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A Systematic Review of Elderly Suicide Prevention Programs

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Abstract

Background—Suicide rates are highest among the elderly, yet research on suicide prevention in old age remains a much-neglected area.

Aims—We carried out a systematic review to examine the results of interventions aimed at suicidal elderly persons and to identify successful strategies and areas needing further exploration.

Methods—Searches through various electronic databases yielded 19 studies with an empirical evaluation of a suicide prevention or intervention program designed especially for adults aged 60 years and older.

Results—Most studies were centered on the reduction of risk factors (depression screening and treatment, and decreasing isolation), but when gender was considered, programs were mostly efficient for women. The empirical evaluations of programs attending to the needs of high-risk older adults seemed positive; most studies showed a reduction in the level of suicidal ideation of patients or in the suicide rate of the participating communities. However, not all studies used

measures of suicidality to evaluate the outcome of the intervention, and rarely did they aim at improving protective factors.

Conclusions—Innovative strategies should improve resilience and positive aging, engage family and community gatekeepers, use telecommunications to reach vulnerable older adult, and evaluate the effects of means restriction and physicians education on elderly suicide.

Keywords

suicide; suicidal ideation; prevention; intervention; systematic review; elderly

Studies show that in many countries suicides rates among elderly persons are higher than or as high as young people (De Leo & Spathonis, 2004; Shah, 2007). Yet, suicide in old age is a much neglected area. In fact, there is a lack of basic knowledge and training about elderly suicide among clinicians (Heisel & Duberstein, 2005), as well as in suicide prevention centers (Adamek & Kaplan, 1996).

On a worldwide level, the suicide rates are found to be highest among the elderly. In 2000, the WHO estimated the rates of men and women, aged 75 and older, to be 50 and 16 per 100,000, respectively (World Health Organization, 2002). Detailed reviews have identified various predictors of suicide in old age (Conwell & Thompson, 2008; O'Connell, Chin, Cunningham, & Lawlor, 2004; Waern, Rubenowitz, & Wilhelmson, 2003). Psychiatric disorders (in particular depression) (Conwell et al., 1996; Waern, Runeson et al., 2002), physical illness (Waern, Rubenowitz et al., 2002), functional impairment (Conwell & Thompson, 2008), and stressful life events (such as loss of spouse) (Erlangsen, Jeune, Bille-Brahe, & Vaupel, 2004) increase the suicide risk in older adults.

Considering that the number of seniors and their proportion in the population will increase significantly all over the world in the coming decades (Christensen, Doblhammer, Rau, & Vaupel, 2009), the absolute number of suicides among older adults is expected to increase accordingly.

From a theoretical perspective, suicide is considered an outcome of both distal and proximal factors (Hawton & van Heeringen, 2009). It is often helpful to think of suicidality as a pathway where wishes to die and depression constitute the first steps into the process toward suicide (Caine & Conwell, 2001). Fortunately, the pathway does not inevitably lead to suicidal actions and might at any point be interrupted by internal or external factors. However, the process also fluctuates over time, which makes it difficult for health professionals to identify suicidal individuals (De Leo, Cerin, Spathonis, & Burgis, 2005).

Prevention can be implemented at different levels, aiming at different stages of suicidality depending on the targeted population. The Institute of Medicine (Mrazek & Haggerty, 1994) distinguishes between universal, selective, and indicated prevention. *Universal prevention* aims at reducing the incidence of new cases in entire populations, such as a nation or a local community, typically through information and skills enhancement. *Selective prevention* focuses on high-risk groups that generally display no advance signs of suicidal thoughts or behavior, but are exposed to important losses and life transitions that can make them vulnerable to depression and suicide (e.g., the very old and highly disabled, the recently retired or bereaved, or those who suffer from painful chronic illnesses). This type of prevention is typically aimed at reducing risk predictors or improving resilience. *Indicated prevention* aims at individuals who clearly exhibit suicide risk behaviors, such as those who have a psychiatric illness, who express wishes to die or suicidal ideations, or who are at imminent danger of attempting suicide.

Although psychiatric disorders are considered to be present in up to 90% of all elderly suicides (O'Connell et al., 2004), it is recommended that preventive efforts employ a multifaceted approach in order to obtain optimal effect (O'Connell et al., 2004). While interventions aimed at small high-risk groups are often implemented, these are thought to have only little impact on the suicide rate as a whole, which is why population-level strategies might be more effective (Lewis, Hawton, & Jones, 1997).

