Integration of suicide prevention program into primary health care network: a field clinical trial in Iran

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Abstract

Background: Suicide prevention is one of the priorities in policies of Iranian Ministry of Health and Medical Education (MHME). The suicide prevention program had two main parts of identifying and treatment of the depressed and suicide high risk individuals by Primary Health Care (PHC) network. The main aim of this study was to evaluate the results of integration of the program into PHC network in two cities with moderate to high rate of suicide with diverse socio-cultural backgrounds.

Methods: This work as a field trial study was conducted in Nahavand and Savojbolagh from April 2010 to March 2011 (12 months). A screening tool was designed. Required capacities such as treatment, referral and registration system were provided six months before the main study. The intervention phase (for one year) including the treatment process and five consultation sessions was conducted to identify depressed people and individuals with high risk of suicide. The data were analyzed by Chi square test.

Results: After one year of intervention, the rate of committing suicide became 4.98 and 3.36 per one hundred thousand population in Nahavand and Savojbolagh, respectively (16 and 1.6 per 100,000 in the year of before intervention respectively, 2009-2010). The female: male ratio of committing suicide was 2:1 in Nahavand and 1:1 in Savojbolagh. The most common method of committing suicide was drug intoxication in both cities. The identified cases by health workers at rural setting were 33 to 44 per 1000, in which 1.3 cases per 1000 population had been approved by general physicians.

Conclusion: This study approved the feasibility and efficacy of integration of suicide prevention program into PHC. The increased rate of suicide in Savojbolagh could be related to low rate of screening and lack of treatment facilities (hospitalization and electroconvulsive therapy (ECT), and part-time psychiatrist. Increasing the PHC capacities could improve the health network efficiency to identify and manage depressed and at risk of suicide individuals. Screening tool/s and method have to be improved to provide better results.

Keywords: Suicide, Suicide prevention, Primary Health Care (PHC), Field trial.

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Introduction

Suicide is considered to be one of the leading public health problems for developed and developing countries (1,2).

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In Iran, a community-based study revealed that lifetime prevalence of suicidal thoughts, plans and attempts were 12.7, 6.2 and 3.3 percent respectively (3). The completed suicide rate of 1.4 to 29.6 per 100,000 was obtained from studies carried out in different geographical part of the country using different sources of information: police department, Ministry of Health and Medical Education (MHME) and Legal Medicine Organization (LMO) (4-6). The rate is two to five times higher in the Western provinces than the average rate of the country. A report from the Death Registration Office of MHME for 23 out of 27 provinces showed that the rate of suicide is 7.6 and 5.1 per 100,000 among men and women, respectively with average rate of 6.4 per 100,000 (7). However, the increasing rate of suicide in Iran during the last decades needs further investigation. New investigations should consider rapid sociocultural changes, increased rate of urbanization, demographic changes of the population, the MHME and LMD improvement of method of data collection, and extension of insurance coverage for suicide.

Comparing suicidal behaviors' data of Iran and with other countries in the region and developed countries may provide us a better vision toward the problem. The prevalence of suicide ideation, plan and attempt for the lifetime and one year period are consistent with reports from Sweden (8.6% and 12% (one year) in 1986 and 1996 respectively) (8), US (13.5% for lifetime) (9), and Australia (10.4% for lifetime) (10).

In spite of similarities between prevalence of idea and attempted suicide in Eastern Mediterranean countries and some other developed countries (10), the rate of deaths due to suicide is remarkably lower (1.3-6.6 suicide per 100,000 people) in Eastern Mediterranean Region. The reason of this dissimilarity has been discussed elsewhere (11).

The suicidal behaviors have multifactorial causes among which mental disorders have a crucial role to play. Current evidence suggests that around 90% of suicide victims have suffered at least one major axis I diagnosis, with major depression being the most common diagnosis (12-16). In a study, the results from Iran showed that 95.7 percent of suicide attempters have had at least one psychiatric diagnosis, in which the mood disorders were the most prevalent issue (17). Interestingly, the strongest diagnostic risk factors were mood disorders in high-income countries while impulse control disorders in low- and middle-income countries (18).

A systematic review showed that the reported rate of depressive disorders among those who had committed suicide by self-burning was from 8 to 60 percent; it was 30% for anxiety disorders and 60 to 75 percent for impulsivity trait (19). The different methodology of evaluation has ended in diverse results. In spite of such evidence, small minority of depressive suicide victims had received appropriate pharmacotherapy, and this observation is particularly a strong concern in PHC (1,2,20,21).

It seems that management of depressed patients in PHC might have preventive role on reducing the suicide rate. Some evidence show that 70% of suicidal patients have visited a general practitioner (GP) one year before attempting suicide (22). Therefore, it seems that they could be treated prior to completed suicide stage (23).

