Victims of traffic occurrence submitted to surgery procedures: characteristics and perioperative complications*

VÍTIMAS DE OCORRÊNCIA DE TRÂNSITO SUBMETIDAS A PROCEDIMENTOS CIRÚRGICOS: CARACTERÍSTICAS E INTERCORRÊNCIAS TRANSOPERATÓRIAS

VÍCTIMAS DE ACCIDENTE DE TRÁNSITO SOMETIDAS A PROCEDIMIENTOS QUIRÚRGICOS: CARACTERÍSTICAS Y COMPLICACIONES TRANSOPERATORIOS

Lívia Ortiz Reiniger[1], Regina Marcia Cardoso de Sousa[2], Lilia de Souza Nogueira[3], Ana Lucia Siqueira Costa[4]

ABSTRACT

This study aimed to characterize the victims of traffic occurrence submitted to anesthetic-surgical procedures according to demographics and clinical data and identify the predictors of complications during the perioperative period (hemorrhagic shock and death). A cross-longitudinal analysis developed from the consultations of patients´ records submitted to surgery at a hospital in São Paulo city. There was predominance of young, male, and motorcycle/cyclist accident victims who received prehospital support in 69 analyzed patients. The abdomen as the most severely injured region, Injury Severity Score, general and orthopedic surgeries variables showed statistically significant association with shock and death. Age was only associated with shock. In the final model, the Injury Severity Score was predictor for shock and death, and general surgery only for shock. Orthopedic surgery was a protection factor for death. These findings subsidize the surgical team in strategic planning that aims to decrease undesirable outcomes.

DESCRIPTORS

Accidents, Traffic
Wounds and Injuries
Surgery Department, Hospital
Death
Shock, Hemorrhagic

RESUMO

Esta pesquisa objetivou caracterizar as vítimas de ocorrência de trânsito submetidas a procedimentos anestésico-cirúrgicos, segundo dados demográficos e clínicos, e identificar os preditores de intercorrências no período transoperatório (choque hemorrágico ou óbito). Estudo de corte transversal desenvolvido a partir de consulta aos prontuários dos pacientes submetidos à cirurgia, no Instituto Central do Hospital das Clínicas da FMUSP. Nos 69 pacientes, predominaram os jovens, do sexo masculino, vítimas de acidentes motociclísticos/ciclísticos e que receberam atendimento pré-hospitalar. As variáveis: abdome como região mais gravemente lesada pelo Injury Severity Score e as cirurgias geral e ortopédica, apresentaram associação estatística significativa com choque e óbito. A idade associou-se apenas com choque. No modelo final, o Injury Severity Score foi preditor para choque e óbito e a cirurgia geral, apenas para choque. A cirurgia ortopédica foi fator de proteção para óbito. Esses achados subsidiam a equipe cirúrgica no planejamento de estratégicas que visem à redução de desfechos indesejados.

DESCRITORES

Acidentes de Trânsito
Ferimentos e Lesões
Centro Cirúrgico Hospitalar
Morte
Choque Hemorrágico

RESUMEN

Esta investigación tuvo como objetivo caracterizar las víctimas de accidente de tránsito sometidas a procedimientos anestésicos y quirúrgicos según datos demográficos y clínicos e identificar predictores de complicaciones en el periodo transoperatorio (choque hemorrágico o óbito). Estudio de cohorte transversal desarrollado a partir de la consulta de archivos de los pacientes sometidos a cirugía en un hospital de Sao Paulo. De los 69 pacientes, predominaron jóvenes, de sexo masculino, víctimas de accidentes de motocicleta/bicicleta y que recibieron atención prehospitalaria. Abdomen como región más gravemente lesionada, Injury Severity Score, cirugías general y ortopédica tuvieron correlación estadística significativa con choque y óbito. Edad se correlacionó apenas con choque. En el modelo final, Injury Severity Score fue predictor para choque y óbito; y cirugía general para choque. Cirugía ortopédica fue factor de protección de óbito. Estos resultados auxilian al equipo quirúrgico en el planeamiento de estrategias orientadas a la reducción de consecuencias indeseables.

