Cogitare Enfermagem

ORIGINAL ARTICLE

FACTORS ASSOCIATED TO MORTALITY IN HOSPITALIZED PATIENTS DUE TO EXTERNAL CAUSES

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ABSTRACT
Objective: To analyze the factors associated to mortality in hospitalized patients due to external causes, according to the characteristics of the individuals, the injuries and hospitalizations.
Method: Cross-sectional study based on secondary data from medical records of patients admitted to a general hospital in Bahia who died from external causes. Data was analyzed through descriptive statistics, and for verification of the factors associated with hospital mortality Pearson's Chi-square test was performed.
Results: There were 5,537 hospitalizations due to external causes at the referred hospital from 2009 to 2013, of which 192 (3.7%) evolved to death. There was an association between hospital deaths and the variable: age group (p = 0.001), city where the injury/violent act occurred (p = 0.018), type of external causes (p = 0.001), injury nature (p = 0.018), body segment (p = 0.001) and day of the week (p = 0.005).
Conclusion: Identification of the factors associated with hospital mortality from external causes may contribute to the development of actions and measures that reduce and prevent such deaths.

DESCRIPTORS: External causes; Accidents; Violence; Hospital Mortality.

HOW TO REFERENCE THIS ARTICLE:
Silva VAC, Nery AA, Oliveira J da S, Carmo EA, Constâncio TO de S, Rios MA, et al. Factors associated to mortality in hospitalized patients due to external causes. Cogitare enferm. [Internet]. 2019 [access "insert day, monh and year"]; 24. Available at: http://dx.doi.org/10.5380/ce.v24i0.61545.

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ARTIGO ORIGINAL / ARTÍCULO ORIGINAL

FATORES ASSOCIADOS À MORTALIDADE HOSPITALAR POR CAUSAS EXTERNAS

RESUMO

Objetivo: analisar os fatores associados à mortalidade hospitalar por causas externas, segundo as características do indivíduo, dos agravos e das internações.
Método: estudo transversal, oriundo de dados secundários dos prontuários das vítimas de causas externas internadas em um hospital geral na Bahia. Os dados foram analisados por meio da estatística descritiva e para verificação dos fatores associados à mortalidade hospitalar utilizou-se o teste Qui-quadrado de Pearson.
Resultados: identificou-se 5.537 internações por causas externas no referido hospital, no período de 2009 a 2013, das quais 192 (3,7%) evoluíram para óbito. Verificou-se associação do óbito hospitalar com as variáveis: faixa etária (p=0,001), município de ocorrência (p=0,018), tipo de causas externas (p=0,001), natureza da lesão (p=0,018), segmento corporal (p=0,001) e dia da semana (p=0,005).
Conclusão: a identificação dos fatores associados à mortalidade hospitalar por causas externas poderá contribuir para a definição de ações e medidas que reduzam e previnam esses óbitos.

DESCRITORES: Causas externas; Acidentes; Violência; Mortalidade Hospitalar.

FACTORES ASOCIADOS A LA MORTALIDAD HOSPITALARIA POR CAUSAS EXTERNAS

RESUMEN:

Objetivo: Analizar los factores asociados a la mortalidad hospitalaria por causas externas según las características del individuo, las complicaciones y las internaciones.
Método: Estudio transversal basado en datos secundarios en historias clínicas de víctimas de causas externas internadas en hospital general de Bahia. Datos analizados mediante estadística descriptiva. Para verificación de factores asociados a la mortalidad hospitalaria, se aplicó test Chi-cuadrado de Pearson.
Resultados: Se identificaron 5.537 internaciones por causas externas en el citado hospital entre 2009 y 2013, de las que 192 (3,7) derivaron en fallecimientos. Se verificó asociación del fallecimiento hospitalario con las variables: faja etaria (p=0,001), municipio de ocurrencia (p=0,018), tipo de causas externas (p=0,001), naturaleza de la lesión (p=0,018), segmento corporal (p=0,001) y día de la semana (p=0,005).
Conclusión: Identificar los factores asociados a la mortalidad hospitalaria por causas externas contribuirá a definir acciones y medidas de reducción y prevención de tales decesos.