A recent systematic review of 86 studies in primary care context revealed that primary care-feasible screening instruments may be able to identify adults at increased risk of suicide, and psychotherapy targeting suicide prevention can be an effective treatment in adults (24). In 2011, a study of six systematic reviews on identifying effective interventions for the prevention of suicide was performed and the best practices identified as effective were as follows: training general practitioners (GPs) to recognize and treat depression and suicidality, improving accessibility of care for at-risk people, and restricting access to means of suicide (25).

Some other evidence from Japan (26), German (27) and Sweden (28) showed that

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depression management can be effective in reducing suicide.

In Iran, in 2001 the first national suicide prevention program (1999) was implemented in four different areas with no included control region, and also, a number of screened and identified depressed cases remained unassessed. The study results showed a decrease in suicide rate in three provinces (29).

The current study was carried out to pilot the national suicide prevention program. The main aims were at first to evaluate the feasibility of integration to PHC networks and at the next step to examine the effects of this program on the rate of suicide and suicide attempt.

Methods

This is a community intervention study without a control group. Field trials in which whole communities are the unit of allocation are called community trials.

This research was conducted simultaneously in Nahavand and Savojbolagh cities located in Hamedan (Western) and Alborz (central) provinces. Thus, the target population was the whole population of Nahavand with 180'658 and Savojbolagh with 238'081 people (National Census, 2011) (28). The experimental population was all depressed and at risk of suicide people who were screened and referred. The rational of this selection was the different suicidal behavior rates in the Western (Nahavand) and central (Savojbolagh) parts of the country. The study was performed during 18 months from October 2009 to March 2011 and the intervention administered during 12 months from April 2010 to March 2011. In the first six months, the required facilities were provided in the PHC networks of the study sites.

Brief introduction to the PHC network of Iran

Since 1979, a new health system established in Iran (30) and Mental Health Program was integrated into PHC after a pilot study during 1991-1993.

The PHC consists of "Health House" (HH) that provides primary health care for rural areas. Each HH covers 1000 to 1500 people (2-3 villages). In every HH, there are two community health workers (called "Behvarz" in Iran). The Behvarzes are middle/high school graduates having two years of basic trainings supplemented by programs specific in various aspects of health. The Behvarzes are responsible for the mental health of their region. S/He will conduct community psychoeducation, patient registration, screening, referral, data management and following up the patient. The next level of primary health care is "the Health Center" (HC) performing as a health center in rural areas. These centers have a catchment population of 10,000 to 15,000 people, staffed by one or two GPs, a health technician for the purpose of controlling contagious diseases, a technician for birth control and occasionally a nurse.

Severe psychiatric disorders, epilepsy and intellectual disability and mild mental disorders are covered. At the HCs, a GP is responsible for treatment of patients. S/He is also responsible for referring the patient to the third-level (Health Center in urban areas) if necessary. Assigned a general hospital will be recognized as the fourth and end level of PHC, serving the severe cases.

Building Capacities in the PHC network of the study regions

The main goal of this study was to make the PHC network enough competent to receive and manage the depressed and at risk individual for suicide. For this major goal the following activities were performed:

Creating screening questionnaire to identify depressed and at risk individuals to suicide.

To provide a screening tool, the following steps were taken: 1) providing a primary checklist for depressive symptoms comprising of 41 items drawn from DSM-IV criteria, (31) (2002), 2) content validity was approved by two psychiatrists and two psychologists working in the mental health services, 3) completing the checklist by a

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psychologist for 70 subjects, 35 cases with major depression (according to DSM-IV criteria) and 35 without mental disorders.

The internal consistency was assessed by calculating Cronbach's coefficient, which was 0.9575. The KMO coefficient was 0.9 and Barttelet analysis yielded a satisfactory result ($\chi 2= 1537.11$, $p< 0.001$). The correlation of 41 items with MDD diagnosis was 0.2-0.5. The items with correlation equal/more than 0.4 were selected to provide the final questionnaire consisting 13 items. The area under the curve (AUC) of the questionnaire was 0.858 ($p<0.001$). The optimum cutoff score was 6.5 with a sensitivity of 0.85 and specificity of 0.70. Positive predictive value (PPV) was 85%.

1. Two steering committees were established in Hamedan University of Medical Sciences (HUMS) and Iran University of Medical Sciences (IUMS), which included the dean, undersecretary of health and treatment, director of the health and mental health officer of the provinces.

