suicide and malignant neoplasms (other than skin cancer), and more variable associations with heart and lung disease; epilepsy and other central nervous system (CNS) disorders; and genitourinary and gastrointestinal illnesses [46,47]. In general, the relative risk for suicide is 1.5 to 4 times higher if an individual has one of these illnesses. Compared with the strength of association between suicide and psychiatric illness, the added risk for medical illness is small. However, older adults may have multiple comorbid medical conditions, and as the number of illnesses increases so does their cumulative risk. Juurlink and colleagues [46] linked prescription records for all residents of Ontario, Canada, aged 65 years and older with provincial coroners' reports of suicide to conduct a case-control analysis of risk associated with specific medical conditions. They found that patients who had three physical illnesses had approximately a threefold increase in the estimated relative risk for suicide compared with subjects who had no diagnosis, whereas older adults who had seven or more illnesses had an approximately nine times greater risk for suicide.

AXIS IV: LIFE EVENT STRESSORS AND SOCIAL CIRCUMSTANCES

The life events associated with suicide in older adults are those typically associated with aging: bereavement, financial stressors associated with retirement and living on reduced means, family discord and loss of social support, and the social and psychological impacts of physical illness. Controlled PA studies again help define whether these stressors are present before suicide more often in older adults than in the general older adult population.

In her PA study of older adults in New Zealand, Beautrais [31] found that elders who committed suicide were more likely to have experienced serious relationship and financial problems in the past year than controls. In Sweden, Rubenowitz and colleagues [33] found, using multivariate analyses, that suicides were more likely than controls to have experienced family discord and financial trouble in the 2 years preceding death, and that after accounting for mental illness, family discord continued to distinguish the groups. In their PA study of individuals older than 50 years who committed suicide in Western New York State, Duberstein and colleagues [29] reported that family discord and employment change distinguished suicides from controls even after adjusting for sociodemographic characteristics and mental disorders that developed in the prior year. Conceptualizing social support as a protective factor, Turvey and colleagues [48] analyzed prospectively collected data in the Established Populations' for Epidemiologic Studies of the Elderly database. They found that having a greater number of friends and relatives with whom to confide was associated with significantly reduced suicide risk in these older adults. Miller [49] reported that matched community controls were significantly more likely than elderly men who committed suicide to have had a confidant, and Barraclough [22] used census data for comparison with elder suicides to conclude that cases were more likely to live alone than their peers in the community. The weight of the evidence indicates that, like psychological and medical factors, social stressors place older adults at risk, whereas robust social supports seem to be a buffer against suicide.

Beautrais [31] used her New Zealand PA study data to estimate the population attributable risk (PAR) for suicide in later life associated with major affective illness and low social support. The PAR statistic estimates the portion of an adverse outcome that may be avoided if a risk factor could be eliminated. She found that if all late-life major depressive episodes could be prevented, suicide rates among older adults would drop by almost 75%. If all seniors could be assured adequate social support, suicides would drop by 27%. These findings have clear implications for the design of preventive interventions in late life.

AXIS V: FUNCTIONING

Measurement of functional status is a core component of comprehensive clinical assessment in geriatric medicine and psychiatry because it is often a sensitive indicator of underlying

physical and psychological problems. Defining associations between functional decrements and suicidal behavior in older adults, therefore, may also help identify those in need of further assessment and intervention. Typical measurements include activities of daily living (ADLs), such as dressing and feeding oneself, and higher-order skills, such as using the telephone or managing one's finances (called *instrumental activities of daily living*, or IADLs).

Only a few controlled studies of late-life suicide, however, have examined the construct of functional capacity. Conwell and colleagues [19] compared functional status among adults aged 60 and older enrolled in primary care practices who had taken their own lives, with a matched sample of living primary care patients. Along with measures of physical health, ADL and IADL scales significantly distinguished the groups. However, after controlling for the presence of mood disorders, neither physical health nor functional variables remained significant predictors of suicide status. Tsoh and colleagues [50] examined IADLs among 66 elderly suicide attempters, 67 suicide completers, and 91 community-dwelling comparison subjects aged 65 years or older, and found that both attempters and completers had significantly greater functional impairment than the nonsuicidal group. Further studies that include more refined measurement of functional capacity in discreet domains are needed.

