

# Knowledge and attitude of nonpsychiatric physicians regarding suicide in spinal cord injury patients and need for structured psychiatric education for suicide prevention

## A prospective survey pilot study

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### Abstract

**Background:** The knowledge and attitude of nonpsychiatric physicians regarding suicide in spinal cord injury (SCI) patients is important to prevent the accident related to suicide. However, most existing studies have focused on perception of and attitudes among psychiatric physician and mental health care worker.

The aim of this study is to investigate awareness and attitude regarding suicide among clinicians treating patients with spinal cord injury, and the necessity of education for suicide prevention.

**Methods** A total of 29 subjects (N = 29; surgical group n=17, nonsurgical group n=12) participated in the study, 6 fellows and 23 residents. They answered a newly revised questionnaire that incorporated 18 items regarding perception of and attitude toward suicide, awareness of suicide in treatment of spinal cord injury patients, and psychiatric consultation; 13 items regarding education and experience; and 4 subjective items regarding their department. A  $\chi^2$  test was performed to investigate differences in sociodemographic factors, awareness of and attitude toward suicide, and clinical experience with spinal cord injury patients. Binary logistic regression analysis was used to identify correlation between the questionnaire items.

**Results:** There were significant differences between surgical and nonsurgical clinicians in 1 question (Q6) about awareness of and attitude toward suicide ( $P < .05$ ) and in 2 questions (Q21, Q25) about psychiatric consultation and experience with suicide-related education ( $P < .01$ ). The correlation analysis revealed significant differences in certain questions among awareness and attitude ( $P < .05$ ) and age ( $P < .05$ ) and specialty ( $P < .01$ ). Two sets of questions (Q16/Q31, Q17/Q26) showed correlation between clinical experience with spinal cord injury patients and awareness of and attitude toward suicide ( $P < .05$ ).

**Conclusion:** Education regarding suicide prevention and suicide-related clinical experience with spinal cord injury patients is important for nonpsychiatric clinicians, such as those in the fields of orthopedics, neurosurgery, and rehabilitation medicine.

**Abbreviations:** BDI = beck depression inventory, CI = confidence interval, NS = neurosurgery, OR = odds ratio, OS = orthopedics surgery, RM = rehabilitation medicine, SCI = spinal cord injury.

**Keywords:** attitude, awareness, education, spinal cord injury, suicide

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J-MH and C-HK were responsible for the conception and design of the study. J-MH was responsible for acquisition of data and performed the data analysis. S-JL and T-WN drafted the manuscript. All authors participated in interpretation of the findings and all authors read and approved the final version of the manuscript. All authors confirm that the content has not been published elsewhere and does not overlap with or duplicate their published work.

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## 1. Introduction

According to data released by the National Statistical Office in September, the total suicide rate in the South Korean population in 2016 was 25.6 per 100,000; the fifth most common cause of death, following cancer, heart disease, cerebrovascular disease, and pneumonia, was reported to be intentional self-harm (suicide). Of the 35 member countries of the Organisation for Economic Co-operation and Development (OECD), Korea has the highest suicide rate, with 24.6 per 100,000 OECD standard population.<sup>[1]</sup>

The risk of suicide in patients with spinal cord injuries is greater than in the general population.<sup>[2]</sup> In the United States, the suicide rate of spinal cord injury patients is 2 to 6 times higher than in the general population.<sup>[3]</sup> In Denmark, the suicide rate of spinal cord injury patients is 5 times higher.<sup>[4]</sup> A study in Australia found the suicide rate in spinal cord injury patients to be 4.4 times higher,<sup>[5]</sup> and one in Norway found that suicide rates were 37.6 times higher in women with spinal cord injury and 3.7 times higher in men with spinal cord injury than in the corresponding general populations of women and men.<sup>[6]</sup> In another study, 50% of patients with spinal cord injury experienced suicidal ideation<sup>[7]</sup> and 10% to 15% reported having planned an actual suicide attempt within 6 months after their spinal cord injury.<sup>[8]</sup>

The suicide rate of patients with spinal cord injuries in Korea was less than 1% in the early 1960s, but has recently steadily increased to 10%.<sup>[9]</sup> Suicide is also the leading cause of death before age 55, and a major cause of death within 5 years of spinal cord injury.<sup>[10]</sup> The limitation of physical and social activities caused by a spinal cord injury leads to depression, which is known to be a major psychiatric problem affecting spinal cord injury patients.