2. The available training manuals on suicide behaviors compiled and edited by MHME/ Mental Health Bureau for health staffs included Behvarzes, GPs, and health technicians (HTs) were revised. According to staffs' positions, the manual included the subjects of description, etiology, clinical characteristics, sign and symptoms, screening, depressive disorders, management, pharmacotherapy algorithm, follow-up in PHC network, referrals and related forms, emergent cases, interview sample, and evaluation of suicide tendency. At the beginning of the study, 118 GPs, 79 HTs and 230 Behvarzes were trained with waterfall model of PHC. Each group of health staffs was divided into 25 to 30 participants who were trained in one-day training workshop. This model is a well-established training model in PHC. In this pyramid-like model, the psychiatrist trains the mental health officer and GPs, the GP trains the HTs and the HT trains the Behvarz of his/her district. The training course took place one month before launching the screening program and the second training course as a

booster course performed three months later. Pretest-posttest evaluation was performed two times in Nahavand and once in Savojbolagh.

3. Referral pathways between different levels of health services were organized for identified cases under study for the first time including HH (level 1), rural/urban HC (level 2), psychiatric outpatient clinic/emergency department (level 3) and psychiatric hospital (level 4). The data collection forms were prepared for each level.

4. A charge-free "suicide prevention consultation office" (SPCO) was established in both cities for referred suicide attempted cases, depressed patients and any individuals at risk of suicide. A trained psychologist with BS degree was in charge of this office. The main tasks were to make an immediate contact with suicide attempters at Emergency Department and to provide five-consecutive-consultation sessions and providing educational brochures to the victims and their family with the aim of prevention of reattempt and furthermore to make a continuous connection with them.

5. Given that, this study was carried in the community and the whole population of the urban and rural areas of the assigned cities were covered, two-day educational workshop was held for the 50 out of 90 GPs from private sector for those people who preferred to receive medical services from private section. Private sector GPs were not included in PHC network. During the workshop, there were presented methods of identification of the depressed and at risk of suicide clients and related management and pharmacotherapy. For both participants and non-participants GPs, a training package including a short training manual, very concise and practical protocol of pharmacotherapy of depressed patients, and educational brochures and the phone number and address of SPCO were provided and handed over in their private office.

6. Holding the educational one-day seminar for different groups of the population in order to raise and sensitize the public awareness on depression and suicide. In

each city seven seminars were held. Following ways were tried to reach the individuals who were probably at risk of suicide: 1. Screening the general population in rural and urban settings by health staffs, 2. Holding educational seminars for different groups of people to provide general information on depression and suicide before conducting the intervention, 3. Providing training for management of suicidal cases for the centers of addiction treatment, 4. Establishing the SPCO to receive and consult with at risk individuals, 5. Disseminating the SPCO introductory leaflet including their address to health centers and doctors' offices.

Staff-tasks definitions

The tasks of each staff were as follows:

1. Behvarzes in level one (HHs) of PHC:

a) active screening of the rural inhabitants for depressive disorder and risk for suicide behaviors, b) registering data on determined forms, c) referring the positive cases to the GP in the HCs (level 2), d) following the treatment of the patients by regular home visits, e) referring the attempted cases to Emergency Department (ED) of hospital.

2. HTs in rural/urban HCs (level two of PHC):

1) Completing medical documents of referred patients, 2) Collecting data. At urban areas, the screening was performed by a HT in every urban health center (UHC). The screening tool was distributed daily among the referrals. The individuals who passed the cut off score were registered and referred to GP at the same HC for further evaluation and possible treatment, 3) Referring the attempted cases to the ED.

3. GP in rural/urban HCs (level two of PHC): GPs had pivotal role in this study: 1) visiting and re-evaluating the referral cases from HHs and HTs for major depression or presence of any risks for suicide, 2) Prescribing medicine, according to the provided algorithm, for the depressed cases and managing at risk of suicide cases (not serious suicide ideation). According to their training program, for the mild depressed cases Fluoxetine and at the second step Fluoxetine plus Nortriptyline were prescribed. The cases with serious suicide ideation or plan were referred to psychiatrist accompanied by one of his/her close relatives. 3) Referral to hospital/ ED (severe cases or attempted suicide). 4) Referring back to Behvarzes (depressed and mild cases of suicide ideation) for follow-up, 5) Following the patient according to his/her specified schedule. The GP in emergency setting registered the attempted suicide, provided emergency remedy, and referred them to SPCO office.

4. Psychiatrists' main responsibilities in hospital (level three of PHC) included: Visiting the referred cases, drug prescription, or hospitalization, or refer to level four (psychiatric hospital), admitted the attempted cases in ED.

5. Psychologist in SPCO had to visit the referred suicide attempters and depressed cases from GPs. The psychologist would provide initial rapport with the clients and their families, hold free of charge 5-session of consultation by providing educational brochures, follow the registered cases by telephone in case of missing any appointment, and register the required data. This service was more available to the urban settlers due to accessibility.

Intervention

The intervention was performed from April 2010 to end of March 2011.