A comprehensive review of strategies for preventing suicides in all age groups identified the following policies: (1) awareness and education (including physician education and gatekeeper training), (2) screening, (3) treatment interventions, (4) means restriction, and (5) codes of conduct for media coverage (Mann et al., 2005). Of these, physician education, gatekeeper training, and means restriction were considered as more promising strategies (Mann et al., 2005). Yet, we do not know how this applies to the more specific context of elderly suicides. The current study presents a systematic review of all programs that focus exclusively on older adults in order to appraise, synthesize, and report evidence of their outcomes. More precisely, the review will try to answer the following questions: (1) What types of program are currently used to prevent elderly suicide? (2) Which type of intervention is the most efficient to reduce suicidal ideation or behavior or their associated risk factors in elderly persons?

The current study was carried out by the Task Force on Elderly Suicide for the International Association for Suicide Prevention.

Method

The guidelines from the Cochrane Collaboration served as an outline for the systematic review (Higgins & Green, 2008). Studies were considered eligible if published in peer-reviewed journals and when the participants consisted only of elderly persons, defined as persons 65 years of age or older. This limitation was later relaxed to include age 60 or older due to the low number of studies fulfilling the original age cutoff limit. Any intervention aiming at reducing suicidality (suicidal ideation, suicidal behavior, or death by suicide) and which included an empirical evaluation was considered. Priority was given to outcomes directly related to measures of suicidality; secondary priority was given to depression ratings.

Studies were identified through electronic searches of the Cochrane library, MEDLINE, ERIC, PsycINFO databases (1966–2009), cross-reference checks, and the collaboration of the members of the International Research Group on Suicide among the Elderly. The search was carried out using index and free-text search terms for suicide, suicidal ideation, suicidal behavior, attempted suicide, prevention, intervention, mental health program, program evaluation, as well as elderly, older adults, and aged (65 years and older) in the age group. All languages and publication years were considered. The search was carried out in November 2009.

Similar interventions, i.e., primary care interventions or telephone counseling interventions, were presented together. Levels of evidence were reported based on the Oxford Centre for Evidence-Based Medicine (Oxford CEBM, 2009), where levels vary from 1 to 5, 1 being the highest level of evidence for a randomized control study. Articles summarizing findings from same data collection were considered jointly and priority was given to outcomes from the longest follow-up period. Meta-analyses were preferred to single studies. For instance, five individual cohort studies (Oyama, Fujita, Goto, Shibuya, & Sakashita, 2006; Oyama, Goto, Fujita, Shibuya, & Sakashita, 2006; Oyama, Koida, Sakashita, & Kudo, 2004; Oyama, Ono et al., 2006; Takahashi et al., 1998) were excluded in favor of their metaanalysis

(Oyama et al., 2008). This study pooled the data from the five cohort studies as they all applied the exact identical intervention, i.e., depression screening of entire rural communities.

The electronic search yielded 490 references. Most of these studies on suicide in old age only made recommendations about ways to prevent elderly suicide, few describe implemented interventions and even less evaluated them empirically. Of the 490 articles, only 19 met the inclusion criteria of an empirical evaluation of a suicide prevention or intervention program. In three cases, effects of their program were described in two subsequent publications, while five studies were combined in a meta-analysis, yielding a total of 11 different interventions. They are presented in Table 1 according to the Oxford CEBM (2009).

Results

Primary Care Interventions

The systematic review identified two primary care collaborative treatment strategies: the IMPACT (Unützer et al., 2002, 2006) and PROSPECT studies (Alexopoulos et al., 2009; Bruce et al., 2004), both of which used a randomized controlled trial design (Level 1 on the Oxford classification of evidence) to examine the effect of their program on depressed elderly patients from primary care settings and to compare it to usual care. Participants in the intervention groups of both studies received support from depression care managers (nurses, psychologists or social workers) who offered education about treatment options, brief psychotherapy (interpersonal or behavioral) and provided close monitoring of depressive symptoms and medication side effects as well as follow-up of patients. Study protocol required that patients assigned to usual care could receive all depression treatments (counseling or medications), except access to the depression care manager's services.

