

Causes of SICU readmission and mortality: analysis of a 6-month period

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ABSTRACT

Our aim was to evaluate the causes, risk factors and mortality rates associated with unexpected readmission to surgical intensive care unit (ICU).

We performed a retrospective analysis of all adult patients readmitted to a 10-bed Surgical Intensive Care Unit (SICU) between 1 October 2013 and 31 March 2014. The readmission cases were collected from the hospital electronic information system. Data collected included rates, risk factor, causes and mortality associated with unexpected readmission to surgical ICU.

Among the 333 patients admitted to the SICU during a six month period, 22 (7%) were readmitted. The most common reasons for readmission in our SICU were respiratory complications (27%) and cardiovascular instability (13.6%). Factors associated with a higher risk of readmission are older age and chronic health conditions, such as arterial hypertension (54.5%) and diabetes (40.9%). The mortality rate of SICU readmission is 22.7%.

Intensive care is a very important part of postoperative care for most patients who undergo major surgery. As found in our study ICU readmission has been associated with a greater risk of hospital mortality and it is therefore important to identify patients at the highest risk of readmission.

Key words: readmission, ICU, mortality

Introduction

Readmission to the intensive care unit during the same hospital stay has been associated with a greater risk of hospital mortality and has been suggested as an indicator of quality of care. (1) Studies have shown that patients readmitted to the ICU have mortality rates up to six times higher than those who were not readmitted and are 11 times more likely to die in hospital. (2) The average ICU readmission rate is 7% (range, 4 to 14%) and has changed little over the last 20 years as shown by studies in both North America and Europe. (2) Respiratory and cardiac conditions were the most common (30 to 70%) precipitating cause of ICU readmission.

(3) It is increasingly important to identify patients at high risk of returning to the ICU. Such patients may require longer, initial courses of high-intensity care in the ICU. The objective of our review was therefore to evaluate the rates, causes and mortality rates associated with unexpected readmission to Surgical Intensive Care Unit (SICU).

Materials and methods

We performed a retrospective analysis of all adult patients readmitted to a 10-bed SICU between 1 October 2013 and 31 March 2014. Readmission to our SICU is not based upon specific criteria or a clinical scoring system. Instead, the decision for each admission is determined by reviewing each patient's case and clinical need, and the decision for admission is made jointly by

intensivists and a surgeon. The readmission cases were collected from the hospital electronic information system. Data collected included rates, risk factor, causes and mortality associated with unexpected readmission to surgical ICU, as well as the need for invasive mechanical ventilation, renal support and inotrope/vasopressor usage. The objective was to reveal the reasons for ICU readmission, to see whether the initial ICU admission diagnoses are associated with readmission, to identify the risk factors for readmission and to see mortality rates associated with readmission.

Results

Among the 333 patients admitted to the SICU during a 6-month period, 22 (7%) were readmitted. For 15 (68%) of them

Table 1. Characteristics of patients on readmission

	readmission n=22
Age, mean (years)	80 (49-90)
Sex	
Female	8 (36.3)
Male	13 (59)
Chronic health conditions	n (%)
Arterial hypertension	12 (54.5)
Chronic heart failure	3 (13.6)
Chronic renal failure	4 (18.19)
Diabetes	9 (40.9)
Cerebrovascular accident	3 (13.6)
Atrial fibrillation	8 (36.3)
Cancer	7 (31.8)
Mortality rate	5 (22.7)

Table 2. Causes for SICU readmission SICU, surgical intensive care unit

Causes of SICU readmission	n (%)
Respiratory failure	6 (27.2)
Cardiovascular instability	3 (13.6)
Neurological complications	2 (9)
Gastrointestinal bleeding	2 (9)
Sepsis	1 (4.5)
Peritonitis	3 (13.6)
Postoperative support	5 (22.7)

it was their second readmission, and for seven (31%) of them it was their third readmission. There were no patients with more than three readmissions. The age ranged from 48 to 90 years with an average of 80 years and the gender was mostly male (59%) (table 1). In 40% of the patients readmission diagnosis was associated with the initial ICU admission. Factors associated with a higher risk of readmission are chronic health conditions such as arterial hypertension (HA) (54.5%), chronic heart failure (9%), chronic renal failure (13%), diabetes (40.9%), cerebrovascular accident (13.6%), atrial fibrillation (FA) (36%) and cancer (31.8%) (table 1). Another factor also frequently asso-

ciated with a higher risk of readmission is mechanical ventilation during the initial stay (13.6%). After readmission, the mean length of stay in SICU was 6 days (range 3 to 45 days). Main symptoms for readmission were respiratory failure (27%), cardiovascular instability (13.6%), neurological complications (9%), sepsis (4.5%), gastrointestinal (GI) bleeding (9%), peritonitis (13.6%) and postoperative support due to wound dehiscence and reoperation (22.7%) (table 2). Variables most frequently associated with ICU readmission are fever (31.8%), hypotension (22.7%), sepsis (4.5%), upper GI bleeding (9%), heart rate >100 (18%) (table 2). The most common supportive therapies

after readmission were vasopressors in 27%, mechanical ventilation in 22.7%, and renal support in 13.6% of patients. The mortality rate of SICU readmission is 22.7%.

Discussion

Intensive care is a very important part of postoperative care for most patients who undergo major abdominal surgery. ICU readmission has been associated with a greater risk of hospital mortality and may predict poor outcomes. The readmission rate of 7% found in our review is close to the rate found in literature. A systematic review of studies by Rosenberg and Watts evaluating ICU readmission rates reported a mean readmission rate of 6% (range 5% to 14%). (3) In another recent review of 20 studies, an average readmission rate of 7.8% was reported (range 0.89% to 19%). (2) One of Kaben's studies on surgical ICU patients reports a readmission rate of 13.4%. (4) In agreement with previous studies, the most common reason for readmission in our SICU was respiratory complications. Coexisting health problems such as HA and diabetes played a significant role in the risk for complications and readmission to SICU. Other factors that were associated with an increased risk of readmission are older age (in our study with an average of 80 years), unstable vital signs such as fever, hypotension and heart rate >100. Similar risk factors for readmission have been reported before. (2-4) The most common supportive therapies for patients readmitted to SICU are vasopressors and mechanical ventilation. Despite initial recovery after surgery requiring surgical intensive care unit admission, many patients remain at risk of subsequent surgical complications and death. The mortality rate of 22.7% found in our study confirms that SICU readmission is associated with higher hospital mortality. Previous studies have reported mortality rates of 12% to 58% in readmitted patients. (5) Our study has several limitations. The main limitations include retrospective study design, the small number of patients in the sample and

a short-term follow-up period. Despite these limitations, our study indicates the importance of identifying patients at the highest risk of readmission.

Conclusion

SICU readmission is associated with higher hospital mortality. The most common reason for readmission was

respiratory failure, and the most common factors associated with a higher risk of readmission are chronic health conditions such as HA and diabetes.

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