


Changes in self-harm attempts after the COVID-19 pandemic based on pre-hospital medical records

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Abstract

Although many concerns have been raised on increased self-harm or suicide attempts since the emergence of the coronavirus disease 2019 (COVID-19) pandemic, the numbers of studies reported no consistent increase. This study aimed to analyze the data on the request for emergency medical service (EMS) in Daegu Metropolitan City in Korea to investigate the effects of the COVID-19 pandemic on the incidence and types of suicidal patients. Data of 4480 cases requesting EMS related to self-harm or suicide 1 year before and after the COVID-19 pandemic were retrospectively comparatively analyzed (February 19, 2019–February 18, 2021). The number of EMS requests for self-harm and suicide increased after the pandemic compared to that before the pandemic (daily mean request 5.83 [± 2.597] vs 6.43 [± 2.918]). In particular, the number of female patients increased per day on average (2.61 [± 1.717] vs 3.17 [± 1.893]). With respect to the reasons for the request, committed self-harm and attempts to commit self-harm increased, whereas the presumption against suicide decreased. With respect to consciousness levels, the number of alert patients increased, whereas the number of transport cases decreased. For the method of the attempt, hanging and carbon monoxide/gas poisoning decreased, whereas jumping from a height and drowning increased. The number of patients with psychiatric history and those with other chronic illnesses increased. In multivariate regression analysis, women (OR 1.227, 95% CI = 1.072–1.405, $P = .003$), patients with psychiatric diseases (OR 1.223, 95% CI = 1.031–1.450, $P = .021$), patients with other chronic illnesses (OR 1.510, 95% CI = 1.127–2.023, $P = .006$), and CO or gas poisoning (not attempted) (OR 1.349, 95% CI = 1.038–1.753, $P = .025$) showed statistically significant differences. Among the request for EMS, requests for committed self-harm and attempts to commit suicide increased. Medical support and measures for mental health and emergency medical systems should be established for female patients and patients with psychiatric or other chronic diseases.

Abbreviations: COVID-19 = coronavirus disease 2019, EMS = emergency medical service, OECD = Organization for Economic Co-operation and Development.

Keywords: COVID-19, emergency medical service, psychiatric disease, self-harm, suicide attempt

1. Introduction

A total of 703,000 people died by suicide in 2019 worldwide, and its prevention is an important health issue.^[1] In the Organization for Economic Co-operation and Development (OECD) countries, an average of 10.9 deaths per 100,000 population died by suicide in 2020, and 24.6 deaths per 100,000 population died by suicide in Korea, which was approximately 2.3 times higher than the average among OECD countries.^[2] Korea's suicide rate was the highest among the OECD countries, and suicide was the fifth most common cause of death in Korea.^[2,3]

Since the coronavirus disease 2019 (COVID-19) was declared a pandemic globally, numbers of studies reported concerns about the risk of suicide due to many effects on the society,

economy, and medicine.^[4–7] However, a study of suicide rates showed that there were no increased suicide rates in high-income countries at the beginning of the pandemic,^[8] whereas a Japanese study that compared suicide rates from 2016 to 2020 reported an increase only in particular months by gender.^[9] A study, which reviewed 78 articles, showed that there was no increase in self-harm after the COVID-19 pandemic.^[10] Also, a Korean study reported that there was no significant difference in the number of suicidal patients before and after the COVID-19 pandemic.^[11]

Previous studies used data collected from patients who visited the emergency rooms after the attempted suicide or from death statistics. 72.4% of patients who visited emergency rooms after attempting suicide used 119 emergency medical service (EMS) in

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The data that support the findings of this study are available from a third party, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are available from the authors upon reasonable request and with permission of the third party.

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Korea.^[12] Although most patients who attempted suicide in Korea used 119 EMS, the actual number of patients who attempted suicide might be underestimated, given that the rate of ambulance transport after requesting EMS was 62.3%–67.3% between 2016 and 2019.^[13] And there are no similar studies. Therefore, this study aimed to analyze the data on the request for EMS in Daegu Metropolitan City in Korea, where a massive COVID-19 outbreak occurred and encountered social and health crises for over 2 years,^[14,15] to investigate the effects of the COVID-19 pandemic on the incidence and types of suicidal patients.

