

Influence of trauma origin site on admission rates of patients submitted to emergency laparotomy.

Influência do local de origem do trauma nos índices de admissão de pacientes submetidos à laparotomia de emergência.

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ABSTRACT

Objective: to evaluate the influence of the site of trauma occurrence on the trauma scores of patients submitted to emergency laparotomy. **Methods:** this is a retrospective, observational, analytical study. We included 212 patients who underwent exploratory laparotomies in the period of January 2015 and December 2017. We obtained information about the accident site and vital data of the patients based on data collection through electronic and physical records. We analyzed the trauma indices of patients from Curitiba and its Metropolitan Region and the place where the patient was rescued (physical establishment or public road). **Results:** among the 212 patients studied, 184 (86.7%) were brought by the Prehospital Care Service from the city of Curitiba, and 28 (13.3%), from the Metropolitan Region of Curitiba. Twenty-five patients (17.6%) were rescued in physical establishments, while 117 (82.4%) were rescued on public roads. We observed higher values of Injury Severity Scores (ISS) in patients coming from the Metropolitan Region than in those coming from Curitiba (29.78 vs 22.46, $P=0.009$), but higher values of Trauma and Injury Severity Scores (TRISS) in patients from Curitiba than the ones from the Metropolitan Region (90.62 vs 81.30, $P=0.015$). Patients rescued in public roads presented lower Revised Trauma Scores (RTS) (6.96 vs 7.65, $P=0.024$) and TRISS (86.42 vs 97.21; $P=0.012$). **Conclusion:** trauma victims from sites more distant from the referral center and rescued on public roads presented worse prognosis.

Keywords: Trauma Severity Indices. Abdominal Injuries. Laparotomy. Geographical Localization of Risk. Epidemiology Descriptive.

INTRODUCTION

The evolution of rescue systems and the possibility of initiating interventions at the trauma scene have led to a significant fall in early post-traumatic mortality rates, especially in those injuries directly associated with the development of early death¹. Studies show that population density is a strong and independent predictor of a county's mortality rates^{2,3}. The time elapsed between injury and definitive treatment is important and it is reasonable to assume that the time of transport to the hospital seems to be an independent predictor of mortality. Some authors affirm that there is greater mortality in patients living in rural areas⁴. However, these

studies were mostly based on national databases, not containing anatomical and physiological data of the lesions, necessary to calculate the indices of trauma to assess the probability of survival.

One of the ways to assess the severity of trauma patients and to predict their prognoses is through the trauma scores. The main examples of trauma scores we used in the article were: Revised Trauma Score (RTS), Trauma and Injury Severity Score (TRISS) and Injury Severity Score (ISS). All scores are used to estimate survival and risk of complications, being used in the preparation of care protocols⁵⁻⁷.

Knowledge of the patients' profile is of paramount importance for the improvement of the service provided, facilitating the direction of

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public policies. Thus, this study aimed to evaluate the influence of the place of trauma occurrence on the trauma scores (ISS, RTS, TRISS) of patients submitted to emergency exploratory laparotomy in a trauma reference hospital center in the country.

METHODS

We conducted a cross-sectional, analytical, observational and retrospective data collection. We included patients who underwent exploratory laparotomy from January 2015 to December 2017. The study scenario was the Emergency Room of the Hospital do Trabalhador (HT), which admits patients who arrive at the hospital by referenced search (SIATE/SAMU). We performed data collection retrospectively from the electronic medical records, and the authors developed a specific field record for this study, which included sociodemographic data, prehospital care records, clinical data, diagnosis, treatment (surgery), postoperative, survival and trauma indices. We excluded from the study the cases of patients with inaccessible records, lack of relevant information for the research, patients younger than 18 years of age, patients who were not rescued by the prehospital care and patients who were not submitted to exploratory laparotomy.

