

# Implementation of a trauma registry in a Brazilian public hospital: the first 1,000 patients

## *Implantação de um registro de trauma em um hospital público brasileiro: os primeiros 1000 pacientes*

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### A B S T R A C T

**Objective:** Show the steps of a Trauma Registry (TR) implementation in a Brazilian public hospital and evaluate the initial data from the database. **Methods:** Descriptive study of the a TR implementation in João XXIII Hospital (Hospital Foundation of the state of Minas Gerais) and analysis of the initial results of the first 1,000 patients. **Results:** The project was initiated in 2011 and from January 2013 we began collecting data for the TR. In January 2014 the registration of the first 1000 patients was completed. The greatest difficulties in the TR implementation were obtaining funds to finance the project and the lack of information within the medical records. The variables with the lowest completion percentage on the physiological conditions were: pulse, blood pressure, respiratory rate and Glasgow coma scale. Consequently, the Revised Trauma Score (RTS) could be calculated in only 31% of cases and the TRISS methodology applied to 30.3% of patients. The main epidemiological characteristics showed a predominance of young male victims (84.7%) and the importance of aggression as a cause of injuries in our environment (47.5%), surpassing traffic accidents. The average length of stay was 6 days, and mortality 13.7%. **Conclusion:** Trauma registries are invaluable tools in improving the care of trauma victims. It is necessary to improve the quality of data recorded in medical records. The involvement of public authorities is critical for the successful implementation and maintenance of trauma registries in Brazilian hospitals.

**Key words:** Registries. Forms and records control. Emergencies. Trauma. Traumatology.

### INTRODUCTION

Trauma is an endemic disease of modern society and is currently the leading cause of death in the population under the 45 years of age<sup>1</sup>. In Brazil alone, it is estimated that 150,000 people die from traumatic injuries every year. Apart from causing many deaths, trauma is also responsible for a large number of sequelae, many of these definitive, and is a major cause of morbidity, causing about one million hospitalizations in the year 2012 in Brazil<sup>2</sup>.

Trauma registries (TRs) are databases containing specific information about patients suffering from trauma and allow the monitoring of all processes involved with the care of these patients<sup>3,4</sup>.

Currently, in developed countries, TRs are an integral part of integrated care systems for trauma victims and are an essential tool in controlling the quality of care provided to these patients<sup>1,5</sup>.

In Minas Gerais, the João XXIII Hospital is the main reference for the care of trauma patients, with 375 beds, around 350 daily visits and 1,000 admissions per month. This public hospital is run exclusively by the Brazilian

Unified Health System (SUS) and belongs to the Hospital Foundation of the state of Minas Gerais (FHEMIG).

Following the implementation of a TR in João XXIII Hospital, the following results are expected: improvement in the quality of epidemiological and care information; assembly of data that leads to the improvement in the quality of patient care and the development of preventive measures; reduction of complications and avoidable or potentially avoidable deaths; classification of patients according to severity indices, allowing a more accurate evaluation of the results through a comparison with other institutions or worldwide literature; effective implementation of trauma indices, which allows scientific publication in indexed journals; development of a regional database, with the potential to cover the entire county, the state and, in future, other regions. This information could be used in various areas, such as analysis of results, costs, epidemiological studies, public policy planning, among others: the use of a TR in an emergency care network, integrating various emergency care points, and providing basic data for the effective establishment and development of the network;

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creation of a field of research for the development of new information technologies in healthcare.

This study aims to show the stages of implementation of a TR in João XXIII Hospital and to evaluate the initial data from the database.

## METHODS

This is a descriptive study of the implementation stages of a TR at João XXIII Hospital and an analysis of the initial results. Initially, in September 2011, a research project, aiming to achieve funding for the implementation of a TR, was prepared in João XXIII Hospital. In February 2012, the Collector® software was purchased. After its acquisition, a period of approximately four months was required for the training of those involved in the project. The team involved was composed of a surgeon, with a workload of 12 hours per week and a nurse with 40 hours per week, devoted solely to the project. Subsequently, the criteria for inclusion of patients were defined. Initially, only those patients who were operated on or hospitalized at the hospital, under the care of the Clinic of General Surgery, were included, even if they were also attended by other specialized personnel (e.g. from neurosurgery, orthopedics, plastic surgery, etc.).

