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Effective suicide prevention strategies in primary healthcare settings: a systematic review

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Abstract

Background: There is a fundamental need for health systems, health managers, and policymakers to identify effective components of suicide prevention strategies (SPS) and programs in primary healthcare (PHC) settings. Accordingly, this systematic review aimed to identify and summarize effective and significant evidence on suicide prevention in PHC setting. We systematically searched the published literature in English from PubMed, Web of Science, Scopus, CINAHL, PsychoINFO, and Embase up to 31 July 2022. The study searched all records reporting effective and significant strategies and programs on suicide prevention in PHC settings. A content analysis approach was carried out to extract major components of suicide prevention strategies in PHC settings.

Results: A total of 10 records (8 original articles and 2 reports) with 1,199,986 samples were included. In all the included articles, SPS decreased suicide rates. The majority of studies were conducted among the general population. The content analysis approach emerged five major components to SPS in PHC setting: (1) training and educating healthcare providers, (2) screening and suicide risk assessment, (3) managing depression symptoms and mental disorders, (4) managing suicide attempters and at-risk cases, and (5) prevention strategies at the general population.

Conclusions: This review provided reliable evidence for health systems to develop SPS in PHC and practitioners who are eager to provide brief and effective contact interventions for suicide risk to well-serve their patients.

Keywords: Primary healthcare, Suicide, Attempted, Prevention, Review

Background

Suicide is the second leading cause of mortality in ages 15–34 and the tenth among all age groups [1, 2]. Worldwide, one million people died due to suicide annually [3]. It is estimated that a 65% increase occurred in the rate of suicide in the past 45 years [4]. However, these statistics are the tip of the iceberg, and the suicide rate has been under-reported [5] due to the absence of an effective suicide surveillance system [6, 7].

It is estimated that 50% of people who die due to suicide visit their first-line healthcare provider within 1 month of doing so, compared with less than 1 in 5 contacting specialty mental health [8, 9]. Accordingly, primary healthcare (PHC) is an important setting for developing and implementing suicide prevention programs and improving the identification and case management of suicide risk [10–12]. PHC are the common readily accessible means of health services that are available and with regular contact so many mental health providers in PHC can provide a significant impact on preventing suicide [10]. World Health Organization (WHO) has had a global mental health action plan since 2013 to reduce suicide deaths by 10% in the world by 2020 while only 18% of countries have a registry for suicide [13].

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Although the majority of suicide mortality occurs in low- and middle-income countries, the majority of comprehensive suicide prevention programs have been developed in high-income countries [14]. It is vitally important to encourage and promote the development, implementation, and evaluation of suicide prevention strategies around the world, especially in the PHC settings [15]. Currently, suicide prevention strategies have been developed in medical settings [16]. Several studies provided suicide prevention programs and interventions around the world [11, 17]. However, the majority of these interventions have been used as a single or simple suicide prevention strategy and/or conducted in a single target group [18–22].

Moreover, health managers and policymakers mostly do not have sufficient awareness for decision-making on what program/strategy makes an effective impact on suicide prevention. Therefore, there is a fundamental need for health systems, health managers, and policymakers to identify effective components of suicide prevention strategies and suicide prevention programs in the PHC setting. Accordingly, this systematic review aimed to identify and summarize effective and significant evidence on suicide prevention in the PHC setting.

Methods

Study design and search strategy

A systematic review was carried out to explore effective and community-based suicide prevention strategies and interventions in the field of primary healthcare. We systematically searched the published literature in English from databases: PubMed, Web of Science, Scopus, CINAHL, PsychoINFO, and Embase, up to 31 July 2022. The study searched all records reporting effective and significant suicide prevention strategies and programs in PHC settings around the world. Grey literature also was explored from WHO and CDC reports, congress papers, and records. The reference lists of the retrieved articles and records were also screened with the purpose to identify other potential data sources.

The search conducted both free text words and medical subject headings (MeSH terms). The initial search terms were "suicide" OR "prevention" in the title and/or abstract. Then, the final search used the relevant MeSH terms and text words related to suicide prevention strategies in PHC in conjunction with "programs, intervention, strategy, control, suicidal behavior/behavior, suicide attempted, family physicians, elderly, schools, adult, and adolescents." Boolean operators including AND, OR, and NOT were used to combine the terms.

We searched community-based suicide prevention programs or interventions or strategies in the context of PHC that were effective/significant in the reduction of suicide, suicide attempt, and/or suicidal behaviors. The target group was any age group in the general population.