The following activities were performed:

1. Screening the population of rural areas. The positive cases founded by Behvarzes were referred to GPs in HCs for reevaluation and possible treatment. The data were registered in HHs and HCs accordingly. This activity was performed regularly by door to door visiting the family. One family member presented in the house responded for him/herself and of behalf of the other members of the family. Using the screening tool, the suspected cases registered in the HHs and referred to HC by using referral form.

In urban areas the screening was performed among the referrals in HCs every day and the suspected cases were referred to GPs in the same center for any management.

2. The referred cases were re-evaluated by GPs. The confirmed cases for depression were treated according to provided algorithm. The difficult patient, severe or psychotic depressed individuals, refractory cases, serious suicide ideation, individual with plan or attempted cases were referred to ED or psychiatrist office by referral form. The ambulatory cases were followed regularly by GPs and Behvarzes for at least three months.

3. In private sector, the suspected patients were treated by the GPs. The data could not be registered in their office and hence no registered data was collected out there. The cases that were in need of consultation were referred to SPCO for follow and education.

4. In hospital setting, the referred suicidal cases were registered in their medical documents. They were visited by the psychiatrist or other specialists in case. The psychologist of SPCO attended in the ED to visit patient and their family and encouraged them to receive the free of charge consultation when the physical condition was suitable. Five consultation sessions by providing educational documents were held for them.

5. Public education performed via providing 15 educational brochures which were distributed in rural and urban health centers, private offices of medical doctors, exhibiting educational stands in health centers and outpatient clinics. There was held educational one-day seminar for different groups of people and organiz ations to raise public awareness and sensitivity on depression and suicide. Besides, there were 2 sessions of TV program at the beginning of the study on depressive disorders. Nurses and GPs working in the EDs had to: 1) Register the diagnosis of referred cases with suicide attempt, 2) Refer the suicide attempters to SPCO after stabilizing the medical condi-
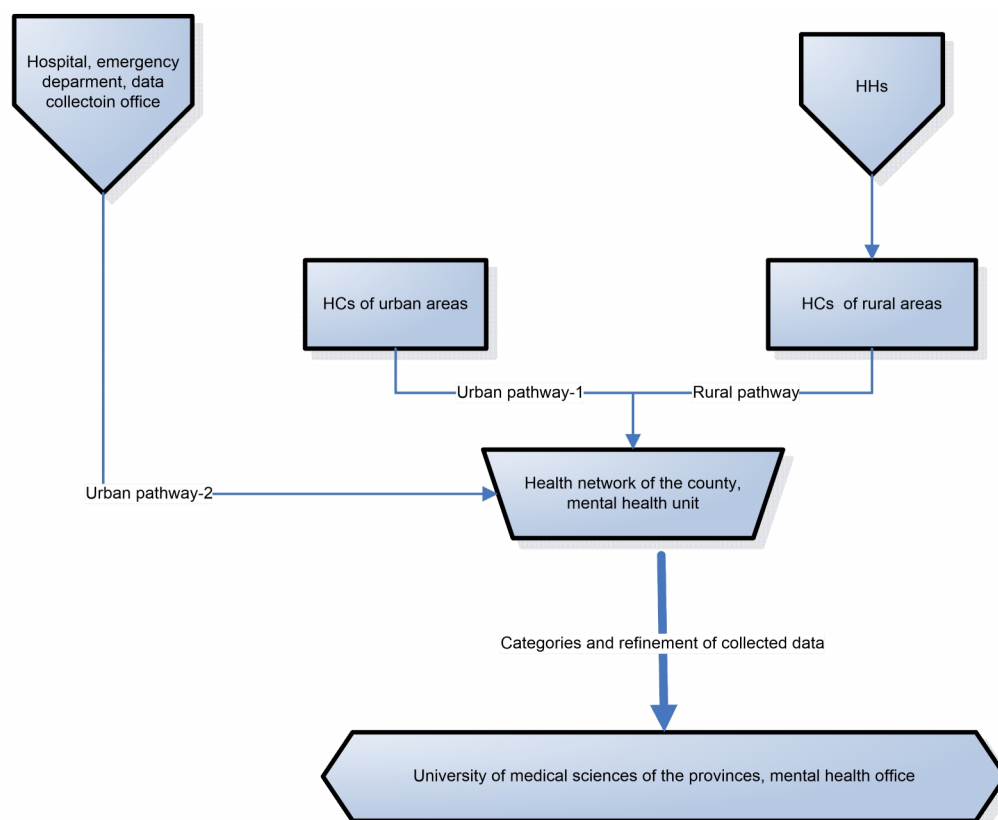

