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ORIGINAL ARTICLE

PREHOSPITAL CARDIORRESPIRATORY ARREST: ASSESSMENT OF CARE ACCORDING TO UTSTEIN STYLE*

PARADA CARDIORRESPIRATÓRIA PRÉ-HOSPITALAR: AVALIAÇÃO DOS ATENDIMENTOS SEGUNDO O *UTSTEIN STYLE*

EL PARO CARDIOPULMONAR PREHOSPITALARIO: EVALUACIÓN DE LAS ASISTENCIAS SEGÚN EL *UTSTEIN STYLE*

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ABSTRACT

Objective: to analyze the occurrences, responses and outcomes of prehospital cardiopulmonary arrest according to Utstein Style and to identify factors associated with survival. ***Method:*** this is a quantitative, documentary and cross-sectional study with victims of cardiopulmonary arrest treated at the advanced life support units in 2015. Data were collected from the rescuer's care reports and organized. and analyzing them according to Utstein Style. Results were presented in tables. ***Results:*** 163 cases were observed, predominantly male, with no association between age and outcomes. Most CRPs were identified as being of clinical cause, at home and in asystole, with orotracheal intubation, peripheral venous access and epinephrine administration being the most frequent procedures. It was found that the occurrences witnessed by lay spectators and the ambulance response time demonstrated an association with the survival outcome. The survival rate was calculated at 25.1%. ***Conclusion:*** the service was evaluated by analyzing the occurrences according to the Utstein Style and there were associations between the outcome and the gaps in care, requiring interventions in each link of the survival chain. ***Descriptors*:** Out-of-Hospital Cardiac Arrest; Cardiopulmonary Resuscitation; Emergency Medical Services; Ambulances; Emergencies; Outcome Assessment.

RESUMO

Objetivo*:** analisar as ocorrências, respostas e desfechos da parada cardiorrespiratória pré-hospitalar segundo o *Utstein Style* e identificar os fatores associados à sobrevida. ***Método*:** trata-se de um estudo quantitativo, documental e transversal, com vítimas de parada cardiorrespiratória atendidas nas unidades de suporte avançado de vida, no ano de 2015. Coletaram-se os dados a partir dos relatórios de atendimento do socorrista, organizando-os e analisando-os de acordo com o *Utstein Style*. Apresentaram-se os resultados em forma de tabelas. ***Resultados*:** verificaram-se 163 atendimentos, predominando o sexo masculino, não havendo associação entre idade e os desfechos. Identificou-se a maioria das PCRs como sendo de causa clínica, na residência e em assistolia, sendo entubação orotraqueal, acesso venoso periférico e administração de adrenalina os procedimentos mais frequentes. Constatou-se que as ocorrências presenciadas por espectadores leigos e o tempo-resposta da ambulância demonstraram uma associação com o desfecho sobrevida. Calculou-se a taxa de sobrevida em 25,1%. ***Conclusão: avaliou-se o serviço por meio da análise das ocorrências segundo o *Utstein Style* e verificaram-se associações entre o desfecho e as lacunas no atendimento, havendo a necessidade de intervenções em cada elo da corrente de sobrevivência. ***Descritores*:** Parada Cardíaca Extra-Hospitalar; Ressuscitação Cardiopulmonar; Serviços Médicos de Emergência; Ambulâncias; Emergências; Avaliação de Resultados.

RESUMEN

Objetivo: analizar las ocurrencias, las respuestas y los resultados del paro cardiopulmonar prehospitalario según el Utstein Style e identificar los factores asociados con la supervivencia. ***Método:*** este es un estudio cuantitativo, documental y transversal con víctimas de paro cardiopulmonar tratadas en las unidades de soporte vital avanzado en 2015. Los datos se recopilaron de los informes de atención del rescatista, organizándolos y analizándolos según el Utstein Style. Los resultados se presentaron en tablas. ***Resultados:*** se observaron 163 casos, predominantemente masculinos, sin asociación entre la edad y los resultados. La mayoría de las PCRs se identificaron como de causa clínica, en el hogar y en la asistolia, siendo los procedimientos más frecuentes la intubación orotraqueal, el acceso venoso periférico y la administración de adrenalina los procedimientos más frecuentes. Se descubrió que las ocurrencias presenciadas por espectadores legos y el tiempo de respuesta de la ambulancia demostraron una asociación con el resultado de supervivencia. La tasa de supervivencia se calculó en 25.1%. ***Conclusión:*** el servicio se evaluó analizando las ocurrencias según el Utstein Style y hubo asociaciones entre el resultado y las brechas en la atención, lo que requiere intervenciones en cada eslabón de la cadena de supervivencia. ***Descriptores*:** Paro Cardíaco Extra-Hospitalario; Reanimación Cardiopulmonar; Servicios Médicos de Urgencia; Ambulancias, Urgencias Médicas, Evaluación de Resultado.

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INTRODUCTION

It is known that to measure the performance of emergency services and to obtain better scientific evidence on care actions and their results, studies are needed. However, in Brazil, there is still little research on evaluations of the prehospital component, which may possibly be justified by the recent creation of a public policy for emergency care.

