Hospital Mortality in Elderly Patients Admitted to Surgical Intensive Care Units at a Tertiary Referral Hospital in Thailand

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Objective: *The number of elderly patients admitted to intensive care unit (ICU) has been increased worldwide. Elderly patients are subjected to various physiologic changes related to aging process and it has been recognized that aging is an important predictor for mortality. The aim of this present study is to determine the hospital mortality and its associated risk factors in elderly patients admitted to general surgical ICU at a tertiary referral hospital in Thailand.*

Material and Method: *This was an analytic study that used database from the prospective observational cohort study conducted in two general surgical ICUs at Siriraj Hospital between April 2011 and November 2012. Elderly patients were defined as patients whose age of more than 70 years old. Demographic data and clinical outcomes were collected. The adjusted logistic regression analysis was performed to identify independent risk factors for hospital mortality.*

Results: *There were 377 elderly patients admitted to two general surgical ICUs, which was accounted for 41.7% of all admission and their mortality was 12.5% (95% CI 9.4 to 16.3). Three independent risk factors for hospital mortality in elderly patients admitted to ICU included APACHE II score of more than 15 (adjusted OR 6.79, 95% CI 3.29 to 14.79) and presence of coagulation and cardiovascular dysfunction at ICU admission (adjusted OR 3.72, 95% CI 1.52 to 9.09 and adjusted OR 2.65, 95% CI, 1.22 to 5.76; respectively).*

Conclusion: *Hospital mortality in elderly patients admitted to general surgical ICU was 12.5%. Among elderly patients, severity of acute illness was an important risk factor for hospital mortality.*

Keywords: *Elderly, Surgical, Critically ill, Intensive care unit, Mortality*

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People whose age of more than 65 years old are generally considered as elderly. The number of elderly has been increased worldwide[1]. In Thailand, the number of elderly defined as those whose age of equal or more than 60 years old has been increased from four million (6.8% of total population) in 1994 to ten million (14.9%) in 2014[2]. As a consequence, the number of elderly seeking medical care has been increased. It has been well recognized that elderly are subjected to various physiologic changes related to aging process including cardiovascular, pulmonary, metabolism, immunity, and cognitive function[3,4]. These changes result in limited physiological reverse in elderly and put them at risk for poor response to acute illness, injury or stress and subsequently rapid deterioration. In term of critical care, elderly patients required admission to intensive care unit (ICU) has also been increased. Previous studies in medical, surgical and mixed medical-surgical elderly patients admitted to ICU with different cut-off age reported short-term mortality ranged between 17.0 and 38.8%[5-12] and 180-day mortality of 28.3%[13]. Various factors have been proposed as predictors of outcomes in elderly patients admitted to ICU such as aging, acute illness, and comorbidity[14]. Since, the data of elderly patients in general surgical ICU is limited, the aim of this present study were to determine the hospital mortality and to identify factors associated with hospital mortality in elderly patients admitted to general surgical ICU.

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Material and Method

Study design and patient population

This analytic study used database from the prospective observational cohort study that was

approved by the Institutional Review Board (Si 271/2010) and conducted in two general surgical ICUs at Siriraj Hospital between April 18th, 2011 and November 13th, 2012 with the aim of reporting adverse events and clinical outcomes in patients admitted to ICU. The study included all adult patients whose age of 18 years old or more and admitted to two general surgical ICUs at Siriraj Hospital and excluded patients who had their ICU length of stay (LOS) of less than six hours, those who were moribund cases, cardiac, neurosurgical and medical patients as well as foreigners (due to language barrier). An informed consent was obtained from each participant or their next of kin. In the present study, elderly patients defined as those whose age of more than 70 years old were included.

