Clinical Characteristics and Risk Factors for Discharge Against Medical Advice among Elderly Patients Presenting with Suicidal behavior to Emergency Department during the Social Distancing Period in South Korea: A Nationwide Analysis using National Emergency Department Information System (NEDIS)

Jong Sun Ok [1] and Soo Young An [2],*

[1] Department of Nursing, Konkuk University, Chungju, Republic of Korea; Professor; sokei@kku.ac.kr
[2] Department of Nursing, Konkuk University Medical Center, Republic of Korea; RN, PhD; 20050058@kuh.ac.kr
* Correspondence

Abstract: Objective: Discharge against medical advice (DAMA) in elderly patients with suicidal behavior presents significant clinical and ethical challenges, particularly during public health crisis such as the COVID-19 pandemic. This study investigated clinical characteristics and risk factors associated with DAMA among elderly individuals (≥ 65years) presenting to emergency departments (EDs) in South Korea during the social distancing period. Methods: A retrospective observational study was conducted using data from the National Emergency Department Information System (NEDIS) between January 1, 2019 and December 31, 2020. Results: A total of 4,351 and 3,931 cases were reported in 2019 and 2020, respectively. DAMA rate increased slightly from 14.6% to 14.9% (p < .001) while ED discharge rates decreased from 15.0% to 14.3%. Intensive care units (ICU) admissions increased from 69.0% to 70.3% (p < .001) and post-hospitalization DAMA increased from 10.9% to 12.7% (p = .007). Mortality after admission increased from 10.2% to 11.3% (p = .007). DAMA was significantly associated with older age (OR: 1.39, p < .001) and the use of highly lethal methods such as hanging (OR: 5.54, p < .001) and poisoning (OR: 5.39, p < .001). Conclusions: These findings underscore the need for ethical frameworks and multidisciplinary interventions to support decision-making and prevent recurrent suicidal behavior among elderly patients.

Keywords: Elderly; Emergency Department; Social Isolation; Suicide

1. Introduction

According to the World Health Organization (WHO), more than 700,000 individuals die by suicide annually, and the number of suicide attempts continues to rise globally [1]. Suicide among the elderly has emerged as a critical public health issue, with individuals aged 70 years and older exhibiting the highest suicide rates in numerous regions worldwide [1]. Even after adjusting for age, suicide rates in older adults remain more than four times higher than those observed in younger age groups [2]. Suicidal behavior among older adults, encompassing both suicide attempts and self-harm, places a substantial burden on healthcare systems due to its strong associations with high recurrence, hospitalization, and mortality. These outcomes contribute to increased utilization of medical resources and overall healthcare expenditure [2]. As of 2019, South Korea recorded the highest suicide rate among member countries of the Organization for Economic Cooperation and Development (OECD), with suicide rates among the elderly surpassing those of adolescents and adults under the age of 60 [3].

Social disconnection is recognized as a significant risk factor for suicidal ideation and behavior in older adults [4]. Following the WHO's declaration of COVID-19 as a global pandemic, many countries implemented restrictive public health measure such as lockdowns, curfews, and social distancing to mitigate viral

transmission [5]. These measures have exacerbated social isolation among the elderly and have been linked to increased vulnerability to anxiety, depression [6], and reduced access to mental health services and social support networks [7]. In addition to psychosocial consequences, the economic instability triggered by the COVID-19 pandemic has had adverse effects on global stock markets and interest-based income, leading to a decline in retirement savings and contributing to elevated suicide risk among older individuals [8]. The pandemic has also been associated with a rise in demand for voluntary assisted suicide among the elderly, a trend correlated with increased instances of intentional self-harm [9, 10]. Moreover, the stain on emergency departments (EDs) during the pandemic has led to a prioritization of COVID-19-related cases and stringent infection control protocols. Consequently, patients presenting with suicidal behavior often encountered ED overcrowding and prolonged wait times, resulting in suboptimal care and follow-up-factors that may further elevate the risk of suicide in this population [8].

