Predictors for lethality and readmission of patients with sepsis admitted to intensive care unit from a hospital in Southern Brazil

Preditores de letalidade e reinternação de pacientes com sepse internados em unidade de terapia intensiva de um hospital do Sul do Brasil

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Abstract

Sepsis is characterized as an organic dysfunction with an uncontrolled immune response of the host to a focal infection that can progress to septic shock. The present study aims to detect predictors of lethality and readmissions in 297 patients hospitalized for sepsis within 365 days, at four different times (T0, T30, T180, and T365). Cox regression analysis was performed, demonstrating the adjusted hazard ratio (HR) and 95% confidence intervals (95%CI) to detect variables associated with lethality and readmissions. The cumulative lethality rate was 43.4% and 27.3% for T0, 10.6% for T30, 15.0% for T180, and 26.9% for T365. In addition, the cumulative rate of readmissions that resulted in death was 21.6% and 25.0% for T30, 19.3% for T180, and 20.8% for T365. Patients who died showed a cumulative rate of readmissions of 69.8% and 84.6% for T30, 68.8% for T180, and 57.1% for T365. Multivariate analysis indicated that variables such as ≥80 years old (HR:1.98; 95%CI:1.15-3.39), chronic kidney disease (CKD) (HR:1.85; 95%CI:1.15-3.74), and neuromuscular disease (HR:2.17;1.04-4.28) were independently associated with lethality. Length of stay (LOS) (≥12 days) and stroke were associated with readmissions at T180 and T365. These variables are clinically important to predict lethality and readmission in the sepsis hospital context.

Keywords: Sepsis; Lethality; Readmission.

Resumo

A sepse é caracterizada como uma disfunção orgânica com resposta imune descontrolada do hospedeiro a uma infecção focal que pode evoluir para choque séptico. O presente estudo visa detectar preditores de letalidade e reinternações em 297 pacientes internados por sepse em 365 dias, em quatro momentos diferentes (T0, T30, T180 e T365). A análise de regressão de Cox foi realizada, demonstrando a taxa de risco ajustada (HR, do inglês *Hazard Ratio*) e intervalos de confiança de 95% (IC95%) para detectar variáveis associadas à letalidade e reinternações. A taxa de letalidade cumulativa foi de 43,4% e, em diferentes seguimentos, foi de 27,3% para T0, 10,6% para T30, 15,0% para T180 e 26,9% para T365. Além disso, a taxa cumulativa de reinternações que resultaram em óbito foi de 21,6% e, em diferentes acompanhamentos, foi de 25,0% para T30, 19,3% para T180 e 20,8% para T365. Os pacientes que faleceram apresentaram uma taxa cumulativa de reinternações de 69,8% e para os acompanhamentos foi de 84,6% para T30, 68,8% para T180 e 57,1% para T365. A análise multivariada indicou que variáveis idade ≥80 anos (HR:1,98; IC 95%:1,15-3,39), doença renal crônica (DRC) (HR:1,85; IC 95%:1,15-3,74) e doença neuromuscular (HR:2,17;1,04-4,28) foram independentemente associados à letalidade. O tempo de internação (≥12 dias) e o AVC foram associados a reinternações nos acompanhamentos T180 e T365. Essas variáveis são clinicamente importantes para predizer letalidade e reinternação no contexto hospitalar de sepse.

Palavras-chave: Sepse; Letalidade; Readmissão.

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INTRODUCTION

Sepsis is characterized as an organic dysfunction with an uncontrolled immune response of the host to a focal infection that can progress to septic shock, a subtype of sepsis, which increases the risk of lethality.[1] It is known that early recognition and treatment starting as soon as possible are key points for a better prognosis in septic patients or septic shock.[2] Sepsis can leave long-term sequelae that can increase the risk of lethality and/or require health care after hospital discharge. The prognosis of sepsis is multifactorial and individual, varying according to the clinical history of each patient.[3,4]

Sepsis and the consequences linked to this pathology are serious problems for health and society, as they represent a strong economic and social impact, both for patients and health institutions. In 2016, a meta-analysis showed that hospital lethality associated with sepsis and severe sepsis reached 26% of total deaths in the period 1997-2015.[2] In 2017, sepsis was defined as a global health problem by the World Health Organization with 48.9 million cases and 11 million sepsis-related deaths worldwide, which accounted for almost 20% of all global deaths (https://www.who.int/news-room/fact-sheets/detail/sepsis).

