

Profile of patients admitted for spinal cord injury in public teaching hospital

Perfil dos pacientes internados por trauma raquimedular em hospital público de ensino

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ABSTRACT

The spinal cord injury (TRM) is an important cause of mortality in Brazil. The PRO/PET-Health III, a Federal Government program developed at the Federal University of Minas Gerais, sought to identify the profile of TRM victims assisted in a large general teaching hospital in Belo Horizonte. A cross-sectional, descriptive study, with analysis of electronic medical records of patients admitted for TRM, was conducted to determine its epidemiological profile. The results revealed the age, length of stay, type of injury, trauma etiology, events registration, results of microbial cultures, and drugs used by these patients. It was possible to establish the relationship between the obtained data and those described in the literature and analyze the context of admission of these individuals, showing the importance of a multidisciplinary vision of the people affected by TRM.

Key words: Spinal Cord Injury; Health Profile; Hospitalization.

RESUMO

O trauma raquimedular (TRM) é importante causa de mortalidade no Brasil. O PRÓ/PET-Saúde III, programa do Governo Federal desenvolvido na Universidade Federal de Minas Gerais buscou identificar o perfil dos usuários vítimas de TRM, em grande hospital geral de ensino de Belo Horizonte. Foi realizado estudo transversal e descritivo, com análise de prontuários eletrônicos de pacientes internados devido à TRM, para determinar seu perfil epidemiológico. Os resultados revelaram a idade, o tempo de internação, tipo de lesão, etiologia do trauma, registro de intercorrências, resultado de culturas microbianas e medicamentos utilizados por esses pacientes. Foi possível estabelecer relação entre os dados obtidos e o descrito na literatura e analisar o contexto de internação desses indivíduos, mostrando a importância de visão multidisciplinar sobre as pessoas acometidas pelo TRM.

Palavras-chave: Traumatismo da Medula Espinal; Perfil de Saúde; Hospitalização.

INTRODUCTION

Spinal cord injury (TRM) is caused by the fracture of the spinal column, be it osseo ligamentar, spinal cord, discal, vascular or radicular, where there is spinal cord injury (LM).^{1,2} It can be associated with significant changes in motor, autonomic, or sensitivity function, with a temporary or permanent character. Complications may also occur related to bowel, bladder, ventilation, vascular³⁻⁵, and reproductive functions,^{6,7} in addition to problems associated with immobility in those who are bedridden, such as pressure ulcers.^{5,8} Victims of TRM, have serious losses in physical integrity and losses in mental and social areas.^{3,9}

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TRM causes psychological, social, and economic impact in the individual's life, therefore, the importance of family support is evident, as well as monitoring by a multidisciplinary team composed of surgeons, neurologists, orthopedists, psychologists, physical therapists, and occupational therapists.¹⁰ It is also a condition of relevance worldwide due to its high incidence and costs that they incur. Most LMs caused by TRM occur in men, in the 4:1 ratio, and in the age group of economically active people – between 15 and 40 years – about 40 TRM cases per million people occurs.¹⁰⁻¹²

In Brazil, 6,000-8,000 thousand cases are estimated per year,¹⁰ however, these traumas are not mandatory to be reported, which determines their under-reporting.^{2,10} It is believed that R\$ 9 billion is allocated to trauma care per year,¹ which is about 0.1% of the national gross domestic product.¹³ In the United States, there are 300,000 people with LM due to TRM and it is estimated that 10,000 new cases occur each year, generating billion dollars spendings with hospitalizations.¹¹

TRM is associated with LM, especially related to car accidents, short falls, diving into shallow waters, and acts of violence; perforations by firearms (PAF) are predominant, which is a reflection of growing violence rates in urban centers.^{7,14}

Considering the TRM impact in the global context, underreporting of cases in Brazil, and the need for better knowledge about cases to improve the quality of services, this study aims to identify the epidemiological profile of patients with TRM admitted to general hospitals that are not a reference for these cases.

PATIENTS AND METHODS

A cross-sectional descriptive study was conducted based on the analysis of electronic medical records of patients admitted due to TRM.

Study site

The study site was a general hospital emergency room inserted into the municipal health network of the city of Belo Horizonte, Minas Gerais, with 360 beds divided into the following units: operating room (BC), intensive care unit (CTI), emergency room (PS), maternity and medical clinic admission units (CM), and clinical surgery (CC). Approximately 12,000 pa-

tients are assisted each month. Most are assisted in the emergency room and about 12.6% are referred to the hospital by the units. The hospital has a computerized system and electronic medical records.