However, leaving a record of psychiatric symptoms is considered a social and cultural taboo, and the reluctance of nonpsychiatric clinicians to discuss psychiatric symptoms with their patients is becoming a high risk factor for psychiatric disorders and increased suicide rates in patients with spinal cord injury. Suicide is closely related to mental health problems, in both healthy individuals and patients with spinal cord injury; therefore, medical staff who treat patients with spinal cord injuries, such as orthopedic surgeons, neurosurgeons, and rehabilitation physicians, must assess their patients' risk of suicide and conduct appropriate intervention. With such efforts, we can expect a decrease in the suicide rate of patients with spinal cord injury.

In the literature on suicide related to the role of health care professionals, according to a systematic review by Luoma et al<sup>[2]</sup> on contact with primary health care professionals prior to death by suicide, an average 45% of suicide victims had contact with health care professionals through related services within 1 month of their suicide. This result shows the importance of relevant institutional staff's roles in preventing suicide. The importance of education for professionals and change in perception regarding access to high-risk suicide subjects was emphasized in a case study of a multistage suicide prevention strategy conducted by van der Feltz-Cornelis et al.<sup>[11]</sup> The results of a study by Mann et al<sup>[12]</sup> on suicide prevention strategies suggest that education for professionals is an effective method of improving access to mental health services and awareness of suicide prevention.

In Korea, some studies have addressed quality of life, depression, and suicide in spinal cord injury patients, but most of these are anecdotal reports, and no existing research examines health care professionals' perception of these issues. In addition,

because most existing studies have focused on perception of and attitudes toward suicide among physicians and health care workers who treat patients diagnosed with a psychiatric disease or from the general population,<sup>[13–15]</sup> they provide a limited understanding of the awareness and attitudes of doctors and health care workers who treat spinal cord injury patients. Overseas, a few preliminary studies have been conducted among psychiatrists in Europe and Asia,<sup>[16,17]</sup> but systematic studies of this type have not yet been conducted in Korea.

The attitudes of medical staff toward suicide in spinal cord injury patients have a significant impact on solving problems related to suicide. Factors that may influence these attitudes can be presumed to be external, such as educational training experience (including years of experience as an attending physician) and experience in medical treatment regarding suicide, and internal, such as the social and cultural background of the individual.

Therefore, this study aimed to investigate whether attending physicians and residents consider suicide when treating spinal cord injury patients, as well as the types of educational content needed for physicians to prevent suicide in spinal cord injury patients.

To do this, we compared the sociodemographic factors of attending physicians and investigated the differences in their knowledge, experience, and attitudes regarding suicide in spinal cord injury patients.

## 2. Materials and methods

### 2.1. Subjects

The subjects of this study were recruited from among medical staff with more than 1 year of experience specializing in treatment of spine injury patients in the orthopedic surgery, neurosurgery, and rehabilitation medicine departments of Kyungpook National University Hospital.

The questionnaire survey was conducted in April 2018. Before the questionnaire was distributed, the purpose and method of the study were described to all participants, and subjects provided a written consent form to participate in the survey.

A total of 29 people, 6 fellows and 23 residents, participated in the study. This study was approved by the Institutional Review Board of Kyungpook National University Hospital.

### 2.2. Method

The questionnaire consisted of 35 items. It was newly revised based on 1 questionnaire on attitudes toward suicide of Diekstra and Kerkhof<sup>[18]</sup> and another questionnaire on respect for life and suicide among Korean people<sup>[19]</sup> and others used in a preliminary survey on the attitude of the general public toward suicide<sup>[20]</sup> and in survey study<sup>[21]</sup> that were modified from Renberg<sup>[22]</sup> and Renberg and Jacobsson<sup>[23]</sup> studies. The preliminary survey questionnaire<sup>[20]</sup> on the general public's attitude toward suicide adopted items from Domino's Suicide Opinion Questionnaire<sup>[24]</sup> that were modified to suit the domestic context.

The newly revised questionnaire used in this study included 18 items regarding perception of and attitude toward suicide, awareness of suicide in treatment of spinal cord injury patients, and psychiatric consultation; 13 items regarding educational experience, specialty, awareness of available survey tools on patient suicide risk, and reasons for insufficient screening tests for suicide; and 4 subjective questions regarding the participant's

specialty. The 18 items regarding awareness of and attitudes toward suicide (Q1–Q18) were rated on a 5-point scale as follows: “Definitely yes (all the time),” “Yes (often),” “Half the time (sometimes),” “No (seldom),” “Definitely no (never).”

### 2.3. Statistical analysis

The subjects’ sociodemographic characteristics were calculated by frequency and percentage, and a  $\chi^2$  test was performed to verify statistical significance. For statistical analysis, responses of “Definitely yes (all the time)” and “Yes (often)” to the 18 items regarding awareness and attitude (Q1–Q18) were changed to “Yes”; responses of “Definitely no (never)” and “No (seldom)” were changed to “No”; and responses of “Half the time (sometimes)” were excluded. To control confounding factors, binary logistic regression analysis was performed with gender, specialty division, years of experience as an attending physician, and age as covariates.

