Trend of care for external causes in the Mobile Emergency Care Service

Tendência de atendimentos por causas externas no Serviço de Atendimento Móvel de Urgência

Tendencia de los auxilios por causas externas en el Servicio de Atención Móvil de Urgencia

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Abstract

Objective: To analyze the trend and impacts caused by regionalization in emergency care for external causes performed by the Mobile Emergency Care Service (SAMU), before, during and after the regionalization process.

Method: This is an ecological study of SAMU care trend. The periods were separated in 2010 to 2012 (pre-regionalization), 2013 to 2015 (transition) and 2016 to 2018 (consolidation). The variables cause of care, day of the week, time, occurrence site, resource forwarded and victim characterization (gender, age, alcohol use and outcome of care) were collected, totaling 17,533 occurrences. Care that did not qualify as external causes was excluded. Descriptive statistics, trends and chi-square association test were performed. A significance level of 5% (p-value≤0.001) was adopted.

Results: Most victims were male, with a higher prevalence in the age group of 30 to 59 years. There was a decrease in death at the site of 41.7% after regionalization. There was an increase in care of external causes in Basic Life Support ambulances in 2015 compared to 2010 (47%), in addition to a decrease of approximately 50% in the number of Advanced Life Support services. The number of joint care of the two ambulances increased approximately 390%.

Conclusion: Regionalization had an important impact on the quality of care provided to the population, resulting in a decrease in mortality at the occurrence site.

Resumo

Objetivo: Analisar tendência e os impactos causados pela regionalização nos atendimentos de emergência por causas externas efetuados pelo Serviço de Atendimento Móvel de Urgência (SAMU), antes, durante e depois do processo de regionalização.

Métodos: Estudo ecológico de tendência dos atendimentos do SAMU. Os períodos foram separados em 2010 a 2012 (pré-regionalização), 2013 a 2015 (transição) e 2016 a 2018 (consolidação). Foram coletadas as variáveis causas do atendimento, dia da semana, horário, local da ocorrência, recurso encaminhado e caracterização da vítima (sexo, idade, uso de álcool e desfecho do atendimento) totalizando 17.533 ocorrências. Foram excluídos os atendimentos que não se classificaram como causas externas. Foram realizadas estatística descritiva, tendência e teste de associação do qui-quadrado. Adotou-se nível de significância de 5% (p-valor ≤0,001).

Resultados: A maioria das vítimas era do sexo masculino, com maior prevalência na faixa etária de 30 a 59 anos. Houve diminuição do óbito no local de 41,7% após a regionalização. Observou-se aumento de atendimento de causas externas nas ambulâncias de Suporte Básico de Vida no ano de 2015 em relação a 2010 (47%), além de diminuição de aproximadamente 50% do número de atendimentos do Suporte Avançado de Vida. O número de atendimento conjunto das duas ambulâncias aumentou aproximadamente 390%.

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Conflicts of interest nothing to declare.

Conclusão: A regionalização apresentou impacto importante na qualidade dos atendimentos prestados à população, resultando na diminuição da mortalidade no local da ocorrência.

Resumen

Objetivo: Analizar la tendencia y los impactos causados por la regionalización de los auxilios de emergencia por causas externas efectuados por el Servicio de Atención Móvil de Urgencia (SAMU) antes, durante y después del proceso de regionalización.

Métodos: Estudio ecológico de tendencia de los auxilios del SAMU. Los períodos fueron separados de la siguiente forma: 2010 a 2012 (preregionalización), 2013 a 2015 (transición) y 2016 a 2018 (consolidación). Fueron recopiladas las variables: causas del auxilio, día de la semana, horario, lugar del incidente, recurso enviado y caracterización de la víctima (sexo, edad, uso de alcohol y desenlace del auxilio), con un total de 17.533 incidentes. Se excluyeron los auxilios que no se clasificaron como causas externas. Se realizó estadística descriptiva, tendencia y prueba de asociación de ji cuadrado. Fue adoptado un nivel de significación de 5 % (p-valor ≤0,001).

