Research article   **Medical research**

A study on pattern of delirium in the patients admitted to MICU in a tertiary care teaching hospital

Dr.M Sureswara Reddy[1], *Gangula Amareswara Reddy[2], P Venkata Ramana[2]

[1]*MD (General Medicine), Associate Professor, RIMS, Kadapa, India*
[2]*Pharm-D, PRRM College of Pharmacy, Kadapa, India 516003*
*Corresponding author: Amareswara Reddy Gangula
E-mail id: amarpdtr@gmail.com

ABSTRACT

Aim

To study the prevalence of various base line risk factors, precipitating and iatrogenic factors in the study population and the effect of delirium on the outcome of patients admitted to the MICU.

Methods

This is a cross sectional, descriptive study conducted for a period of six months in the Medical Intensive Care Unit (MICU). Socio-demographic data sheet, risk factor checklist, confusion assessment method (CAM), and Simplified acute physiology score (SAPS -II) were the instruments used in the study.

Results

Majority of the study group (63%) were males and uneducated. Mean days spent in delirium were high for males (4.92 days) when compared to females (3.72 days). The mean score of SAPS-II for development of delirium is 27 (26.95). Mean days spent in delirium (5.95 days) was high when there is no visible day light. 60% of study population were hyperactive and were forcibly restrained to cots. From the total study population, 18 were discharged from MICU (M=14, F=37); 62 were transferred to medical wards (M=37, F=25); 9 were transferred to other wards (M=5, F=4) and11 patients were dead (M=7, F=4).

Conclusion

Being male, lower socio-economic statuses, substance abuse (57%) were found as significant predisposing factors. Type of delirium had no statistically significant effect over outcome. Delirium outcomes were either in higher number of deaths or prolonged hospital stay. The mean SAP score was considerably higher in the death group compared to the other groups and the differences are also significant with P<0.001.

Keywords: Effect of delirium on outcome of patient, Delirium in MICU patients.

INTRODUCTION

Recent advances in critical care medicine have improved outcomes of critically ill patients worldwide and in doing so they have revealed a major public health concern that previously had been under-appreciated. Critical care clinicians have historically been attuned to pulmonary, cardiac, and renal dysfunction as a source of morbidity and mortality in critical care patients but have underestimated the impact of brain dysfunction [1].Foremost disturbance of consciousness, attention, cognition and perception is known as delirium. It is a common psychiatric syndrome which commonly heralds an increase in morbidity and mortality. Patients with delirium remain in hospital longer and more commonly discharged to long term facilities. Behavioral manifestations of delirium may interfere with treatment compliance and are often precipitants for psychiatric consultation. A psychiatrist should provide and/or advocate for the appropriate treatment beyond simple medical expedience. Delirium - a

common manifestation of acute brain dysfunction in critically ill patients is associated with poor short-term outcomes and may result in adverse sequelae years after ICU discharge. Delirium remains unrecognized and misdiagnosed because of its short onset, fluctuating course and manifestations similar to those of depression and dementia. [2]

EPIDEMIOLOGY

This is most commonly seen in elderly people. In community studies 1% of the elderly population aged 55 or more have delirium, 13% of 85 and older group. Studies among elderly emergency room subjects have reported prevalence rates of 5 to 10%. Some of these studies have reported under recognition of delirium in up to 60% of these subjects. The mortality rates among hospitalized patients with delirium range from 22 to 76%, as high as the rates among patients with acute myocardial infarction or sepsis. The 1 year mortality rate

associated with cases of delirium is 35 to 40%.No data related to incidence and prevalence of delirium is available from India. The current statistics quoted here were from other countries. Delirium is never caused by a single factor, but is always the consequence of multiple factors. Inouye and colleagues [3] conceived a risk model for patients outside the intensive care unit based on predisposing and precipitating factors. Predisposing factors are patient dependent or related to chronic pathology. These factors are limited or not modifiable. Precipitating factors are related to the acute illness or the environment. In the intensive care unit current illness and aggressive treatment generate different impacts. More than 60 variables have been studied for their relation with delirium in the general hospital population. A patient encountering three or more of these factors has a 60% increased risk for the development of delirium [4, 5] Ely and colleagues stated that a patient in the intensive care unit accumulates 10 or more of these factors. As not all patients in the intensive care unit may develop delirium, it seems obvious that not all factors studied in general patients or elderly may be extrapolated to the intensive care patient. Therefore, each factor must be studied in the context of the intensive care unit. Earlier research on risk factors for delirium in the intensive care unit, using different methods and populations, showed sometimes conflicting results [9, 10, 13 14 and 15]. Additionally, environmental factors are poorly studied in the intensive care unit.