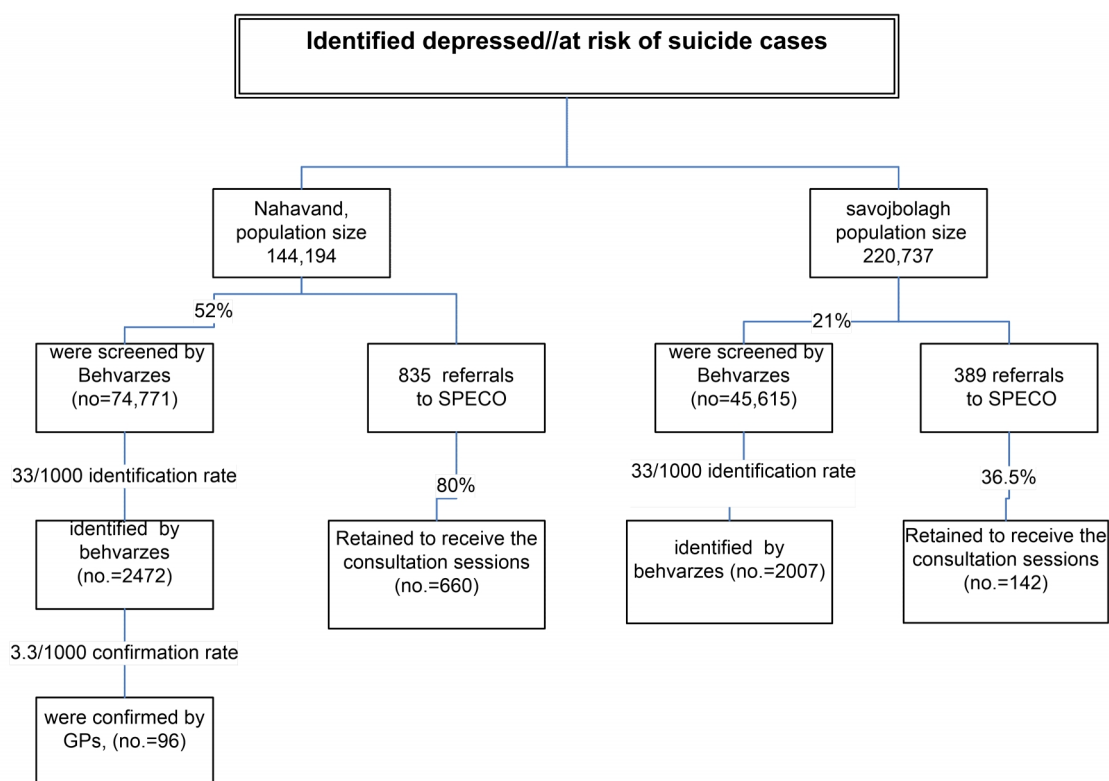Fig. 1. Data collection pathways in rural and urban areas

Chart 1. Identification of depressed / individuals at risk of suicide and the activity of SPECO

tion.

6. Visiting the attempted cases in ED by psychiatrist and prescribing required inpatient or outpatient management, referring the severe cases to a mental hospital in center of the province.

Intervention program process monitoring

The implementation of the program was supervised by the main investigators and the deputy of health of IUMS and HUMS through regular field visiting. The monitoring was performed every month by the investigator team and deputy of health of the two universities.

Data collection

The pathway of flowing data in this study is shown in Fig. 1. After categorizing the data, the refined file was sent to the university, and Mental Health Bureau, as the end point of data collection of this study (Fig. 1).

1.1. Outcome measures

I. Primary outcome

Number of committed suicides

Suicide data were collected from the end point, at the end of March 2011 from Mental Health offices in HMUS and IUMS. The data were reported every month.

II. The secondary outcomes

Number of identified at risk individuals for suicidal behaviors. The secondary outcomes were the number of individuals with major depressive disorder and identified at risk cases by active screening, which were conducted by Behvarzes in rural areas and HTs in urban areas. Secondly, some referrals in SPCO office were individuals with attempted suicide and depression. The process of screening and referrals to SPECO is shown in Chart 1.

1.2. Ethical Approval.

This study was approved ethically by the Ethical Committee of Mental Health Research Center, Iran University of Medical Sciences with no. of 88/06/09/04. Regarding to the community screening program, the consent form was not taken by the study subjects. The received Iranian Registry of Clinical Trials code is: IRCT13880 3061959N1.

Statistical Analysis

The data were analyzed using SPSS for windows, version 16 (SPSS Inc., Chicago, IL). We used frequency tables to present categorical variables. Mean and standard deviation were used to summarize numeric variables. Paired t-test was used to compare the mean score of health worker's knowledge before and after education.

Results

3.1. pre-posttest of health staff training:

To evaluate the knowledge of mental health workers after training course in both cities, pre and posttest examination was carried out in the first six months of the study. The mean scores (SD) of pretest in three groups of Behvarzes, HTs and GPs were 6.5 (2.3), 17.5 (2.6) and 13.5 (2.4) and the mean scores of posttest were 9.4 (1.8), 21.3 (2) and 17.8 (1.4), respectively (p<0.02).