The main objective of this study was to detect predictors of lethality and readmissions for sepsis and evaluate the incidence of lethality within 365 days after hospital admission. In addition, to detect the readmission rate due to the death of these patients within one year after hospital discharge.

METHODS

Study Location

The Rio Grande do Sul (RS) has moderately cold winters with the occurrence of frosts and occasional snow and hot summers. Currently, the population of RS is approximately 11,5 million, with the city of Porto Alegre being the most populous (approximately 1,5 million inhabitants) (https://cidades.ibge.gov.br/brasil/rs).

Study Design and Study Population

This is a prospective observational study to investigate the epidemiological profile and clinical outcomes of patients over 18 years of age, with a medical diagnosis of sepsis diagnosed in the internal medicine department of a private hospital in southern Brazil, in the period December/2019 to August/2021. All participants signed an informed consent form and this study was approved by the Institutional Review Board of the National Health Council of Brazil (approval number 4.268.446).

Data Collection

Criteria for defining sepsis for inclusion in the study were based on the Q-SOFA score (quick sequential organ failure assessment score), a tool used at the bedside to identify adverse outcomes in patients with possible or confirmed infection,[2] in addition to including patients who had two assessed Systemic Inflammatory Response Syndrome (SIRS) criteria and/or at least one organ dysfunction and were admitted to a private hospital in southern Brazil.

Data were collected from hospital medical records and through telephone interviews after hospital discharge. Follow-ups are described as T0 (admission), T30 (30 days after discharge), T180 (180 days after discharge), and T365 (365 days after discharge). Follow-up data were considered for analysis only when the questionnaire was completed.

Statistical analysis

Qualitative variables were represented by absolute and relative frequencies. Differences between these variables were verified by Pearson's chi-square or Fisher's exact tests, as appropriate. The types of distributions of the quantitative variables were evaluated by the Kolmogorov-Smirnov test with Lilliefors correction and by the Shapiro-Wilk test. In addition, the homogeneities of variances were verified by Levene's test. Medians and interquartile ranges (IQR) were shown. The Mann-Whitney test was applied to verify possible significant differences between quantitative variables. Multivariate analysis was performed using Cox regression, represented by the adjusted hazard ratio and 95% confidence intervals (95%CI) to identify variables possibly independently associated with cumulative lethality and readmission at different follow-ups from sepsis. *P*-values ≤ 0.05 was considered significant for all tests performed. SPSS, Version 25.0 for Windows (SPSS Inc., Chicago, IL, USA) was used for data analysis.

RESULTS

The sociodemographic and clinical characteristics of the patients in the present study are described in Table 1. The median age of patients was 82 (IQR: 72.0 - 89.0) years, body mass index (BMI) was 25.3 (IQR: 22.8 - 28.7), females were slightly more frequent (50.5%) and the level of complete high school was 80.4%. The median length of stay (LOS) was 13.0 (IQR: 7.0 - 20.0). The predominant comorbidities were hypertension (67.7%), diabetes (27.3%), cancer (23.7%), heart failure (23.0%), and chronic kidney disease (CKD) (21.0%).

Table 1

Description of the sociodemographic and clinical characteristics of the patients evaluated in the present study.