Cardiopulmonary arrest (CPA) is a limiting situation between life and death and the success of its treatment depends on the reduction of the time elapsed between the occurrence and the beginning of the maneuvers, the effectiveness of the team, the activation and ambulance travel time, among other factors.[1] It is even more difficult in this situation to perform evaluative measures of the service, including records, due to the dynamics and stress experienced in the service.

It is estimated that in Brazil there are approximately 200,000 CRAs per year, half of which refer to cases recorded in the prehospital environment.[2] It is noted that most out-of-hospital cardiopulmonary arrest (HCPA) is presumably of a cause of heart disease, with ischemic heart disease being the main responsible.[1,3] It is estimated that less than 6% of victims survive.[4]

It is understood that, in order to effectively treat CRA victims, a sequence of actions taken in an integrated manner, such as CRA recognition, emergency service activation, cardiopulmonary resuscitation (CPR), early defibrillation and, also, advanced life support (ALS) and post-CRA care. This is called a survival chain sequence in which, if all links work, the chances of survival increase considerably, and attention must be paid to care systems.[5]

In order to obtain a better quality of care systems, it is necessary to establish continuous and systematic evaluation, [5] and the response time is an important item to be observed6. Survival after cardiac arrest is found to be inversely related to the interval from collapse to definitive care.[6] It is known that every minute without CPA, the chances of survival decrease by seven to 10% in a victim with CRA.[1-2]

Therefore, we consider the essential role of the Mobile Emergency Care Service (SAMU) in CRA care and the importance of knowing its performance and the records of activities performed, as well as their outcomes.

OBJECTIVE

- To analyze the occurrences, responses and outcomes of prehospital cardiopulmonary arrest according to Utstein Style and identify factors associated with survival.

METHOD

This is a quantitative, documentary and cross-sectional study conducted at SAMU of Londrina (PR). All visits from SAMU advanced life support units (USAV) teams to patients with pre-hospital cardiac arrest who underwent cardiopulmonary resuscitation (CPR) from the 1st of January to December 31, 2015, aged from ten years.

It is noteworthy that the chosen age classification is justified by the protocol of care and the systematized survival chain published by the American Heart Association, whose procedures are equally standardized from adolescence[5], which, according to the World Health Organization, starts at ten.[7] The following exclusion criteria were defined: victims who had the intervention performed exclusively by the Basic Support Unit (BSU) and occurrences in fixed prehospital components, such as the Emergency Care Unit and the Basic Health Unit.

Data was collected from SAMU first responders' care reports (RCR), completed by doctors, nurses or first responders and filed by the service itself. All RCRs of the year 2015 were checked, manually separating for data collection only the records that dealt with calls that met the inclusion criteria.

The data collection instrument was elaborated according to the information available in the RCRs, from the variables based on Utstein Style. It is pointed out that this reference lists the recommendations for data collection and standardization of definitions of terms related to CRA care in order to standardize studies on this topic worldwide.[6]

According to the Utstein Style out-of-hospital cardiac arrest (HCRA) resuscitation registry model, which was last revised in 2015, the data are organized as follows: data related to the system (population served by the service) emergency physician, description of care system, CRAs attended, CPRs performed and not performed); triggering (identification by the regulator of CRA prior to SAMU arrival, provision of CPR instructions by telephone); patient (age, gender, comorbidities, witnessed CRA, CPR before SAMU, location, first rhythm detected, etiology); process (response time, procedures performed, target temperature management, CPR quality, reperfusion attempt, referral hospital) and outcome (immediate survival, non-survivor organ donation, survival 30 days and 12 months after CRA and neurological outcome).[6]

The response time, in relation to the time periods in the process step, is defined as the interval between the call and the arrival of the SME at the place of occurrence.[6] However, it was decided to divide this variable into two periods: occurrence-triggering", which comprises the time

elapsed between the moment the call is received at the call center and the ambulance activation time by regulation, and triggering-arrival", which is the interval between the ambulance activation and the arrival of the vehicle at the place of occurrence.

In this study, it is emphasized that the data related to the result are represented only by the immediate survival outcome, which consists of the victim with the return of spontaneous circulation (WHtR) and delivered alive to the destination health service.

Data was tabulated and stored in a spreadsheet of the Microsoft Office 365 Excel program. The variables were coded in Arabic numbers and double-digitized. After the database validation, the information was transferred to the SPSS 20.0 software, and the necessary statistical calculations and analyzes were performed to achieve the objectives, with the help of a statistical professional.

For the descriptive analysis, the calculation of simple absolute and simple relative frequencies was developed. The measures of central tendency and dispersion for age and ambulance response time were also calculated. Pearson's chi-square and Fisher's exact tests were used to verify the association between the findings and, for significance, the Mann-Whitney test. The outcome associations were considered as variables with a significance level of up to 5% and a confidence interval (CI) of 95%.

