

Manchester System: time spent on risk classification and priority of care at an emergency medical service



Sistema Manchester: tempo empregado na classificação de risco e prioridade para atendimento em uma emergência

Sistema Manchester: tiempo que se gasta en la clasificación de riesgo y la prioridad para atención en una emergencia

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How to cite this article:

Anziliero F, Dal Soler BE, Silva BA, Beghetto MG. Manchester System: time spent on risk classification and priority of care at an emergency medical service. Rev Gaúcha Enferm. 2016 Dec;37(4):e64753. doi: <http://dx.doi.org/10.1590/1983-1447.2016.04.64753>.

doi: <http://dx.doi.org/10.1590/1983-1447.2016.04.64753>

ABSTRACT

Objective: To assess the time before and time spent on risk classification, priority of care, and destination of patients within 24 hours after their admission to an emergency medical service.

Methods: Retrospective cohort study that included adults classified by the Manchester Triage System at the largest emergency medical service in the south of the country in 2012. The data were made available in the form of an electronic sheet and analyzed according to their characteristics and distribution.

Results: Of the 139,556 admissions, half of the patients arrived at classification within the time recommended (7; IQR: 2–20 minutes), and were classified within two (IQR: 1–3) minutes. Lower priority classifications and hospital discharges (88.4%) were more frequent than hospitalizations (11.4%) and deaths (0.2%).

Conclusion: The time involved in activities that precede the first medical care remained within the recommendation. The proportion of lower priority classifications and hospital discharges within 24 hours after classification was high.

Keywords: Nursing service, hospital. Triage. Nursing. Health management. Emergencies.

RESUMO

Objetivo: Avaliar o tempo que antecede e o tempo empregado na classificação de risco, na prioridade para atendimento e no destino dos pacientes 24 horas após a admissão em uma Emergência.

Métodos: Coorte retrospectiva que incluiu adultos classificados pelo Sistema Manchester de Classificação de Risco na maior Emergência do sul do país em 2012. Os dados foram disponibilizados em forma de planilha eletrônica e analisados de acordo com suas características e distribuição.

Resultados: Dos 139.556 atendimentos, metade dos pacientes chegou à classificação no tempo preconizado (7; IQR: 2 – 20 minutos), sendo classificados em dois (IQR: 1 – 3) minutos. As classificações de menor prioridade e as altas hospitalares (88,4%) foram mais frequentes que hospitalizações (11,4%) e óbitos (0,2%).

Conclusão: O tempo envolvido em atividades que antecedem o primeiro atendimento médico permaneceu dentro do preconizado. A proporção de classificações de menor prioridade e as altas, 24 horas após a classificação, foram elevadas.

Palavras-chave: Serviço hospitalar de enfermagem. Triage. Enfermagem. Gestão em saúde. Emergências.

RESUMEN

Objetivo: Evaluar el tiempo que precede y lo que se gasta en la clasificación de riesgo, la Clasificación de Riesgo y los resultados en las 24 horas de los pacientes atendidos en una emergencia.

Métodos: Estudio retrospectivo de cohortes que incluyó adultos clasificados por el Sistema Manchester de Clasificación de Riesgo ingresados en la más grande Emergencia del sur del país en 2012. Los datos fueron en forma de planillas electrónicas y las variables se analizaron de acuerdo con sus características y distribución.

Resultados: De las 139.556 atenciones, la mitad de los pacientes llegaron a la calificación de riesgo en el tiempo recomendado (7; IQR: 2–20 minutos) siendo clasificada en dos (IQR: 1–3) minutos. Las calificaciones de riesgo de prioridad más baja y el alta hospitalaria (88,4%) fueron más frecuentes que las hospitalizaciones (11,4%) y muertes (0,2%).

Conclusión: El tiempo dedicado en actividades que preceden a la primera atención médica quedó dentro del recomendada. Las calificaciones de riesgo de prioridad más baja y las altas hospitalarias fueron altas.

Palabras clave: Servicio de enfermería en hospital. Tiraje. Enfermería. Gestión en salud. Urgencias médicas.

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■ INTRODUCTION

The Manchester Triage System (MTS) was developed by nurses and doctors in the United Kingdom as a strategy to establish, among the demands of patients in emergency medical services, which patients should have priority of care based on clinical criteria⁽¹⁻²⁾. It works as a guideline for planning assistance in emergency medical services, prioritizing patients under higher clinical risk conditions⁽¹⁻²⁾. Recently implemented in some hospitals in Brazil, with the purpose of minimizing the effects of the constant overcrowding in emergency departments (EDs), the methodology of the MTS is based on the main complaint of patients, directing nurses to flowcharts of clinical conditions. Each flowchart contains discriminators that guide the research and, according to the responses supplied by patients, classification of severity or clinical risk is obtained⁽¹⁾.

