

## Relationship between complaints presented by emergency patients and the final outcome<sup>1</sup>

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**Objective:** to relate complaints presented by emergency room patients, classified using the Manchester Triage System, with the final outcome (discharge/death/transfer). **Methods:** prospective cohort study, involving 509 patients who were admitted to the emergency room and remained there for more than 24 hours after admission, being monitored to the final outcome. Data were analyzed with a statistical program using descriptive and analytical statistics. **Results:** the mean age of the patients was 59.1 years and 59.3% were male. The main complaints were unwell adult (130 - 22.5%), shortness of breath in adults (81 - 14.0%), abdominal pain in adults (58 - 10.0%) and behaving strangely (34 - 5.9%), with 87% of the patients being discharged. More deaths were found in the patients classified in the severe colors, with 42.8% classified as red, 17.0% as orange and 8.9% as yellow. Among the patients classified as green, 9.6% died. **Conclusion:** in the various colors of the Manchester Triage System, death prevailed in patients that presented the complaints of unwell adult, shortness of breath, head injury, major trauma, diarrhea and vomiting. The higher the clinical priority the greater the prevalence of death.

**Descriptors:** Nursing; Emergency Medical Services; Triage; Clinical Evolution.

<sup>1</sup> Supported by Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG), Brazil, process # APQ-01153-12 e APQ-02677-12.

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## Introduction

In Brazil, patient care takes place within interconnected networks. These networks are in the construction process and are intended to ensure the integrality of the care in a resolute way<sup>(1)</sup>. However, increasing demands in traditional emergency rooms have caused overcrowding leading to difficulty in the care. This growing demand is directly related to increases in urban violence, accidents and primary care that cannot cope with all the demand<sup>(2)</sup>. Added to this, much of this care originates from low complexity illnesses that could be resolved if there were a structured primary network or emergency services of less complexity<sup>(1)</sup>.

Triage has been implemented, in order to reorganize the emergency services. The term triage originates in the French language and the word comes from *trier* meaning to separate or select<sup>(3)</sup>. Triage is not an end point, but the beginning of a process of examination and clinical determination<sup>(3)</sup>. It must be efficient and performed by experienced professionals, assigning the patient to the correct place to receive adequate care.

In Minas Gerais, as part of the state health policy, the government implemented the Manchester Triage System (MTS) as a guiding instrument for screening patients in emergency care services. The nurse identifies the main complaint and then selects a specific flowchart, guided by determinants presented in the form of questions. The MTS is a dynamic process which assigns colors to the priority levels and provides recommendations regarding waiting time for medical care. It contains 52 different flowcharts and a risk scale that, depending on the signs and symptoms, classifies patients into: red (emergency care), orange (very urgent care), yellow (urgent care), green (standard) and blue (non-urgent care), with times ranging between 0 and 240 minutes<sup>(4-5)</sup>.

The formulation of a medical diagnosis is not expected from the MTS, however, it includes an evaluation of the severity criteria of the patient, in an objective and systematic way, in which the main complaint is prioritized<sup>(6)</sup>. Nurses are included in this context because, among the different health professionals, nurses are the most appropriate professionals to classify the risk of patients seeking emergency services<sup>(7)</sup>. This classification requires professional experience and specific training. Accordingly, the nurse must demonstrate agility, skill and the ability to establish priorities and act consciously and safely<sup>(8)</sup>.

In studies with the MTS, it has been concluded that the system is more inclusive<sup>(7)</sup> and able to distinguish clinical

priorities<sup>(4,9)</sup>. The MTS stands out as an essential tool for the prioritization of care, contributing to the minimization of risks arising from care that was previously organized according to the order of arrival in the service<sup>(7)</sup>. Thus, this study aimed to answer the following question: what is the relationship between the risk classification of the complaint presented by the user and the final clinical outcome?

In this study, the aim was to relate the complaints presented by patients classified by the MTS in an Emergency Room (ER) with the final outcome (discharge/death/transfer).

## Methods

This was a prospective cohort study, performed in the ER of the *Santa Casa de Caridade* hospital of Diamantina, MG, which is one of the leading healthcare institutions in the *Vale do Jequitinhonha* region, being a reference for the expanded region of medical-hospital healthcare of medium and high complexity, serving the city, its districts and more than 35 municipalities in the *Vale do Jequitinhonha*.