2. Methods

2.1. Study duration and participants

Daegu Metropolitan City is a big city with a population of 2470,000. Since the first patient with COVID-19 was confirmed on 18 February, 2020, the number of patients with COVID-19 has increased rapidly from the following day.^[14,15] Accordingly, before and after the outbreak of pandemic were divided as of 19 February, 2020. Based on the time for the request, 258,391 (121,635 + 121,012 + 15,744) cases, which requested the local 119 EMS in Daegu and were recorded on the EMS activity reports from February 19, 2019 to February 18, 2021, were retrospectively analyzed. Of these, 4480 cases (1.73%) of the request related to self-harm or suicide were finally selected as target subjects.

2.2. Study methods

EMS activity reports were retrospectively analyzed to investigate patients' age, sex, level of consciousness, reason for request, methods of self-harm or suicide attempts, attempt time, transportation, reason for incomplete transportation, history of psychiatric disease, and presence of other chronic disease. The consciousness level was classified into alert, verbal response, pain response, and unresponsive. The reasons for requesting EMS were divided into committed self-harm, attempted self-harm, and the presumption against self-harm (by others). The methods of self-harm or suicide attempt were classified into ingestion of poison, cutting/stabbing, hanging, jumping from a height, CO or gas poisoning, drowning, and other. Attempt time was divided into 0 to 6, 6 to 12, 12 to 18, and 18 to 24 o'clock. The reasons for incomplete transportation were classified into the refusal of transportation, use of different car, patients' escape from the scene, undiscovered patients, and death.

2.3. Statistical method

Statistical analysis was performed using SPSS version 21.0 for Windows (SPSS Inc., Chicago, IL). For continuous variables, normality was tested by using Shapiro–Wilk test, followed by a Student *t* test. Comparison of ratios was analyzed using the Chi-square test. Factors that were statistically significant were further analyzed with multivariate logistic regression. And all tests were 2-sided and *P* value of < .05 considered to indicate statistical significance.

2.4. Research ethics

This study was approved by the Institutional Review Board (IRB) of Daegu Catholic University Hospital (IRB number: CR-22-035-L). Informed consent was not required.

3. Result

3.1. General characteristics of patients (Table 1)

During the entire study period, the total number of requests for EMS related to self-harm or suicide was 4480, including

2128 and 2352 before and after the COVID-19 pandemic, respectively. The average number of requests per day was 5.83 (± 2.597) before and 6.43 (± 2.918) after the pandemic, showing a statistically significant difference. The average number of female patients per day increased from 2.61 (± 1.717) to 3.17 (± 1.893) before the pandemic, which showed a statistical difference. The average age of patients was 42.46 (± 17.439) years old before and 42.50 (± 18.593) years old after the pandemic, which showed no statistically significant difference. With respect to sex, 1,024 (48.12%) patients were men, 974 (45.77%) were women, and 130 (6.11%) were unknown before the pandemic while 1020 (43.37%), 1165 (49.53%), and 167 (7.10%) were men, women, and unknown, respectively, after the pandemic, showing a statistically significant difference.

Comparison of the reasons for requesting EMS showed committed suicide in 1830 (86.0%) patients, commotion to committing suicide in 173 (8.1%) patients, and presumption against suicide in 125 (5.9%) patients before the pandemic. The numbers after the pandemic were 1908 (81.1%), 364 (15.5%), and 80 (3.4%) patients, respectively. Comparison of the two periods showed that the number of requesting EMS for the presumption decreased while the number of requesting EMS for committed suicide and commotions increased after the pandemic. Especially, the number of requesting EMS for commotion increased 2.1 times. Both of the proportion and daily average number of requests showed a statistically significant difference.

Levels of consciousness at the time of ambulance arrivals were alert in 1161 (56.5%) patients, verbal response in 282 (13.7%), pain response in 188 (9.2%), and unresponsive in 423 (20.6%) before the pandemic. After the pandemic, levels of consciousness were alert in 1382 (61.5%) patients, verbal response in 260 (11.6%), pain response in 179 (8.0%), and unresponsive in 426 (19.0%). There was statistical difference between the two periods.