Eligibility criteria

The inclusion criteria were all records that evaluated suicide prevention strategies, programs, and/or interventions in PHC settings for all people or patients at any age. We also excluded records that fulfilled at least one of the following criteria:

- – Reviews, editorials, letters, commentaries, conference abstracts, editorials, and qualitative studies
- – Study protocols
- – Suicide prevention interventions/strategies carried out in medical settings and/or out of PHC settings
- – Case reports and case series
- – No significant measure of association found in suicide prevention

Study selection and extraction

Two authors (HA, EDE) evaluated the eligibility of records independently in a blinded and standardized way. The records screening was conducted through title and abstract and then reviewers screened and selected relevant full-text papers. Discrepancies and disputes were resolved by consensus and the participation of one more author.

We extracted information including the year of publication, authors, study design, setting, country, major findings and recommendations, sample size, target group, type of mental health service providers, and the effectiveness of the intervention. At the end of this stage, the first draft of the list of interventions or programs was prepared by the two experts. No quality and risk of bias assessments were carried out since the studies included with various designs and reports.

Analysis

Data were extracted in an Excel file sheet and involved each study's details. To extract the core and major components of suicide prevention strategies in PHC settings, the content analysis approach was carried out. The content analysis process was conducted based on the method suggested in a qualitative study and previous suicide prevention strategies [16, 23]. After constructing the transcriptions, the suicide prevention strategies were reviewed several times. To this end, the codes and semantic units were recognized for generating SPS and interventions after a consensus discussion.

Results

A total of 4987 records were obtained in the systematic search; PubMed ($n = 1979$), Scopus (n 1237), ISI web of science ($n = 956$), Embase ($n = 815$), and open gray ($n = 7$). After assessment of the "title and abstract," and "duplication" 26 records remained, and the full text of them was evaluated for eligibility criteria and the study outcome. After evaluating the eligibility of the study, 16 records were excluded from the searched list. In total, 10 records (8 original articles and 2 reports) were included in the systematic review. Figure 1 shows the studies' selection process.

Study characteristics

Table 1 shows the baseline characteristics of the included studies. All included studies were published between 2006 and 2021. The majority of studies were carried out in the USA ($n = 3$), two in Iran, one in Australia, one in Finland, one in Germany, and two reports (WHO and National Action Alliance for Suicide Prevention Executive Committee). The study sample size varied from 599 to 522,246, and the total number of samples was 1,199,986. The study designs varied from the report of the institute to longitudinal, field trial, and interventional studies.

The majority of studies were conducted among the general population ($n = 6$), 60 years or older ($n = 2$), one in adolescents, and one in depressed patients. The original studies also included various health service providers such as general practitioners, community health workers, family physicians, medical doctors, nurses, receptions, social workers, and psychiatrists for implementing suicide prevention strategies and interventions. Concerning suicide prevention strategies, studies recommended/implemented various interventions to prevent suicide in
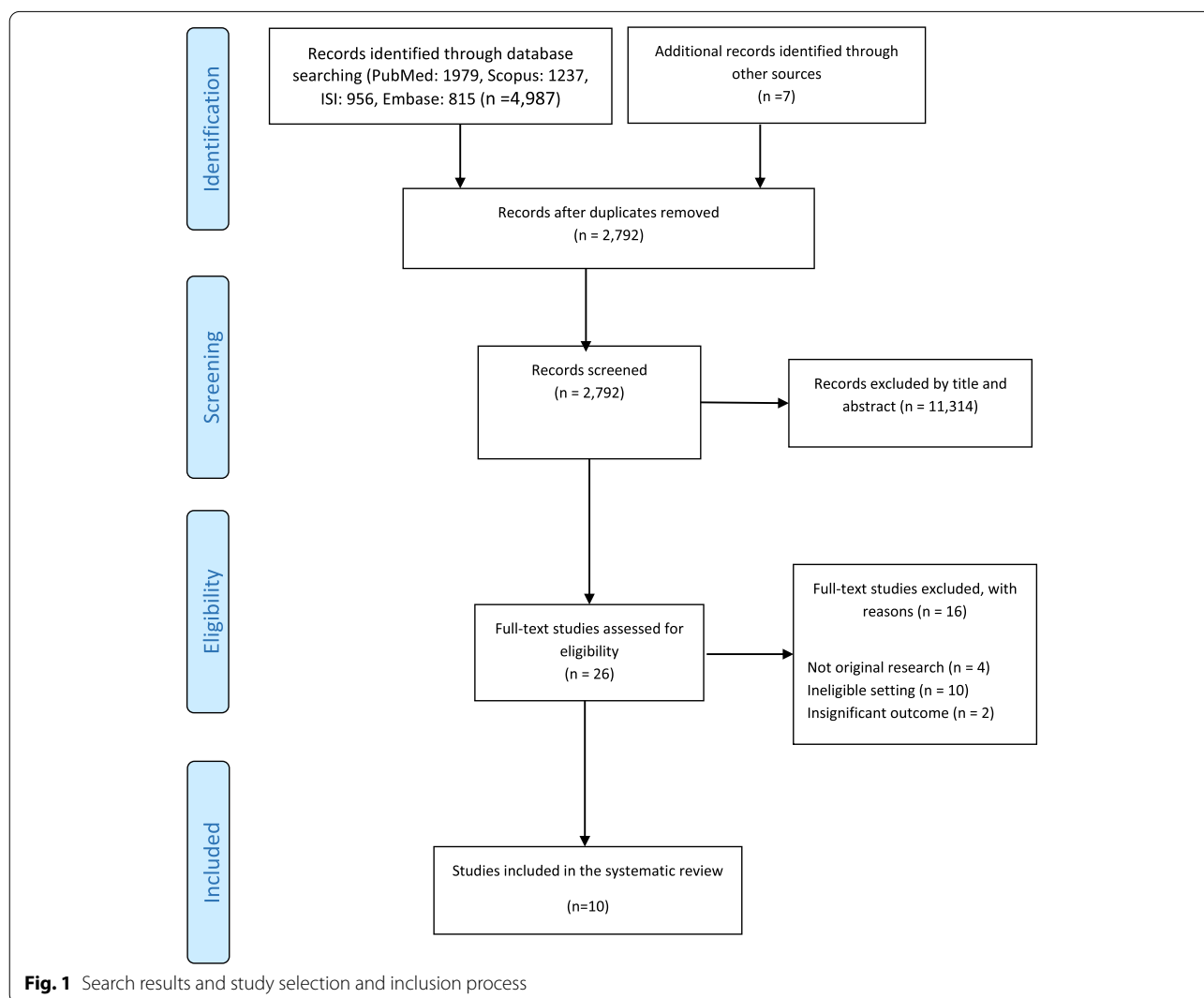

