Clinical-epidemiological profile of patients classified with the possible sepsis discriminator in the emergency department

RESUMO | Objetivo: descrever o perfil clínico-epidemiológico de pacientes classificados com o discriminador "sepse possível" do Sistema Manchester de Classificação de Risco em um departamento de emergência terciário. Método: estudo observacional retrospectivo, realizado no período de janeiro de 2018 a dezembro de 2019. A amostra foi composta por 1522 pacientes. A coleta de dados foi realizada em dados de prontuário eletrônico. A análise foi realizada com o uso de estatística descritiva. Resultados: O sexo feminino foi majoritário (50,6%), com idade média de 63,7 anos (±15,48). A maioria dos atendimentos foi por demanda espontânea (74,1%), com tempos médios de espera para CR e tempo de CR de 3/4 e 4/3 minutos, em 2018 e 2019, respectivamente. Conclusão: É necessário associar o protocolo de classificação de risco, já instituído, outros mecanismos a fim de aprimorar o entendimento e o fluxo assistencial acerca de pacientes potencialmente sépticos.
Descritores: Sepse; Emergência; Triagem; Perfil Epidemiológico; Enfermagem em Emergência.

ABSTRACT | Objective: The present study aims to describe the clinical profile of patients classified with the discriminator "possible sepsis" of the Manchester Risk Classification System in a terciary emergency department. Method: Retrospective observational study, carried out from January 2018 to December 2019. The sample composed of 1522 patients. Data collection was performed using electronic medical records. Analysis performed using descriptive statistics. Results: Females were the majority (50.6%), with a mean age of 63.7 years (±15.48). Most attendances were by spontaneous demand (74.1%), with average waiting times for risk classification and risk classification time of 3/4 and 4/3 minutes, in 2018 and 2019, respectively. Conclusion: It is necessary to associate the risk classification protocol, already in place, with other mechanisms in order to improve the understanding and care flow about potentially septic patients.
Keywords: Sepsis; Emergencies; Triage; Health Profile; Emergency Nursing

RESUMEN | Objetivo: describir el perfil clínico-epidemiológico de los pacientes clasificados con el discriminador "posible sepsis" del Manchester Risk Classification System en un servicio de urgencias de tercer nivel. Método: estudio observacional retrospectivo, realizado de enero de 2018 a diciembre de 2019. La muestra estuvo compuesta por 1522 pacientes. La recolección de datos se realizó mediante historias clínicas electrónicas. El análisis se realizó mediante estadística descriptiva. Resultados: el sexo femenino fue mayoritario (50,6%), con una edad media de 63,7 años (±15,48). La mayoría de las atenciones fueron por demanda espontánea (74,1%), con tiempos promedio de espera para clasificación de riesgo y tiempo de clasificación de riesgo de 3/4 y 4/3 minutos, en 2018 y 2019, respectivamente. Conclusión: Es necesario asociar el protocolo de clasificación de riesgo, ya existente, con otros mecanismos para mejorar la comprensión y el flujo de atención sobre pacientes potencialmente sépticos.
Palabras claves: Septicemia; Emergencia; Triaje; Perfil Epidemiológico; Enfermería de Urgencias.

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INTRODUCTION

Emergency departments have become one of the main entrances for users to the health system, either because of the lack of access and/or non-resolution of other levels of care, or because of the lack of regulation of health systems. Understanding that the emergency is the main point of support

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of the health network for the care of acute or chronic cases, the excessive number of visits not characterized as emergencies can negatively impact the quality of care provided in these health services. [1,2] Over the past decade, the Organization for Economic Co-operation and Development has recorded increasing trends in the number of emergency room visits across different countries and continents. In a decade, the number of visits to emergency services increased by about 5.2% (from 29.3 visits/100 inhabitants to 30.8 visits/100 inhabitants). [3]

In order for emergency departments to be able to meet this demand in an organized manner and identify risks to life, risk classification (RC) protocols are adopted. [4-7] In the Brazilian context, it is the nurse who is legally qualified to lead this process. [4] RC is performed when the patient arrives at the emergency room. From this, priorities are established and the patient is referred to where he will have his needs met. [6,7] It should be noted that the RC does not advocate opening clinical care protocols, but rather the early identification of the possibility of a health problem. Care routines and clinical protocols should be established after the initial RC. [4,7]

