PROFILE OF READMISSIONS IN AN ADULT CLINICAL / SURGICAL INTENSIVE CARE UNIT: FACTORS PREDISPONENT TO REINTERNATION

Perfil de readmissões em uma unidade de terapia intensiva adulto clínica/ cirúrgica: fatores predisponentes a reinternação

Perfil de readmisiones en unidad de cuidados intensivos clínicos / quirúrgicos para adultos: factores predisponentes a la reinternación

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ABSTRACT

Objective: to analyze the profile of patients readmitted to a clinical / surgical intensive care unit and the main factors that culminated in this event. **Method:** a descriptive, retrospective study with a quantitative approach, based on the registration of all patients admitted to the clinical / surgical intensive care unit between January and December 2019. **Results:** the sample presents a male, elderly profile, with one to three pre-comorbidities – existing, admitted for respiratory causes, being readmitted for respiratory complications, followed by infections, with an average time of 5.6 days. They presented hematological and renal changes, with death as the main outcome. **Conclusion:** advanced age, presence of comorbidities, complications due to infectious conditions, anemia and decline in renal function are characteristics relevant to patients readmitted to intensive care.

DESCRIPTORS: Critical care; Hospitalization; Causality.

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RESUMO

Objetivo: analisar o perfil dos pacientes readmitidos em uma unidade de terapia intensiva clínica/cirúrgica e principais fatores que culminaram neste evento. **Método:** estudo descritivo, retrospectivo com abordagem quantitativa, baseado no registro de todos os pacientes admitidos na unidade de terapia intensiva clínica/cirúrgica entre janeiro e dezembro de 2019. **Resultados:** a amostra apresenta perfil masculino, idoso, tendo de uma a três comorbidades pré-existentes, admitidos por causas respiratórias, sendo readmitidos por complicações respiratórias, seguidas por infecções, com tempo médio de 5,6 dias. Apresentaram alterações hematológicas e renais, tendo o óbito como principal desfecho. **Conclusão:** idade avançada, presença de comorbidades, complicações por quadros infecciosos, anemia e declínio da função renal são características pertinentes aos pacientes readmitidos na terapia intensiva.

DESCRITORES: Cuidados críticos; Hospitalização; Causalidade.

RESUMEN

Objetivo: analizar el perfil de los pacientes reingresados en una unidad de cuidados intensivos clínico-quirúrgicos y los principales factores que culminaron en este evento. **Método:** estudio descriptivo, retrospectivo, con abordaje cuantitativo, basado en el registro de todos los pacientes ingresados en la unidad de cuidados intensivos clínico-quirúrgicos entre enero y diciembre de 2019. **Resultados:** la muestra tiene un perfil masculino, anciano, con una a tres pre – comorbilidades existentes – existente, ingresado por causas respiratorias, reingreso por complicaciones respiratorias, seguido de infecciones, con un tiempo promedio de 5,6 días. Presentaron alteraciones hematológicas y renales, siendo la muerte el principal desenlace. **Conclusión:** la edad avanzada, la presencia de comorbilidades, las complicaciones por enfermedades infecciosas, la anemia y el deterioro de la función renal son características relevantes para los pacientes reingresados a cuidados intensivos.

DESCRIPTORES: Cuidados críticos; Hospitalización; Causalidad.

INTRODUCTION

The Intensive Care Unit (ICU) is characterized as a sector caring for critically ill patients, integrating high complexity of care and technology.[1] It is expected that after receiving the necessary care, patients are recovered and ready to be discharged from the ICU, being rescheduled to less complex care.[2,3] However, discharge of patients admitted to intensive care remains a major challenge for intensivists.[2,4]

The period of transition of care of patients discharged from the ICU to the ward is indicated as the stage of greatest risk of deterioration of the clinical picture of these patients.[5] Mortality rates, as well as length of stay and costs are higher in patients who are readmitted to the ICU, [4-6] that is, are again admitted to the same ICU.[7]

However factors such as external pressure to release beds for more severely ill patients, scarcity of resources, and variability in the clinical decision pattern about the best time to discharge a patient, [6,9] may often result in increased risk of complications and exposure to an environment that fails to rapidly recognize the declining clinical status of these patients.