We analyzed the responses to items about suicide awareness, attitudes and personal experiences, experience with and assessment of suicide risk in spinal cord injury patients to identify significant differences among specialty division, divided by orthopedics, neurosurgery, and rehabilitation medicine, sex, years of experience as an attending physician, and age. All data were analyzed using SPSS for Windows version 18.0 (SPSS Inc, Chicago, IL), with statistical significance set at  $P < .05$ .

## 3. Results

### 3.1. Sociodemographic characteristics of participants

The sociodemographic characteristics of the study’s participants are shown in Table 1. A total of 29 subjects were included in the study. The average age of all subjects was 34.0 years; the average age of orthopedic surgeons and neurosurgeons (surgical group) was 33.0 years, and the average age of rehabilitation medicine physicians (nonsurgical group) was 34.4 years. There were 25 men (86.2%) and 4 women (13.8%); 15 physicians (51.7%) were married and 14 (48.3%) were unmarried; 12 physicians (41.4%) had 1 to 2 years of experience as an attending physician treating spinal cord injury patients, and 17 (58.6%) had at least 3 years’ experience. The proportion of men was higher in the surgical group than the nonsurgical group, and there were no significant differences in age, marital status, or experience as an attending physician.

### 3.2. Responses of surgical and nonsurgical physicians to questionnaire items

**3.2.1. Items regarding perception of and attitude toward suicide.** The response results for each item are shown in Table 2. A statistically significant difference between surgical and nonsurgical attending physicians was found for item Q6, “Do not consult patients about suicide” ( $\chi^2 = 5.720$ ,  $df = 1$ ,  $P = .024$ ).

**3.2.2. Items regarding experience with psychiatric consultation, education, and medical intervention for suicide.** The response results for each question are shown in Table 3. With respect to experience with psychiatric consultation and education, a statistically significant difference was found between surgical and nonsurgical attending physicians for item Q21, “Can you appropriately assess the risk of suicide in spinal cord injury patients admitted to the hospital?” ( $\chi^2 = 18.277$ ,  $df = 1$ ,  $P < .05$ ), and item Q25, “Do you perform a screening test for depression when you see spinal cord injury patients?” ( $\chi^2 = 15.086$ ,  $df = 1$ ,  $P < .001$ ).

**3.2.3. Binary logistic regression analysis according to surgical/nonsurgical classification and sociodemographic background.** Table 4 shows the results of binary logistic regression analysis of the questionnaire responses with all sociodemographic background factors as independent variables.

### 3.3. Items regarding perception of and attitude toward suicide

Higher age correlated with the response rate of “Yes” for Q5, “You can understand that someone would want to commit suicide if they had an incurable disease” (B: 3.618, odds ratio [OR]: 37.280, 95% confidence interval [CI]: 1.312–1059.605,  $P = .034$ ), and Q9, “Those who threaten to commit suicide have a higher risk of actually attempting suicide” (B: -2.516, OR: 0.122, 95% CI: 0.019–0.771,  $P = .025$ ).

### 3.4. Items regarding experience with psychiatric consultation, education, and medical intervention for suicide

Specialty (distinguished as surgical or nonsurgical) was correlated with the response rate of “Yes” in items such as Q25, “Do you perform a screening test for depression when you see spinal cord injury patients?” (B: -3.938, OR: 0.019, 95% CI: 0.002–0.214,  $P < .001$ ); Q27, “Do you actively conduct intervention for spinal

**Table 1**  
Sociodemographic characteristics of participants.

Variables	Characteristics	Surgical OS, NS		Nonsurgical RM		Total		$\chi^2$	P
		N	(%)	n	(%)	n	(%)		
Age, y	<35	12	(70.6)	4	(33.3)	16	(55.2)	3.948	.067
	≥35	5	(29.4)	8	(66.7)	13	(44.8)		
Sex	Male	17	(100)	8	(66.7)	25	(86.2)	6.673	.021*
	Female	0	(0)	4	(33.3)	4	(13.8)		
Marital status	Unmarried	9	(52.9)	5	(41.7)	14	(48.3)	0.358	.71
	Married	8	(47.1)	7	(58.3)	15	(51.7)		
Experience as attending physician, y	1–2 y	10	(58.8)	2	(16.7)	12	(41.4)	5.154	.053
	>3 y	7	(41.1)	10	(83.3)	17	(58.6)		

NS=neurosurgery, OS=orthopedic surgery, RM=rehabilitation medicine.

$\chi^2$  test  
\*  $P < .05$ .