In this sense, in 2017, the Latin American Sepsis Institute (ILAS - Instituto Latino-Americano de Sepse) and the Brazilian Risk Classification Group (GBCR - Grupo Brasileiro de Classificação de Risco) developed and proposed the inclusion of a specific discriminator for sepsis care in emergency departments in RC by the Manchester Risk Classification System (SMCR). The included discriminator, called "Possible Sepsis", would allow the identification of potentially septic cases still in the RC. [8]

Sepsis is considered a life-threatening organ dysfunction, resulting from the host's disordered response to infection and which, in the event of circulatory, metabolic and cellular disorders, is capable of progressing to septic shock, which increases its mortality rate. [9] In Brazil, there are about 670 thousand cases per year, being the main cause of death in Intensive Care Units (ICU) and one of the main causes of late hospital mortality, surpassing other diseases, such as acute myocardial infarction and cancer. In addition, it has high mortality, reaching 65% of cases, while the world average is close to 30-40%. It is also important to point out that mortality in Brazil is higher than in other developing countries, such as India and Argentina. [10,11]

In the Brazilian scenario of emergency care, sepsis takes on more critical contours, as many services are overcrowded or have insufficient resources for adequate care. [1,4] In addition, there are difficulties in early diagnosis, due to its initial symptoms being similar to other infectious processes. [12] Evidence guides that sepsis care should be instituted in the first manifestations of the disease, thus avoiding the worsening of organic dysfunction. For this, the orientation is the first hour care package with the purpose of reducing morbidity and mortality. [9,10,13]

Many studies relating MTS and early identification of sepsis in emergency departments are not yet described in the literature. Thus, the present study aims to describe the clinical-epidemiological profile of patients classified with the MTS "possible sepsis" discriminator in a tertiary emergency department.

METHOD

This is a retrospective observational study carried out in a tertiary emergency department in the city of Porto Alegre, RS, Brazil. The study site meets clinical, surgical and gynecological demands, hosting approximately 8,000 consultations/month in the RC. In addition, it has 64 beds registered for care, however, every day about 80 patients are waiting by clinical definition in the emergency department. The study population consisted of 1522 individuals, a number that represents all patients, between the years 2018 and 2019, classified with the discriminator "possible sepsis" of the MTS at the study site. However, risk classifications from the year 2020 were not considered, in view of the Covid-19 pandemic, as many contaminated patients had septic conditions resulting from complications of the disease.

Duplicate consultations on the list generated by an error in the computerized system and patients under 18 years of age were excluded. Data collection was carried out in May 2022, through the institution's computerized indicator system that automatically generates RC data transparently to the institution's employees. Constant clinical and sociodemographic variables were observed in a previously prepared instrument. After that, the data were accommodated and processed in a database in the Excel for Windows software, version 2010. The analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 20 software, using descriptive statistics, using mean and standard deviation or median and interquartile ranges, according to distribution, for quantitative variables. Categorical variables were represented by absolute and relative frequency.

Regarding the logistics of care, upon arrival at the emergency department where the study was conducted, the patient and his family member or guardian are directed to the reception desk, where professionals perform the registration, opening the medical record for assistance in the computerized system. Once registered, the patient's name will appear on the list of classifier nurses, who are allocated in two specific rooms for this purpose, calling the patient in the order of arri-

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val at the service. The time taken from the opening of the electronic medical record at the reception to the initial click of the RC by the nurse classifier in the computerized system is referred to here as "waiting time for RC". When opening the patient's medical record, the computerized system starts counting the RC time, ending the count as soon as the classifier nurse clicks selecting the patient's referral - this time is referred to in the results as "RC time".

As for the flow of patient referrals after RC, those with clinical priorities blue, green and yellow are waiting for medical care in the emergency entrance hall. Otherwise, patients in the orange and red priorities are referred directly to urgent and emergency rooms, respectively, receiving immediate medical care. By definition, every patient classified with the discriminator "possible sepsis" is prioritized as orange, a very urgent priority, with an estimated time for medical care of up to 10 minutes. [7,8] Thus, the "time for medical care" is the sum of the other two times (waiting time and RC time), given that care is provided immediately.

The study was approved by the Research Ethics Committee and followed the provisions of Resolution No. 466/2012 of the National Health Council on Research involving human beings. This study is linked to the project entitled "Identification of clinical phenotypes of sepsis in the emergency department of a Brazilian tertiary hospital" (CAEE: 57544522.6.0000.5530). [14]

RESULTS

Between 2018 and 2019, the emergency department received 108,321 patients, 1522 of which were classified with the possible sepsis discriminator. Regarding the characterization of the sample, it was noticed that a little more than half of the patients were female (n = 770; 50.6%), with a mean age of 63.[7] years (SD = ± 15.48). As for the origin of the patients, 60.3% were from the capital (Porto Alegre), 32.3% from the metropolitan region and 12.4% from the interior of the state of Rio Grande do Sul.

