

ASSOCIATION BETWEEN RECEPTION WITH RISK CLASSIFICATION, CLINICAL OUTCOME AND THE MEWS SCORE

ASSOCIAÇÃO ENTRE O ACOLHIMENTO COM CLASSIFICAÇÃO DE RISCO, DESFECHO CLÍNICO E O ESCORE MEWS

ASOCIACIÓN ENTRE LA ACOGIDA CON CLASIFICACIÓN DE RIESGO, EL DESENLACE CLÍNICO Y LA PUNTUACIÓN MEWS

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ABSTRACT

Objective: to verify the association between the risk classification, the MEWS score and the clinical outcome of patients assisted in an urgency and emergency unit. **Method:** this is a cross-sectional study with quantitative approach conducted in an urgency and emergency unit of a private hospital in the countryside of São Paulo. Data collection took place between July 2014 and June 2015, with a sample of 1674 medical records of patients that sought clinical care. **Results:** of the assessed medical records, 65% were of female patients, with an average age of 42 years, and the most common complaints were related to the digestive tract (14.8%). Most of the treated patients were classified as less urgent (green), 91.2%. As for outcomes, 98.7% were discharged after medical care, with a prevalence of the non-urgent classification. Of the patients referred for hospitalization, 59.1% were classified as emergent/urgent. When relating the risk classification with the Modified Early Warning Score (MEWS), we noted a higher score in patients classified as emergent/ urgent, where the admitted patients obtained a score higher than those who were discharged. **Final considerations:** the results showed that risk classification was effective in defining priorities of care and foreseeing the outcome in an urgent and emergency unit.

Keywords: Measures of Association, Exposure, Risk or Outcome; Emergency Medical Services; Triage.

RESUMO

Objetivo: verificar a associação entre a classificação de risco, o escore de MEWS e o desfecho clínico do paciente atendido em uma unidade de urgência e emergência. **Método:** trata-se de estudo transversal, de abordagem quantitativa, o qual foi realizado em uma unidade de urgência e emergência de um hospital privado do interior paulista. A coleta dos dados ocorreu entre os meses de julho de 2014 e junho de 2015, com amostra de 1.674 prontuários de pacientes que buscaram atendimento clínico. **Resultados:** dos prontuários avaliados, 65% eram de pacientes do sexo feminino, com média de idade de 42 anos, queixa mais frequente relacionada ao trato digestório (14,8%). A maioria dos pacientes atendidos foi classificada como pouco urgente (verde) 91,2%. Na análise dos desfechos, 98,7% receberam alta após atendimento médico, tendo como prevalente a classificação não urgente. Dos pacientes encaminhados à internação, 59,1% foram classificados como emergentes/urgentes. Ao relacionar a classificação de risco com o escore de alerta precoce (MEWS), observa-se uma pontuação superior nos pacientes classificados como emergentes/urgentes, sendo que os pacientes internados obtiveram pontuação maior dos que foram liberados de alta. **Considerações finais:** os resultados demonstraram que a classificação de risco foi efetiva em definir a prioridade de atendimento e prever o desfecho em uma unidade de urgência e emergência.

Palavras-chave: Medidas de Associação, Exposição, Risco ou Desfecho; Serviços Médicos de Emergência; Triage.

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RESUMEN

Objetivo: verificar la asociación entre la clasificación de riesgo, la puntuación de MEWS y el desenlace clínico del paciente atendido en el servicio de urgencias y emergencias. **Método:** se trata de un estudio transversal de investigación cuantitativa realizado en el servicio de urgencias y emergencias médicas de un hospital privado del interior de São Paulo. Los datos se recogieron entre julio 2014 y junio 2015, con una muestra de 1.674 expedientes médicos de pacientes que buscaron atención clínica. **Resultados:** entre los expedientes médicos evaluados, el 65% pertenecía a pacientes del sexo femenino, edad promedio de 42 años y queja más frecuente relacionada con el tracto digestivo (el 14,8%). La mayoría de los pacientes atendidos (91,2%) fue clasificada como poco urgente (verde). En el análisis de los desenlaces, el 98,7% fue dado de alta después de la atención médica, con prevalencia de clasificación no urgente. Entre los pacientes remitidos para internación el 59,1% fue clasificado como emergente/urgente. Al comparar la clasificación de riesgo con la puntuación de alerta temprana (MEWS), se observa que la puntuación es superior en los pacientes clasificados como emergentes/urgentes y que los pacientes internados obtuvieron puntuación más elevada que aquéllos dados de alta. **Consideraciones finales:** los resultados demuestran que la clasificación de riesgo se muestra eficaz en definir la prioridad de atención y en prever el desenlace en un servicio de urgencias y emergencias.