The research complied with the Resolution No. 466/2012 of the National Health Council on research involving human beings, approving it by the Ethics and Research Committee Involving Human Beings of the State University of Londrina (UEL) under the opinion no. 666.503 - CAAE: 05931612.8.005231. It is stated that the study was funded and funded by the researchers.

RESULTS

There were 470 SAMU triggers for PCRs in 2015, of which 294 (62.5%) had no indications of intervention, as the victims already had signs of death found by reports that included the absence of vital signs, rigor mortis, mydriatic pupils, terminal illness and the family's desire not to revive. It was found that, in 13 cases, there was only intervention by the Basic Support Unit, leaving 163 calls (34.7%) that met the inclusion criteria.

The predominance of males was recorded, showing no relationship between sex and immediate survival outcome (p = 0.119), as shown in table 1.

It was found the age variation from 15 to 95 years, with an average of 60.68 years and a median of 65 years (SD = 20.1). Age records were found in 155 visits (95.1%). The medians of 70 years for females and 60 for males were calculated. It should be noted that the mean age of the immediate survival and death groups were, respectively, 60.1 and 60.9 years, and the medians were 65.5 and 65 years.

Most CRAs have been shown to be of clinical cause, with asystole being the main rhythm found. In relation to the place of occurrence, it was found that in most (58.3%) of the medical records, there was no such information, so it was possible to apply the statistical test only among victims who were on public roads or in the residence, the latter being the main place. It is noteworthy that the cause, the place of occurrence and the first rhythm detected did not reveal associations with the outcomes (Table 1).

Table 1 also shows the distribution, according to the outcome, of the occurrences that were witnessed by lay spectators or by the SAMU team. It is also recorded if there was CPR before the arrival of SAMU. The lack of this information was noted in the records and, among the data found, only the occurrences that were witnessed by lay spectators demonstrated associations with the immediate survival outcome, with p = 0.021.

Table 1. General characteristics of CRA visits performed by SAMU, according to Utstein Style, and comparative analysis between immediate survival and death at the site. Londrina (PR), Brazil, 2015.

Variables	Frequency		Outcome		Association
	N	%	Survival	Death	p
Sex					0.063**
Male	100	61.3	20 (20.0%)	80 (80.0%)	
Female	62	38.0	21 (33.9%)	41 (66.1%)	
Ignored	01	0.6	00 (0.0%)	01 (100%)	
Causa					P=0.495**
Clinical	126	77.3	33 (26.2%)	93 (73.8%)	
External	31	19.0	06 (19.4%)	25 (80.6%)	
Ignored	06	3.7	02 (33.3%)	04 (66.7%)	
Location					0.485**
Public way	19	11.7	05 (26.3%)	14 (73.7%)	
Residence	36	22.1	06 (16.7%)	30 (83.3%)	
Other***	13	8.0	06 (46.2%)	07 (53.8%)	
Ignored	95	58.3	24 (25.3%)	71 (74.7%)	
First rythm					0.758*
FV/TV****	17	10.4	05 (29.4%)	12 (70.6%)	
AESP	21	12.9	07 (33.3%)	14 (66.7%)	
Asystole	40	24.5	09 (22.5%)	31 (77.5%)	
Ignored	85	52.1	20 (23.5%)	65 (76.5%)	
Witnessed by viewers					0.021**
Yes	31	19.0	12 (38.7%)	19 (61.3%)	
No	10	6.1	00 (0%)	10 (100%)	
Ignored	122	74.8	29 (23.8%)	93 (76.2%)	
Witnessed by SAMU					0.174**
Yes	21	12.9	08 (38.1%)	13 (61.9%)	
No	140	85.9	32 (22.9%)	108 (81.1%)	
Ignored	02	1.2	01 (50%)	01 (50%)	
CPR before SAMU					1.000**
Yes	32	19.6	08 (25%)	24 (75%)	
No	23	14.1	06 (26.1%)	17 (73.9%)	
Ignored	108	66.3	27 (25%)	81 (75%)	

* P value obtained by chi-square test.
** P value obtained by Fisher's exact test.
*** Nursing home, commercial establishment.
**** Ventricular fibrillation / pulseless ventricular tachycardia

In Table 2, regarding the procedures performed, the main access of choice was the peripheral venous and, in most consultations, there was a definitive airway report through the endotracheal tube. Defibrillation was reported in 41 (25.2%) records. The association of these variables with outcomes is denied.

Adrenaline was the most commonly used drug, followed by amiodarone (Table 2). There was also a record of the use of other drugs less frequently, thus not allowing a statistical analysis: lidocaine; atropine; crystalloids; magnesium sulfate; calcium gluconate and hypertonic glucose.

For the data presented in table 2, the answer yes was considered only when there was a description of the procedure performed or the medication applied.

Table 2. Procedures and medications recorded during CRA visits and comparative analysis between immediate survival and on-site death outcomes. Londrina (PR), Brazil, 2015.