This study was approved by the Research Ethics Committee of the Federal University of Minas Gerais (UFMG) under CAAE Protocol - 0430.0.203.000-11.

The study population consisted of all patients who were admitted to the ER of the hospital and remained hospitalized for more than 24 hours.

For the sample calculation, a confidence level of 95%, a maximum permissible error of 5% and an interest proportion of 47% were used, giving a sample of 370 patients. Twenty percent was added to this value, which totaled a minimum of 444 persons for the composition of the sample.

The study included patients who had medical records that presented the identification of the nursing professional (professional responsible for the risk classification in the study site) that conducted the care, the description of the evaluation carried out and the level of risk classification assigned.

Patients transferred to other hospitals, those who were discharged or died within 24 hours and those that were under 18 years or age were excluded.

Data collection was performed over 4 consecutive months, between May and September 2012. All patients that entered the ER and remained hospitalized for more than 24 hours were included, totaling a sample of 509 patients. There were no losses, considering that the data collection took place every day of the week, including weekends.

Data were collected from the manual form of risk classification of the ER and the clinical outcomes (discharge, transfer and death) from the Hospital Management System (SPDATA). Data were entered and submitted to descriptive statistical analysis, using the Statistical Package for the Social Sciences (SPSS) version 17.0. Patients were categorized into discharge/transfer and death outcomes. The chi-square test was used for the color group of the MTS *versus* outcome analysis. The significance level adopted was 5%, with values of  $p \leq 0.05$  considered significance.

## Results

Of the cohort of 509 patients analyzed, 59.3% were male, with a mean age of 59.1 years. In addition, they presented a mean of 7.6 days of hospitalization on various wards of the hospital. In this study, 29 (55.7%) flowcharts of the MTS were used to classify the patients. The main complaints were unwell adult (130 - 25.5%), shortness of breath in adults (81 - 15.9%), abdominal pain in adults (58 - 11.4%) and behaving strangely (34 - 6.7%).

The MTS includes the complaint of pain in 8 (15.4%) of its 52 flowcharts. Patients that complained of pain were found in the following 7 flowcharts: abdominal pain in adults, neck pain, sore throat, back pain, testicular pain, chest pain, and headache. These complaints of pain accounted for 22.8% of the complaints presented by the patients.

The complaints presented by the patients classified as red are shown in Table 1.

The discriminators used to direct these flowcharts were: inadequate breathing (9 - 42.8%), shock (6 - 28.6%), airway compromise (2 - 9.5%), currently fitting (2 - 9.5%), hypoglycemia (1 - 4.8%) and hyperglycemia (1 - 4.8%).

The complaints presented by the patients classified as orange are shown in Table 2.

It was observed that 17.4% of the orange flowcharts were related to pain. The key discriminators that directed the choice of these flowcharts were: very low SpO<sub>2</sub> (32 - 20.6%), significant mechanism of injury (24 - 15.1%), new neurological deficit (28 - 17.7%), severe pain (17 - 10.9%), chest pain (9 - 5.8%) and altered conscious level (10 - 6.3%). The shortness of breath flowchart stood out as the main complaint of this group.

The complaints presented by the patients classified as yellow are shown in Table 3.

Pain was present in 27.8% of the complaints of the patients classified as yellow. The main discriminators that justified the classification were: moderate pain (94 - 35.2%), new neurological deficit (59 - 22.0%), low SpO<sub>2</sub> (41 - 15.4%), abrupt onset (22 - 8.2%) and history of fitting (7 - 2.6%).

The complaints presented by the patients classified as green are shown in Table 4.

Patients classified as green, or regular, presented the main complaints of unwell adult (33.9%), pain (19.3%) and limb problems (14.5%). The main discriminators were recent mild pain (12 - 36.6%), recent injury (32 - 51.6%) and swelling (5 to 8.1%).

Only one (0.17%) patients was classified as blue and presented the unwell adult flowchart.

Among the patients attended in the hospital, 443 (87.0%) were discharged or transferred. Of the 66 (13.0%) deaths, more were proportionally found in patients classified in the more severe colors: 9 (42.8%) classified as red, 27 (17.0%) as orange and 24 (8.9%) as yellow. Among the patients classified as green, 6 (9.6%) died. A statistical difference between the clinical outcome and risk classification groups was found, as shown in Table 5.