The time of self-harm or suicide attempt was 0 to 6 o'clock in 493 (28.7%), 6 to 12 in 296 (17.2%), 12 to 18 in 377 (21.9%), and 18 to 24 in 554 (32.2%) before the pandemic. After the pandemic, the numbers were 539 (29.4%), 276 (15.0%), 388 (21.2%), and 631 (34.4%) in the same chronological order. Comparison of the two periods did not show a statistical difference.

Before the pandemic, the most common method of attempting self-harm was ingestion of poison (35.3%), followed by cutting/stabbing (25.4%), hanging (13.7%), CO/gas poisoning (7.6%), jumping from a height (6.1%), drowning (1.2%), and other (0.0%). After the pandemic, the most common method was ingestion of poison (33.9%), followed by cutting/stabbing (25.3%), hanging (10.7%), jumping from a height (7.1%), CO/gas poisoning (5.2%), drowning (1.8%), and other (0.1%). Comparison of each method of attempt in the two periods showed statistically significant differences in hanging, jumping from a height, CO/gas poisoning, and drowning.

The number of complete transportations was 1296 (60.9%) before and 1288 (54.8%) after the pandemic, which showed a statistical difference. The number of complete transportation of patients who committed self-harm or attempted suicide was 1296 and 1281, respectively, which were not different. However, the proportion of complete transportation of those patients reduced from 50.3% to 49.7%, which showed a statistically significant difference. The most common reason for incomplete transportation before the pandemic was the refusal of transportation (49.6%), followed by obvious death (33.4%), use of a different car (8.7%), undiscovered patients (7.8%), and escape from the scene (0.5%). Similarly, after the pandemic, the most common reason was the refusal of transportation (55.5%), followed by obvious death (24.2%), use of different car (12.2%), undiscovered patients (6.8%), and escape from the scene (1.2%). Despite an increased total number of requests, incomplete transportation due to obvious death decreased. Comparison of the two periods also showed a significant difference.

Table 1
General characteristics.

	Total (N = 4480)	Before (N = 2128)	After (N = 2352)	P value
Per day				
Request	6.13 (±2.777)	5.83 (±2.597)	6.43 (±2.918)	.005**
Male	2.77 (±1.808)	2.78 (±1.774)	2.76 (±1.843)	.375
Female	2.89 (±1.827)	2.61 (±1.717)	3.17 (±1.893)	.034*
Commit	5.11 (±2.540)	5.01 (±2.386)	5.21 (±2.684)	.003**
Commotion	0.73 (±0.912)	0.47 (±0.680)	0.99 (±0.977)	<.001**
Presumption	0.28 (±0.556)	0.34 (±0.607)	0.22 (±0.492)	<.001**
Age	41.48 (±18.046)	42.46 (±17.439)	42.50 (±18.593)	.940
Sex				.003**
Male	2044 (45.63%)	1024 (48.12%)	1020 (43.37%)	
Female	2139 (47.75%)	974 (45.77%)	1165 (49.53%)	
Unknown	297 (6.63%)	130 (6.11%)	167 (7.10%)	
Reason for request				<.001**
Commit	3738 (83.4%)	1830 (86.0%)	1908 (81.1%)	
Commotion	537 (12.0%)	173 (8.1%)	364 (15.5%)	
Presumption	205 (4.6%)	125 (5.9%)	80 (3.4%)	
Mentality				.009**
Alert	2543 (59.1%)	1161 (56.5%)	1382 (61.5%)	
Verbal response	542 (12.6%)	282 (13.7%)	260 (11.6%)	
Pain response	367 (8.5%)	188 (9.2%)	179 (8.0%)	
No response	849 (19.7%)	423 (20.6%)	426 (19.0%)	
Attempt time				.235
0–6	1032 (29.0%)	493 (28.7%)	539 (29.4%)	
6–12	572 (16.1%)	296 (17.2%)	276 (15.0%)	
12–18	765 (21.5%)	377 (21.9%)	388 (21.2%)	
18–24	1185 (33.3%)	554 (32.2%)	631 (34.4%)	
Method (multiple)				
Ingestion	1549 (34.6%)	751 (35.3%)	798 (33.9%)	.626
Cutting, stabbing	1137 (25.4%)	541 (25.4%)	596 (25.3%)	.266
Hanging	543 (12.1%)	291 (13.7%)	252 (10.7%)	.020*
Jumping	295 (6.6%)	129 (6.1%)	166 (7.1%)	.007**
CO/gas intoxication	284 (6.3%)	161 (7.6%)	123 (5.2%)	.007**
Drowning	68 (1.5%)	25 (1.2%)	43 (1.8%)	.042*
Others	4 (0.1%)	1 (0.0%)	3 (0.1%)	.338
Complete transportation	2584 (57.7%)	1296 (60.9%)	1288 (54.8%)	<.001**
Among commit	2577 (68.9%)	1296 (60.3%)	1281 (49.7%)	.015*
Reason for incomplete transportation				<.001**
Refuse	1004 (53.0%)	413 (49.6%)	591 (55.5%)	
Use another car	202 (19.7%)	72 (8.7%)	130 (12.2%)	
Escape the scene	17 (0.9%)	4 (0.5%)	13 (1.2%)	
Undiscovered	137 (7.2%)	65 (7.8%)	72 (6.8%)	
Obvious death	536 (28.3%)	278 (33.4%)	258 (24.2%)	
Alcohol co-ingestion	1068 (24.6%)	523 (25.4%)	545 (23.9%)	.268
Hx of psychiatric disease	769 (17.7%)	338 (16.4%)	431 (18.9%)	.030*
Hx of other chronic disease	206 (4.7%)	83 (4.0%)	123 (5.4%)	.034*