DESCRIPTORES

Accidentes de Tránsito
Heridas y Traumatismos
Servicio de Cirurgía en Hospital
Muerte
Choque Hemorrágico

* Extracted from the dissertation "Caracterização da gravidade das vítimas de acidente de transporte atendidas em uma unidade de Centro Cirúrgico", the University of São Paulo School of Nursing Graduate Program in Adult Health Nursing, 2010.

[1]Master in Sciences by the Graduate Program in Adult Health at the University of São Paulo School of Nursing. RN at the Emergency Room of Hospital Geral de Pedreira Cruzada Bandeirante São Camilo. São Paulo, SP, Brazil. livia.reiniger@usp.br [2]RN. Full Professor of the Medical-Surgical Nursing Department, University of São Paulo School of Nursing. São Paulo, SP, Brazil. vian@usp.br [3]RN. Doctoral student of the Graduate Program in Adult Health Nursing, University of São Paulo School of Nursing. São Paulo, SP, Brazil. lilianogueira@usp.br [4]RN. Ph.D., Professor of the Medical-Surgical Nursing Department, University of São Paulo School of Nursing. São Paulo, SP, Brazil. anascosta@usp.br

Rev Esc Enferm USP
2012; 46(Esp):58-64
www.ee.usp.br/reeusp/

Received: 04/10/2012
Approved: 05/22/2012

Português / Inglês
www.scielo.br/reeusp

INTRODUCTION

According to the Ministry of Health, 38,469 deaths resulted from traffic accidents in Brazil in 2009. In the last four years, the number of hospital admittance processes related to this issue increased 66.2%, and healthcare service-based costs 90.5%, thus overloading the health system[1].

Traffic accidents are highlighted among transportation accident victims. The analysis of this type of event among 100 countries places Brazil on the top-10 list related to highest traffic mortality rates. Over the last decades, traffic accidents and subsequent injuries capable of generating irreversible damage or death, especially among young populations, became a social and public health problem. In the 1998-2008 decade, the figure for car passenger deaths more than doubled, the number of bicycle riders quadrupled and the mortality rate of motorcycle riders increased 754%[2].

In the perspective of Trauma Care Systems, the trauma injury has a purely surgical foundation[3] and the intraoperative period is a critical element of the treatment of trauma patients, as trauma victims are admitted into Surgery centers in an emergency situation, without adequate assessment and proper preoperative preparation, which favors the occurrence of adverse events[4] resulting from the lack of control and ability to predict the happenings.

Within this context, there has been a growing interest and concern at knowing the characteristics of traffic victims submitted to surgical procedures, as well as mapping out the risks and non-conformities in the treatment period. Thus, we sought the supporting information needed to propose interventions that are capable of strengthening the security of trauma victims during anesthetic-surgical procedures.

...there has been a growing interest and concern at knowing the characteristics of traffic victims submitted to surgical procedures, as well as mapping out the risks and non-conformities in the treatment period. Thus, we sought the supporting information needed to propose interventions that are capable of strengthening the security of trauma victims during anesthetic-surgical procedures.

In the intraoperative period, the death of trauma victims is often seen as a consequence of severe, unrecoverable injuries. Little attention has been given to this incident. Failed resuscitation, intense bleeding, delay in hemostasis, as well as the failure to recognize trauma's lethal triad – coagulopathy, acidosis and hypothermia[5-6] – are the major causes of death.

The hemorrhagic shock represents the main cause of deaths in trauma patients, either in the first minutes or hours after the trauma event[7-8], and also in the intraoperative period[5]. The volume of lost blood is directly associated with the victim's outcome; in other words, massive blood losses represent worse results[8].

Therefore, it is vital to acknowledge the characteristics of surgical patients involved in traffic accidents, analyze intraoperative death and hemorrhagic shock incidents, and identify the factors associated with these undesired outcomes in order to alert Surgery Center teams regarding major risk groups prone to such intraoperative occurrences. Additionally, knowing the characteristics of the victims affected by hemorrhagic shock and death allows for an easier understanding of the reality of these events and contributes toward the improvement of the planning and decision-making processes aimed to prevent these intraoperative complications.

