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Characteristics of Inpatients Who Survive Suicide Attempts

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ABSTRACT

Objectives: The purpose of this study was to analyze the characteristics and factors affecting the survival of inpatients admitted following a suicide attempt.
Methods: A total of 3,095 cases retrieved from the Korean National Hospital Discharge In-depth Injury Survey data (from 2011 to 2015) were grouped according to survival and death and analyzed using descriptive statistics chi-square and logistic regression analysis.
Results: The following factors had statistically significant risks on reducing survival: female (OR = 2.352, $p < 0.001$), 40-59 years old (OR = 0.606, $p = 0.014$), over 60 years old (OR = 0.186, $p < 0.001$), poisoning (OR = 0.474, $p = 0.009$), hanging (OR = 0.031, $p < 0.001$), jumping (OR = 0.144, $p < 0.001$), conflicts with family (OR = 2.851, $p < 0.001$), physical diseases (OR = 1.687, $p = 0.046$), mental health problems (OR = 2.693, $p < 0.001$), financial problems (OR = 3.314, $p = 0.002$), 2014 (OR = 2.498, $p = < 0.001$) and 2015 (OR = 2.942, $p = 0.005$).
Conclusion: The survival group that had a history of attempted suicide (high-risk suicide group), should be further characterized. It is necessary to identify the suicide methods and risk factors for suicide prevention management policies and to continuously expand the management policy according to these characteristics.

Introduction

Suicide attempts that demonstrate a will to die [1] is a composite phenomenon of interactions involving various factors such as psychological pain, economic problems, physical health, social factors, and individual personality [2-7]. The suicide mortality rate in the Republic of Korea (2015) was 26.5 people per 100,000, which was the highest among OECD member nations [8]. The socioeconomic cost for suicide was 6,500 billion KRW in 2012, which was the second highest cost following cancer. Identifying suicide factors at a national level may help to alleviate the socio-economic impact.

A history of attempted suicide has the greatest impact on suicide compared with other factors [9-13]. It has been reported that 10% of suicide attempts would be fatal within a period of 10 years of the first attempt and 19% to 24% of deaths caused by suicide occur in patients that had a history of suicide attempts [14]. Among individuals who have attempted suicide, 4.5% resulted in death within a month, with 9% to 37% attempting suicide again within 6 months [15]. It has been reported that 61% of those that attempt suicide have had emergency medical care and between 37.9% to 98.8% have been hospitalized [16-19]. In the case of prolonged mental health treatment for those patients that have attempted suicide, the rate of committing suicide again decreased [20,21].

Patients that survive an attempted suicide are classified as "predictable high-risk patients" due to repeated suicide attempts. Therefore, understanding the characteristics and

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behaviors of high-risk patients and giving institutional support, may help to reduce the risk of suicide by providing a therapeutic environment. However, in most cases the stay in the emergency room is short because patients (or their guardians) want to leave hospital once their immediate clinical problems have been resolved, resulting in a lack of in-depth consultations to address the whole issues [13]. Thus, a hospitalization period is more appropriate than emergency room treatment alone to encourage patients and their families to receive continuous psychotherapy.

The purpose of this study was to analyze the characteristics and factors in patients that survived a suicide attempt. The patients that were admitted following a suicide attempt were assigned to the Survival group or Death group. Understanding the characteristics of those patients who attempt suicide may help to establish management methods that include initial crisis management from medical staff once patients enter hospital, and offer recommendations for long-term continuous treatment to prevent suicides.

Materials and Methods

1. Patients

Data from the Korean National Hospital Discharge In-depth Injury Survey (KNHDIIS) between 2011 to 2015 (Korea Centers for Disease Control and Prevention) were used to provide data for national health improvement and healthcare policy. Healthcare statistics of major chronic diseases afflicting the nation were available through these patient medical records and the incidences following discharge were identified. The study population was restricted to patients who were discharged from general hospitals with more than 100 beds (excluding clinics), nursing hospitals, veteran's hospitals, national army hospitals, or rehabilitation hospitals. Data were extracted by complex sample survey from 170 hospitals(30.3%) out of a total of 561 hospitals for the survey population.