This classification is described by colors that show maximum times for first medical care. The color red establishes an emergency condition, suggesting immediate care; orange establishes very urgent conditions, whose time for care must be ≤ 10 minutes; yellow establishes urgent conditions, whose time for care must be ≤ 60 minutes; green establishes standard conditions, whose time for care must be ≤ 120 minutes; blue establishes non-urgent conditions, whose time for care must be ≤ 240 minutes⁽¹⁻²⁾. In Portugal and Brazil, the color white establishes patients who make use of emergency departments to undertake elective procedures. For these patients, there is no indication of time for care⁽¹⁾.

Under the guidelines of the MTS, in addition to times for first medical care, there are recommendations suggesting that patients should have their risk classification (RC) initiated within up to 10 minutes after their arrival at emergency medical services. This time represents the period in which patients complete their identification, registration, opening of an admission form, or other equivalent process. The time for nurses to undertake RC is also recommended, and should not exceed three minutes⁽¹⁻²⁾. Some studies⁽³⁻⁵⁾ have already assessed the time between risk classification and first medical care in specific situations such as myocardial infarction, as well as outcomes of patients studied. However, studies with a focus on the assessment of time between the arrival of patients at emergency medical services and their classification, as well as the time spent on RC, which is a stage undertaken by nurses, cannot be found in the literature.

Although publications show that the MTS is accurate, easy for nurses to apply, and enables the standardization of decisions^(6,8), studies on its use and time spent on RC are incipient in the Brazilian nursing context with regard

to work organization, especially when the particularities of the Brazilian Unified Health System (SUS, as per its acronym in Portuguese) are considered. In care practice, because of the recent implementation of the MTS, the results from its applicability along with the internal flows of Brazilian institutions are unknown. In addition, little is known about the time demanded for RC, whether there is a difference among categories (classification colors), and how much it affects patients' evolution. Therefore, the aim of the present study, which originated from a dissertation⁽⁹⁾, was to assess the time before and the time spent on risk classification, priority of care, and destination of patients within 24 hours after their admission to an emergency medical service.

■ METHODS

This was a retrospective cohort study whose population were all adults (age ≥ 18 years) admitted to the largest emergency medical service in southern Brazil. All patients classified by nurses were included by means of the MTS, regardless of their means of access to the emergency medical service (SAMU, which is a Brazilian mobile emergency care service, self-referral, or referral from another service). Duplicate classifications were excluded—that is, when more than one RC for the same patient at the same date was identified, as well as reclassification of patients admitted before. In compliance with the eligibility criteria, the sample was made up of all patients admitted during the calendar year of 2012.

Considering that the risk classification followed the guidelines of the MTS completely, being handled by nurses trained for this purpose, all records generated during classifications carried out from January to December 2012 were assessed. After approval of the project along with the emergency medical service, a query was requested and provided to the researchers in Microsoft Excel® sheets, which included the following information: number of the patient's record; date of birth; gender; time of registration (arrival at the emergency medical service); time of the risk classification; MTS flowchart chosen; medical specialty that provided care; and evolution within 24 hours (discharge from the emergency medical service, hospitalization, or death). Full information is then made available in the patient's electronic medical record. The data were analyzed with the help of the Statistical Package for Social Sciences 18 (SPSS). The variables were analyzed and presented according to their characteristics and distribution. The study was approved by the ethics committee of the institution's head office regarding its ethical and methodological aspects, under protocol no. 14-052.

RESULTS

During the study, 153,885 risk classifications were carried out for 139,556 patients, with mean age of 44 ± 18 years (minimum: 18; maximum: 104), and 60% of them were under 55 years of age. In addition, 59.8% were women. After RC, 62% of the patients were referred to clinical care, 17.8% to surgical care, 8.5% to gynecological care, 6.5% to dental care, 0.4% to nursing care, 0.9% to the immediate care unit, and 0.6% to primary health care. Referral to other care units accounted for 3.4%.