Procedures			Outcome		Association
	N	%	Survival	Death	p
Venouse access					0,734*
Peripheral venous access	113	69,3	30 (26,5%)	83 (73,5%)	
Central venous access	12	7,4	04 (33,3%)	08 (66,7%)	
No access report	35	21,5	05 (14,3%)	30 (85,7%)	
Others***	03	1,8	02 (66,7%)	01 (33,3%)	
Intubation					0,849**
Yes	108	66,3	28 (25,9%)	80 (74,1%)	
No	55	33,7	13 (23,6%)	42 (76,4%)	
Defibrillation					0,211**
Yes	41	25,2	13 (31,7%)	28 (68,3%)	
No	121	74,8	28 (23%)	94 (77%)	
Medication ADRENALINE					0,081**
Yes	113	69,3	33 (29,2%)	80 (70,8%)	
No	48	30,7	08 (16,7%)	42 (83,3%)	
AMIODARONA					0,253**
Yes	30	18,4	10 (33,3%)	20 (66,7%)	
No	133	80,4	31 (23,3%)	102 (76,7%)	

* P value obtained by chi-square test.
** p value obtained by Fisher's exact test.
*** Other: Phlebotomy, portocath and intraosseous.

It is mentioned that in 24 (14.7%) medical records, there was no detailed report of how the service occurred, including the information performed CPR according to the Advanced Cardiac Life Support (ACLS) protocol".

Table 3 shows the time intervals of the occurrences. In 153 (93.9%) records, these data were complete, allowing the calculation of the intervals. It is noteworthy that the immediate survival group had a shorter average vehicle response time compared to the death group, with an association with the outcome only in this interval, with p = 0.012.

Table 3. Time intervals for PCR occurrences attended by SAMU advanced life support teams. Londrina (PR), Brazil, 2015.

Intervalo de tempo em minutos	N	Média	DP	Mín	1º Q	2º Q	3º Q	Máx	p*
General									
Occurrence-trigger	153	14.36	15.76	01	05	08	20	92	
Vehicle response time	153	9.45	7.40	02	05	08	11	77	
Survival									
Occurrence-trigger	40	13.83	15.98	02	05	07	18.75	78	0.940
Vehicle response time	41	7.53	3.96	02	05	6.5	10	20	0.012
Death									
Occurrence-trigger	116	14.55	15.76	01	04	08	21.5	92	
Vehicle response time	120	10.13	8.18	02	06	09	12	77	

*p value obtained by the Mann-Whitney test.

It was identified that 31 occurrences had the intervention of USB first, then to be triggered by USAV. Thus, the USAV occurrence-trigger interval was calculated, when the previous intervention of the USB was performed, with an average of 31.9 minutes, a median of 26 minutes and a standard deviation of 20.2, varying the duration of seven. 92 minutes, with 75% of occurrences ending within 39 minutes. When treated exclusively by USAV, the mean interval decreased to 9.9 minutes, with a median of six minutes and duration of one to 65 minutes, with a standard deviation of 10.6, and 75% of occurrences were completed within 11 minutes. A significant difference was confirmed with the nonparametric test, obtaining p <0.05.

It is noted that the interval between the occurrence and arrival of the ambulance at the scene was shorter between the shockable rhythms, with an average of 20.38 minutes and a median of 13.5 minutes; among the victims found in AESP, an average of 22.21 and a median of 16 minutes were recorded. In cases where asystole occurred, an average of 23.9 and a median of 20 minutes were calculated.

It is emphasized that the events that had the attendance by the USB did not show associations with the outcomes, with p = 1,000. Forty-one (25.1%) victims were found to have an immediate survival and were referred to a live health service, and the remaining 122 (74.9%) died either locally or during transport.

DISCUSSION

It is considered that the Utstein Style registration model is recognized worldwide as a standard for directing research on CRP care. It is also identified by this method, the assessment of the emergency care system precisely, which covers from the moment of occurrence to the outcome of care, organizing the variables related to the system", activation", patient". , process and outcome .[6] It is therefore verified that the indirect assessment of the quality of the RAS records is made possible by this method.

Regarding the system", it is noted that the emergency care system is regulated by Ordinance 160/2011, which reformulated the National Emergency Care Policy (PNAU) and established the Emergency Care Network and Emergencies in UHS, SAMU being one of the components of this policy. It is noteworthy that the regional SAMU Londrina is in accordance with this regulation.

It is evident that the proportion between the triggers for CRAs attendance and the number of CPRs performed, 163 (34.7%), may reflect the quality of emergency system care, since the larger the gap between the collapse and care, the lower the chances of survival with resuscitation indication.[1,6]

Note that information related to the trigger topic suggested by the Utstein model is not included in the data source used - whether the regulator identified the CRA prior to SAMU arrival and whether instructions were provided to the informant / requestor by telephone. It should be noted that if there were instructions from the regulator to the requester, they should be on CPR only with chest compressions.[8]

Regarding the variables related to the patient", a great variation of age was noticed. In this study, all victims from the age of ten were considered, although it was found that similar studies chose to include only patients from the age of 18,[3,9] but it is noteworthy that there was only one victim inserted in this age range. Nevertheless, it was found that the calculated median age (65 years) was slightly higher than that recorded in another Brazilian study (64 years old).[9]

It is shown that two Asian cities had higher medians: 69 years in Seoul and 77 in Osaka[10]. In addition, in a study that addressed much of Europe, the median was 70 years,[11] suggesting that the numbers found were similar only in researches that portray the Brazilian reality. Among adults, the risk of sudden cardiac death increases exponentially with age.[12]

A significant difference between the mean age of the survival and death groups was denied, unlike two international studies that demonstrated a substantial age disparity between the groups, [3,13] being the lowest mean among patients who returned from the spontaneous hospital circulation.