Resultados: La mayoría de las víctimas era de sexo masculino, con mayor prevalencia del grupo de edad de 30 a 59 años. Hubo una reducción de fallecimiento en el lugar del 41,7 % después de la regionalización. Se observó un aumento de auxilios de causas externas en las ambulancias de Soporte Vital Básico en el año 2015 con relación a 2010 (47 %), además de una reducción aproximada del 50 % del número de auxilios de Soporte Vital Avanzado. El número de asistencia conjunta de las dos ambulancias aumentó un 390 % aproximadamente.

Conclusión: La regionalización presentó un impacto importante en la calidad de la atención brindada a la población, lo que redujo la mortalidad en el lugar del incidente.

Introduction

External causes are classified as accidents or violence, which cause health injuries. They can be accidental, such as being run over, falling, poisoning, drowning, traffic accidents, or intentional, related to aggression, self-harm and homicide.[1,2]

Every day, in the world, there are 3,400 deaths from traffic accidents per day. Every year, more than 1.6 million people lose their lives due to violence. In Brazil, this number has been increasing significantly. In 2017, these numbers were the third leading cause of death among children aged zero to 9 years and the first in young adults aged 10 to 49. In 2016, there were an average of eight homicides per hour. The United Nations (UN) recognizes external causes as a public health problem worldwide.[1-5]

This growing demand requires new skills, equipment and greater arrangement of the health system, configuring as a priority in Brazil since 2003, expressing itself in the Brazilian National Policy of Emergency Care (PNAU - *Política Nacional de Atenção às Urgências*), in order to guarantee universality, equity and integrality in the care of clinical, surgical, gynecological-obstetric, psychiatric, pediatric emergencies and those related to external causes.[5-7]

Since the provision of pre-hospital care services, lacking adequate structure and trained teams were insufficient, the Ministry of Health implemented PNAU's first phase and instituted the Mobile Emergency Care Service (SAMU - *Serviço de Atendimento Móvel de Urgência*). This type of service becomes an attribution of the health area linked to a regulatory center. Until then, this service was performed by the Integrated Emergency Trauma Care Service (SIATE - *Serviço Integrado de Atendimento ao Trauma em Emergência*), which is part of the Department of Public Safety.[7-9]

SAMU of Maringá was implemented in December 2004. The regulator decides which best resource to patient, which can be a telephone guidance or referral by a care team. It had four basic support units, with an emergency vehicle driver and a nursing technician, and a SIATE rapid intervention vehicle, with a doctor, nurse and military rescue driver. Upon arrival at the scene, the team reports the situation, and support such as other ambulances, military police, or firefighter rescue trucks may be requested.[7-9]

Within the perspective of structuring according to the Unified Health System (SUS - *Sistema Único de Saúde*) guidelines, the Ministry of Health recommends that specialized and more complex services be reference for one or more smaller cities. Thus, these smaller cities must be structured to embrace patients, carry out the initial assessment and stabilization, and arrange for their transfer to the local regional reference services.[7-9]

In order to meet this recommendation and ensure access to the entire population, in August 2016, there was the regionalization of SAMU of Maringá, which came to be called SAMU of Norte

Novo, becoming responsible for structured and resolute medical regulation and organization of access to emergency services and hospital beds, of Maringá and 29 other cities, assisting a population of almost 800,000 people.[7-9]

Due to the importance that external causes began to have and due to the magnitude of the problem they represent, several studies on pre-hospital care and external causes were found.[10-13] In Brazil, there are several studies on the implementation process and characterization of SAMU care[14-16] regarding the Health Care Network.[17] However, as far as we know, no studies were found that addressed the regionalization process of an already implemented SAMU, nor were any studies that used trend analysis to monitor the impact on the number of visits related to external causes.

This study aimed to analyze the trend and impacts caused by regionalization in emergency care for external causes performed by SAMU, before, during and after regionalization.