Readmission rates in intensive care settings are noted as metrics of quality of care in this sector, so that a high readmission rate may indicate the presence of adverse events, whereas few readmissions suggest a prolonged and unnecessary stay for patients, increasing iatrogenesis and hospital costs. [10]

The best time to decide when to readmit a patient to the ICU is subject to intrinsic factors, related to the patient's clinical condition and prognosis, as well as extrinsic conditions, related to the hospital structure.[3] Thus, this research is justified as it contributes to a better understanding of this reality, thus promoting a better response capacity on the part of health services.

Thus, this article aims to analyze the profile of patients readmitted to a clinical/surgical intensive care unit, as well as the main factors that led to this event.

METHODS

This is a descriptive, retrospective study of quantitative approach, based on the record of all patients admitted to an adult intensive care unit, with care directed to pre – and post-surgical patients, as well as medical clinical nature. This unit has capacity for 20 beds, belonging to a large, philanthropic and teaching hospital, with care provided by SUS, located in Juiz de Fora, Minas Gerais.

The study sample consisted of patients who were readmitted to this critical care unit in the period of twelve months from January 2019. Inclusion criteria included readmitted patients whose personal and hospitalization information was described in the medical record and who remained in this ICU for more than 24 hours. The factors that led to sample exclusion were patients who were not readmitted to this ICU and who were transferred to another healthcare institution.

To facilitate the synthesis of the flow of choice of patients included in the study, Figure 1 shows an explanatory scheme about the sample size with respective reasons for exclusion.

As a guiding instrument for data collection, an adaptation of the nursing questionnaire validated in a General ICU was used,[11] which contained sociodemographic data of the patients and information regarding their period of stay, such as diagnosis of ICU stay, previous diseases, duration of hospital stay, time

between ICU discharge and return, cause of readmission, use of invasive devices, level of consciousness, use of oxygen therapy and clinical outcome; for the evaluation of laboratory status at the time of discharge from the ICU to the ward, blood count, electrolytes and blood gas analysis were analyzed.

The information obtained was structured in three separate databases, where database I represented sociodemographic data, database II was composed of clinical data, and database III was composed of laboratory data. The elements that were not found or were not present in the patients' records were disregarded in the quantitative analysis, but the patients who met the inclusion criteria were kept in the sample.

The data were analyzed using the statistical software Excel, version 2016 and Statistical Package for Social Sciences (SPSS), version 21.0. In studying the data, a descriptive analysis was performed with the percentage frequencies of the variables and reported those with the greatest impact. The mean and standard deviation of the quantitative variables were also obtained.

The study followed the norms of Resolution n°466/12, of the National Health Council and was submitted for approval to the Ethics Committee of the Juiz de Fora College of Medical and Health Sciences – Suprema, under opinion number 37246220.4.0000.5103, on 11/2020, and the data were collected in December 2020. As for the risks, the research presented minimal risks, with the authors being responsible for maintaining the confidentiality of the analyzed patients' data and the correct handling of these documents.

RESULTS

Among the 1233 patients admitted to the ICU during the study period, 58 (4.7%) were rehospitalized in this unit. The sociodemographic data of the sample obtained through the analysis of the medical records are shown in Table 1.

Of the 58 patients who were readmitted, 37 (63.8%) were male, 39 (67.2%) were from the city where the health institution is located, 33 (56.9%) retired, with a mean age of 69 years. As for tobacco and alcohol consumption, 36 (62.1%) and 38 (65.5%), respectively, denied using them.

Table 2 gathered the hospitalization and readmission history of the sample, listing duration, causal factors from first admission

to readmission, patient origin, past illness, conduct, and clinical outcome of the cases.

The patients had a mean of 10.6 days in the first ICU admission and 35.8 days of hospital stay. Regarding the origin, it was observed that 26 (44.8%) came from another health institution, followed by 23 (39.7%) from the hospital's Surgical Center. It was found that 38 (65.5%) of the readmitted patients had from one to three pre-existing comorbidities, being cardiovascular diseases the most prevalent 34 (58.7%), and that 45 (77.6%) of the patients suffered only one readmission in the ICU.

The period between discharge from the ICU to the ward and return to the originating unit took an average of 5.6 days, with readmissions longer than seven days being the highest rate, respiratory complications being the main cause of return to this unit. Regarding invasive devices, the consumption was about three devices per patient during ICU stay, and two at the time of discharge; breathing on ambient air (AA) without the aid of oxygen therapy 35 (60.3%) and with oral feeding (VO) 43 (74.3%). The clinical outcome of 41 (70.7%) of the readmitted patients was death, as shown in table 2.

