The Impacts of Surgical Intensive Care Unit Admission Source on Morbidity and Mortality Outcomes: The Results from the THAI-SICU Study

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Objective: *The present study aims to examine the association between admission source and outcomes in surgical ICU (SICU) patients.*
Material and Method: *The data in the present report were retrieved from the THAI-SICU database which was designed as a multi-center prospective observational study. The data were collected at 9 university-based surgical ICUs over 22 months from April 2011 to January 2013.*
Results: *The sources of SICU admissions were categorized into operating room (OR) group with 3,238 admissions (69.6%), emergency room (ER) group with 499 admissions (10.7%), ward group with 825 admissions (17.7%), and other ICUs group with 90 admissions (1.9%). In view of transfer from other hospitals, the transfer group included 938 patients (20.2%) while the non-transfer group included 3,714 patients (79.8%). Patients admitted from other ICUs were nearly three-times more likely to die in SICU (adjusted odds ratio (OR) 2.89; 95% confidence interval (CI) 1.52-5.51, p = 0.001) than those who came from operating room. However, the ward group still had a high risk to dying (OR 2.49; 95 % CI 1.88-3.30, p<0.001). In view of outcomes for inter-hospital transfer patients, the transfer group was at greater risk of dying in SICU and had greater risk of 28-day mortality than the non-transfer group.*
Conclusion: *Surgical, critically ill patients, who transferred from other ICUs to SICU, have the highest risk of ICU morbidity and mortality. In addition, ward patients and transfer patients also have high risk of unfavorable outcomes.*

Keywords: *Surgical ICU, Critically ill, Admission source, Transferred patients, ICU outcomes*

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Critically ill patients are at high risk of death and therefore require intensive care units (ICU) which can provide the highest level of hospital care. However, admitted patient outcomes depend on multiple factors[1-4]. One of the most reliable predictors of outcomes is the ICU admission source. In previous studies[2-7], an association with mortality has been correlated with the source of ICU admission. For example, patients transferred from wards have been reported with the highest mortality rates compared to other admission sources[3-5]. Nowadays, there is greater demand for high quality ICU care but at the same time facilities are faced with a shortage of ICU beds despite efforts to increase their proportion in hospitals[8]. As a result, some critically ill patients cannot be provided care in ICU and have to be admitted to regular wards. Lack of proper care and monitoring of critically ill patients in regular wards can lead to serious adverse outcomes, increased mortality and decreased cost effectiveness[9]. Although the concept of early detection to extenuate serious adverse outcomes in ward patients has existed for more than a decade[10], nevertheless, the problem of high mortality rates in ICU patients transferred from wards is still substantial. Given limited information available on surgical, critically ill patients because the previous studies have mostly been conducted in medical or mixed ICU

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settings[2,11,12], the current study aims to examine the association between admission source and outcomes in surgical ICU (SICU) patients.

Material and Method

This report is a subdivision from the THAI-SICU study database[13] which was designed as a multi-center prospective observational study. The data were collected in 9 university-based surgical ICUs over 22 months from April 2011 to January 2013.

All patients over 18 years of age admitted to general surgical ICUs in 9 university-based hospitals were recruited to the study. The exclusion criteria were patients unlikely to obtain advantage from ICU admission. Patients in surgical ICU can come from a variety of sources. For the purposes of this study, we defined patients as in the operating Room (OR) group if they were admitted to ICU immediately after an operation, emergency room (ER) group if they were admitted to ICU after initial treatment in an emergency room, ward group if they were transferred from a ward to ICU in the same hospitals and other ICUs group if they had been transferred from other ICUs in the same hospital or from other ICUs in other hospitals. Because the trial was conducted in university-based hospitals where patients had transferred from community hospitals, we also classified the patients according to the transfer condition on admission as transfer group if they were transferred from another hospital and non-transfer group defined as patients initially admitted to a hospital in the study group. In the initial phase of the study, all patients were admitted to various units in the hospitals under study (ICU and non-ICU) and finally, the two groups were admitted to the surgical ICU.

Patient data collection was divided into three main phases according to the THAI-SICU study[13]; on admission, at discharge and all daily recorded data. On admission, the admission case record form (CRF) was used. Demographic data, admission source, underlying diseases, and diagnosis were recorded. During the ICU stay, daily CRFs were recorded and patients were followed until they were discharged from the ICU or up to 28 days of their ICU admission. These patients were followed-up to up to 28 days following discharge from the ICU if they survived.