Methods

This is an ecological trend study of care in external causes, conducted by SAMU of Maringá/SAMU of Norte Novo, from 2010 to 2018. Data collection was performed from September 2018 to October 2019, in the SAMU of Norte Novo regulatory center, using medical care records/nursing care records and the basic support unit care record.[18,19]

The study was developed in the city of Maringá, a city in northern Paraná State, with an estimated population in 2019 of 423,666,000 inhabitants and a metropolitan region with 754,570 inhabitants. It is a city of medium to large size, being the third largest in the state and the seventh in the Southern of Brazil. It stands out for the quality of life offered to its residents.[20]

We used a data collection script composed of the following groupings of external causes: self-harm, aggression, traffic accidents, falls and other external causes (drowning, choking, burns, exogenous intoxication, electric shock and work accident). The following variables were collected from each record: day of the week, occurrence site, resource referred (Basic Life Support [BLS] unit or Advanced Life Support [ALS] unit), victim characteristics, time, sex, age, alcohol use and outcome of care (patient stabilization and referral to hospital care, death or on-site guidance/care and discharge).

Care was excluded in which the calls were not characterized as an external cause, such as convulsive crisis followed by fall.

In order to avoid selection bias and data duplication, the resources directed to the same patient were transcribed as a single information in an Excel spreadsheet and subjected to statistical treatment through a descriptive statistical summary,[18] in addition to trend analysis by the non-parametric Mann-Kendall test[19] and the chi-square association test, in order to assess associations between variables. A significance level of 5% (p-value of ≤0.001) was adopted. All analyses were performed with the help of the statistical environment R (R Development Core Team), version 3.5.[21]

As this is a trend research, it was necessary to separate the years to build historical series. As regionalization occurred in 2016, separation would be disproportionate only in pre- and post-regionalization. Furthermore, the regionalization process and political agreements began in 2013 for regionalization to be implemented in 2016. Therefore, the study was separated into three-year period: 2010 to 2012 (SAMU phase of Maringá), 2013 to 2015 (preparatory phase) and 2016 to 2018 (regionalization). When the separation of the trienniums did not change the values of the complete period of research, we opted for the total period of 2010 to 2018. The trienniums' rates were calculated according to the n of the period: from 2010 to 2012, there were 3,740 occurrences, from 2013 to 2015, 4,516, and from 2016 to 2018, 9,277 occurrences, totaling 17,533 occurrences due to external causes.[18,19]

Even with regionalization, there was no change in the number of Basic Life Support. There was only the exchange of old vehicles that were scrapped by new vehicles.

For this study, only the visits in Maringá were considered so that the differences between the periods were proportional.

Ethical issues were observed, and the study was developed in accordance with Resolution 466 of December 12, 2012. The research project was submitted to assessment by the Institutional Review Board of the *Universidade Estadual de Maringá*. It was approved and received a favorable opinion of number 3,071,844 (CAAE (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 02200918.4.0000.0104). As the data came from the SAMU database, the Informed Consent Form was waived.

Results

During the study period, 17,533 forms related to external causes assisted by SAMU were investigated, divided into three-year periods: from 2010 to 2012 there were 3,740 occurrences; From 2013 to 2015, there were 4,516, and from 2016 to 2018, 9,277 occurrences. No case losses were observed; however, some data were incomplete and, to minimize it, they were searched on the internet and on local news sites (sex, age, time, outcome of the event and nature). Table 1 presents the service attendance arrangement in relation to sex, age group, nature and outcome of occurrences assisted by SAMU, 2010 to 2018. There was an increase in service from the 2010 to 2012 triennium to the 2013 to 2015 triennium (20.74%), and in the 2016 to 2018 triennium, the increase was 105% compared to the previous one. Regarding sex, the most prevalent was male. However, there was a drop in these services from the first to the second triennium of 6.5%, and from the second to the third triennium, of 2.4%.

On the other hand, there was an increase in the number of women assisted over the trienniums. From the first to the second triennium, the increase was 17.7%, and from the second to the third triennium, 5.0%.

The highest prevalence of service was observed in the age group from 30 to 59 years, remaining constant throughout the study period (40.0%). In the 15 to 29 age group, there was a drop in the number of services. From the first to the second triennium, the fall was 9.6%, and from the second to the third triennium, 4.0%.

