

Risk factors of delirium in the emergency intensive care unit patients

Hyun Kyung Kim¹ and Young Mee Lee²

¹Uijeongbu St. Mary's Hospital

271, Cheonbo-Ro, Uijeongbu-si, Kyungi-Do, South Korea

²Dept. of Nursing, Kangwon National University

346 Hwangjo-gil, Dogye-eup, Samcheok-si, Gangwon-do, 245-710, South Korea

ymlee@kangwon.ac.kr

Corresponding author

Abstract- Delirium risk increases in the hospitals. Most of intensive care unit patients are not only mechanical ventilators and caring medication, but are also severely ill. They may have many delirium risk factors. The purpose of this study was to investigate the risk factors of delirium in the emergency intensive care unit patients. The sample was 127 adult patients admitted in the EICU at one University hospital in Korea. The prevalence of delirium was 18.9%. Delirium occurred within mean 4 days after the EICU admission, and 87.4% experienced within 4~5 days hospitalization at EICU. In conclusion, it would be contributed to the awareness of delirium for EICU nurses.

Keywords- Delirium, Emergency Intensive Care Unit, CAM-ICU

1. Introduction

1.1. Needs for the Study

Delirium is the most common psychiatric syndrome in the hospital environment. It is characterized by a sudden change in attention ability and cognitive intelligence[1]. Delirium is an independent predictor of mortality and long-term cognitive disability[2] and is also associated with self-extubation, long-term hospital stay, and increased hospital cost[3]. The delirium incidence rates in hospitalized patients vary depending on clinical situations. For most ICU patients, whose overall conditions have been deteriorated, are hemodynamically unstable, and stresses from the ICU characteristics such as their worsened disease state, death of other patients, and the unfamiliar environment can cause psychological imbalance such as severe anxiety[4]. The delirium incidence rate in ICU patients in one study was 16-89%, higher than that in general patients [5]. As the delirium prevalence is high in ICU, recent clinical data guidelines recommend that all ICUs perform a regular delirium screening[1]. There were a number of previous studies on delirium in general ward patients but not ICUs in Korea[6]. The only studies on ICU patients were conducted on patients in internal medicine ICUs[7] or surgical ICUs [8], and thus there is no study in which patients were not selected based on specific diseases or patients in various clinical departments were included.

2. Study Methods

2.1. Study Subjects

The subjects of this study were patients admitted to the ICU in C University Hospital located in Uijeongbu City from May

to August 2012, who met the selection criteria and consented to the written agreement. As a result of calculating the sample size using G-power 3.0 based on the delirium development risk factor study on surgical ICUs[8], 106 subjects were found to be necessary(effect size: 0.55, power: 0.8, significance level: 0.05, two-sided test). Assuming a dropout rate of 20%, 127 subjects calculated to be needed. A total of 130 patients were evaluated, and 127 were used in the final analysis after excluding 3 dropouts (2.3%).

2.2. Study Tool

Using the CAM-ICU tool developed by Ely et al.[9], subjects who developed delirium at least once in 5 days after admission (including those discharged after 36 hours) were designated as the delirium group. For delirium assessment using CAM-ICU (Confusion Assessment Method – ICU)after the sedation scale of patients was assessed using RASS(Richmond Agitation and Sedation Scale), 4 features of CAM-ICU were assessed if the RASS score was above -3 points (-3 ~ +4 points).

2.3. Data Collection Process and Methods

Data collection was conducted after obtaining an approval from the Institutional Review Board of the corresponding hospital (project number: UC12EISE0035). After conducting an onsite preliminary study on 20 ICU patients, the data questionnaire was revised and supplemented. Collected data were analyzed using the SPSS Window version 14.0 Program.

3. Study Results

3.1. General Characteristics of the Subjects

The subjects were composed of 66.2% males and 33.8% females. The average age was 61.4 years old and 56.6% were above 60 years old. Married persons were 92% and disease severity of 81.9% subjects, which was investigated on admission to ICU, belonged to Group 5.

Since multiple responses were possible, the disease history of the subjects included hypertension (44%), diabetes (18.1%), and liver diseases (11.8%). Among them, 70.8% of the subjects had metabolic diseases such as hypertension and diabetes. While 90% of the subjects were admitted through ICU, 3.8% of the subjects had a history of delirium. Those who experienced a respirator at least once after being admitted to ICU were 10%, physical restraint was applied to 30%, and 13.8% were admitted to an isolation room. 26.9% of subjects received transfusion

during hospitalization, and 30% of the subjects received medications including analgesics or sedatives for pain control or effective respirator treatment. The average stay in the ICU was 4.1 days (Table 1).