All patients enrolled in this study completed the standard informed consent document. The research proposal and all CRFs were approved by the Thailand Joint Research Ethics Committees (JREC) as well as each institution's Ethics Committee (EC) or Institutional Review Board (IRB) prior to the collection of any data.

The data were analyzed with the STATA statistical program, version 11.0 (STATA Inc., College Station, TX). Descriptive data were reported as percentages in categorized data and mean $\pm$ standard deviations (SD) for continuous data with parametric distribution or median and interquartile range (IQR) for non-parametric distribution. Univariable analysis was used to compare the differences between the groups using a t-test, the Mann-Whitney U test, ANOVA or Kruskal-Wallis test for continuous variables at its distribution. The Chi-square or Fisher exact probability test was utilized for categorical data. Relationships between predictor and outcome variables were analyzed with regression analysis with univariable or multivariable controls. Statistically significant differences were defined as $p<0.05$.

Results

The data collected from 4,652 admissions in 9 university-based surgical ICUs in a 22-months period were analyzed. The sources of SICU admissions were categorized into OR group with 3,238 admissions (69.6%), ER group with 499 admissions (10.7%), ward group with 825 admissions (17.7%), and other ICUs group with 90 admissions (1.9%). The majority of the patients were male in all groups. The age of patients was recorded in median (IQR) and the difference in between groups was found to be statistically significant ($p<0.001$). In view of severity of disease that was recorded at the time of admission, there was a significant difference between groups both in the APACHE II score ($p<0.001$) and SOFA score ($p<0.001$) (Table 1).

The causes of SICU admission were categorized according to the main problems patients suffered from as shown in Table 1. Because the survey took place in SICU, the main reason for admission in each group was intra-abdominal lesions and the second most frequent reason was cardiovascular problems. Hypertension was the main underlying disease present while second most frequent in all groups was diabetes mellitus.

Data were also analyzed in view of transfer from other hospitals (Table 1). The transferred patients might be initially admitted to a ward, SICU, or set up for emergency surgery. The transfer group included 938 patients (20.2%) while the non-transfer group included 3,714 patients (79.8%). The majority of patients were male in both groups. The data show the APACHE II score in the transfer group was 13 (9-19) and 10 (6-15) for the non-transfer group. The causes of SICU admission were similar to those stated