Data collection

Demographic data including age, gender, comorbidities, the Charlson comorbidity index[15], sources (operating theater, ward, other ICU or emergency room) and types (after elective or emergency surgery or non-postoperative admission) of ICU admission, severity of illness including the Acute Physiology and Chronic Health Evaluation (APACHE) II score and the Sequential Organ Failure Assessment (SOFA) score, presence of organ dysfunction at ICU admission including respiratory, renal, cardiovascular, coagulation and hepatobiliary systems and laboratory values at ICU admission including hemoglobin level, serum albumin and serum creatinine were collected. Organ dysfunction was defined as SOFA score of 2 or more on respiratory, renal, coagulation, and hepatobiliary systems, and SOFA score of 1, 3, or 4 on cardiovascular system[16]. All included patients were followed-up daily until they were discharged from the ICU or until 28 days after ICU admission. New adverse events developed during their ICU stay including ICU-acquired infection, acute kidney injury (AKI), acute lung injury (ALI)/acute respiratory distress syndrome (ARDS), arrhythmias, myocardial infarction were monitored daily. ICU-acquired infection was defined as clinically suspected infection with antibiotics given or positive culture from sterile site; AKI as increasing in serum creatinine of more than 0.3 mg/dL from baseline; ALI/ARDS as bilateral infiltration on chest x-ray and no evidence of left atrial hypertension by clinical signs or pulmonary artery occlusion pressure of equal or less than 18 mmHg plus partial pressure of oxygen in arterial blood to fraction of inspired oxygen (PaO_2/FiO_2) ratio of equal or less than 300 for ALI and PaO_2/FiO_2 ratio of equal or less than 200 for ARDS; arrhythmias including atrial fibrillation, atrial flutter, multifocal atrial tachycardia, ventricular tachycardia, ventricular fibrillation, Torsad de pointes, atrioventricular block and sinus arrest; myocardial infarction as at least 2 of the following criteria: (1) positive troponin-T, (2) ischemic symptoms of more than 20 minutes, (3) ECG alterations[17]. ICU and hospital LOS as well as ICU and hospital discharge status (either alive or death) were also recorded.

Statistical analysis

The primary endpoint of this study was to determine the hospital mortality rate in elderly patients defined as patients whose age of more than 70 years old admitted to the ICU. In previous studies, hospital mortality in elderly patients reported ranged between 19.0 and 38.8%[5-11]. With estimated hospital mortality of 28% and 95% confidence interval (CI) of 5%, a sample size of 310 was required. For additional 20% inflation, a sample size of 372 was selected in the present study. The secondary endpoints were to identify risk factors associated with hospital mortality in elderly patients admitted to the ICU. Data were presented as number with percentage for categorical variables and mean with standard deviation (SD) or median with 25th and 75th percentile (P_{25} and P_{75}, respectively) for continuous variables when appropriate. All included elderly patients were categorized into survivor versus non-survivor according to their hospital discharge status (either alive or death, respectively). The difference between the two groups was compared using Person's Chi-squared test or Fisher's exact test for categorical variables and independent t-test or Mann Whitney U test for continuous variables. To identify the independent variables associated with hospital mortality, all of the variables that were statistically significant at *p*-values of less than 0.2 in the unadjusted analyses were simultaneously entered into the adjusted logistic regression analysis and the adjusted odds ratio (OR) with 95% CI of those independent variables associated with hospital mortality were then reported. For all analyses, a two-tailed test was performed and a *p*-value of less than 0.05 was considered statistical significance. Data were prepared and analyzed using PASW Statistics for Windows, 18.0 Chicago: SPSS Inc.

Results

Overall, there were 903 patients admitted to the ICU during the study period and elderly patients included in the present study were accounted for 377 (41.7%) patients. Elderly patients had mean (SD) age of

79.0 (5.8) years old and the majority of them were admitted following surgery (80.4%) with a half following elective surgery and one forth following emergency surgery. Their median (P_{25}, P_{75}) APACHE II score and SOFA score were 11 (8, 15) and 2 (1, 5), respectively (Table 1).

