

Brief Communication

Assessment of ICU readmission risk with the Stability and Workload Index for Transfer score*

Avaliação de riscos de readmissão em UTI através do escore
Stability and Workload Index for Transfer

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Abstract

Patient discharge from the ICU is indicated on the basis of clinical evidence and the result of strategies aimed at improving health care. Nevertheless, some patients might be discharged too early. We attempted to identify risk factors for unplanned ICU readmission, using a score for risk assessment, designated the Stability and Workload Index for Transfer (SWIFT) score. We evaluated 100 patients discharged from an ICU and found that the SWIFT score can be used as a tool for improving the assessment of ICU patients and the appropriateness of ICU discharge, thus preventing readmission.

Keywords: Intensive care units; Risk factors; Patient readmission.

Resumo

A alta da UTI é indicada com base em evidências clínicas e resultados de estratégias que objetivam melhorar o atendimento. No entanto, os pacientes podem ser submetidos a alta precoce. Objetivamos identificar fatores de risco para a readmissão não planejada na UTI, através de um escore de avaliação dos riscos denominado *Stability and Workload Index for Transfer* (SWIFT). Foram avaliados 100 pacientes com alta de uma UTI e verificamos que o escore SWIFT pode ser uma possível ferramenta para uma melhor avaliação do paciente e adequação da alta da UTI, evitando sua readmissão.

Descritores: Unidades de terapia intensiva; Fatores de risco; Readmissão do paciente.

Introduction

The best timing for ICU discharge is determined on the basis of clinical evidence that is usually subjective. The process of discharging a patient from the ICU involves careful evaluation of disease severity and patient clinical status. Therefore, there is a need to evaluate tools for assessing the risk of ICU readmission.^(1,2)

In many critically ill patients, clinical status deterioration or death occurs shortly after ICU discharge.⁽³⁾ Studies have shown that the decision regarding patient discharge from the ICU also depends on organizational factors, such as workload and the number of beds available.^(4,5) In addition, early discharge accounts for 22-44% of all cases of ICU readmission, mortality being higher in such cases.⁽⁶⁾

The objective of the present study was to identify risk factors for unplanned ICU readmission by using a risk assessment scale designated the Stability and Workload Index for Transfer (SWIFT) score.

This was a prospective cohort study conducted in the Central ICU of the Santa Clara Hospital, which is part of the Santa Casa Hospital Complex, located in the city of Porto Alegre, Brazil. Between September of 2008 and January of 2009, we evaluated 156 patients who had been discharged from the ICU, who met the inclusion criteria, and who agreed to participate in the present study.

The inclusion criteria were as follows: being over 18 years of age; having stayed in the ICU for

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more than 24 h; and having been followed during the ICU stay, at discharge, and at readmission (when applicable). Clinical features, clinical diagnosis, length of ICU stay, and time to readmission were analyzed. Acute Physiology and Chronic Health Evaluation II (APACHE II) and SWIFT scores were calculated. The values of SWIFT score variables PaO₂, PaCO₂, FiO₂, and PaO₂/FiO₂ were those obtained in the most recent arterial blood gas analysis. Patients who died during their ICU stay and those who were transferred from the hospital in which the study was conducted were excluded.

The SWIFT score is a risk assessment score that measures the extent to which the conditions for ICU discharge are appropriate. It ranges from 0 to 64, a higher score translating to a higher risk of ICU readmission. The SWIFT score is practical and easy to use.⁽⁷⁾ The ICU patients investigated in the present study were divided into two groups: the readmission group, comprising those who were readmitted to the ICU; and the non-readmission group, comprising those who were not.

The present study was approved by the Research Ethics Committees of the Santa Casa Hospital Complex and the Porto Alegre Institute Methodist University Center. All patients or their legal guardians gave written informed consent.

Quantitative variables were expressed as mean and standard deviation, whereas qualitative variables were expressed as absolute and relative frequencies. In order to compare the variables between the two groups, we used the Mann-Whitney U test. For all tests, the level of significance was set at 5%. In order to determine the risk of readmission, we calculated the area under the ROC curve for the SWIFT score. We used the Statistical Package for the Social Sciences, version 16.0 (SPSS Inc., Chicago, IL, USA).

During the data collection period, 156 patients were included in the initial sample. However, 56 patients were excluded because they died during their ICU stay. The final study sample consisted of 100 patients who stayed in the ICU for more than 24 h and then were discharged. Of those 100 patients, 9 were readmitted. The general characteristics of the sample are shown in Table 1.

The SWIFT score was significantly higher in the readmission group than in the non-readmission group (p = 0.001). With the objective of predicting ICU readmission, we calculated the area under the

ROC curve for the SWIFT score and found an area of 0.76 (95% CI: 0.619-0.918). We also found a significant difference between the non-readmission and readmission groups in terms of the Glasgow Coma Scale score (p = 0.001; Table 2).