Palabras clave: Medidas de Asociación, Exposición, Riesgo o Desenlace; Servicios Médicos de Urgencia; Triage.

INTRODUCTION

Urgency and emergency services are key components of health care. However, an increase in the demand for these services has been observed as the possible result of several factors such as increased the number of accidents, urban violence, and the poor structure of the network. These factors contribute to the overload of services and may directly affect the quality of the care provided.¹ In order to organize the flow of users and humanize the provision of care in these services, the National Humanization Policy of 2004 established the practice of Reception with Risk Classification (RRC) as an assistance guide for these units.²

The RRC is defined as an evaluation process used to establish priorities among patients arriving at the urgency and emergency department.³ The severity of the state of the patient is evaluated based on the signs and symptoms evidenced. Risk assessment and its vulnerabilities should be considered in the RRC, taking into account the users and their social networks and the degree of physical and psychological suffering.⁴

In this perspective, the use of protocols in risk classification allows professionals to follow the same parameters in the prioritization of care to patients according to the severity of their health problem, reducing the possibility of subjectivity.⁴

In general, RRC is performed by nurses through interaction with the clients to identify their main complaints, which will define the patients' level of risk.⁴ The collected data and the physical examination of the user give nurses support for the decision making. This is based on qualified listening and clinical and critical judgment of complaints that induce a logical reasoning leading to prioritization of care.⁵

Although the use of RRC in urgency and emergency services in Brazil was incorporated in 2004, few studies have verified the potential of this type of assessment to predict the clinical outcome of the patient. This type of survey can bring important contributions to the institutions; it allows assessing the risk classification process and the effectiveness of the protocols used, anticipate the demand for care and, consequently, promote the

adequacy of human and material resources and more organization in the assistance provided, resulting in improved patient care.

A discriminator was used to validate the risk classification protocol, the Modified Early Warning Score (MEWS), whose purpose is to identify as early as possible the risk of clinical deterioration of patients.⁶ Patients with altered score need more attention from the team, considering that early intervention may improve their clinical outcome.⁷ It is thus expected that patients classified as being at a high risk in the RRC will also have higher MEWS scores.

Therefore, the objective of this study was to verify the association between the risk classification, the MEWS score, and the clinical outcome of patients assisted in an urgency and emergency unit.

METHOD

This is an analytical, retrospective, cohort study with cross-sectional design, with quantitative approach. The study was conducted at the urgency and emergency unit of a medium-sized private hospital located in the north of São Paulo, which assists approximately 12,000 patient per month and is linked to 28 complementary health care providers.

Data were collected directly from the patient's electronic record. At the institution, the patients' data are recorded in a specific computerized system created for risk classification. The risk classification protocol proposed by the Ministry of Health in 2004 was used as a reference for the classification of clinical patients.²

Although the original protocol foresees the classification into four colors, the abovementioned institution adopted an adaptation in the protocol where the colors blue and green were treated as one because of the small demand for this type of care in the institution. Thus, patients are classified as: emergent (red), urgent (yellow) and less urgent (green).

A risk classification protocol is valid if it measures what it is supposed to measure: "true urgency". To assess the validity of risk classification protocols, a gold standard has to be defined.³ Thus,

in the institution where this study was conducted, the discriminator used for validation of the RRC was the Modified Early Warning Score – MEWS. The MEWS is an alert scale based on a system for assigning scores to vital parameters. The variables evaluated include heart rate, respiratory rate, systolic blood pressure, body temperature and level of consciousness.⁶ The more distant the parameters are from normality, the higher is the score.