AIM OF THE STUDY

To study the prevalence of various base line risk factors, precipitating and iatrogenic factors in the study population and the effect of delirium on the outcome of patients admitted to the MICU.

MATERIALS AND METHODS

This is a cross sectional, descriptive study conducted in the Medical Intensive Care Unit (MICU), which is under the supervision of Dept. of Medicine of the same institute. The study was carried after obtaining prior permission from concerned authorities. Majority of cases on evaluation turned out to be delirium due to their general medical condition. In view of raising trends of such referrals a study was planned to explore the pattern and outcome of patients who were delirious during the MICU admission. The study was carried out for six months and the Study sample include hundred patients of delirium admitted to medical intensive care unit. The patients in the MICU were screened for symptoms of delirium and such subjects were evaluated for socio-demographic data, baseline risk factors, precipitating or iatrogenic factors. The study subjects in- hospital outcome was evaluated in terms of whether the patient was discharged (or) transfer to medical ward (or) transfer to other ward(or) dead.

Both male and female subjects who fulfills criteria for delirium by confusion assessment method (CAM) and are above 18 years of age are included in the study. Also willingness of their guardians to give an informed consent was considered. Socio-demographic data sheet, risk factor checklist, confusion assessment method (CAM- for screening delirium), SAPS –II were the instruments used in the study. In Risk factor checklist, Factors were grouped into four domains based on the predisposing and precipitating model of Inouye & colleagues [4].

a) The patient characteristics
b) Chronic pathology
c) Acute illness
d) Environmental factors

The first two domains contain predisposing or achieved factors being less modifiable through preventive actions. The last domains apply to current situation and are probably more modifiable to reduce the incidence of intensive care unit delirium. In the domain of patient characteristics- age, gender and substance use and other socio-demographic variables were included. In the domain of chronic pathology, presence or absence of various organic illnesses was included. In the domain of acute illness, factors relating to current diagnosis or treatment were studied. Factors from fourth domain relate to the interaction between patient and environment. The Confusion Assessment Method (CAM) includes two parts. Part one is an assessment Instrument that screens for overall cognitive impairment. Part two includes only those four features that were found to have the greatest ability to distinguish delirium or reversible confusion from other types of cognitive impairment. SAPS II was designed to measure the severity of disease for patients admitted to intensive care unit aged 15 or more.24 hours after admission to the ICU, the measurement has been completed and resulted in an integer point score between 0 and 163 and a predicted mortality between 0% and 100%. No new score can be calculated during the stay. If a patient is discharged from the ICU and readmitted, a new SAPS II score can be calculated. The calculation method is optimized for paper schemas. In contrast to APACHE II, the resulting value is much better at comparing patients with different diseases. This scoring system is mostly used to describe the morbidity of a patient when comparing the outcome with other patients (or) describe the morbidity of a group of patients when comparing the outcome with another group of patients.

RESULTS AND DISCUSSION

At the beginning of our study, one of the objectives was to know the effect of socio-demographic profile over the presentation, pattern and outcome of deliria admitted to medical intensive care unit. But after gathering data we have found that 87% of the cases who were represented in this study belong to lower middle and lower socioeconomic class. Majority of this study group were people living below poverty line. As all the attendee's to patients suffering with deliria during the collection of data had accepted and signed the informed consent, the sample doesn't become a convenient sample and it has become a serial sample. Hence it may represent deliria occurring in the lower strata of the society.

Factors related to patient characteristics / socio-demographic data

In the total study population males formed the majority (63%). This is in line with van Rompaey et al where he had found that being a male is a risk factor to develop delirium. In the study population, majority of cases are distributed around 20-70 years (table-1). But neither age nor gender had shown their effect on the onset of delirium as in van Rompaey et al [5] where the mean age is 64 years and most population were male. Majority of study population fall under uneducated and primary educated as they belong to older generation and literacy levels were low (table-1) in contrast to van Rompaey et al [5]. Most of the study population belongs to lower middle class and the economic status stood as the major risk for the onset of delirium. In this study majority were married people and they are having families living with them (fig-1) which is contrast to van Rompaey et al [5]where delirium occurred more frequently in people living alone. In the study group 39% were unskilled workers mainly constituting agricultural coolies and farmers but this had no significant effect on the onset of delirium (table-2).

