

# Fractures in adults: from functional and surgical implications to health education\*

ADULTOS COM FRATURAS: DAS IMPLICAÇÕES FUNCIONAIS E CIRÚRGICAS À EDUCAÇÃO EM SAÚDE

ADULTOS CON FRACTURAS: DE LAS IMPLICACIONES FUNCIONALES Y QUIRURGICAS HASTA LA EDUCACIÓN PARA LA SALUD

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## ABSTRACT

This study aimed to identify the functional and surgical implications for adult patients with fractures, characterizing the demographic profile of the study sample, to assess the functional independence of victims of fractures and discuss the implications related to surgical procedures involved in treating these patients. The survey was conducted between November 2006 and April 2007 with 74 patients admitted to a hospital in Sao Paulo. Male subjects were predominant (91.9%), mean age 31.8 years, whites (51.3%), victims of accidents (51.4%). Fractures of lower limbs accounted for 73.0% of cases and upper limbs 13.5%. The accidents were responsible for 58.1% of admissions. Regarding Functional Independence Measure (FIM), there was an increase in mean values of FIM during the evaluation. Moreover, there is a decrease of these values in cases of accidents and pedestrian accidents and in those whose limbs are affected.

## KEY WORDS

Wounds and injuries.  
External causes.  
Orthopedic nursing.  
Emergency nursing.  
Health education.

## RESUMO

Este estudo objetivou identificar as implicações funcionais e cirúrgicas relativas a pacientes adultos com fraturas, caracterizar o perfil sociodemográfico da amostra do estudo, avaliar a independência funcional das vítimas de fraturas e discutir as implicações relacionadas aos procedimentos cirúrgicos envolvidos no tratamento a esses pacientes. A pesquisa foi realizada entre novembro de 2006 e abril de 2007 com 74 pacientes internados em um hospital de São Paulo. Foram predominantes indivíduos do sexo masculino (91,9%), média de idade de 31,8 anos, brancos (51,3%), vítimas de acidentes de trabalho (51,4%). As fraturas de membros inferiores representaram 73,0% dos casos e membros superiores 13,5%. Os acidentes automobilísticos foram responsáveis por 58,1% das internações. Quanto à Medida de Independência Funcional (MIF), houve aumento nas médias dos valores no decorrer da avaliação. Por outro lado, há diminuição desses valores em casos de acidentes automobilísticos e atropelamentos e naqueles em que os membros inferiores são atingidos.

## DESCRIPTORIOS

Ferimentos e lesões.  
Causas externas.  
Enfermagem ortopédica.  
Enfermagem em emergência.  
Educação em saúde.

## RESUMEN

Este estudio tuvo como objetivo identificar las implicaciones funcionales y quirúrgicas de adultos con fracturas, caracterizar el perfil demográfico de la muestra del estudio, evaluar la independencia funcional de las víctimas de fracturas y discutir las implicaciones relativas a los procedimientos quirúrgicos implicados en el tratamiento de estos pacientes. La encuesta fue realizada entre noviembre de 2006 y abril de 2007 con 74 pacientes ingresados en un hospital de Sao Paulo. Varones fueron predominantes (91,9%), edad promedio 31,8 años, blancos (51,3%), víctimas de accidentes (51,4%). Las fracturas de extremidades inferiores representaron el 73,0% de los casos y de extremidades superiores 13,5%. Los accidentes fueron responsables por 58,1% de los ingresos. Quanto a la Medida de Independencia Funcional (MIF), hubo un aumento en los valores medios durante la evaluación. Por otra parte, hay una disminución de estos valores en casos de accidentes, atropellamientos y en aquellos cuyos miembros inferiores son lesionados.

## DESCRIPTORIOS

Heridas y traumatismos.  
Causas externas.  
Enfermería ortopédica.  
Enfermería de urgencia.  
Educación en salud.