Table 1 - Complaints presented by the patients classified as red by the MTS, according to clinical outcome. Diamantina, MG, Brazil, 2012

Flowchart	Discharge/transfer		Death		Frequency	
	n	%	n	%	n	%
Unwell adult	3	14.3	2	9.5	5	23.8
Fits	3	14.3	0	0.0	3	14.3
Behaving strangely	1	4.8	1	4.8	2	9.5
Diabetes	2	9.5	0	0.0	2	9.5
Shortness of breath in adults	0	0.0	2	9.5	2	9.5
Head injury	0	0.0	2	9.5	2	9.5
Major trauma	2	9.5	0	0.0	2	9.5

(continue...)

Table 1 - (continuation)

Flowchart	Discharge/transfer		Death		Frequency	
	n	%	n	%	n	%
Headache	0	0.0	1	4.8	1	4.8
Abdominal pain in adults	0	0.0	1	4.8	1	4.8
Torso injury	1	4.8	0	0.0	1	4.8
Total	12	57.2	9	42.9	21	100

Table 2 - Complaints presented by the patients classified as orange by the MTS, according to clinical outcome. Diamantina, MG, Brazil, 2012

Flowchart	Discharge/transfer		Death		Frequency	
	n	%	n	%	n	%
Shortness of breath in adults	28	18.0	5	3.2	33	21.3
Unwell adult	21	13.5	9	5.8	30	19.3
Head injury	3	2.0	17	11.0	20	12.9
Chest pain	6	4.0	5	3.2	11	7.1
Behaving strangely	7	4.5	3	2.0	10	6.5
Major trauma	2	1.3	8	5.1	10	6.5
Abdominal pain in adults	5	3.2	4	2.6	9	5.8
Gastrointestinal bleeding	3	2.0	4	2.6	7	4.5
Limb problems	4	2.6	2	1.3	6	4.0
Diarrhea and vomiting	1	0.6	3	2.0	4	2.6
Back pain	1	0.6	3	2.0	4	2.6
Fits	2	1.3	0	0.0	2	1.3
Torso injury	0	0.0	2	1.3	2	1.3
Headache	0	0.0	2	1.3	2	1.3
Diabetes	1	0.6	0	0.0	1	0.6
Asthma	1	0.6	0	0.0	1	0.6
Neck pain	0	0.0	1	0.6	1	0.6
Urinary problems	1	0.6	0	0.0	1	0.6
Falls	0	0.0	1	0.6	1	0.6
Total	86	55.4	69	44.6	155	100

Note: three patients presented blank flowcharts

Table 3 - Complaints presented by the patients classified as yellow by the MTS, according to clinical outcome. Diamantina, MG, Brazil, 2012

Flowchart	Discharge/transfer		Death		Frequency	
	n	%	n	%	n	%
Unwell adult	63	23.7	10	3.7	73	27.4
Shortness of breath in adults	40	15.0	3	1.1	43	16.1
Abdominal pain in adults	36	13.5	4	1.5	40	15.0
Behaving strangely	18	6.7	4	1.5	22	8.3
Chest pain	15	5.6	1	0.4	16	6.0
Back pain	11	4.1	0	0.0	11	4.1
Limb problems	11	4.1	0	0.0	11	4.1
Diarrhea and vomiting	7	2.6	1	0.4	8	3.0
Fits	7	2.6	0	0.0	7	2.6
Head injury	6	2.2	0	0.0	6	2.2
Diabetes	5	1.9	0	0.0	5	1.9
Falls	4	1.5	0	0.0	4	1.5
Neck pain	3	1.1	0	0.0	3	1.1
Wounds	2	0.8	1	0.4	3	1.1
Headache	2	0.8	0	0.0	2	0.8

(continue...)

Table 3 - (continuation)

Flowchart	Discharge/transfer		Death		Frequency	
	n	%	n	%	n	%
Foreign body	2	0.8	0	0.0	2	0.8
Eye problems	2	0.8	0	0.0	2	0.8
Sore throat	1	0.4	0	0.0	1	0.4
Testicular pain	1	0.4	0	0.0	1	0.4
Rashes	1	0.4	0	0.0	1	0.4
Bites and stings	1	0.4	0	0.0	1	0.4
Urinary problems	1	0.4	0	0.0	1	0.4
Overdose and poisoning	1	0.4	0	0.0	1	0.4
PV bleeding	1	0.4	0	0.0	1	0.4
Torso injury	1	0.4	0	0.0	1	0.4
Total	242	91.0	24	9.0	266	100