Bearing such perspective in mind, the present study was aimed to characterize traffic victims submitted to anesthetic-surgical procedures according to demographic and clinical data and, in this group, identify complication predictors in the intraoperative period.

METHOD

The data for this cross-sectional, retrospective, quantitative study were collected at the Central Institute of University of São Paulo Faculty of Medicine (ICHC-FMUSP), a reference center for the care of trauma victims, located in São Paulo.

After being approved by the institution's Ethics Committee for Research Proposal Analysis (CAPPesq), the Medical File Department was asked to provide the records of patients who had been victims of general trauma and assisted at the ICHC-FMUSP emergency unit in 2008.

Following the analysis of these records, patients that met the following inclusion criteria were selected: traffic victims (pedestrians, motorcycle/bicycle riders, passengers in other types of vehicles) admitted to the ICHC-FMUSP emergency unit and forwarded to the institution's Surgery Center (SC). Individuals referred from other hospitals and those who had not finished the surgery recovery process in one of the ICHC-FMUSP units were excluded from the study.

The following dependent variables were taken into account in the association analysis: presence of hemorrhagic shock and death. The medical record related to these intraoperative complications in the patient's record was the parameter used to identify each outcome. The intraoperative period taken into account by this study begins with the time the injured victim was admitted into the SC and closes with the patient's referral to the post-anesthetic recovery process[9].

Independent variables were: age; pre-hospital care (air-based, land-based or no care); type of victim (pedestrian, motorcycle/bicycle rider or passenger in other type of vehicle); type of applied surgery (general, neurologic, thoracic, orthopedic, vascular); number of injured body regions; most seriously injured region according to the Abbreviated Injury Scale (AIS); and overall severity of the trauma calculated by the Injury Severity Score (ISS)[10].

The sample characterization process also analyzed the patients' gender and the use of blood derivatives and colloids/crystalloids in the Surgery Center.

In order to compare the groups of patients who underwent shock and those who did not, as well as fatal victims and survivors, the association analysis applied the Fisher's Exact Test for the nominal independent variables and the t-Student Test for the continuous independent variables.

The multivariable analysis was employed in order to identify complication predictor factors in the intraoperative period. In this stage, the logistical regression model was rebuilt by means of the Akaike Information Criterion (AIC) method, where independent variables displaying values of p≤0.20 in the association analysis have been included in the beginning of the modeling process and eventually withdrawn, following a descending significance order. In the end, only the independent variables that reached p≤0.05 remained. The regression model's adequacy was assessed by the Receiver Operating Characteristics (ROC) curve.

RESULTS

Considering the 451 reports handed by the Medical File Department concerning the 2008-2009 period, 69 met the inclusion criteria and thus comprised the study sample.

Table 1 shows that most patients admitted to the surgery center were male (59, 85.5%). It also points out an approximate male/female correlation of 6:1. There were 35 (50.7%) motorcycle/bicycle accident victims; 47 (68.1%) patients, received land-based pre-hospital care; 50 (58.0%) patients were submitted to orthopedic surgery, followed by general surgery (35, or 50.7%). Neurologic and thoracic surgeries accounted for less than 12% of the study sample.

Twenty-five patients (36.2%) were submitted to two or more surgical procedures. A special highlight is given to the combinations of orthopedic and general (11 cases) and orthopedic and vascular (9 cases) surgeries.

It is observed that nearly all patients (65, or 94.2%) were given crystalloid and/or colloid-based volume replacement at the surgery center. The majority of patients (39, or 56.5%) were submitted to transfusions of blood derivatives (Table 1).

