● **Original article**

EPIDEMIOLOGICAL PROFILE AND MONITORING AFTER DISCHARGE OF PATIENTS HOSPITALIZED AT AN INTENSIVE CARE UNIT

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ABSTRACT: To describe the epidemiological profile and monitoring after discharge of patients hospitalized at an intensive care unit. Descriptive and cross-sectional research with a quantitative approach, using documentary analysis of adult patients' electronic histories, who were hospitalized at a tertiary care service in the city of Rio de Janeiro between November 2014 and November 2015. In the sample (n=573), 73% were 60 years of age or older, which was associated with a higher risk of death. The mean length of hospitalization at the intensive care unit was 10.7 days, the death rate at the intensive care unit was 26% (n= 148) and 56% (n=112) died of septic shock. Ten percent (n= 44) of patients with relative death risk (p=0.001) were readmitted to the intensive care unit. The variables female sex, age over 60 years, hospitalized at the intensive care unit for more than 30 days and readmission to the unit are risk factors for death.
DESCRIPTORS: Intensive care units; Patient readmission; Hospital mortality; Shock, septic.

PERFIL EPIDEMIOLÓGICO E SEGUIMENTO APÓS ALTA DE PACIENTES INTERNADOS EM UNIDADE DE TERAPIA INTENSIVA

RESUMO: Descrever o perfil epidemiológico e o seguimento após alta de pacientes internados em uma unidade de terapia intensiva. Pesquisa descritiva, seccional e de abordagem quantitativa, por meio de análise documental dos prontuários eletrônicos de pacientes adultos, internados na unidade de terapia intensiva em um hospital de atenção terciária na cidade do Rio de Janeiro, no período de novembro de 2014 a novembro de 2015. Na amostra (n=573) 73% apresentaram idade igual ou acima de 60 anos, que foi associada a maior risco de morte. A média do tempo de internação na unidade de terapia intensiva foi de 10,7 dias, a taxa de óbito na unidade de terapia intensiva foi de 26% (n= 148), sendo que 56% (n=112) foram a óbito por choque séptico. Foram readmitidos na unidade de terapia intensiva 10% (n= 44) dos pacientes que apresentaram maior risco relativo para óbito (p=0,001). As variáveis sexo feminino, idade acima de 60 anos, internação na unidade de terapia intensiva acima de 30 dias e readmissão na unidade são fatores de risco para óbito.
DESCRITORES: Unidades de terapia intensiva; Readmissão do paciente; Mortalidade hospitalar; Choque séptico.

PERFIL EPIDEMIOLÓGICO Y SEGUIMIENTO TRAS ALTA DE PACIENTES INTERNADOS EN UNIDAD DE TERAPIA INTENSIVA

RESUMEN: Describir el perfil epidemiológico y el seguimiento tras alta de pacientes internados en una unidad de terapia intensiva. Investigación descriptiva, seccional y de aproximación cuantitativa, mediante análisis documental de los archivos electrónicos de pacientes adultos, internados en la unidad de terapia intensiva en un hospital de atención terciaria en la ciudad de Rio de Janeiro, entre noviembre del 2014 y noviembre del 2015. En la muestra (n=573), 73% tuvo edad igual o superior a 60 años, que fue asociada a mayor riesgo de muerte. El promedio del tiempo de hospitalización en la unidad de terapia intensiva fue 10.7 días, la tasa de óbito en la unidad de cuidados intensivos fue del 26% (n= 148), siendo que 56% (n=112) fallecieron por choque séptico. Fue readmitido en la unidad de terapia intensiva 10% (n= 44) de los pacientes que presentaron mayor riesgo relativo para óbito (p=0,001). Las variables sexo femenino, edad superior a 60 años, hospitalización en la unidad de cuidados intensivos superior a 30 días y readmisión en la unidad son factores de riesgo para óbito.
DESCRIPTORES: Unidades de cuidados intensivos; Readmisión del paciente; Mortalidad hospitalaria; Choque séptico.