Factors related to chronic pathology
Prevalence of predisposing factors in study groups was mainly studied (table-3). Pre-existing dementia and past history of delirium showed to be important risk factors for delirium [2, 3, 7, 8]. The factor related to chronic pathology, substance use has major risk for the occurrence (or) onset of delirium (57%). This category of patients suffered withdrawal delirium at admission to MICU and this is in line with Brenda T.pun and E.Wesley Ely [9, 10]. Endocrine disorders like DM and hypothyroid also stood as risk factors followed by poly pharmacy.

Factors related to acute illness
Days spent in ICU (table-4) before developing delirium which is also known as length of stay was not shown any relevant significance in the onset of the delirium because 81% of the study population got enrolled into the study on the day of admission into MICU due to the following reasons.
✓ Majority of them reached hospital after florid symptoms of delirium appeared.
✓ Acute poisonings with organo-phosphorous compounds and prescription tablet overdosing,
✓ Referrals from outside hospitals once the case worsened.
Those people who became delirious during a period of 3 days had history of dependency to alcohol and other substance of abuse and they became delirious because of environmental factors of the MICU. Mean days spent in delirium had significant effect over outcome of the study group. This was high for males i.e., 4.92 days when compared to females which were 3.72 days (table-5). Age group 71-78 years had more days spent in delirium than others i.e., 6.00 days which concluded that duration of delirium increased with increase in age followed by the death case which is 5.09 days. Metabolic and infectious cause had

significant effect over duration of delirium (table-5). Hypoactive type of delirium has spent more days compared to other two groups (table-5). In 15% of population, psychoactive drugs were given as part of treatment and they stood as risk factor for onset of delirium (fig-2). Atropine, haloperidol and short acting benzodiazepine (Lorazepam and Midazolam) were the drugs used in most population. In some researches use of benzodiazepines pointed with more details on the effect of delirium [9, 10, 11, and 12]. Patients having bladder catheter and nasogastric tube were at greater risk for delirium compared to psychoactive drugs. Simplified acute physiology score- II [6] for development of delirium was assessed and the scores were as follows in fig-3.The mean score of SAPS-II for development of delirium is 27 (26.95) (table-6) which is contrast to Van Rompaey et al [5] where a SAPS-II Score of 40 was shown to be relevant marker in the onset of delirium. The mean SAP score is considerably higher in the death group compared to the other groups and the differences are also significant with $P<0.001$.

Factors related to environment
Same as our study, earlier van rompaey et.al had also discussed about the intensive care unit architectural structure as a possible risk factor for delirium [5]. The environmental factors like visible day light, clock visible/present, visiting by relatives and physical restraints were assessed as the part of our study. Mean days spent in delirium was high when there is no visible day light by a mean of 5.95 days (table-7). This fulfills or agrees with the research stating that the disturbances in circadian rhythm might cause delirium. Recovering from delirium was delayed in cases which had no visible clock but not a higher risk factor. There was no positive effect of physical restrains over duration of delirium. 60% of study population posed problem to nursing staff due to hyperactivity and were forcibly restrained to cots (table-7).In our study all the patients were visited by their relatives who were beneficiary to some extent compared to other studies as they say that patients without visitors are at greater risk.

Outcomes of the study
From the total study population, 18 were discharged from MICU (M=14, F=37); 62 were transferred to medical wards (M=37, F=25); 9 were transferred to other wards (M=5, F=4) and11 patients were dead (M=7, F=4) (table-8).Outcome was poor in infective group of patient with high death rates and increased need for intermediate care compared to poisoning group. But type of delirium had no impact over outcome. It is difficult to conclude that any one of the domain or individual effect of single factor for delirium. It may be a combined effect of all the domains or any two. Lack of training in identifying early signs of delirium among the nursing staff was one of the significant factors turned out during the study.