3.2. Primary Outcome

Committing suicide: Seventeen subjects committed suicide in both cities (9 deaths in Nahavand and 8 in Savojbolagh). Regarding to the population size in Nahavand (180'658) and in Savojbolagh (238'081) the rate of suicide after intervention became 5 and 3.4 per 100'000 population. The most of the victims were male (58.8%) in the age range of 15 to 25 (41%), 25-40 (47%), middle/high schooling (47%), housewives (23.5%), married (53%) and living in rural areas (64.7%). The most common methods of committed suicide were drug-intoxication followed by hanging and self-immolation, respectively (Table 1).

Table 1. Demographic characteristics of subjects with committing suicide

	Category	Number	Percent
Gender	Male	10	58.8
	Female	7	41.2
Age Groups	11-15	0	0
	16-20	4	23.5
	21-25	3	17.6
	26-30	5	29.4
	31-40	3	17.6
	41-50	0	0
	51-65	1	5.9
	Above 65	1	5.9
Educational level	Lay Or Elementary School	2	11.8
	Secondary And High-School	8	47.1
	Above High-School	0	0
	Not Registered	7	41.2
Marital Status	Single	8	47.1
	Married	9	52.9
Occupational status	Jobless	3	17.6
	Having Job	3	17.6
	House Keeper	4	23.5
	Not Registered	7	41.17
Living Area	Urban	6	35.3
	Rural	11	64.7
History of Suicide	Yes	2	11.8
	No	7	41.2
	Not Registered	8	47.1
History of Chronic Medical Condition	Yes	1	5.9
	No	7	41.2
	Not Registered	9	52.9
History of Chronic Mental illness	Yes	8	47
	No	0	0
	Not Registered	9	53
History of Substance Abuse	Yes	7	41.2
	No	0	0
	Not Registered	10	58.8

Table 2. Demographic characteristics of subjects with attempt suicide

	Category	City	N (Percent)
Gender	Male	Nahavand	299 (45.6)
		Savojbolagh	106 (27.2)
	Female	Nahavand	356 (54.4)
		Savojbolagh	283 (72.8)
Age Groups	11-15	Nahavand	23 (3.5)
		Savojbolagh	19 (4.9)
	16-20	Nahavand	218 (33.3)
		Savojbolagh	100 (25.7)
	21-25	Nahavand	190 (29)
		Savojbolagh	119 (30.6)
	26-30	Nahavand	97 (14.8)
		Savojbolagh	61 (15.7)
	31-40	Nahavand	74 (11.3)
		Savojbolagh	63 (16.2)
	41-50	Nahavand	32 (4.9)
		Savojbolagh	17 (4.4)
	51-65	Nahavand	13 (2)
		Savojbolagh	4 (1)
	Above 65	Nahavand	8 (1.2)
		Savojbolagh	6 (1.5)
Educational level	Lay or Elementary school	Nahavand	142 (21.7)
		Savojbolagh	65 (16.7)
	Secondary and high-school	Nahavand	323 (49.3)
		Savojbolagh	291 (74.8)
	Above high-school	Nahavand	42 (6.5)
		Savojbolagh	16 (4.1)
	Not registered	Nahavand	148 (22.6)
		Savojbolagh	17 (4.4)
Marital Status	Single	Nahavand	336 (51.3)
		Savojbolagh	177 (45.5)
	Married	Nahavand	319 (48.7)
		Savojbolagh	212 (54.5)
Occupational status	Jobless	Nahavand	56 (8.5)
		Savojbolagh	48 (12.3)
	House keeper	Nahavand	231 (35.3)
		Savojbolagh	207 (53.2)
	Self-employed	Nahavand	65 (9.9)
		Savojbolagh	21 (5.4)
	Student	Nahavand	89 (13.6)
		Savojbolagh	72 (18.5)
	Others	Nahavand	67 (10.2)
		Savojbolagh	25 (6.4)
	Not registered	Nahavand	147 (22.4)
		Savojbolagh	16 (4.1)

The rate of committing suicide reduced from 16 in 2009 (in the year of before intervention, HUMS, Statistics Office) to 5 per 100'000 population in 2010 (in the intervention period). This rate is close to the average rate of committed suicide in the country (7). However, in Savojbolagh, the program was not successful and the rate of suicide rose from 1.6 (in the year of before intervention, IUMS, Statistics Office) to 3.4 per 100'000 population (in the intervention period) in the correspondence period.

The male/female ratio of committing suicide was 1.4:1. Married to single ratio was 1.1:1. Regarding to the residential areas, rural: urban ratio was 1.8:1 which happened mostly in summer. The rate of committing suicide was 2.1% and 1.8 % of attempters in Savojbolagh and Nahavand respectively. In other word for each committing suicide, 50-60 individuals attempted suicide. History of treatment for mental disorder reported in 45% of victims (the complete data are as below).