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## INTRODUCTION

Nowadays, violence and accidents – known as external causes – are one of the main sources of concern in Brazil and around the world. The significant increase in incidence levels of external causes as from the 1980's reveals a new morbidity and mortality picture in the country and underlines the need to put in practice prevention and control measures, given the public health problem. Historically, actions for rapid care delivery to victims of external causes increased during the 20<sup>th</sup>-century wars and led to a substantial decrease in the victim removal time for definitive care, from four hours during World War II to 27 minutes in Vietnam. From that point onwards, this experience has been generalized, especially for injury victims caused by external causes in large urban centers<sup>(1)</sup>.

Lesions, traumas and deaths caused by accidents and violence produce huge economic, social and emotional costs. Spending on hospitalizations, treatment and rehabilitation, social insurance, leave of absence from work, potential years of life that are lost, psychological damage to victims and their relatives is very costly, mainly due to the fact that victims are mainly young people in their productive age. In May 2001, the Ministry of Health, acknowledging the increase in accidents as a Public Health problem, approved decree GM/MS No737, which presents the National Policy for the Reduction of Morbidity and Mortality caused by accidents and violence<sup>(2)</sup>. As a result, the Emergency Medical Care Service SAMU was created, structured with equipment and vehicles that can transport the victims of these injuries<sup>(2)</sup>.

Research has demonstrated that, in the age range from zero to 18 years, traffic accidents represent 31% of causes of death, while physical trauma represents the third global cause of death in Brazil in the age range between five and 40 years. This represents an average of 100,000 Brazilian deaths by trauma and approximately 1,500,000 injured<sup>(3)</sup>.

In economic terms, costs of losses due to traffic accidents rise up to about 1.0% of the gross domestic product (GDP) in low-income countries and 2.0% of GDP in high-income countries<sup>(2)</sup>. In 2005, hospitalizations due to external causes in the public health system produced a cost of about R\$157 million, ranking third in cost terms and sixth in terms of causes of hospitalization<sup>(4)</sup>.

In view of current reality and the dimension of the figures involved, traumas have progressively stood out in diagnosis and hospitalization statistics. They have become the primary cause of morbidity and mortality in the population from zero to 39 years of age, making them a severe public health problem that demands immediate intervention measures<sup>(5)</sup>.

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To decrease the impact of this reality, emergency medical care services aim to deliver fast and adequate care to victims with a view to minimizing sequelae and restore the victim's full functional capacity. Studies prove that the golden hour, i.e. the first hour after a trauma event, is considered critical for the treatment institution to modify the prognosis, as up to 40% of deaths occur in the pre-hospital phase. This short period is the pre-hospital care service's activity margin, aimed at rapidly and safely removing trauma victims from the event site and taking them to where they will receive adequate treatment<sup>(6)</sup>.

Orthopedic and especially bone fracture victims are important representatives of temporary or permanent disabilities, deficiencies, sequelae and decreased functional capacity. The acknowledged increase in the number of accident survivors and the extent of the sequelae caused by these events evidence the need for rehabilitation programs aimed at these clients. Therefore, health professionals can use instruments to quantify patients' functional capacity, so as to better direct rehabilitation programs. One of these instruments is the FIM (Functional Independence Measure).

The FIM is a multidimensional instrument that mainly focuses on a patient's demand for care by third persons to perform daily activities. It is applied to verify the patient's evolution in rehabilitation therapy while yet hospitalized, mainly for trauma victims that abruptly caused severe disabilities. It is often used in specialized orthopedic patient care institutions. The FIM includes 18 activities, distributed in two domains. In the motor domain, emphasis lies on self-care (eating, grooming, bathing, dressing, toileting), bladder and bowel management, transferring (bed, chair, wheelchair, toilet, shower) and locomotion (walking and going up and down stairs), covering thirteen activities. The cognitive/social domain comprises communication (understanding and expression) and social cognition function (social interaction, problem solving and memory), with five activities<sup>(5)</sup>. These areas are scored from 1 (complete dependence) to 7 (total independence); the higher the score, the greater the person's independence, with total scores ranging from 18 to 126<sup>(7)</sup>.