Table 1. Services for external causes by the Mobile Emergency Care Service in the trienniums according to sex, age, nature of service and outcome of victims

Variable	1st triennium 2010-2012 (n=3,740) n(%)	2nd triennium 2013-2015 (n=4,516) n(%)	3rd triennium 2016-2018 (n=9,277) n(%)	Study period 2010-2018 (n=17,533) n(%)
Sex				
Male	2693(72.0)	3039(67.3)	6098(65.7)	11830(67.4)
Female	1041(27.8)	1.476(32.7)	3173(34.2)	5690(32.5)
Not recorded	6(0.2)	1(0.0)	6(0.1)	13(0.1)
Age group, years				
0-7	218(5.9)	289(6.4)	617(6.7)	1124(6.4)
8-14	157(4.2)	208(4.6)	381(4.1)	746(4.2)
15-29	1369(36.6)	1.497(33.1)	2947(31.8)	5813(33.2)
30-59	1474(39.4)	1.821(40.3)	3751(40.4)	7046(40.2)
60 and older	503(13.4)	676(15.0)	1504(16.2)	2683(15.3)
Not recorded	19(0.5)	25(0.6)	77(0.8)	121(0.7)
Nature of service				
Accidents	1543(41.3)	1667(37.0)	3514(37.9)	6724(38.4)
Falls	796(21.2)	1066(23.6)	2332(25.1)	4194(23.9)
Aggression	516(13.8)	573(12.7)	1038(11.2)	2127(12.1)
Self-harm	305(8.2)	390(8.6)	724(7.8)	1419(8.1)
Others	572(15.3)	805(17.8)	1657(17.9)	3034(17.3)
Not recorded	8(0.2)	15(0.3)	12(0.1)	35(0.2)
Outcome				
Hospital	2.501(66.9)	2976(65.9)	6044(65.2)	11521(65.9)
ECU	517(13.8)	804(17.8)	1877(20.2)	3198(18.2)
LMI	241(6.5)	233(5.2)	351(3.8)	825(4.7)
Refusal	147(3.9)	219(4.8)	553(5.9)	919(5.9)
Discharge in-site	11(0.3)	1(0.0)	14(0.2)	26(0.1)
Others	1(0.0)	0(0)	10(0.1)	11(0.1)
Not recorded	322(8.6)	283(6.3)	428(4.6)	919(5.1)

Results expressed as n (%); ECU - Emergency Care Unit; LMI - Legal Medical Institute

The third most affected age group was 60 years or older, with an increase of 12% in relation to the first and second triennium and of 8% from the second to the third triennium. There was also an 8% increase in services in the age group from zero to 7 years between the first and second triennium, and 4.7%, from the second to the third triennium. The services in the age group from 8 to 14 years old remained stable over the triennium.

As for the nature of external causes, there was no change in the services over the years. As for the outcome, there was a decrease over the years of referrals to the Legal Medical Institute (death on the spot) of 20% between the first and second triennium, and 26.9% between the second and third triennium.

Regarding the age distribution, over the 9 years studied, there was a wide range in age, indicating that the data had asymmetry, in addition to a significant frequency of consultations in children un-

Table 2. Descriptive analysis and association test between variables and nature of service provided by the Mobile Emergency Care Service