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Table 2. Continued

	Categoty	City	N (Percent)
Living Area	Urban	Nahavand	357 (54.5)
		Savojbolagh	199 (51.1)
	Rural	Nahavand	298 (45.5)
		Savojbolagh	190 (48.9)
History of Suicide	Yes	Nahavand	495 (75.5)
		Savojbolagh	73 (18.7)
	No	Nahavand	7 (1.1)
		Savojbolagh	316 (81.3)
	Not registered	Nahavand	153 (23.4)
		Savojbolagh	0
History of Chronic Medical Condition	Yes	Nahavand	6 (0.9)
		Savojbolagh	57 (14.7)
	No	Nahavand	480 (73.3)
		Savojbolagh	323 (83)
	Not registered	Nahavand	169 (25.8)
		Savojbolagh	9 (2.3)
History of Chronic Mental illness	Yes	Nahavand	464 (70.8)
		Savojbolagh	254 (65.3)
	No	Nahavand	10 (1.5)
		Savojbolagh	113 (29)
	Not registered	Nahavand	181 (27.6)
		Savojbolagh	22 (5.7)
History of Substance Abuse	Yes	Nahavand	87 (13.3)
		Savojbolagh	23 (5.9)
	No	Nahavand	400 (61.1)
		Savojbolagh	322 (82.8)
	Not registered	Nahavand	168 (25.6)
		Savojbolagh	44 (11.3)

Secondary Outcomes

1. Suicide attempt. One thousands and forty four (1044) subjects attempted suicide in both cities (Nahavand= 655, Savojbolagh=389) (Table 2). The most attempted were females (64%), within the age range of 15-25 (59.3%) and 16-40 (28.6%), middle school/high school (62%), single (48.4%), married (51.6%), housewife (44.2%), student (16%), and residents of urban areas (52.8%) (Table 2). The most prevalent methods of attempt were drug poisoning, agricultural poisoning, and using sharp objects.

Comparing the features of committed and attempters, it was revealed that the females attempted more than males, the age of committers tended to older people, both groups were married and in middle schooling, more committers were inhabitant of rural areas and they used more fatal methods such as hanging and self-immolation (more data is shown below).

Discussion

Suicide prevention is going to be a national priority. Primary care can potentially play an important role in helping identify people at increased risk of suicide and provide them with appropriate treatment (24, 25).

Some researchers have investigated the effects of a primary care intervention on suicidal ideation and depression in older patients and shown the intervention's effectiveness in reducing suicidal ideation, regardless of depression severity (33). Another study in this line suggests that sustained collaborative care maintains high utilization of depression treatment, reduces suicidal ideation, and improves the outcomes of major depression over 2 years (34). After 98 months fallow up of older adults with major depression in practice provided with additional resources to intensively manage depression, a mortality risk lower than that observed in usual care and similar to older adults without depression was yielded (35).

On the other hand, some studies have shown that a continuing medical education program for GPs on depression can control

suicide rates. In Jämtland county, Sweden, by interactive seminars in a 7 year period the suicide rate decreased to the same level as the national average. The use of antidepressants increased from 25% below the Swedish average to the same level (36).

The feasibility: The results showed that the PHC network in terms of identified suspected cases, referral system, and training of health staffs had enough potential in rural health network. Since 1979 the PHC in Iran has provided suitable substrate to integrate and implement the suicide prevention program. The positive aspects of this study were to help the staff to obtain awareness on mental health status of the uncovered people, identify the at risk people, provide consultation services, help people to recognize their depressive disorders, train the staff on mental health issues, and helped to reduce the social stigma.

However, some impediments against the feasibility of the plan are as follows:

1. Work load of Behvarzes which may hinder the screening program. During interview with Behvarzes, the work load of their current duties was one of their main complains.

2. Changing GPs frequently in HCs,

3. Not receiving regular supervision by the specialist

4. Registration system needs to be addressed for further revision and reform for more fruitful integration of suicide prevention program.

5. From the referrals only 35% visited the GPs. This means that due to social stigma or any other possible reasons the majority of the identified cases refused to seek the medical remedy or visited private physicians or specialist out of PHC network.

6. Lack of availability of the necessary psychotherapeutic medicine, such as fluoxetine.

Facing with crowded outpatient services in PHC network, along with stigma of having mental disorders may encourage the clients to use the private section to prevent the exposure of their mental disorders. Suspected individuals refusing of visiting the GPs should be overcome by appropriate strategies. By establishing Family Physician program, in which every GP is responsible for the health of a portion of population, this obstacle could be removed. However, the results of screening encourage the at risk people to seek any remedy from PHC network or private sections. Although, it may cost a lot to the families, may help the society on suicide prevention. The screening tool was able to identify only 33 to 44 per 1000 by Behvarzes. Although it was close to 0.07 to 2 percent reports of different studies carried out in Iran on integration of mental health program into PHC (37, 38). It seems that the means of screening have to be revised for better outcome. In Iran, the expected rate just for major depression is 50 per 1000 (39). Screening the whole covered population by HHs and Behvarzes, demands more time and should be performed by extra trained staffs. To improve the sensitivity of screening tool, it should be revised according to the local cultures. The low rate of identification depicted the necessity of retraining the Behvarzes and revision of the screening tool.