Regarding the presence or absence of an invasive device in the patients, the use was observed in all patients, and the most frequent ones were the indwelling urinary catheter – DVC 45 (77.6%), the peripheral venous access – PVI 33 (56.9%) and the central venous catheter – CVC 30 (51.7%). At discharge, all these frequencies decreased, with only the AVP increasing to 35 (60.3%), as shown in table 3.

The data in Table 4 reflect the laboratory findings on the day of discharge to the ward for patients readmitted to the ICU.

Analyzing the laboratory findings on the day of discharge to the ICU ward, we observed a mean of 3.4 million/mm3 for erythrocytes; 9.6 g/dL for hemoglobin; 29.4% for hematocrit. As for the white blood cell count, the average was 10,975 mm3. As for the platelet evaluation, the average was 219,527.4 mm3. About the electrolytic part, the average was 115.7mg/dL for glucose; 3.8mmol/L for Potassium; 141.4mmol/L for Sodium.

Regarding gasometric findings, 48 patients had laboratory tests at the time of discharge to the ward, with a centralized pH at 7.33; alveolar oxygen partial pressure (PaO2) at 103.8mmHg; CO2 partial pressure at 32.4mmHg; plasma bicarbonate concentration (HCO3) at 22.3mEq/L; base excess (BE) dissolved in plasma at – 0.7mEq/L and arterial saturation at 97.2%.

Figure 1 – Explanatory scheme of the sampling design. Juiz de Fora, MG, 2021
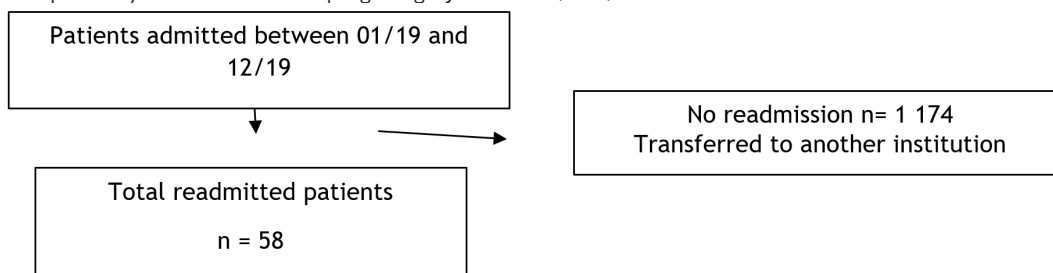
Table 1 – Sociodemographic characteristics of the sample (n=58). Juiz de Fora, MG, Brazil, 2021

Sociodemographic Results		Frequency	%
Gender	Male	37	63,8
	Female	21	36,2
Birthplace	Juiz de Fora	39	67,2
	Other	19	32,8
Profession	Retired	33	56,9
	Household	9	15,5
	Other	16	27,6
Age (mean and SD)	69,2 (17,6)		
Smoking	Deny	36	62,1
	Yes	9	15,5
	Ex	12	20,7
Alcoholism	Deny	38	65,5
	Yes	11	19,0
	Ex	8	13,8

Source: data extracted from medical records using the questionnaire adapted by the authors.
SD: Standard Deviation.

Table 2 – Characteristics of the length of stay of patients readmitted to the ICU (n=58). Juiz de Fora, MG, Brazil, 2021

Patient Clinical Data		Frequency	%
Length of first ICU admission in days [mean (SD)]		10,6 (13,7)	
Length of hospital stay in days [mean (SD)]		35,8 (28,0)	
Intake Source	Other institution	26	44,8
	Emergency Sector	2	3,4
	Nurse's Station	7	12,1
	Surgical Center	23	39,7
Number of past diseases	0	10	17,2
	1 to 3	38	65,5
	4 or more	10	17,2
Pre-existing diseases	cardiovascular	34	58,6
	respiratory	5	8,6
	endocrine-metabolic	19	32,7
	renal	4	6,9
	neoplastic	6	10,3
	nervous system	11	18,9
Causes of ICU admission	respiratory	16	27,5
	cardiocirculatory	9	15,6
	digestive system d	9	15,6
	infectious and parasitic	1	1,7
	neoplastic	1	1,7
	genitourinary	2	3,4
	Post-surgery	19	32,8
	Other	1	1,7
Causes of ICU readmission	Respiratory complications	16	27,6
	Cardiovascular complications	11	19
	Digestive complications	3	5,2
	Sepsis, septic shock	14	24,1
	Lowering of consciousness level	6	10,3
	Post-operations	6	10,3
	Surgical reapproach	2	3,5
Number of readmissions to the ICU	1	45	77,6
	2	11	19
	3 or more	2	3,4
Time between discharge and readmission	Up to 1 day	15	25,8
	2 days	3	5,2

Table 2 – Cont.