"Intentional self-harm suicide attempt" is a term that includes purposeful, self-inflicted poisoning or injury, in addition to attempted suicide. A total of 3,095 cases from the population surveyed aged 20 years and above (codes X60-X84 and Y87.0) were selected by using the Korean Standard Classification of Disease and Cause of Death, KCD-7 [16,22-26].

2. Study design

Dependent variables were classified into either the Survival group or Death group; the Death group was identified using the discharge of deathbeds. Independent variables were characteristics of patients and suicide-related parameters. Characteristics of patients included gender and age (20-39, 40-59, and over 60 years) and the Charlson comorbidity index (CCI). CCI consisted of 17 disease groups and weights, 1-6 points per category (0 points, 1-2 points, over 3 points) and used the sum of the weights as the total score [27].

Suicide-related characteristics included 1) suicide methods such as poisoning (X60-X69), hanging (X70), jumping (X80), and others (X72-X79, X80) [23-26], 2) place of suicide (residence areas, non-residence areas), 3) associated risk factors (conflicts with family, physical diseases, mental problems, financial problems, others and unknown), 4) alcohol related (no drink, drink), 5) year (2011 to 2015), and 6) season (Spring, Summer, Autumn, Winter) [13,28].

3. Statistical analysis

The study patients that were admitted to hospital following a suicide attempt were assigned into the Survival or Death group. Frequencies and percentages were recorded and the chi-square test was performed. Multiple logistic regression was conducted. In this study, statistical program STATA 12.0 (Stata Corp, College Station, TX, USA) was used for analysis of the collected data. All tests were 2-sided, and statistical significance was reached at $p < 0.05$. Data excluding medical institution code and patient registered number (that would reveal personal identification) were obtained from Korea Centers for Disease Control and Prevention after review.

Results

1. General characteristics of patients

The number of female patients hospitalized due to suicide attempts was higher than male patients. By age group, patients aged 40-59 years were the most likely to commit suicide followed by patients aged 20-39 years, then the over 60 years age group. The highest incidence of patients who attempted suicide were those with a CCI score of 0 points (86.0%), followed by 1-2 points (9.5%), then over 3 points (4.5%). The most common method of suicide was poisoning (79.3%) followed by other (14.1%), then hanging (4.2%), and jumping (2.4%). Most of the suicide attempts were made in non-residential areas (88.1%). The greatest risk factor of suicide attempts were other and unknown (42.3%), followed by mental health problems (26.2%), conflicts with the family (19.2%), financial problems (6.5%), and physical diseases (5.9%). Drinking was a factor involved in 1.2% of cases of attempted suicide. From 2011 to 2015, the percentage of the patients hospitalized due to suicide attempts peaked in 2012 (21.0%), and was at its lowest in 2015 (19.3%). Spring (41.4%) was the season where most suicide attempts were made followed by Summer (23.6%), Autumn (19.4%), and Winter (15.7%; Table 1).

Table 1. Related characteristics of survival and death groups.

