

## RISK CHARACTERIZATION AND CLASSIFICATION IN HYPERTENSIVE URGENCY AND EMERGENCY EVENTS

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**ABSTRACT:** The aim of this study was to characterize patients with hypertensive urgency or emergency events in an emergency care unit in the state of Minas Gerais, regarding their socioeconomic conditions, blood pressure levels, and risk classification. This is a cross-sectional and retrospective study based on secondary data of 63 records of patients treated from October to December of 2013. Data were collected in 2014 by means of a form containing the patient's data and risk classification. The chi-squared test and a 5% significance level was used for data analysis. The most prevalent age groups were 41-45 (15.9%) and 46-50 years (19%). The systolic and diastolic blood pressure averaged on levels 170-219 mmHg and 120-129 mmHg, respectively. Although the presented with diastolic blood pressure  $\geq 120$  mmHg, 27% of the patients were not referred to urgent care. These results indicate the importance of identifying patients with high diastolic blood pressure and referring them to appropriate treatment, according to their clinical priorities.

**DESCRIPTORS:** Hypertension; Triage; Emergency Medical Services; Nursing.

### CARACTERIZAÇÃO E CLASSIFICAÇÃO DE RISCO EM URGÊNCIA E EMERGÊNCIA HIPERTENSIVA

**RESUMO:** Objetivou-se caracterizar usuários com urgência/emergência hipertensiva em unidade de pronto atendimento de Minas Gerais, quanto às condições socioeconômicas, níveis pressóricos e classificação de risco. Estudo transversal e retrospectivo que utilizou dados secundários de 63 prontuários de usuários atendidos de outubro a dezembro de 2013. A coleta de dados foi realizada em 2014, com formulário contendo dados do usuário e da classificação de risco. Para análise dos dados, aplicou-se o teste qui-quadrado e nível de significância de 5%. As faixas etárias mais prevalentes foram 41-45 (15,9%) e 46-50 anos (19%). A pressão arterial sistólica concentrou-se nas faixas 170-219 mmHg e a diastólica 120-129 mmHg. Apesar de apresentar pressão diastólica  $\geq 120$  mmHg, 27% dos pacientes não foram encaminhados como atendimento de urgência. Estes resultados indicam a importância de identificar os usuários com pressão diastólica elevada e encaminhá-los a tratamento adequado, conforme a prioridade clínica.

**DESCRIPTORIOS:** Hipertensão; Triage; Serviços médicos de emergência; Enfermagem.

### CARACTERIZACIÓN Y CLASIFICACIÓN DE RIESGO EN URGENCIA Y EMERGENCIA HIPERTENSIVA

**RESUMEN:** Se objetivó caracterizar usuarios con urgencia/emergencia hipertensiva en unidad de pronta atención de Minas Gerais, respecto a condiciones socioeconómicas, niveles de presión y clasificación de riesgo. Estudio transversal, retrospectivo, utilizando datos secundarios de 63 historias clínicas de usuarios atendidos de octubre a diciembre de 2013. Datos recolectados en 2014, con formulario incluyendo información del usuario y de la clasificación de riesgo. Para el análisis de los datos, se aplicó test Chi-cuadrado y nivel de significancia de 5%. Las fajas etarias prevalentes fueron 41-45 (15,9%) y 46-50 (19%) años. La presión arterial sistólica se concentró en los segmentos 170-219 mmHg, y la diastólica en 120-129 mmHg. A pesar de presentar presión diastólica  $\geq 120$  mmHg, el 27% de los pacientes no fueron derivados como atención de urgencia. Estos resultados indican la importancia de identificar a los usuarios con presión diastólica elevada y derivarlos a tratamiento adecuado, conforme a la prioridad clínica.