Variables	n	%
Sex		
Male	150	50.5
Female	147	49.5
Age in years		
≤49	20	6.7
50 - 64	24	8.1
65 - 74	49	16.5
75 - 84	81	27.3
≥ 85	123	41.4
Median age (IQR)	82.0 (72.0 - 89.0)	
Median BMI (IQR)	25.3 (22.8 - 28.7)	
Education		
No instruction	5	2.5
Incomplete Elementary school	7	3.4
Complete Elementary school	20	9.8
Incomplete high school	3	1.5
Complete high school	164	80.4
Bachelor's degree	5	2.5
Median LOS (IQR)	12.0 (7.0 – 20.0)	
Comorbidities		
Systemic arterial hypertension	203	67.7
Diabetes	82	27.3
Cancer	70	23.7
Cardiac insufficiency	67	23.0
Chronic kidney disease	62	21.0
Stroke	51	17.0
Neuromuscular	43	14.7
Immunosuppression	33	11.3
Chronic obstructive pulmonary disease	27	9.0
AIDS	10	3.3
Alcohol use disorder	8	2.7
Number of comorbidities		
Zero	29	10.0
One	57	19.0
Two	99	33.3
Three	58	19.3
Four	43	14.7
Five	11	3.7

IQR: Interquartile range; BMI: Body mass index; LOS: Length of stay.

The cumulative lethality rate was 43.4% (n=129/297) and 27.3% (n=81/297) for T0, 10.6% (n=15/142) for T30, 15.0% (n=19/127) for T180 and 26.9% (n=14/52) for T365. In addition, the cumulative rate of readmissions that resulted in death was 21.6% (n=27/125) and 25.0% (n=11/44) for T30, 19.3% (n=11/57) for T180, and 20.8% (n=5/24) for T365. Patients who died showed a cumulative rate of readmissions of 69.8% (n=30/43) and 84.6% (n=11/13) for T30, 68.8% (n=11/16) for T180, and 57.1% (n=8/14) for T365.

In assessing the outcome of death, at T0, sex, age, LOS, number, and type of comorbidities were analyzed. In cases of death, there was a higher frequency of males (54.3%), ≥ 85 years old (56.8%), median LOS of 14.0 (IQR: 8.0 – 21.0), ≥3 comorbidities (45.7%), diabetes (34.6%), cancer (29.6%), CKD (29.6%), neuromuscular disease (22.2%), immunosuppression (13.5%) and alcohol use disorder (3.7%). The median age was higher in cases of death (86.1), and the age group ≥ 85 years old was associated with death ($p = 0.03$). In addition, comorbidities such as CKD ($p = 0.03$) and neuromuscular disease ($p = 0.04$) were associated with death (Table 2).

T30, T180, and T365 were investigated. In the T30, the variables more frequent in deaths compared to survived were: male (66.7% vs 33.3%), ≥ 85 years old (73.3% vs 31.7%), and ≥3 comorbidities (46.7% vs 28.2%). The median age was higher in deaths than for survived (88.3 vs 79.0). In the T180, the variables that were more frequent in deaths compared to survived were: male gender (68.4% vs 49.6%), age group ≥ 85 years (47.4% vs 33.1%), and ≥3 comorbidities (52.6% vs 35.4%). The median age was higher in cases of death than for survived (84.5 vs 79.4). Finally, in T365, the most frequent variables in deaths compared to survived were female sex (64.3% vs 46.2%), age group ≥ 85 years old (42.9% vs 28.8%), and ≥3 comorbidities (50.0% vs 40.4%). The median age was higher for death than for survived (83.4% vs 77.1%). The age was higher in death compared to survival patients at T30 and T180 ($p < 0.05$), but it was not statistically different at T365 ($p = 0.44$) (Table 3).