		Patients N = 3,095	Survival Group N = 2,789 (90.1%)	Death Group N = 306 (9.9%)	x^2	p
Gender	Male	1,414 (45.7)	1,212 (85.7)	202 (14.3)	56.541	< 0.001
	Female	1,681 (54.3)	1,577 (93.8)	104 (6.2)		
Age (y)	20 - 39	1,071 (34.6)	1,022 (95.4)	49 (4.6)	133.809	< 0.001
	40 - 59	1,144 (37.0)	1,059 (92.6)	85 (7.4)		
	≥ 60	880 (28.4)	708 (80.5)	172 (19.5)		
CCI	0	2,660 (86.0)	2,412 (90.7)	248 (9.3)	11.275	0.004
	1 - 2	294 (9.5)	261 (88.8)	33 (11.2)		
	≥ 3	141 (4.5)	116 (82.3)	25 (17.7)		
Methods	Poisoning	2,455 (79.3)	2,233 (91.0)	222 (9.0)	187.935	0.004
	Hanging	130 (4.2)	74 (56.9)	56 (43.1)		
	Jumping	74 (2.4)	61 (82.4)	13 (17.6)		
	Other	436 (14.1)	421 (96.6)	13 (3.4)		
Place	Residence areas	369 (11.9)	335 (90.8)	34 (9.2)	0.213	0.645
	Non-residence areas	2,726 (88.1)	2,454 (90.0)	272 (10.0)		
Risk factors	Conflicts with family	593 (19.2)	561 (94.6)	32 (5.4)	69.046	< 0.001
	Physical diseases	183 (5.9)	159 (86.9)	24 (13.1)		
	Mental problems	810 (26.2)	761 (94.0)	49 (6.0)		
	Financial problems	200 (6.5)	191 (95.5)	9 (4.5)		
	Other and unknown	1,309 (42.3)	1,117 (85.3)	192 (14.7)		
Alcohol	No drink	3,059 (98.8)	2,755 (90.1)	304 (9.9)	0.767	0.810
	Drink	36 (1.2)	34 (94.4)	2 (5.6)		
Year	2011	622 (20.1)	548 (88.1)	74 (11.9)	33.561	< 0.001
	2012	649 (21.0)	561 (86.4)	88 (13.6)		
	2013	620 (20.3)	551 (88.9)	69 (11.1)		
	2014	608 (19.6)	577 (94.9)	31 (5.1)		
	2015	596 (19.3)	552 (92.6)	44 (7.4)		
Season	Spring	1,280 (41.4)	1,161 (90.7)	119 (9.3)	3.909	0.272
	Summer	729 (23.6)	643 (88.2)	86 (11.8)		
	Autumn	599 (19.4)	543 (90.7)	56 (9.3)		
	Winter	487 (15.7)	442 (90.8)	45 (9.2)		

Data are presented as n (%).
CCI = Charlson comorbidity index.

2. Analysis of death and survival differences of patients

Classifying the patients hospitalized due to suicide attempt according to death and survival, 90.1% of them survived and 9.9% died. The survival rate of female patients (93.8%) was higher than males (85.7%). The lower their age, and the lower the CCI score, the higher the survival rate.

Among suicide methods, the survival rates were highest in other (96.6%), followed by poisoning (91.0%), jumping (82.4%),

then hanging (56.9%). In the risk factors causing an individual to commit suicide, survival rates were highest where financial problems were the main reason (95.5%), followed by conflicts with family (94.6%), mental health problems (94.0%), physical diseases (86.9%), and other and unknown (85.3%). The survival rate of the patients who attempted suicide in 2014 (94.9%) was the highest, followed by 2015 (92.6%), 2013 (88.9%), 2011 (88.1%), and 2012 (86.4%; Table 1).

3. Factors affecting survival

Multiple logistic regression analysis was performed to find out the statistically relevant risk factors for survival and death among the characteristics of the patients and the suicide attempts (Table 2).

Compared to male patients, females [odds ratio (OR), 2.352, 95% confidence interval (CI), 1.781 to 3.106] had statistically

Table 2. Multiple logistic regression analysis.

		OR	p	95% CI
Gender	Male	1		
	Female	2.352	< 0.001	1.781 - 3.106
Age (y)	20 - 39	1		
	40 - 59	0.606	0.014	0.405 - 0.905
	≥ 60	0.186	< 0.001	0.125 - 0.274
CCI	0	1		
	1 - 2	1.361	0.155	0.890 - 2.079
	≥ 3	0.957	0.869	0.569 - 1.611
Methods	Poisoning	0.474	0.009	0.272 - 0.827
	Hanging	0.031	< 0.001	0.159 - 0.061
	Jumping	0.144	< 0.001	0.061 - 0.334
	Other	1		
Place	Residence areas	1		
	Non-residence areas	1.075	0.144	0.976 - 1.183
Risk factors	Conflicts with family	2.851	< 0.001	1.873 - 4.339
	Physical diseases	1.687	0.046	1.010 - 2.816
	Mental problems	2.693	< 0.001	1.886 - 3.847
	Financial problems	3.314	0.002	1.579 - 6.954
	Other and unknown	1		
Alcohol	No drink	1		
	Drink	1.186	0.827	0.258 - 5.439
Year	2011	1		
	2012	0.834	0.333	0.577 - 1.204
	2013	1.039	0.843	0.709 - 1.523
	2014	2.498	< 0.001	1.559 - 4.003
	2015	2.942	0.005	1.386 - 6.239
Season	Spring	1		
	Summer	1.000	0.999	0.695 - 1.440
	Autumn	1.152	0.485	0.774 - 1.716
	Winter	1.076	0.741	0.698 - 1.567