DESCRIPTORES: Causas Externas; Accidentes; Violencia; Mortalidad Hospitalaria.

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INTRODUCTION

External causes are leading causes of morbidity and mortality worldwide and have become a major public health problem[1]. External causes were defined by the World Health Organization (WHO) as intentional injuries, e.g. occurrences related to assaults, homicides, suicides, deprivation or neglect, and unintentional injuries, e.g. traffic accidents, drowning, falls, burns, among others. Accidents are considered external causes and are described as avoidable events that generate physical and/or emotional injuries, as well as violence, described as actions carried out by individuals, which can also lead to several types of damage[2].

According to the WHO, in 2012 Brazil had a homicide rate of 32.4/100 thousand inhabitants, ranking 11th in the world, higher than in countries like Bahamas (32.1), Haiti (26.6%) and Mexico (22.0)[3]. n 2012, external causes accounted for 12.9% of the country's mortality rate, and were considered the third main cause of deaths, with homicides being the leading external cause of death (37.1%), followed by traffic accidents (30 .3%) and suicides (6.8%). The other deaths were caused by drowning and other causes[1].

In 2016, external causes accounted for 155,861 deaths in Brazil, particularly of male individuals (82.23%) aged 20-39 years (42.74%) who lived in the Southeastern Region 35%, followed by the Northeastern region with 32.66% of the cases[4].

Depending on the severity of the injuries, the victims seek health care units to obtain outpatient care, hospitalization and rehabilitation. These injuries result in high hospitalization rates and a large number of survivors have physical and psychological sequelae, which may be temporary and/or permanent, and sometimes lead to death[5].

Identification of the factors (sociodemographic profile or characteristics associated with the injuries) that contribute to the progressive growth of different types of external causes is essential. In epidemiological analysis, this characterization is a key tool for determining the population groups at higher risk, in order to implement prevention actions.

Given the growing number of hospital deaths due to external causes, it is of utmost importance to recognize the magnitude and severity of the problem, to analyze the prevalent diseases, in order to provide guidance on health surveillance actions and support to public policies aimed to reduce and prevent the occurrence of such deaths. In view of the aforementioned, the present study aimed to analyze the factors associated with hospital mortality due to external causes, according to the characteristics of the individual, injuries and hospital admissions.

METHOD

Cross-sectional study that originated from the project "Morbimortality due to external causes in a public hospital in the hinterland of Bahia". Data was collected from medical records of individuals hospitalized due to injuries from some types of external causes in the 2009-2013 period.

The study field was Hospital Geral Prado Valadares (HGPV), located in the city of Jequié, Bahia, in the southwest of the state, 365 km far from capital Salvador. Jequié is an urban area with high traffic density, which is crossed by main highways, such as BR-116 and BR-330. HGPV is one of the main centers for referral in emergency services of the hinterland of the state of Bahia that covers more than 25 municipalities[6].

The hospital provides services exclusively under the Unified Health System (SUS), offering medium and high complexity services. There are 275 hospital beds in the following units: Internal Medicine, Clinical Surgery, Neurological Surgery, Pediatrics, Psychiatry,

Intensive care, as well as urgent and emergency services [7].

The study population consisted of 5,537 individuals admitted to the HGPV from 2009 to 2013 due to injuries from external causes and died. Care provided to individuals assisted at the emergency sector of the hospital and did not require hospitalization, as well the deaths of individuals at the crash/accident/violent act scene were not considered.

The data collection instrument was developed by the researchers. The study variables included sociodemographic characteristics: gender, age, marital status, ethnicity, city of residence; characteristics related to the injury/violent act: location (city), place, type of external cause, injury nature, body segment; and characteristics related to hospitalization: day of the week, shift, length of hospital stay and evolution.