CO = carbon monoxide, Hx = history.

*P < .05

**P < .01.

The number of patients who drank alcohol was 523 (25.4%) before and 545 (23.9%) after the pandemic, which showed no statistical difference. The number of patients with history of psychiatric disease was 338 (16.4%) and 431 (18.9%) while patients with history of other chronic diseases was 83 (4.0%) and 123 (5.4%), showing statistically significant difference in both groups.

3.2. Comparison by sex and period (Table 2)

In the mean daily incidence rate, the number of male patients was 2.81 (±1.763) and 2.79 (±1.843) before and after the pandemic, respectively, and there was no statistical difference. However, the number of female patients increased from 2.67 (±1.707) before to 3.18 (±1.893) after the pandemic, with an average of 0.51 more female patients per day, and there were statistical differences. The mean age of male patients was 44.71 (±17.449) and 45.51 (±18.667) before and after the pandemic,

respectively, while the mean age of female patients was 40.10 (±17.152) and 39.94 (±18.191). Neither group did show a statistical difference per periods. Nevertheless, female patients were 4.61 years and 5.57 years younger than male patients in each period.

Comparison of reasons for request showed reduced ratio of committed self-harm and presumption but increased commotion to committing self-harm in both genders, and there were statistical differences. Comparison of level of consciousness showed that male patients did not show a difference in periods. However, 534 (55.7%) female patients were alert, 189 (19.7%) responded to verbal stimuli, 109 (11.4%) responded to painful stimuli, and 127 (13.2%) were unresponsive before the pandemic. After the pandemic, the numbers were 723 (63.1%), 159 (13.9%), 107 (9.3%), and 157 (13.7%). There were statistically significant differences in comparison by period. Comparison of attempt time in both genders did not show a difference between the periods.

Table 2
Comparison by sex and period.