CCI = Charlson comorbidity index; CI = confidence interval; OR = odds ratio.

significant higher survival rates. Physical diseases (OR, 1.687; 95% CI, 1.010 to 2.816), mental health problems (OR, 2.639; 95% CI, 1.886 to 3.847), conflicts with family (OR, 2.851; 95% CI, 1.873 to 4.339), financial problems (OR, 3.314; 95% CI, 1.579 to 6.954) and other and unknown also had statistically significant higher survival rates. The year of 2015 (OR, 2.942; 95% CI, 1.386 to 6.239) had the highest survival rates, followed by 2014 (OR, 2.498; 95% CI, 1.559 to 4.003) then 2011.

Patients aged 40-59 years (OR, 0.606; 95% CI, 0.405-0.095) and over 60 years (OR, 0.186; CI 0.125-0.274) had statistically significant lower survival rates compared to 20-39 years old patients. Statistically significant lower survival rates were identified for poisoning (OR, 0.474; 95% CI 0.272 to 0.827), jumping (OR, 0.144; 95% CI 0.061 to 0.334), and hanging (OR, 0.031; 95% CI 0.159 to 0.061) compared with other suicide methods.

Discussion

Suicide is preventable [29]. People who have previously attempted suicide can be identified and preventive programs offered to reduce the risk of dying from suicide. The purpose of this research was to contribute to basic data on suicide prevention by identifying the characteristics and factors involved in suicide by analyzing patients grouped according to whether their suicide attempts resulted in Survival or Death using KNHDIIS data.

A study in 2013, analyzed suicide attempts data from 2007 to 2011, from the emergency rooms of 16 hospitals that showed 2.7% of these patients died from their re-suicide attempts [30]. They also found that risk factors such as being the elderly, male, living alone, physical illness, psychiatric treatment, depressive disorders or a history of attempted suicide, were factors involved in repeated suicide attempts that resulted in death. In a 14-year follow-up study of 1,018 people who had attempted suicide, long-term risk factors were investigated using survival analysis. Risk factors such as male, history of suicide, psychiatric treatment, physical illness, and self-reported risk of suicide were analyzed [31]. A history of suicide was identified as a major predictor for further suicide attempts, therefore characterization of those who survived suicide may help in determining prevention strategies.

In this study, multiple logistic regression was performed to identify death and survival factors of suicide attempts in patients. Female patients showed higher survival rates than males and the younger patients, the higher the survival rate. Among risk factors, financial problems were the highest factor, followed by conflict with family members, mental health problems, and physical diseases than other or unknown. In addition, compared to 2011, the survival rates increased

in 2013, 2014, and 2015. Therefore, the study suggests that prevention policies to reduce the risk factors for suicide, should be based on characteristics of these survivor groups.