**Table 2****Comparison of awareness and attitude regarding suicide between surgical and nonsurgical physicians.**

Items	Yes/no	Surgical/nonsurgical group			P
		OS and NS, n (%)	RM, n (%)	Total, n (%)	
Q1. The suicide rate in Korea is higher than the global average	Yes	15 (100)	11 (100)	26 (100)	
	No	0 (0)	0 (0)	0 (0)	
Q2. The probability of a patient with a severe condition conducting suicide is higher than normal	Yes	11 (91.7)	9 (81.8)	20 (87.0)	.590
	No	1 (8.3)	2 (18.2)	3 (13.0)	
Q3. Everyone has potential to commit suicide	Yes	6 (46.2)	3 (50)	9 (47.4)	1.000
	No	7 (53.8)	3 (50)	10 (52.6)	
Q4. Suicide is wrong	Yes	11 (100)	9 (100)	20 (100)	
	No	0 (0)	0 (0)	0 (0)	
Q5. You can understand that someone would want to commit suicide if they had an incurable disease	Yes	10 (90.9)	6 (66.7)	16 (80)	.285
	No	1 (9.1)	3 (33.3)	4 (20)	
Q6. Do consult patients about suicide	Yes	9 (60)	11 (100)	20 (76.9)	.024*
	No	6 (40)	0 (0)	6 (23.1)	
Q7. A person who survives a suicide attempt is likely to try again	Yes	13 (92.9)	10 (90.9)	23 (92.0)	.500
	No	1 (7.1)	1 (9.1)	2 (8.0)	
Q8. Suicide can be prevented if a person with suicidal ideation receives counseling or treatment	Yes	13 (86.7)	12 (100)	23 (92.0)	.487
	No	2 (13.3)	0 (0)	2 (8.0)	
Q9. Those who threaten to commit suicide have a higher risk of actually attempting suicide	Yes	12 (85.7)	8 (88.9)	20 (87.0)	1
	No	2 (14.3)	1 (11.1)	3 (13.0)	
Q10. People who commit suicide are those who made a firm commitment to die	Yes	3 (21.4)	3 (42.9)	6 (28.6)	.354
	No	11 (78.6)	4 (57.1)	15 (71.4)	
Q11. Most people who attempt suicide have an accompanying mental disorder	Yes	6 (50)	3 (42.9)	9 (47.4)	1.000
	No	6 (50)	4 (57.1)	10 (52.6)	
Q12. People who do not have family or social support are at a higher risk of suicide	Yes	16 (100)	12 (100)	28 (100)	
	No	0 (0)	0 (0)	0 (0)	
Q13. If one of my family members commits suicide, it will be shameful	Yes	2 (14.3)	2 (25)	4 (20)	1.000
	No	10 (85.7)	6 (75)	16 (80)	
Q14. People have the right to choose suicide	Yes	11 (78.6)	8 (80)	19 (79.2)	1.000
	No	3 (21.4)	2 (20)	5 (20.8)	
Q15. Celebrity suicides, such as entertainers, affect suicide among the public	Yes	15 (100)	11 (100)	26 (100)	
	No	0 (0)	0 (0)	0 (0)	
Q16. The media reports on suicide are so stimulating	Yes	10 (76.9)	8 (100)	18 (85.7)	.257
	No	3 (23.1)	0 (0)	3 (14.3)	
Q17. Suicide is the responsibility of society rather than the individual	Yes	4 (66.7)	6 (100)	10 (83.3)	.455
	No	2 (33.3)	0 (0)	2 (16.7)	
Q18. To prevent suicide, the government must take active measures	Yes	13 (92.9)	11 (100)	24 (96)	1.000
	No	1 (7.1)	0 (0)	1 (4)	

NS = neurosurgery, OS = orthopedic surgery, RM = rehabilitation medicine.  
 $\chi^2$  test, \* $P < .05$ ; Fisher exact test, † $P < .05$ .

cord injury patients who are assessed to have serious psychiatric problems after performing a screening test?" (B:  $-1.966$ , OR:  $0.140$ , 95% CI:  $0.023-0.846$ ,  $P = .032$ ); and Q31, "Do you think that education regarding suicide and serious psychiatric problems in spinal cord injury patients is necessary during training for physicians?" (B:  $-2.549$ , OR:  $0.078$ , 95% CI:  $0.006-0.957$ ,  $P = .046$ ).

### 3.5. Correlation between items on awareness of and attitude toward suicide and items on psychiatric consultation, education, and clinical experience

The results regarding correlation between awareness of and attitude toward suicide (Q1–Q18) and psychiatric consultation

and education (Q19–Q31), obtained through binary logistic regression analysis, are shown in Table 5.