Table 1 – Distributions of patients according to demographic and clinical data - São Paulo 2008

Variable	N	%
Gender		
Female	10	14.5
Male	59	85.5
Type of victim		
Motorcycle/Bicycle	35	50.7
Pedestrian	27	39.1
Passenger of other type of vehicle	7	10.2
Pre-hospital care		
Land-based	47	68.1
Air-based	20	29.0
No care	2	2.9
General surgery		
Yes	35	50.7
No	34	49.3
Neurologic surgery		
Yes	4	5.8
No	65	94.2
Thoracic surgery		
Yes	4	5.8
No	65	94.2
Orthopedic surgery		
Yes	40	58.0
No	29	42.0
Vascular surgery		
Yes	12	17.4
No	57	82.6
Use of blood derivatives at the SC*		
Yes	39	56.5
No	30	43.5
Use of crystalloids/colloids at the SC*		
Yes	65	94.2
No	4	5.8

* Surgery center. Score: (n=69)

Data on Table 2 indicate that case studies are basically comprised of young people (average age = 33.9 years old; median = 32 years old) admitted into the SC. Only three victims were over 60 years of age. As for the number of injured body regions, in accordance with the Abbreviated Injury Scale (AIS), nearly 73.0% of patients presented injuries in one or two regions. A total amount of 30 (43.5%) victims displayed ISS between 16 and 24 (moderate trauma) and 32 (46.4%) were above this interval (severe trauma). Only 7 (10.1%) patients presented ISS lower than 16 (light trauma).

Table 2 – Descriptive statistics of quantitative variables concerning the age, number of injured body regions and Injury Severity Score - São Paulo, 2008

Variable	Average(SD)	Median	Minimum	Maximum
Age	33.9 (15.3)	32	6	76
Number of injured body regions	2.0 (0.9)	2	1	4
Injury Severity Score	23.8 (9.8)	22	8	48

*SD = standard deviation

From the 69 patients analyzed at the Surgery center, 19 (27.5%) displayed hemorrhagic shock and 12 (17.4%) evolved to a death status. The total amount of patients who presented cardiopulmonary arrest died and all deaths were preceded by hemorrhagic shock.

There has been a statistically significant association between intraoperative complications (shock and death) and the following variables: general surgery, orthopedic surgery, and abdomen as the most severely injured body region. Besides these variables, the thoracic and vascular surgeries (p≤0.20) were also selected in the logistical regression analysis; the latter was selected only for the shock model (Table 3).

Table 3 – Association analysis between nominal independent variables and intraoperative complications (death, shock) - São Paulo, 2008

Variables	Categories	Shock		p*	Death		p*
		Yes	No		Yes	No	
Pre-hospital care	Air-based	8	12	0.298	5	15	0.540
	Land-based	11	36		7	40	
	No care	-	2		-	2	
Type of victim	Motorcycle/Bicycle	10	25	0.854	7	28	0.595
	Pedestrian	8	19		5	22	
	Passenger in other type of vehicle	1	6		-	7	
Neurologic surgery	Yes	2	2	0.303	1	3	0.543
	No	17	48		11	54	
General surgery	Yes	17	18	<0.001**	11	24	0.003**
	No	2	32		1	33	
Thoracic surgery	Yes	3	1	0.061***	2	2	0.137***
	No	16	49		10	55	
Orthopedic surgery	Yes	6	34	0.013**	1	39	<0.001**
	No	13	16		11	18	
Vascular surgery	Yes	1	11	0.157***	1	11	0.677
	No	18	39		11	46	
Number of injured body regions	One	3	18	0.376	2	19	0.454
	Two	9	20		7	22	
	Three	5	9		3	11	
	Four	2	3		-	5	
MSIBR** head**	Yes	4	8	0.725	2	10	1.000
	No	15	42		10	47	
MSIBR** face**	Yes	1	2	1.000	1	2	0.442
	No	18	48		11	55	
MSIBR** thorax**	Yes	4	8	0.725	3	9	0.426
	No	15	42		9	48	
MSIBR** abdomen**	Yes	12	16	0.028**	9	19	0.011**
	No	7	34		3	38	
MSIBR ** extremities**	Yes	10	29	0.788	5	34	0.340
	No	9	21		7	23	
MSIBR ** external surface**	Yes	-	2	1.000	-	2	1.000
	No	19	48		12	55	

* Fisher's Exact Test ** p≤0.05 *** p≤0.20 **** Most severely injured body region – MSIBR

In the comparison of averages, a statistically significant association was found between the presence of hemorrhagic shock and age (p=0.024) and ISS (p<0.001) variables. The highest averages between these variables were present in patients that displayed hemorrhagic shock. As for the death, only the severity of the trauma (ISS) showed relevant significance in the statistical analysis (p<0.001). The highest scores were found in the dead victim (Table 4).