Fig. 1 Search results and study selection and inclusion process

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Table 1 Characteristics of the included studies on suicide prevention in primary healthcare settings

First author	Year	Country	Study design	Major findings/ recommendations to suicide prevention in PHC	Target group	Sample size	Type of mental health provider	Effectiveness/outcome measures
WHO [24]	2012	WHO	Report	1. Prevention strategies at the general population level (a) Restrict access to means of self-harm/suicide (b) Develop policies to reduce the harmful use of alcohol as a component of suicide prevention (c) Assist and encourage the media to follow responsible reporting practices of suicide 2. Prevention strategies for vulnerable sub-populations at risk (a) Gatekeeper training (especially various types of healthcare providers) (b) Mobilizing communities (c) Survivors (who have lost someone to suicide) 3. Prevention strategies at the individual level (a) Identification and treatment of mental disorders (b) Management of persons who attempted suicide or who are at risk 4. Improving case registration and conducting research 5. Monitoring and evaluation	General population	Report	Report	Report
National Action Alliance for Suicide Prevention Executive Committee [25]	2011	Report	Report	(1) Screening and risk assessment, (2) intervening to increase coping to ensure safety, (3) treating and caring for persons at-risk of suicide, and (4) follow-up and case management of attempters	General population	Report	Report	Report

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Table 1 (continued)

First author	Year	Country	Study design	Major findings/ recommendations to suicide prevention in PHC	Target group	Sample size	Type of mental health provider	Effectiveness/outcome measures
Azizi et al. [7]	2021	Iran	Longitudinal	A community-based suicide prevention program was conducted in primary healthcare context for the general population of Malekan County from 2014 to 2017: (1) establishing a research team, (2) creating suicide registration system, (3) conducting research, (4) staff training, (5) case management of suicide attempters, and (6) public awareness campaigns	General population	117,000	General practitioners, community health workers, family physicians, and emergency nurses	Suicide, attempt, and re-attempt were lowered by 75%, 22%, and 42%, at the study end, respectively
Hogan et al. [26]	2016	USA	Theoretical model	(1) Establishing a top leadership for suicide prevention, (2) educating heath service providers, (3) screening and risk assessment, (4) systematic suicide care protocol, (5) evidence-based treatment of suicidality, (6) provision of excellent support during care transition, and (7) measuring outcomes and conducting quality improvement	General population	Report	NR	Without implementation
Solin et al. [27]	2021	Finland	Interventional	Training for healthcare providers	General population	2027	General practitioners, nurses, public health nurses, and social work professionals	Increased the self-perceived competence of the participants

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Table 1 (continued)