**DESCRIPTORIOS:** Hipertensión; Triage; Servicios Médicos de Urgencia; Enfermería.

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Received: 20/10/2015

Finalized: 20/04/2016

## ● INTRODUCTION

The purpose of risk classification in emergency care units (ECU) is to ensure quality of care and safety for patients, providing them priority of care by means of a standardization of procedures among several professionals who must perform in a sequential or simultaneous way, according to the situations that present themselves.<sup>(1)</sup>

In the state of Minas Gerais in Brazil, the Manchester Risk Classification System Protocol is used for the admission of ECU patients, which presupposes a fast and focused approach on the complaint or reason that led the patient to seek urgent care. For this purpose, flowcharts containing general and specific discriminators that describe the patients' potential signs and symptoms are used, classifying them by clinical priority categories. The general discriminators are as follows: threat to life, pain, hemorrhage, level of consciousness, temperature, and intensity. The specific discriminators are related to the specific signs and symptoms of each disease.<sup>(1)</sup>

Medical care must occur according to the classification carried out at the health unit's reception area. Immediate medical care is performed for category 1, characterized by the color red (emergency); there are time limits up to 10 minutes for category 2 (color orange, very urgent), 60 minutes for category 3 (color yellow, urgent), 120 minutes for category 4 (color green, semiurgent), and up to 240 minutes for category 5 (color blue, nonurgent).<sup>(1)</sup>

Patients with cardiovascular diseases stand out among patients treated in the ECU, with emphasis on systemic arterial hypertension (SAH), which is an important modifiable risk factor for cardiovascular diseases and a challenge for global public health.<sup>(2)</sup>

SAH is a multifactorial clinical condition characterized by sustained high levels of blood pressure (BP). It is frequently associated with functional and/or structural alterations of the heart, brain, kidneys, and blood vessels as well as metabolic changes, increasing the risk of fatal and nonfatal cardiovascular events.<sup>(3)</sup>

The diagnosis of SAH requires attention at the time of the interview and when the information is given, both as regards the patient being hypertensive or not, and their individual levels of BP, and in relation to the exclusion of biases regarding instruments, BP measurement techniques, and sociodemographic and health profiles, among others.<sup>(4)</sup>

Besides being the most prevalent vascular disease worldwide and predominant cause of deaths in Brazil, SAH is silent,<sup>(4)</sup> and in most cases, hypertensive patients do not present signs and symptoms that draw the attention of nurses during their admission. Considering that these patients might present blood pressure levels that require immediate care, not measuring BP at the time of risk classification might cause misunderstandings in the prioritization of the patient's care.

A study conducted in a city in the state of São Paulo showed that hypertensive crises accounted for 0.5% of all emergency care and 1.7% of clinical emergencies, and urgency was more common than hypertensive emergency.<sup>(5)</sup>

Hypertensive urgency (HU) is characterized by the elevation of diastolic BP reading  $\geq 120$  mmHg, but with clinical stability and without damage to the target organs. These patients are exposed to a higher risk of cardiovascular events in the future, compared to hypertensive individuals who have never presented with HU.<sup>(3)</sup>

Hypertensive emergency (HE) is characterized by the sudden elevation of BP, causing the loss of the brain's blood flow autoregulation and evidence of vascular injury, with the clinical conditions of hypertensive encephalopathy, hemorrhagic injuries to the retina vessels, and papilledema.<sup>(3)</sup>

The question of the present study was as follows: what are the sociodemographic characteristics, blood pressure levels, and risk classification of patients with hypertensive urgency or emergency admitted to the ECU? In this respect, the objective of the study was to characterize the socioeconomic conditions, blood pressure levels, and risk classification of patients with hypertensive urgency or emergency in an ECU of a city in the state of Minas Gerais.

The risk classification for the prioritization of care in emergency services is considered a private activity of nurses.<sup>(6)</sup> The results of this study show evidence that might contribute to the improvement of service regarding patients' risk classification for hypertensive urgency or emergency events in ECUs.

## ● METHOD

Cross-sectional and retrospective study was conducted with secondary data from records of patients treated in the last quarter of 2013 in a 24-hour ECU of a medium-sized city in the state of Minas Gerais.

The 24-hour ECU, the place of the study, is located in a district of the western region of the city and was opened on May 27, 2010, under the management of the University Hospital Support Foundation. Nurses are responsible for the admission of patients, using the Manchester Risk Classification System Protocol for urgent care.