Regarding gender, the highest proportion of men observed in this study is in agreement with other authors, both national[9] and international.[3,11,13] It is recognized, however, that there was no significant difference in the relationship between sex and the immediate survival outcome (p = 0.119), as concluded in another international study.[13]

According to Utstein Style, it is explained that the cause of the occurrence is classified as clinical, when it is presumably cardiac, unknown (or other medical causes) or external, including substance abuse, electrocution, asphyxiation, drowning, among others. In this study, it was observed that most occurrences were of clinical cause, corroborating findings in the literature[1,3,11-2], and there was no association with the outcome, as in a European study. In a Dutch study, the association between clinical causes and a higher survival rate.[13] It has been shown in the United States that most occurrences are predominantly cardiac, and ischemic disease is primarily responsible. It is estimated that one in 7.4 people dies from sudden cardiac death.[12]

Although less than half of the medical records (41.7%) contain information on the place of occurrence, among the data found, the residence was the main place, followed by the public road, finding that meets the most recent[12] American and European data.[11] The association between outcome and place of occurrence was denied in this study; However, in the international literature, CRA in the public area is related to the greater chance of survival.[3,12-3] It is explained that the higher chances of early recognition of collapse in public roads, compared to residence, help to justify the findings of other studies.

It is accepted that knowing the location of CRA occurrences can help the community determine how their resources can be optimized and deployed to reduce emergency response intervals, increasing the likelihood of survival.[6]

It is found in the new Utstein Style recommendations that, in addition to measuring the CRAs that were treated by the Emergency Medical Service (EMS), the first shockable rhythm also measures the effectiveness of the system.[6] In several studies[3, 12-13], significant differences in survival when a shockable rhythm is detected upon arrival of the ambulance. It is emphasized that the shorter the ambulance arrival interval, the greater the likelihood of finding a shockable rhythm and the greater the chance of spontaneous circulation (CSC) return.[3,14]

It is noteworthy that, among the recorded rhythms, information contained in only 47.9% of the medical records, asystole was the main one, present in 51.3% of these victims, followed by PEA and, later, shockable rhythms. A similar finding was found in a Brazilian study, where 50.1% of the CRA cases attended by the SAMU of Belo Horizonte were characterized by an initial asystole rhythm, also succeeded by AESP and FV / TV, but among victims survived, most had a shockable initial rhythm.[9] In the United States, in 2016, a shockable initial rhythm was observed in 19.8% of out-of-hospital cardiopulmonary arrest events seen by the emergency service[12] and in Europe the proportion was 22.2%.[11]

It is suggested that the predominance of asystole, considered the worst prognosis and the final rhythm, and the low detection of the shockable rhythm (10.4%) may be related to the poor dissemination and implementation of training programs for the lay population, in the sense of teach her to recognize and initiate CPA maneuvers, which is characteristic of the emergency response system at the scene of the incident, the time of activation and response of the ambulance, and the poor availability of AED (automatic external defibrillator) in the community.

Another important piece of data recommended by the Utstein model is the possibility of the event being witnessed by spectators or by the emergency medical service. However, it was found that this data was not available in most cases (74.8%) and, in 75.6% of the cases that had this information, there was a report that a layman witnessed CRA. Based on the information obtained, it is evaluated that the CRA witnessed by some spectator showed an association with the survival outcome, with p = 0.019, as stated in an Asian study.[15] In another Brazilian study, it was noted 29.1% of the CRAs were witnessed prior to the arrival of USAU from SAMU.[9]

According to data obtained from a US registry system, 37% of the occurrences of CRA in a prehospital setting were witnessed by lay people in 2015 in that country, thus demonstrating a much longer survival, compared to unseen occurrences.[12] It was concluded that, in Europe, 54.3% of occurrences were witnessed, 11 being the highest proportion among the findings cited.

We highlight a Danish study that followed for 12 years the occurrences of victims of cardiac arrest in a prehospital setting that survived for at least 30 days, where it was found that the risks of brain damage and death after one year were significantly lower among survivors who received CPA or bystander defibrillation than those who were not resuscitated.[16]

In addition to the presence of CRP witnesses, CPR before the arrival of the Emergency Service was also related to survival.[3,13] In European studies, rates of 64.3%, 51, 1% and 47.4% related to victims who were resuscitated before the arrival of the MES[3,11,17] and, in the United States, 40.7% of patients were resuscitated by lay people.[12] In a Brazilian study, it was pointed out

that when CRA was witnessed by someone trained in basic life support, victims were 3.5 times more likely to survive immediately.[9]

It is noted in this study that 19.6% of victims received CPR prior to the arrival of SAMU, with no indication as to whether the resuscitator was a layman or someone trained in basic life support, and not demonstrating an association with the CPR outcome, contrary to the other studies presented. However, it is noteworthy that there was no such information in 66.3% of the medical records.