We classified and analyzed the data collected in two different ways: the first corresponded to the trauma site (Curitiba or Metropolitan Region) and the second corresponded to the trauma scene (physical establishment or public road) in which the patient was found and assisted for the first time after trauma. By Metropolitan Region, we understood all the municipalities that, by conurbation, have become close to the Paraná's capital, Curitiba. We collected data retrospectively, between January 2017 and March 2018, compiled them using

thema Google Docs® online form and them analyzed using the open online Socscistatistics® platform.

We described clinic and demographic characteristics with normal distribution using mean and standard deviation. We calculated epidemiological data with simple statistical percentages. We analyzed continuous variables with the Student's t-test, and categorical ones, with the chi-square test; we defined the level of significance at 5%. The present study was approved by the Ethics Committee of Hospital do Trabalhador with the following reference number 1,802,091.

RESULTS

During the study period, 413 patients were submitted to exploratory laparotomy, of which 201 were excluded from the study. Among the 212 patients studied, 184 (86.7%) were brought by the Prehospital Care Service from the city of Curitiba, and 28 (13.3%), from the Curitiba Metropolitan Region. Among the patients studied, there was a predominance of males (88.7%) and mean age of 28.7 years (Table 1).

In relation to trauma mechanisms, gunshot wounds (GW) was responsible for 111 (52.3%) of traumas, stab wounds (SW) for 53 (25%), auto accidents for 31 (14.6% %), falls by three (1.4%) and other mechanisms by four (1.8%). We could not find this information in the medical records of 10 (4.7%) patients. According to the trauma location, in Curitiba there were 88 (47.8%) GW, 50 (27.1%) SW, 29 (16.3%) auto accidents, three (1.6%) falls, three (1.6%) traumas by other mechanisms and ten (5.4%) patients without this data recorded. In the metropolitan region, we observed 23 (82.1%) GW, three (10.7%) SW, one (3.5%) accident and one (3.5%) trauma by other mechanism.

We found higher ISS values in patients coming from the Metropolitan Region than in those coming from Curitiba (P=0.009). We observed greater values of TRISS in patients from Curitiba than in individuals from the Metropolitan Region (P=0.0155). There was no statistically significant difference between the RTS of the two localities (P=0.405) (Table 2).

There were 14.6% of deaths in patients from Curitiba and 25% in patients coming from the Metropolitan Region. Despite the trend towards higher mortality in the metropolitan region, it showed no significant difference (P=0.165). On the

other hand, the time of transport from the place of trauma to the reference hospital was higher in the Metropolitan Region cases than in the Curitiba ones (P<0.001) (Table 3).

As for the trauma scene in which the patient was assisted for the first time after trauma, there was a predominance of rescues from public roads (182 patients, 85.8%), followed by care in Basic Health Units (BCU) or Emergency Care Units (ECU) (18 patients, 8.4%). There were no documented deaths in patients attended at their place of work or at home. Patients rescued in public roads presented lower values of RTS (P=0.034) and TRISS (P=0.023)

Table 1. Epidemiological data.

| | Sample (N=212) | Curitiba (N=184) | Metropolitan Region (N=28) |
|-------------------------|----------------|------------------|----------------------------|
| Gender (%) | | | |
| Male | 188 (88.7) | 162 (88) | 26 (92.8) |
| Female | 24 (11.3) | 22 (12) | 2 (7.2) |
| Age (Average) | 28.7 | 29 | 26.6 |
| Mechanism of trauma (%) | | | |
| GW | 111 (52.3) | 88 (47.8) | 23 (82.1) |
| SW | 53 (25) | 50 (27.1) | 3 (10.7) |
| Auto | 31 (14.6) | 30 (16.3) | 1 (3.5) |
| Falls | 3 (1.4) | 3 (1.6) | 0 |
| Other | 4 (1.8) | 3 (1.6) | 1 (3.5) |
| Not informed | 10 (4.7) | 10 (5.4) | 0 |

N= sample number; SD= standard deviation; GW= gunshot wound; SW= stab wound; Auto= auto accidents.