Table 4 – Comparing the averages of age and Injury Severity Score variables in accordance with the intraoperative complications (death, shock) - São Paulo, 2008

Variable	Shock		p*	Death		p*
	Yes	No		Yes	No	
Age						
Average		31.36	0.024**	36.83	33.28	0.468
Standard deviation	18.71	13.10		20.80	14.01	
Injury Severity Score						
Average	32.05	20.66	<0.001**	35.83	21.26	<0.001**
Standard deviation	10.66	7.44		10.65	7.55	

* t-Student Test ** p≤0.05

In the regression model, the independent variables found to be predictors of hemorrhagic shock were the general surgery and the ISS; as for the predictor of death, only the ISS was identified as the independent variable. Patients submitted to general surgery had 10.4 times more chances of presenting hemorrhagic shock when compared with the victims who were not submitted to this type of procedure. Regarding the severity of the trauma, each extra score in the ISS enhanced in 14% the chance of generating hemorrhagic shock and 20% the death possibility. The orthopedic surgery was a protection factor against death; In other words, patients submitted to such procedure had 95% less chance of dying on the surgery compared with those submitted to other surgeries. The accuracy, according to the ROC curve, reached 88.3% for the shock model and 94.3% for the death model (Table 5).

Table 5 – Multiple logistical regression model for intraoperative complications – São Paulo, 2008

Variable	$OR_{adjusted}$	IC 95% OR
Shock		
General surgery	10.40	2.4 – 118.5
Injury Severity Score	1.14	1.06 – 1.30
Death		
Orthopedic surgery	0.05	0.00 - 0.35
Injury Severity Score	1.20	1.08 - 1.56

DISCUSSION

This present investigation showed that the demographic profile of the victims submitted to anesthetic-surgical procedures was similar to those addressed in studies that analyze trauma traffic victims. The predominance of young males was clearly observed. International studies approaching general trauma victims admitted into Surgery centers[5,11] also point out this profile of patients involved in accidents or violence.

Motorcycle and bicycle riders represented around 50% of case studies and together with pedestrians (39.1%) compose the vast majority of surgical patients. Motorcycle riders and pedestrians are the most frequent traffic victims who die or are admitted into hospitals accredited by the Unified Health System (UHS)[1]. Additionally, paired by bicycle riders, they comprehend traffic victims with the highest risk for severe injuries, given the fragility of the human body when it is exposed to a vehicle[12].

The severity of the trauma measured by the Injury Severity Score (average 23.8±15.3) was very high in the analyzed group, especially when the high frequency of patients with score ≥ 16 (89.8%) are observed. Overall, the majority of trauma victims comprehend patients with light injuries; severe and moderate cases comprise the smaller portion of trauma patients[3]. Hence, the result of the current study shows that the cases dealt with at the Surgery center present higher severity levels if compared to general trauma victims. An ISS value ≥ 16 (moderate and severe trauma) corresponds to a +10% mortality rate, and consequently demands patients to be cared for in a specialized trauma center[13].

Regarding pre-hospital care, the study observed that nearly all individuals (97.1%) were cared for on the spot; among them, 29% were transported by air. These results reaffirm the degree of severity of those who participated in this investigation, as the data provided by the Advanced Life Support of the São Paulo's Emergency Mobile Assistance System show that only 3% of the victims need to be transferred in aircrafts[14].

On the other hand, the presence of pre-hospital care may have positively influenced the results of the research in almost all the cases. The contribution of the mobile pre-hospital care toward reducing mortality rates and preventing negative consequences to trauma victims is undeniable, as it avoids late or inadequate first care[15].