The keys to survival after cardiac arrest are known to be early recognition and treatment, specifically early CPR and early defibrillation, [1] thus training the population to identify and initiate CRA treatment. It is paramount. It is recognized that, in Brazil, the measurement of prehospital care initiated by the laity is not yet valued.

It is observed that the use of AED by the viewer is a variable to be recorded, but there were no reports of the use of the equipment by spectators. It is mentioned that, in the city of Londrina, there is Law no. 8845 of July 17, 2002, which provides for the availability of an AED in public or private establishments and places of high concentration of people, and the obligation to conduct training and qualification of personnel to provide basic life support in case of heart attack.

A proportion of CRA witnessed by SAMU of 12.9% was calculated, and there was no association with survival outcome, a finding different from that found in the literature. It was found in Belo Horizonte that the victim who had the CRA witnessed by the SAMU team was 2.9 times more likely to survive immediately[9], and in the United States, 41.4% of the victims of occurrences witnessed by the emergency medical service they arrived alive at the hospital.[12] It is warned that there is no association with the outcome and may be related to the quality of the care and response system or also to the negative prognosis of the patient who was probably already presenting signs of deterioration of health when triggering SAMU, unlike sudden CRA.

Some variables related to the patient stage were not considered due to the absence of relevant data in the source used, such as comorbidities, presence of implantable cardiodesfibrillator or ventricular device, ST-segment elevation acute myocardial infarction and whether victim had an independent life.

The process step includes the procedures performed during CPR and the emergency service response times.

It is suggested, by the Utstein Style method, to describe the main route used for drug administration and also to measure the time interval between the call and obtaining an access, in addition to the administration of the first drug.

It was noticed that, in most of the consultations, the access of choice reported was the peripheral venous, which was already expected, since it is characterized as the first option in emergencies, as it is the easiest to perform, both by professionals and by materials available. Attention is drawn to the fact that central venous access is the second most reported, in 7.4% of cases, and the second choice should be the intraosseous route, according to the recommendations of the American Heart Association, [5] reporting just a use of this route. It is understood that this fact can be justified both by the unavailability of adequate material and the possible lack of skill of the team. It was revealed that the type of access showed no association with the survival outcome.

It is noteworthy that the measurement of the time interval between the call and the access was not possible due to the limitations of the data source, as well as the interval until the first drug administration.

It is noteworthy that, regarding the drug used, there were no associations with the survival outcome, with adrenaline being the most reported, present in 112 (68.7%) visits, a drug that, according to the latest Advanced Cardiovascular Life Support protocol[5], should be applied to all CRA modalities; thus, it was expected to be reported in all consultations. It is emphasized, according to the latest recommendation, published in 2019, that the administration of epinephrine should occur as soon as possible in non-shockable rhythms and, when it is a shockable rhythm, the drug should be applied only after the first attempt at defibrillation if unsuccessful and vasopressin is not recommended.[18]

In two recent systematic reviews, it was found that there are benefits to the administration of epinephrine in the return of spontaneous circulation during resuscitation maneuvers, as well as an increase in survival at hospital discharge[19-20] and after 30 days when administered epinephrine within ten minutes compared to late application[19] and also after three months.[20]

Amiodarone use was reported to have been reported in 30 (18.4%) consultations, being the drug of choice when there is a shockable rhythm detected, according to the 2015 recommendation[5]; however, this number does not correspond to the number of shockable rhythms found - 17 (10.4%) - nor to the number of patients receiving defibrillation, which was 41 (25.2%). It is noteworthy that these numbers should be similar since these variables are interconnected in a shock-rate PCR service, according to the ACLS protocol.[5] It is pointed out, again, the lack of information as a possible explanation for this divergence.

The most recent recommendation emphasizes that the use of amiodarone or lidocaine, both antiarrhythmic drugs, is suggested in cases of VF / VT refractory to electrical therapy.[21]

In another Brazilian study, it was found that adrenaline was the most used drug, present in 68.7% of the consultations, followed by atropine and amiodarone.[9] This difference can be attributed to the fact that this research was conducted until 2010, when the 2005 ACLS guidelines were still in force, which recommended the application of atropine after detection of asystole or AESP.

It is considered that, currently, the use of atropine in the treatment of CRA is not indicated, but in six cases, the use of the substance was reported. It is pointed out that, in some situations, atropine was used during CRA care, where there may have been a return of spontaneous circulation with bradycardic rhythm.

It is reported that Utstein Style brings implanted defibrillation (AED) or defibrillator as a variable to be obtained, [6] however, there were no reports of lay defibrillation or implantable cardioverter-defibrillator (ICD) triggering consulted services.