In Unützer et al.'s study (2006), depressed older adults were randomly assigned to the IMPACT program (Improving Mood – Promoting Access to Collaborative Treatment for depression in primary care) or to usual care. After the 12-month intervention period, program participants had statistically significant lower rates of depression (Hunkeler et al., 2006; Unützer et al., 2002) and suicidal ideation (assessed with a single item) at 6, 12, 18, and 24 months (Unützer et al., 2006), compared to patients assigned to usual care. Patients in the intervention group also experienced greater quality of life and reported less functional impairment, suggesting that the effects of this intervention extended beyond reducing depressive symptoms (Unützer et al., 2002). Some key components of the IMPACT intervention could have facilitated the improvement: development of a therapeutic alliance, a personalized treatment plan that included patient preferences, as well as proactive follow-up (biweekly during acute phase and monthly during continuation phase) by the depression care manager. Tailored collaborative care and quality therapeutic relationship can actively engage older adults in treatment for depression and deliver long term benefits, such as self-efficacy and greater confidence in managing their depression (Hunkeler et al., 2006; Unützer et al., 2002).

In the PROSPECT study (Prevention of Suicide in Primary Care Elderly: Collaborative Trial), primary care practices were randomly assigned to provide either the care management intervention or usual care (Alexopoulos et al., 2009). Results showed that, after 24 months, decline in suicidal ideation was 2.1 times greater [0.8–5.5] in the intervention group (16.9%; at baseline, 29.7%) than in usual-care group (17.4%; at baseline, 20.4%), though the difference was not statistically significant ($p = .11$). The benefits were limited to patients with major depression who had a significant lower level of active suicidal desire at 4, 8, and 24 months, compared to the usual-care group. The differences were not statistically

significant among patients with minor depression. It should be noted that the study carried relatively high refusal and dropout rates. Furthermore, neither of these randomized trials made gender specific distinctions with regard to the impact of the intervention.

Community-Based Outreach

Various Japanese cohort studies have implemented community-based outreach programs in rural areas of the country, where the suicide rate was elevated (over 150/100,000) for both men and women aged 65 years and older (Chiu, Takahashi, & Suh, 2003; Oyama et al., 2004, 2005; Oyama, Fujita et al., 2006; Oyama, Goto et al., 2006; Oyama, Ono et al., 2006). These programs typically included mental-health workshops for the elderly, conducted by municipal public health nurses, to promote awareness of depression and suicide risk. The programs also included annual depression screenings of all residents aged 65 years and over. Positive results on the screening test were followed by a clinical interview with a psychiatrist (where available) or a general practitioner (GP) with follow-up meetings with mental health nurses. In another cohort study (Oyama et al., 2005), the program was different: group activities (social, recreational, physical, volunteering) to reinforce social support and no systematic depression screenings but a recommendation to participants to self-assess depression with a short questionnaire.

The empirical studies from Japan (Oyama et al., 2005, 2008) were carried out in localized areas, and the age-adjusted incidence rate ratios of suicide (IRR: number of suicide cases divided by the population) were compared to baseline rates and to those in the comparison region. The results of the meta-analysis (Oyama et al., 2008) showed significant reductions in the rate ratio of suicide, compared to baseline, but mostly among women whose risk was reduced by around 70%. The reduction in older men's suicide rate ratios appeared to be associated with the presence of follow-up assessment by a clinical psychiatrist (IRR = 0.3 [0.1–0.7]), whereas no significant reduction was found for follow-up by GPs (IRR = 0.7 [0.4–1.2]). Oyama et al. (2005) had similar results. From the five studies included in the meta-analysis, two showed a significant reduction in the suicide rate for the males (Oyama et al., 2004; Takahashi et al., 1998). Those particular interventions included educational activities, which emphasized that suicide is avoidable. During the years the programs were implemented, the suicide rate of the comparison areas remained high for both men and women, although the baseline suicide rates and socioeconomic characteristics were similar. Intervention centered on depression screening and group activities seem very efficient for females, while there was no significant reduction for males in all but the two studies mentioned above.