Given the multifaceted impact of the COVID-19 pandemic on mental health and healthcare access, especially among the elderly, there is an urgent need for targeted suicide prevention strategies. Therefore, this study aims to compare the clinical characteristics and risk factors for discharge against medical advice (DAMA) of elderly patients (aged 65 years and older) who visited the EDs for suicidal behavior during 2020—when the strictest social distancing policies were in effect—with those from the corresponding period in 2019, prior to the onset of the COVID-19 pandemic.

2. Materials and Methods

2.1 Study design

A retrospective observational study was conducted using the EDs visit data from the National Emergency Department Information System (NEDIS).

2.2 Study participants

Data were obtained from the NEDIS (approval number N20221120211), a government-managed surveillance system that collects real-time medical information from over 150 EDs across South Korea. There were 10,581,800 participants who visited local and regional EDs throughout the country between January 1, 2019 and December 31, 2020, and among these, 8,321 participants aged 65 and above visited the EDs with intentional self-harm and suicide. A total of 8,282 cases (0.08%), excluding missing values, were selected as the final study participants. Figure 1 illustrates the detailed process of selecting participants.

2.3 Variables

The variables for the NEDIS data were based on the emergency medical status statistical data in the Statistical Information Report [11]. This study gathered data regarding age, sex, insurance type, mode of arrival, route of ED visit, methods of suicidal behavior, initial mental status, vital signs, the Korean Triage and Acuity Scale (KTAS) level, time from the onset of symptoms to ED visit, duration of stay in the ED, ED disposition, results after hospitalization, length of hospitalization, and major physical illness. The detailed classification of poisoning and major physical illnesses were classified using ED discharge diagnostic codes and diagnostic codes for discharge after hospitalization based on the 8th Korean Standard Classification of Diseases (KCD-8) [12].

2.4 Data collection and research ethics

Prior to receiving the NEDIS data, the purpose and content of this study were approved by the Institutional Review Board of Konkuk University Medical Center, and written consent was exempted since personally identifiable information was excluded from the NEDIS data (KUMC 2022-08-017).

2.5 Data analysis

Data were analyzed using R for Windows version 4.2.0. Descriptive statistics were used to summarize the general characteristics of the study population. Differences between the years 2019 and 2020 were assessed using the chi-square test. A significance level of $p < 0.05$ was applied to all statistical tests. Logistic regression analysis was performed to identify risk factors associated with DAMA.
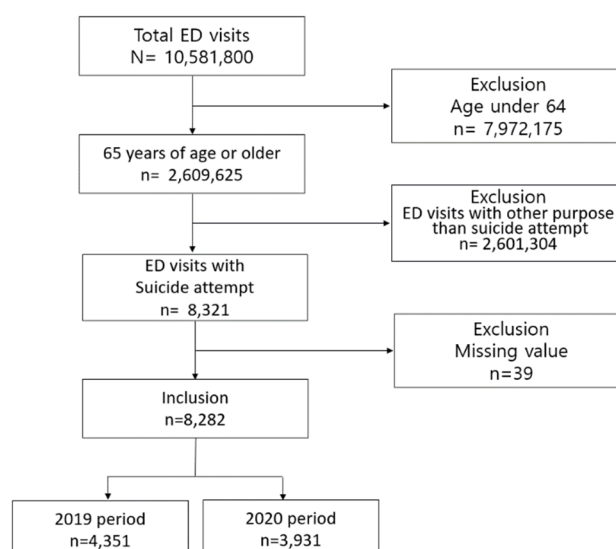
Figure 1. Flow chart of the process of selecting study subjects