Data collection and analysis

The inclusion criteria used for the selection of medical records were: patients being treated at the hospital in the last three months, aged between 18 and 98 years, from both genders, with an assigned international code of diseases identified as TRM, and with the following descriptors: "fracture of spine cord at a non-specified level," "fracture in vertebrae (lumbar, cervical, or sacral)," "multiple fractures of the spine cord" and "multiple non-specified injuries". A total of 2,726 records were reviewed and obtained through the generation of a report in the computerized system of the institution.

Based on the list of patients with spine cord fractures and non-specified injuries, all records were read in order to identify the occurrence of TRM. Eight cases of TRM were identified, which were entered into this study.

The variables age, gender, marital status, reason for hospitalization, diagnosis, TRM reason, hospitalization time, medications taken, records of suspected infections related to health care, and possible complications resulting from hospitalization, such as pressure ulcers (PU) and urinary tract infections (UTI) were considered for these patients, which could be identified from the interpretation of the evolution of medical records of patients and analysis of microbiological culture tests; and in appropriate cases, the reason why the patient had not been discharged until the end of the study. In addition, all drugs taken by these patients were evaluated along with results from the culture of microorganisms. A computerized spreadsheet was elaborated into recorded data through the Microsoft Office Excel software 2003®; the univariate statistical analysis was performed subsequently.

This study was submitted to the Ethics Committee of the Federal University of Minas Gerais under the opinion number 364 228 - 07.08.2013.

Records of complications were identified in 5 (62.5%) patients (Table 2).

Data on the performed tests for the detection of bacterial colonies was listed (Table 3).

The specification and quantification of microorganisms identified in culture were performed (Table 4).

Table 1 - Length of hospital stay, international code of diseases, the cause of trauma, and type of injury in patients admitted to the Risoleta Tolentino Neves Hospital, of the Federal University of Minas Gerais, during three months of observation

Patient	CID	Type of lesion	Etiology	Days of hospitalization
1	Fractures of other cervical vertebrae	TRM T4 sensitive level	Assault by PAF	104
2	Multiple non-specified injuries	TRM C7cervical fracture	Assault by PAF	103
3	Multiple non-specified injuries, lumbar vertebra fracture, fracture of the lumbar spine and pelvis	TRM, cervical spondylotic myelopathy	Height fall	6
4	Multiple non-specified injuries, diffuse brain trauma	T12 and L1 fracture	Height fall	30
5	Fracture of other specified cervical vertebrae, multiple non-specified injuries	TRM spinal cord contusion	Traffic accident	27
6	Fracture of other specified cervical vertebrae	C6 and C7 dislocation	Height fall	59
7	Multiple non-specified injuries	TRM C2 Cervical	Assault by PAF	6
8	Multiple non-specified injuries	TRM	Assault by PAF	39

TRM: Spinal cord injury, PAF: firearm projectile.

Table 2 - Specifications of complications in patients with spinal cord injuries hospitalized at the Risoleta Tolentino Neves Hospital, during three months of observation

Patient	Complications records during hospitalization
1	Multiple bedsores/urinary tract infection (ITU)
2	Necrotizing pneumonia and lung abscess/Colonization by KPC/bedsores
3	None
4	ITU/Alcohol withdrawal syndrome
5	None
6	ITU/sacral ulcer grade II with necrosis
7	None
8	<i>Acinetobacter baumannii</i> colonization

Table 3 - Microorganisms culture results for patients with spinal cord injury hospitalized at the Risoleta Tolentino Neves Hospital, during three months of observation

Patient	Type of microorganism found	Type of culture	Positive result
1	<i>Escherichia coli</i>	Urine culture	2
	<i>Acinetobacter spp</i>		1
	<i>Pseudomonas aeruginosa</i>		4
	<i>Proteus mirabilis</i>		1
	<i>Acinetobacter spp</i>		Urine culture; nasal, axillary, and perianal swab
2	<i>Enterococcus spp</i>	Urine culture	2
	<i>Escherichia coli</i>	Tracheal aspirate	1
	<i>Morganella morganii</i>	Mini-BAL	1
	<i>Klebsiella pneumoniae</i>	Urine culture	1
	<i>Providencia stuartii</i>		1

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Table 3 - Microorganisms culture results for patients with spinal cord injury hospitalized at the Risoleta Tolentino Neves Hospital, during three months of observation

Patient	Type of microorganism found	Type of culture	Positive result
2	<i>Pseudomonas spp</i>	Tracheal aspirate, mini-BAL, and urine culture	4
	<i>Staphylococcus spp</i>	Blood culture, nasal, tracheal, and aspirate swab	6
	<i>Stenotrophomonas maltophilia</i>	Tracheal aspirate	1
3	No culture performed		
4	<i>Escherichia coli</i>	Urine culture	2
	<i>Acinetobacter spp</i>	Urine culture and nasal swab	3
	<i>Staphylococcus spp</i>	Blood culture, mini-BAL, and central venous catheter tip	5
	<i>Enterococcus faecium</i>	Central venous catheter tip	1
	<i>Proteus mirabilis</i>	Blood culture	1
5	No bacterial growth in performed cultures		
6	<i>Staphylococcus spp</i>	Blood culture	2
	<i>Acinetobacter spp</i>	Mini-BAL and nasal and anal swab	5
	<i>Pseudomonas spp</i>	Urine culture	3
7	No culture performed		
8	<i>Acinetobacter spp</i>	Urine culture	1

The medications used to treat these patients are marked according to the necessity of their use and separated by pharmacologic classes (Table 5).