	Male (N = 2044)			Female (N = 2139)		
	Before (N = 1024)	After (N = 1020)	P value	Before (N = 974)	After (N = 1165)	P value
Request per day	2.81 (±1.763)	2.79 (±1.843)	.756	2.67 (±1.707)	3.18 (±1.893)	<.001**
Age	44.71 (±17.449)	45.51 (±18.667)	.326	40.10 (±17.152)	39.94 (±18.191)	.840
Reason for request			<.001**			<.001**
Commit	921 (89.9%)	855 (83.8%)		875 (89.8%)	1011 (86.8%)	
Commotion	77 (7.5%)	149 (14.6%)		70 (7.2%)	139 (11.9%)	
Presumption	26 (2.5%)	16 (1.6%)		29 (3.0%)	15 (1.3%)	
Mentality			.422			.001**
Alert	561 (55.5%)	579 (58.0%)		534 (55.7%)	723 (63.1%)	
Verbal response	93 (9.2%)	101 (10.1%)		189 (19.7%)	159 (13.9%)	
Pain response	79 (7.8%)	72 (7.2%)		109 (11.4%)	107 (9.3%)	
No response	278 (27.5%)	246 (24.6%)		127 (13.2%)	157 (13.7%)	
Attempt time			.477			.410
0–6	225 (28.5%)	208 (27.4%)		239 (29.3%)	293 (31.4%)	
6–12	142 (18.0%)	122 (16.1%)		130 (16.0%)	132 (14.1%)	
12–18	187 (23.7%)	176 (23.2%)		173 (21.2%)	178 (19.1%)	
18–24	235 (29.8%)	252 (33.2%)		276 (33.5%)	331 (35.4%)	
Method (multiple)						
Ingestion	300 (32.6%)	297 (34.7%)	.335	446 (51.0%)	498 (49.3%)	.458
Cutting, stabbing	273 (29.6%)	263 (30.8%)	.608	261 (29.8%)	321 (31.8%)	.367
Hanging	176 (19.1%)	146 (17.1%)	.266	102 (11.7%)	96 (9.5%)	.127
Jumping	71 (7.7%)	84 (9.8%)	.114	55 (6.3%)	76 (7.5%)	.294
CO/Gas intoxication	111 (12.1%)	74 (8.7%)	.019*	46 (5.3%)	47 (4.6%)	.543
Drowning	13 (1.4%)	17 (2.0%)	.346	12 (1.4%)	18 (1.8%)	.479
Others	0 (0.0%)	3 (0.4%)	.072	1 (0.1%)	0 (0.0%)	.282
Complete transportation	602 (58.8%)	539 (52.8%)	.007**	692 (71.0%)	747 (64.1%)	.001**
Reason for incomplete transportation			.005**			.028*
Refuse	185 (43.8%)	244 (50.7%)		173 (61.3%)	284 (67.9%)	
Use another car	34 (8.1%)	52 (10.8%)		23 (8.2%)	43 (10.3%)	
Escape the scene	3 (0.7%)	9 (1.9%)		0 (0.0%)	3 (0.7%)	
Undiscovered	11 (2.6%)	17 (3.5%)		14 (5.0%)	10 (2.4%)	
Obvious death	189 (44.8%)	159 (33.1%)		72 (25.5%)	78 (18.7%)	
Alcohol co-ingestion	253 (25.0%)	263 (26.2%)	.522	266 (27.7%)	276 (23.9%)	.046*
Hx of psychiatric disease	102 (10.1%)	135 (13.5%)	.018*	233 (24.3%)	296 (25.6%)	.473
Hx of other chronic disease	38 (3.8%)	66 (6.6%)	.004**	45 (4.7%)	57 (4.9%)	.791

CO = carbon monoxide, Hx = history.

* $P < .05$ ** $P < .01$.

In comparison of the method of the attempt, the most common method in male patients was ingestion of poison (32.6%), followed by cutting/stabbing (29.6%), hanging (19.1%), CO/gas poisoning (12.1%), jumping from a height (7.7%), drowning (1.4%), and other (0.0%) before the pandemic. The order changed to the following after the pandemic: ingestion of poison (34.7%), cutting/stabbing (30.8%), hanging (17.1%), jumping from a height (9.8%), CO/gas poisoning (8.7%), drowning (2.0%), and other (0.4%). The comparison of each method did not show a statistically significant difference. In female patients, there was no change in order before and after the pandemic, and all of them did not show statistical differences.

The number of complete transportations after the pandemic decreased by 6.0% for males and 6.9% for females, and there was no statistical difference. The comparison of incomplete transportation in male patients showed that the most common reason was obvious death (44.8%), refusal of transportation (43.8%), use of different car (8.1%), undiscovered patients (2.6%), and escape from the scene (0.7%) before the pandemic. This order changed after the pandemic to refusal of transportation (50.7%), obvious death (33.1%), use of different car (10.8%), undiscovered patients (3.5%), and escape from the scene (1.9%), and there was no statistical difference. In female patients, no change in the order was observed, but the proportion of refusal of transportation increased from 61.3% to 67.9% while the proportion of obvious death decreased from 25.5% to 18.7%, with statistically significant differences.