3. Results

The total number of elderly participants with suicidal behavior who visited the EDs in 2020 and 2019 was 3,931 and 4,351, respectively. The average number of elderly participants with suicidal behavior who visited the ED per day was approximately 10.8 in 2020 and 11.9 in 2019, but there was no change in the ratio. The proportion of female patients over the age of 80 increased in 2020 (age (p)=.096, sex (p)=.062). In this study, poisoning, hanging, and cutting were the most common methods used to commit suicidal behavior (p=.856). As a result of the detailed classification of poisoning, pesticide and herbicide poisoning as well as clinical drug poisoning accounted for the highest proportion (p=.310). In initial mental status when visiting the EDs, the ratio of semi-coma and coma increased in 2020 as compared to the 2019 (p=.287). Moreover, KTAS levels 1 and 3 patient groups increased in 2020, while KTAS levels 4, and 5 patient groups decreased (p=.001). The number of participants discharge from the ED was 15.0% in 2019, and it decreased to 14.3% in 2020. However, the number of participants DAMA from the EDs increased from 14.6% in 2019 to 14.9% in 2020. Additionally, the number of hospitalizations to general wards (GW) or intensive care units (ICU) increased from 50.1% in 2019 to 53.7% in 2020 (p <.001). After hospitalization, the number of discharges decreased from 62.1% in 2019 to 59.6% in 2020. In contrast, the number of DAMA after hospitalization increased from 10.9% in 2019 to 12.7% in 2020. Additionally, the number of deaths after hospitalization increased from 10.2% in 2019 to 11.3% in 2020 (p=.007). Amidst the physical illnesses among the elderly participants with suicidal behavior, there has been an increase in neurological diseases (cerebrovascular disease (CVD), Parkinson's disease) and musculoskeletal disorders, and psychological problems such as depression and anxiety in 2020. Analysis of factors associated with DAMA during the pandemic revealed that these patients were generally older (OR 1.39, p <.001) and more likely to have employed highly lethal methods, such as hanging (OR 5.54, p <.001) or poisoning (OR 5.39, p <.001) Table 1-Table 5.

Table 1. General Characteristics of Suicidal Behavior Among elderly

Variance	2019 (n=4,351)	2020 (n=3,931)	P-value
Age (years)			.096
65-69	1081 (24.9)	908 (23.1)	
70-74	963 (22.1)	840 (21.4)	
75-79	987 (22.7)	878 (22.3)	
80-84	790 (18.1)	800 (20.4)	
85-89	395 (9.1)	371 (9.4)	
≥90	135 (3.1)	134 (3.4)	
Sex			.062
Female	1790 (41.1)	1698 (43.2)	

Male	2561 (58.9)	2233 (56.8)	
Insurance type			.115
National health insurance	3595 (82.6)	3322 (84.5)	
General insurance	351 (8.1)	270 (6.9)	
Medical care	389 (8.9)	325 (8.3)	
Others	16 (0.4)	14 (0.3)	
Mode of arrival			<.001
Ambulance	3149 (72.4)	3043 (77.4)	
Private ambulance	692 (15.9)	421 (10.7)	
Private car	490 (11.3)	453 (11.5)	
Walking	3 (0.1)	2 (0.1)	
Others	17 (0.3)	12 (0.3)	
Route of ED visit			<.001
Direct visit	3649 (83.8)	3491 (88.8)	
Transfer	694 (16.0)	434 (11.0)	
Through an outpatient	7 (0.2)	6 (0.2)	
Others	1 (0.0)	0	

ED=emergency department

Table 2. General Characteristics of Suicidal Behavior Among elderly (continued)

Variance	2019 (n=4,351)	2020 (n=3,931)	P-value
Methods of suicidal behavior			.856
Others	119 (2.7)	93 (2.4)	
Falling	99 (2.3)	85 (2.1)	
Slipping down	12 (0.3)	14 (0.4)	
Struck	55 (1.3)	44 (1.1)	
Firearm/ Cutting	333 (7.6)	306 (7.8)	
Burning	7 (0.2)	5 (0.1)	
Drowning	41 (0.9)	28 (0.7)	
Hanging	438 (10.1)	415 (10.6)	
Poisoning	3247 (74.6)	2941 (74.8)	.310
Pesticides and herbicides	172 (5.3)	172 (5.9)	
Clinical drugs	106 (3.3)	100 (3.4)	
Inhalation gases	11 (0.3)	3 (0.1)	
Chemical and environmental toxins	11 (0.3)	10 (0.3)	
Others	2947 (90.8)	2656 (90.3)	
Initial mental state			.287
Alert	1997 (45.9)	1777 (45.2)	
Drowsy	918 (21.1)	783 (19.9)	
Semi coma	855 (19.6)	820 (20.9)	
Coma	581 (13.4)	551 (14.0)	
Vital signs			
SBP (mmHg)	131.75±30.15	131.89±30.27	.845
DBP (mmHg)	76.59±17.62	77.17±18.02	.163
PR (beats/min)	85.53±18.52	85.04±18.12	.259
RR (breath/min)	19.73±3.26	19.63±3.06	.199
BT (℃)	36.40±0.79	36.35±0.83	.017
Saturation (%)	95.54±5.81	95.81±4.86	.043

SBP=systolic blood pressure; DBP=diastolic blood pressure; PR=pulse rate; RR=respiration rate; BT=body temperature.