Table 1. General Characteristics of Subjects

Characteristics	Category	n	%	Mean±SD
Gender	Male	84	66.1	61.3±16.5
Age(yr)	≤40	16	12.5	
	41 ~ 50	19	14.9	
	51 ~ 60	20	15.7	
	≥61	72	56.6	
Religion	Yes	69	54.3	
Marital Status	Married	117	92.1	
Comorbidity	None	36	27.6	
	Hypertension	55	43.3	
	Diabetes Mellitus	22	17.3	
	Liver Disease	15	11.5	
	Others	2	1.5	
Admission route	Emergency Room	116	91.3	
	Ward	11	8.7	
Delirium History	Yes	5	3.9	
Mechanically Ventilated	Yes	114	89.8	
Use of physical restraint	Yes	88	69.3	
Isolation	In isolation	18	14.2	
	Not in isolation	109	85.8	
Rest pain	Yes	41	32.3	
Use of patient controlled analgesia	Yes	37	29.1	
Length of ICU stay(days)				4.1±2.1

3.2. Delirium Incidence Rate and Onset Time

In delirium assessment using CAM-ICU, the delirium incidence rate of the subjects determined to have delirium was 18.9%. The mean onset time was 4.5 days after admission to ICU, and the mean delirium onset time was 3 or 4 days after admission in 67% of 24 delirium patients (Table 2).

Table 2. Incidence of Delirium Development (N=24)

Incidence	N (%)	Mean±SD
Onset(after admission)	24(18.9)	3.56±1.08
1 day	0 (0)	
2 day	3 (12.5)	
3 day	7 (29.1)	
4 day	9 (37.5)	
5 day	5 (20.8)	

3.3. Risk factors for Delirium Development

The mean age of the delirium group was 69.3 years old, which was significantly older than that of the non-delirium group, 59.6 (p=.004). Physical restraint was used in 69.3% of the delirium group, which was significantly higher than 30.7% in the non-delirium group(p=.000). There was a significant difference in the use of isolation room between the delirium group (37.5%) and the non-delirium group (8.7%) (Table 3). Factors influencing delirium incidence were age [of a subject], drinking, restraint application, and use of isolation room. A delirium development model was constructed using the derived variables and the result is presented in Table 3. The final description variables extracted as the delirium development risk factors in ICU patients were use of physical restraint (p=.000), use of isolation room (p=.001), length of ICU stay (p=.000), and age (p=0.21). That is, the delirium incidence in patients using physical restraint was 2.2 times higher than that in patients not using physical restraint; it was 4.3 times higher in patients using isolation room than that in those not using it; the probability of developing delirium increased with age (Table 4).

Table 3. Clinical characteristics between delirium and no delirium (N=127)

Factor	Category	Delirium		χ^2 or t	p
		Present (%) n=24	Absent (%) n=103		
Gender	Male	12(50.0)	72(69.9)	3.44	.092
	Female	12(50.0)	31(30.1)		
Age (yr)	Mean±SD	69.4±12.4	59.6±17.0	.02	.002
Alcohol drinking	No	6(25.0)	18(75.0)	4.37	.042
	Yes	50(48.5)	53(51.5)		
Smoking	No	6(25.0)	18(75.0)	3.11	.106
	Yes	46(44.7)	57(55.3)		
Comorbidity	No	4(16.7)	34(33.0)	2.47	.142
	Yes	20(83.3)	69(67.0)		
Use of patient controlled analgesia	No	18(75.0)	72(69.9)	.24	.804
	Yes	6(25.0)	31(30.1)		
Delirium History	No	24(100)	98(95.1)	1.21	.583
	Yes	0(0)	5(4.9)		
Transfusion	No	22(91.7)	70(68.0)	5.47	.022
	Yes	2(8.3)	33(32.0)		
Rest pain	No pain	18(75.0)	68(66.0)	.71	.473
	pain	6(25.0)	35(34.0)		
Mechanically Ventilated	No	22(91.7)	92(89.3)	.12	1.000
	Yes	2(8.3)	11(10.7)		
Use of physical restraint	No	4(16.7)	84(81.6)	38.51	.000
	Yes	20(83.3)	19(18.4)		
Isolation	In isolation	9(37.5)	9(8.7)	13.23	.001
	Not in isolation	15(62.5)	94(91.3)		

Table 4. Factors in the Logistic Regression Model Associated with Delirium(N=127)

Factor	Wald	p	Odds ratio
Age	8.2	.000	.889
Length of ICU stay(days)	13.1	.004	.209
Use of physical restraint	17.1	.000	.009

Model summary: Method= Enter Nagelkerke R2 = .642, $\chi^2 = 64.505$, df = 3, p = .000

4. Discussion

We identified an 18.5% delirium incidence rate in this study, which is lower than 35.7% reported in internal medicine ICUs in Korea[7] and 20% in surgical ICUs[8]. The lower incidence rate compared to the previous studies might be due to the difference in the age of subjects; while this study used subjects above 20 years of age, most international studies limited the age of subjects to above 65[10]. The delirium development probability increased with the age of ICU patients, use of isolation room, and longer stay. Among the CAM-ICU positive patients who were classified as the delirium group, only 33% of them were referred to neuropsychiatric experts and sedatives were prescribed to 62.5% of the delirium group while the rest of the patients never received any measure or management. The early delirium diagnosis rate can be increased if delirium is assessed and diagnosed with CAM-ICU by ICU nurses monitoring patients for 24 hours.

5. Conclusion

Taking the above results together, age, length of stay, drinking, transfusion, use of isolation room, and use of physical restraint were identified as factors associated with delirium development after admission to ICU. Immediate intervention through environmental improvement is needed. As an intervention to aid the patients' sleep, the environment should be bright during the day and dark in the night. Furthermore, unnecessary medical device alarms should be minimized, loud conversation restrained, and noise above 80db avoided[11].

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