Most patients (n = 1128; 74.1%) arrived at the emergency department spontaneously, 159 (10.5%) patients were referred through the health network through counter-referral, 131 (8.6%) were referred from the outpatient clinics of the institution and only 103 (6.7%) arrived transported by the pre-hospital care service. Regarding the referral service after CR, flows directed to clinical emergencies were prevalent (n = 1258; 82.7%). Among the patients classified as "possible sepsis", 995 were hospitalized (65.4%), with a mean hospital stay of 15.42 days (Table 1).

It is important to point out that in the SMCR, regardless of the flowchart assigned by the classifier to the patient, all are classified as in orange priority, that is, classified as "very urgent", since for the "possible sepsis" discriminator only this priority can be assigned. Among the flowcharts used by the risk classifiers, three were prevalent: "discomfort in adults" (n = 431; 28.3%), "abdominal pain in adults" (n = 348; 22.9%) and " dyspnea in adults" (n = 199; 13.1%) (Table 2) The waiting time between reception and RC was four minutes and the time between RC and medical care was five minutes. As for the time spent for RC, the RC time itself stands out, which had a median of four minutes (P25-P75: 2-5) in 2018, with a time optimization of one minute in 2019 , one year after the insertion of the "possible sepsis" discriminator.

As for the clinical outcome of the patients, 65% (n = 995) were admitted

Table 1. Sociodemographic characteristics of patients classified with the "possible sepsis" discriminator of the MTS – Porto Alegre, RS, 2018/2019 (n = 1522).

Variable	n (%)	Mean (SD)	Median (P25-P75)
Sexo			
Female	770 (50,6%)	761(9)	761
Male	752 (49,4%)		
Age Group			
15 to 19	15 (1%)		
20 to 24	48 (3,2%)		
25 to 29	34 (2,2%)		
30 to 34	52 (3,4%)		
35 to 39	42 (2,8%)		
40 to 44	53 (3,5%)		
45 to 49	66 (4,3%)	63,7(±15,48)	81
50 to 54	96 (6,3%)		
55 to 59	135 (8,9%)		
60 to 64	178 (11,7%)		
65 to 69	169 (11,1%)		
70 to 74	199 (13,1%)		
75 to 79	173 (11,4%)		
80 years and older	262 (17,2%)		

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to the institution through the emergency, of which 56% (n = 557) were transferred to intensive care beds, 14% (n = 139) transferred to inpatient unit beds and 30% (n = 299) remained hospitalized in the emergency room until the outcome of hospital discharge, death or hospital transfer. Some patients classified using the "possible sepsis" discriminator (n = 527; 35%) were discharged from the emergency department after medical consultation, although classified as very urgent (priority orange) (Table 3).

City			
Porto Alegre	918 (60,3%)		
Alvorada	189 (12,3%)		
Viamão	79 (5,2%)	253,6	133,5
Gravataí	74 (4,9%)		
Cachoeirinha	74 (4,9%)		
Interior do estado	188 (12,4%)		
Origin			
Spontaneous demand	1128 (74,1%)		
Referral of the health network	159 (10,5%)		
Institution's outpatient clinic	131 (8,6%)	304,4	131
Pre-hospital care service	103 (6,7%)		
Judicial demand	1 (0,1%)		
Forwarding Service			
Clinical Emergency	1258 (82,7%)		
Surgical Emergency	249 (16,4%)	507,3	249
Gynecological Emergency	15 (1%)		
Hospitalization	995 (65,4%)		
Hospitalization time (days)		15,42	

SD = Standard Deviation. P25-P75 = 25% percentile and 75% percentile.
Source: Survey data (2022).

Table 2. Flowcharts and RC times in minutes of patients classified with the MTS "possible sepsis" discriminator – Porto Alegre, RS, 2018/2019 (n = 1522).

Variable	n (%)	Median (P25-P75)
Flowcharts		
Adult malaise	431 (28,3%)	
Adult abdominal pain	348 (22,9%)	
Dyspnea in adult	199 (13,1%)	199
Diarrhea and/or vomiting	87 (5,7%)	
Other flowcharts	177 (30%)	
Waiting time for RC (minutes)		3 (2018) 4 (2019)
RC time (minutes)		4 (2018) 3 (2019)

P25-P75 = 25% percentile and 75% percentile.
Source: Survey data (2022).