Table 3. General Characteristics of Suicidal Behavior Among elderly (continued)

Variance	2019 Period (n=4,351)	2020 (n=3,931)	P-value
KTAS level			.001
Level 1 Resuscitation	702 (16.1)	643 (16.4)	
Level 2 Emergent	1779 (40.9)	1519 (38.6)	
Level 3 Urgent	1505 (34.6)	1479 (37.6)	
Level 4 Less urgent	331 (7.6)	279 (7.1)	
Level 5 Non urgent	34 (0.8)	11 (0.3)	
Time from the onset of symptoms to ED visit (min)	318.51±1605.93	439.29±5823.62	.189
Duration of stay in the ED (min)	468.53±799.34	466.23±606.13	.883
ED disposition			<.001
Discharged	651 (15.0)	564 (14.3)	
DAMA	637 (14.6)	587 (14.9)	
Transferred	379 (8.7)	238 (6.1)	
Death in ED	172 (4.0)	140 (3.6)	
DOA	313 (7.2)	283 (7.2)	
Others	17 (0.4)	10 (0.2)	
Admission	2182 (50.1)	2109 (53.7)	
Admitted to GW	676 (31.0)	627 (29.7)	
Admitted to ICU	1506 (69.0)	1482 (70.3)	
Results after hospitalization			.007
Discharged	1354 (62.1)	1258 (59.6)	
DAMA	238 (10.9)	267 (12.7)	
Transferred	365 (16.7)	333 (15.8)	
Death in hospital	223 (10.2)	238 (11.3)	
Others	2 (0.1)	13 (0.6)	
Length of hospitalization (min)	13216.14±18466.94	12923.13±19034.54	.609

KTAS=Korean Triage and Acuity Scale; ED=emergency department; DAMA=discharged against medical advice; DOA=Dead On Arrival; ICU=intensive care unit; GW=general ward.

Table 4. Major Physical Illnesses

Variance	2019 (n=4,351)	2020 (n=3,931)	P-value
HHD	895 (20.6)	807 (20.5)	.985
DM	593 (13.6)	578 (14.7)	.171
Pneumonia and influenza	470 (10.8)	390 (9.9)	.202
Disease of digestive system	256 (5.9)	233 (5.9)	.970
Chronic lower respiratory disease	255 (5.9)	192 (4.9)	.055
CVD	185 (4.3)	200 (5.1)	.080
Dementia	172 (4.0)	172 (4.4)	.365
Malignant neoplasm	172 (4.0)	161 (4.1)	.784
Musculoskeletal diseases	154 (3.5)	164 (4.2)	.920
Depression	91 (2.1)	100 (2.5)	.195
IHD	88 (2.0)	65 (1.7)	.245
Parkinson's disease	27 (0.6)	40 (1.0)	.059
Anxiety	21 (0.5)	24 (0.6)	.522

HHD=hypertensive heart disease; DM= Diabetes mellitus; CVD= Cerebrovascular diseases; IHD=ischemic heart disease.

Table 5. Comparison of Odds Ratios for Discharge Against Medical Advice Among Elderly Patients Presenting with Suicide or Self-harm to the Emergency Department in 2020 Versus 2019