Patients with age ≥80 years old were 98% more likely to die (HR: 1.98; 95%CI: 1.15 - 3.39; $p = 0.01$), CKD 85% (HR: 1.85; CI95 %: 1.15 - 3.74; $p = 0.03$) and with neuromuscular disease 117% (HR: 2.17; 95% CI: 1.04 - 4.28; $p = 0.03$) (Table 4). Age, CKD, and neuromuscular disease are significant predictors of cumulative lethality for sepsis. Significant predictors for readmission at T180 were LOS (≥12 days) (HR: 2.25; 95%CI: 1.05 – 4.79; $p = 0.03$) and stroke (HR: 2.39; 95%CI: 1.93 – 6.13; $p = 0.04$). Also, LOS (≥12 days) (HR: 8.02; 95%CI: 1.74 – 36.83; $p < 0.01$) and stroke (HR: 7.64; 95%CI: 1.19 – 49.03; $p = 0.03$) were predictors for readmission at T365 (Table 5).

Table 2

Bivariate analysis between the variables sex, age, and comorbidities with the outcome of death at admission (T0)

Variables	Survived (n=216)		Death (n=81)		*p-value*
	n	%	n	%	
Sex					0.36
Female	113	51.6	37	45.7	
Male	106	48.4	44	54.3	
Age in years					**0.03**
≤49	16	7.3	4	4.9	
50 - 64	20	9.1	4	4.9	
65 - 74	40	18.3	10	12.3	
75 - 84	64	29.2	17	21.0	
≥ 85	79	36.1	46	56.8	
Median age (IQR)	80.0 (71.1-88.3)		86.1 (77.3–92.0)		**0.04**
Median LOS (IQR)	12 (7.0 - 19.0)		14.0 (8.0 - 21.0)		0.45
Number of comorbidities					0.19
0	24	11.0	6	7.4	
1-2	119	54.3	38	46.9	
≥3	76	34.7	37	45.7	
Type of comorbidity					
Systemic arterial hypertension	151	68.9	52	64.2	0.72
Diabetes	54	24.7	28	34.6	0.19
Cancer	47	21.5	24	29.6	0.21
Cardiac insufficiency	51	23.3	18	22.2	0.84
Chronic kidney disease	39	17.8	24	29.6	**0.03**
Stroke	40	18.3	11	13.6	0.25
Neuromuscular	26	11.9	18	22.2	**0.04**
Immunosuppression	23	10.5	11	13.6	0.42
Chronic obstructive pulmonary disease	20	9.1	7	8.6	0.72
AIDS	9	4.1	1	1.2	0.74
Alcohol use disorder	5	2.3	3	3.7	0.87

IQR: Interquartile range; LOS: Length of stay; In bold, significant *p*-values are highlighted.

Table 3

Comparison between the variables sex, age, and comorbidities with the outcome of death at times T30, T180 and T365

Variables	n	%	n	%	*p-value*
T30	Survived (n=142)		Death (n=15)		
Sex					0.23
Female	71	50.0	5	33.3	
Male	71	50.0	10	66.7	

Table 3 (continuação)

Variables	n	%	n	%	*p-value*
Age in years					**0.02**
≤49	9	6.3	1	6.7	
50 - 64	16	11.3	1	6.7	
65 - 74	29	20.4	0	0	
75 - 84	43	30.3	2	13.3	
≥ 85	45	31.7	11	73.3	
Median age (IQR)	79.0 (70.2 -87.8)		88.3 (82.7–90.4)		**0.03**
Number of comorbidities					0.34
0	16	11.3	1	6.7	
1-2	86	60.6	7	46.7	
≥3	40	28.2	7	46.7	
T180	Survived (n=127)		Death (n=19)		p-value
Sex					0.12
Female	64	50.4	6	31.6	
Male	63	49.6	13	68.4	
Age in years					**0.04**
≤49	12	9.4	0	0.0	
50 - 64	11	8.7	0	0.0	
65 - 74	24	18.9	4	21.1	
75 - 84	38	29.9	6	31.6	
≥ 85	42	33.1	9	47.4	
Age median (IQR)	79.4 (70.3 - 87.4)		84.5 (77.8 –91.1)		**0.03**
Number of comorbidities					0.16
0	15	11.8	0	0.0	
1-2	67	52.8	9	47.4	
≥3	45	35.4	10	52.6	
T365	Survived (n=52)		Death (n=14)		p-value
Sex					0.13
Female	24	46.2	9	64.3	
Male	28	53.8	5	35.7	
Age in years					0.44
≤49	6	11.5	1	7.1	
50 - 64	6	11.5	0	0	
65 - 74	9	17.3	1	7.1	
75 - 84	16	30.8	6	42.9	
≥ 85	15	28.8	6	42.9	
Age median (IQR)	77.1 (67.3 - 87.8)		83.4 (78.3–87.9)		0.48
Number of comorbidities					0.54
0	10	19.2	1	7.1	
1-2	21	40.4	6	42.9	
≥3	21	40.4	7	50.0	