In the second half of 2012, a pilot test using initial data was carried out, and an awareness scheme was initiated, aimed at the medical staff, as to the importance of the quality of the information contained in the medical records, and to the fact that it is also used in the TR.

In January 2013, the collection of TR data was initiated, and the data was input into Collector® using information available in the medical records.

## RESULTS

The results presented here cover the period from 01/01/2013 to 14/01/2014, when the number of patients included in the TR reached 1,000.

There was wide variation in the percentage of completeness of the information. Table 1 shows the completeness of each variable, according to their availability in the medical records, and their consequent input to the system.

The population studied showed a predominance of male victims (84.7%) and young people (53% were aged between 20 and 39 years). Ages varied from 0 to 87 years, with a mean and median of 32.5 and 29 years respectively.

With regard to intentionality, 51.4% of injuries were accidental, and the others were intentional, including self-inflicted injuries (1.8%). The main reason for hospital attendance was assault (47.5%) and the main cause of injury was blunt trauma (53%). The ISS (Injury Severity Score) varied between 1 and 75, with a mean of 15.7 and a median

of 13. There were significant differences in ISS when the blunt trauma injuries were compared to the penetrating injuries (means of 18.5 and 12.6 respectively,  $p < 0,0001$ ). The length of hospital stay varied between 1 and 221 days, with a mean and median of 11 and 6 days respectively. 13.7% of the patients died, of which 86% were male. The main causes of death were traffic accidents (54%) and assaults (36%), with aggression by firearm being the most common (Table 2).

An analysis of the TR information allowed us to identify 21 patients (2.1%) whose medical care (or a factor related to their medical care) resulted in complications (8 patients) or avoidable, or potentially avoidable, death (13 patients).

## DISCUSSION

Although the majority of trauma deaths occur in underdeveloped or developing countries, it is precisely in these locations that, paradoxically, there are no TRs, or when they do exist, the information therein is of poor quality<sup>6,7</sup>. Approximately 82% of the published literature on TRs is from developed countries and 50% originates from the United States<sup>8</sup>. A recent study, which assessed publications on TRs from developing countries in medical literature, found no publications on TRs in South American countries. Most TRs in these countries contain only epidemiological data, with less than 20 variables in the database and without the use of trauma scores<sup>9</sup>.

Aiming to develop national protocols for the care of trauma victims and to evaluate the quality of care

**Table 1** - Percentage of completeness of selected variables.

Variable	Completeness (%)
Gender	100.0
Age	98.4
Diagnosis of external cause	100.0
Type of injury (blunt/penetrating)	99.7
Intentionality (accident/aggression/self-inflicted)	99.8
Date of injury	99.4
Date of admission	100.0
Main injury	99.7
Pulse	70.3
Systolic blood pressure	50.3
Respiratory rate	37.5
Glasgow Coma Scale (ECG)	69.5
RTS	31.0
TRISS	30.3
ISS	99.6
Procedures performed	100.0
Discharge Status	100.0

Source: Collector®

**Table 2** – Distribution of characteristics of patients included in the Trauma Registry.

Characteristic	N	%
Gender		
Male	847	84.7
Female	153	15.3
Age range		
0 -12	37	3.8
13 – 19	147	14.9
20 – 29	310	31.5
30 – 39	215	21.9
40 – 49	127	12.9
50 – 59	86	8.7
60 – 69	36	3.7
70 +	26	2.6
Type of injury		
Blunt	527	52.9
Penetrating	465	46.7
External cause		
Assault	475	47.5
Motor vehicle accident	382	38.2
Accidental fall	83	8.3
Other	60	6.0
Result		
Discharge	863	86.3
Death	137	13.7

Source: Collector®

provided, the Major Trauma Outcome Study (MTOS) was carried out in 1982. It was an analysis of a large database containing information from TRs of 139 U.S. hospitals involving 80,544 patients. Through the data obtained, hospitals were able to compare their mortality rates with other patients with injuries of the same severity, as well as identify deaths among patients with good prognosis or survivors among patients most likely to die, according to the injury severity indices. The authors of this study concluded that information from TRs are so important, that it is impossible to establish effective programs of care or prevention without these data<sup>10</sup>.