Variable	Odds ratio	95% CI for OR		P-value
		Lower bound	Upper bound	
Year (reference = 2019)	0.92	0.88	0.96	<.001
Male (reference = Female)	0.90	0.86	0.95	<.001
Age (reference=65-74years old)				
75-84 years old	0.97	0.81	1.16	0.758
≥85years old	1.39	1.24	1.56	<.001
Insurance type (reference = National Health Insurance)				
Car insurance	1.11	0.48	2.54	0.805
Medical care	1.02	0.95	1.10	0.569
General insurance	0.82	0.76	0.89	<.001
others	1.05	0.74	1.50	0.777
Methods of suicidal behavior (reference = Traffic accident)				
Falling	4.33	2.11	8.92	<.001
Slipping down / struck	0.66	0.33	1.33	0.250
Firearm/ Cutting	2.81	1.42	5.56	0.003
Drowning	3.41	1.68	6.95	0.001
Poisoning	5.39	2.73	10.66	<.001
Hanging	5.54	2.78	11.05	<.001
Burning	2.31	0.92	5.80	0.074
Others	3.96	1.99	7.90	<.001
Initial mental state (reference = Alert)				
Drowsy	0.96	0.90	1.02	0.219
Semi coma	0.86	0.78	0.94	0.001
Coma	0.44	0.31	0.63	<.001
KTAS level (reference = Level 1 Resuscitation)				
Level 2 Emergent	1.06	0.81	1.39	0.678
Level 3 Urgent	0.80	0.61	1.05	0.108
Level 4 Less urgent	0.44	0.33	0.57	<.001
Level 5 Non urgent	0.11	0.08	0.15	<.001

KTAS=Korean Triage and Acuity Scale.

4. Discussion

A major strength of this study is the utilization of large-scale, nationwide data to examine and compare the clinical characteristics and risk factors associated with DAMA among elderly patients presenting to EDs with suicidal behavior during the period of COVID-19-related social distancing measures.

The findings indicate that, although the overall number of elderly individuals presenting with suicidal behavior declined during the COVID-19 pandemic, the severity of these cases increased. Specifically, there was an observed rise in the proportion of high-acuity emergency presentations, classified as KTAS levels 1, 2, and 3. Additionally, hospitalization rates in both GWs and ICUs increased, as did in-hospital mortality among this population. These results suggest a shift toward more severe presentations of suicidal behavior among the elderly during the pandemic period [13]. Historical data further underscore the elevated risk associated with suicidal behavior in older adults. A 20-year review of trauma patients who engaged in self-harm revealed that only 6% of individuals aged 65 and older were discharged with clinical improvement, compared to 20% of those under age 65. Mortality rates also differed markedly, with rates of 38% in patients aged 65 and older, compared to 18% in younger patients [14]. Similarly, a longitudinal study of 1,177 elderly self-harm patients in the United Kingdom reported that nearly 13% engaged in repeated self-harm within one year, and 1.5% died by suicide during that time [15]. In another long-term follow-up study of adult suicide attempters, 37.6% died within 21 to 32 years of follow-up, with 7.2% of deaths directly attributed to suicide and 53% of these occurring within five years of the initial attempt.

Of particular concern in this study was the high rate of DAMA among elderly patients aged 65 and older who visited the EDs following suicidal behavior. DAMA accounted for nearly the same proportion of cases as

standard discharges. Analysis of factors associated with DAMA during the pandemic revealed that these patients were generally older and more likely to have employed highly lethal methods, such as hanging or poisoning. Interestingly, while previous studies have indicated that DAMA rates tend to decrease with age [16], the current findings show the opposite trend, with increased DAMA rates observed among older adults with suicidal behavior. Prior literature has documented that 19% of patients DAMA were readmitted within 24 hours, with 30-day readmission and mortality rates nearly double those of patients discharged with medical approval [16]. Approximately 20.8% of DAMA patients returned to the EDs within 72 hours, and those who did exhibited a 2% mortality rate [17]. These outcomes highlight the adverse health consequences of DAMA, which also has psychological ramifications for healthcare providers, including increased guilt and professional stress, in addition to contributing to greater healthcare system strain. Economically, the impact of DAMA is significant. The average cost of readmission for DAMA patients was found to be 56% higher than that for patients discharged with medical approval, with an estimated national readmission cost of $822 million in the United States alone [16]. Given that elderly individuals often experience cognitive decline and are burdened with multiple comorbidities, it is difficult to ensure that DAMA decisions are fully informed and autonomous. Previous studies have also shown that, among adults aged 65 and older, suicidal behavior during pandemics such as SARS was frequently associated with fears of infection and concerns about becoming a burden to family members [18]. In the context of COVID-19, increased isolation-related anxiety in older adults has similarly been linked to recurrent suicidal behavior [19]. Therefore, in the context of an aging society, it is imperative to establish a broad societal consensus on the direction of care for elderly individuals presenting with suicidal behavior. Particular attention should be given to ensuring that patients possess the cognitive capacity to make DAMA decisions autonomously. Additionally, there is a need to develop a legal and ethical framework that allows for the incorporation of healthcare professionals' expert opinions into the decision-making processes involving patients and their caregivers.