The median time between the arrival of patients (139,556) at the ED and the beginning of risk classification was seven (IQR: 2-20) minutes. The time spent on RC was two (IQR: 1-3) minutes, and the total time between the arrival at the ED and conclusion of classification was 10 (IQR: 4-23) minutes. Approximately 58% of the patients arrived at the RC within the 10 minutes recommended or less. In spite of the fact that the MTS's recommendation for carrying out risk classification of patients within three minutes was fulfilled in about 85% of cases, on record of classification was found to require excessive time (44 minutes) (Table 1).

Table 2 shows the waiting time until RC, time spent on RC itself, and total time involved from the arrival of patients at the emergency medical service until the conclusion of classification according to category of priority. Most pa-

tients (69.7%) were classified as priority green (standard), and priority red (emergency) was the lowest frequency (0.5%). Half of the patients placed in categories of higher priority (red and orange) waited for more than four minutes at the stage before risk classification undertaken by nurses, but still within the time recommended. Equally, the time for RC (up to three minutes) was fulfilled in half of the patients classified by the MTS. Considering median times, between the arrival of patients at the emergency medical service and the conclusion of RC, it took more than seven minutes for half of the patients, including in those categories in which medical care should have been immediate (red), or in up to ten minutes (orange) to be treated.

Differences in the total median time, that is, between the arrival of patients at the ED and the conclusion of risk classification stratified by category (color) of classification were tested. When compared, excluding outlier results, priorities red and orange ($p > 0.05$), as well as priorities green and blue ($p > 0.05$), did not present differences between them. However, these had different median times from other categories (Figure 1).

Considering the destination of patients within 24 hours as clinical evolution, a greater proportion of hospital discharges (88.4%) was found, and hospital stay and death were less frequent (11.4% and 0.2%, respectively). A greater proportion of deaths occurred in patients with category of classification red (7.8%) and orange (1.6%).

Table 1 – Distribution of the total of patients (n=139,556) according to the time spent between the arrival in the emergency medical service and risk classification, time spent on risk classification, and total time. Data are expressed in absolute number and ratio. Porto Alegre, Rio Grande do Sul, Brazil, 2014.

Time in minutes	Waiting time for risk classification N (%)	Time of risk classification N (%)	Total time from the arrival to the conclusion of risk classification N (%)
<1	19,908 (14.3)	3,160 (2.3)	1,059 (0.8)
1	11,618 (8.3)	35,348 (25.3)	8,088 (5.8)
2	9,120 (6.5)	52,722 (37.9)	9,316 (6.6)
3	7,671 (5.6)	26,848 (19.2)	9,374 (6.7)
4	6,525 (4.7)	11,647 (8.3)	8,718 (6.3)
5 to 10	26,602 (19)	9,570 (6.8)	35,778 (25.6)
11 to 20	23,741 (17)	260 (0.2)	28,364 (20.3)
21 to 30	13,383 (9.5)	—	15,289 (11)
31 to 40	8,048 (5.8)	—	9,066 (6.5)
>40	12,940 (9.3)	1 (0.001)	14,504 (10.4)
Total	139,556 (100)	139,556 (100)	139,556 (100)

Source: Research data, 2014.

Table 2 – Times according to the category of care priority between the arrival of patients at risk classification, during risk classification, and total time between the arrival of patients and conclusion of risk classification. Categories of risk classification (colors) expressed in absolute number and ratio. Time (minutes) expressed in median and interquartile range. Porto Alegre, Rio Grande do Sul, Brazil, 2014.

Categories (n=139,556) n (%)	Waiting time for risk classification	Time of risk classification	Total time from the arrival to the conclusion of risk classification
Red 678 (0.5)	5 (2-13)	2 (1-4)	8 (4-16)
Orange 9,024 (6.5)	4 (1-11)	3 (2-4)	8 (4-15)
Yellow 24,285 (17.4)	6 (2-17)	3 (2-4)	10 (4-15)
Green 97,263 (69.7)	9 (3-23)	2 (1-3)	11 (5-25)
Blue 4,903 (3.5)	9 (2-23)	2 (1-3)	12 (5-25)
White 3,403 (2.4)	9 (2-24)	1 (1-3)	11 (4-26)
All 139,556 (100)	7 (2-20)	2 (1-3)	10 (4-23)

Source: Research data, 2014.