For the proper operation of a TR, some components are key: specific funding, an appropriate computer program, well-defined inclusion criteria of patients, specialized and trained personnel, as well as procedures for the collection of detailed and validated information<sup>4,11</sup>. The design and implementation of a TR is long, hard work, which involves professionals from various fields and requires detailed planning. The entire process of TR implementation in João XXIII Hospital comprised the following steps: the preparation of a project to try and get funds from granting agencies for research in Minas Gerais, the acquisition and installation of a computer program (Collector®), the definition of patient inclusion criteria, the education and orientation of professionals with regard to

the importance of the TR to the hospital and the need for adequate completion of medical records. A major obstacle to the implementation of a TR is the cost. Besides the high price of available software, one must consider the costs of employees working exclusively for the TR and the necessary computer equipment. Sanidas *et al.* considered that one employee is needed for the inclusion of each 1,000 patients/year. This need may vary according to the complexity of the information contained in the TR<sup>12</sup>.

Stevens *et al.* reported that, in addition to the lack of resources, there was a great difficulty in making the policy makers aware of the importance of TRs in improving the care for trauma victims in Kenya<sup>13</sup>.

The difficulties of obtaining funding are more evident in underdeveloped or developing countries, however, a project aiming to create a single database in the European community was started in 2002 (EuroTARN), but was discontinued due to lack of funding<sup>14</sup>. Because it is a public hospital, we had great difficulty in obtaining funds to purchase Collector® (US\$10,000 for the license and US\$2,500/year for maintenance), mainly due to the enormous bureaucracy involved in importation and the legislation applicable to public purchases. We could only get the software through another channel; from an educational institution, that uses our hospital as a training field for its students. We still had to face the costs of 2 PCs and two employees estimated at R\$10,000/month. Added to this was the need for the participation of specialized personnel for data analysis.

With the idea of reducing costs, we looked at reports of developed TRs in poor countries, with satisfactory results. Mehmood *et al.* developed some software (Karachi Trauma Registry) in Pakistan with a total implementation cost of US\$9,600, and it was able to meet local demands<sup>6</sup>. Another successful experiment was reported by Zargarani *et al.* who used mobile devices (tablets), with an easy-to-use interface, in South African hospitals<sup>7</sup>. In this low-cost project, the data were collected in the emergency room itself, stored in tablets and subsequently wirelessly transferred to a TR. The total cost, including software, hardware and personnel was about US\$10,000.

Another major problem for the implementation of an efficient TR is the lack of appropriate information in medical records, especially from the pre-hospital care stage and the emergency room<sup>1,6</sup>. In our study, the variables with the lowest percentages of completeness are those that provide information on the physiological condition: pulse, blood pressure, respiratory rate and Glasgow coma scale. This information is essential for the understanding of the response to trauma, the building of trauma indices and the evaluation of patient prognosis.

The analysis in Table 1 shows that it was possible to calculate the RTS in only 31% of patients, a number explained by the low volume of data needed for its calculation (Glasgow Coma Scale, systolic blood pressure and respiratory rate). The ISS was obtained in 99.6% of

cases, since the descriptions of surgeries are given by the residents, who are instructed to include the classification of injuries in the medical records and are appropriately reminded. The same analysis applies to the descriptions of procedures performed, with a correct-registration percentage of 100%. Data with higher percentages of completeness are precisely those that do not depend on the doctor and are registered at patient admission in the registration department, for example: gender, age, type of injury, etc. The awareness of the medical staff as to the importance of this information is an important step in the implementation process of a TR and can reduce these shortcomings. In hospitals that have electronic medical records, the implementation of obligatory fields can minimize this problem.