This study found that while a higher proportion of elderly patients presenting to EDs with suicidal behavior during the COVID-19 pandemic were female, male sex was identified as a significant risk factor for DAMA. This finding aligns with international data indicating that suicide risk among the elderly is disproportionately higher in men and white, particularly in high-income countries such as the United States of America, Austria, Japan, and Hong Kong [20]. In contrast, in low-and middle-income countries, including Ethiopia, Uganda, South Africa, Nepal, India, suicide risk tends to be elevated among younger females [21]. In South Korea, although elderly women report higher levels of suicidal ideation [22], the actual suicide rate among elderly men is markedly higher-82.2 per 100.000 compared to 23.7 per 100.000 in women, a 3.5-fold difference [23]. Prior research has demonstrated that reduced social contact during the COVID-19 pandemic was associated with increased suicidal ideation among community-dwelling older adults [24]. Social capital has also been identified as a protective factor against suicide in later life. Attributes of social capital, including trust (e.g., lower divorce rates), reciprocity (e.g., volunteering), network strength (e.g., the number of civic, religious, cultural, leisure, and welfare institutions), and civil participation (e.g., local election voting rates), exert differential impacts by gender [23]. For elderly women, trust and social safety nets appear more influential, whereas for elderly men, network-related variables such as access to community organizations and welfare infrastructure are more critical [23]. Moreover, regional characteristics, including higher per capita local tax revenues, increased fiscal dependences, a greater number of elderly welfare facilities, have been associated with lower suicide rate. Conversely, regions characterized, by high rates of early divorce, depression, and single-person households show elevated suicide risks [25]. Given these finding, a gender-sensitive, community-based approach is essential in addressing DAMA among elderly patients with suicidal behavior. Intervention should consider the spatial mobility and activity limitations of older adults and prioritize collaboration between local emergency medical service and community welfare infrastructures to strengthen social support networks and reduce suicide risk in this population.

As a result of this study, although it was not statistically significant, it is reported that the rate of neurological diseases and musculoskeletal disorders increased with the aging of the elderly subjects, and psychological problems such as depression and anxiety also increased. In previous studies, physical illness has been reported as a risk factor for suicide among the elderly [26], and a study by Shin et al. [27] found that suicidal ideation is associated with stroke warning signs, depression, and anxiety. It is important to consider the results of long-term observations of the complications of various physical illnesses in the elderly as an index to develop strategies for preventing suicidal behavior. In fact, physical, psychological, social, and economic factors play an important role in the development of suicidal behavior among the elderly. It is crucial to develop

an intervention strategy prepared by a group of experts and policies designed to manage the surroundings of the elderly.

Despite its strengths, this study has certain limitations. Notably, it excluded elderly individuals with suicidal behavior who visited local hospitals not included in the NEDIS database, which may limit the generalizability of the findings. To address these limitations, future studies should incorporate data from a broader range of emergency medical facilities, including regional and local emergency centers that contribute the majority of NEDIS data. Moreover, there is a pressing need for longitudinal follow-up studies on elderly suicide at the national level to inform targeted interventions and policy development.

5. Conclusions

This study investigated the clinical characteristics and risk factors associated with DAMA among elderly individuals (≥ 65years) presenting to EDs in South Korea during the social distancing period. The findings indicate that, although the overall number of elderly individuals presenting with suicidal behavior declined during the COVID-19 pandemic, the severity of these cases increased. Analysis of factors associated with DAMA during the pandemic revealed that these patients were generally older and more likely to have employed highly lethal methods, such as hanging or poisoning.