The intervention

The intervention strategy based on improvement of PHC network capability to identify at risk subjects and to provide mental health services, was effective. In Nahavand the committed suicide rate reduced from 16 in 2009 to 5 per 100'000 population in 2010 (in the intervention period). This rate is close to the average rate of committed suicide in the country (7). This is also in concordant with Feltz-Cornelis et al study who identified best practices in managing suicide in PHC (25). In Riihimäki et al study risk of suicidal acts was almost exclusively confined to MDEs, with or without concurrent active substance abuse (40).

Table 3. The rate of attempt and committing suicide in the years before and after intervention period

Year	Nahavand		Savojbolagh	
	Attempt	Death	Attempt	death
2009	568	16	310	4
2010	655	9	389	8
2011	600	7	326	6
2012	-	-	436	10

However, in Savojbolagh the program was not successful and the rate of suicide rose from 1.6 to 3.4 per 100'000 population (in the intervention period) in the correspondence period. The rate of attempt and committing suicide in the years before and after intervention period is shown in Table 3.

For this incongruity between the sites of conducting program, few reasons could be speculated. First, the treatment facilities such as working full time psychiatrist, available psychiatric bed and ECT service, in case of emergency, were not available in Savojbolagh. Second, the activity of SPCO was more satisfactory in Nahavand, showing that 80% of referrals were participating in consultation sessions compared to 36% in Savojbolagh. Third, the 52% screening rate in Nahavand was much higher than 21% in Savojbolagh.

In Nahavand 360 and in Savojbolagh 163 individuals per 100'000 attempted suicide, however, 1.8 and 2 percent of them committed suicide, respectively. This may indicate efficient and more available treatment and consultation facilities in Nahavand.

The decreased rate of suicide at Nahavand could be considered partly to the ability of Nahavand PHC network to identify and manage the depressed cases and individuals who were at risk of suicide. High percentage of population screening, providing treatment services by GPs and specialties at level 3 and 4 of PHC, and provided consultation services by SPCO two times more than Savojbolagh, were helpful to reduce the reattempt suicide and prevent suicide commitment. Review of the literature revealed that providing immediate contact with the victims by different means could be helpful to prevent attempts of suicide (41, 42). We were not trying to show the relation between reducing and management of mainly depressive disorder with suicide rate, however, the results confirmed the role of depression and its management as a remarkable risk factor in suicide prevention.

Regarding to committing suicide, the current study findings were not consistent with other Iranian studies'. For instance, in Kerman province, the rate of suicide for female: male was 1:3 (5). Accordingly, low level of education may account for inefficient problem solving, anger management and lack of coping skills based on emotional reactions.

Living in rural areas has increased the risk of suicide commitment. This corresponds with results from developed countries in which the mortality rate, particularly due to motor vehicle accident, suicide and poisoning, is higher in rural areas than urban places (42, 43). The "intention to die" might be more serious in rural than urban areas. However, it could be associated with rapid urbanization during the last decade, increasing struggles between family members as the most prevalent proximal stressors among suicide attempters in Iran (44-47). Using self-burning is more common among the Western provinces of Iran. Less access to mental health services, and less possibilities of treatment of depressive illnesses, certainly could increase the rate of suicide commitments.

Limitations

There were some limitations to this study. Screening the household members by interviewing only one member of the family and considering him/her as a proxy for other family members, reduced the accuracy of identifying at risk cases among other members. Screening the whole village by Behvarz in short period of time was exhausting and might reduce the accuracy of screen-

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ing.

Conclusion

The result of this study revealed that despite the obstacles, the improvement of PHC network capacities to identify and manage the depressed subjects and individuals at risk of suicide behaviors was feasible and effective to reduce the rate of suicide commitment. The following suggestions could enhance the quality of the implementation of such programs:

1. The top health managers have to be well trained to support and monitor the project.

2. Providing more effective screening tools.

3. Reducing the burnout of Behvarzes in the period of screening via hiring trained interviewers/ expanding the time of study implementation.

4. Reducing stigma of suicide and depression through increasing public awareness

5. Providing available mental health facilities for survived and their families.

6. Providing accessible facilities of treatment and consultation for survivors.

Conflict of interests

The authors declare that they have no competing interests.

Trial Registration

The study registered code by the Iranian Clinical Trials Registry is IRCT201008 271959N4.

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