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● **INTRODUCTION**

Intensive Care Units (ICU) are specialized spaces inside hospitals for the treatment of patients whose survival is threatened by diseases or clinical conditions that cause instability or dysfunction of one or more physiological systems. To deliver proper care to these patients, besides qualified staff, technological monitoring resources, vital function support, use of invasive devices and knowledge of patients' needs are necessary[1].

Among the ways available to discover patients' needs, research stands out, such as epidemiological profiling, including a set of actions that provide knowledge, detection or prevention of any change in the determining and conditioning individual or collective health factors, with a view to recommending and adopting measures to prevent and control diseases and problems[2].

Therefore, the epidemiological profile is an important tool for the planning, organization and operation of health services, as well as to standardize correlated technical activities[2]. The research is also relevant as from the moment when changes occur in the dynamics of the diseases' epidemiological profile and advances in scientific knowledge, a fact that requires the constant updating of the epidemiological knowledge on the population that is to be investigated[2].

In the mean time, the knowledge on the patient's epidemiological profile can be deepened by assessing his monitoring, by following up on the patient throughout the hospitalization period. The target unit and the evolution of the patient's severity at the ICU are also important parameters to facilitate the service management, as they offer indications to proceed with the patient's treatment[3].

Getting to know the population attended at the ICU and its clinical evolution is fundamental, as it permits the detection of changes and the formulation of objectives and targets for the sector, with a view to improving the care provided and, consequently, these indicators.

Thus, the following questions were raised: what is the epidemiological profile of ICU patients at a tertiary care hospital? And their monitoring after discharge from the ICU? To answer these questions, the objective of the research was to: describe the epidemiological profile and monitoring after discharge of patients hospitalized at an intensive care unit of a tertiary hospital.

● **METHOD**

A descriptive and cross-sectional study was undertaken with retrospective analysis of patient histories and a quantitative approach.

It was developed at the ICU of a tertiary care hospital in the state of Rio de Janeiro, classified as an adult general and surgical medicine service, consisting of 16 beds; between November 2014 and November 2015, through documentary analysis of the electronic files of patients admitted during that period. All patients ≥ 18 years of age were included who were hospitalized at the ICU for at least 24 hours and whose hospitalization history was concluded. On the other hand, all patients who did not comply with the above inclusion criteria or whose information required for the research was lacking were excluded.

The data collection tool contained the following variables: sex (male and female) and age; origin: emergency, operating room, step-down unit, nursing wards; cause of admission: hemodynamic instability, respiratory instability, hemodialysis, post-elective surgery or post-emergency surgery, neurological problem or other causes; main diagnosis; length of ICU hospitalization in days; outcome at ICU: discharger, transfer to other sector or death; monitoring at other sector; transfer to step-down unit, transfer to ward or other location; outcome at other sector: discharge, death or readmission at ICU; outcome after ICU readmission (discharge or death) and, if that is the case, cause of death.

The findings were organized and presented in tables, using Epi Info version 7 to organize the data. To analyze the data, the chi-squared test and descriptive statistics were used, considering p < 0.05 as statistical significance.

This research was submitted to the Research Ethics Committee of the proposing and co-participant institutions for appreciation and authorization of the collection, in compliance with Resolution No. 466/12[4]. Approval was obtained under opinions 1.411.041/2016 and 1.446.098/2016, respectively.

● **RESULTS**

Six hundred patient histories were considered, according to the criteria described, but 27 were excluded as the length of ICU hospitalization was less than 24 hours, totaling a final sample of 573 histories.

Next, Table 1 displays the demographic and clinical characteristics of the study population (n = 573). Besides the data shown, what the age is concerned, the mean and median corresponded to 66.5 years ±19.4 and 71 years, respectively; the mean length of hospitalization was 10.7 days ± 18.8 and the median four days.