There are a variety of data that can be used to study individuals who have attempted suicide. Statistics Korea, data of KNHDIIS, data from National Emergency Department Information System (NEDIS), Youth Health Behavior Online Survey, and data of social and psychological anxiety surveys in Korean society have been used for statistical analysis of the causes of death [32–34]. Statistics from death reports in Statistics Korea have limitations because the causes of death do not provide details of the suicide attempts, preventing analysis of the characteristics of the survivors. Similar to the KNHDIIS data, NEDIS data of the patients in the emergency medical center were provided in the form of a combination of suicide attempts and death. However, there was insufficient information on death and survival after the first attempt. Thus, it is difficult to analyze the characteristics of self-harm or those that attempt suicide, the choices of suicide methods, and the possibilities of carrying out psychiatric treatment with medical staff using the NEDIS data. The KNHDIIS has been conducted on patients who were admitted following a suicide attempt. It is possible to analyze characteristics of the suicide attempt, characteristics of patients according to suicide method, and mortality and survival factors. However, there is a disadvantage in that data for those who did not come to any hospital, or from patients who are not hospitalized due to death or discharge from the center were not included. Therefore, it is necessary to construct data that can be analyzed to determine the characteristics of surviving patients after suicide attempts, and to elucidate the characteristics of the high-risk self-harming group.

Suicide mortality is more closely related to the method of suicide than the risk factors involved in a suicide attempt [35]. Therefore, focusing on suicide methods will have a major effect on suicide prevention. Suicide methods are influenced by various factors such as the national culture and suicide prevention policies. In the WHO analysis of suicide mortality, pesticides in Asia and Latin America, drugs in Northern Europe and jumping in Hong Kong, Eastern Europe, and the United States of America, were reported as the main methods of suicide [36]. In Korea and Japan, gas poisoning is 1 of the main methods of suicide; firearms are used but it is rare [37]. It is necessary to apply effective preventive strategies focused on suicide methods that apply to the whole population including subgroups and individuals. In this study the research suggests that women over 60 years of age, who have suicide history should be identified.

According to National Suicide Statistics in Korea from 2011 to 2015, the suicide mortality rate decreased from 31.8 to 26.5 persons per 100,000 population [8]. It was believed that a ban

on the sale of parquet (fatal toxic pesticide), caused the decline in suicide mortality. This report also showed that the suicide admission rate of deliberate self-inflicted suicide attempts in elderly patients was reduced by less than 20%, and the survival rate increased after 2014. Therefore, access restriction (where possible) to products used in suicide attempts and environmental control implemented by public health strategies can help to prevent deliberate self-harm [23,38]. However, injuries from self-harm increased from 41.3 to 51.0 persons per 100,000 population during the same period in Korea [13,39]. Therefore, accounting for suicide methods should be reflected in suicide prevention policies.

In establishing suicide prevention policies, suicide risk factors (which have a great effect on survival and death factors) including financial problems, conflict with family members, mental health problems, and physical illness, and love conflicts should all be considered [13,40]. In another study, the sequence of causes of suicidal attempt was interpersonal difficulties, conflicts with family members, financial problems, and hallucinations or delusions [41]. These differences in risk factors are due to differences in individuals, so further research into the risk factors encountered by high-risk suicide patients should be conducted to identify causal factors, which need to be reflected when establishing suicide prevention policies.

The limitations of this study are as follows: Firstly, the number of patients in the study were limited to medical institutions with more than 100 beds. However, this allowed the data of the patients to be classified on a nationwide scale, and not restricted to a particular hospital, according to survival and death. This is where this study is different from other previous studies. Secondly, because of complex characteristics of suicide due to the interaction of various factors, many factors that could affect suicide attempts were not considered. This might be due to the limitation of the use of administrative data. In further studies, these limitations should be addressed by evaluating various risk factors which are known to be relevant to suicide. Despite the limitations, this study identified the characteristics of high-risk patients that can inform policymakers. Data from multiple sources needs to be collated and analyzed to help prevent suicide in high-risk individuals. This will enable policies aiding healthcare providers to develop suicide prevention strategies by identifying the characteristics of the high-risk group that have previously attempted suicide. It is necessary to continuously develop management policies to present solutions to minimize risk factors in high-risk suicide patients. To this end, it is important to devise policies to support the treatment for suicide prevention during the admission period after suicide attempts.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