The information collected with the pre-hospital care team may become plausible parameters toward precociously activating specialized team and hospital units, as shown by a study carried out in Louisville, Kentucky (US), where patients displaying hypotension at the accident scenario were more injured than those presenting stable vital signals; approximately half of these patients needed an urgent surgery. Therefore, the information on the hemodynamic status of the patient can serve as an alert for the activation of the hospital surgical team[16].

Volume replacement in trauma patients, as well as its benefits and risks, especially during the initial care process, is broadly discussed in literature. The indiscriminate use of blood derivatives or components can lead to interstitial leakage, cerebral edema, coagulopathies, hemodilution and increased bleeding, especially when hemorrhage is not controlled. The permissive hypotension technique has been currently employed in penetrating traumas prior to the surgical intervention[7]. The present study shows an intense use of blood derivatives and crystalloids/colloids. Nonetheless, the study did not aim to analyze the amount of administered volumes, but whether or not the components were used. It is worth highlighting, however, that the surgical team should be aware of the inherent risks related to aggressive resuscitation processes before controlling the bleeding.

The most frequent types of surgeries among trauma victims who took part in the research were orthopedic (58%) and general (50%) surgery. Notwithstanding, 36.2% of the sample recorded more than one surgical procedure. Polytrauma victims are frequent among those involved in traffic accidents[17] and this finding was also observed in this study (two injured body regions, in average). As a consequence, the service care provided to these patients must be prepared under the perspective of a multidisciplinary approach.

The current investigation also showed that almost all patients who presented cardiopulmonary arrest (CPA) at the surgery center died and all deaths were preceded by hemorrhagic shock. Death occurred in 17.4% of victims and the hemorrhagic shock was diagnosed in 27.5% of the analyzed cases.

Emergency surgeries, highly frequent in trauma victims, differ from elective surgeries as they present massive and uncontrollable tissue trauma situations, hypovolemia, shock, hypoperfusion and tissue hypoxia, hypothermia and in some cases consumptive coagulopathy[18]; and these differences should always be taken into account in the surgical environment, as the chance of a patient submitted to an emergency surgery to present CPA is 5.14 times higher than those submitted to elective surgeries[19]. This study also concluded that 100% of trauma victims who presented CPA in the intraoperative period eventually died[19].

Traffic victims display blunt trauma, in which the identification of the source of the bleeding is not always an easy task, thus representing a great challenge for the care team[8]. In these cases, the hypovolemic shock installs rapidly, especially in regions where a large amount of occult blood is accumulated, such as the abdomen, thorax, pelvis and long bones[7].

This exsanguination and death risk context is aggravated by the installation of trauma's lethal triad (coagulopathy, acidosis and hypothermia). In the presence of the triad, the only way to change the patient's prognostic is to interrupt this fatal cycle. For that purpose, the damage control technique, characterized by an abbreviated operation (temporary control of hemorrhage through the use of compresses), resuscitation in the Intensive Care Unit aimed to interrupt the lethal triad, and the programmed reoperation for the definite treatment of the injury is taken into account by many medical teams[6].

Such life-saving measure is grounded on the premise that the uncontrollable bleeding is related to the cardiopulmonary arrest. A study that analyzed 23 intraoperative CPAs confirmed such presupposition. Besides concluding that 52.2% of the bleeding cases were caused by CPAs, the study also found out that one of the risk factors was the emergency-based surgery of trauma victims[20].

The degree of trauma severity as established by the Injury Severity Score was a predictor of both mortality and shock. Studies have confirmed the influence of trauma severity in undesired outcomes of victims in surgical treatments. The highest death rates of victims with ISS > 25 was observed in laparotomy surgery trauma patients[21]. A similar finding concerning trauma severity was observed in a study that analyzed trauma abdominal vascular injuries[11]. Furthermore, the high average of the ISS (41) was noticed in a study that analyzed 537 intraoperative deaths in eight American hospitals[5].