Item Q16 in the section on awareness and attitude, "The media reports on suicide are so stimulating," was highly correlated with the positive response rate for item Q31 in the section on education and experience, "Do you think that education regarding suicide and serious psychiatric problems in spinal cord injury patients is necessary for physicians during training?" (B:  $1.897$ , OR:  $6.667$ , 95% CI:  $1.008-44.097$ ,  $P = .049$ ). Item Q17 in the section on perception and attitude, "Suicide is the responsibility of society rather than the individual," was highly correlated with the positive response rate for item Q26 in the section on education and experience, "Do you identify psychiatric problems, such as prior depression and attempted

**Table 3****Comparison of psychiatric consultation and experience with suicide-related education between surgical and nonsurgical physicians.**

Items	Yes/no	Surgical/nonsurgical group			P
		OS and NS, n (%)	RM, n (%)	Total, n (%)	
Q19. Do you have a spinal cord injury patient who has mentioned a suicide attempt during treatment?	Yes	5 (33.3)	4 (36.4)	9 (34.6)	1
	No	10 (66.7)	7 (63.6)	17 (65.4)	
Q20. Do you have a spinal cord injury patient who has attempted suicide during treatment?	Yes	1 (6.7)	1 (9.1)	2 (7.7)	1
	No	14 (93.3)	10 (90.9)	24 (92.3)	
Q21. Can you appropriately assess the risk of suicide in spinal cord injury patients who are admitted to the hospital?	Yes	1 (7.7)	9 (100)	10 (45.5)	.000*
	No	12 (92.3)	0 (0)	12 (54.5)	
Q22. Are you confident you can help prevent suicide in high-risk spinal cord injury patients?	Yes	4 (57.1)	3 (60)	7 (58.3)	1
	No	3 (42.9)	2 (40)	5 (41.7)	
Q23. Do you perform a screening test for suicide in most patients with spinal cord injury?	Yes	1 (7.7)	2 (18.2)	3 (12.5)	.576
	No	12 (92.3)	9 (81.8)	21 (87.5)	
Q24. Are there many cases in which patients with a spinal injury feel depressed during treatment?	Yes	12 (85.7)	12 (100)	24 (92.3)	.483
	No	2 (14.3)	0 (0)	2 (7.7)	
Q25. Do you perform a screening test for depression when you see spinal cord injury patients?	Yes	2 (20)	12 (100)	14 (63.6)	.000*
	No	8 (80)	0 (0)	8 (36.4)	
Q26. Do you identify psychiatric problems, such as prior depression and attempted suicide, when you see spinal cord injury patients?	Yes	4 (40)	7 (87.5)	11 (61.1)	.066
	No	6 (60)	1 (12.5)	7 (38.9)	
Q27. Do you actively conduct intervention for spinal cord injury patients who assessed to have serious psychiatric problems after performing a screening test?	Yes	7 (63.6)	10 (100)	17 (81.0)	.09
	No	4 (36.4)	0 (0)	4 (19.0)	
Q28. Do you refer spinal cord injury patients who are presumed to have severe psychiatric problems to the psychiatry department after screening?	Yes	15 (93.8)	11 (100)	26 (96.3)	1
	No	1 (6.2)	0 (0)	1 (3.7)	
Q29. Do you consider suicide risk in patients with spinal cord injury who are suspected to have severe psychiatric problems?	Yes	9 (81.8)	8 (80)	17 (81.0)	1
	No	2 (18.2)	2 (20)	4 (19.0)	
Q30. Do you conduct screening or ask additional questions about suicide for patients with spinal cord injury who are presumed to have severe psychiatric problems?	Yes	2 (22.2)	3 (37.5)	5 (29.4)	.62
	No	7 (77.8)	5 (62.5)	12 (70.6)	
Q31. Do you think that education regarding suicide and serious psychiatric problems in spinal cord injury patients is necessary for physicians during training?	Yes	11 (91.7)	11 (100)	22 (95.7)	1
	No	1 (8.3)	0 (0)	1 (4.3)	

NS=neurosurgery, OS=orthopedic surgery, RM=rehabilitation medicine.  $\chi^2$  test, \* $P < .05$ ; Fisher exact test, † $P < .05$ .

suicide, when you see spinal cord injury patients?” (B: 2.815, OR: 16.699, 95% CI: 1.189–234.528,  $P = .037$ ).

#### 4. Discussion

Among the items regarding awareness of and attitude toward suicide (Q1–Q18), the response rate of “Yes” for Q6, “Do consult patients about suicide” was higher in the nonsurgical group (100%) than the surgical group (40%), in other words, all nonsurgical physicians answered that they should discuss suicide with patients.