Telephone Counseling

Four studies implemented telephone counseling outreach programs (De Leo, Carollo, & Dello Buono, 1995; De Leo, Dello Buono, & Dwyer, 2002; Fiske & Arbore, 2000; Morrow-Howell, Becker-Kemppainen, & Judy, 1998). De Leo's team evaluated the long-term impact on suicide rates of a telephone service that included (1) Tele-Help, a 24 h emergency service for elders to call for help, and (2) Tele-Check, a twice-weekly telephone support. After 11 years (priority was given to the publication presenting the longest follow-up period), the number of observed suicide ($n = 6$) of elderly service users living in the intervention area was statistically significantly lower ($\chi^2(1) = 10.6, p < .001$) than the expected number ($n = 20.86$) calculated from the prevailing rate in the region (De Leo et al., 2002), with a standardized mortality ratio indicating that only 28.8% of the expected suicide mortality occurred. This intervention also had a positive impact on clients' psychosocial functioning (reductions in depression scores, hospital admission, and requests for home visit by GPs). Telephone outreach programs seem to have had significant benefit for females only: the difference between observed and expected number of suicides was significant ($\chi^2(1) = 8.4$,

$p < .01$). It should be noted that 84% of participants were women. Morrow-Howell et al. (1998) presented the evaluation of Link-Plus, a free telephone social work service with supportive therapy that was part of a crisis hot line dedicated to the prevention of suicide. After receiving standard crisis intervention, participants with low suicide risk were randomly assigned to experimental (Link Plus) or waiting-list condition (control group). While there was no difference between groups at pretest on the Geriatric Depression Scale, clients of Link-Plus showed a reduction ($p = .04$) of depressive symptomatology after 4 months. Fiske and Arbore (2000) evaluated a community agency designed especially to prevent suicide among older adults. This agency had two programs: The Friendship Line, which received 15 000 calls per year, provided emotional support, crisis intervention, information, and referral services for older adults; the Geriatric Outreach program provided counseling via telephone call appointments (17,000 per year) and home visits (1,500 per year) to elderly who may be at risk for suicide. A paired t -test revealed that there was a significant reduction in hopelessness, but no significant changes in depressive symptoms. The last two studies did not include specific measures of suicidality even if they were dedicated to elderly at risk of suicide.

Clinical Treatment

In Szanto, Mulsant, Houck, Dew, and Reynolds's research (2003), data from three intervention studies were pooled to evaluate a short-term (12-week) depression treatment using pharmacotherapy, with or without interpersonal psychotherapy sessions (IPT). The goal of the analysis was to compare the impact of the intervention on suicidal ideation and depression according to the patients' level of suicidality: high, moderate, or low risk. After 12 weeks of treatment, suicidal ideation had resolved in all treated patients regardless of treatment assignment, and only 4.6% still reported thoughts of death. Patients with higher suicide risk needed longer time to respond to treatment (6 weeks) compared to low-suicide-risk elders (3 weeks). With a similar intervention, Szanto et al. (2001) also found high remission rates (defined by a score of 10 or lower on the Hamilton Depression Scale) in both suicidal (77%) and nonsuicidal (78%) depressed older adults; however, there was a higher relapse rates in ideators (26% vs. 13%) during maintenance treatment. The authors concluded that medical treatment, and potentially IPT, was able to reduce suicidal ideations in older persons. The studies did not report differential impact of treatment on elderly men and women.

Improving Resilience

All previously mentioned studies addressed risk factors (depression or isolation), basing their intervention approach on the strong associations of mental illness or social factors with suicidal behavior. Instead, two intervention programs focused on strengthening protective factors to improve older adults' resilience to suicidality. One program included an 11-week workshop, based on a cognitive-behavioral approach, which was offered to small groups of early retirees who had problems adapting to retirement. It aimed at increasing meaning in life by helping participants set, plan, pursue, and realize meaningful, concrete personal goals (Lapierre, Dubé, Bouffard, & Alain, 2007). Levels of depression and psychological distress decreased significantly among participants in the program compared to those of the control group (participants of another study on adaptation to retirement) which remained high. Program participants also improved significantly on hope, goal realization, serenity, flexibility, and attitude toward retirement. The gains were maintained six months later. Eighty percent of the experimental group, but only 36% of the control group, reported absence of suicidal ideation at the 6-month follow-up. The group intervention format could be adding some protection against suicide as well as the behavioral activation of the participants.

The other program provided a 16-week interpersonal psychotherapy, for adults over 60 years at elevated risk for suicide, to improve their social functioning and skills in order to enhance social support and satisfaction of interpersonal needs (Heisel, Duberstein, Talbot, King, & Tu, 2009). Although the group was small, results indicated a significant reduction between pre- and posttreatment on the severity of depressive symptoms and on the score of the Geriatric Suicide Ideation Scale. The authors stressed the importance of a strong therapeutic alliance, round the clock access to the therapist, and the possibility for patients to talk openly about suicidal thoughts during sessions. The data concerning enhancement of social adjustment and perceived social support have yet to be published.