Korea, which has the highest elderly suicide rate among OECD countries, is rapidly aging, and infectious diseases, such as COVID-19 are predicted to become more prevalent in the future. It will be inevitable that the rapid increase in the number of elderly people who self-harm or commit suicide will have a significant impact on the social and economic aspects of Korea in the future. Since suicide can be prevented, social and cultural interventions as well as efforts to detect and recognize symptoms at an early stage are essential. Therefore, it is necessary to develop an index that can be used to prevent and predict suicidal behavior among the elderly in the future. As a result, it aims to improve the quality of life and well-being of the elderly by not only reducing the incidence of suicidal behavior of the elderly but also preventing potential repeated suicidal behavior.

Conflicts of Interest: The authors declare no conflict of interest.

References

[1]   World Health Organization, Suicide Worldwide in 2019: Global Health Estimates, 2019. [Online] Available: https://www.who.int/publications/i/item/9789240026643

[2]   I. Conejero, E. Olié, P. Courtet, and R. Calati, "Suicide in older adults: current perspectives," Clin. Interv. Aging, vol. 13, pp. 691-699, 2018, doi: http://doi.org/10.2147/CIA.S130670.

[3]   Ministry of Health and Welfare, OECD Health Statistics 2021, 2021.

[4]   M. Sinyor, A. Schaffer, and D. L. Streiner, "Characterizing suicide in Toronto: an observational study and cluster analysis," Can. J. Psychiatry, vol. 59, no. 1, pp. 26-33, 2014, doi: http://doi.org/10.1177/070674371405900106.

[5]   World Health Organization, General's opening remarks at the media briefing on COVID-19, 2020. [Online] Available: https://www.who.int

[6]   Z. I. Santini, J. T. Koyanagi, A. E. Tyrovolas, M. Haro, and B. E. Donovan, "Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): a longitudinal mediation analysis," Lancet Public Health, vol. 5, no. 1, pp. e62-e70, 2020, doi: http://doi.org/10.1016/S2468-2667(19)30230-0.

[7]   R. Armitage and L. B. Nellums, "COVID-19 and the consequences of isolating the elderly," Lancet Public Health, vol. 5, no. 5, p. e256, 2020, doi: http://doi.org/10.1016/S2468-2667(20)30061-X.

[8]   M. A. Reger, I. H. Stanley, and T. E. Joiner, "Suicide mortality and coronavirus disease 2019—a perfect storm?," JAMA Psychiatry, vol. 77, no. 11, pp. 1093-1094, 2020, doi: http://doi.org/10.1001/jamapsychiatry.2020.1060.

[9]   M. I. Lapid, D. Koopmans, P. Sampson, K. O. Van den Block, and G. Peisah, "Providing quality end-of-life care to older people in the era of COVID-19: perspectives from five countries," Int. Psychogeriatr., vol. 32, no. 11, pp. 1345-1352, 2020, doi: http://doi.org/10.1017/S1041610220000836.

[10] A. P. F. Wand and C. Peisah, "COVID-19 and suicide in older adults," Med. J. Aust., vol. 213, no. 7, pp. 335-335.e1, 2020, doi: http://doi.org/10.5694/mja2.50788.

[11] National Emergency Medical Center, Emergency Medical Status Statistics, 2021.

[12] Korea Information Classification of Diseases, 8th Korean Standard Classification of Disease, 2021.

[13] J. H. Kang, S. W. Lee, J. G. Ji, J. K. Yu, Y. D. Jang, S. J. Kim, et al., "Changes in the pattern of suicide attempters visiting the emergency room after COVID-19 pandemic: an observational cross sectional study," BMC Psychiatry, vol. 21, no. 1, p. 571, 2021, doi: http://doi.org/10.1186/s12888-021-03570-y.

[14] K. B. Schaffer, J. D. Hanna, J. R. Burg, T. A. Pappas, R. H. Johnson, and R. A. Maxwell, "Self-inflicted injury and the older trauma patient: a 20 year review of suicide attempts and outcomes," Eur. Geriatr. Med., vol. 13, no. 1, pp.

119-125, 2022, doi: http://doi.org/10.1007/s41999-021-00561-w.