According to the institution's records, 54,275 individuals were attended to in 2013, including adults, elderly people, and children, with a mean of 150 patients/day. The study used records of adult and elderly patients with diastolic blood pressure (DBP)  $\geq 120$  mmHg at the time of medical care prioritization.

The Power Analysis and Sample Size (PASS 13) software was used for the sample size calculation, and an inferential statistical analysis was adopted using the several flowcharts that could be applied: palpitations, chest pain, fainting, malaise in adults, headache, and pregnancy. For this purpose, a stratified estimate by type of flowchart used was chosen, using a test power of 80%. A randomization test using resampling via statistical simulation was conducted to compare proportions among the different flowcharts, using a minimum sample size of 45 individuals.

Records of 9,755 adults and elderly people treated in the ECU from October to December of 2013 were checked to obtain the sample. Sixty-three records meeting the study's established criteria were selected: records of adult elderly patients classified by clinical priority according to the Manchester Risk Classification System Protocol, with DBP  $\geq 120$  mmHg, with or without an urgency or emergency hypertensive diagnosis (myocardial infarction, stroke, and acute pulmonary edema, among others). Records that did not contain BP measurements were excluded, although they may have included a hypertensive urgency or emergency diagnosis.

Data were collected from August to October of 2014 by the researcher and 2 students of the nursing course registered in a Brazilian Scientific Initiation Program (PIC, as per its acronym in Portuguese). The printed file and the software ALERT<sup>®</sup> used in the ECU were manually consulted for the records' selection. An instrument developed by the authors and validated by specialists was used, composed of 17 semistructured questions, including sociodemographic conditions (gender, age group, origin, place of residence), blood pressure levels, selected flowcharts, clinical priority attributed during classification (assigned color), and discharge diagnosis.

The Manchester Risk Classification System Protocol provides 52 flowcharts consisting of signs and symptoms to categorize the risk classification of patients with different demands for urgency or emergency services. Depending on the signs and symptoms, they can be classified with the use of one or more flowcharts, since there is not a specific flowchart to classify patients with hypertensive urgency or emergency. In the present study, patients assigned yellow, orange, or red colors were classified as urgent cases.<sup>(1)</sup>

The database was entered in the Statistical Package for the Social Sciences (SPSS 23) program. The statistical analysis included absolute and relative frequencies and the chi-square test for comparison and association of qualitative variables. An alpha error of 5% was established; that is, the results were considered statistically significant when  $P \leq 0.05$ . The interpretative analysis was conducted from the thematic framework.

The research project was approved on May 22, 2014, by the University Hospital Research Ethics Committee, with an exemption for the informed consent form, under protocol no. 629,931.

## ● RESULTS

There were similarities in the percentage of men and women included in the sample. The most common age groups were 41-45 years (15.9%) and 46-50 years (19%), with a range of 27 to 84 years and a mean of 51.8 years. Most patients (90.5%,  $P < 0.0001$ ) lived in the city studied, in the urban area (95.2%,  $P < 0.0001$ ), and arrived in the ECU from their own residences (88.9%,  $P < 0.0001$ ). The prevalence of systolic blood pressure was concentrated near 170-219 mmHg ( $P < 0.0001$ ), and diastolic blood pressure was near 120-129 mmHg ( $P < 0.0001$ ) (Table 1).

For clinical risk classification, the following flowcharts were used: malaise in adults (49.2%), headache (27%), chest pain (22.2%), and palpitations (1.6%).

It is worth mentioning that 27% of the patients involved in the study were not included in the urgent category, even if they presented with  $DBP \geq 120$  mmHg. Regarding the discharge diagnosis, 33.3% of patients with  $DBP \geq 120$  mmHg were not diagnosed with a hypertensive crisis.