DISCUSSION

Regarding the sociodemographic characteristics of the sample, there is a slight predominance of female patients, with a mean age of 63.7 years. Other studies using the MTS showed similar results to this one regarding the demand for emergency services, in which females were the most frequent, however, with a lower mean age of patients (39.3 years and 42 years, respectively). [15-18] These findings are in line with the study by Knauth et al. 19 about the presence and demands of men in health services in view of the implementation of the National Policy for Integral Attention to Men's Health, as there may be factors arising from the cultural context of masculinities in seeking the health service only in the case of greater severity. [18,19]

The overcrowding observed in the emergency department studied was also similar to other studies. [1,2,6,17,18] This is a systemic problem and its solution is not punctual or local, it involves all actors in the health network at different levels of care. [1,4] Overcrowding is not a problem unique to Brazilian hospitals and can be considered a global public health issue, which can directly impact the recognition of patients with signs of infection and suspected sepsis.

The research was carried out in a tertiary service, naturally regionalized. However, this regionalization takes place from the agreements between the system managers through counter-referrals, however, only 10% of the services took place through this system. The results of the present study are similar to other studies, since most of the demand arrived by spontaneous demand and many were from the metropolitan region or countryside of the state, wi-

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thout counter-reference. [1,6,17,18]

In the researched emergency, RC professionals, using the MTS, were able to recognize the sentinel signs and symptoms of sepsis severity and provide an immediate reference so that the first propaedeutic and therapeutic interventions could be initiated. The MTS does not aim to establish the nosological diagnosis, but to ensure that medical and nursing care occurs according to the response time determined by the patient's clinical severity, based on categories of signs and symptoms. [4,7,20] The initial suspicion of sepsis raised by the MTS discriminator was very sensitive and determined the opening of the sepsis protocol. However, it will still need further studies to better determine its specificity.

In this study, patients classified using the "possible sepsis" discriminator did not have the sepsis protocol open in RC. This fact corroborates the GBCR and ILAS guidelines, [8] who do not recommend that this practice be performed by the professional responsible for the CR, as this could compromise the general performance of the RC process and delay the care process of other patients in acute or acute chronic situations, as severe as sepsis. [7,8] It should be noted that the presence of possible sepsis criteria may be present in practically all care priorities. Therefore, there may be patients who may have open sepsis protocols in the post-RC care process. [8]

The significant number of hospitalizations after RC using the "possible sepsis" discriminator and the average number of days of hospitalization higher than the average of the researched institution (median of 10 days) point to the magnitude of the problem we face with this disease in Brazil. Between 2008 and 2016, a total of 100,795,269, 6,612,296 and 1,579,041 hospitalizations for sepsis were registered in DATASUS in the country, in the state of Rio Grande do Sul and in the city of Porto Alegre, respectively. [21] This data is in agreement with the literature that presents Brazil among the countries with the highest rates of hospitalization and morbidity and mortality from sepsis in the world. [21,22]

Table 3. Clinical outcome of patients classified with the MTS "possible sepsis" discriminator – Porto Alegre, RS, 2018/2019 (total patients n = 1522).

Variable	n	Percentage
Emergency discharge	527	35%
Hospitalization	995	65%
Transfer from emergency to ICU	557	56%
Emergency admission	299	30%
Transfer from emergency to inpatient unit	139	14%
Deaths	456	46%

P25-P75 = 25% percentile and 75% percentile.
Source: Survey data (2022).

In the analysis of flowcharts and RC times in minutes of patients classified with the MTS "possible sepsis" discriminator according to complaints, they presented a higher percentage of neurological, respiratory and digestive complaints. This finding is justified, as the service studied is a reference center for high-complexity care in the line of care for stroke and cardiovascular disease. In this study, it was identified that the relationship between the choice of flowcharts by the classifiers and the flow of referral to the care specialties demanded by patients are similar to the results of other national and international studies [23,24] and we identified that more than half of the consultations were performed by the clinical specialty. According to the literature, the reason for hospitalization of most patients with sepsis is clinical, where clinical complications are the most prevalent reason for hospitalization in the intensive care unit, as well as the prolonged period of hospitalization. [21]