[15] E. Murphy, K. Kapur, J. Webb, D. Cooper, M. Bergen, H. Hawton, et al., "Risk factors for repetition and suicide following self-harm in older adults: multicentre cohort study," Br. J. Psychiatry, vol. 200, no. 5, pp. 399-404, 2012, doi: http://doi.org/10.1192/bjp.bp.111.094177.

[16] S. Y. Tan, C. B. Low, C. C. Yang, N. J. Goh, H. T. Chin, M. Y. Foo, et al., "Association of hospital discharge against medical advice with readmission and in-hospital mortality," JAMA Netw. Open, vol. 3, no. 6, p. e206009, 2020, doi: http://doi.org/10.1001/jamanetworkopen.2020.6009.

[17] F. H. Abuzeyad, A. Al Sharif, F. E. B. AlKuwaiti, M. Al Suwaidi, A. Al Mazrouei, S. Al Abdouli, et al., "Discharge against medical advice from the emergency department in a university hospital," BMC Emerg. Med., vol. 21, no. 1, p. 31, 2021, doi: http://doi.org/10.1186/s12873-021-00422-6.

[18] P. S. Yip, E. H. Cheung, S. Chau, and P. Law, "The impact of epidemic outbreak: the case of severe acute respiratory syndrome (SARS) and suicide among older adults in Hong Kong," Crisis, vol. 31, no. 2, pp. 86-92, 2010, doi: http://doi.org/10.1027/0227-5910/a000015.

[19] L. Bareket-Bojmel, G. Shahar, and M. Margalit, "COVID-19-related economic anxiety is as high as health anxiety: findings from the USA, the UK, and Israel," Int. J. Cogn. Ther., vol. 14, no. 3, pp. 566-574, 2021, doi: http://doi.org/10.1007/s41811-020-00078-3.

[20] J. Snowdon, R. Chiu, and H. Y. Yip, "Changes in age patterns of suicide in Australia, the United States, Japan and Hong Kong," J. Affect. Disord., vol. 211, pp. 12-19, 2017, doi: http://doi.org/10.1016/j.jad.2017.01.007.

[21] M. Jordans, J. Kohrt, M. Luitel, S. Komproe, and I. Lund, "Suicidal ideation and behaviour among community and health care seeking populations in five low- and middle-income countries: a cross-sectional study," Epidemiol. Psychiatr. Sci., vol. 27, no. 4, pp. 393-402, 2018, doi: http://doi.org/10.1017/S2045796017000038.

[22] M. Choi, D. H. Kim, K. Lee, and J. S. Yi, "Physical, psychological, and social risk factors affecting suicidal ideation among the elderly," J. Korean Neuropsychiatr. Assoc., vol. 54, no. 4, pp. 459-467, 2015, doi: http://doi.org/10.4306/jknpa.2015.54.4.459.

[23] T. Lee and S. Hur, "Analysis of the effect of suicide prevention policies on reducing elderly suicide rates," J. Korea Contents Assoc., vol. 22, no. 7, pp. 318-331, 2022, doi: http://doi.org/10.5392/JKCA.2022.22.07.318.

[24] J. Kim, "The Effects of social contact, depression, and anxiety on suicidal ideation among the elderly during the COVID-19 pandemic," J. Korea Contents Assoc., vol. 21, no. 12, pp. 870-878, 2021, doi: http://doi.org/10.5392/JKCA.2021.21.12.870.

[25] Y. Lee and K. Kim, "Changes and Factors of Suicide Rate by Region in Korea," J. Korea Contents Assoc., vol. 18, no. 8, pp. 51-61, 2018, doi: http://doi.org/10.5392/JKCA.2018.18.08.051.

[26] S. H. Kim, H. J. Kim, S. H. Oh, and K. Cha, "Analysis of attempted suicide episodes presenting to the emergency department: comparison of young, middle aged and older people," Int. J. Ment. Health Syst., vol. 14, p. 46, 2020, doi: http://doi.org/10.1186/s13033-020-00378-3.

[27] K. M. Shin, J. Y. Jeon, H. Y. Ha, and S. J. Kim, "Suicide among the elderly and associated factors in South Korea," Aging Ment. Health, vol. 17, no. 1, pp. 109-114, 2013, doi: http://doi.org/10.1080/13607863.2012.702732.