Table 1 – Demographic and clinical characteristics. Rio de Janeiro, RJ, Brazil, 2016 (continues)

Characteristics	n (%)
Age	
≥18 and ≤39	70 (12)
≥40 and ≤59	83 (15)
≥60	420 (73)
Sex	
Male	305 (53)
Female	268 (47)
Origin	
Emergency	254 (44)
Operating room	241 (42)
General wards	64 (11)
Step-down unit	14 (03)
Causes of admission	
Post-elective surgery	155 (27)
Respiratory failure	151 (26)
Post-emergency surgery	88 (16)
Neurological problem	76 (13)
Hemodynamic instability	65 (11)
Hemodialysis	16 (03)
Other cause	22 (04)
Main diagnosis	
Neurological diseases	108 (19)
Respiratory diseases	100 (17)
Neoplasms	81 (14)
Cardiovascular diseases	61 (11)
Musculoskeletal diseases	57 (10)
Gastrointestinal diseases	53 (09)
Genitourinary diseases	33 (06)
Endocrine diseases	20 (04)
Liver diseases	13 (02)
Hematological diseases	10 (02)
Others	37 (06)

Length of ICU hospitalization	
≥ 1 and ≤ 2 days	198 (35)
≥ 3 and ≤ 7 days	187 (33)
≥ 8 and ≤ 12 days	64 (11)
≥ 13 and ≤ 17 days	35 (06)
≥ 18 and ≤ 23 days	19 (03)
≥ 24 and ≤ 29 days	11 (02)
≥ 30 days	59 (10)
Outcome after first hospitalization	
Death	148 (26)
Transferred to other sectors	425 (74)
Cause of death	
Septic shock	112 (56)
Refractory shock/cardiorespiratory arrest	40 (20)
Respiratory failure	12 (24)

What the variable main diagnosis is concerned, the research institution has a coronary intensive care unit, justifying the smaller number of patients admitted with cardiovascular diseases as the main diagnosis at the ICU assessed.

Table 2 displays the outcomes related to the variable first hospitalization, showing the female sex and age over 60 years as significant factors that led to a larger number of deaths in individuals with these characteristics.

Table 2 – Outcome of first ICU hospitalization according to sex and age. Rio de Janeiro, RJ, Brazil, 2016

Characteristics	Death n (%)	Transfer	Total	P-value	Relative Risk
Female	80 (30)	188 (70)	268 (100)	0.02*	RR= 1.339*
Male	68 (22)	237 (78)	305 (100)		
≥ 60 years of age	133 (32)	287 (68)	420 (100)	<0.001*	RR= 3.23*
≥ 18 and ≤ 59 years of age	15 (10)	138 (90)	153 (100)		

*Chi-squared

Table 3 highlights the association between the length of ICU hospitalization and its outcome, in that patients hospitalized at the unit for more than 30 days showed a higher relative risk of death.

Table 3 – Outcome of first ICU hospitalization according to length of ICU hospitalization. Rio de Janeiro, RJ, Brazil, 2016

Length of hospitalization	Death n (%)	Transfer	Total	P-value	Relative Risk
≥ 30 days	23 (39)	36 (61)	59 (100)	0.009*	RR= 1.60*
≤ 29 days	125 (24)	389 (76)	514 (100)		

*Chi-squared

Table 4 evidences a significantly larger number of deaths at other units after the ICU discharge among patients hospitalized at the ICU for more than 30 days during the first hospitalization. In addition, the same patients showed a higher relative risk of readmission at the ICU.

Table 4 – Association of outcome after ICU discharge. Rio de Janeiro, RJ, Brazil, 2016

Length of ICU hospitalization during first hospitalization	After ICU discharge, death at other units n (%)	After ICU discharge, discharge from other units	Total	P-value	Relative Risk
≥ 30 days	11 (38)	18 (62)	29 (100)	0.001*	RR= 6.069*
≤ 29 days	22 (06)	330 (94)	352 (100)		
Length of ICU hospitalization during first hospitalization	ICU readmission	After ICU discharge, discharge from other units	Total	P-value	Relative Risk
≥ 30 days	07 (28%)	18 (72)	25 (100)	0.008*	RR= 2.777*
≤ 29 days	37 (10%)	330 (90)	367 (100)		

*Chi-squared

Another factor that appeared in this research was the larger number of deaths in patients rehospitalized at the ICU, with a higher risk (RR = 1.848) compared to patients hospitalized for the first time, as proven by the data in Table 5.