First author	Year	Country	Study design	Major findings/recommendations to suicide prevention in PHC	Target group	Sample size	Type of mental health provider	Effectiveness/outcome measures
Malakouti et al. [4]	2015	Iran	Field trial	A field trial was conducted to evaluate the integration of suicide prevention program with primary healthcare in two counties in Iran (intervention and control regions). Interventions included screening and treatment of depressive disorders, training of health service provider, providing intervention protocol for identification and treatment	General population	522,246	General practitioners, health technicians, community health workers, and psychiatrists	Suicide surveillance capacity enhanced and subsequently reduced the number of suicides
Wintersteen et al. [28]	2013	USA	Longitudinal	Staff training, screening, and available services on referrals to the emergency department	Adolescents ages 12–18	56,352	Medical, nursing, social work, and reception staff	There were 87% fewer referrals to the ED during the intervention year in the intervention clinic
Almeida et al. [29]	2012	Australia	*Interventional*	*Educational intervention;* consisted of a practice audit with personalized automated audit feedback, printed educational material, and 6 monthly educational newsletters delivered over a period of 2 years	60 years or older	21,762	general practitioners	The intervention had no effect on recovery from depression or self-harm behavior, but it prevented the onset of new cases of self-harm behavior during follow-up
George et al. [30]	2009	USA	Interventional	The intervention consisted of services of 15 trained care managers, who offered algorithm-based recommendations to physicians and helped patients with treatment adherence over 24 months	60 years or older	599	Care managers, physicians	Compared with patients receiving usual care, the intervention group had a 2.2 times greater decline in suicidal ideation over 24 months

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Table 1 (continued)

First author	Year	Country	Study design	Major findings/ recommendations to suicide prevention in PHC	Target group	Sample size	Type of mental health provider	Effectiveness/outcome measures
Hegerl U et al.[31]	2006	Germany	Interventional	A 2-year intervention program was performed at four levels: training of family doctors and support through different methods, a public relations campaign informing about depression, cooperation with community facilitators (teachers, priests, local media, etc.), and support for self-help activities as well as for high-risk groups	Patients with depression	480,000	Family doctors, teachers, priests, local media, etc.	A reduction in the frequency of suicidal acts was found (19.4% vs. 24%)

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PHC settings. Interventions varied from screening, risk assessment, and training, to therapeutic interventions. Both personal and population-based strategies were recommended and/or implemented in the studies. More details of the study findings and interventions were presented in Table 1. The results of all the included original studies indicated significant reduction measures in suicide and suicidal behaviors.

After the content analysis approach, we found five major components/strategies to suicide prevention in PHC setting: (1) training and educating healthcare providers, (2) screening and suicide risk assessment, (3) managing depression symptoms and mental disorders, (4) managing suicide attempters and at-risk cases, and (5) prevention strategies at the general population. The study also recommended intervention in each strategy (Table 2).

Discussion

The present systematic review was aimed to provide effective and reliable components of SPS and interventions in the context of PHC, where the majority of suicides visit their first-line healthcare providers within 1 month of doing in primary care. In this review, we systematically searched effective SPS and programs in PHC at first, and then five major components of SPS emerged using the content analysis approach. The main advantage of this review over previous review studies is in two respects. The first advantage was the review of original studies with effective and significant interventions in reducing the suicide rate, and the second advantage was limiting the current study to the results of studies conducted in PHC settings. Furthermore, we extracted the main components of suicide prevention strategies with the content analysis approach. Therefore, the practical framework that emerged in the current review can be used to progress and develop suicide prevention programs in PHC settings.

The first major component of SPS was staff training and educating of health service providers which it is recommended in the majority of original articles and records. Hogan et al., George et al. [30], and Wintersteen et al. [28] in the USA; Azizi et al. [7] and Malakouti et al. [4] in Iran; Solin et al. [27] in Finland; and Hegerl et al. [31] in Germany. Besides, gatekeeper and health worker training was also one of the main recommendations in the report of WHO. Therefore, the initial step and intervention for implementing suicide prevention programs is educational intervention.

The second strategy was screening and suicide risk assessment among the at-risk group or the general population. This strategy was specifically highlighted by reports of institutes such as WHO [24] and National Action Alliance for Suicide Prevention Executive Committee [25], and also in the majority of the included original studies. There are many instruments to screen suicide risk or to predict suicide. In-Chul Baek et al. have provided the list of different suicide and depression risk assessment tools in a review study [32]. Among the wide range of depression screening tools, the Beck's Scale for Suicide Ideation (BSSI) [33] and the Columbia Suicide Severity Rating Scale (C-SSRS) [34] were the most frequently carried out. The original version of both tools have a high level of sensitivity and specificity, and they can be administered to a variety of target groups including youths, adults, outpatients, inpatients, and could be used for cross-cultural adaptation.