OTHER FACTORS AND POTENTIAL MECHANISMS

Another potential risk factor with implications for prevention is access to lethal means. Older adults tend to act on suicidal thoughts with greater lethality of intent and implementation, and use more immediately lethal means, particularly firearms. In his PA study of older men who took their own lives, Miller [49] observed that, although no difference was seen between men who completed suicides and controls in the proportion who owned a firearm, a significantly greater proportion of men who completed suicide had acquired the weapon within the past week. In the authors' controlled PA study in Western New York State, they found that the presence of a handgun (but not a rifle) in the home significantly increased risk for suicide in elderly men but not women [51]. Among those who kept a gun, storing the weapon loaded and unlocked were also independent predictors of suicide case status.

Among the exciting advances in suicide research in recent decades are the observed associations between suicidal behavior and a range of neurobiological parameters. The most consistent findings suggest that abnormalities in central serotonergic function predispose individuals to act impulsively and aggressively in the face of dysphoria, hopelessness, and emergent suicidal ideation in the depressed state [52]. Noradrenergic, dopaminergic, and other neurobiological systems have also been implicated [53]. The dramatic rise in suicide rates concomitant with age among men in the United States and among men and women in many other countries raises the question of whether aging-related changes in neurobiological systems may contribute. However, few studies have examined these questions in older adults because high rates of medication use and medical comorbidity in elderly individuals who commit suicide complicate the interpretation of findings.

Several investigators have explored whether measures of brain structure or neuropsychological function distinguish those at greater risk for suicide. For example, underlying vascular disease may predispose to depression [54,55], but also result in abnormalities in frontal executive function that could impair a person's capacity to manage stress effectively [55]. Keilp and colleagues [56] found that adult suicide attempters performed poorly on frontal executive tasks relative to controls, whereas King and colleagues [57] made a similar observation in older adults who attempted suicide. Ahearn and colleagues [58] reported that elderly depressives with lifetime histories of suicide attempts had significantly more subcortical gray matter hyperintensities on MRI than carefully matched depressives with no previous suicide attempt

history, further supporting the hypothesis that underlying vascular disease may predispose to late-life suicidal acts.

Elucidation of neurobiological mechanisms for the expression of suicidal behavior has exciting implications for the design of preventive interventions. Currently, however, their value for older adults is heuristic.

POINTS OF ACCESS: WHERE TO FIND SENIORS AT RISK

This article next consider where preventive interventions can be most effectively implemented: what settings provide the greatest access to older adults, both those at high risk and those amenable to interventions designed to prevent development of risk states? Fig. 4 illustrates the primary targets. Given the strong link between suicide and psychiatric illness, mental health providers and clinics would be a logical starting point. However, older adults rarely use these services. Instead, they are far more likely to visit a primary care provider, including during periods of high risk. Studies have repeatedly found that two thirds or more of older adults who killed themselves had been in a primary care provider's office in the past 30 days of life and up to a half within 1 week of their suicide, many with symptomatic affective disorders [19, 59]. Given that a large proportion of the population at risk is seen in these settings, primary care is the most obvious venue for which to develop and implement preventive interventions.

Any health care delivery setting in which older adults who have chronic physical illness and functional decline receive services may offer important opportunities for preventive interventions, including community-based long-term care. Bruce and colleagues [60], for example, found high rates of major affective disorder among older adults who used visiting nurse services. Reported rates of suicide in nursing homes are not as high as one might expect given the prevalence of psychiatric illness among their residents [61,62], a finding that might be explained by underreporting and the level of supervision and restricted access to lethal means characteristic of residential long-term care. At the same time, rates of indirect self-destructive behaviors (acts that cause self harm leading indirectly over time to one's death) are high [61].