IQR: Interquartile range; In bold, significant *p-values* are highlighted.

Table 4

Multivariate analysis with mortality predictors demonstrating independent associations with the cumulative mortality outcome in patients with sepsis

Variables	Coefficient	Standard error	*p-value*	Hazard Ratio	CI95%
Age (≥80 years)	**0.63**	**0.31**	**0.01**	**1.98**	**(1.15 - 3.39)**
Sex Male	0.22	0.28	0.33	1.33	(0.77 - 2.25)
Chronic kidney disease	**0.68**	**0.34**	**0.03**	**1.85**	**(1.15 - 3.74)**
*Neuromuscular disease	**0.72**	**0.46**	**0.03**	**2.17**	**(1.04 - 4.28)**
Number of comorbidities (≥3)	0.12	0.31	0.79	0.84	(0.41 - 1.84)
Length of stay (≥12)	0.22	0.33	0.55	1.20	(0.55 - 3.54)
Diabetes	0.21	0.31	0.11	1.70	(0.86 - 4.42)
Systemic arterial hypertension	0.33	0.44	0.74	0.95	(0.71 - 4.58)
Cancer	0.21	0.33	0.24	1.36	(0.88 - 4.99)
Cardiac insufficiency	0.35	0.28	0.88	0.97	(0.78 - 4.91)
Stroke	0.31	0.41	0.81	0.91	(0.61 - 4.12)
Immunosuppression	0.18	0.61	0.79	0.95	(0.55 - 4.74)
Chronic obstructive pulmonary disease	0.33	0.60	0.87	0.93	(0.74 - 6.13)
AIDS	0.17	0.84	0.72	0.98	(0.66 - 6.41)
Alcohol use disorder	0.12	0.91	0.95	1.21	(0.85 - 6.12)
Constant	-1883	0.35	**<0.01**		

*Neuromuscular disease included amyotrophic lateral sclerosis, multiple sclerosis, muscular dystrophy, myasthenia gravis, myopathy, myositis, peripheral neuropathy, and spinal muscular atrophy; CI95%: 95% confidence interval; In bold, significant *p*-values are highlighted.

Table 5

Multivariate analysis with readmission at 30 days (T30), at 180 days (T180), and 365 days (T365) predictors in patients with sepsis

Variable (readmission at 30 days)	Coefficient	Standard Error	*p-value*	Hazard Ratio	CI95%
Age (≥80 years)	-0.05	0.41	0.89	0.94	(0.41 - 2.13)
Sex Male	0.04	0.37	0.90	1.04	(0.50 - 2.17)
Chronic kidney disease	0.10	0.59	0.86	1.10	(0.34 - 3.56)
Neuromuscular disease	0.13	0.69	0.85	1.14	(0.28 - 4.48)
Number of comorbidities (≥3)	-0.31	0.73	0.67	0.73	(0.17 - 3.11)
Length of stay (≥12)	0.26	0.36	0.46	1.30	(0.63 - 2.68)
Diabetes	0.29	0.59	0.61	1.34	(0.42 - 4.26)
Systemic arterial hypertension	0.09	0.43	0.82	1.10	(0.47 - 2.57)
Cancer	0.70	0.51	0.16	2.03	(0.74 - 5.57)
Cardiac insufficiency	0.09	0.53	0.85	1.10	(0.38 - 3.13)
Stroke	0.31	0.51	0.54	1.36	(0.50 - 3.71)
Immunosuppression	-0.04	0.65	0.95	0.95	(0.26 - 3.48)
Chronic obstructive pulmonary disease	-0.01	0.73	0.97	0.98	(0.23 - 4.17)
AIDS	0.85	0.76	0.26	2.34	(0.52 - 10.56)
Alcohol use disorder	12.30	11.10	0.26	3.45	(0.38 - 30.69)
Constant	-15.394	0.56	<0.01		