A research carried out in Virginia, US, indicated that more severe victims (ISS>25) were found to be more susceptible to adverse events. The study also showed that human errors are frequently predominant at surgery centers and Emergency Departments[22]. The major failures observed in the SC were: inadequate surgical resuscitation, delay in bleeding control, and failure to identify injuries[5,22].

The general surgery was a predictor of shock and in the current investigation nearly 74% of patients submitted to such procedure presented the abdomen as the most severely injured body region. Abdominal bleeding can make way to the rapid installation of the hypovolemic shock, as this is one of the regions that most accumulates large amounts of occult blood[7]. A study that analyzed the deaths occurred at a surgery center showed that uncontrolled hemorrhage was deemed to be the major cause of death in 82% of trauma patients; the study also defined the hepatic exsanguination as a common injury[5]. Additionally, the mistakes in the identification of injuries in the surgical environment take place mainly in the abdominal, thoracic and retroperitoneal regions[5].

The submission of the patient to an orthopedic surgery was considered as a protection factor against deaths in the regression model. Prior to the surgery, the immobilization of skeletal-muscular injuries allows for the temporary control of bleeding; in general, although very severe injuries may not threaten the patient's life, they may threaten affected limbs[7].

In their vast majority, traffic accident injuries require specialized treatment and diagnosis, as they point to emergency surgical procedures. For this purpose, it is necessary to identify the predictors of intraoperative complications, as they can subsidize the surgery center's multidisciplinary team with valuable information toward organizing the strategic planning of their actions and care, aiming to avoid the occurrence of preventable events.

CONCLUSION

The characterization of the victims involved in traffic accidents and submitted to anesthetic-surgical procedures was similar to the data presented by literature concerning age and sex. However, in the great majority of cases, the degree of severity of trauma patients showed to be either moderate or severe. Motorcycle/bicycle riders and pedestrians were predominant and stand out as the most severely injured victims in the analyzed incidents. Nearly the total amount of wounded people referred to surgery received pre-hospital care and volume replacement in the surgery. Polytrauma patients were frequent among trauma victims in surgical treatments, and were predominant among traffic victims. Nearly one third of the subjects needed more than one surgical procedure and the orthopedic and general surgeries were the most prevalent among them.

Intraoperative hemorrhagic shock took place in more than one fourth of victims and the chance for such complication was more markedly seen in individuals with more severe traumas submitted to general surgery.

The mortality rate reached approximately 18% and was steadily associated with the hemorrhagic shock. The severity of the trauma stood out as a predictor of deaths. Individuals submitted to orthopedic surgery had lower chances of dying in the intraoperative period compared with subjects submitted to other surgical interventions.

The identification of the group with the highest probability of presenting intraoperative hemorrhagic shock or death can guide the multidisciplinary team working at the Surgery center toward the elaboration of preventive measures and decision-making processes aimed to reduce the occurrence of such incidents.

REFERENCES

1. Brasil. Ministério da Saúde. DATASUS. Informações de Saúde. Estatísticas de morbidade e mortalidade. Óbitos por ocorrência e internação hospitalar do SUS segundo causas externas de morbidade e mortalidade no Brasil [Internet]. Brasília; 2012 [citado 2012 abr. 11]. Disponível em: http://www2.datasus.gov.br/DATASUS/index.php?area=02

2. Instituto Sangari. Mapa da violência 2011: acidentes de trânsito [Internet]. São Paulo; 2012 [citado 2012 abr. 11]. Disponível em: http://www.sangari.com/mapadaviolencia/pdf2011/acidentes_transito.pdf

3. Committee on Trauma American College of Surgeons. Resources for optimal care of the injured patient 2006. Chicago: American College of Surgeons; 2006. Trauma systems; p. 5-15.

4. Gallotti RMD. Eventos adversos – o que são? Rev Assoc Med Bras. 2004;50(2):114-4.

5. Hoyt DB, Bulger EM, Knudson MM, Morris J, Ierardi R, Sugerman HJ, et al. Death in the operating room: an analysis of a multi-center experience. J Trauma. 1994;37(3):426-32.