Table 1. Baseline characteristics of surgical intensive care unit patients

	Admission source					Transfer from other hospital		
	OR (n = 3,238)	ER (n = 499)	Ward (n = 825)	Other ICUs (n = 90)	*p*-value	Non-transfer (n = 3,714)	Transfer (n = 938)	*p*-value
Age, median (IQR)	64 (51-75)	59 (44-74)	68 (55-77)	65 (56-78)	<0.001	65 (53-75)	60 (44-74)	<0.001
Male, n (%)	1,836 (56.70)	366 (67.33)	500 (60.61)	57 (63.33)	<0.001	2,104 (56.65)	625 (66.63)	<0.001
Diagnosis, n (%)								
Cardiovascular	481 (14.85)	113 (22.65)	131 (15.88)	14 (15.56)	<0.001	497 (13.38)	242 (25.80)	<0.001
Respiratory	201 (6.21)	22 (4.41)	131 (15.88)	7 (7.78)		290 (7.81)	71 (7.57)	
Abdominal (GI-HBP)	1,378 (42.56)	177 (35.47)	289 (35.03)	25 (27.78)		1,580 (42.54)	289 (30.81)	
Neuro-head-neck	182 (5.62)	20 (4.01)	29 (3.52)	5 (5.56)		205 (5.52)	31 (3.30)	
Sepsis	20 (0.62)	32 (6.41)	110 (13.33)	10 (11.11)		122 (3.28)	50 (5.33)	
Trauma	192 (5.93)	97 (19.44)	26 (3.15)	12 (13.33)		173 (4.66)	154 (16.42)	
Metabolic	67 (2.07)	3 (0.60)	11 (1.33)	1 (1.11)		76 (2.05)	6 (0.64)	
Hematological	1 (0.03)	0 (0.00)	1 (0.12)	0 (0.00)		2 (0.05)	0 (0.00)	
Renal-GU	310 (9.57)	13 (2.61)	44 (5.33)	6 (6.67)		345 (9.29)	28 (2.99)	
Ob-Gyn	108 (3.34)	4 (0.80)	12 (1.45)	0 (0.00)		105 (2.83)	19 (2.03)	
Musculo-skeletal-skin	252 (7.78)	16 (3.21)	36 (4.36)	6 (6.67)		268 (7.22)	42 (4.48)	
Others	46 (1.42)	2 (0.40)	5 (0.61)	4 (4.44)		51 (1.37)	6 (0.64)	
Underlying disease, n (%)								
Hypertension	1,630 (50.34)	184 (36.87)	409 (49.58)	45 (50.00)	<0.001	1,894 (51.00)	374 (39.87)	<0.001
CAD	335 (10.35)	23 (4.61)	91 (11.03)	11 (12.22)	<0.001	402 (10.82)	58 (6.18)	<0.001
CHF	60 (1.85)	10 (2.00)	31 (3.76)	6 (6.67)	<0.001	79 (2.13)	28 (2.99)	0.117
Vascular disease	163 (5.03)	29 (5.81)	72 (8.73)	4 (4.44)	0.001	213 (5.74)	55 (5.86)	0.880
Previous stroke	188 (5.81)	32 (6.41)	49 (5.94)	7 (7.78)	0.838	232 (6.25)	44 (4.69)	0.072
Other cardiovascular	265 (8.18)	30 (6.01)	69 (8.36)	7 (7.78)	0.394	307 (8.27)	64 (6.82)	0.145
Asthma	51 (1.58)	4 (0.80)	19 (2.30)	1 (1.11)	0.193	66 (1.78)	9 (0.96)	0.076
COPD	118 (3.64)	21 (4.21)	68 (8.24)	5 (5.56)	<0.001	160 (4.31)	52 (5.54)	0.105
Other respiratory	102 (3.15)	10 (2.00)	19 (2.30)	3 (3.33)	0.353	110 (2.96)	24 (2.56)	0.510
DM	712 (21.99)	69 (13.83)	212 (25.70)	25 (27.78)	<0.001	861 (23.18)	157 (16.74)	<0.001
Chronic renal failure	300 (9.26)	30 (6.01)	102 (12.36)	10 (11.11)	0.001	377 (10.15)	65 (6.93)	0.003
HIV positive/AIDS	12 (0.37)	1 (0.20)	5 (0.61)	0 (0.00)	0.604	14 (0.38)	4 (0.43)	0.827
Malignancy	478 (14.76)	61 (12.22)	175 (21.21)	13 (14.44)	<0.001	639 (17.21)	88 (9.38)	<0.001
Immune disease	39 (1.20)	7 (1.40)	10 (1.21)	0 (0.00)	0.738	44 (1.18)	12 (1.28)	0.812
Organ transplantation	18 (0.56)	0 (0.00)	6 (0.73)	1 (1.11)	0.281	24 (0.65)	1 (0.11)	0.043
Unknown	154 (4.76)	32 (6.41)	36 (4.36)	2 (2.22)	0.213	165 (4.44)	59 (6.29)	0.018
N/A	848 (26.19)	176 (35.27)	134 (16.24)	18 (20.00)	<0.001	884 (23.80)	292 (31.13)	<0.001
Severity of disease, median (IQR)								
APACHE II score	9 (6-13)	13 (9-19)	15 (10-20)	14 (9-22)	<0.001	10 (6-15)	13 (9-19)	<0.001
SOFA score	2 (0-4)	3 (1-6)	5 (2-7)	5 (2-9)	<0.001			

IQR = interquartile range, BMI = body mass index, GI-HBP = gastrointestinal-hepatobiliary and pancreatic, CAD = coronary artery disease, CHF = congestive heart failure, COPD = chronic obstructive pulmonary disease, DM = diabetes mellitus, PA = pulmonary artery, CO = cardiac output

above as the main cause was intra-abdominal lesion and the second was cardiovascular problems. The most common underlying disease was hypertension and the second was diabetes mellitus in both groups.