Table 5 – Comparison between outcome of first ICU hospitalization and outcome of ICU readmission. Rio de Janeiro, RJ, Brazil, 2016

Outcomes	Death n (%)	Discharge	Total	P-value	Relative Risk
Readmission	21 (48)	23 (52)	44 (100)	0.001*	RR= 1.848*
1st hospitalization	148 (26)	425 (74)	573 (100)		

*Chi-squared

● DISCUSSION

According to Table 1, what the demographic characteristics are concerned, the total research population (n = 573) consists of 53% (n = 305) men and 47% (n = 268) women and 73% (n = 420) were over 60 years of age. The mean and median age were 66.5 and 71 years, respectively. These data are in line with earlier studies, which also presented a predominantly male population, ranging between 54% and 60%, and a population over 60 years of age, ranging between 53% and 58%[5-8].

As for the patients' origin, the majority had access to the ICU from the emergency sector 44% (n = 254), followed by the operating room 42% (n = 241). This variable is in accordance with some studies, where the emergency sector revealed the highest rate of origin for ICU patients, ranging between 26% and 40%[6,9-10], but differs from other studies, in which most patients had access to the ICU from the operating room, ranging between 36% and 55%[3,7-8].

As regards the causes of ICU admission, the main cause was post-elective surgery in 27% (n = 155), followed by respiratory failure 26% (n = 151). This fact differs from another study in which the main cause was respiratory failure (43% from a total of 67), followed by hemodynamic failure (29% from a total of 67)[6].

The most frequent category within the main diagnosis was related to the neurological conditions 19% (n = 108), followed by diseases of the respiratory apparatus 17% (n = 100), and neoplasms 14% (n = 81). These data differed from other studies though, which did not agree either in their results on the main diagnosis; in those studies, the percentages of respiratory conditions ranged from 13 % to 31% and neoplasms between 10% and 18%[6,9].

As regards the length of hospitalization at the ICU, during the first hospitalization, the mean length was 10.7 days, the median four days and the predominant period between 01 and 02 days 35% (n = 198), while 10% (n = 59) of the patients spent more than 30 days at the ICU. Great differences are found in the literature with regard to the patient's mean length of stay at the ICU, with an average ranging from 8.9 to 23.2 days. The studies agreed on a smaller percentage of patients hospitalized with more than 30 days at the ICU[5,7,9].

In addition, it was observed that the age variable ≥ 60 years was a risk factor RR =1.78 (p=0.03) when compared to the variable patients ≥ 18 years until ≤ 59 years of age for longer ICU hospitalization (≥ 30 days).

The patient is discharged from the ICU when the hemodynamic condition has stabilized and there is no more need for invasive mechanical ventilation or continuing monitoring and intensive care[8].

Among the patients transferred to other units (n = 425, 74% of the total), after the ICU care, 94% (n = 398) were transferred to the wards and only 6% (n = 27) to the step-down unit. It should be highlighted that research in which the larger percentage of population transferred to the wards in comparison with the step-down units tend to present longer ICU hospitalization[11]. Hence, the mean ICU hospitalization in this research was 10.7 days, against 8.1 to 8.9 days in studies with higher rates of patient transfer to the step-down unit[3,9].

In Brazil, the number of step-down beds is unknown, but we do know that it does not attend to the population's needs at all. As a result, when these patients are hospitalized at nursing wards, they do not receive the support and care they need from qualified staff, which can determine higher ICU rehospitalization rates and higher hospital mortality[12].

Another relevant piece of information is death, being a frequent indicator of the   quality of ICU care[3]. Among the 573 patients investigated, 148 died during the first ICU hospitalization, totaling 26% of the sample. In the literature, this rate ranged from 11% to 34.8%[3,6-7,9-10,12]. These patients presented a higher average hospitalization of 16 days and a higher median of seven days when compared to the general population.

Also concerning death during the ICU hospitalization, it can be observed in Table 3 that the patients who spent ≥ 30 days at the ICU obtained an RR= 1.60 higher (p=0.009) of passing away when compared to the remainder. A consensus exists in the literature that patients who spent more time at the ICU present more unstable conditions or complications, due to their disease or invasive procedures[9]. Other studies in Latin American and European countries have demonstrated the relation between long hospitalizations and the development of infections, a factor that increases the probability of death[13-15].