Note: one patient presented a blank flowchart

Table 4 – Main complaints presented by the patients classified as green by the MTS, according to clinical outcome. Diamantina, MG, Brazil, 2012

Flowchart	Discharge/transfer		Death		Frequency	
	n	%	n	%	n	%
Unwell adult	16	25.8	5	8.1	21	33.9
Limb problems	9	14.5	0	0	9	14.5
Abdominal pain in adults	8	12.9	0	0	8	12.9
Diarrhea and vomiting	4	6.5	1	1.6	5	8.1
Shortness of breath in adults	3	4.9	0	0	3	4.9
Wounds	3	4.9	0	0	3	4.9
Chest pain	2	3.2	0	0	2	3.2
Urinary problems	2	3.2	0	0	2	3.2
Falls	2	3.2	0	0	2	3.2
Headache	1	1.6	0	0	1	1.6
Head injury	1	1.6	0	0	1	1.6
Bites and stings	1	1.6	0	0	1	1.6
Neck pain	1	1.6	0	0	1	1.6
Back pain	1	1.6	0	0	1	1.6
Rashes	1	1.6	0	0	1	1.6
Facial problems	1	1.6	0	0	1	1.6
Total	56	90.3	6	9.7	62	100

Note: one person presented a blank flowchart

Table 5 - Distribution of clinical outcomes among the risk classification groups. Diamantina, MG, Brazil, 2012

Classification groups	Discharge/transfer		Death		Total		P value*
	n	%	n	%	N	%	
Red	12	2.4	9	1.8	21	4.1	<0.001
Orange	131	25.7	27	5.3	158	31.0	
Yellow	243	47.7	24	4.7	267	52.5	
Green/blue†	57	11.2	6	1.2	63	12.4	
All patients.	443	87.0	66	13.0	509	100	

\*p calculated using the chi-square test, significant when  $p \leq 0.05$ .

†The color blue was grouped with green due to having only one person, who was discharged.

## Discussion

In this study, 59.3% of the patients attended in the ER were male, with a mean age of 59.1 years, equivalent to the data found in another study<sup>(4)</sup>. However, the mean hospitalization period of 7.6 days was shorter than that found in the study, which identified 9.6 days of hospitalization<sup>(4)</sup>.

Ten flowcharts were used for classifying patients into the red color. The outcome of death predominated among patients classified as unwell adult (9.5%), shortness of breath (9.5%) and head injury (9.5%).

The unwell adult classification had high prevalence in patients classified in all colors. This is a nonspecific flowchart used for patients who do not feel well, without a specific complaint. However, this raises the question of whether it was, in fact, not possible to identify the main complaint. In the clinical practice, the use of this flowchart provides a certain convenience for the professional, as it is widely applicable. The concern with this complaint is justified by the fact that, in all colors of the MTS, the unwell adult complaint was a major cause of death.

The shortness of breath flowchart also had high prevalence in patients classified as orange (21.3%) and yellow (16.1%). The high percentage of patients with this complaint may be related to the predominance of elderly people in the study. In addition, the municipality does not have a Minor Injuries Unit (MIU), which causes the demand not absorbed by health units to be taken up by the ER. This complaint was closely related to the mortality of patients classified as red, orange and yellow.

In individuals classified as orange, death predominated when the complaints were: head injury (11.0%), major trauma (5.1%), unwell adult (5.8%) and shortness of breath in adults (3.2%). Studies conducted at the Research Center of the Department of Surgery, University of Washington, USA, showed that, in the last 14 years, the number of deaths in the inter-hospital context, during hospitalization for head injury, has improved, however, there is still high number of deaths from this cause. The study suggests that the use of strategies is required to increase survival, such as the use of high technology and rapid quality interventions<sup>(10)</sup>.

The majority of complaints of the patients classified as yellow (266 - 28.2%) were related to pain. Another study<sup>(7)</sup> found headache (14.5%) as the main complaint of individuals classified in this color, followed by chest pain (11.6%), unwell adult (10.1%) and sore throat (7.2%).

Pain in various parts of the body was present in 22.8% of the complaints of the patients classified as red, orange, yellow and green. Another study identified that 25.2% of the complaints in patients of an ER were related to pain<sup>(4)</sup>. Data found in national and international studies<sup>(7,11)</sup> corroborate the finding that pain is the main complaint of patients seen in ER's. According to a study conducted in Spain, the evaluation of pain is infrequent due to insufficient education of the users and the lack of clarity in the MTS guidelines<sup>(11)</sup>.