6. Parreira JG, Soldá S, Rasslan S. Controle de danos: uma opção tática no tratamento dos traumatizados com hemorragia grave. Arq Gastroenterol. 2002;39(3):188-97.

7. American College of Surgeons. Advanced Trauma Life Support: student course manual. 8th ed. Chicago: American College of Surgeons; 2008. Choque; p. 55-71.

8. Kauvar DS, Lefering R, Wade CE. Impact of hemorrhage on trauma outcome: an overview of epidemiology, clinical presentations, and therapeutic considerations. J Trauma. 2006;60(6):S3-S11.

9. Castellanos BEP, Jouclas VMG. Assistência de Enfermagem perioperatória: um modelo conceitual. Rev Esc Enferm USP. 1990;24(3):359-70.

10. Association for the Advancement of Automotive Medicine. The Abbreviated Injury Scale (AIS): 1990 revision, update 2005. Illinois: AAAM; 2005.

11. Tyburski JG, Wilson RF, Dente C, Steffes C, Carlin AM. Factors affecting mortality rates in patients with abdominal vascular injuries. J Trauma. 2001;50(6):1020-6.

12. Gawryszewski VP, Coelho HMM, Scarpelini S, Zan J, Jorge MHPM, Rodrigues EMS. Perfil dos atendimentos a acidentes de transporte terrestre por serviços de emergência em São Paulo, 2005. Rev Saúde Pública. 2009;43(2):275-82.

13. Champion HR, Copes WS, Sacco WJ, Lawnick MM, Keast SL, Bain LW, et al. The Major Trauma Outcome Study: establishing national norms for trauma care. J Trauma. 1990;30(11):1356-65.

14. Malvestio MAA. Predeterminantes de sobrevivência em vítimas de acidentes de trânsito submetidas a atendimento pré-hospitalar de suporte avançado à vida [tese doutorado]. São Paulo: Escola de Enfermagem, Universidade de São Paulo; 2008.

15. Pereira WAP, Lima MADS. A organização tecnológica do trabalho no atendimento pré-hospitalar à vítima de acidente de trânsito. Ciênc Cuidado Saúde. 2006;5(2):127-34.

16. Franklin GA, Boaz PW, Spain DA, Lukan JK, Carrillo EH, Richardson JD. Prehospital hypotension as a valid indicator of trauma team activation. J Trauma. 2000;48(6):1034-9.

17. Sallum AMC, Koizumi MS. Natureza e gravidade das lesões em vítimas de acidente de trânsito de veículo a motor. Rev Esc Enferm USP. 1999;33(2):157-64.

18. Zunini-Fernández G, Rando-Huluk K, Martínez-Pelayo FJ, Castillo-Trevizo AL. Transfusión masiva y manejo del paciente traumatizado: enfoque fisiopatológico del tratamiento. Cir Cir. 2011;79(5):473-80.

19. Newland MC, Ellis SJ, Lydiatt CA, Peters R, Tinker JH, Romberger DJ, et al. Anesthetic-related cardiac arrest and its mortality: a report covering 72.959 anesthetics over 10 years from a US teaching hospital. Anesthesiology. 2002;97(1):108-15.

20. An JX, Zhang LM, Sullivan EA, Guo QL, Williams JP. Intraoperative cardiac arrest during anesthesia: a retrospective study of 218.274 anesthetics undergoing non-cardiac surgery in a US teaching hospital. Chin Med J. 2011;124(2):227-32.

21. Fraga GP, Mantovani M, Magna LA. Índices de trauma em pacientes submetidos à laparotomia. Rev Col Bras Cir. 2004;31(5):299-306.

22. Ivatury RR, Guilford K, Malhotra AK, Duane T, Aboutanos M, Martin N. Patient safety in trauma: maximal impact management errors at a Level I Trauma Center. J Trauma. 2008;64(2):265-70.

Correspondence addressed to: Ana Lucia Siqueira Costa
Av. Dr. Enéas de Carvalho Aguiar, 419 – Cerqueira Cesar
CEP 05403-000 – São Paulo, SP, Brazil