Proportion of patients who drank alcohol decreased from 27.7% to 23.9% in female patients, and proportion of patients with history of psychiatric diseases increased from 10.1% to 13.5% in male patients. Also, in the comparison of patients with history of other chronic diseases showed that the proportion of male patients increased from 3.8% to 6.6%, with statistically significant differences.

3.3. Multivariate logistic regression (Table 3)

Multivariate regression analysis was performed with variables, such as sex, reason for request, history of psychiatric diseases, history of other chronic diseases, CO or gas poisoning, jumping from a height, and hanging, that showed statistically significant differences in comparisons before and after the COVID-19 pandemic.

The results showed statistically significant differences in women (OR, 1.227; 95% CI, 1.072–1.405; $P = .003$), patients with psychiatric diseases (OR, 1.223; 95% CI, 1.031–1.450; $P = .021$), patients with other chronic diseases (OR, 1.510; 95% CI, 1.127–2.023; $P = .006$), and CO or gas poisoning (not attempt) (OR, 1.349; 95% CI, 1.038–1.753; $P = .025$) after the pandemic.

4. Discussion

There was a great psychological and health impact of COVID-19 pandemic resulting in an emergent neologism, corona blue,

Table 3
Multivariate logistic regression (univariate *P* value <.01).

	Odds ratio	95% confidence interval	<i>P</i> values
Sex	1.227	1.072–1.405	.003**
Hx of psychiatric disease	1.223	1.031–1.450	.021*
Hx of other chronic disease	1.510	1.127–2.023	.006**
Mentality			
Verbal response (versus alert)	0.827	0.679–1.007	.058
Pain response (versus alert)	0.896	0.713–1.128	.350
No response (versus alert)	0.968	0.753–1.245	.801
CO/gas intoxication (not attempt)	1.349	1.038–1.753	.025*
Hanging	1.221	0.908–1.641	.186
Jumping	0.764	0.853–1.001	.051

CO = carbon monoxide, Hx = history.

**P* < .05

***P* < .01.

and relevant studies have been conducted. Among those studies, a Chinese study conducted during the beginning of the COVID-19 reported that 16.5% of patients suffered from moderate to severe depression while 28.8% suffered from moderate to severe anxiety.^[16] Another study reported increased anxiety and psychological stress and decreased quality of sleep.^[17] Although there are concerns about the possibility of self-harm or suicide rate increased due to such psychological effects, other previous studies include recent meta-analysis study conducted in patients who had attempted self-harm or suicide did not show increased rate of self-harm or suicide.^[8–11,18] However, in this study, the number of seeking EMS care for self-harm or suicide increased by approximately 10.3% (*P* value: .005) from 5.83 per day on average before the COVID-19 pandemic to 6.43 per day on average after the pandemic. Of these, the number of calls due to attempted self-harm or suicide increased by approximately 4.0% (*P* value: .003) from 5.01 per day on average to 5.21. Further, in comparison of reasons for calling, a commotion of committing suicide increased by 91.4% from 0.47 per day on average before the pandemic to 0.99 per day on average after the pandemic. Proportion of patients, who were transported after committing self-harm or attempting suicide, decreased, and the difference was statistically significant. However, given that the number of transported patients was almost similar, it is assumed that the number of patients who visited emergency room might be investigated to show no change before and after the COVID-19 pandemic.

The number of female patients seeking EMS care increased from 974 (45.77%) to 1165 (49.53%), and both the number and percentage increased (*P* value: .034, .003). This means that being a woman is a risk factor of mental health, and it is consistent with the results from the previous studies showing that women are more vulnerable to depression (OR = 9.111 95% CI: 2.143–38.729, *P* < .01) and anxiety (OR = 3.206, 95% CI: 1.073–9.583, *P* < .05) than men even after the COVID-19.^[19,20] The results of this study demonstrated no change in the number of seeking EMS care for self-harm or suicide in male patients. Increased number of female patients showed that women were more mentally vulnerable to social and health crises such as pandemics.