Besides the absence of information, another factor of great impact in the usefulness of a TR is the quality of information available. The main deficiencies observed were: errors in data collection from medical records, the under-reporting of complications and a lack of definition or standardization of some variables. For example, the average length of hospital stay may vary if the period of stay is calculated in full days (every 24 hours) or in hours<sup>11</sup>.

Table 2 shows a predominance of young male victims and the importance of aggression as a cause of injuries in our environment, outnumbering traffic accidents. These data are consistent with other studies on the epidemiology of trauma in Brazil and reflect the major social problems, which are experienced in our country<sup>15-18</sup>.

Currently, TRs represent an indispensable tool with the function to provide detailed, reliable and easily accessible information, which will allow continuous the monitoring of care and its outcomes. A program with

guidelines to improve the quality of medical care to trauma victims, prepared by the World Health Organization (WHO), considers that the identification of complications and avoidable or potentially avoidable deaths, and subsequently the adoption of corrective action, is an essential step<sup>19</sup>. In our study, we identified 21 such patients (13 deaths and 8 complications, all preventable or potentially preventable). All this information was forwarded to the head of the surgical clinic who was then able to discuss, at his/her discretion, these data with the medical teams involved. We believe that these are essential tools for the internal procedures concerned with care quality control.

Through TRs, we can obtain important epidemiological data in the field of prevention, such as: patients at risk, most frequent types of injuries, how and where traumas occur and social aspects involved. This information can be used to guide specific measures for preventive and educational approaches.

In addition to local hospital data, the TR can be standardized and implemented in various member-points of a network of emergency care, at the municipal, state or thereafter nationwide level across the country, composing a strategic database for decision-making, and guidance on welfare measures and public policy.

In conclusion, trauma registries are invaluable tools for improving the care for trauma victims. From the results found, it is clear that a greater involvement of the medical staff is needed in order to improve the quality of the data registered during the early stages of patient care. The effective performance of public authorities, with policies for the implementation and financing of TRs in hospitals involved in caring for trauma patients, is necessary in Brazil.

## R E S U M O

**Objetivo:** apresentar as etapas da implantação de um Registro de Trauma (RT) em hospital público brasileiro e avaliar os dados iniciais deste banco de dados. **Métodos:** estudo descritivo da implantação de um RT no Hospital João XXIII – FHEMIG (Fundação Hospitalar do Estado de Minas Gerais) e análise dos resultados iniciais dos primeiros 1000 pacientes. **Resultados:** o projeto foi iniciado em 2011 e, a partir de janeiro de 2013, iniciamos a coleta de dados para o RT e em janeiro de 2014 completamos o registro dos primeiros 1000 pacientes. As maiores dificuldades na implantação do RT foram obter recursos para o financiamento do projeto e a falta de informações nos prontuários médicos. As variáveis com os menores percentuais de preenchimento foram sobre as condições fisiológicas: pulso, pressão arterial, frequência respiratória e escala de coma de Glasgow. O Revised Trauma Score (RTS) foi calculado em 31% dos casos e a metodologia TRISS aplicada em 30,3% dos pacientes. As principais características epidemiológicas mostraram um predomínio de vítimas jovens do sexo masculino (84,7%) e a importância das agressões como causa de lesões (47,5%), superando os acidentes de trânsito. O tempo médio de permanência foi seis dias e a mortalidade, 13,7%. **Conclusão:** os registros de trauma são ferramentas de grande valor para melhorar a assistência às vítimas de trauma. É necessário melhorar a qualidade do registro de dados no prontuário médico. O envolvimento do poder público é fundamental para a implantação e manutenção dos RT nos hospitais brasileiros.

**Descritores:** Sistema de registro. Controle de formulários e registros. Emergências. Trauma. Traumatologia.

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