In a study of 260 psychiatric residents using questions upon which some of the items in this study are based,<sup>[14]</sup> more than 95% of the respondents answered “No” to the item “It is

disgraceful to talk about suicide.” More than 98% of the respondents answered “No” to the item “Asking about suicidal ideation should be avoided because this stimulates suicide attempts.” In both of the above examples, clinicians showed a higher response rate regarding the necessity of discussing suicide-related behaviors, suggesting that preintervention is necessary for suicide risk groups.

Among the items regarding psychiatric consultation, education, and experience about treatment for suicide (Q19–Q31), 92% of the surgical group answered “No” and all of nonsurgical group answered “Yes” to Q21, “Can you appropriately assess the risk of suicide in spinal cord injury patients who are admitted to the hospital?” Additionally, 20% of the surgical group answered “No” and all of the nonsurgical group answered “Yes”

**Table 4**

**Results of binary logistic regression analysis regarding all sociodemographic variables.**

Items	Variables	B	SE	Wald	P	OR	CI	
							Low	High
Awareness of and attitude toward suicide								
Q5. You can understand that someone would want to commit suicide if they had an incurable disease	Age (y)	3.618	1.708	4.489	.034*	37.280	1.312	1059.605
	Marital status	-2.291	1.308	3.070	.079	0.101	0.008	1.312
	Experience as an attending physician (y)	-2.516	1.338	3.537	.060	0.081	0.006	1.112
Q9. Those who threaten to commit suicide have a higher risk of actually attempting suicide	Age (y)	-2.100	0.939	5.006	.025*	0.122	0.019	0.771
Clinical experience with suicide								
Q25. Do you perform a screening test for depression when you see spinal cord injury patients?	Specialty	-3.938	1.223	10.370	.001*	0.019	0.002	0.214
Q27. Do you have actively conduct intervention for spinal cord injury patients who are assessed to have serious psychiatric problems after performing a screening test?	Specialty	-1.966	0.918	4.586	.032*	0.140	0.023	0.846
Q29. Do you consider suicide risk in patients with spinal cord injury who are suspected to have severe psychiatric problems?	Age (y)	-2.130	1.174	3.296	.069	0.119	0.012	1.185
	Specialty	-2.351	1.210	3.776	.051	0.095	0.009	1.020
Q31. Do you think that education regarding suicide and serious psychiatric problems in spinal cord injury patients is necessary for physicians during training?	Specialty	-2.549	1.278	3.979	.046*	0.078	0.006	0.957
	Experience as an attending physician (y)	-1.719	1.081	2.529	.111	0.179	0.022	1.491

CI=confidence interval, OR=odds ratio, SE=standard error. Binary logistic regression analysis, \*P<.05, †P<.01, ‡P<.001.

to item Q25, “Do you perform a screening test for depression when you see spinal cord injury patients?”

This result is explained by the characteristics of rehabilitation medicine, in which the long-term inpatient rate is higher and the Beck Depression Inventory (BDI) is frequently used for evaluation of

depression during treatment. Thus, the responses of the nonsurgical group in this study indicated greater confidence in ability to assess suicide risk than the surgical group. However, attention must be paid to the interpretation of the higher positive response rate, as no comparative study has been conducted involving other groups.

**Table 5**

**Results of binary logistic regression analysis regarding correlation between individual/clinical experiences with suicide and attitude toward suicide.**

Items	Variables	B	SE	Wald	P	OR	CI	
							Low	High
Q7. A person who survives a suicide attempt is likely to try again	Q27. Do you have actively conduct intervention for spinal cord injury patients who are assessed to have serious psychiatric problems after performing a screening test?	-3.573	1.971	3.287	.069	0.028	0.001	1.336
Q11. Most people who attempt suicide have an accompanying mental disorder	Q26. Do you identify psychiatric problems, such as prior depression and attempted suicide, when you see spinal cord injury patients?	1.522	0.935	2.651	.103	4.583	0.733	28.646
Q14. People have the right to choose suicide	Q24. Are there many cases in which patients with spinal injury feel depressed during treatment?	2.114	1.306	2.619	.106	8.279	0.640	107.079
	Q26. Do you identify psychiatric problems, such as prior depression and attempted suicide, when you see spinal cord injury patients?	1.936	1.167	2.752	.097	6.934	0.704	68.325
Q16. The media reports on suicide are so stimulating	Q31. Do you think that education regarding suicide and serious psychiatric problems in spinal cord injury patients is necessary for physicians during training?	1.897	0.964	3.873	.049*	6.667	1.008	44.097
Q17. Suicide is the responsibility of society rather than the individual	Q26. Do you identify psychiatric problems, such as prior depression and attempted suicide, when you see spinal cord injury patients?	2.815	1.348	4.361	.037*	16.699	1.189	234.528
	Q31. Do you think that education regarding suicide and serious psychiatric problems in spinal cord injury patients is necessary for physicians during training?	2.346	1.556	2.271	.132	10.439	0.494	220.491

CI=confidence interval, OR=odds ratio, SE=standard error. Binary logistic regression analysis, \*P<.05; †P<.01.