The outcomes of interest for this study's purposes were ICU morbidity and mortality (Table 2). The data reveal an ICU mortality rate for the OR group of 5.1%, the ER group was 14.6%, the ward group 22.6%, and for the other ICUs group it was 24.4% ($p<0.001$). The 28-day mortality was similar to the outcomes of ICU mortality ($p<0.001$). Considering levels of morbidity, in terms of ICU length of stay, hospital length of stay and days on ventilator, the results show the most unfavorable outcomes were confined to the other ICUs group and the ward group. ICU morbidity and mortality of transfer patients were also analyzed in comparison with the non-transfer group. The ICU mortality rate was 17.1% versus 7.7% and 28-day mortality was 22.1% versus 11.7% with the transfer group the higher. ICU length of stay and ventilator days were also significantly higher in the transfer group.

Table 3 presents the adjusted odds ratio (OR) of ICU mortality and 28-day mortality and the adjusted coefficient for ICU morbidity. All of the results were adjusted for admission APACHE II score, age, sex, and admission diagnosis. Patients admitted from other ICUs were nearly three-times more likely to die in SICU (OR 2.89; 95% CI 1.52-5.51, $p = 0.001$) than those who came from OR, defined as the reference group. However, the ward group still had a high risk of dying (OR 2.49; 95% CI 1.88-3.30, $p<0.001$). The data for 28-day mortality show a high adjusted odds ratio of the other ICUs group (OR 3.43; 95% CI 1.96-5.99, $p<0.001$) and the ward group (OR 2.55; 95% CI 2.02-3.22, $p<0.001$). The adjusted coefficient for ICU morbidity demonstrates that the most unfavorable outcomes are still confined to the other ICUs and ward groups, but these outcomes were not consistent with the ER group. In view of outcomes for inter-hospital transfer patients, the transfer group was at greater risk of dying in SICU (OR 1.42; 95% CI 1.09-1.86, $p = 0.01$) and had greater risk of 28-day mortality (OR 1.28; 95% CI 1.02-1.61, $p = 0.033$) than the non-transfer group. In the adjusted coefficient analysis, the authors demonstrate the divergent outcomes of the transfer group.

Discussion

The study has shown the association between admission source and outcomes. The adjusted odds ratio of ICU mortality in the other ICUs group is

Table 2. The morbidity and mortality outcomes: according to the admission sources

	Admission source					Transfer from other hospital		
	OR (n = 3,238)	ER (n = 499)	Ward (n = 825)	Other ICUs (n = 90)	*p*-value	Non-transfer (n = 3,714)	Transfer (n = 938)	*p*-value
ICU mortality, n (%)	166 (5.13)	73 (14.63)	186 (22.55)	22 (24.44)	<0.001	287 (7.73)	160 (17.06)	<0.001
Day 28 mortality, n (%)	258 (7.97)	98 (19.64)	255 (30.91)	31 (34.44)	<0.001	435 (11.71)	207 (22.07)	<0.001
ICU length of stay, median (IQR)	1 (1-3)	3 (1-5)	4 (2-9)	5 (3-10)	<0.001	2 (1-3)	3 (1-6)	<0.001
Hospital length of stay, median (IQR)	14 (9-23)	12 (6-23)	21 (12-38)	21 (11.5-41)	<0.001	15 (9-26)	15 (8-27)	0.864
Ventilator day, median (IQR)	1 (1-3)	2 (1-6)	4 (2-9)	5 (3-12)	<0.001	2 (1-4)	3 (1-6)	<0.001

IQR = interquartile range, OR = operating room, ER = emergency room

Table 3. Multivariable analysis to determine the risk of admission sources on the morbidity and mortality outcomes