Users who sought the service for clinical care and were submitted to the RRC in the urgency and emergency unit between July 2014 and June 2015 were considered eligible. Patients from Orthopedics, Gynecology and Pediatrics were excluded from the study because Pediatrics and Gynecology have specificities and Orthopedic patients are referred directly to medical care and are usually received without risk classification.

A form was prepared to the record of the collected data. The form addressed information regarding the registration number in the unit, date, identification of the patient (initials of the patient’s name), age, main complaint, waiting time between arrival and RRC, classification assigned to the user, MEWS score at arrival, waiting time between classification and medical care, if hospitalization was necessary and in which unit, outcome (discharge or death) and closure date.

Stratified sampling was used for sample selection, with proportional allocation by strata. For the draw of the elements, systematic sampling was used. Calculations and drawing were carried out in the R software version 3.1.2. The data collected from the electronic medical records were typed in a *Microsoft Excel* 2010 spreadsheet with double typing technique followed by validation.

Data analysis was performed using the Statistical Package for Social Sciences (SPSS), version 17.0. Descriptive analyses were performed. Categorical variables were subjected to simple frequency analysis, while continuous variables were analyzed according to the measures of central tendency (mean) and dispersion (standard deviation – SD). The Pearson Chi-square test was used to test the association between the outcome (discharge x hospitalization) and the classification (green x yellow/red). The non-parametric Mann-Whitney test was used to compare MEWS mean scores among outcome and classification groups. The level of significance in the statistical analyses adopted was $p < 0.05$.

This work was prepared according to the guidelines contained in Resolution NHC 466/2012 for research with human beings, and it was approved by the competent Research Ethics Committee (CAAE 44093615.2.0000.5393).

RESULTS

Between July 2014 and June 2015, 167,610 cases were received in the emergency department of the institution. Of these, 34.5% (n = 57,949) sought clinical care. Of the total of these patients, 57.8% (n = 33,495) underwent RRC. After application of

the eligibility and selection criteria, the sample of this study was composed of 1,674 medical records. The analysis of the data showed that 65% (n = 1,088) of the patients were female, the age of the patients ranged from 18 to 99 years, with a mean age of 42.0 years (SD = 19.20, median 36.0). Regarding the age group, 80% (n = 1,340) of the patients were aged 18 to 59 years and 20% (n = 334) were over 60 years of age.

The patients presented a wide variety of complaints, and up to three complaints were reported at the time of classification. The most frequently reported complaints were related to the digestive system (21.9%), followed by the respiratory system (16.2%), nervous system (12.3%), urinary system (7.8%) and musculoskeletal system (6.4%).

The waiting time between arrival and RRC and between the risk classification and medical care can be observed in Table 1. It was observed that there was a statistically significant difference between patients classified as green and those classified as yellow/red, showing that patients classified as urgent/emergent received care faster than those classified as less urgent.

Table 1 - Waiting time between arrival and risk classification and waiting time between risk classification and medical care, according to the color risk classification. Franca, São Paulo, Brazil, 2015

Variables	Sample N=1674	Time (min)	SD	p-value
Time between arrival and risk classification				
Green	1.519	21.8	0.5	0.000
Yellow/red	147	15.0	1.0	
Time between risk classification and medical care				
Green	1.519	31.3	0.7	0.000
Yellow/red	147	20.4	1.4	

SD: standard error.

Most patients, 91.2% (n = 1,526), were classified as less urgent (green), followed by urgent (yellow), 8.8% (n = 147). Only 0.1% (n = 1) of the patients were classified as emergent (red). For the purpose of the analysis, the only patient classified as red was added to the group of patients classified as yellow. Table 2 shows the destinations of the patients after medical care (discharge or hospitalization), the hospitalization sectors, and the clinical outcome after hospitalization (discharge or death).

The majority of patients (98.7% - n = 1652) were discharged after medical care and were classified as non-urgent (green). Among the patients referred for hospitalization, 59.1% (n = 13) were classified as emergent/urgent (red/yellow) and 40.9% (n = 9) as less urgent (green).