Table 4 - Frequency of microorganisms found in hospitalized patients with spinal cord injury at the Risoleta Tolentino Neves Hospital, during three months of observation

Microorganisms	Absolute frequency	Relative frequency
<i>Acinetobacter spp</i>	26	40.63%
<i>Staphylococcus spp</i>	13	20.31%
<i>Pseudomonas spp</i>	11	17.19%
<i>Escherichia coli</i>	5	7.81%
<i>Enterococcus spp</i>	3	4.69%
<i>Proteus mirabilis</i>	2	3.13%
<i>Klebsiella pneumoniae</i>	1	1.56%
<i>Morganella morganii</i>	1	1.56%
<i>Providencia stuartii</i>	1	1.56%
<i>Stenotrophomonas maltophilia</i>	1	1.56%
Total	64	100%

Table 5 - Frequency of the main drugs used in patients with spinal cord injuries hospitalized at the Risoleta Tolentino Neves Hospital, during three months of observation

Pharmacological Class	Quantity	Relative frequency
Antibacterials for systemic use	1490	17.98%
Analgesics	1155	13.93%
Drugs for disorders acid	662	7.99%
Muscle relaxant	478	5.77%
Antithrombotic agents	440	5.31%
Preparations for cough and cold	435	5.25%
Cardiac therapy	391	4.72%
Anti-infectives for systemic use	333	4.02%
Psycholeptics	316	3.81%
Antiemetics and antinauseants	312	3.76%
Drugs for Functional Gastrointestinal Disorders	261	3.15%
Blood substitutes and perfusion solutions	235	2.84%
Alimentary tract and metabolism	229	2.76%
Antiepileptics	187	2.26%
Psychoanaleptics	152	1.83%
Agents acting on the Renin-Angiotensin System	127	1.53%
Vitamins	115	1.39%
Antihypertensive	96	1.16%
Antihistamines for systemic use	95	1.15%
Preparations for the treatment of wounds and ulcers	87	1.05%
Other pharmacological classes	693	8.36%
Total	8289	100.00%
<i>Average medicines used by patient</i>	<i>1036.25</i>	

Furthermore, a search for complicating factors for the discharge of each patient was performed when applicable (Table 6).

Table 6 - Record of barriers for hospital discharge in patients with spinal cord injuries hospitalized at the Risoleta Tolentino Neves Hospital, during three months of observation

Patient	Record of barriers for hospital discharge
1	Waiting for wheelchair, as well as legal complications because this is an individual in prison
2	None
3	None
4	Oral diet progression (in enteral nutrition, clinical observation)
5	Waited transfer for spinal surgery because of hospital overcrowding, being registered in the Beds' Central
6	Pain in the left shoulder, pseudomonas colonization with fever peaks
7	None
8	None

The means of transportation to get to the hospital were: three (37.5%) through Mobile Emergency Service; one (12.5%) through the Fire Department; one (12.5%) through family help; one (12.5%) through a police escort; one (12.5%) through transfer from another unit; one (12.5%) was not specified.

DISCUSSION

All patients were males with a mean age of 39 years, which matches the worldwide¹⁵ and national¹⁰ patterns of TRM incidence.^{10,12} This prevalence may be associated with the lifestyle adopted by male individuals who often have challenging behaviors in addition to being exposed to risky situations.¹¹ It is emphasized that the occurrence of TRM causes great harm to the individual and society because most of the victims are in the productive age group; their psyche, physical state, family relationships, and social and occupational values are also affected.¹⁶

A direct link between the cause of trauma and length of hospital stay is observed because of the variables involved, including social factors and comorbidities.⁸ The type of treatment administered also has a complex character considering various factors such as: spinal cord stability and level of neurological impairment, the age of the patient, psychosocial and economic characteristics, comorbidities or multiple traumas, which must be con-

sidered,¹⁷ and make it complex interfering with a hospital stay. It should be further noted that among the factors that can increase hospital stay are complications generated by hospitalization such as the incidence of pressure ulcers (UP) identified in 37.5% (three) of patients, usually associated with prolonged immobilization accompanied by changes in skin elasticity and circulation, which can be decisive for tissue ischemia. UPs can act as an entry site for infection and exudates, leading to the risk of sepsis and/or other clinical complications.¹⁸ In addition, UP is shown to be of great relevance to the length of stay, which is described in several studies.¹⁹