The observation that life stressors and social isolation contribute independently to risk for suicide in later life, whereas social support may help protect against the emergence of suicidal states, indicates other potential venues for preventive interventions. The aging services network consists of a well-organized infrastructure of 655 Area Agencies on Aging connected and partially funded through an amendment to the Older Americans Act of 1973. Together they constitute an extensive, federally mandated and funded social service system designed to address the needs of older people experiencing social stressors that are associated with increased suicide risk. Faith communities may offer important opportunities to access older people at risk, as may other community "gatekeepers," or service providers who are likely to interact with senior citizens and, therefore, with training may identify those in distress and refer them for evaluation and care [63].

APPROACHES TO PREVENTION

With knowledge of the epidemiology of suicide in older adults and the settings best suited for case finding, the next step in the prevention research cycle involves the design and testing of preventive interventions. These may be characterized as addressing suicide at one or more of three levels: indicated, selective, and universal [64]. Table 3 provides a definition and general example for each, and Table 4 lists published studies in which the impact of an intervention on suicidal ideation or completed suicide in older adults was the specific outcome of interest. The authors are not aware of any studies with attempted suicide as the targeted outcome.

Two studies represent indicated preventive interventions. Both targeted older adults in primary care practices who had symptomatic affective illness, and were based on the collaborative, stepped-care model in which expertise in the diagnosis and treatment of affective illness is incorporated into the practice. The Prevention of Suicide In Primary Care Elderly: Collaborative Trial (PROSPECT study) compared usual care by the primary care providers with algorithm-driven antidepressant treatment; interpersonal psychotherapy when indicated; physician, patient, and family education about the illness; and care management by a depression specialist (social worker, nurse, or psychologist) [65]. In a sample of 598 subjects older than 60 years who had depression, Bruce and colleagues [65] found that rates of suicidal ideation declined significantly faster in the intervention than comparison condition.

Unützer and colleagues [66] took a similar approach with the Improving Mood: Promoting Access to Collaborative Treatment (IMPACT) study. They compared a collaborative depression care management intervention with usual care of 1801 patients aged 60 years or older who had major depression, dysthymic disorder, or both. As in PROSPECT, the IMPACT intervention included a depression care manager collaborating with a psychiatrist and primary care provider to offer patient and family education, facilitation of antidepressant treatment, and the option of brief problem-solving psychotherapy. In addition to significantly greater improvements in depressive symptoms, intervention subjects had significantly lower rates of suicidal ideation than controls for up to 24 months [67].

Unfortunately, neither trial could assess the effectiveness of the intervention on suicidal behavior. Furthermore, given that approximately 70% of subjects in each trial were women and therefore at far lower risk for completed suicide than men, the impact that collaborative care models may have on late-life suicide at the population level remains to be established. Nonetheless, the most appropriate clinical position is certainly that screening for depressive illness in older adults should be routine and its diagnosis and treatment assertively pursued. When suicidal ideation is detected, aggressive indicated interventions should be initiated.

Examples of selective and universal preventive interventions applied to late-life suicide are also rare. The Telehelp/Telecheck service evaluated by DeLeo and colleagues [68] represents a selective late-life suicide preventive intervention because the targeted population is older adults who are socially isolated and functionally impaired. Telehelp/Telecheck, based in Padua, Italy, provided telephone-based outreach, evaluation, and support services to more than 18,600 seniors with a mean age of 80 years; 84% were women. Over 11 years of service delivery, significantly fewer suicides occurred among clients than would have been expected in the elder population of that region. In subsequent analyses, however, no specific effect of the intervention on suicide in men could be shown; the intervention seemed to be effective in reducing suicide only in elderly women.

Experience in the United Kingdom indicates that means restriction may be an effective universal approach to preventing suicide. Hawton and colleagues [69] reported that after legislation limited the pack size of paracetamol and salicylates sold over the counter, morbidity and mortality from overdose with these medications decreased significantly.