	Value	Adjusted value (95% CI)	*p*-value
ICU mortality			
Previous ICU admission source			
OR		Reference	
ER	Odds ratio	1.67 (1.17-2.39)	0.005
Ward	Odds ratio	2.49 (1.88-3.30)	<0.001
Other ICUs	Odds ratio	2.89 (1.52-5.51)	0.001
Transfer from other hospital			
Non-transfer		Reference	
Transfer	Odds ratio	1.42 (1.09-1.86)	0.010
Day 28 mortality			
Previous ICU admission source			
OR		Reference	
ER	Odds ratio	1.58 (1.17-2.14)	0.003
Ward	Odds ratio	2.55 (2.02-3.22)	<0.001
Other ICUs	Odds ratio	3.43 (1.96-5.99)	<0.001
Transfer from other hospital			
Non-transfer		Reference	
Transfer	Odds ratio	1.28 (1.02-1.61)	0.033
ICU length of stay			
Previous ICU admission source			
OR		Reference	
ER	Coefficient	1.27 (0.79-1.74)	<0.001
Ward	Coefficient	2.89 (2.49-3.28)	<0.001
Other ICUs	Coefficient	4.48 (3.44-5.53)	<0.001
Transfer from other hospital			
Non-transfer		Reference	
Transfer	Coefficient	1.15 (0.78-1.52)	<0.001
Hospital length of stay			
Previous ICU admission source			
OR		Reference	
ER	Coefficient	-1.24 (-3.38-0.91)	0.258
Ward	Coefficient	9.82 (7.98-11.65)	<0.001
Other ICUs	Coefficient	13.18 (8.06-18.31)	<0.001
Transfer from other hospital			
Non-transfer		Reference	
Transfer	Coefficient	0.23 (-1.47-1.93)	0.793
Ventilator day			
Previous ICU admission source			
OR		Reference	
ER	Coefficient	1.52 (0.88-2.16)	<0.001
Ward	Coefficient	3.06 (2.55-3.57)	<0.001
Other ICUs	Coefficient	4.55 (3.28-5.82)	<0.001
Transfer from other hospital			
Non-transfer		Reference	
Transfer	Coefficient	1.28 (0.80-1.76)	<0.001

Adjusted from admission APACHE II score, age, sex, admission diagnosis

the highest. In addition, the results found another high risk group was the ward group and this outcome was consistent with the preceding studies that described the risk groups with increased mortality in ICU were

the transfer group from ward and other ICUs[14]. The reasons why the critically ill surgical patients who were transferred from other ICUs had the highest mortality rate in the study were not shown. A likely explanation for the high mortality of this group may be contained in specific characteristics of these patients. The other ICUs group consisted of critically ill patients who were originally admitted to a medical ICU in the same hospital who then developed surgical problems during medical ICU admission and were thus transferred to SICU, in addition to critically ill surgical patients who had been transferred to SICU from other hospital ICUs. The inter-hospital transfer patients who were directly admitted to SICU were categorized in the other ICUs group in this study which might have influenced the outcomes because the transfer process may cause delays in urgency surgery[7]. The available information indicates that the transfer patients had more unfavorable outcomes, which harmonizes with the aforementioned information. The authors demonstrated that the transferred patients, whether admitted to ward first then transferred to SICU or directly admitted to SICU, when compared with non-transfer patients, had significantly greater ICU mortality, 28-day mortality, ICU length of stay, and more ventilator days but showed a non-significant difference in hospital length of stay.

The results of the study reveal interesting points in comparison with other studies. Previous studies have mostly conducted their surveys in medical or mixed ICUs, whereas the study is a multi-center trial conducted in surgical ICUs, which may explain the somewhat different character of the study. The outcomes indicate that the highest risk group for unfavorable outcomes is the other ICUs group. In our setting, the primary doctor from the rural hospitals usually transfers the surgical critically ill patients directly to the university hospital ICUs for a variety of reasons such as an urgent need for high risk surgery, and high risk medical conditions in surgical patients. As a consequence of having high risk conditions, the other ICUs patient group was shown to have the highest unfavorable outcomes; therefore, strategies to improve outcomes for this group of patients should be developed. Such strategies referring to ICU admission source must address several issues such as transfer protocols to ensure stabilization of patients during transportation[15], fast track ICU admission[9,16] for early treatment in severe but reversible conditions, and ICU care coverage by intensivists[17]. Finally, we may apply this multi-faceted approach in ICU strategies to improve outcomes of ICU patients in the future.

Conclusion

The present study reveals that surgery on critically ill patients, transferred from other ICUs to SICU, have the highest risk of ICU morbidity and mortality depending on admission source. In addition, ward patients and transfer patients also have high risk of ICU morbidity and mortality. This information may lead to the development of an ICU triage, transfer system and could be of practical use for an early warning score especially in countries with limited health care resources.

What is already known on this topic?

One of the most reliable predictors of ICU outcomes is the ICU admission source. Patients transferred from wards have been reported with the highest mortality rates compared to other admission sources. Some studies have reported that inter-hospital transfer patients had worse outcomes than those admitted directly. However, there is still limited information on the impact of surgical ICU admission sources on morbidity and mortality outcomes.

What this study adds?