Table 5 (continuação)

Variable (readmission at 180 days)	Coefficient	Standard Error	*p-value*	Hazard Ratio	CI95%
Age (≥80 years)	0.16	0.42	0.69	1.18	(0.51 - 2.74)
Sex Male	0.09	0.37	0.80	1.09	(0.52 - 2.27)
Chronic kidney disease	0.05	0.58	0.92	1.05	(0.33 - 3.31)
Neuromuscular disease	11.35	0.68	0.09	3.11	(0.81 - 11.91)
Number of comorbidities (≥3)	-0.18	0.73	0.80	0.83	(0.19 - 3.54)
Length of stay (≥12)	0.81	0.38	**0.03**	**2.25**	**(1.05 - 4.79)**
Diabetes	0.70	0.62	0.25	2.02	(0.60 - 6.85)
Systemic arterial hypertension	0.06	0.44	0.87	1.07	(0.44 - 2.57)
Cancer	-0.16	0.54	0.76	0.85	(0.29 - 2.48)
Cardiac insufficiency	-0.31	0.55	0.56	0.73	(0.24 - 2.15)
Stroke	0.87	0.47	**0.04**	**2.39**	**(1.93 - 6.13)**
Immunosuppression	0.02	0.62	0.96	1.02	(0.29 - 3.50)
Chronic obstructive pulmonary disease	-0.06	0.66	0.92	0.93	(0.25 - 3.42)
AIDS	-0.63	0.97	0.51	0.53	(0.07 - 3.62)
Alcohol use disorder	13.43	10.2	0.29	3.14	(0.45 - 39.79)
Constant	-12.630	0.55	0.01		
Variable (readmission at 365 days)	**Coefficient**	**Standard Error**	***p-value***	**Hazard Ratio**	**CI95%**
Age (≥80 years)	0.44	0.79	0.57	1.55	(0.32 - 7.31)
Sex Male	-0.49	0.66	0.45	0.60	(0.16 - 2.24)
Chronic kidney disease	-0.38	10.0	0.69	0.67	(0.09 - 4.82)
Neuromuscular disease	11.60	13.7	0.39	3.19	(0.21 - 46.78)
Number of comorbidities (≥3)	0.93	16.01	0.56	2.54	(0.11 - 58.73)
Length of stay (≥12)	20.82	0.77	**<0.01**	**8.02**	**(1.74 - 36.83)**
Diabetes	-0.80	15.05	0.59	0.44	(0.02 - 8.51)
Systemic arterial hypertension	-16.08	0.93	0.08	0.20	(0.03 - 1.24)
Cancer	-0.65	11.56	0.57	0.51	(0.05 - 5.00)
Cardiac insufficiency	-0.10	10.91	0.92	0.90	(0.10 - 7.68)
Stroke	20.34	0.948	**0.03**	**7.64**	**(1.19 - 49.03)**
Immunosuppression	0.65	12.04	0.58	1.92	(0.18 - 20.36)
Chronic obstructive pulmonary disease	-20.60	12.89	0.11	0.12	(0.01 - 1.59)
AIDS	11.22	21.38	0.59	3.07	(0.04 - 20.31)
Alcohol use disorder	0.57	15.4	0.70	1.77	(0.08 - 36.37)
Constant	-10.315	0.41	0.01		

CI95%: 95% confidence interval. In bold, significant *p-values* are highlighted.