The length of hospital stay of those patients who were hospitalized ranged from one to 14 days, with a mean of six days. Only one of the patients evolved to death, having received the yellow classification in the RRC. The waiting time between arrival

and risk classification was eight minutes, and the time between RRC and medical care was 61 minutes, and MEWS score 1. This patient was 58 years old, had a complaint related to the urinary tract and remained hospitalized for three days. With the occurrence of only one death, it was not possible to evaluate the relationship between the risk classification received and death.

Table 2 - Proportion according to destination after medical care, hospitalization and clinical outcome (discharge or death) Franca, São Paulo, Brazil, 2015

Variables	Frequency	Percentage
Destination		
Discharge after medical care	1652	98.7%
Referral for hospitalization	22	1.3%
Hospitalization sector		
Medical Clinic Unit	18	81.1%
Surgical Clinic Unit	2	9.1%
Intensive Care Unit	2	9.1%
Clinical outcome		
Discharge after hospitalization	21	95.5%
Death	1	4.1%

All patients who underwent RRC were assessed for severity of health state by means of the MEWS, with the minimum value of zero and the maximum of five. When the MEWS was associated with color risk classification, it was observed that there was a statistically significant difference between the MEWS score of the patients who received the green classification and those who received the yellow/red classification; clients classified as yellow/red scored higher on the MEWS than patients who were classified as green (Table 3), indicating that the RRC is capable of predicting the severity of the patient's clinical condition.

Among the 22 hospitalized patients, two were referred to the intensive care unit (ICU); these patients had been classified as urgent (yellow) and their MEWS scores ranged from three to

five. In Table 3 are shown the results of associations made between the MEWS and color risk classification.

DISCUSSION

This study showed characteristics of the population assisted in the emergency unit of the abovementioned institution and brought up evidence that the RRC system used was effective in predicting the destination and clinical outcome of the patients.

Regarding the sociodemographic characteristics of the sample, there was a predominance of female patients, with a mean age of 42 years, whose most frequent classification was green (less urgent). A study conducted in the city of Belo Horizonte, Minas Gerais, showed a similar result to the demand for urgency and emergency services, in which the female sex was more frequent and the mean age of the patients was 39.3 years.^{7,8} It is assumed that the predominance of the female sex is due to the cultural behaviour of males, who seek health services only in the case of more serious situations, and also by the traditional model of masculinity.⁹

Patients classified as red/yellow in the RRC (emergent/urgent) scored higher on the MEWS, indicating that these two evaluations are related. Moreover, there was an association between the classification and the occurrence of hospital admission, since most patients classified as red/yellow (emergent/urgent) were referred for hospital admission.

A study conducted in England used the MEWS in ICUs to predict the hospitalization and mortality of cancer patients and showed a positive and statistically significant result regarding the use of this score.¹⁰ Another study that used the MEWS as secondary evaluation in patients classified in the urgency and emergency service was performed in a hospital in Porto Alegre between 2013 and 2014 with trauma victims, classified as orange according to the Manchester protocol. These patients were evaluated at the moment of arrival and after six hours of initial care, highlighting the evolution of the severity of the patients reassessed after six hours. In this study, the MEWS was a useful tool in the reclassification of patients in urgency and emergency services.¹¹

Table 3 - Association between the MEWS and the color risk classification, and association between the MEWS and the patient's destination after medical care. Franca, São Paulo, Brazil, 2015

Variable	Frequency	MEWS			p-value	
	N=1674	Mean	SD	Minimum		Maximum
Risk classification						
Green	1526	0.3	0.7	0	5	0.000
Yellow/red	148	0.7	1.1	0	5	
Destination						
Discharge after medical care	1652	0.3	0.7	0	5	0.000
Referral for hospitalization	22	1.4	1.4	0	5	

MEWS: Modified Early Warning Score; SD: standard deviation.

In the present study, the most frequent complaints among the patients screened in the RRC system were related to the digestive system, nervous system, and respiratory system. On the other hand, another study carried out in a service unit in the countryside of São Paulo pointed out that the main reasons for seeking this service are acute pain, respiratory problems, followed by trauma and malaise.¹² The evidences of both studies show that the health problems that lead the population to look for care in emergency services are of low severity.