Critically ill, surgery patients, transferred from other ICUs to SICU, have the highest risk of ICU morbidity and mortality depending on admission sources.

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Potential conflicts of interest

None.

References

1. Kudlow P, Burns KE, Adhikari NK, Bell B, Klein DJ, Xie B, et al. Inter-hospital transfers and outcomes of critically ill patients with severe acute kidney injury: a multicenter cohort study. Crit Care 2014; 18: 513.
2. Rosenberg AL, Hofer TP, Strachan C, Watts CM, Hayward RA. Accepting critically ill transfer patients: adverse effect on a referral center's outcome and benchmark measures. Ann Intern Med 2003; 138: 882-90.
3. Hill AD, Vingilis E, Martin CM, Hartford K, Speechley KN. Interhospital transfer of critically ill patients: demographic and outcomes comparison with nontransferred intensive care unit patients. J Crit Care 2007; 22: 290-5.
4. El Halal MG, Barbieri E, Filho RM, Trotta EA, Carvalho PR. Admission source and mortality in a pediatric intensive care unit. Indian J Crit Care Med 2012; 16: 81-6.
5. Ilori IU, Kalu QN. Intensive care admissions and outcome at the University of Calabar Teaching Hospital, Nigeria. J Crit Care 2012; 27: 105-4.
6. Arthur KR, Kelz RR, Mills AM, Reinke CE, Robertson MP, Sims CA, et al. Interhospital transfer: an independent risk factor for mortality in the surgical intensive care unit. Am Surg 2013; 79: 909-13.
7. Holena DN, Mills AM, Carr BG, Wirtalla C, Sarani B, Kim PK, et al. Transfer status: a risk factor for mortality in patients with necrotizing fasciitis. Surgery 2011; 150: 363-70.
8. Murthy S, Adhikari NK. Global health care of the critically ill in low-resource settings. Ann Am Thorac Soc 2013; 10: 509-13.
9. Champunot R, Thawitsri T, Kamsawang N, Sirichote V, Nopmaneejumruslers C. Cost effectiveness analysis of an initial ICU admission as compared to a delayed ICU admission in patients with severe sepsis or in septic shock. J Med Assoc Thai 2014; 97 (Suppl 1): S102-7.
10. Goldhill DR, McNarry AF. Physiological abnormalities in early warning scores are related to mortality in adult inpatients. Br J Anaesth 2004; 92: 882-4.
11. Golestanian E, Scruggs JE, Gangnon RE, Mak RP, Wood KE. Effect of interhospital transfer on resource utilization and outcomes at a tertiary care referral center. Crit Care Med 2007; 35: 1470-6.
12. Rishu AH, Aldawood AS, Haddad SH, Tamim HM, Al Dorzi HM, Al Jabbary A, et al. Demographics and outcomes of critically ill patients transferred from other hospitals to a tertiary care academic referral center in Saudi Arabia. Ann Intensive Care 2013; 3: 26.
13. 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.
14. Combes A, Luyt CE, Trouillet JL, Chastre J, Gibert C. Adverse effect on a referral intensive care unit's performance of accepting patients transferred from another intensive care unit. Crit Care Med 2005; 33: 705-10.
15. Azim A, Bhatia P, Baronia AK, Poddar B, Gurjar M, Singh RK, et al. Deficits in referral notes during inter-hospital transfers of critically ill patients: an observational study from a developing nation. Int J Periop Ultrasound Appl Technol 2013; 2: 89-91.
16. Chalfin DB, Trzeciak S, Likourezos A, Baumann BM, Dellinger RP. Impact of delayed transfer of critically ill patients from the emergency department to the intensive care unit. Crit Care Med 2007; 35: 1477-83.
17. Gajic O, Afessa B. Physician staffing models and patient safety in the ICU. Chest 2009; 135: 1038-44.