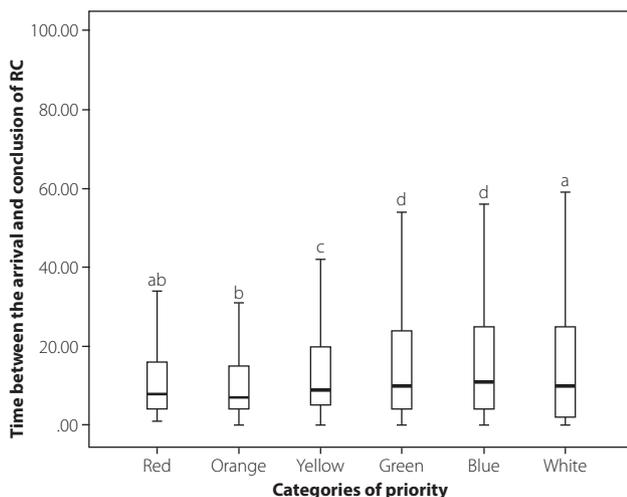


Figure 1 – Comparison between median times (minutes) from the arrival at the emergency medical service until the conclusion of risk classification, stratified by category of care priority (colors)*

Source: Research data, 2014.

*Equal letters correspond to categories of risk classification's priority (colors) with times between the arrival of patients at the emergency medical service until the conclusion of risk classification with equal medians. Kruskal-Wallis test, followed by Dunn's multiple comparison test with adjustment of the Bonferroni correction ($p < 0.05$).

DISCUSSION

In the year of the study, the largest emergency medical service in southern Brazil admitted patients whose clinical priority was classified as standard. For half of the patients, the time until the arrival at the risk classification area was close to the limit of 10 minutes recommended; however, classification occurred within the time recommended by

the MTS. Low mortality within the 24 hours following risk classification was found, and deaths occurred particularly in those patients classified as very urgent.

Times involved in risk classification using the MTS were not assessed in the Brazilian context, which makes comparisons difficult. In the European context, only one study⁽¹⁰⁾ assessed the influence of the MTS on the times between the arrival at the service and access to RC, classification, and length of stay after the implementation of the system. The authors found median time between the arrival of patients at the service and the beginning of RC (6 minutes; minimum: 0; maximum: 35) to be lower than the present study.

However, the same authors⁽¹⁰⁾ found median time spent on RC to be higher than that identified in the present study (4 minutes; minimum: 1; maximum: 16). For half of the patients in the present study, with regard to the category of priority, the time spent on RC remained within the recommendation. It is worth noting that the abovementioned study⁽¹⁰⁾ evaluated the data of 900 risk classifications six months after the adoption of the MTS, whereas the institution's head office in the present study was already using the system for two years from the time of data collection. The size of the sample and overcoming of the learning curve may partially explain the differences found in the time spent on RC.

In the present study, categories red and orange had waiting times for RC and time spent on classification shorter than the others, which seems to strengthen the MTS's potential as an organizer of demand. Still, in spite of clinical priority, the total time between patient arrival and the conclusion of their classification demanded valuable minutes of the time recommended by the MTS for patients to receive their first medical care⁽¹⁻²⁾. However, as well as in other

EDs, high-priority patients are often cared for even before their registration begins. Therefore, the identification and issue of the admission form are carried out in parallel with care, and RC occurs in a retrospective way, after clinical stabilization of patients.

In this respect, with the aim of evaluating the use of the MTS for patients with acute coronary syndrome, a study⁽⁴⁾ conducted in Portugal found that the time between RC and first medical care was five minutes in category red ($n=1$) and 15.1 ± 1.5 minutes in category orange. The authors strengthen the possibility of overestimation of the time for care, especially in more seriously ill patients, whose registration and RC, as well as clinical records, will only be carried out after they are clinically stabilized.

When time between the arrival at the ED and conclusion of the classification was compared, the medians of categories red and orange, as well as categories green and blue, were similar. Therefore, the MTS was already described as a powerful tool to distinguish patients needing high-priority care from those needing low-priority care⁽¹¹⁾, which might have been reflected in shorter times for categories of higher priority, and higher times for those of lower priority.

Similarly to the findings of the present study, in which 73.2% of patients were classified into standard or non-urgent priorities (green and blue, respectively), in a study⁽¹²⁾ conducted in the Brazilian context and with a similar population the authors found the proportion of classifications in categories green and blue to be very similar to those found in the present study (73.7%). However, in the pediatrics and European context, the classification of patients in standard categories ranged from 34.6%⁽¹³⁾ to 45.3%⁽¹⁴⁾ to 52%⁽¹⁵⁾. In this scenario⁽¹⁵⁾, even adding patients from category white to those with lower priority, the proportion remained lower than that found in the present study.