Despite the high response rate of the nonsurgical group described above, there was no significant difference between the responses of surgical (57%) and nonsurgical (60%) clinicians to Q22, “Are you confident you can help prevent suicide in high-risk spinal cord injury patients?”

With respect to awareness of and attitude toward suicide (Q1–Q18), a majority of clinicians who participated in this study responded that the probability of a patient with a severe condition committing suicide was higher than normal (Q2, 87% of all clinicians), and that they could understand that someone with an incurable disease would want to commit suicide (Q5, 80% of all clinicians). However, all clinicians also answered that suicide was wrong (Q4). These results indicate that there is a general taboo against committing suicide, but that suicide is more likely to occur in patients with severe conditions. When compared with the 260 psychiatric residents in Lee et al’s study,<sup>[14]</sup> both groups were showed lower acceptance of the choice to commit suicide (present study’s nonpsychiatric clinicians: 46%; psychiatric residents: 26%), but differed in the degree to which they understood the impulse to commit suicide in those with an incurable disease (nonpsychiatric clinicians: 80%; psychiatric residents: 58%).

In the present study, the clinicians’ responses indicated that a person who survives a suicide attempt is likely to try again (Q7, 92% of all clinicians), that those who threaten to commit suicide have a higher risk of actually attempting suicide (Q9, 87% of all clinicians), and that suicide could be prevented if a person with suicidal ideation received counseling or treatment (Q8, 92% of all clinicians). These results suggest that appropriate intervention is needed in spinal cord injury patients who are at risk of suicide.

The specialty of clinicians responded that people without family or social support were at higher risk of suicide (Q12, all clinicians), that suicide is the responsibility of the society rather than the individual (Q17, 83% of all clinicians), and that the government must take active measures to prevent suicide (Q18, 96% of all clinicians). In the case of intervention after a suicide-related incident, the government must take effective measures to prevent suicide, because it is not possible for suicide itself to take intervention to prevent death related to suicide or it is imposed the social and economic burden.<sup>[25]</sup> Because Korea has had the highest suicide rate of all OECD member countries since 2003, legislation concerning suicide prevention and a culture of respect for life was promulgated in 2011, focusing on prevention and early intervention for suicide.<sup>[26]</sup> However, although the government has provided legal measures for such mental health services, there is still a lack of specialists and the budget to support them.<sup>[27]</sup> In particular, a 2015 survey found that mental health specialists in Korea, such as psychiatric clinicians, general doctors, nurses, psychologists, social workers, occupational therapists, and so on, numbered 42 per 100,000 people—one-seventh the number of mental health specialists in the United Kingdom, one-third the number in the United States, and one-half the number in Finland.<sup>[28]</sup> Given this lack of specialists, clinicians responded that government measures, such as securing mental health specialists for suicide prevention activities and increasing the budgetary process, are needed.

A Slovenian study<sup>[29]</sup> suggested that 58% of patients with spinal cord injury are in retirement due to limitations in physical activity, and may experience social isolation; this reduction in social contact can lead to feelings of shame due to one’s limited social role, powerlessness, low self-esteem, and depression.<sup>[30]</sup> In addition, a study by Kishi and Robinson<sup>[8]</sup> found that 10% to 15% of spinal cord injury patients in a sample group planned a

suicide attempt within 6 months of their injury, and that they lacked adequate social support. This is consistent with the responses found in this study that “People who do not have family or social support are a higher risk of suicide (Q12, all clinicians). To Q17, “Suicide is the responsibility of society rather than the individual,” 83% of all clinicians in the present study answered “Yes,” a higher rate than was found in a study of psychiatric residents (47.8%). Adequate social support, which can be promoted through interpersonal relationships in various social environments, such as family, religious communities, and workplaces,<sup>[31]</sup> helps buffer patients exposed to stressful situations, protecting them physically and mentally, and enabling them to adapt to individual crisis or change. Thus, patients’ recovery is known to vary according to the degree of support they receive; family support in particular has a great influence on patient motivation and effectiveness of treatment.<sup>[32]</sup>

In the items related to experience with psychiatric consultation, education, and medical intervention for suicide, 91% of surgical physicians and all nonsurgical physicians answered “Yes” to Q31, “Do you think that education regarding suicide and serious psychiatric problems in spinal cord injury patients is necessary for physicians during training?” A study by Park et al<sup>[33]</sup> stated that action-knowledge suicide-related behavior, preparation of suicide prevention behaviors, and education on related knowledge for health nursing and other government official positions can increase suicide prevention. Based on such education, clinicians can increase their knowledge of suicide prevention and the suicide prevention rate of the patients they treat, that can be expected that self-evaluation can be enhanced.