References

[1] World Health Organization 2014. Preventing suicide-A global imperative. Geneva (Switzerland); 2004. 12 p.
[2] Fairweather AK, Anstey KJ, Rodgers B, et al. Age and gender differences among Australian suicide ideators: prevalence and correlates. J Nerv Ment Dis 2007;195(2):130-6.
[3] Jagodic HK, Agius M, Pregelj P. Inter-regional variations in suicide rates. Psychiat Danub 2012;24 Suppl 1:S82-5.
[4] Beghi M, Rosenbaum JF, Cerri C, et al. Risk factors for fatal and nonfatal repetition of suicide attempts: a literature review. Neuropsychiatr Dis Treat 2013;9:1725-36.
[5] Finkelstein Y, Macdonald EM, Hollands S, et al. Risk of suicide following deliberate self-poisoning. JAMA Psychiatry 2015;72(6):570-5.
[6] Seoul Mental Health Center Suicide Crisis Intervention Handbook. 2011. p.1-55.
[7] Jin W, Choi WJ, Yoon JH, et al. Associated factors of psychiatric follow-up after emergency care in suicide attempters. J Korean Soc Dep Bip Disorders 2013;11:143-50.
[8] Ministry of Health and Welfare. 2017, White Paper of Health and Welfare. 2018. p.18-19.
[9] Casey P, Dunn G, Kelly BD, et al. The prevalence of suicidal ideation in the general population: results from the Outcome of Depression International Network (ODIN) study. Soc Psychiatry Psychiatr Epidemiol 2008;43(4):299-304.
[10] Chen YY, Lee MB, Chang CM, et al. Methods of suicide in different psychiatric diag Nam YY, Ko SM, Lee HS, Hong KE. The characteristics of suicide attempts and psychosocial risk factors in correctional institutions. J Korean Neuropsychiatr Assoc 2009;48:368-73.
[11] Jung WY, Park JM, Kang CJ, et al. Clinical characteristics of completed versus non-completed suicide and re-attempt rates in 2-4 years. J Korean Neuropsychiatr Assoc 2009;48:488-95.
[12] Nordentoft M, Mortensen PB, Pedersen CB. Absolute risk of suicide after first hospital contact in mental disorder. Arch Gen Psychiatry 2011;68(10):1058-64.
[13] Kim HY, Kim BR, Kang SG, et al. Attempted Suicides in South Korea: A Multi-Center Analysis of Causes, Methods, and Psychiatric Diagnoses of Suicidal Attempters in 2013. Korean J Biol Psychiatry 2015;22(4):187-94.
[14] Statistics Korea [Internet]. Annual Report on Causes of Death, 2012. 2013. Available from: https://kostat.go.kr/portal/korea/kor_nw/2/6/2/index.board?bmode=read&aSeq=308559.
[15] Ministry of Health and Welfare. Korea Association for Suicide Prevention. Psychological Autopsy of Suicides in Mental Health Center and an Establishment of Case Management Service for Suicides. 2009.
[16] Bilen K, Ottosson C, Castren M, et al. Deliberate self-harm patients in the emergency department: factors associated with repeated self-harm among 1524 patients. Emerg Med J 2011;28(12):1019-25.
[17] Lee OS, Cheon YJ, Kim JT, et al. Evaluation of Drugs for Suicide Attempt and Antidote Uses in Emergency Room of a Hospital in Korea. Korean J Clin Pharm 2012;22(4):304-15.
[18] Lee H, Oh ST, Kim MG, et al. Severity of Comorbidities among Suicidal Attempters Classified by the Forms of Psychiatric Follow-up. Korean J Psychosom Med 2016;24(1):74-82.
[19] Cheon SH [Dissertation]. Characteristics of The Suicide Attempters Referred to Department of Psychiatry in Emergency Room of A University Hospital. Chosun University; 2014.
[20] Kapur N, Cooper J, Hiroeh U, May C, et al. Emergency department management and outcome for self-poisoning: a cohort study. Gen Hosp Psychiatry 2004;26(1):36-41.

[21] Kim WJ, Song YJ, Namkoong K, et al. Does a copycat effect exist in the emergency department? Int J Psychiatry Med 2013;45(1):59-72.