Table 1 showed demographic data of 377 elderly patients admitted to the ICU compared between those who survived and did not survived to hospital discharge. Of these, 47 elderly patients did not survive to hospital discharge, which was translated to hospital mortality rate of 12.5% (95% CI, 9.4 to 16.3%). The hospital mortality in elderly patients was significant higher than that in younger patients (12.5% versus 6.5%, $p = 0.002$; OR, 2.06; 95% CI, 1.30 to 3.27). When compared with the elderly survivors, the elderly non-survivors significantly had higher rate of ICU admission from ward (31.9% versus 13.3%, $p<0.001$) as well as after emergency surgery (46.8% versus 23.6%, $p<0.001$) but lower rate of ICU admission from operating

Table 1. Demographic data of 377 elderly patients admitted to the intensive care unit compared between those who survived and did not survive to hospital discharge

	n (%), mean (SD), median (P_{25}, P_{75})			*p*-value
	All (n = 377)	Survivor (n = 330)	Non-survivor (n = 47)	
Age, year	79.00 (5.8)	78.90 (5.8)	80.00 (5.9)	0.20
Male gender	199 (52.8)	174 (52.7)	25 (53.2)	0.95
Comorbidity				
Hypertension	275 (72.9)	243 (73.6)	32 (68.1)	0.42
Coronary artery disease	99 (26.3)	90 (27.3)	9 (19.1)	0.24
Stroke	42 (11.1)	38 (11.5)	4 (8.5)	0.54
Vascular diseases	44 (11.7)	37 (11.2)	7 (14.9)	0.46
Chronic obstructive pulmonary disease	27 (7.2)	26 (7.9)	1 (2.1)	0.23
Diabetes mellitus	104 (27.6)	89 (27.0)	15 (31.9)	0.48
Chronic kidney disease	46 (12.2)	38 (11.5)	8 (17.0)	0.28
Charlson comorbidity index	1 (0, 3)	1 (0, 3)	1 (0.50, 3.5)	0.23
ICU admission source				
Operating theater	303 (80.4)	273 (82.7)	30 (63.8)	<0.01
Ward	59 (15.6)	44 (13.3)	15 (31.9)	<0.01
Other ICU	6 (1.6)	5 (1.5)	1 (2.1)	0.55
Emergency room	9 (2.4)	8 (2.4)	1 (2.1)	>0.99
Type of ICU admission				
Elective surgery	210 (55.7)	197 (59.7)	13 (27.7)	<0.01
Emergency surgery	100 (26.5)	78 (23.6)	22 (46.8)	<0.01
Non-postoperative admission	67 (17.8)	55 (16.7)	12 (25.5)	0.14
APACHE II score	11 (8, 15)	10 (8, 13)	18 (14, 25)	<0.01
SOFA score	2 (1, 5)	2 (0, 4)	7 (3, 11)	<0.01
Organ dysfunction at ICU admission				
Respiratory	94 (24.9)	75 (22.7)	19 (40.4)	<0.01
Renal	70 (18.6)	53 (16.1)	17 (36.2)	<0.01
Cardiovascular	59 (15.6)	38 (11.5)	21 (44.7)	<0.01
Coagulation	39 (10.3)	26 (7.9)	13 (27.7)	<0.01
Hepatobiliary	38 (10.1)	27 (8.2)	11 (23.4)	<0.01
Laboratory values at ICU admission				
Hemoglobin, g/dL	10.60 (1.8)	10.70 (1.8)	9.90 (2.0)	<0.01
Albumin, g/dL	2.90 (0.7)	2.90 (0.7)	2.60 (0.8)	0.02
Creatinine, mg/dL	1.50 (1.4)	1.40 (1.3)	2.20 (1.8)	0.01