In this research, according to Table 2, patients ≥ 60 years of age had a higher relative risk RR=3.23 (p=<0.001) of passing away during the first ICU hospitalization when compared to the others. This is in line with another study in which 63% of patients ≥ 60 years passed away[5]. Table 2 demonstrated that female patients also had a higher relative risk RR=1.339 (p=0.02) of passing away during the first ICU hospitalization when compared to male patients, different from a research that found no statistically significant difference between the sexes, with a death rate of 16% among women and 11% among men[16].

Death can also take place after discharge from the ICU. From the 425 patients transferred to other sectors, 8% (n = 33%) passed away. What these patients are concerned, it can be observed in Table 4 that patients hospitalized at the ICU ≥ 30 days during the first hospitalization had an RR=6.069 higher (p=<0.001) of passing away in other sectors when compared to the remainder. In the literature, death rates after discharge from the ICU range between 2% and 4%[5,10].

It was verified that the largest number of deaths at the ICU was due to septic shock 56% (n = 112), followed by refractory shock/cardiorespiratory arrest 20% (n = 40) and respiratory failure 12% (n = 24).

These data are in accordance with the literature, which also presented a higher rate of ICU deaths due to septic shock, followed by refractory shock/cardiorespiratory arrest and respiratory failure[10].

The possibility should be considered that most cases classified as refractory shock and cardiorespiratory arrest may also have been due to sepsis[10].

The death may be related to the natural evolution of the disease, when the patient has exhausted all therapeutic possibilities. Nevertheless, it can also derive from factors like limited human resources and availability of equipment, mainly in services without intermediary care units, or can also indicate premature discharge from the ICU[3,8].

Hence, in view of the several limiting factors in health, it was verified that 10% of all 425 patients needed readmission to the ICU, while a literature review presented rehospitalization rates ranging between 0.89 and 19%[17]. It was also observed in Table 4 that the patients who spent ≥ 30 days hospitalized at the ICU during the first hospitalization had an RR=2.777 higher (p=0.008) of being readmitted to the ICU when compared to the remainder.

When the patient is readmitted to the ICU, new exposures to invasive procedures take place. Therefore, these patients are considered in more severe conditions and present a length of hospitalization 2.5 times longer, present more chronic comorbidities and a probability of death four times higher when compared to patients who were not readmitted[18-20].

A high mortality rate of 48% (out of 44) was verified (Table 5) after patients' readmission to the ICU. In the literature, this rate ranged between 27% and 69%[20-21]. Thus, this population had an RR= 1.848 (p=0.001) higher of passing away when compared to the patients during the first hospitalization.

It is highlighted that this research comes with a number of limitations: it was developed at a single ICU, all patients in the sample come from a one-year period, the patients' clinical severity was not analyzed, the length of hospitalization before ICU admission was not verified, which may be a factor that increases the mortality[22]. The variable comorbidities could not be collected satisfactorily, due to the lack of information in the patient history, and was therefore excluded from the research so as not to negatively affect the research result.

● **CONCLUSION**

The lack of step-down beds may have increased the mean number of hospitalization days at the ICU, evidencing the need for further research at two or more institutions with distinct step-down situations in order to better clarify this aspect.

The variables female sex, age over 60 years, ICU hospitalization longer than 30 days and readmission to the unit represented risk factors for death. The main cause of death was septic shock, presented in the research, in line with the literature. Nevertheless, it cannot be affirmed that the cause of death was septic shock only or whether this was but a factor contributing to the occurrence of death, due to the data collection method used, which did not permit a more detailed study of each patient.

It was also observed that patients over 60 years of age presented risk for the need for longer ICU hospitalization (≥ 30 days). In addition, patients who spent more time hospitalized at the ICU (≥ 30 days) presented a higher percentage of death in other sectors after the transfer and a higher percentage of readmissions.

Without any claim on exhausting the theme, this research adds knowledge on the epidemiological profile of patients at an ICU and supports future research in the area.

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