Managing depression symptoms and mental disorders was the third component of SPS in PHC that emerged in this review. Evidence frequently highlighted that depression and psychiatric disorders are a robust alarm to predict suicide and suicidal behaviors [35–37]. It is estimated that depression is the most prevalent mental disorder in cases who decease by suicide [38, 39]. In a study [31] conducted among depressed patients in Germany, a 2-year intervention program decreased suicide attempts. A review study demonstrated that depressed patients' characteristics including male gender, family history of psychiatric disorder, any history of suicide attempts, severe depression, hopelessness, and comorbid disorders, including anxiety and abuse of drugs and alcohol, were significantly associated with suicide [38]. Consequently, screening and early treatment of depressive disorders and psychiatric disorders can be considered a very effective lever to prevent suicide [40].

The fourth main component of suicide prevention strategies was managing suicide attempters. Azizi et al. mentioned that follow-up monitoring of suicide attempters is one of the most effective and efficient strategies to reduce suicide and re-attempt rates in the population of their studies [3, 7, 15, 41]. Findings indicated that the re-attempt suicide rate is 16% during the first year of follow-up, 21% from the second to the fourth year, and 23% after the fourth year [42]. After a suicide attempt, Brief Contact Intervention (BCI) is a low-cost, non-intrusive intervention that seeks to maintain long-term contact with patients, without the provision of additional therapies such as telephone contacts, postcards, crisis cards, psychological sessions, brief educational intervention, and text messages [43]. BCI was associated with a lower risk of suicide after attempt, and it is recommended that BCI could be implemented extensively to prevent re-attempt suicide in clinical practice [44].

The fifth main component of suicide prevention is having a suicide prevention strategy for the general population. This strategy as primordial and primary level

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Table 2 Major components of suicide prevention strategies (SPS) and intervention emerged from literature review using a content analysis approach

Number	Major components/strategies of suicide prevention	Recommended interventions
1	Training and educating of health service providers	a) Training mental healthcare providers b) Gatekeeper training c) Training general practitioners
2	Screening and suicide risk assessment	a) Screening for suicide b) Screening for depressive symptoms
3	Managing depression symptoms and mental disorders	a) Identification and treatment of depressive disorders b) Identification and treatment of mental disorders c) Access to mental health services d) Improving suicide prevention in medical and emergency wards
4	Managing suicide attempters and at-risk cases	a) Follow-up monitoring of attempters b) Using brief contact intervention to prevent re-attempt
5	Prevention strategies at the general population	a) Suicide surveillance system b) Suicide registration c) Restrict access to mean d) Public awareness campaigns e) Conducting research f) Media assistance

prevention in the general population can significantly reduce suicide in the whole community through an active and dynamic surveillance system and in a pre-determined period of time, while it may be costly [7, 45, 46].

The World Health Organization highlighted that developing a registry for suicide and suicidal behaviors is the first step in suicide prevention. However, only 18% of countries have an electronic registry for suicide [24]. Having an active and flexible surveillance system enables us to easily design and implement suicide prevention programs and interventions in the context of the community [47, 48]. It seems that PHC could be an appropriate setting for developing and implementing SPS, given that PHC health services are the most readily available means of healthcare which are accessible and with high rates of regular and numerous healthcare providers in primary care can provide a visible character for reducing the suicide rate [7, 10, 49]. Furthermore, performing public awareness campaigns, conducting research, restricting access to means in the setting of a surveillance system, and integrating mental health services into PHC, especially by improving political commitment and significant social actions, are needed at the grass-root level for implementing SPS and to achieve a significant reduction in the suicide rate [50].

Conclusions

This review provided reliable evidence for health systems to develop SPS in PHC and practitioners who are eager to provide brief and effective contact interventions for suicide risk to well-serve their patients.

Besides, the study findings challenge the single-based intervention models of suicide prevention and highlight the essential to consider multi-interventional strategies and evidence-based suicide surveillance systems as major components of the suicide prevention strategy. This review provided evidence for decision-making in the health care systems, especially in the urgent and pandemic conditions of diseases [51], it taught us that authentic evidence should be produced timely and utilization of knowledge made available to health decision-makers.

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Declarations

Ethics approval and consent to participate
The study protocol was approved by the Ethics Committee, Tabriz University of Medical Sciences, under the code IR.TBZMED.VCR.REC.1399.020. We confirm that all methods were performed in accordance with the relevant guidelines and regulations.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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