APACHE II = Acute Physiology and Chronic Health Evaluation II score; LOS = length of stay = P_{25}, 25^{th} percentile; P_{75} = 75^{Th} percentile; SD = standard deviation; SOFA = Sequential Organ Failure Assessment score

theater (63.8% versus 82.7%, $p<0.001$) and after elective surgery (27.7% versus 59.7%, $p<0.001$). The elderly non-survivors significantly had higher APACHE II score (median 18 [P_{25}, P_{75}; 14, 25] versus median 10 [P_{25}, P_{75}; 8, 13], $p<0.001$) as well as SOFA score (median 7 [P_{25}, P_{75}; 3, 11] versus median 2 [P_{25}, P_{75}; 0, 4], $p<0.001$), higher rate of organ dysfunction including respiratory (40.4% versus 22.7%, $p<0.001$), renal (36.2% versus 16.1%, $p<0.001$), cardiovascular (44.7% versus 11.5%, $p<0.001$), coagulation (27.7% versus 7.9%, $p<0.001$) and hepatobiliary systems (23.4% versus 8.2%, $p<0.001$) and lower hemoglobin level (9.9±2.0 g/dL versus 10.7±1.8 g/dL, $p<0.001$), lower serum albumin (2.6±0.8 g/dL versus 2.9±0.7 g/dL, $p = 0.02$) and higher serum creatinine (2.2±1.8 mg/dL versus 1.4±1.3 mg/dL, $p = 0.01$) at ICU admission.

Regarding clinical outcomes (Table 2), the elderly non-survivors significantly had higher rate of new arrhythmias developed during ICU stay (10.6% versus 3.3%, $p = 0.04$) as well as longer ICU and hospital LOS (median 4 [P_{25}, P_{75}; 1, 19.5] days versus median 2 [P_{25}, P_{75}; 1, 5] days, $p<0.001$ and median 34 [P_{25}, P_{75}; 10, 64.5] days versus median 16 [P_{25}, P_{75}; 9, 27] days, $p<0.001$, respectively).

To determine the independent variables associated with the hospital mortality, the logistic regression analysis was performed, in which the hospital mortality was entered in the model as the dependent variable and variables were entered as covariates including ICU admission from operating theater and from ward, ICU admission after elective and emergency surgery, APACHE II score of more than 15, presence of organ dysfunction at ICU admission, hemoglobin level at ICU admission of less than 8 g/dL and ICU LOS of more than 7 days. Table 3 demonstrated that the independent risk factors for hospital mortality

Table 2. Clinical outcomes of 377 elderly patients admitted to the intensive care unit compared between those who survived and did not survive to hospital discharge

	n (%), median (P_{25}, P_{75})			*p*-value
	All (n = 377)	Survivor (n = 330)	Non-survivor (n = 47)	
Adverse events in ICU				
Infection	97 (25.7)	82 (24.8)	15 (31.9)	0.30
Acute kidney injury	57 (15.1)	47 (14.2)	10 (21.3)	0.21
ALI/ARDS	10 (2.7)	8 (2.4)	2 (4.3)	0.36
Arrhythmias	16 (4.2)	11 (3.3)	5 (10.6)	0.04
Myocardial infarction	6 (1.6)	6 (1.8)	0 (0.0)	>0.99
ICU LOS, day	2 (1, 5)	2 (1, 5)	4 (1, 19.5)	<0.01
Hospital LOS, day	16 (9, 30)	16 (9, 27)	34 (10, 64.5)	<0.01

ALI/ARDS = acute lung injury/acute respiratory distress syndrome; ICU = intensive care unit; LOS = length of stay; P_{25} = 25th percentile; P_{75} = 75Th percentile

Table 3. Independent risk factors for hospital mortality in elderly patients admitted to the intensive care unit

	Adjusted odds ratio*	95% confidence interval	*p*-value
APACHE II score >15	6.97	3.29-14.79	<0.01
Coagulation dysfunction at ICU admission	3.72	1.52-9.09	<0.01
Cardiovascular dysfunction ICU at admission	2.65	1.22-5.76	0.01

* Variables entered as covariates in the logistic regression analysis included ICU admission from operating theater and from ward, ICU admission after elective and emergency surgery APACHE II score of more than 15, presence of organ dysfunction at ICU admission, hemoglobin level at ICU admission of less than 8 g/dL and ICU length of stay of more than 7 days.
APACHE II=Acute Physiology and Chronic Health Evaluation II score; ICU = intensive care unit

in elderly patients admitted to the ICU included APACHE II score of more than 15 (adjusted OR, 6.97; 95% CI, 3.29 to 14.79; $p<0.001$) and presence of coagulation and cardiovascular dysfunction at ICU admission (adjusted OR, 3.72; 95% CI, 1.52 to 9.09; $p<0.001$ and adjusted OR, 2.65; 95% CI, 1.22 to 5.76; $p = 0.01$, respectively).