Table-1: Factors related to patient characteristics

Characteristics	Males (n=63)	Females (n=37)	No of patients (N=100)
Age in years			
<20	2	3	5
21 - 30	12	3	15
31 - 40	7	6	13
41 - 50	13	11	24
51 - 60	10	5	15
61 - 70	14	8	22
71 - 80	3	1	4
81 - 90	2	0	2
Religion			
Hindu	57	34	91
Islam	6	3	9
Education			
Not gone to school	25	20	45
Primary education	21	7	28
Secondary education	9	6	15
Intermediate	0	2	2
Degree and above	7	2	9
Postgraduate &professional	1	0	1
Marital status			
Un married	6	3	9
Married	50	27	77
Widowed	7	7	14
Economic status			
Upper class	1	1	2
Middle class	7	4	11
Lower middle class	40	28	72
Lower class	11	4	1

Table-2: Occupation of study group

Sl. No	OCCUPATION	No of patients(N=100)
1	Un skilled	39
2	Skilled	27
3	Self-employment	11
4	House wife	12
5	Other	11

Table-3: Prevalence of predisposing factors

Sl. No	Predisposing	Yes	No	Total patients
1	Central nervous system disorder	24	70	100
2	Psychiatric disorder	13	87	100
3	Substance use	57	43	100
4	Sensory impairment	21	79	100
5	Previous history of surgery	11	89	100
6	Chronic kidney disease	6	94	100
7	Chronic pulmonary disease	12	88	100

8	Chronic liver disease	2	98	100
9	Chronic cardiac disease	32	68	100
10	Cancer	4	96	100
11	HIV status	0	100	100
12	Endocrine disorders	25	75	100
13	Polypharmacy	25	75	100

Table-4: Days spent in ICU

Sl. No	Stay in ICU before inclusion	Male	Female	Total
1	On day of admission	48	33	81
2	≤ 3 days of admission	12	3	15
3	> 3 days of admission	3	1	4

Table-5: Mean days spent in Delirium

Factors	Mean days in delirium	No of patients (N=100)
Sex		
Male	4.92	63
Female	3.72	37
Age group		
<20	3.20	5
21 - 30	4.47	15
31 - 40	3.62	13
41 - 50	4.17	24
51 - 60	5.07	15
61 - 70	5.09	22
71 - 80	6.00	4
81 – 90	3.00	2
In hospital outcome		
Discharge	4.82	18
Intermediate care	4.30	71
Death	5.09	11
Precipitating event		
Infections	4.17	65
Metabolic	5.00	10
Illicit drug use	3.50	6
Poisoning	3.74	19
Type of delirium		
Hyper active	4.00	48
Hypo active	5.60	25
Mixed	4.30	27

Table-6: Means of SAPS-II scores

In hospital outcome	Mean of SAPs II score	Total (N=100)
Discharge	30.72	18
Transfer to medicine	22.90	62
Transfer to speciality ward	34.66	9
Death	37.27	11
Mean score for group	26.95	

Table-7: Effects of Environmental factors

Factors	Mean days in delirium	N=100
Presence of day light		
Yes	4.09	79
No	5.95	21
Presence of clock		
Yes	4.42	73
No	4.62	27
Use of physical restraints		
Yes	4.17	60
No	4.95	40

Table-8: The outcome of precipitating agent and type of Delirium

FACTORS	IN HOSPITAL DISCHARGE	OUTCOME TRANSFER TO MEDICINE WARD	TRANSFER TO OTHER WARD	DEATH	Total
PRECIPITATING EVENT					
Infective causes	16	36	4	9	65
Metabolic causes	1	5	3	1	10
Illicit drug use	1	4	0	1	6
Poisoning	0	17	2	0	19
Total	18	62	9	11	100
TYPE OF DELIRIUM					
Hyperactive	9	26	5	8	48
Hypoactive	4	17	2	2	25
Mixed	5	19	2	1	27
Total	18	62	9	11	100