It is noted that the advanced airway is part of the procedures that are performed exclusively by the Advanced Life Support Units, and early VAS is a link in the survival chain.[5] It was found in this research, the report of endotracheal intubation in 66.3% of the consultations, with no association with survival outcome. Two Asian studies are cited in which the negative association between advanced airway and survival was demonstrated by the first, with a worse outcome among CRA victims[15], and by the second, a better survival among patients who received advanced airway, but only for non-shockable rhythms.[22]

It is explained that the mechanisms for measuring the quality of CPR and directed temperature control after the CER with the comatose patient are some supplementary items suggested in the current Utstein Style review, [6] however, there was no such control in the care provided.

It is recognized that the time elapsing between collapse and initiation of treatment is possibly the most important factor in caring for the victims of a CRA; thus, emergency medical service (EMS) response time must be known and assessed.

It is suggested that the division of response time in the occurrence-trigger and trigger-arrival intervals, proposed in this study, may help in identifying possible difficulties related to the studied reality responsible for the delay in the response time of occurrences.

It is stated that one of the reasons that lead to the extensive occurrence-triggering interval, pointed out by a Brazilian study, is the difficulty in obtaining information from the applicant about the victim's condition. It was shown that in 38.8% of the calls, the information was considered insufficient for suspected CRA, which is justified, since people may be under strong emotions when evidencing a state of possible CRA, presenting difficulty in clear and objective information transmission and impairing immediate care.[23]

In relation to the occurrence-triggering interval, it is noteworthy that, in 19% of the occurrences, there was a previous intervention of the BHU, so that the USAV could be triggered, a fact that caused delays in the described interval substantial difference in the median, which fell from 26 to six minutes.

It was revealed that the handling of occurrences by the BHU showed no association with survival, ($p > 0.05$). This finding is compared to an American study in which pre-hospital CRA patients who were treated by the BHU team had a higher survival rate at hospital discharge, with better neurological prognoses than those who received ACL.[24]

In this study, it was demonstrated that the interval between the occurrence of receipt and the start of the vehicle did not show a significant difference between the immediate survival and death groups, with $p = 0.940$.

As for the time-response item (TR) of the USAVs, it is understood that there was a shorter interval between patients who had survival compared to the group that died, showing a significant disparity ($p = 0.012$). In this interval, the median was eight minutes, similar to that of another Brazilian study, which presented a median of nine minutes.[9] In addition, this study also considered the response time from activation of the ambulance until arrival at the place of occurrence.

It should be noted that the calculation of the median of the interval between the reception of the call and the arrival of the team, following the recommended by Utstein Style, results in 17 minutes, a longer period than that found in the international literature. In a Swedish study, the median response time was six minutes.[17]

It is noteworthy that the difference in the response time recorded between the survivors and the group that died shows the importance of a fast and effective response of SAMU to the calls of suspected CRA. An Asian study is found that found an association between survival and events that responded within eight minutes.[15] It is cautioned that the shorter the displacement time, the faster the victim is assisted and the greater the chances of survival.[3]

In several studies, the response-time indicator is listed as one of the evaluation items of the emergency service process.[3,25] It is noteworthy that, under the National Emergency Care Policy,

GM Ordinance No. 1010, of May 21, 2012, determines that, among the SAMU 192 evaluation indicators, the minimum, medium and maximum response times must be evaluated, monitored and presented every six months to the Ministry of Health.

A shorter response time was found in patients with shockable rhythm, which is in accordance with the literature, since the earlier the treatment of EMS, the greater the chances of detecting a shockable rhythm, favoring survival and over time the initial shockable rate deteriorates to asystole, representing a worse prognosis.[14,17]

All survivors are reported to have been referred to a public or private tertiary hospital.

Regarding the variables related to the outcome", the immediate survival rate of 25.1% was similar to that found in a Brazilian study, [9] in which 21.9% of the victims arrived alive at the hospital and slightly lower than in the United States, where the hospital admission survival rate was 29% in 2016.[12]

It is emphasized that a successful CRA depends on a sequence of procedures that can be systematized through the concept of survival current. It is understood that this current of survival, first devised in 1991 by the American Heart Association, is composed of links consisting of important actions to be performed whose impacts on survival of a CRA victim are significant.[2]

In a study conducted in Sweden, we analyzed all care provided to the CRP victim within a 20-year interval, and found that survival more than doubled during the period, which was attributed to improvements in all patients links of the survival chain in the country.[26]

It is known that the use of survival chain[2], or survival chain[5], is recommended to identify the different ways of care of patients who underwent cardiac arrest in a hospital or prehospital setting. Thus, in the most recent AHA guidelines, the current of survival in both situations is defended. It also addresses the incorporation of social media technologies to summon rescuers who are close to a victim suspected of having an out-of-hospital cardiopulmonary arrest who are willing and prepared to perform CPR.[5]