## ● DISCUSSION

The present study demonstrated numerical similarities of men and women that visited the ECU with hypertensive urgency or emergency events. This result was also found in a study with 273 people  $\geq 60$  years old, residents in the Legal Amazônia region in the state of Mato Grosso (44.7% men and 55.3% women). The research showed the high prevalence of SAH among elderly people (67.4%).<sup>(7)</sup>

In Brazil, a study conducted with data collected from the Brazilian System of Information (DATASUS, as per its acronym in Portuguese) evaluated the evolution of SAH prevalence among elderly people between 2006 and 2010. Values found in 5 Brazilian regions regarding the prevalence of hypertension were above 55% in all of the analyzed years, but this did not follow a linear trend. Regarding gender, in all years, SAH prevalence in elderly women was significantly higher than in men.<sup>(8)</sup>

In the present study, the fact that most patients were from the urban area of the city was similar to a study conducted in India, which reported a higher prevalence of hypertension among populations in the urban area. The research pointed out that compared to rural populations, the prevalence of hypertension and awareness and treatment of it were higher among urban populations. It was concluded that socioeconomic factors and metabolic risks (diabetes and hypercholesterolemia) influenced some of the differences observed between the 2 populations.<sup>(2)</sup>

Our results show that almost all patients with hypertensive urgency or emergency events live where the ECU is located, besides being residents of the urban area. In this area, residents have the option to be treated in 3 primary health care units that monitor chronic hypertensive patients. Since the ECU offers 24-hour care, demand occurs based on the patients' opportunity to be treated after the working hours of the primary health care units, as well as their easy access to the service.

According to our results, the most prevalent age of hypertensive urgency or emergency patients treated in the ECU ranged from 41 to 50 years, and the systolic and diastolic BP was concentrated near 170-219 mmHg and 120-129 mmHg, respectively. The panel of the Eighth National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommended values lesser than 140/90 mmHg for the 41-50 age group. The same limits and goals were recommended both for hypertensive adults with diabetes or chronic kidney disease, nondiabetics, and the general hypertensive population younger than 60.<sup>(9)</sup>

Hypertensive urgency or emergency events occur when the diastolic and systolic BP values exceed 120-130 mmHg and 220-220 mmHg, respectively. It is worth mentioning that severe hypertension is considered a risk factor for cardiovascular diseases, even without symptoms or acute damage to the target organs.<sup>(10)</sup>

Hypertensive urgency and emergency events constitute a heterogeneous group of acute hypertensive disorders, requiring fast recognition and appropriate treatment to limit or avoid damage to the target organs.<sup>(10)</sup> Verifying the presence or absence of damage to the target organs is more important than

Table 1 - Characterization of the sample, in absolute and percentage values in relation to socioeconomic data and pressure values, n = 63. City in the state of Minas Gerais, Brazil, 2014

<b>Variable</b>	<b>n</b>	<b>%</b>	<b>P value*</b>
<b>Gender</b>			<b>P=0.899</b>
Male	<b>32</b>	<b>50.8</b>	
Female	<b>30</b>	<b>47.6</b>	
No information	1	1.6	
<b>Age group</b>			<b>P=0.047</b>
25-30	1	1.6	
31-35	4	6.4	
36-40	6	9.5	
41-45	<b>10</b>	<b>15.9</b>	
46-50	<b>12</b>	<b>19</b>	
51-55	6	9.5	
56-60	8	12.7	
61-65	5	7.9	
66-70	5	7.9	
71-75	4	6.4	
≥ 76	2	3.2	
<b>Origin</b>			<b>P&lt;0.0001</b>
Residence	<b>56</b>	<b>88.9</b>	
Urgent medical care service	3	4.8	
Job	2	3.2	
Health care	2	3.1	
<b>City</b>			<b>P&lt;0.0001</b>
City location of the ECU	<b>57</b>	<b>90.5</b>	
Other cities in Minas Gerais	1	1.6	
Cities in other states	1	1.6	
No record	4	6.3	
<b>Residence</b>			<b>P&lt;0.0001</b>
Urban	<b>60</b>	<b>95.24</b>	
Rural	3	4.76	
<b>Blood pressure (BP)</b>			
<b>Systolic BP</b>			<b>P&lt;0.0001</b>
150-169	5	7.9	
170-189	<b>21</b>	<b>33</b>	
190-219	<b>20</b>	<b>31.8</b>	
220-229	13	20.6	
230-280	4	6.7	
<b>Diastolic BP</b>			<b>P&lt;0.0001</b>
120-129	<b>46</b>	<b>73</b>	
130-139	7	11.1	
140-149	7	11.1	
150-180	3	4.8	