Pain evaluation in the emergency context is difficult, as patients feel pressured to emphasize the pain they are feeling to justify their demand for the service. Conversely, it may happen that some people, especially children, deny the pain to avoid treatment or hospitalization. Because of its importance, pain should not only be considered in its subjective aspects in risk classification. For healthcare professionals, the careful evaluation of pain is extremely important, since it is present in the vast majority of consultations. As a result, some emergency services are using formal instruments for the evaluation of pain, such as visual analog scales. Therefore, it is the responsibility of the health professionals who carry out the risk assessment, as well as the entire team, to improve technical skills and knowledge to assess and treat pain<sup>(7)</sup>.

Regarding the clinical outcome, the complaint that led to more deaths of patients classified as yellow was unwell adult (3.7%). Among the patients, 242 (91%) were discharged/transferred and 24 (9%) died, corroborating another study<sup>(4)</sup>, in which it was found that 90 (90.9%) patients classified as yellow were discharged or transferred and 9 (9.1%) died during the hospitalization.

Patients classified as green, or standard, presented the main complaints of unwell adult (33.9%), pain (19.3%) and limb problems (14.5%). In the present study there were 62 (10.7%) patients classified as green that, after 24 hours, were hospitalized, the outcome for whom was discharge in 56 (90.3%) and death in 6 (9.7%). This percentage in less severe patients may be related to the fact that they presented complications in their clinical conditions during the 24 hours of admission, or the fact that the classification performed by the nurse was inadequate, configuring a human error. Death was related to the unwell adult (8.1%) and diarrhea and vomiting (1.6%) complaints.

In a national study, 55.6% of the consultations performed in an ER were for patients with less serious clinical situations, which were classified as green and

blue<sup>(7)</sup>. The prevalence of people seeking treatment in the ER while presenting complaints of low clinical priority has also been described in national and international studies<sup>(7,12-13)</sup>.

Patients classified in the less serious categories presented high prevalence of complaints related to limb problems (14.5%). A study of low severity patients confirms this finding<sup>(14)</sup>. The authors found that 77.1% of the complaints of patients referred to limb problems. Of these, 69.6% were due to fractures.

Of the consultations with less severe patients, 80% could be performed by a physician of the clinical network, considering that one in every 15 low severity patients was referred from the clinical physician to an ER, due to the need for technological resources<sup>(14)</sup>. The authors concluded that low urgency patients can be effectively and safely treated by clinical physicians that practice in the primary healthcare network.

In this study, significant differences were found between the MTS classification and the clinical outcome ( $p < 0.001$ ). It was possible to observe that patients classified in the most serious categories died more than those of the other categories. Studies have shown that death is associated with the urgency categories of the MTS<sup>(5,12)</sup> and the risk of death for high priority patients (red and orange) was 5.58 times greater than the risk of death for those of low priority (yellow, green and blue)<sup>(5)</sup>.

A limiting factor of the study was the selection of a sample of patients who remained hospitalized for more than 24 hours in the emergency service. This may have influenced the data, since very severe cases may have died within 24 hours and less serious patients may have been discharged.

## Conclusion

In the present study it was found that the majority of patients were male (59.3%), with a mean age of 59.1 years, presenting complaints of unwell adult (22.5%) and pain (22.8%). Experience and data from this study have shown that the unwell adult and pain complaints are the most frequent among patients seeking emergency services, and both the accurate evaluation of pain and a greater discrimination of the unwell complaint continue to be problems in the emergency service practice.

It was observed that the higher the clinical priority of the patient the higher the death rate. Death was the outcome in 45.8% in the patients classified as red, 16.4% as orange, 8.6% as yellow and 9.2% as green.

These patients presented complaints such as unwell adult, shortness of breath, head injury, major trauma, and diarrhea and vomiting.

With the data from this study it is possible that, at the tertiary level, human resources and materials can be optimized to effectively meet the patient complaints that most lead to death, in order to provide quality care and increase survival. The study also identified the complaints of people seeking care in the ER. Health care levels can be organized in relation to the severity of the complaints, in order to better meet the demand at each level. It is suggested that further studies could demonstrate practical strategies for resolving the complaints listed in this study.

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