Another result of the present study that corroborates these conclusions is that 91.2% of the cases were classified as green (less urgent). It is worth mentioning that some factors may be related to this result, such as the low concentration of human and technological resources in primary and secondary services, the effectiveness of medical assistance procedures available at the tertiary level, and the culture of trust in the hospital.¹³ Furthermore, other authors believe that the search for urgency and emergency units by patients with less urgent illnesses may be linked to cultural issues that concern aspects of preference, family indication, quality of service, and geographical proximity.¹⁴

In this context, a reflexion about the mistaken way of using urgency and emergency services by the population takes place. This misuse causes overcrowding of health units and often delay the assistance to cases of greater complexity, because of the high demand of patients to be classified, causing long waiting times of care in these units. As a matter of fact, health problems classified as "less urgent" could be treated in less complex services.

The dissemination of studies on the importance and purpose of prioritization in health care, especially in urgency and emergency services, in addition to the dissemination of the services offered in each unit taking into account their level of care and complexity is paramount and may represent a strategy to improve this scenario. Moreover, such studies can aid in the process of demystification of the medicalization culture. The fact that the institution where this study was conducted is linked to several complementary health care providers may contribute to a profile of users other than that of the public network. Thus, specific studies addressing these issues could fill these gaps.

In this study, the majority of patients classified as less urgent did not require hospitalization, as in other studies.^{13,15} Furthermore, the risk classification given to patients and the need for hospitalization were associated ($p < 0.000$), so that the cases classified as urgent/emergent had a greater need for hospital admission when compared to patients classified as less urgent.

These results show that the risk classification was effective in defining the priorities of care among patients in the service. A different scenario was found in a study carried out in a hospital in Portugal where the Manchester system is used. That study found that the frequency of patients screened and given the yellow classification was 50.7%, and 12.5% required hospitalization.

Moreover, 31.8% of the hospitalized patients were classified as red, 22.0% as orange, 6.9% as yellow, followed by 1.8% as green and 1.4% as blue.¹⁵

The occurrence of death is considered to be directly related to higher priority of care. However, in this study only one patient died, preventing the evaluation of the relationship between risk classification and mortality. A recent study carried out at an emergency department in Minas Gerais reported that 30% of the patients who had death as clinical outcome had been classified as red (emergent).¹⁶ Moreover, the same research indicated that the higher the priority of care, the greater is the probability that the patient will be hospitalized. The length of hospital stay was on average 7.3 days¹⁶, a time greater than that found in the present study, which was six days.

Although the present study demonstrated that the risk classification was effective to indicate the priority of care, to predict the destination and the clinical outcome, some limitations were found. The risk classification system used takes into account only three colors, which makes it difficult to compare the present results with other studies, since most institutions use protocols with five classification levels. Also, due to the flow of care established in the institution for medical specialties such as Gynecology and Obstetrics and Orthopedics, only cases of clinical patients were included in the sample. There may also have been sample losses or underestimation of the emergent/urgent classification because, routinely, the most serious patients are taken to the hospital by the mobile pre-hospital service and/or transferred from other health institutions and immediately allocated to the medical consultation room.

FINAL CONSIDERATIONS

This study showed that the protocol of risk classification was able to predict the destination and clinical outcome (hospitalization, discharge, death), evidenced by the association between the high priority classifications and the greater number of hospitalizations, which predominated in high priority patients when compared with the less urgent ones. Discharge after medical care occurred in the case of patients classified as green and less urgent.

The use of MEWS in risk classification was an important aid to check the relationship between the most urgent risk classification and the highest score, and it can also be used as a predictor of hospital admission. There was a relation between the RRC and the MEWS, indicating the validity of the system used in the unit. It is estimated that the MEWS may be useful to determine the time for reassessment of patients during the waiting time for medical attention. However, future studies should focus on knowing its effectiveness when used for this purpose.

It is hoped that this study may contribute to enhance the knowledge about the use of the RRC system, besides proposing improvements to assist in the provision of physical and material resources and adequacy of personnel, providing better management of the unit with prioritization of patients and improvement of the quality of care offered.

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