\*P value of the chi-square test

exceeding the recommended limits of blood pressure values.<sup>(11)</sup>

The pressure values identified in the sample can be classified as stage II and III of SAH, considering the BP value measured in medical clinics in patients over 18 years old.<sup>(3)</sup> Regarding systolic blood pressure, stage I includes values of 140-159 mmHg; the range is 160-179 mmHg in stage II, and the value is  $\geq 180$  mmHg in stage III. With regard to diastolic blood pressure, there is a range of 90-99 mmHg in stage I, 100-109 mmHg in stage II, and  $\geq 110$  mmHg in stage III.<sup>(3)</sup>

It was found that "malaise in adults" was the most used flowchart by nurses to classify clinical risk and prioritization of patients' care. This result was similar to the one found in study conducted in 2014 in an emergency care unit of a university hospital in the state of Santa Catarina, which specified this flowchart as the second most used in care prioritization.<sup>(12)</sup>

According to the Manchester Risk Classification System Protocol, the "malaise in adult" flowchart is used to classify patients who do not feel well, though without specific complaints. In this in case, general discriminators are used to determine the level of consciousness, pain, and body temperature, and specific discriminators are used when some of the signs and symptoms that clearly indicate a specific disease are presented. The specific discriminators of this flowchart include an acute neurological deficit, a coagulation disorder, drug eruptions, widespread vesicular rash, immunethrombocytopenic purpura, immunosuppression, hemoptysis, hypoglycemia, hypothermia, a special risk of infection, a history of recent travel, sudden onset, signs of meningism, and changes in vital signs.<sup>(1)</sup>

In the present study, besides this flowchart, it was found that palpitations, chest pain, and headache flowcharts were also used. The palpitations flowchart was developed to evaluate complaints of palpitations related to myocardial ischemia, heart disease, others and even anxiety. This flowchart ensures that signs and symptoms of heart failure are included in the orange and red categories. It presents these specific discriminators: a history of cardiac disease, a current history of unconsciousness and palpitation, irregular pulse, sudden loss of consciousness, acute dyspnea, and precordial or chest pain.<sup>(1)</sup>

The chest pain flowchart is used in pain cases that vary from acute myocardial infarction to muscular irritation. The specific discriminators include the type and intensity of pain (cardiac or pleural) and alteration of pulse. Headache is a flowchart that has specific discriminators such as seizure, inadequate breathing, upper airway obstruction, sudden onset of headache, fever, sudden loss of consciousness, moderate pain, conflict of history, a recent reduction in visual acuity, fever, vomiting, recent and mild pain, and recent events.<sup>(1)</sup>

Since a severe elevation of BP is not always related to specific signs and symptoms due to the asymptomatic characteristics of the disease, most patients were regarded as having complaints that characterize malaise, and the malaise-in-adults flowchart was predominantly used. A study conducted in Bosnia supported these results by showing that it is not known when the persistent and significant elevation of BP the hypertensive urgency/emergency occurred, since in about 50% of individuals diagnosed with hypertensive urgency or emergency, the disease progressed in an asymptomatic way, making treatment difficult.<sup>(13)</sup>

In Brazil, a research pointed out that some hypertensive patients might present extremely high BP measurements when they seek emergency care; however, most times, they proved to be oligosymptomatic or asymptomatic patients. It was also highlighted that other hypertensive patients might present with a temporary increase of BP in the face of some painful event, emotional disorder, or discomfort, such as migraine, dizziness, vascular headaches caused by musculoskeletal problems, and signs of panic disorder, which characterize the hypertensive crisis.<sup>(14)</sup>