Nine patients (9%) were readmitted to the ICU. The mean time to readmission was 5.3 ± 5.5 days. Of the readmitted patients, 5 (55.6%) were readmitted in less than 48 h. Five patients died after having been readmitted to the ICU, 2 (22.2%) were transferred to other hospitals, and only 2 (22.2%) were discharged.

The hospital stay was longer in the readmission group (17 ± 24 days) than in the non-readmission group (13 ± 21 days), the difference being statistically significant (p = 0.007).

The main finding of the present study was that the SWIFT score was higher and the hospital stay was longer in the patients who were readmitted to the ICU than in those who were not.

We used the SWIFT score, previously validated by Gajic et al.⁽⁷⁾ The SWIFT score assesses PaO₂, FiO₂, and PaCO₂, among other parameters. When

Table 1 – General characteristics of the patients included in the present study.^a

Characteristics	Non-readmission group	Readmission group
Age, years ^b	59.36 ± 16.88	78.8 ± 9.79
Gender		
Male	48 (52.7)	3 (33.3)
Female	43 (47.3)	6 (66.7)
Type of health insurance		
Public	58 (64.4)	4 (44.4)
Private	33 (35.6)	5 (55.6)
Race		
White	77 (84.6)	9 (100)
Black	12 (13.2)	-
Mulatto	2 (2.2)	-
Physical therapy		
Yes	65 (71.4)	9 (100)
No	26 (28.6)	-
APACHE II score ^b	20.91 ± 6.81	20.77 ± 5.95
Reason for readmission		
Acute respiratory failure	-	4 (44.4)
Cardiopulmonary arrest	-	3 (33.3)
Sepsis	-	2 (22.2)
Length of ICU stay, days ^b	11 ± 21	7 ± 25

APACHE II: Acute Physiology and Chronic Health Evaluation II.

^aValues expressed as n (%), except where otherwise indicated.

^bValues expressed as mean ± SD.

Table 2 – Comparison of the study variables between the two groups of patients under study.^a

Variable	Non-readmission group	Readmission group
Patient referral source		
Hospital ward	35 (38.5)	4 (44.4)
Emergency room	23 (25.3)	1 (11.1)
Surgical ward	21 (23.1)	2 (22.2)
Another hospital	12 (13.2)	2 (22.2)
Reason for hospitalization		
Acute respiratory failure	22 (24.4)	3 (33.3)
Immediate postoperative period	21 (23.3)	2 (22.2)
Sepsis	12 (13.3)	-
Stroke	8 (8.9)	-
Decompensated congestive heart failure	5 (5.6)	1 (11.1)
Hypovolemic shock	5 (5.6)	1 (11.1)
Renal failure	4 (4.4)	1 (11.1)
Bronchopneumonia	3 (3.3)	-
Other reasons	10 (11.1)	1 (11.1)
Glasgow Coma Scale score ^b	13.60 ± 1.03	11.66 ± 1.32*
FiO ₂ ^b	0.48 ± 0.29	0.23 ± 0.35
PaO ₂ , mmHg ^b	112.42 ± 41.43	86.28 ± 35.24
PaO ₂ /FiO ₂ ^b	489.44 ± 188.44	373.28 ± 118.72
PaCO ₂ , mmHg ^b	37.77 ± 10.16	36.82 ± 2.77
SWIFT score ^b	13.81 ± 7.85	23.50 ± 8.75*

SWIFT: Stability and Workload Index for Transfer. ^aValues expressed as n (%), except where otherwise indicated. ^bValues expressed as mean ± SD. *p = 0.001.

we analyzed those variables in isolation, we found no significant differences between the two groups of patients.

Several studies have shown that mortality is significantly higher and hospital stays are significantly longer in patients who are readmitted to the ICU.⁽⁸⁻¹⁰⁾ In our study, the hospital stay was longer for the patients who were readmitted to the ICU than for those who were not.

Nishi et al. evaluated 10,840 ICU patients and found that 97 had been readmitted to the ICU; of those 97 patients, 5% had been readmitted because of early discharge. In our study, 5 patients were readmitted to the ICU for that reason.⁽¹¹⁾

Kastrup et al. attempted to validate the use of the SWIFT score in heterogeneous ICU populations (a total of 7,175 patients) and found that the SWIFT score is poor at predicting ICU readmission, having found an area under the ROC curve of 0.581.⁽¹²⁾ Unlike Kastrup et al., we found an area under the ROC curve of 0.76, showing that the SWIFT score was good at predicting ICU readmission in our study population.

Ounes et al. sought to evaluate independent predictors of ICU readmission and develop an analytical model of mortality and readmission

after discharge. The authors evaluated 3,462 patients and found that independent risk factors for ICU readmission included disease severity and ICU discharge at night; the authors also found that the rate of ICU readmission within 7 days after discharge was 3%.⁽¹³⁾ In the present study, there was no difference between the two groups of patients regarding disease severity as measured by APACHE II scores.

As shown in the present study, the SWIFT score can be used as a tool for improving the assessment of ICU patients and the appropriateness of ICU discharge, thus preventing readmission.

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