Discussion

This systematic review showed that 19 of the 490 publications on elderly suicide presented an empirical evaluation of a prevention or intervention program focusing on older adults. Compared to the 83 studies on adult populations, identified by Mann et al. (2005) in their systematic review of suicide prevention strategies, our review showed a lack of evidence-based studies designed for the aged. There could be other studies that evaluated the effects of intervention programs on dimensions we consider as risk factors, but if the authors did not conceive them as means for late life suicide prevention, they could not be retrieved in the review because they did not match the search terms. Moreover, although all 19 studies hoped to reduce suicidality by targeting known risk factors for older adults, some did not evaluate this outcome measure, but evaluated only the effects on depression or hopelessness.

The synthesis of the 19 studies yielded 11 different interventions presented here. Of these, three studies had suicide rate as the outcome measure, four studies looked at the impact on suicidal ideation, and four studies were limited to the assessment of depression levels. It would be interesting if future research would select similar outcome variables in order to efficiently compare the effects of various types of interventions.

Impact of Interventions

Most programs ($n = 9/11$) addressed risk predictors. They were centered on depression screening and treatment, information to older adults about symptoms, treatment options, and use of medications, as well as reduction of social isolation. Our review showed that 6 of 9 interventions were associated with a reduction in the level of patients' suicidal ideation or in the suicide rate of the participating communities. Two of the three studies using depression measures found a significant reduction in this outcome variable. The empirical evaluations of programs attending to the needs of high-risk older adults seemed positive.

Programs aiming at improving protective factors are still rare, even if some authors have emphasized social interaction and communication through activation programs (Heisel et al., 2009; Oyama et al., 2005; Oyama, Ono et al., 2006; Unützer et al., 2006) or the realization of meaningful personal goals (Lapierre et al., 2007). Strategies that enhance positive aging and quality of life by increasing empowerment, coping and adaptive behavior (Heisel & Duberstein, 2005), flexibility (Brandtstädter & Rothermund, 2002), social skills (Hinrichsen & Hernandez, 1993), self-esteem (Chatterton, Hall, & Tarrier, 2007), sense of belonging (McLaren, Gomez, Bailey, & Van Der Horst, 2007), reasons for living (Malone et al., 2000), hope (Snyder & Rand, 2004), meaning in life (Edwards & Holden, 2001; Heisel & Flett, 2004), religion or spirituality (Dervic et al., 2004), and even humor (Richman, 1993) could be innovative and promising ways to prevent suicide in older adults.

Gender Differences

Gender-specific distinctions regarding the impact of the interventions were seldom considered. However, when gender was considered, most programs appeared to have benefited women more than men. Women are more likely than men to use social resources and mental health services (Drapeau, Boyer, & Lesage, 2009), so workshops, telephone counseling, and group meetings are more likely to appeal to them. Older men, on the other hand, are particularly less inclined to seek medical advice (Drapeau et al., 2009) and could prefer intervention programs that focus on action and problem solving rather than the expression of emotions or creating new relationships.