Discussion

The main findings of the present study were that (1) elderly patients were accounted for 41.7% of patients admitted to general surgical ICUs and their hospital mortality rate was 12.5%, (2) among elderly patients admitted to ICU, severity of illness, presence of coagulation and cardiovascular dysfunction at ICU admission were identified as independent risk factors for hospital mortality, and (3) elderly patients had significantly higher hospital mortality than younger patients.

As mentioned earlier, elderly are subjected to various physiological changes related to aging process with limited physiological reverse that could result in poor response to acute illness, injury or stress and subsequently rapid deterioration[3,4]. In the present study, hospital mortality rate in elderly patients was significantly higher than that in younger patients (12.5% versus 6.5%). However, it was substantially lower compared to those reported in previous studies, which ranged between 19.0 and 38.8 %[5-11]. This discrepancy could be explained, in part, by the difference in patient population. This study mainly focused on elderly patients admitted to general surgical ICU while others did on medical[11] or mixed medical-surgical population[5-9]. Nevertheless, there is a conflict regarding mortality rate reported among surgical elderly patients. Fort el al[10] reported as high as 33.3% hospital mortality in patients whose age of more than 80 years old admitted to ICU following surgery. Meanwhile, Zampieri et al[6] revealed that surgical patients whose age of equal or more than 80 years old had as low as 9.5% hospital mortality. Actually, surgical elderly patients seemed to have lower mortality than medical ones[5-7]. In the recent review article[1], Nguyen et al pointed out that planned surgical elderly patients rather than unplanned surgical or medical ones might take advantage of ICU admission. Moreover, there was also difference in the cut-off age to define elderly among studies. In general, people with chronological age of more than 65 years old are considered as elderly. However, not only chronological age but also physiologic changes related to aging especially cardiopulmonary reserve and cognitive function should be taken into account. Recent study suggested that on the basis of physical activity, functional independency as well as clinical and pathological data, definition of elderly should be those whose age of more than 75 years old instead of more than 65 years old[18]. In this present study, the cut-off age of 70 years old was chosen as this should represent both chronological and physiological age and could cover more than 40% of patients admitted to ICU. Finally, the difference in severity of illness might result in the difference in mortality rate reported among studies. The patient population in the present study seemed to have less severity of illness as reflected by lower APACHE II score and SOFA score compared with other studies[7-10].

Aging has been identified as an independent risk factor for mortality in most critically ill patients[5,8]. The present study was similarly demonstrated that elderly patients admitted to general surgical ICU had significantly higher hospital mortality than younger patients. Nevertheless, it should be kept in mind that there might be selection bias on admission of elderly patients to ICU[4,14]. Some intensivists might prefer admission of sicker patients to ICU, some might be reluctant to admit elderly patients to ICU or some elderly patients and their relatives might refuse to receive aggressive treatment in ICU[14]. In such a way, most studies, including the present study, studied on the "preselected" elderly patient population, which meant that the association between aging and mortality might be over- or underestimated. de Rooij et al suggested in their review article[14] that other factors related to aging process as well as severity of acute illness rather than aging per se potentially impact clinical outcomes in elderly patients.