	3 days	7	12,1
	4 to 7 days	17	29,3
	Up to 7 days	16	27,6
Time between ICU discharge and readmission in days [mean (SD)]		5,6 (4,9)	
Average ICU admission devices per patient [mean (SD)]		2,6 (1,3)	
Average number of devices at ICU discharge per patient [mean (SD)]		2,0 (0,9)	
Oxygen therapy	Ambient Air	35	60,3
	Nasal Catheter	10	17,2
	Tracheostomy/other	12	22,5
	Nasogastric Catheter	2	3,4
Nutritional Support	Enteral	13	22,3
	Orally	43	74,3
Clinical Outcome	High	17	29,3
	Death	41	70,7

Source: data extracted from medical records using the questionnaire adapted by the authors.
SD: Standard Deviation

Table 3 – Devices Present in Patients at ICU Admission and Discharge (n=58). Juiz de Fora, MG, Brazil, 2021

	Enter		High	
	Frequency	%	Frequency	%
Central Venous Catheter	30	51,7	22	37,9
Peripheral Venous Access	33	56,9	35	60,3
Delayed Bladder Catheter	45	77,6	31	53,4
Orotracheal Tube	11	19,0	0	0,0
Tracheostomy	11	19,0	10	17,2
Penrose drain	5	8,6	4	6,9
Hemodialysis Catheter	4	6,9	4	6,9
Chest Drain	3	5,2	3	5,2
Other	7	12,1	7	12,0

Source: data extracted from medical records using the questionnaire adapted by the authors.

Table 4 – Laboratory tests of patients readmitted to the ICU (n=58). Juiz de Fora, MG, Brazil, 2021

		Lower Limit	Upper Limit	Average	Standard Deviation
CBC	RBCs	2,2	6,9	3,4	0,9
	Hemoglobin	6,6	19,0	9,6	2,5
	Hematocrit	19,4	59,5	29,4	7,7
	Leukocytes	1 740,0	32 300,0	10 975,0	5 268,6
	Platelets	11 300,0	581 100,0	219 527,4	148 655,3
Renal Function	Urea	11,0	195,0	67,4	43,7
	Creatinine	1,8	8,2	1,57	1,87
Metabolic Function	Potassium	2,6	6,0	3,8	0,6
	Sodium	129,0	162,0	141,4	6,2
	Glucose	31,0	283,0	115,7	46,6
Respiratory Function	pH	7,33	7,58	7,43	0,06
	PaO2	159,1	63,5	103,8	22,4
	PaCO2	46,5	20,6	32,4	5,5
	HCO3	13,5	33,2	22,5	4,1
	BE	-9	11,3	-0,7	4,3
	Saturation	89,3	99,5	97,2	1,7

Source: data extracted from medical records using the questionnaire adapted by the authors.

DISCUSSION

The profile of patients readmitted to the ICU during the same stay found in this study corresponds to the national and international scenario, the majority being composed of men and elderly above 65 years of age.[12-14] Pre-existing cardiovascular and endocrine-metabolic comorbidities,[10,13,15] as well as current or previous tobacco and/or alcohol consumption[16] are increased risks of readmission, conditions which were evidenced in the sample.

Among the ICU admission causes, it was observed the prevalence of postoperative care, due to the institutional profile, followed by respiratory, cardiovascular and gastrointestinal tract diseases aggravation; this situation is in accordance with the Brazilian study carried out in five ICUs,[17] which points to the growth of non-transmissible chronic diseases in the general population, culminating in a greater quantitative need of intensive care beds for treatment of diseases resulting from modifiable life habits.