Descriptive statistics was used for data analysis, and data was presented in absolute and relative frequencies. Subsequently, the factors associated with hospital death by external causes was analyzed through bivariate analysis between the dependent variable (death) and the independent variables (other variables of the study). For this purpose, Chi-square test was used for comparison of the percentages of cases that led and did not lead to death.

Fisher's Exact Test was considered in cases where the expected frequency of the contingency tables was ≤ 5. As to the level of statistical significance, $p < 0.05$ was used. Data was tabulated and analyzed through the Statistical Package for Social Sciences (SPSS), version 21.

The present study was approved by the Research Ethics Committee of Universidade Estadual do Sudoeste da Bahia (CEP/ UESB), according to Resolution 466/2012[8], of the National Health Council, under protocol no 069/2010.

RESULTS

In the analyzed period, there were 5,537 hospitalizations due to external causes. Regarding the socio-demographic characteristics, there were 4,069 (73.7%) men, aged 20-39 years: 2,137 (38.7%), non-white: 1,195 (92.1%), unmarried: 1,253 (69.3%) and who lived in the city of Jequié: 2,865 (51.8%), according to Table 1.

Table 1 – Sociodemographic characteristics of individuals who died from external causes assisted at Hospital Geral Prado Valadares from 2009 to 2013. Jequié, BA, Brazil, 2018 (continues)

Variable	N	%
Gender (n= 5.523)		
Male	4,069	73.7
Female	1,454	26.3
Age range (in years) (n= 5.529)		
0-19	1,382	25
20-39	2,137	38.7
40-59	1,165	21
60 or older	845	15.3
Ethnicity (n= 1.297)		
White	102	7.9

Non-white	1,195	92.1
Marital status (n= 1.807)		
Married	554	30.7
Unmarried	1,253	69.3
City of residence (n= 5.532)		
Jequié	2,865	51.8
Others	2,667	48.2

Source: Authorization form for hospital admission (AIH) from Hospital Geral Prado Valadares. * Ignored cases were excluded

Regarding the city of residence, 1,915 (34.6%) individuals lived in Jequié, and the main place of occurrence of the injury/violent acts were the streets: 845 (55.2%) individuals. As for the types of external causes, there were 2,068 ground transportation accidents (41.3%), and of these, motorcycle accidents accounted for 1,235 (64.1%) of the hospitalizations.

In the majority of cases, the nature of the injury resulted in trauma: 4,003 (83.3%) and the body segment most affected were the upper and lower limbs: 3,127 (60.4%). The highest rate of hospitalizations occurred on weekdays 3,676 (68.1%) during daytime: 2,042 (59%). The time spent in the unit in most cases was up to 5 days: 2,775 (50.2%), and 4,831 (90.1%) were discharged from hospital and 192 (3.7%) died, according to Table 2.

Table 2 – Distribution of the characteristics of occurrences and hospital admissions of individuals affected by external causes assisted at Hospital Geral Prado Valadares, 2009-2013. Jequié, BA, Brazil, 2018 (continues)

Variable	**n**	**%**
City where the injury/violent act occurred (n= 5.532)		
Jequié	1,915	34.6
Others	3,617	65.4
Place where the injury/violent event occurred (n= 1.531)		
At home	553	36.1
In the street	845	55.2
Others	133	8.7
Type of external causes (n= 5.018)		
Ground transportation accident	2,068	41.3
Falls	1,501	29.9
Violence	735	14.6
Others	714	14.2
Ground transportation accident (n= 1.926)		
Car passenger	345	17.9
Motorcyclist	1,235	64.1
Cyclist	111	5.8
Pedestrian	230	11.9
Others	5	0.3