In the results of binary logistic regression analysis according to sociodemographic background, positive response rate increased with age for item Q5, “You can understand that someone would want to commit suicide if they had an incurable disease.” This differs from the responses found by Kwon et al<sup>[15]</sup> in a study on the general perception of suicide among doctors and health workers. Positive response rate also increased with age for item Q9, “Those who threaten to commit suicide have a higher risk of actually attempting suicide,” similar to the findings of Lee et al’s<sup>[14]</sup> study of psychiatric residents, which showed that positive response rate increased with age above 30 to the question, “The person who committed suicide is the one who made a firm decision to die” ( $P=.022$ ).

With respect to specialty, significant difference was found in items Q25, “Do you perform a screening test for depression when you see spinal cord injury patients?,” Q27, “Do you actively conduct intervention for spinal cord injury patients who are assessed to have serious psychiatric problems after performing a screening test?,” and Q31, “Do you think that education on suicide and serious psychiatric problems in spinal cord injury patients is necessary for physicians during training?” No significant differences were found in the responses according to years of experience as an attending physician.

Regression analysis related to overall awareness of suicide and experience with psychiatric consultation and education found a high correlation between positive response rate for Q17, “Suicide is the responsibility of society rather than the individual,” and Q26, “Do you identify psychiatric problems, such as prior depression and attempted suicide, when you see spinal cord injury patients?” It emphasizes again the necessity of institutional support for suicide prevention. In the study by Lee et al<sup>[14]</sup> a high correlation in positive response rate was found between “Suicide can be prevented with counseling and treatment” with “I have had experience with a suicide attempt patient.” This suggests that

suicide mortality can be reduced by accurately understanding psychiatric problems and providing adequate counseling and intervention, even in patients who actually attempt suicide.

Spinal cord injury patients have been reported to have a high risk of suicide related behaviors compared with the general population.<sup>[34]</sup> Kennedy and Garmon-Jones<sup>[35]</sup> explain that this high-risk suicide rate is due to the suddenness of the injury and the resulting damage to emotional and mental well-being. Kwak and Park<sup>[36]</sup> suggest that spinal cord injury patients with a more depressed emotional state experienced a longer period of rehabilitation, and that the personality trait of having depressed and maladaptive emotions physically inhibited effective rehabilitation. Boekamp et al<sup>[37]</sup> suggest that spinal cord injury patients who experience depression easily tend to fall into substance abuse, hopelessness, and feelings of abandonment; that those who make at least 1 suicide attempt have more problems with alcohol, substance abuse, and depression; and that depression is associated with higher mortality rate in spinal cord injury patients.

This suggests the necessity of education and training on psychiatric interventions to maintain mental health after injury and tools that can be used effectively in actual medical fields by appropriately reflecting the clinical characteristics of spinal cord injury patients.

This study has some limitations. First, the survey method used in this study, a self-report questionnaire, has the potential to be influenced by recall bias. Second, the questionnaire used in this study was newly revised and modified other questionnaires.<sup>[18–24]</sup> Therefore, its validity has not been verified by comparison with the general public and patients with psychiatric diagnoses. In future, it will be necessary to conduct validity tests with the aforementioned groups. Finally, because the number of questionnaire respondents in this study was low, it has a limited ability to generalize differences between surgical and nonsurgical physicians who treat spinal cord injury patients.

Based on the results of this study, the factor analysis should be revised to reflect the characteristic of spinal cord injury patients having high risk of suicide. Additionally, follow-up study of awareness of and attitude toward suicide in spinal cord injury patients, psychiatric consultation about suicide, and differences in education and treatment according to attending physicians' years of training will be pursued in both surgical and nonsurgical fields. This can contribute to development of a physician training course on suicide prevention in spinal cord injury patients.

## 5. Conclusion

With respect to general awareness of and attitude toward suicide, nonsurgical physicians responded more positively than surgical physicians regarding the idea that suicide should be discussed with the patient; the tendency to conduct assessment of suicide risk and perform suicide screening tests in spinal cord injury patients undergoing treatment in the hospital; the immediate involvement of spinal cord injury patients with severe psychiatric problems in treatment after screening for depression; and the necessity of training on psychiatric problems and suicide in spinal cord injury patients.

Higher age correlated with higher response rate in questions regarding understanding someone's impulse to commit suicide if they had an incurable disease and that those who threaten to commit suicide have a higher risk of actually attempting suicide.

## Author contributions

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