One study was found that suggests a specific effect of means restriction on suicide among older adults. Ludwig and Cooke [70] examined whether implementation of the Brady Handgun Violence Prevention Act in the United States in 1994 was associated with changes in total and firearm-specific homicide and suicide rates in the general adult (≥ 21 years) and later late (≥ 55 years) populations. The Brady Act required that licensed firearm dealers observe a waiting period and initiate a background check before selling a handgun. States that already had this legislation established constituted the control group, whereas states newly instituting the legislation served as the experimental condition. Changes in rates of homicide and suicide in

experimental and control states were not significantly different, except for firearm suicides among persons aged 55 years or older, which showed a significant reduction in the intervention states. Consistent with Miller's [49] observation that older male suicides were more likely than controls to have purchased the gun used to kill themselves in the week preceding death, the observed effect of the Brady legislation was much stronger in states that had instituted waiting periods and background checks than in states that only changed background check requirements. In the United States, where older men are at far higher risk than other groups and more than 75% die of self-inflicted gunshot wounds, these findings are particularly notable. Because of the complex social and political implications of gun control legislation, however, this promising approach to late-life suicide prevention will be difficult to test.

A basic tenet of prevention science is that interventions that combine approaches are more likely to have an effect at the population level than any single preventive intervention. Oyama and colleagues [71–75] recently reported results of a series of five studies that test, in a quasi-experimental design, combinations of universal, selective, and indicated preventive interventions referred to in Table 4 as a multilayered approach. Subjects included all residents aged 65 years and older who lived in small towns in rural Japan. Implemented over 5- to 10-year periods, these complex interventions typically included public education and socialization programs for seniors held in community centers; either a self-assessment or structured screening for depression; and follow-up referral with primary care or mental health care providers for those who screened positive. The investigators measured changes in the relative risk for suicide in older adults before and after the program's implementation and relative to a neighboring reference town of similar size and character. In all five of these separate studies, a significant reduction (64%–76%) was seen in the risk for suicide in elderly women. However, only one of the five towns showed a significant risk reduction for men [71].

SUMMARY

Suicide is a major public health concern for older adults, who have higher rates of completed suicide than any other age group in most countries of the world. Older men are at greatest risk. Reduction of suicide-related morbidity and mortality in this age group hinges on systematic and methodological study at each point in the suicide preventive intervention research cycle. Improvements in systems for surveillance of late-life suicidal behavior, particularly attempted suicide, are needed to further develop the foundation on which to evaluate differences in the elderly subgroup, over time, and in different locations, and to better assess changes in response to interventions.

PA studies of completed suicide in later life are limited by their retrospective approach, reliance on proxy informants, and typically small sample sizes. Nonetheless, recent efforts that have included standardized measures and matched comparison samples have greatly increased understanding of the factors that contribute to, and to a lesser extent serve as a buffer against, suicide risk in later life. Psychiatric illness, and particularly late-life affective disorder, is the most potent of these factors. A past history of attempts is less common than among younger adults, but vitally important for clinicians to be aware of in their patients. Comorbid general medical conditions, often including pain and role function decline, also seem to contribute as independent risk factors and because of their close association with depression in older adults. Social dependency or isolation and family discord and bereavement should also be included as a component of routine risk assessment. Neuroticism and low OTE, along with a rigid coping style, may predispose to the emergence of suicidal states under certain stressful circumstances.

The U.S. Preventive Services Task Force does not recommend routine screening for suicidal ideation in primary care [76]. However, routine screening for depression using one of the readily available and easily applied screening tools is appropriate for older adults [7,77,78].

When depression is suspected, or when words or actions by the older person may suggest thoughts of suicide (eg, withdrawal, nihilistic, morbid comments), further inquiry about suicidal thoughts and intent pursued in a nonjudgmental and supportive manner is necessary. When suicide risk is appreciable, aggressive intervention should be performed, including any measures necessary to maintain safety until the crisis passes. As in other age groups, reduction of intolerable pain will help resolve thoughts of suicide.