Moreover, researchers from the IMPACT trial, described above, found that older men were significantly less likely than women to be referred to the collaborative-care treatment program (Hinton, Zweifach, Oishi, Tang, & Unützer, 2006). They observed significant gender differences in the presentation of depressive symptoms. Qualitative interviews, with 30 clinicians involved in the IMPACT trial, indicated that older men expressed their depression atypically, making it more difficult to recognize and complicating the referral process (Hinton et al., 2006). It seemed that men endorsed core symptoms, like feeling down and lack of interest, less often than older women. On the other hand, they were also more likely to express their distress through somatic symptoms or interpersonal stress. Informants added that older men could have difficulty assessing and recognizing their emotions and could try to conceal their depression to avoid mental illness, stigma, and feelings of shame often associated with their negative perception of the disorder (Hinton et al., 2006). The authors suggested that future avenues for intervention should address attitudinal barriers to help-seeking and treatment in older men by deemphasizing labeling of depression and accentuating the focus on symptoms and stressors (Hinton et al., 2006). Future research should also seek new ways of reaching suicidal older men, for example by training community gatekeepers (Matthieu, Cross, Batres, Flora, & Knox, 2008). Risk assessment could be improved by addressing a wider than usual range of issues (Lapierre et al., 2011), such as those frequently faced by suicidal older men, such as involuntary retirement, pain, dependency, daily hassles, sleep problems, loss of driver's license, bereavement, and, in particular, alcohol abuse. None of the suicide prevention programs addressed substance use in elderly males, even though a retrospective case-control study showed that alcohol dependence or misuse was observed in 35% of the elderly men who died by suicide, and that alcohol use disorder remained an independent predictor of suicide risk (Waern, 2003). Oyama et al. (2008) added that intervention programs should also address older men's impulsivity, which makes them more at risk for suicidal behavior (Neufeld & O'Rourke, 2009). Studies evaluating suicide prevention programs should have sufficient power to test the differential impact on men and women; more research is still needed to determine the type of intervention that might have a positive influence on older men. We should add that no studies looked at the differential impact of their programs on young- and old- elderly persons to see if each group presents different challenges.

Future Interventions

Improvement in the detection, treatment, and management of mood disorders should still be the primary focus of suicide prevention. In addition, new programs should involve relatives, because they are an important part of the lives of many elderly individuals (Richman, 1993). Moreover, family members, but also friends, formal and informal caregivers, who are in regular contact with distressed older adults, may have valuable information regarding life context and suicidal risk that health professionals are lacking or unaware of (Waern, Beskow, Runeson, & Skoog, 1999). It seems necessary to involve them in the treatment process. All opportunities (home visits, case management, nursing care, follow-up, contacts with caregivers) must be used to increase chances for suicide prevention. According to Jones

(2002), telephone counseling outreach programs (such as TeleHelp-TeleCheck services) seem to give the essential elements to the prevention of suicide, that is, a regular, confiding relationship with a helping person, and a method of increasing the person's sense of mastery, in spite of the physical distance with the health care staff. One of the important findings of the telecommunication studies is that face-to-face contact may not be required for successful mental health care interventions (De Leo et al., 2002; Fiske & Arbore, 2000; Morrow-Howell et al., 1998). Many elderly patients find medical centers intimidating and their services difficult to negotiate or inconvenient. Jones (2002) considers that using telecommunications to expand education and support as well as detection and treatment of mental illness should be a key component of health service planning. Round the clock access to the therapist could also be helpful, creating a lifeline that could increase feelings of security (Heisel et al., 2009).

According to Motohashi, Kaneko, and Sasaki (2004), the content of suicide prevention programs must be multifaceted to answer the needs of suicidal persons. In addition to the early detection (with the help of family and community gatekeepers) and treatment of high-risk elderly individuals, physician education and increased outreach to older adults are key strategies for suicide prevention. Suominen, Isometsä, and Lönnqvist (2004) have indicated that the majority (93%) of elders who have attempted suicide have seen a health professional in the last 12 months. However, only 38% had received a diagnosis indicating a mood disorder. Although patients seem to have difficulties in communicating their wish to die to their doctor (Fekete, Osvath, & Michel, 2004; Wittink, Barg, & Gallo, 2006; Wittink, Dahlberg, Biruk, & Barg, 2008), contacts with health professionals are probably a form of help-seeking and could constitute a special opportunity for prevention. Therefore, in primary care settings, valuable strategies should include seeing patients frequently and regularly to monitor adherence to the prescribed regimen and response to treatment, and offer support to address sources of distress (Grek, 2007). Furthermore, many studies found that painful chronic diseases or sleep disorders were associated with suicidal ideation (Lapierre et al., 2011). Since older adults might report more easily sleep problems or physical pain than depression to their family doctors (Pan, Lee, Chiang, & Liao, 2009), attention should be directed to the evaluation of these difficulties as part of the investigation of possible suicide risk. However, since doctors alone cannot dedicate the time needed by high-risk patients, collaborative care models, such as IMPACT and PROSPECT, can improve outcomes by offering access to the services of depression care managers (nurses, psychologist, or social workers). Our review did not identify any published studies that evaluated the impact of physicians' education on elderly suicide, although it is often strongly recommended for recognition of persons at risk of suicide (Gilbody, Whitty, Grimshaw, & Thomas, 2003). Considering previous successful experience with educational programs on depressive disorders for general practitioners (Rutz, von Knorring, & Wälinder, 1992), this might be an area to explore further in future primary care intervention. Already, PROSPECT and IMPACT studies have included algorithm-based recommendations for physicians.