DISCUSSION

Lethality incidences have varied around the world due to different definitions of sepsis and criteria that can be used to diagnose the patient. The incidence of overall lethality in our study at T0 was 27.3%, while in the follow-up we observed incidences of 10.6% for T30, 15.0% for T180, and 26.9% for T365. These incidences are in agreement with a global study of epidemiological data on sepsis that reported a lethality rate of 17% in cases of sepsis and 26% in cases of severe sepsis.[6] On the other hand, our findings for the incidence of lethality are lower when compared to a study conducted in a hospital in Pakistan, which identified a lethality rate of 42%,[7] which is justified because it is an institution with limited resources in a country in development, in the institution evaluated in the present study, which is private, has several resources in technology and innovation for rapid care and rehabilitation of these patients.

Comparing the deaths at each follow-up period, readmission rates were high, 84.6% at 30 days, 68.8% at 180 days, and 57.1% at 365 days, which is justified due to the reduction in the sample, during this cohort and because the readmissions were of patients with greater severity in the post-sepsis health condition. In this context, a study showed that patients with comorbidities before the diagnosis of sepsis tend to be readmitted early and their predictive value of lethality in one year ends up being higher due to the necessary resources of the health system for their survival.[8] A retrospective cohort analysis also reported that 30% of readmissions observed were due to sepsis again and another 60% were due to other infections, showing that the morbidity of sepsis is high even after hospital discharge.[9]

Among septic patients, the presence of comorbidities was analyzed in the incidence of death. CKD and neuromuscular disease showed independent associations with the outcome of death, in addition, the presence of comorbidities was associated with the risk of lethality for sepsis in a previous study.[10] However, other comorbidities observed in patients, such as diabetes (27.3%), cancer (23.7%), and immunosuppression (11.3%), were not significantly associated with the outcome of death in the sample evaluated in the present study, however, other studies have shown that these comorbidities can interfere with the sepsis recovery process, worsening the condition of the disease and consequently leading to a greater probability of death.[11,12]

There are no comparative data in the literature regarding lethality rates in elderly patients with sepsis, due to the discrepancy of information in existing analyses.[13] Most of the existing epidemiological studies concerning lethality associated with sepsis are carried out in short-term outcomes,[14] in contrast, in the present study, statistical significance was detected in the comparison of the age variable concerning death at all follow-up times in up to 365 days, in addition to age ≥82 years being a significant predictor for the death in septic patients, which is consistent with other studies that show that elderly patients are more susceptible to infections and require greater care due to the multifactorial risk associated with age.[12,13,15]

LOS (≥12 days) and stroke were associated with readmissions at T180 and T365. Longer LOS and vascular disease associated with readmission for sepsis were reported in the previous study.[16-18] This study has some limitations, such as loss of sample along the time (24.5% for T30, 12.0% for T180, and, 25.0% for T365) and the absence of survival and readmission data, which often do not occur in the hospital institution evaluated.

Predictive variables for lethality were older age (≥80 years), CKD, or neuromuscular diseases, in addition to high lethality incidence values when compared to hospital readmission. Also, LOS (≥12 days) and stroke were associated with readmissions at T180 and T365. These predictors are clinically important to predict lethality and readmission in the sepsis hospital context. As this is one of the few studies to assess lethality and clinical characteristics of septic patients up to 365 days after hospital discharge, we show the importance of maintaining long-term of septic patients to increase the survival of those who are in the highest-risk group for evolution to death, bringing value to the institution in the care of these patients, reducing costs, and optimizing treatments.

AUTHORSHIP

J. Wolf, J.G. Maccari, and L.A Nasi designed the study. J. Wolf performed the statistical analyses. J. Wolf, H. Petek, J.G. Maccari, M.P. Mutlaq, and L.A. Nasi wrote the first draft of the manuscript and contributed to the literature review and discussion of the results. All authors contributed to and have approved the final manuscript.

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