Therefore, it seems that the great demand of patients with lower level priority of care in emergency medical services is associated with different factors that can range from issues of hospital management⁽¹⁶⁾ to the problem-solving belief that patients expect from emergency medical services⁽¹⁶⁻¹⁷⁾ and the system of open doors with full-time care⁽¹⁶⁾. These factors reflect in poor use of the healthcare system, generating pressure for care to low-severity patients in emergency medical services, causing the phenomenon of overcrowding in these services⁽¹⁶⁾.

Regarding specialties of care demanded by patients, corroborating international findings⁽¹¹⁾, the present study found that more than half of the care provided was carried out by clinical specialty, which was also responsible for most higher-priority care (red and orange). A study⁽¹¹⁾ con-

ducted in Portugal found that clinical specialty cared for and admitted patients three to four times more than surgical specialty. Likewise, clinical specialty was responsible for more admission of higher-priority patients⁽¹¹⁻¹²⁾.

When the destination of the patients cared for was assessed, it was found that most of them were medically discharged in up to 24 hours from their admission to the emergency medical service. Similarly to a study⁽¹⁸⁾ conducted in an emergency medical service in the state of Minas Gerais, whose aim was to analyze the predictive value of the MTS with regard to clinical evolution, 83.5% of patients were discharged after care. These findings point to the challenge that primary health care has not yet managed to overcome in the Brazilian scenario: assistance for presentations of low clinical risk in a decisive and responsive way⁽¹⁹⁾.

In addition, hospitalizations occurred in a lower ratio (11.4%). At an emergency medical service in the same city where the present study was carried out, the percentage of hospitalizations (10.4%) in pediatric emergency care was similar. However, regardless of the adult or pediatric context, these proportions represent a significant number of patients demanding hospital beds (approximately 44 patients per day), which significantly contributes to justify the overload of the operational limit of these services⁽¹⁶⁾. This situation is found not only in the Brazilian scenario, but European studies show hospital admission rates ranging between 9.5%⁽¹¹⁾ and 21%⁽¹⁴⁾. However, they do not show stratification of priority in RC.

In the present study, deaths that occurred within the first 24 hours after arrival in the emergency medical service were of lower ratio (0.2%), confirming the association with higher levels of priority. A similar percentage to that found in the present study was reported in a retrospective study⁽¹¹⁾ that analyzed more than 300,000 records of adult patients (>16 years) cared for in a clinical and surgical emergency medical service during the course of 30 months. Deaths that occurred up to 48 hours after admission were considered. Of the 82,000 patients classified in the categories red and orange, mortality in the period was 0.4%. In the other categories, of more than 230,000 patients classified, mortality represented 0.002%.

Similarly, other studies^(3,11-12,14,18,20) have already shown an association between priority attributed by the MTS and severity levels^(18,20), risk of remaining hospitalized^(11-12,18,20), length of hospital stay⁽¹⁸⁾, and risk of death^(11-12,18,20). One of these studies⁽¹⁸⁾ proved that the mean of number of days of hospital stay decreased in the same order of complexity of patient status (red, orange, yellow, and green). In addition, the probability of death of those classified as red was 5.9 times higher when compared with other priorities.

■ CONCLUSION

The waiting time until RC and time spent on classification remained within those recommended by the MTS for all categories. Many of the patients cared for presented low priority, suggesting that they could have been assisted in other services of the healthcare network. A higher percentage of patients had hospital discharge; however, above the capacity of hospital beds, a large number of patients demanded hospitalization in up to 24 hours from their arrival at the emergency medical service.

The limitations presented in the present study were associated with all retrospective designs, in which data originated from existing records. While the examination of patients' medical records assures that all patients with eligibility criteria had been included, it also limits the accurate interpretation of data on times of care, since they are linked to the time of registration, not the time of care itself.

Even so, the lack of studies on the MTS conducted in the Brazilian healthcare scenario, especially in the south of the country, strengthens the importance of studies like this, which are able to supply information on the specific evaluation of the times involved between the arrival of patients at the emergency medical service and RC, stages in which nurses have total responsibility. In addition, the assessment of the destination of patients within the 24 hours after RC may contribute to the organization of flowcharts and management of care and services. Therefore, this assessment serves as one more alert for disarticulation of the healthcare network, since most patients could have been admitted to the service that should be the main entrance door of the SUS: primary health care.

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Received: 05.15.2016

Approved: 01.05.2017