Continuous quality improvement through the assessment of structure (people, education and equipment), process (protocols, policies and procedures), system (program, organizations and culture) and outcomes (patient evolution: satisfaction; safety and quality), is proposed in the AHA's new guidelines for CPR and emergency cardiovascular care (ACE), showing the focus of effective care systems that comprise all of these elements.[5]

It is believed that a simplification of procedures, especially for the lay rescuer, can provide greater adherence to possible successful resuscitation attempts. It is hoped that a better understanding of potential barriers to CPR may lead to actions that increase CPR rates, especially in the out-of-hospital setting.[2]

In an Asian study, the behavior of university students who underwent emergency care training in the face of CRA was assessed, and it was concluded that among those who found people with collapse, 15.4% performed chest compressions, 14, 2% used the AED and 47.4% performed other resuscitation actions. Among those who did not perform chest compressions, difficulties in diagnosing cardiac arrest, confusion and panic were identified as barriers.[27]

Emphasizes the importance of training the lay public, such as students who have not yet completed high school, to assist in situations of cardiopulmonary arrest, enabling them to identify them and initiate chest compressions and the use of AED if necessary.[4]

In a European study, it has been shown that in recent years there has been an increase in the proportion of victims who were resuscitated before the emergency service arrived, with a consequent increase in survival. These numbers are possibly related to actions aimed at training the general population.[28]

The other variables suggested by Utstein Style at this stage, such as survival at 30 days and 12 months after CRA, as well as the neurological outcome, were not obtained, as the patients were not followed up in the in-hospital setting. This is one of the main limitations of this study.

It is noteworthy that the Utstein model itself recognizes that some variables are impossible to collect, such as the collapse time of an unseen CRA, or very difficult because they are not routinely verified, such as the time of the beginning of compression, the obtaining of access and arrival of the victim to the place and time of the CER, and these important data can be obtained from specific studies.[6]

It is noted that the lack of important information due to incomplete filing of the rescuer's care reports was not an exclusive limitation of this work, as another author also reported difficulties in obtaining complete data.[9]

Other limitations of the research are: the search for data after the occurrence of events and access only to the information described in the attendance forms; The data source (RAS) did not include specific fields to fill in some of the variables explored in this study, according to Utstein Style, such as witnessed CRA, CPR before SAMU arrival, procedures and medications adopted, rhythm detected and the place of occurrence, which contributed to the considerable

absence of this information. In addition, in the RASs, there was a blank space to fill out, in full, the conducts / procedures performed and, in most cases, the professional did not include, in their records, the most important information regarding care.

It is suggested that the adequacy of the RAS with more checklist fields, including relevant care information, may facilitate the completion of the record, both in relation to the time spent and the orientation of the notes, avoiding the forgetting of essential information. Thus, it is believed that, for a post-care analysis, as well as the professional's own support for correct notes, the adequacy of the instrument may be valid.

It is also recommended to add the variables explored in Utstein Style in RAS, so that the report can be used as an instrument for service evaluation and to make research more consistent and comparable to other countries.

It is advisable to train the emergency service staff on the indispensable role of a quality record of the actions performed through the Urgency Education Center (UEC) in the service.

It is also necessary to implement computerized programs that facilitate the recording of actions performed in the APH, as a way to improve data collection and facilitate the creation of quality indicators through the records.

Finally, it is pointed out that neurological condition and survival at 30 days and 12 months after CRP, as suggested by Utstein Style, constitute important information to analyze the impact of actions on prehospital care, and can be objects of future studies.

CONCLUSION

With this study, it was possible to evaluate the quality of the local emergency service through the variables related to the system, patient, process and outcome, according to Utstein Style, allowing a reflection on the links of the survival chain.

CRA was associated with survival. In view of the above, the implementation of systematic basic life support (BLS) training programs for lay people is of great importance, including the use of social media technologies, as suggested by the AHA. It is noteworthy that people trained in BLS more easily recognize a CPR and activate the emergency service more quickly, as well as being able to initiate CPR maneuvers, contributing to the increased chance of survival of victims.

Early access to defibrillation is important as it is the most effective treatment for shockable rhythms.

It is verified that the gap in the occurrence-actuation interval, identified at work, shows that it is necessary to intervene in this stage of the process, with strategies ranging from education and training of the lay public to the improvement of medical regulation itself. Through the unquestionable difference between the USAV intervals, when the first and only action was triggered, the importance of the commitment of the proper care unit was verified.

The association between ambulance response time and survival was demonstrated, and the elapsed time was shorter among survivors, with one more link of the survival current and its importance for the outcome. The decentralization of the city's service bases is suggested.

It is believed that a faster and more effective response of the emergency service can be optimized by maintaining the number of vehicles and human resources, as recommended by the PNAU for the city, and also by educating drivers on the behavior they should exhibit when they see an ambulance on their way, considering that heavy traffic, especially during peak hours, may contribute to increased ambulance travel time.

It is noteworthy that interventions in each link of the survival chain can and should be performed, as they have an important impact on the survival of CRA victims, and should not be considered in isolation, as none of these interventions can reverse most of them of CRA's.

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