ผลของแหล่งที่มาเข้ารับการรักษาในหอผู้ป่วยวิกฤตศัลยกรรมต่อผลลัพธ์ด้านความเจ็บป่วยและเสียชีวิต: ผลจากการศึกษา THAI-SICU

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วัตถุประสงค์: การพยากรณ์ที่เชื่อถือได้มากที่สุดข้อหนึ่งสำหรับผลลัพธ์ของหน่วยดูแลผู้ป่วยวิกฤตคือ แหล่งที่มาเข้ารับการรักษาของผู้ป่วยวิกฤตศัลยกรรมมีลักษณะเฉพาะที่อาจแตกต่างจากผู้ป่วยอายุรกรรม การศึกษาชิ้นนี้จึงมีวัตถุประสงค์เพื่อตรวจสอบความสัมพันธ์ระหว่างแหล่งที่มาเข้ารับการรักษาและผลลัพธ์ของผู้ป่วยในหอผู้ป่วยวิกฤตศัลยกรรม

วัสดุและวิธีการ: รายงานนี้เป็นการศึกษาย่อยจากฐานข้อมูลการศึกษา THAI-SICU ซึ่งได้รับการออกแบบเป็นการศึกษาสหสถาบันเชิงสังเกตไปข้างหน้า การเก็บข้อมูลจะดำเนินในหอผู้ป่วยวิกฤตศัลยกรรมในโรงพยาบาลโรงเรียนแพทย์ 9 แห่ง ที่ร่วมการศึกษารวมระยะเวลา 22 เดือนตั้งแต่เดือนเมษายน พ.ศ. 2554 ถึง เดือนมกราคม พ.ศ. 2556

ผลการศึกษา: แหล่งที่มาเข้ารับการรักษาในหอผู้ป่วยวิกฤตศัลยกรรมถูกแบ่งออกเป็นมีการส่งผู้ป่วยมาจากห้องผ่าตัด 3,238 ครั้ง (69.6%), ห้องฉุกเฉิน 499 ครั้ง (10.7%) หอผู้ป่วย 825 ครั้ง (17.7%) และหอผู้ป่วยวิกฤตอื่นๆ 90 ครั้ง (1.9%) เมื่อพิจารณาในด้านของการรับย้ายจากโรงพยาบาลอื่นๆ พบว่าผู้ป่วยที่มีการรับย้าย 938 ราย (20.2%) ในขณะที่เป็นผู้ป่วยเข้ารับการรักษาโดยตรง 3,714 ราย (79.8%) ผู้ป่วยที่เข้ารับการรักษาจากหอผู้ป่วยวิกฤตอื่นๆ มีแนวโน้มที่จะเสียชีวิตในหอผู้ป่วยวิกฤตศัลยกรรมมากกว่าเกือบ 3 เท่า เมื่อเทียบกับผู้ป่วยที่มาจากห้องผ่าตัด ซึ่งกำหนดให้เป็นกลุ่มอ้างอิง (adjusted odds ratio (OR) 2.89; 95% confidence interval (CI) 1.52-5.51, p = 0.001) ทว่ากลุ่มที่รับย้ายจากหอผู้ป่วยก็ยังคงมีความเสี่ยงสูงที่จะเสียชีวิต (OR 2.49; 95% CI 1.88-3.30, p<0.001) การปรับค่าสัมประสิทธิ์สำหรับการเจ็บป่วยในหอผู้ป่วยวิกฤต แสดงให้เห็นถึงผลลัพธ์ที่ไม่พึงปรารถนาโดยส่วนใหญ่ยังคงจำกัดอยู่ในกลุ่มผู้ป่วยที่รับมาจากหอผู้ป่วยวิกฤตอื่นๆ และหอผู้ป่วย ในด้านของผลลัพธ์สำหรับผู้ป่วยที่มีการรับย้ายระหว่างโรงพยาบาลกลุ่มที่มีการรับย้ายมีความเสี่ยงมากขึ้นที่จะเสียชีวิตในหอผู้ป่วยวิกฤตศัลยกรรม และมีความเสี่ยงมากขึ้นต่อการเสียชีวิตใน 28 วันมากกว่ากลุ่มที่เข้ารับการรักษาโดยตรง

สรุป: ผู้ป่วยวิกฤตศัลยกรรมที่รับย้ายจากหอผู้ป่วยวิกฤตอื่นๆ มาสู่หอผู้ป่วยวิกฤตศัลยกรรมมีความเสี่ยงสูงสุดต่อการเจ็บป่วยและการเสียชีวิต นอกจากนี้ผู้ป่วยที่รับย้ายจากหอผู้ป่วยและที่รับย้ายจากโรงพยาบาลอื่นๆ ยังมีความเสี่ยงสูงต่อการเกิดผลลัพธ์ที่ไม่พึงปรารถนา