[22] Doshi A, Boudreaux ED, Wang N, et al. National Study of US Emergency Department Visits for Attempted Suicide and Self-Inflicted Injury, 1997-2001. Ann Emerg Med 2005;46(4):369-75.

[23] Park SH, Lim DO. A Study on Tools Employed for Suicides in Korea', 2003-2011. Korean Public Health Res 2013;39(1):47-55.

[24] Park SH, Kim YB, Lim DO. Regional Suicide Mortality Rate in Korea. Korean J Health Serv Manag 2013;7(3):287-96.

[25] Kim JA [Dissertation]. Estimation of the Scale of Damage corresponding to Severities. Graduate School of Ajou University; 2013.

[26] Lim DH, Park SH. Contributive Effects of Age Structure over Death Rate of Intentional Self-Injuries', 1985-89, 2010-14. J Health Info Stat 2016;41(4):411-6.

[27] Sundararajan V, Henderson T, Perry C, Muggivana A, et al. New ICD-10 version of the Charlson comorbidity index predicted in-hospital mortality. J Clin Epidemiol 2004;57(12):1288-94.

[28] Choi JW [Dissertation]. A Study on Death Rate by Suicides of Inpatients in Department of Psychiatry, Patients visited Emergency Rooms, and Suicide Attempters. Graduate School of Ulsan University; 2010.

[29] World Health Organization [Internet]. Preventing suicide: A global imperative. Geneva (Switzerland): World Health Organization Headquarters. [cited 2018 Apr 22]. Available from: https://www.who.int/mental_health/suicide-prevention/world_report_2014/en/.

[30] Ahn YM, Kim BR, Kim SH, et al. 2013 National Survey on Suicide. Seoul (Korea): SUNH; 2014. 453 p.

[31] Suokas J, Suominen K, Isometsä E, et al. Long-term risk factors for suicide mortality after attempted suicide - findings of a 14-year follow-up study. Acta Psychiatr Scand 2001;104(2):117-21.

[32] Statistics Korea [Internet]. Cause of Death. Available from: http://kosis.kr/statisticsList/statisticsListIndex.do?menuId=M_01_01&vwcd=MT_ZTITLE&parmTabId=M_01_01.

[33] Ministry of Health & Welfare, Korea Centers for Disease Control and Prevention. 2015 Guide of Korean National Hospital Discharge In-depth Injury Survey.

[34] National Emergency Department Information System [Internet]. [cited 2018 Apr 25]. Available from: http://www.e-gen.or.kr/nemc/main.do

[35] Miller M, Azrael D, Barber C. Suicide mortality in the United States: the importance of attending to method in understanding population-level disparities in the burden of suicide. Annu Rev Public Health 2012;33:393-408.

[36] Ajdacic-Gross V, Weiss MG, Ring M, et al. Methods of suicide: international suicide patterns derived from the WHO mortality database. Bull World Health Organ 2008;86(9):726-32.

[37] Korea Centers for Disease Control and Prevention [Internet]. KNHDIIS: Korean National Hospital Discharge In-depth Injury Survey System. Osong (Korea): KCDC; 2006 [cited 2018 Feb 1]. Available from: http://www.e-gen.or.kr/nemc/main.do

[38] Habenstein A, Steffen T, Bartsch C, et al. Chances and limits of method restriction: a detailed analysis of suicide methods in Switzerland. Arch Suicide Res 2013;17(1):75-87.

[39] Jung SY [Dissertation]. Estimation and analysis of the incidence of suicidal attempts extrapolated from the Emergency Department based Injury Surveillance System. Seoul (Korea): Ewha Womans University; 2017.

[40] Kwon JW, Ko YH, Han CS, et al. Psychosocial Characteristics and Factors Associated with Referral to Psychiatric Care of the Suicide Attempters Visited Emergency Centers. J Psychosom Med 2013;21(2):106-13.

[41] Jun SH [Dissertation]. Characteristics of the suicide attempters referred to department of psychiatry in emergency room of a university hospital. Chosun University; 2014.