It is worth mentioning that the symptoms reported by patients with hypertensive urgency or emergency events treated in the ECU were predominantly headache and chest pain. Another study showed that the most common symptoms presented by these patients were headache (74.1%), chest pain and dyspnea (62.4%), dizziness (49.4%), and nausea and vomiting (41.2%). HU's most common symptoms were headache (78.9%) and chest pain (56.3%), and in HEs, they were chest pain (92.9%) and dyspnea (71.4%). Headache, chest pain, and dyspnea were the most significant symptoms presented in patients with hypertensive emergencies ( $P < 0.005$ ). The clinical manifestations of the HE were related to acute coronary syndrome (92.9%) and acute pulmonary edema (7.1%).<sup>(13)</sup>

In Brazil, a study that assessed the prevalence, clinical condition, and organic injuries associated with a hypertensive crisis showed that hypertensive urgency or emergency events occurred clinically, in descending order, as headache, dizziness, dyspnea, neurological deficit, and chest pain. In hypertensive urgency events, headache and dizziness were the most common symptoms, while in hypertensive emergencies, the most frequent clinical manifestations were neurological deficits and dyspnea compatible with the target organs.<sup>(5)</sup>

The Brazilian Guidelines on Hypertension, as well as the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (VII JNC), highlighted the severe elevation of BP (DBP  $\geq$ 120 mmHg), which characterizes hypertensive urgency or emergency events.<sup>(3,15)</sup>

In the present study, the fact that 27% of the patients with hypertensive urgency or emergency events, and with DBP  $\geq$  120 mmHg, were not included in the urgent category calls for attention, since they might have returned to their residences without seeking health services or treatment to prevent worsening related to the severe elevation of their BP. It is important to note that nurses should be aware that decisions made at the time of risk classification might be unstable, uncertain, and potentially unsafe without a scientific basis.<sup>(1)</sup>

Approximately one-third of the patients that presented with DBP  $\geq$ 120 mmHg and who were not diagnosed with hypertensive crisis received other diagnoses, such as anxiety, headache, and malaise, among others. It is worth mentioning that besides the use of flowcharts proposed by the Manchester Risk Classification System Protocol, the Brazilian Guidelines on Hypertension<sup>(3)</sup> and international guidelines<sup>(15)</sup> should also be considered.

Measurements of BP, heart and respiratory rates, and level of consciousness are used to predict the need for emergency care.<sup>(16)</sup> A study conducted in a city of the state of Minas Gerais, where the health service uses the Manchester Risk Classification System Protocol, showed that only 0.5% of the records analyzed contained BP values measured at the time of risk classification.<sup>(17)</sup> This might make difficult the diagnosis and the beginning of the required therapeutic interventions.

It is also important to note that in emergency care, the measurement of blood pressure should be performed and confirmed in more than one anatomic location, with several reassessments before and after treatment.<sup>(15)</sup>

The present study presented limitations, since it used secondary data from records with incomplete information. However, such limitations did not invalidate the relevance of the results obtained, since they show important data on sociodemographic conditions, blood pressure levels, and risk classification of patients with hypertensive urgency or emergency events in the ECU.

## ● CONCLUSION

The characteristics of patients with hypertensive crises in the ECU show a similarity in the percentage of men and women, a predominance of the 41-50 age group, and the majority living in urban areas of cities and in areas covered by health services. The majority of systolic and diastolic blood pressure levels were concentrated near 170-219 mmHg and 120-129 mmHg, respectively.

The main flowcharts of signs and symptoms used by nurses at the time of risk classification were malaise in adults, Headache, and Chest pain. It is worth mentioning the high percentage of patients who sought care in the ECU with DBP  $\geq$  120 mmHg and who were not classified in the urgent category at least. It is also notable the high percentage of patients who did not receive a discharge diagnosis of a hypertensive crisis.

These results indicate the need to clarify to those responsible for risk evaluation the importance of identifying patients with high diastolic pressure and referring them to appropriate treatment, according to their clinical priority.

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