Ultimately, however, the most effective approach to reducing suicide deaths among older people requires development of strategies that prevent onset of the suicidal state. Preliminary data suggest that selective preventive interventions targeting groups of older adults at risk for suicide because of their social isolation, recent losses, pain, or functional impairment may be effective for older women. Universal prevention through education programs to reduce stigma associated with seeking help, improve access to quality health care, and remove access to immediately lethal means may also be useful approaches. Although the most effective strategy is likely one that combines indicated, selective, and universal strategies, older men—the group at highest risk in this country—remain resistant to any intervention tested. A more refined understanding of gender differences in late-life suicide is needed to inform subsequent steps in the development of preventive interventions.

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Fig. 1.
The suicide preventive intervention research cycle.

Fig. 2.
Suicide rates by age, race, and gender in the United States in 2004.

Fig. 3.
Suicide rates by age and gender for Canada (2002) and rural China (1999).

Fig. 4.
Points of access to older adults at risk for suicide.

Table 1

Axis I diagnoses made by psychologic autopsy in studies of late life suicide

Diagnosis (%)									
Study	Location	Age (y)	Sample size	Major depression	Other mood disorder	Alcohol use disorder	Other drug use disorder	Nonaffective psychosis	No diagnosis ^a
Barracough[22] Beautrais [31]	West Sussex, UK	≥65	N = 30	87			3	0	13
	New Zealand	≥55	N = 31 20 men (64.5%) 11 women (35.5%)	86			14	—	9
Carney et al. [23]	San Diego, US	≥60	N = 49	54			22	—	14
			29 men (59.2%) 20 men (40.8%)						
Chiu et al. [27]	Hong Kong	≥60	N = 70	53	26	3	—	9	14
			32 men (45.7%) 38 women (54.3%)	46.9% 57.9%	34.4% 18.4%	6.3% 0%		9.4% 7.9%	12.5% 15.8%
Clark [24]	Chicago, US	≥65	N = 54	54	11		19	0	24
Conwell et al. [25]	Monroe county, US	55–74	N = 36	47	17	43	3	6	8
			28 men (77.8%) 8 women (22.2%)						
Harwood et al. [32] Henriksson et al. [26]	Cebtral England, UK Finland	≥60	100						
			43 34 men (54.1%) 39 women (45.9%)	44	21	5	25	4 5	23 12
Waern et al. [28]	Gateborg, Sweden	≥65	N = 85	46	36		27	8	5
			46 men (54.1%) 39 women (45.9%)						

^aIncludes cases with insufficient data to allow diagnosis.

Table 2

Odds ratios for suicide by Axis I diagnosis in controlled psychologic autopsy studies of older adults

Odds ratio	Harwood et al. [32]	Beautrais [31]	Waern et al. [28]	Chiu et al. [27]
Any Axis I diagnosis	—	43.9	113.1	50.0
Any mood disorder	4.0	184.6	63.1	59.2
Major depressive episode	—	—	28.6	36.3
Substance use disorder	ns	4.4	43.1	ns
Anxiety disorder	—	—	3.6	ns
Schizophrenic spectrum	ns	—	10.7	>1.0
Dementia/delirium	0.2	—	ns	ns

Abbreviation: ns, not significant.