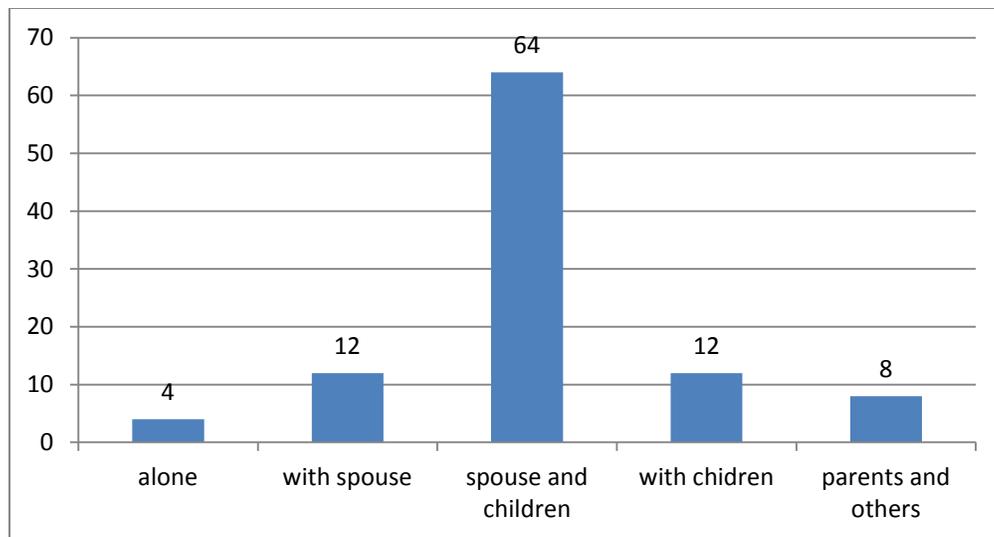**Figure-1: Living arrangement among study group**
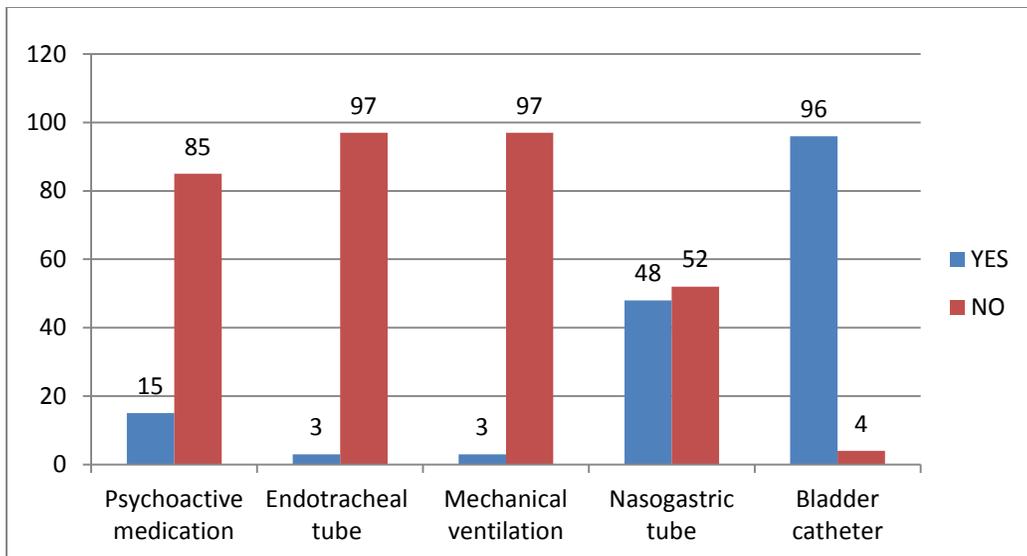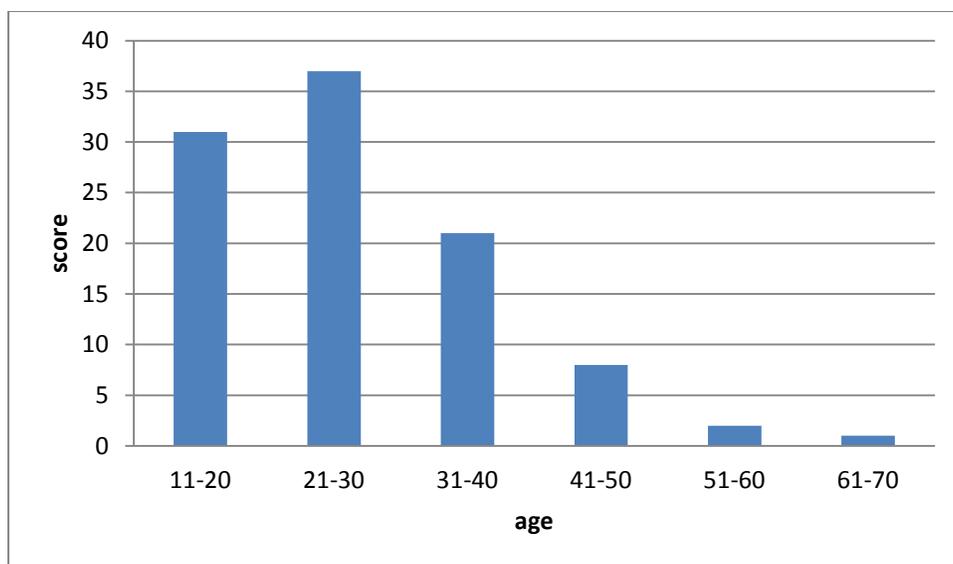