Table 2. Trauma indices according to the trauma location.

| | Curitiba (N=184) | Metropolitan Region (N=28) | P (IC 95%) |
|------------|------------------|----------------------------|------------|
| ISS (SD) | 22.46 (±14.59) | 29.78 (±19.49) | 0.009* |
| RTS (SD) | 7.143 (±1.61) | 7.121 (±1.25) | 0.405 |
| TRISS (SD) | 90.62 (±19.44) | 81.30 (±30.37) | 0.015* |

N= sample number; SD= standard deviation; *= statistically significant result.

Table 3. Mortality rate and time of transport from the trauma location.

| | Curitiba (N=184) | Metropolitan Region (N=28) | P (IC 95%) |
|--------------------------------|------------------|----------------------------|------------|
| Deaths (%) | 27 (14.6) | 7 (25) | 0.165 |
| Transport time in minutes (SD) | 37.97 (±20.15) | 112.0 (±90.06) | <0.001* |

N= sample number; SD= standard deviation; *= statistically significant result.

than those rescued in a physical establishment. We observed no statistically significant difference between the number of deaths and ISS among patients assisted in these trauma scenes (Table 4).

DISCUSSION

For this study, as predicted in the literature, the trauma indices were used to evaluate the possibility of survival of the polytraumatized patient and to quantify their physiological changes and anatomical lesions. The sample consisted of patients submitted to exploratory laparotomy, with the aim of directly evaluating the trauma indices with greater fidelity. Two of the three indices evaluated (TRISS and RTS) showed a positive association with the place of trauma where the ISS was higher in patients from the metropolitan region, indicating that they were more severely injured, and a higher TRISS in patients from the capital, representing a greater chance of survival for such patients⁸.

We did not include patients admitted by direct search in this study, only those by referenced search, with prehospital care. In this way, the transportation time was calculated by the difference of the hours recorded in the Rescue Attendance Report (RAS) and the Emergency Bulletin issued by the hospital at the time of admission. Although there were differences between the time of

transportation to the hospital of patients from the Metropolitan Region in relation to those coming from Curitiba (112min. vs 37min., $P < 0.001$), the number of deaths among these locations did not present a significant difference ($P = 0.165$). A cohort study of 19,167 patients⁹ found that the time of transport to the referral hospital influences survival of trauma patients. However, the authors of the study found this association with a transport time of less than 20 minutes. The present study did not show differences between the mortality rate for transport times greater than 20 minutes.

Increased waiting for definitive treatment may influence the patient's neurological worsening, hemodynamic instability and, consequently, a higher risk of Cardiopulmonary arrest, among other conditions¹⁰. However, despite the fact that patients from the metropolitan region presented a more severe picture on arrival at the emergency room (minor TRISS), we did not find a relation between the place of occurrence of trauma and mortality. In addition, higher we observed ISS scores in patients from the metropolitan areas, indicating more severely injured patients. This may be due to the higher crime rate in the metropolitan area.

As for the trauma scene from which the victim was rescued, we observed a higher index of anatomical lesions (ISS) in patients rescued from

Table 4. Site where patient was found.

| | Deaths (%) | ISS (%) | RTS (%) | TRISS (%) |
|------------------------------|------------|-----------------------|----------------------|-----------------------|
| Public road (N=117) | 23 (19.6) | 26.06 (± 18.06) | 6.96 (± 1.72) | 86.42 (± 24.32) |
| Physical establishing (N=25) | 2 | 18.80 (± 8.91) | 7.65 (± 0.50) | 97.21 (± 2.56) |
| BCU/ECU (N=18) | 2 (11.1) | 18.88 (± 9.21) | 7.61 (± 0.58) | 97.08 (± 2.52) |
| Workplace (N=3) | 0 | 19.66 (± 12.89) | 7.841 (± 0) | 96.23 (± 4.72) |
| Home (N=4) | 0 | 18.0 (± 7.14) | 7.693 (± 0.33) | 98.26 (0.80) |
| p (IC 95%) | 0.164 | 0.024* | 0.024* | 0.012* |