Another example of secondary complication from hospitalization due to TRM that was identified in some of the patients included in this study was urinary tract infections (ITU), observed in 37.5% (three) of patients. In many situations, ITU presents itself as an important factor for increased hospital stay and high costs for treatment.^{1,20} All these findings are similar to those already described indicating that the longer the LM carrier stays in the hospital, the greater the chances of developing complications and infections⁵ such as ITUs.²¹ It is essential, therefore, to establish a proper dynamic between the health, technical, and nursing care, such as the exchange of information and records for the well-being of TRM patients.

With regard to the possible occurrence of health care-related infections, it is observed that despite that 62.5% (five) of the patients showed positive results for the presence several species of bacteria, not all were responsible for infections. A significant identification of multidrug-resistant bacteria such as *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Klebsiella pneumoniae*, was noted often related to multidrug resistance,²² which can be explained by the large range of microbes present in the hospital environment. The most relevant microorganisms were in the genera *Acinetobacter spp*, *Staphylococcus pp*, and *Pseudomonas spp*, commonly associated with infections related to health care.²³

The four most commonly used drug classes were: antimicrobials, 17.98% (1,490) indicating that part of the colonization by bacteria evolved to infection; analgesics, 13.93% (1155), probably due to post-TRM myelopathic pain, which usually affects LM and is generally aggravated when associated with UP²⁴; anti dyspeptics, 7.99% (662), and antiemetics indicating the need for the prevention of gastrointestinal problems associated with the diversity of drugs used and the tension caused by TRM and LM; and antithrombotic agents, administered due to the immobility that stems from TRM. Therefore, the occur-

rence of polypharmacy is observed, which increases the possibility of adverse events, prolonged hospitalization, and suggests continuous monitoring of TRM victims.²⁵

Some social and administrative factors also acted as discharge barriers, impacting the increase in the length of hospital stay and promoting further deterioration of physical and mental health in patients. Patient 01 can be cited, who was in prison awaiting the court hearing to be granted house arrest, a wheelchair, and ankle monitors; patient 05 awaiting surgery, which suggested the need for intervention in the flow and supply of care in the health system. These facts demonstrate the importance of an effective joint action among professionals responsible for the care of TRM victims at all levels of care.

When considering the factors associated with the prolongation of hospitalizations in each case, a closer relationship between the health professional, the person affected by TRM, and caregivers is recommended in order to make the patient aware of the importance of his condition because the prevention of pressure ulcers is a multidisciplinary problem and requires attention and total commitment by the team and patient^{10,20} in addition to conducting work processes related to offering care to TRM victims and implementing strategies to prevent the occurrence of UP.^{16,18}

One limitation of this study is associated with the consideration of the CID classification to identify patients. Despite that the institution adopts an electronic medical record system as a primary form of patient registration, which theoretically favors organization and insight about records, this apparent benefit collaborates in some degree into disengagement on the use of the most appropriate CID about the condition of patients, which causes potential errors in the classification of reasons for hospitalization. These factors hindered this study in which the specificity of CID referred to a large number of trauma cases with no relation with LM, and a small portion of records selected through the used filters, in fact corresponding to TRM; out of the 2,727 medical records analyzed, eight were confirmed as TRM, and six of which were described as "non-specified multiple injuries". The main impact of this limitation was the long time spent on the analysis of each chart, which require thorough and exhaustive reading.

In addition, although there are benefits in the convenience and accessibility of using electronic medical records, the accuracy of data must be thoroughly investigated because the source of information used is tertiary. In addition, the constant exchange of professionals along the patient's evolution contributed

to the occurrence of cases of apparent inconsistent information contained in medical records, requiring great attention and detailed analysis and interpretation of information. All these constraints coupled with the CID issue previously discussed contributed with some barriers in the development of this study.

CONCLUSIONS

The analysis presented here, despite the small sample size, indicates that the profile of TRM victims treated at the HRTN matches the description in the literature, that is, of men at working age,⁷⁻⁹ with main LMs etiologies associated with accidents by PAF, which follows the trend of increasing violence and crime in large urban centers^{7,14} and high incidence of hospital complications mainly due to UP and ITU.²¹

This data can contribute to the development of preventive and aiding measures, especially regarding the planning of actions to reduce crime and promote safety and the physical integrity of citizens residents in the studied area, and in in-hospital interventions to reduce complications and rehabilitation time needed by TRM victims.

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