Injury nature (n= 4.807)		
Trauma	4,003	83.3
Other injuries	804	16.7
Body segment affected (n= 5.180)		
Head/neck	933	18
Thorax/abdomen	575	11.1
Upper and lower limbs	3,127	60.4
Multiple Segments	545	10.5
Day of the week (n= 5.394)		
Weekdays	3,676	68.1
Weekend	1,718	31.9
Shift (n= 3.459)		
Night	1,417	41
Day	2,042	59
Length of stay (n= 5.523)		
Up to 5 days	2,775	50.2
> 5 days	2,748	49.8
Evolution (n= 5.308)		
Discharge	4,831	91
Admission	7	0.1
Evasion	60	1.1
Death	192	3.7
Transfer	218	4.1

Source: Authorization form for hospital admission (AIH) from Hospital Geral Prado Valadares.
* Ignored cases were excluded.

Table 3 shows the distribution of hospitalizations due to external causes, according to specific causes, gender and age group. Ground transportation accidents were the most frequent occurrences, with 2,068 (41.3%) of the cases, followed by falls: 1,501 (29.9%) of the individuals. The number of hospitalizations due to external causes was higher in males, with the prevalence of ground transportation accidents: 1,655 (45%). The rate of hospitalizations due to falls: 611 (45.9%) and other types of external causes: 209 (15.7%) were higher in women compared to men.

Table 3 – Admissions by type of external causes, according to the specific cause, gender and age of the individuals assisted at Hospital Geral Prado Valadares, 2009-2013. Jequié, BA, Brazil, 2018 (continues)

Type of External Causes*	**TOTAL**		**GENDER***				**AGE RANGE***							
			Male		**Female**		**0-19 years**		**20-39 years**		**40-59 years**		**60 or older**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Ground Transportation Accident	2,068	41.3	1,655	45	413	31	384	31.3	1,099	55.9	452	42.9	132	17.2

Falls	1,501	29.9	890	24.2	611	45.9	476	38.8	223	11.3	278	26.4	523	68.1
Violence	735	14.6	635	17.3	99	7.4	132	10.7	431	21.9	130	12.4	41	5.3
Others	714	14.2	501	13.5	209	15.7	235	19.2	214	10.9	193	18.3	72	9.4
TOTAL	5018	100	3681	100	1332	100	1227	100	1967	100	1053	100	768	100

Authorization form for hospital admission (AIH) from Hospital Geral Prado Valadares. * Ignored cases were excluded.

The highest rate of hospitalizations due to ground transportation accidents was observed in the age group of 20-39 years: 1,099 (55.9%) and 40-59 years: 452 (42.9%). Falls were more frequent in the age groups of 0-19 years (476, 38.8%) and 60 years or older (n = 523, 68.1%).

In the present study, 192 deaths (3.7%) occurred in the hospital environment due to external causes. Table 4 shows the results of the analysis of association between sociodemographic aspects and hospital deaths due to external causes. The results showed a statistically significant relationship with the age group variable (p = 0.001), and the death rate was higher in the age group of 60 years or older, corresponding to 60 (7.4%). It can be seen that the percentage of deaths decreases in the lower age groups.

Table 4 – Sociodemographic factors associated with hospital mortality due to external causes, 2009-2013. Jequié, BA, Brazil, 2018

Independent variables	**Deaths**		**p-value***
	Yes n (%)	**No n (%)**	
Gender (n= 5.299)			
Male	145 (3.7)	3,773 (96.3)	0.611**
Female	47 (3.4)	1,334 (96.6)	
Age range (in years) (n= 5.305)			
0-19	15 (1.1)	1,319 (98.9)	0.001**
20-39	70 (3.4)	1,977 (96.6)	
40-59	47 (4.2)	1,069 (95.8)	
60 or older	60 (7.4)	748 (92.6)	
Marital Status (n= 1.704)			
Married	16 (3)	515 (97)	0.591**
Unmarried	30 (2.6)	1,143 (97.4)	
Ethnicity (n= 1.206)			
White	2 (2)	96 (98)	0.698***
Non-white	20 (1.8)	1,088 (98.2)	
City of residence (n= 5.308)			
Jequié	100 (3.6)	2,646 (96.4)	0.921**
Others	92 (3.6)	2,470 (96.4)	