N= number of sample; SD= standard deviation; *= statistically significant result; BCU= Basic Health Unit; ECU= Emergency Care Unit.

a public road when compared with those treated in some type of physical establishment ($P=0.024$). Concomitantly, patients treated on public roads presented worse physiological clinical conditions by the RTS index ($P=0.024$) and a lower probability of survival by the TRISS index ($P=0.012$) when compared with the patients found in a physical establishment. It is likely that the environmental and the often uncertain weather conditions at the moment of trauma are factors that contribute significantly to a worse prognosis of patients rescued from public roads at the time of hospital admission.

On the other hand, there are few studies that relate prognosis and the place where the trauma victim was found by the prehospital care team. Although this study did not find an association between the number of hospital deaths in patients rescued at different sites, it is expected that a physical establishment, whether at home or Primary Care Units, would be more favorable to clinical stabilization and rapid referral to the nearest trauma reference center. This early and efficient

management of the patient may not be able to improve survival based on raised trauma rates, but may be instrumental in maintaining similar death rates between the two sites types. Therefore, new studies are needed to evaluate the quality of hospital and pre-hospital care to prove the proportional similarity of death rates between the two locations.

The study has the limitation of being based on records that were not specifically designed for it, such as the Rescue Attendant Report (RAS), which compromises the quality of the data in some cases. There was also a frequent lack of data to fill in the data sheet for potential confounders, since data were recorded in the past. Losses of patient follow-up may also represent bias for retrospective studies such as this.

The proposed study model showed that trauma victims from the metropolitan region had a worse prognosis based on calculated trauma indices. Concomitantly, we also observed a worse prognosis in patients rescued from public roads when compared with patients rescued in a physical establishment.

R E S U M O

Objetivo: avaliar a influência do local de ocorrência do trauma nos escores de trauma de pacientes submetidos à laparotomia de emergência. **Métodos:** estudo retrospectivo observacional analítico. Foram incluídos 212 pacientes submetidos à laparotomias exploratórias no período de janeiro de 2015 e dezembro de 2017. Informações sobre o local do acidente e dados vitais dos pacientes foram obtidas com base na coleta de dados por meio de prontuários eletrônicos e físicos. Foram analisados os índices de trauma de pacientes provenientes de Curitiba e Região Metropolitana e o local em que o paciente foi socorrido (estabelecimento físico ou via pública). **Resultados:** entre os 212 pacientes estudados, 184 (86,7%) foram trazidos pelo Serviço de Atendimento Pré-Hospitalar provenientes da cidade Curitiba e 28 (13,3%) provenientes de Região Metropolitana de Curitiba. Foram socorridos em estabelecimentos físicos 25 pacientes (17,6%), enquanto 117 (82,4%) foram socorridos em via pública. Observou-se maiores valores de ISS (Injury Severity Score) dos pacientes procedentes da Região Metropolitana em relação aos procedentes de Curitiba (29,78 vs 22,46, $P=0,009$), enquanto valores maiores do TRISS (Trauma Trauma and Injury Severity Score) foram observados em pacientes procedentes de Curitiba em relação aos da Região Metropolitana (90,62 vs 81,30; $P=0,015$). Pacientes socorridos em via pública apresentaram menor valor de RTS (Revised Trauma Score) (6,96 vs 7,65; $P=0,024$) e TRISS (86,42 vs 97,21; $P=0,012$). **Conclusão:** pacientes vítimas de trauma procedentes de locais mais distantes do atendimento no centro de referência apresentaram pior prognóstico à admissão e foi observado pior prognóstico em pacientes socorridos em via pública.

Descritores: Índices de Gravidade do Trauma. Traumatismos Abdominais. Laparotomia. Localização Geográfica de Risco. Epidemiologia Descritiva.

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