Mean waiting times for RC and RC time are consistent with other studies analyzing triage systems. [6,7,18,20] A Brazilian study evaluated 139,556 patients and presented a shorter RC time (median of two minutes), however, the waiting and total times from arrival to completion of RC were longer (medians of seven and ten minutes, respectively). [23] The time recommended by the MTS to perform the RC is three minutes, and the median time presented here, in the first year of the analysis - 2018, was higher than recommended. The longest time to RC in patients with the "possible sepsis" discriminator may be justified by the need for a greater number of vital signs measurements to define the discriminator (heart rate - HR, respiratory rate - RR, axillary temperature - Tax, blood pressure - BP) as well as assessment of peripheral oxygen saturation (SpO2) and classifiers' lack of familiarity with the new "possible sepsis" discriminator. [7,8]

In the present study, the waiting time for RC and the RC time seem to reinforce the potential of the MTS as an organizer of the flow and demand of the emergency. [1,23] However, as in other emergency departments, critically ill patients, that is, those with the highest priority in the RC, are usually treated even before their registration is started. The identification and issuance of the care report, therefore, takes place in parallel with the care and the RC occurs retrospectively, after the patient's clinical stabilization, and these times may be overestimated, as already

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suggested in other studies. [23,25]

When evaluating the clinical outcome of the patients seen, it was found that 65% of the patients admitted through RC using the "possible sepsis" discriminator were hospitalized after admission to the emergency room. This data differs from another study conducted in an Emergency Room in the state of Minas Gerais, whose objective was to analyze the predictive value of the MTS in relation to the clinical evolution, where 83.5% of the patients were discharged from the hospital after treatment. [27] The findings of this research point to challenges that are still present in the health network, such as: difficulties in regulating and transitioning care between different levels of care; lack of access and monitoring of chronic cases in order to reduce acute chronic cases; and, also, the difficulty of internal regulation of beds to avoid "hospitalizations in the emergency".

Hospitalizations through emergency departments are expressive in Brazil. [1,4,6] In this study, the percentages of patients transferred to intensive care units or inpatient units were consistent with what is described in the literature. [11,12,13] However, these admitted patients often remain for the entire period of hospitalization and are discharged home from the emergency department 1, as found in this research, where 30% of patients classified using the discriminator "possible sepsis" and, later, hospitalized, with an average of 15.42 days, ended up being discharged from the emergency department.

Likewise, it is necessary to emphasize that the percentage of deaths was significant for the total number of patients hospitalized through the emergency department. Evidence demonstrates that saturation of the operational threshold of emergency departments greatly increases the likelihood of adverse events and mortality rates. [1,3,4,7] The congestion of emergency services does not end in the Brazilian scenario, as international studies reveal high rates of hospital admission through emergency without, however, demonstrating the stratification of priority in RC. [20]

The knowledge and recognition of the clinical and epidemiological aspects of septic patients in the context of emergencies can help to create validated parameters for the planning and evaluation of these services, reducing the chronic crisis generated by the insufficient supply of services with the consequent overcrowding. The high percentage of deaths of patients classified using the discriminator "possible sepsis" was one of the most impacting clinical outcomes of this study. This finding may be associated with reduced quality of care due to overcrowding. This result corroborates other studies that demonstrate worse clinical outcomes and decreased patient satisfaction associated with overcrowding in the emergency department, as well as increased mortality associated with overcrowding in emergency services. [1,2,3,24] An Australian study found results indicating that ten days after the admission of a patient through overcrowded emergency departments, there is a 43% increase in mortality. [28]

CONCLUSION

The profile of the patient classified by the MTS with the discriminator "Possible sepsis" is female, with a mean age of 63.7 years, who arrive at the emergency department spontaneously. The median RC time was higher than that recommended by the MTS only in the first year of analysis, but they are consistent with other studies that analyze triage systems. There was a significant number of hospitalizations after RC using the discriminator "possible sepsis", as well as the high number of patients who were not transferred to the intensive care unit or hospitalization and the percentage of deaths, indicating the magnitude of the problem.

The MTS has already been described as a "powerful tool" for distinguishing patients with high priority of care. Thus, in addition to early recognition of patients with sentinel signs and symptoms for sepsis, it is also necessary to ensure their safety in the emergency department and, since they need more intensive care, errors may occur, subject to health damage. Therefore, more robust studies with different types of analysis are needed. In addition, the possibility of associating the RC protocols, already established, with other mechanisms is fundamental in order to improve the understanding and care flow regarding the early presentation and recognition of potentially septic patients in the emergency department.

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