Source: Authorization form for hospital admission (AIH) from Hospital Geral Prado Valadares.
* Ignored cases were excluded. ** Pearson's Chi-square test *** Fisher's Exact Test

Regarding the characteristics of the injuries and hospitalizations, there was an association between hospital deaths due to external causes and the variables: city of occurrence of the injury/violent act (p = 0.018), types of external causes (p = 0.001), injury nature (p = 0.018), body segment (p = 0.001) and day of the week of hospitalization (p = 0.005) (Table 5).

Table 5 – Factors associated with hospital mortality due to external causes according to the characteristics of occurrences and hospitalizations, 2009-2013. Jequié, BA, Brazil, 2018

Independent variables	**Deaths**		**p-value***
	Yes n (%)	**No n (%)**	
City where the injury/violent act occurred (n= 5.308)			
Jequié	82 (4.4)	1,762 (95.6)	**0.018****
Others	110 (3.2)	3,354 (96.8)	
Place (n= 1.484)			
At home	28 (5.2)	510 (94.8)	0.409***
In the street	37 (4.5)	780 (95.5)	
Others	3 (2.3)	126 (97.7)	
Type of External Causes (n= 4.838)			
Ground transportation accident	72 (3.6)	1,914 (96.4)	**< 0.001****
Falls	59 (4.1)	1,379 (95.9)	
Violence	45 (6.3)	672 (93.7)	
Others	9 (1.3)	688 (98.7)	
Injury nature (n= 4.675)			
Trauma	158 (4.1)	3,732 (95.9)	**0.018****
Other injuries	18 (2.3)	767 (97.7)	
Body segment (n= 4.983)			
Head/Neck	83 (9.3)	811 (90.7)	**< 0.001****
Thorax/abdomen	23 (4.2)	531 (95.8)	
Upper and lower limbs	41 (1.4)	2,957 (98.6)	
Multiple Segments	38 (7.1)	499 (92.9)	
Day of the week (n= 5.197)			
Weekdays	111 (3.2)	3,412 (96.8)	**0.005****
Weekend	79 (4.7)	1,595 (95.3)	
Shift (n= 3.363)			
Night	67 (4.8)	1,319 (95.2)	0.240**
Day	79 (4)	1898 (96)	
Length of stay (n= 5.308)			
Up to 5 days	100 (3.8)	2,549 (96.2)	0.539**
> 5 days	92 (3.5)	2,567 (96.5)	

Source: Authorization form for hospital admission (AIH) from Hospital Geral Prado Valadares.

* Ignored cases were excluded. **Pearson's Chi-square test *** Fisher's Exact Test

Compared to the other municipalities, Jequié had a higher rate of occurrences: 82 (4.4%), and violence (violent acts): 45 (6.3%) were the types of external causes that most resulted in death. Regarding the nature of the injury/violent act, trauma: 158 (4.1%) was the most frequent type of external cause, and the body segment most affected was the head/neck region: 83 (9.3%). The highest rate of deaths by external causes occurred in the weekends: 79 (4.7%).

DISCUSSION

Non-white unmarried men aged 20-39 years who lived in the city of Jequié were the individuals most frequently affected by different types of external causes admitted to a public hospital in the hinterland of Bahia.

Morbimortality due to external causes manifests itself through problems caused by multiple factors (individual and social). Studies conducted in the city of Diamantina, state of Minas Gerais, based on DATASUS data, corroborate the present study, in which occurrences due to external causes are more frequent in male individuals. This can be explained by the greater exposure of men to risk factors, as well as by differences in behavior, lifestyles, and cultural factors, as men tend to take more risks and be more careless than women [9-12].