Table 3

Levels of preventive intervention

Intervention	Target population	Prevention objectives	Examples
Indicated	Individuals who have detectable symptoms or other proximal risk factors for suicide	Treat individuals who have precursor signs and symptoms to prevent development of disorder or the expression of suicidal behavior	Increase screening/treatment in primary care settings for elders who have depression, anxiety, and substance misuse Improve providers' assessment and restriction of access to lethal means
Selective	Asymptomatic or presymptomatic individuals or subgroups who have distal risk factors for suicide, or who have a higher-than-average risk for developing mental disorders or other more proximal risk factors	Prevent suicide-related morbidity and mortality through addressing specific characteristics that place elders at risk	Promote church-based and community programs to contact and support isolated elders for those experiencing social isolation Focus medical and social services on reducing disability and enhancing independent functioning; increase access to home care and rehabilitation service; and improve access to pain management and palliative care services; treat elders with chronic pain syndromes more effectively for those who are medically ill, functionally impaired Provide gatekeeper training Link outreach and gatekeeper services to comprehensive evaluation and health management services in a continuum of care Implement strategies to provide more accessible, acceptable, and affordable mental health care to elders
Universal	Entire population, not identified based on individual risk	Implement broadly directed initiatives to prevent suicide-related morbidity and mortality through reducing risk and enhancing protective factors	Education of the general public, clergy, the media, and health care providers concerning normal aging, ageism and stigma regarding mental illness, and depression and suicidal behaviors Restrict access to lethal means

Table developed in collaboration with Kerry Knox, PhD, and Eric D. Caine, MD.

Table 4

Studies of elderly suicide prevention programs

Study	Intervention type	Target population	Intervention	Age (y)	Sample size	Outcomes
Bruce et al. ^a [65]	Indicated	Depressed elderly patients from primary care practices	Interpersonal psychotherapy and/or citalopram monitored by depression care manager who collaborated with primary care provider	60–94	N = 598 Intervention: n = 320 Usual care: n = 278	Rates of suicidal ideation declined faster in intervention patients than in usual care patients
Unützer et al. ^a [67]	Indicated	Depressed elderly patients from primary care practices	1-year treatment group: depression care manager provided who assessed depression, collaborated with primary care provider on antidepressant medication management, offered 12-month course of Problem Solving Treatment	≥60	N = 1801 Intervention: n = 906 Usual care: n = 895	Significantly lower rates of suicidal and death ideation compared with usual care group at 6, 12, 18, and 24 months
DeLeo et al. ^b [68]	Selective	Elderly users of telephone helpline and emergency response service	Telehelp: 24-hour emergency alarm service Telecheck: twice-weekly support and needs assessment telephone calls	≥65	N = 18,641	Observed completed suicide rate significantly lower for clients than expected Significantly fewer observed suicides in women than expected No difference between observed and expected suicide rates in men
Oyama et al. ^b [72]	Multi-level	All elderly in rural area	Community-based suicide prevention program: 7-year depression screening with follow-up by primary care providers 10-year implementation of public education on depression and suicide in elderly	≥65	N = 998 to 1260/year	64% suicide risk reduction of completed suicides among women in intervention compared with baseline No significant change in risk reduction for men
Oyama et al. ^b [74]	Multi-level	All elderly in rural area	10-year community-based suicide prevention program: mental health workshops for elderly Depression screening with follow-up by primary care providers Public education on depression and suicide in elderly	≥65	N = 12,782	70% risk reduction in completed suicides among women in intervention compared with baseline No significant change in risk for men
Oyama et al. ^b [75]	Multi-level	All elderly in rural area	Community-based suicide prevention program: depression screening with follow-up by primary care providers Group activities with public health nurses: social, voluntary, leisure, exercise	≥65	N = 403–463	74% risk reduction in completed suicides among women in intervention compared with baseline No significant change in risk for men
Oyama et al. ^b [73]	Universal + selective	All elderly in rural area	8-year community-based suicide prevention program: mental health workshops for elderly Group activities to increase relationships Psychoeducation and selfassessment of depression	≥65	N = 1407–1739	76% risk reduction in completed suicides among women in intervention compared with baseline No significant change in risk for men
Oyama et al. ^b [71]	Multi-level	All elderly in rural area	10-year community-based suicide prevention program: depression screening with follow-up in mental health care or psychiatric treatment	≥65	N = 1121–1505	76% risk reduction in completed suicides among women in intervention compared with baseline

Study	Intervention type	Target population	Intervention	Sample size	Outcomes
			Psychoeducation on depression		Psychoeducation on depression

^aRandomized controlled trials.
^bWell-designed controlled and uncontrolled studies.