As for the reasons leading to readmission of patients to the critical care unit, respiratory complications, such as acute respiratory failure, took the lead, accompanied by sepsis and septic shock, converging with studies previously carried out[12,13,18], in which discharge criteria and the capacity of the wards to receive patients in this unit were questioned.[14] Authors associate an early readmission, that is, within 48 hours, to severity of the pathology responsible for the ICU admission, while later readmissions occur due to complications of pre-existing comorbidities.[2]

In contrast with a study carried out in the south of the country, the results obtained show better rates, with a lower readmission rate, as well as lower results regarding readmissions in less than 48 hours, however, it is similar regarding the clinical outcome of readmitted patients, with most of the sample having evolved to death.[19] The presence of intermediate care units may present a way out regarding the progressive care of patients coming from the ICU, providing a gradual transition of care, thus reducing the occupation of intensive care beds and the risk of unplanned readmissions.[20]

The need for continuous monitoring and technological support for rapid intervention in critically ill patients is a requisite for ICU admission. Invasive devices such as venous therapy for rapid and controlled effect, the need for invasive ventilatory support by means of orotracheal tube or tracheotomy, nasogastric or nasoenteric catheter for nutritional support, indwelling urinary catheter for diuresis and hydroelectrolytic balance control are routine.[21] However, such instruments require constant care and vigilance because they are indicated as the main cause of hospital infection. Such support tends to decrease when the patient is discharged to the ward[22], since there is no need for help to maintain the patient's stability, which is in agreement with the results obtained in this study.

As for the laboratory findings, the sample presented a mean below the reference levels for red blood series, a routine dysfunction found in hospitalized patients due to pre-existing comorbidities, nutritional deficit and inflammatory/ infectious conditions; associated with leukocytosis evidenced in the mean of the results obtained for the evaluation of the white blood series, corroborates the second cause for readmission in the study.[23-25]

Routinely, patients are admitted to the ICU with hypovolemic, cardiac and/or septic type disorders, and such circumstances may compromise the renal function of these patients.[26] Disturbance of the renal regulatory, excretory and endocrine functions affects the entire body, generating complications by increasing retention of metabolism toxins.[27] As for the laboratory biochemistry of readmitted patients, it is observed in their discharge to the ward the presence of altered renal function identified by increased creatinine and urea levels.

Hyperglycemia, a result obtained by capillary blood sampling at any time with a result above 200mg/dL, in critically ill patients is deleterious to recovery, increasing the inflammatory response through cell injury, reducing the action of the immune system, generating coagulation and hydro-electrolytic disorders.[28] In this study the patients presented an average within the reference values.

Arterial blood gas analysis is part of the laboratory blood tests required in the hospital environment to assess pulmonary condition, as well as gas exchange and acid-base balance; imbalances of this system are associated with increased risk of death in intensive care settings.[29] The sample under study presented on average a tendency to respiratory alkalosis, although keeping the pH within acceptable limits, the PaO2 was above the expected limit, a pattern associated with an excess of oxygen supply, and reduced PCO2, characteristic of a hyperventilation picture, conditions that may be associated with emotional changes, ventilatory assistance, CNS injuries, sepsis, intoxications and hypoxemia.[29,30]

CONCLUDING REMARKS

It is observed, therefore, that the sample analyzed presents a male profile, aged with an average of 69 years, with the presence of one to three pre-existing comorbidities, absence of alcohol and tobacco consumption, coming from another health institution and from the surgical center in the postoperative period and for respiratory causes. As for the reasons that led to readmission, respiratory complications and sepsis and/or septic shock, occurring in an average of 5.6 days, stood out. They presented hematological and renal function alterations. The prevalent clinical outcome was death.

The patient evaluation comprises clinical, laboratory and imaging aspects, requiring more and more knowledge from health professionals to interpret these findings. Thus, this study aims to contribute to a profile of the characteristics that the patients readmitted to the ICU had at the time of discharge that contributed to their return, since the decision making for the intensive care discharge implies knowing the ideal moment for this transition of care, in order to stimulate the progression of recovery and reduce the risks that permeate a prolonged stay.

The research was limited to data from a single tertiary care institution, with restriction to patients readmitted to the ICU of this service, not analyzing the characteristics of the group of

patients who were discharged from intensive care and did not need to return. Although there are criteria for discharge, this is a medical decision, restricting data generalization. Finally, no information was collected regarding readmitted patients who had a DNR order, an index that may have influenced the death rate.

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