The results of this study showed that the majority of occurrences affected adult individuals, specifically in the age range of 20-39 years, as it has been reported in other studies conducted in Brazil [13-14]. According to the characterization of external causes, it was also found that death rates were higher among non-white individuals who were not in a stable marital relationship, which may be justified by the fact that most of these individuals are young and then often unmarried, which has also been reported in other studies[15-16].

In this study, hospital mortality due to external causes was associated with the variables age group, city where the injury/violent act occurred, type of external cause, injury nature, body segment and the day of the week in which hospitalization occurred. There was no association between gender and death in the hospital setting, and there was no significant difference between the groups, contrasting with the findings of a study conducted in Espírito Santo [10]. However, age range was associated with hospital mortality, and the highest death rate was observed in the group of individuals aged 60 years or older, corroborating a study carried out in the city of Diamantina [9].

Mortality in the elderly population is the consequence of a series of internal and external events[17]. These deaths can be caused by the worsening of existing chronic degenerative diseases, since the elderly have reduced physical capacity and organic functional reserves, which makes maintenance of homeostatic balance and recovery of these individuals difficult. Thus, hospitalized elderly are more susceptible to death [18].

The city of Jequié had high mortality rates due to external causes related to violence. It is located in the hinterland of the state of Bahia and has an estimated population of 162,209 people as of 2017. It is a large population [19]. Some authors affirmed that the economic stagnation of capitals and metropolitan regions might be causing an urban exodus, with the consequent increase of external causes related to violence in these municipalities, in a sort of "internalization of violence" [20-21]. Therefore, more investments in security in small municipalities are necessary.

The type of external cause was also a factor associated with death, and violence prevailed. Mortality caused by violent acts is related to the tragic effects of these events on the health of the individuals, e.g. situations that result in cuts/lacerations, bruises and/or trauma. These conditions may jeopardize the health status of the individuals, resulting in serious medical condition and evolving to death [21-22].

The factors that may contribute to increase the levels of violence are socioeconomic

inequalities, deficits in public safety, lack of opportunities, human rights violations and the establishment of a prison facility in municipalities, because during holidays inmates are eligible to be released from a prison or correctional facility on parole, which facilitates escapes, stealing and consequently increases violence and crimes [23-25].

There was a statistically significant association between injury nature and body segment affected by an injury that resulted in death and trauma and head/neck region, respectively. It can be inferred that the main diagnosis and cause of the deaths was traumatic brain injury (TBI), as it compromises the structural functions of the encephalon and can lead to death. A study conducted in Recife found that most victims of TBI are economically active individuals, and trauma often evolves to brain death, reflecting a serious public health problem [26].

Corroborating other studies, the present study found that most violent events that led to the hospitalization of victims of external causes occurred in the weekends, possibly because parties, social gatherings and leisure events occur mainly on these days of the week. Also, on these days many people go to places of gatherings and busy streets where they are at higher risk of suffering violence and traffic accidents [27].

Some limitations of this study concerned the underreporting of data in the patients records analyzed, mostly regarding the sociodemographic profile of the victims, marital status and ethnicity, as well as the place of occurrence of the injury/violent event. Nevertheless, the factors associated with these events that affected the population admitted to the hospital in the city of Jequié were described based on the variables whose data was properly documented in the records.

CONCLUSION

The present study allowed to identify the factors associated with hospital mortality due to external causes, as follows: age group, city where the injury/violent act occurred, type of external cause, body segment and day of the week. When the factors associated with deaths from external causes are identified, the healthcare team and public agencies can implement strategies to improve the care delivered to the population.

It is believed that the results of this study may support measures that minimize the occurrence of deaths caused by external causes, based on intersector actions that include the elaboration and implementation of public policies, greater security and enforcement, as well as health education actions, in order to make people aware of the importance of not engaging in behaviors and/or taking actions that put their own lives and the lives of others at risk.

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Received: 05/10/2018
Finalized: 25/06/2019

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Final approval of the version to be published - VACS, AAN, JSO, EAC, TOSC, MAR, GMS
Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - VACS, AAN, JSO