There are three independent risk factors for hospital mortality identified in this present study; APACHE II score of more than 15 and presence of coagulation and cardiovascular dysfunction at ICU admission. Since, the majority of studies have determined severity of illness as a potential predictor for mortality in elderly patients[6-9,12,13], this factor should be considerate as one of potential factors that impact clinical outcomes in elderly patients[14]. As a consequence of aging process[3,4], elderly patients usually have decreased cardiovascular reserve and put them at risk for rapid deterioration. As shown in previous studies[5,10,13] that the presence of cardiovascular dysfunction manifested by requirement of vasoactive agents was reported as a predictor for

mortality in elderly patients, the present study revealed the similar result. Causes of thrombocytopenia in critically ill patients are multifactorial involving decreased production and increased destruction of platelets[19]. Approximately one forth of patients had thrombocytopenia at ICU admission[20,21] and they seemed to have higher mortality than those without thrombocytopenia[20]. The presence of thrombocy topenia is considered as a marker of severity of acute illness rather than direct cause of death in critically ill patients[19]. Other factors associated with mortality in elderly patients that identified in previous studies such as male gender[9], comorbidities[8,11,13], performance status prior to admission[6,9], emergency admission[13], requirement of mechanical ventilation[12,13] or renal replacement therapy[11,13] were not identified in the present study. However, most of those factors seemed to relate to aging process and marker of severity of illness of elderly patients.

There were some limitations in the present study deserved to discuss. Firstly, the target population of the present study was elderly patients whose age of more than 70 years old admitted to general surgical ICU, the results might be not able to extrapolate to general elderly patient population. The difference in patient setting (general ward versus ICU or medical versus surgical patients) and cut-off age of elderly could result in different results and patient outcomes. Secondly, as a retrospective study design, some unmeasured factors that potentially impact clinical outcomes might not be included in the analysis. For example, performance status prior to ICU admission should be a good indicator of cardiopulmonary reserve in elderly patients but it could not be explored in the present study. Thirdly, the present study mainly focused on variables indicated comorbidity and severity of illness at ICU admission, variables during time course in ICU and after ICU discharge were not taken in to account. These variables might impact patient outcomes as well. Fourthly, the present study was not primary designed to detect risk factors for mortality in elderly patients. Therefore, it might not have enough power to identify other potential risk factors in this setting. Lastly, the present study did not focus on the long-term clinical outcomes such as one-year survival or performance status or quality of life following hospital discharge, which should be considered as relevant clinical outcomes in elderly patients.

Conclusion

Elderly patients admitted to general surgical ICU were accounted for 41.7% of all admission and their hospital mortality was 12.5%. Elderly patients had significantly higher hospital mortality than younger patients. This might be due to physiologic changes related to aging process with decreased cardiopulmonary reserve rather than aging per se. Three potential risk factors for hospital mortality in elderly patient admitted to general surgical ICU were identified; severity of illness, presence of cardiovascular and coagulation dysfunction at ICU admission. Further studies are warranted to determine whether strategies such as early detection, early ICU admission, and early management will improve outcomes in these patients or not.

What is already known on this topic?

As a consequence of aging process, elderly patients are subjected to various physiologic changes and subsequently limited cardiopulmonary reserve. Aging is generally considerate as a predictor of mortality. Mortality in elderly patients admitted to ICU reported in previous studies ranged between 17.0 and 38.8%. Nevertheless, the data regarding hospital mortality and its associated risk factors in elderly patients admitted to general surgical ICU is limited.

What this study adds?

The present study demonstrated that hospital mortality in elderly patients admitted to general surgical ICU was 12.5%, which was relatively lower than those previously reported. Among elderly patients admitted to general surgical ICU, severity of acute illness, which was indicated by illness severity scoring and organ dysfunction, was an independent predictor for hospital mortality.

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Trial registration

Clinicaltrials.gov; NCT01354197.

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Potential conflicts of interest

None.