To our knowledge, there are no programs centered on means restriction that focus exclusively on the elderly, even if two studies from the United States did indicate that firearm accessibility, especially handguns, was associated with a higher risk of suicide in older adult men (Birckmayer & Hemenway, 2001; Conwell et al., 2002). Furthermore, in a study on firearm homicide and suicide in the general population, Ludwig and Cook (2000) demonstrated that the Brady Handgun Violence Prevention Act (waiting period and background check) was associated with a significant reduction in firearm suicide among persons 55 years or older in the American states where the act was implemented.

Research on suicide prevention and intervention in nursing homes patients is also a neglected area of study (Scocco, de Girolamo, & Pavan, 2006), even if recent data call

attention to the high rates of all types of suicidal behaviors in older adults living in long-term care facilities (Mezuk et al., 2008; Scocco, Rapattoni et al., 2006; Scocco, Fantoni, Rapattoni, de Girolamo, & Pavan, 2009). Finally, there were also no media reporting guidelines or internet programs especially designed to prevent elderly suicide. Innovative strategies could include eHealth applications, defined as health promotion, information, or intervention using or being delivered over the internet (Kreps & Neuhauser, 2010). Web-based depression management interventions have been created and their effects seemed positive even though enrollment and follow-up completion rate were relatively low (Clarke et al., 2005). Emotional support was also offered online to distressed suicidal users of a confidential and anonymous site, though it was not empirically evaluated (Barak, 2007). Moreover, none focused exclusively on depressed or suicidal elderly persons.

From the various policies identified by Mann et al. (2005) in their comprehensive review of preventive strategies, only depression screening and treatment intervention were applied and empirically evaluated to the more specific context of elderly suicides. Physician education, gatekeeper training, means restriction, and codes of conduct for media coverage are strategies that still need to be explored.

Conclusion

In sum, many of the reviewed interventions applied a multifaceted approach at individual, group, or population levels. Five studies implemented “indicated” prevention programs which targeted individuals who exhibit suicide risk behaviors or clinical depression, while four studies applied the “selective” type of prevention by targeting groups that face difficult situations (disability, isolation) that can make them vulnerable to suicide. Only the Japanese community-based outreach programs were targeting entire population and combined “universal,” “selective,” and “indicated” levels of prevention. However, their positive influence was seldom significant for both genders. All types of preventive interventions were useful for the population they reached. However, none stood out from the others with regard to their effect on the various outcome variables. Interventions attending to depressed elderly individuals seemed to succeed through their personalized treatment plan and improved follow-up; telecommunications were an interesting tool for vulnerable groups, while population screening and awareness programs were associated with reduced rates of elderly suicide in local communities. Nonetheless, the prevention of suicide among elderly citizens still faces challenging tasks. For now, priority should be given to reaching out to those who fail to seek medical or psychological help. In particular, we need trials that demonstrate successful interventions aimed at older men. Development of positive aging, strengths, coping, and resilience still represent unexplored potentials for elderly suicide prevention and intervention.

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Table 1
Peer-reviewed studies reporting on empirically evaluated interventions on suicidality in older persons

Source	Evidence level/ Study design	Type of prevention	Duration	Age	Intervention	Participants (controls)	Outcome variable	Measurement	Effect
Unützer et al., 2002; Unützer et al., 2006	1B-RCT By patients	Indicated	2 years.	60+	IMPACT: Activation programs, care manager, medical or behavioral therapy	906 (895) with major depression/ dysthymia	Suicidal ideation	Odds ratios ² [CI-95%]	After 6 months: 0.54 [0.37-0.78] After 12 months: 0.54 [0.40-0.73] After 18 months: 0.52 [0.36-0.75] After 24 months: 0.65 [0.46-0.91]
Alexopoulos et al., 2009; Bruce et al., 2004	1B-RCT By practices	Indicated	2 years	60+	PROSPECT: Care managers, monitoring, IPT, follow-up, antidepressants	320 (279) with mood disorders	Suicidal ideation	Odds ratio [CI-95%]	Only for major depression 4 months: 2.5 [1.1-6.2], 8 months: 4.2 [1.7-10.5] 24 months: 3.2 [1.1-9.5]
Oyama et al., 2008	2A – Meta-analysis	Multilevel	7-11 years	65+	Depression screening Mental health workshop, follow-up, referral, treatment	σ : 20,598 PY ρ : 28,437 PY	Suicide rate	Incidence rate ratio ³ [CI-95%]	Psychiatrist follow-up: σ : 0.3 [0.1-0.7] ρ : 0.3 [0.2-0.6] GP follow-up: σ : 0.73 [0.4-1.2] <i>ns</i> ρ : 0.36 [0.2-0.6]
Oyama et al., 2005	2B – Cohort	Multilevel	8 years	65+	Group activity program, mental health workshop, self-assessment of depression	σ : 5,254 PY ρ : 7,556 PY	Suicide rate	Incidence rate ratio ³ [CI-95%]	σ : 0.79 [0.18-3.52] <i>ns</i> ρ : 0.24 [0.10-0.58]