Variable	Nature						p-value*
	Accident n(%)	Aggression n(%)	Self-harm n(%)	Falls n(%)	Others n(%)	Not recorded n(%)	
Age, years							<0.001
≤18	832(12)	234(11)	201(14)	751(18)	937(31)	10(29)	
19-59	5267(78)	1792(84)	1148(81)	1794(43)	1742(58)	19(54)	
≥60	560(8)	87(4)	65(5)	1634(39)	331(11)	6(17)	
Sex							<0.001
Male	4930(73)	1710(80)	673(47)	2491(59)	1998(66)	25(71)	
Female	1794(27)	415(20)	745(53)	1700(41)	1026(34)	10(29)	
Not recorded	8(0)	1(0)	1(0)	3(0)	3(0)	0(0)	
Alcohol consumption							<0.001
No	2771(41)	1009(47)	1045(74)	3521(84)	2381(79)	10(29)	
Yes	3959(59)	1115(52)	374(26)	668(16)	644(21)	25(71)	
Not recorded	2(0)	2(0)	0(0)	5(0)	2(0)	0(0)	
Time							<0.001
Early morning	703(10)	496(23)	185(13)	307(7)	399(13)	5(14)	
Morning	1284(19)	274(13)	244(17)	1207(29)	670(22)	9(26)	
Afternoon	2028(30)	392(18)	451(32)	1525(36)	933(31)	11(31)	
Night	2274(34)	862(41)	484(34)	1033(25)	915(30)	4(11)	
Not recorded	443(7)	102(5)	55(4)	122(3)	110(4)	6(17)	
Outcome							<0.001
LMI	280(34.0)	320(38.8)	136(16.5)	23(2.8)	61(7.4)	5(0.5)	
Hospital	5128(44.5)	1354(11.8)	396(3.4)	3142(27.3)	1227(10.7)	274(2.3)	
ECU	86(2.7)	262(8.2)	771(24.1)	709(22.2)	1362(42.5)	8(0.3)	
Others	2(18.2)	0*	3(27.3)	6(54.5)	0(0)*	0(0)*	
On-site discharge	3(11.5)	5(19.2)	3(11.5)	10(38.5)	4(15.4)	1(3.9)	
Refusal	291(31.7)	93(10.2)	69(7.5)	204(22.3)	242(26.3)	17(2.0)	
Not recorded	614(59.4)	101(9.8)	48(4.6)	111(10.7)	113(11.0)	46(4.5)	
Series Tau	0.016	0.72	0.65	0.56	0.59	0.38	
p-value*	0.016†	0.009†	0.021†	0.048†	0.036*†	0.203†	
Direction‡	↑	↑	↑	↑	↑	*	

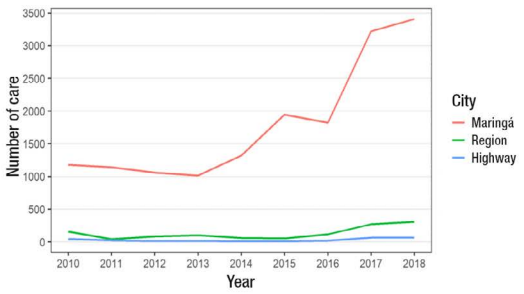
Results expressed as n (%), when not stated otherwise; *Non-significant association; †significance level p≤0.05; ‡ direction of increasing trend in the Mann-Kendall test; ECU - Emergency Care Unit; LMI - Legal Medical Institute

der 5 years of age. There was also a relationship between the variables, although not linear, since the most common age was around 20 years old, and, as age increased, the number of services decreased. Spearman's correlation test showed a statistically significant association, with p-value ≤0.001 between age and number of services.

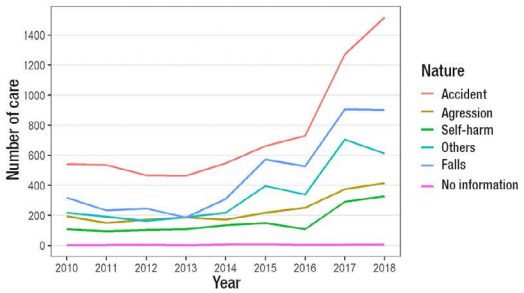
The mean age was 36.6 years (standard deviation ±20.9). The minimum age was zero years (3 days of life), and the maximum was 104 years.

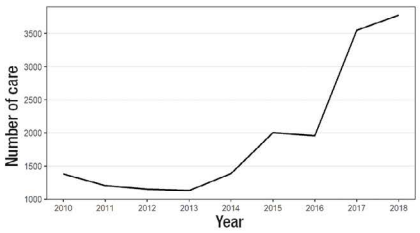
Table 2 presents the summary of descriptive statistics, with the crossing of variables of interest and nature of service. A significant association was observed between the age of the victims assisted and the nature of service (p-value <0.001).