References

1. Nguyen YL, Angus DC, Boumendil A, Guidet B. The challenge of admitting the very elderly to intensive care. Ann Intensive Care 2011; 1: 29.
2. National Statistical Office, Ministry of Information and Communication Technology, Thailand. The 2014 survey of the older persons in Thailand [Internet]. 2014 [cited 2017 Apr 1]. Available from:http://service.nso.go.th/nso/nsopublish/themes/files/elderlyworkFullReport57-1.pdf.
3. Marik PE. Management of the critically ill geriatric patient. Crit Care Med 2006; 34 (9 Suppl): S176-82.
4. Pisani MA. Considerations in caring for the critically ill older patient. J Intensive Care Med 2009; 24: 83-95.
5. Becker S, Muller J, de Heer G, Braune S, Fuhrmann V, Kluge S. Clinical characteristics and outcome of very elderly patients >/=90 years in intensive care: a retrospective observational study. Ann Intensive Care 2015; 5: 53.
6. Zampieri FG, Colombari F. The impact of performance status and comorbidities on the short-term prognosis of very elderly patients admitted to the ICU. BMC Anesthesiol 2014; 14: 59.
7. Vosylius S, Sipylaite J, Ivaskevicius J. Determinants of outcome in elderly patients admitted to the intensive care unit. Age Ageing 2005; 34: 157-62.
8. Fuchs L, Chronaki CE, Park S, Novack V, Baumfeld Y, Scott D, et al. ICU admission characteristics and mortality rates among elderly and very elderly patients. Intensive Care Med 2012; 38: 1654-61.
9. Le Maguet P, Roquilly A, Lasocki S, Asehnoune K, Carise E, Saint MM, et al. Prevalence and impact of frailty on mortality in elderly ICU patients: a prospective, multicenter, observational study. Intensive Care Med 2014; 40: 674-82.
10. Ford PN, Thomas I, Cook TM, Whitley E, Peden CJ. Determinants of outcome in critically ill octogenarians after surgery: an observational study. Br J Anaesth 2007; 99: 824-9.
11. Mukhopadhyay A, Tai BC, See KC, Ng WY, Lim TK, Onsiong S, et al. Risk factors for hospital and long-term mortality of critically ill elderly patients admitted to an intensive care unit. Biomed Res Int 2014; 2014: 960575.
12. Reyes JC, Alonso JV, Fonseca J, Santos ML, Jimenez ML, Braniff J. Characteristics and mortality of elderly patients admitted to the Intensive Care Unit of a district hospital. Indian J Crit Care Med 2016; 20: 391-7.
13. Shum HP, Chan KC, Wong HY, Yan WW. Outcome of elderly patients who receive intensive care at a regional hospital in Hong Kong. Hong Kong Med J 2015; 21: 490-8.
14. deRooij SE, Abu-Hanna A, Levi M, de Jonge E. Factors that predict outcome of intensive care treatment in very elderly patients: a review. Crit Care 2005; 9: R307-R314.
15. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis 1987; 40: 373-83.
16. Caironi P, Tognoni G, Masson S, Fumagalli R, Pesenti A, Romero M, et al. Albumin replacement in patients with severe sepsis or septic shock. N Engl J Med 2014; 370: 1412-21.
17. Chittawatanarat K, Chaiwat O, Morakul S, Pipanmekaporn T, Thawitsri T, Wacharasint P, et al. A multi-center Thai university-based surgical intensive care units study (THAI-SICU study): methodology and ICU characteristics. J Med Assoc Thai 2014; 97 (Suppl 1): S45-54.
18. Orimo H, Ito H, Suzuki T, Araki A, Hosoi T, Sawabe M. Reviewing the definition of "elderly". Geriatr GerontolInt 2006; 6: 149-58.
19. Parker RI. Etiology and significance of thrombocytopenia in critically ill patients. Crit Care Clin 2012; 28: 399-411.
20. Crowther MA, Cook DJ, Meade MO, Griffith LE, Guyatt GH, Arnold DM, et al. Thrombocytopenia in medical-surgical critically ill patients: prevalence, incidence, and risk factors. J Crit Care 2005; 20: 348-53.
21. Venkata C, Kashyap R, Farmer JC, Afessa B. Thrombocytopenia in adult patients with sepsis: incidence, risk factors, and its association with clinical outcome. J Intensive Care 2013; 1: 9.