Figure-2: Precipitating agents

Figure-3: Distribution of SAPS-II score

CONCLUSION

Our study is a cross sectional, descriptive study conducted in medical intensive care unit for a period of six months to study the cause and effect of delirium over outcome of patients. One hundred cases were studied for their socio-demographic data, predisposing factors, precipitating factors and environmental factors. Using appropriate statistical methodology the following conclusions were drawn. Mean days spent in delirium were greater in men, making male gender a predisposing factor for delirium and increased as the age increased. Majority of people in the study group fall under 50 years of age and living alone had no impact over predisposition to delirium which is contrast to Van Rompaey et a.Majority of study group belonged to lower socio-economic status. Substance abuse was present in 57% of population making it a significant

predisposing factor for delirium. Our study also concluded that type of delirium had no statistically significant effect over outcome and other predisposing factors like chronic diseases were observed to be less in incidence due to the higher number of younger population in the study group but Infectious diseases were the most common cause of delirium in the study group and its outcome resulted either in higher number of deaths or prolonged hospital stay when compared to outcome of delirium in patients with poisoning. The mean score of SAPS-II for development of delirium was 27 (26.95).The mean SAP score was considerably higher in the death group compared to the other groups and the differences are also significant with P<0.001. This is contrast to the Van Rompaey et al which concluded that SAPS-II higher than 40 were at a higher risk of delirium.

REFERENCES

[1] Timothy D Girard, Pratik P Pandharipande and E Wesley Ely. Delirium in the intensive care unit Critical Care 2008, 12 (Suppl-3).

[2] Yu-Ling Chang, Yun-Fang Tsai, Pyng-Jing Lin, Min-Chi Chen and Chia-Yih Liu. Prevalence and Risk Factors for Postoperative Delirium in a Cardiovascular Intensive Care Unit.American Journal of Critical Care, November 2008, Volume 17, No. 6.

[3] Inouye SK, Charpentier PA. Precipitating factors for delirium in hospitalized elderly persons: predictive model and interrelationship with baseline vulnerability. JAMA 1996; 275:852–857.

[4] Inouye SK: Deli0rium in older persons. N Engl J Med 2006, 354:1157-1165.

[5] Bart Van Rompaey et al. Risk factors for delirium in intensive care patients: a prospective cohort study, Critical Care 2009, 13:R77.

[6] Le Gall JR, Lemeshow S, Saulnier F. A new Simplified Acute Physiology Score (SAPS II) based on a European/North American multicenter study. JAMA 1994 May 4; 271(17):1321.

[7] Brenda T. Pun and E. Wesley Ely, The Importance Of Diagnosing and Managing ICU Delirium Chest 2007; 132; 624-636.

[8] Webb JM, Carlton EF, and Geeham DM. Delirium in the intensive care unit: are we helping the patient? Crit Care Nurs Q 2000; 22:47–60.

[9] Ouimet S, Kavanagh BP, Gottfried SB, et al. Incidence, risk factors and consequences of ICU delirium. Intensive Care Med 2007; 33:66–73.

[10] Dubois MJ, Bergeron N, Dumont M, et al. Delirium in an intensive care unit: a study of risk factors. Intensive Care Med 2001; 27:1297–1304.

[11] Jacobson S, Dwyer P, Machan J, Carskadon M: Quantitative analysis of rest-activity patterns in elderly postoperative patients with delirium: support for a theory of pathologic wakefulness. J Clin Sleep Med 2008, 4:137-142.

[12] Taguchi T, Yano M, and Kido Y: Influence of bright light therapy on postoperative patients: A pilot study. Intensive Crit Care Nurs 2007, 23:289-297.

[13] Aldemir M, Ozen S, Kara I, Sir A, Bac B: Predisposing factors for delirium in the surgical intensive care unit. Crit Care 2001, 5:265-270.

[14] Pandharipande PP, Shintani A, Peterson JF, Pun BT, Wilkinson GR, Dittus RS, Bernard G, Ely EW: Lorazepam is an independent risk factor for transitioning to delirium in intensive care unit patients. Anesthesiology2006, 104:21-26.

[15] Pisani MA, Murphy TE, Van Ness PH, Araujo KLB, and Inouye SK: Characteristics associated with delirium in older patients in a medical intensive care unit. *Arch Intern Med* 2007.