Regarding age, most accidents, assaults and self-harm (78%, 84% and 81%, respectively) were among individuals aged 19 to 59 years. As for falls, approximately 40% of them occurred in older adults (≥60 years); more than 31% of other types occurred in individuals up to 18 years of age. Women predominated only in cases whose nature was of self-harm; in the other variables, men were the most prevalent. Still in self-harm, there was no use of alcohol in 74% of these services. Aggressions and traffic accidents accounted for more than 70% of the services with death in the place (Legal Medical Institute) carried out by SAMU. The highest mortality rate at the occurrence site was in the age group from 15 to 29 years (6.0%). The second highest rate was 5.23%, with the age group from 30 to 59. More than half of accidents and aggressions had alcohol consumption reported by the team that cared for the victims. The number of services for external causes performed by SAMU in Maringá showed an upward trend, especially between 2016 and 2017. For all natures (types of occurrences), the series of service showed a significant trend, being



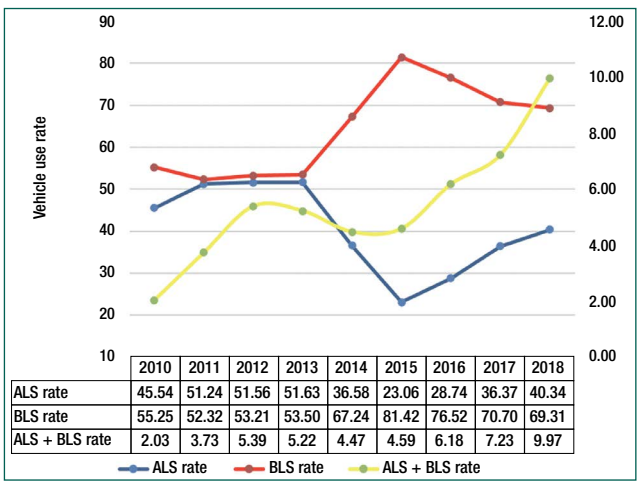
Series	Tau	*p-value*	Direction
City			
Maringá	0.61	0.029*	↑
Region	0.39	0.175	-
Highway	0.11	0.752	-
General	0.61	0.029*	↑





*p-value ≤0.05; ↑ rising trend direction in the Mann-Kendall test; - non-significant association

Figure 1. Trend in the number of annual care as to nature and location of SAMU of Norte Novo's service nature and site



	2010	2011	2012	2013	2014	2015	2016	2017	2018
ALS rate	45.54	51.24	51.56	51.63	36.58	23.06	28.74	36.37	40.34
BLS rate	55.25	52.32	53.21	53.50	67.24	81.42	76.52	70.70	69.31
ALS + BLS rate	2.03	3.73	5.39	5.22	4.47	4.59	6.18	7.23	9.97

ALS - Advanced Life Support; BLS - Basic Life Support

Figure 2. Service fee per vehicle used in SAMU of Norte Novo

all positive, indicating an increase in the number of services over time. According to the Tau trend coefficient, the strongest growth was observed for cases of aggression, accident and self-harm (Figure 1).

Throughout the entire period studied, only the services provided in Maringá showed trend to rise after regionalization. The services provided in the region and on the highway were stable. Regionalization did not present a significant change in the number of services on the highway and in the region. Figure 2 shows the increase in services of external causes in Basic Life Support ambulances in 2015 compared to 2010 (47%). On the other hand, there was a decrease of approximately 50% in the number of Advanced Life Support services. These Advanced Life Support and Basic Life Support rates were inversely proportional. The number of joint care of the two ambulances increased approximately 390%.

Discussion

This is one of the few studies that addresses the transition over time of a SAMU regionalization process and points out epidemiological changes in the service provided to the population.

The problem of external causes is complex and multifactorial, and control strategies must involve public actions and policies. For this, epidemiological knowledge is of unique importance, and SAMU was considered essential for the formation of the emergency network and the drop of mortality,[8] which corroborates the data found in this research. In the first triennium studied, underfunding was evidenced due to the difficulty in keeping the fleet running.[13,16] The vehicle fleet gets very bad long before its renewal, which occurs, on average, every 4 years.[16,17]

Due to regionalization, already scrapped old vehicles were replaced by new ones, preventing the ambulances from being constantly stopped for maintenance and with the four Basic Life Support units ready for service. There was an increase in the number of occurrences during the second and third triennium studied. This happened due to service organization and public sector support, as public management became closer to the service and had greater clarity of the real need and difficulties faced. This increase in services reached 105%. This number is higher when compared only to the BLS unit – they were the ambulances with the greatest wear, i.e., when exchanging old ambulances for new and functioning ones, the service dropped by 157.6%. Such data show how important regionalization was for SAMU and especially for the population assisted.