อัตราการเสียชีวิตในโรงพยาบาลในผู้ป่วยสูงอายุที่เข้ารับการรักษาในหออภิบาลผู้ป่วยวิกฤตทางศัลยกรรม ณ โรงพยาบาลระดับตติยภูมิในประเทศไทย

อรรณพ พิริยะแพทย์สม, อรอุมา ชัยวัฒน์, สุณีรัตน์ คงเสรีพงศ์

วัตถุประสงค์: *จำนวนผู้ป่วยสูงอายุที่เข้ารับการรักษาในหออภิบาลมีปริมาณเพิ่มขึ้นทั่วโลก ผู้ป่วยสูงอายุ จะมีการเปลี่ยนแปลงของระบบการทำงานต่างๆ เนื่องจากอายุที่เพิ่มขึ้น และความชราภาพนี้ถือเป็นปัจจัยเสี่ยงของการเสียชีวิต จุดประสงค์ของการศึกษานี้ คือ เพื่อหาอัตราการเสียชีวิตในโรงพยาบาลและปัจจัยเสี่ยงที่สัมพันธ์กับการเสียชีวิตนี้ในผู้ป่วยสูงอายุที่เข้ารับการรักษาในหออภิบาลผู้ป่วยวิกฤตทางศัลยกรรม ณ โรงพยาบาลระดับตติยภูมิในประเทศไทย*

วัสดุและวิธีการ: *การศึกษานี้เป็นการศึกษาจากข้อมูลที่มีการเก็บแบบไปข้างหน้าในผู้ป่วยที่เข้ารับการรักษาในหออภิบาลผู้ป่วยวิกฤตทางศัลยกรรม ณ โรงพยาบาลศิริราชระหว่าง เดือนเมษายน พ.ศ. 2554 ถึง เดือนพฤศจิกายน พ.ศ. 2555 ผู้ป่วยสูงอายุ หมายถึง ผู้ป่วยที่มีอายุมากกว่า 70 ปี ข้อมูลพื้นฐานและผลลัพธ์ทางคลินิกจะได้รับการบันทึก ปัจจัยที่มีผลต่อการเสียชีวิตในโรงพยาบาลจะถูกวิเคราะห์ด้วยวิธีการวิเคราะห์การถดถอยพหุคูณ*

ผลการศึกษา: *ผู้ป่วยสูงอายุที่เข้ารับการรักษาในหออภิบาลผู้ป่วยวิกฤตทางศัลยกรรมมีจำนวนทั้งสิ้น 377 ราย คิดเป็นร้อยละ 41.7 ของจำนวนผู้ป่วยทั้งหมดที่เข้ารับการรักษาในหออภิบาลผู้ป่วยวิกฤตทางศัลยกรรม อัตราการเสียชีวิตในโรงพยาบาลในผู้ป่วยสูงอายุกลุ่มนี้เท่ากับร้อยละ 12.5 ปัจจัยที่มีผลต่อการเสียชีวิตในโรงพยาบาล ในผู้ป่วยสูงอายุที่เข้ารับการรักษาในหออภิบาลผู้ป่วยวิกฤตทางศัลยกรรม ได้แก่ คะแนน APACHE II ที่มากกว่า 15 (adjusted OR 6.79, 95%CI 3.29 ถึง 14.79) และการทำงานของระบบการแข็งตัวของเลือดและระบบการไหลเวียนเลือดล้มเหลว ณ เวลาที่เข้ารับการรักษาในหออภิบาลผู้ป่วยวิกฤตทางศัลยกรรม (adjusted OR 3.72, 95% CI 1.52 ถึง 9.09 และ adjusted OR 2.65, 95% CI 1.22 ถึง 5.57 ตามลำดับ)*

สรุป: *ผู้ป่วยสูงอายุที่เข้ารับการรักษาในหออภิบาลผู้ป่วยวิกฤตทางศัลยกรรมมีอัตราการเสียชีวิตร้อยละ 12.5 สำหรับผู้ป่วยสูงอายุความรุนแรงของการเจ็บป่วยเป็นปัจจัยเสี่ยงที่สำคัญของการเสียชีวิตในโรงพยาบาล*