Source	Evidence level/ Study design	Type of prevention	Duration	Age	Intervention	Participants (controls)	Outcome variable	Measurement	Effect
De Leo, Carollo, & Dello Buono, 1995; De Leo, Dello Buono, & Dwyer, 2002	2B – Cohort	Selective	11 years	65+	24 h alarm system Weekly phone contact	$n = 2,983$ $n = 15,658$	Suicide rate	Standardized mortality ratio	All users 28.8% [11.5–62.5] $\eta = 16.7\%$ [2.0–59.9] $\sigma = ns$
Morrow-Howell, Becker-Kemppainen, & Judy, 1998	2B – Cohort ⁴	Selective	4 months	61+	Social services arrangement, supportive therapy. Telephone only.	30 (31) callers to crisis phone line with low suicide risk	Depression	Mean scores difference	After 4 months $t = 1.78, p = .04$ Lower in experimental
Szanto et al., 2001	3B – Case control	Indicated	16 weeks	60+	Antidepressants, IPT	30 (150) with major depression Suicidal vs (no ideation)	Depression	Remission rate	Ideators: 77% [62–92] Nonideators: 78% [71–85] No group difference
Lapierre, Dubé, Bouffard, & Alain, 2007	3B – Case control	Indicated	9 months	50–65	Personal goal management workshop	11 (10) retirees with suicidal ideation	Depression	Repeated measure of variance	$F(2,38) = 5.17, p = .01$ Lower in experimental
Fiske & Arbore, 2000	4 – Case series	Selective	12 months	58–97	Telephone counseling, home visits, 24-h hotline	79 agency clients	Depression	Paired t -tests	No change in depression Reduction in hopelessness $t = 2.15, p = .04$
Szanto, Mulsant, Houck, Dew, & Reynolds, 2003	4 – Case series	Indicated	12 weeks	59+	Antidepressants, IPT	395 with major depression and high, moderate, or low suicide risk	Suicidal ideation	Depression remission rate [CI-95%]	Suicidal ideation resolved in all high risk: 67% [54–81] moderate risk: 77% [70–84] low risk: 85% [80–90]

Source	Evidence level/ Study design	Type of prevention	Duration	Age	Intervention	Participants (controls)	Outcome variable	Measurement	Effect
Heisel, Duberstein, Talbot, King, & Tu, 2009	4 – Case series	Selective	16 weeks	60–78	IPT to improve social functioning + existing treatment	11 referrals from clinicians & medical staff	Suicidal ideation	Paired <i>t</i> -tests	Ideation: <i>t</i> = 2.75, <i>p</i> = .02 Depression: <i>t</i> = 5.05, <i>p</i> = .00

Note. Abbreviations: GP = general practitioner; IPT = interpersonal psychotherapy; *ns* = not significant; *p* = *p*-value; PY = person-years; RCT = Randomized controlled trial.

¹ Oxford Classification of levels of evidence (see References): 1 to 5, 1 = Highest level of evidence.

² Adjusted for: age, sex, chronic medical condition, anxiety, suicidal ideation (baseline measure), depression scores, quality of life, functional impairment, recruitment method, health care organization.

³ Adjusted for age.

⁴ In the study by Morrow-Howell et al. (1998), the intervention was assigned randomly and could have been classified as a RCT, but due to the absence of confidence intervals it was considered as having an evidence level of 2b.