Another important factor was team training, which started to be more stimulated, in addition to protocol institution of protocol and material implementation. This directly impacts mortality at the event site.[22] This study showed a decrease of approximately 47% in mortality at the point of care, proving that with a regulator and trained Basic Life Support (BLS) and Advanced Life Support (ALS) teams, with an adequate structure, the outcome is much better.[16,22]

Faster service avoids patient aggravation at the occurrence site.[16,22] The importance of BLS service to minimize these problems is highlighted. The increase in BLS service, the decrease in ALS of approximately 50% in the number of services and the decrease in mortality at the occurrence site reinforce this statement. Basic support trained and equipped saves many lives[22]

Also, regionalization brought a very large increase in the number of services in the city. This is due to the fact that SAMU has a new fleet of vehicles and, thus, can take on all types of occurrences. Prior to regionalization, preferably, SAMU treated clinical patients, and SIATE treated events involving trauma; however, once there is a trained, qualified team and functioning ambulances, it is possible to assist all types of occurrences, regardless of the cause. This separation in the pre-hospital service provided to the population could bureaucratize the system.[14]

The high prevalence of male care observed in this study is related to the fact that men are more exposed to the risk of external causes, which are influenced by lifestyle. However, this study showed an increase in the number of external causes in women (16.9%). As women enter the job market, there is an approximation of a male lifestyle, with greater exposure to risks, resulting in a reduction in care and mortality differences.[12,23,24]

The age of patients treated by SAMU for external causes was wider than that found in the literature,[13,25] ranging from 3 days to 104 years, with a mean of 36.6 years. These data differ from those found in other studies, since the age group with the highest prevalence was between 30 and 59 years, while the literature points to the group between 15 and 29 years. This may be related to the fact that the study focused on all external causes, and that found in the literature assessed one or more causes. When only mortality from external causes is analyzed, the age group is the same as that found in the literature (15 to 29 years).[3,11,13]

Another important finding was the increase in care in the age groups from zero to 7 years and 60 years and over. Accidents and violence in childhood include peculiarities, and this increase in external causes in this age group in Maringá should be better studied, considering the difference found in other studies.[26-28]

As for the nature of the external causes that generated a call to SAMU, they were traffic accidents, falls, aggressions and self-harm, with aggression and accidents having the highest mortality, contrary to other records.[12,26,29] Regarding aggression, this phenomenon may be related to the internalization of violence[28,30] and the fact that Maringá has a good Human Development Index (0.808),[20] placing it as one of the best cities in Brazil to live in.[31]

Falls accounted for 23.9% of the total number of services in the period. The increase in the second and third trienniums may be due to the increase in civil construction, in which many of these events occurred, with a high mortality rate.[20]

The main limitation of this study involved the use of secondary databases, since the information is related to the correct completion of the first re-

sponders' care records, medical care records and nursing care records. However, to minimize errors, all occurrences were read and classified by the researcher.

Finally, this study presented important data on SAMU regionalization, through an analysis of victim characteristics and evolution of care, over a period of 9 years, in order to provide subsidies for decision-making in terms of public management. There was significant impact on the quality of care provided to the population, resulting in a decrease in mortality at the occurrence site.

The increase in the number of SAMU services and the decrease in mortality mean that more patients arrive at the hospital. This may have caused an overload for hospitals, which were not adequately prepared. A broader study on this impact is suggested.

Conclusion

Regionalization brought a significant decrease in mortality at the occurrence site, which was very important for the population assisted. Moreover, it serves as a parameter to enable targeting of actions and provide subsidies for managers in the construction of public policies. The increase in the care provided by BLS and ALS teams showed that SAMU, working with greater partnership, adequate equipment and ambulances and better technical preparation, also contributed to reducing mortality at site. The increase in services for external causes in the age group under 7 and over 60 years old shows that managers have to look at this population and devise strategies to prevent such numbers from continuing to increase.

Collaborations

Souza MP, Pelosso SM, Riedo CO, Salvarani WS, Oliveira NLB and Carvalho MDB declare that they contributed to study design, data analysis and interpretation, article writing, relevant intellectual content and approval of the final version to be published.

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