In comparison of level of consciousness, the number of alert patients increased from 1161 (56.5%) to 1382 (61.5%), which might be associated with the facts that patients with commotion to committing suicide can make a commotion only if they are alert. Attempt time did not show statistical differences between before and after the pandemic, but the incidence occurred most frequently between 18 and 24 o'clock, followed by 0 to 6 o'clock, 12 to 18 o'clock, and 6 to 12 o'clock. There was no difference in the high incidence rate of self-harm or suicide attempts during the night time by period.

The methods of suicide attempts varied depending on country and culture.^[21] From the previous results, the most common method was ingestion of poison and cutting/stabbing in Korea,^[11] and the same results were also seen in the present study. In addition, comparison of both methods before and after the pandemic did not show a statistical difference. Comparison of other methods showed that the number of cases with jumping from a height (129 [6.1%] vs 166 [7.1%]) and submersion (25 [1.2%] vs 43 [1.8%]) increased while the number of cases with hanging (291 [13.7%] vs 252 [10.7%]) and CO or gas poisoning (161 [7.6%] vs 123 [5.2%]) decreased. Of Risk Rescue Rating Scale,^[22] shooting and jumping had the highest score for the item “agent used” of risk rating. Considering there are almost no self-harm or suicide by guns because gun possession is illegal in Korea, the increase in jumping which records the highest score, implies an increase in the methods that can cause more serious damage.

Comparison of genders before and after the pandemic showed that the mean age in male patients increased from 44.71 (±17.449) years old to 45.51 (±18.667) years old while the mean age in female patients decreased from 40.10 (±17.152) years to 39.94 (±18.191) years. There were no statistical differences. Comparison of genders demonstrated that the mean age of female patients was 4.61 and 5.57 years younger for each period compared to male patients. Unlike the male patients, the findings showed that the number of female patients who were alert increased from 534 (55.7%) before to 723 (63.1%) after the pandemic. We think that future additional research is necessary for such findings.

In multivariate regression analysis of this study, there were significant differences in women (OR, 1.227; 95% CI, 1.072–1.405; *P* = .003), patients with psychiatry disease (OR, 1.223; 95% CI, 1.031–1.450; *P* = .021), patients with other chronic disease (OR, 1.510; 95% CI, 1.127–2.023; *P* = .006), and CO or gas poisoning (not attempt) (OR, 1.349; 95% CI, 1.038–1.753; *P* = .025) after the pandemic. This is consistent with the results^[23] suggesting that women, patients with chronic disease, and patients with psychiatric disease are risk factors for mental health after the COVID-19 pandemic. It also shows that these are risk factors for self-harm or suicide behaviors in mental health crises.

This study has some limitations. First, the data used might be insufficient since it is a retrospective study based on EMS activity reports, which were completed with a medical history obtained from the time when the technician contacted patients and while performing emergency care. As a result of post hoc analysis of the power for all variables in multivariate logistic regression (Table 3), it showed a high power of 0.999. Another limitation is that additional medical history, test results, or prognosis cannot be confirmed after transportation.

Despite of these limitations, this study is of great significance in that the first complete enumeration was conducted with EMS activity reports for over 2 years in a city with a population of millions of people, and data were from pre-hospital step. The differences of the results of this study from those from the previous studies are that the number of patients who committed self-harm or attempted suicide or have a commotion to such actions, but were not admitted to the hospital, has increased since the pandemic.

In conclusion, patients with psychiatric diseases, patients with other chronic diseases, and women showed a greater number of incidences related to self-harm or suicide in social, economic, and mental health crises, such as pandemics. Mental health crisis and the number of patients committing self-harm or attempting suicide may increase as the pandemic continues. Also, if the pandemic continues, there is a possibility of increased social isolation, economic crisis, and mental health crisis. Increase of self-harm or suicide not only causes problems, such as physical injury or death, for the individual patient, but also causes the breakdown of his/her family and an increase of health care cost for the society as a whole. Furthermore, the family may also suffer from economic and health financing crises. Accordingly, the local community and emergency medical system should also prepare for the prevention of self-harm or suicide and treatment of patients. In addition, patients who commit self-harm or attempt suicide should be tracked both in outpatient and inpatient and should be analyzed in a holistic way.

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