## OBJECTIVES

The general aim was to identify the functional and surgical complications of adult patients with fractures, and specific aims were to:

- Characterize the sociodemographic profile of the study sample;
- Assess the functional independence of fracture victims and
- Discuss implications related to the surgical procedures involved in these patients' treatment.

## METHOD

This is a longitudinal, exploratory and descriptive study with a quantitative approach. The research area involved the Trauma, Geriatrics and Emergency Care Units of the Orthopedics and Traumatology Institute at the University of São Paulo Medical School *Hospital das Clínicas* (IOT/FMUSP). Approval for the research was obtained from the Scientific Commission (memorandum 51/2006) and also from the Research Ethics Committee at University of São Paulo School of Nursing (protocol 537/2006 - CEP/EEUSP).

The study sample consisted of 74 adults (between 18 and 59 years), with fractures and hospitalized for at least 48 hours. During the data collection period, 538 adults received care, 459 of whom were excluded and six lost. Patients with spinal cord injury, intracranial trauma, mental and behavioral disorders on the occasion of the research were excluded, as well as patients transferred to another unit or institution during their hospitalization, patients with earlier limb amputation and cases of pathological fractures. The sample power was 99.80% (Cronbach's Alpha). Data were collected between November 16th 2006 and April 16th 2007 through semistructured interviews, a questionnaire with questions about socio-demographic data and the trauma and the application of the FIM. The FIM was first applied after 48 hours of hospitalization due to occasional surgeries during the first 24 hours. The second application occurred when the patient was discharged and the third and last by phone, within approximately one month after the patient's return home. The three interviews were held with the patient alone, without involving caregivers and relatives.

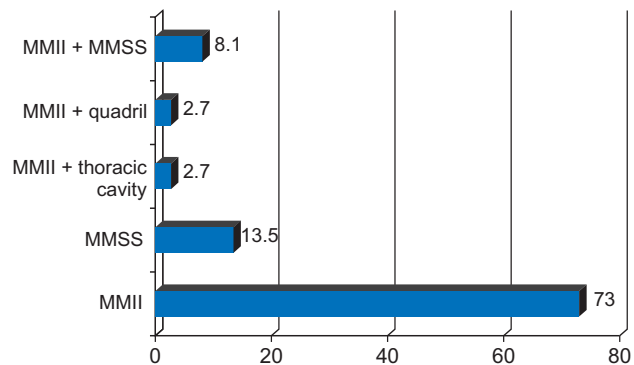
## RESULTS AND DISCUSSION

To fill out the instrument, information was obtained from voluntary participants and their medical hospital records. With regard to patients' age, the mean was 31.7 years. Men (91.9%) and white ethnic origin (51.3%) predominated.

The high incidence of young people in different societies has been related with lack of driving experience, besides characteristics proper of youth, such as impulsiveness and the need for self-affirmation towards peers. This is aggravated by the fact that young people generally consume more alcohol and drugs than adults of more advanced age, and tend to exceed speed limits and ignore other traffic safety standards more, which increases the chances of accidents<sup>(8-9)</sup>. In a study carried out in Londrina in the year 2000, it was verified that 65.6% of male young people had already been involved in traffic accidents, 15.6% had already participated in *street races* and 44.6% had consumed alcoholic beverages and driven a vehicle afterwards in the last 30 days<sup>(10)</sup>. Another study in the South of Brazil, carried out between 1997 and 2000, indicated

that the predominant age range in traffic accidents, with more than 70.0%, was between 10 and 39 years<sup>(11)</sup>.

As for civil status, the majority was single (47.2%), followed by the group that was married or lived in consensual union (45.9%). With regard to the body region affected by the orthopedic trauma, 73.0% had suffered lower limb injuries (MMII). The second most affected body regions were upper limbs (MMSS), with 13.5% (Figure 1).



**Figure 1** - Percentage distribution of interviewees according to topography of body lesions - São Paulo - 2007

The medical diagnosis of trauma was obtained from the patients' hospital records as that information was more precise. It should be highlighted that the sample only included cases of any type of bone fractures, except for pathological fractures. Exposed fractures predominated (47.2%), followed by the closed type (41.9%).

When asked about the external cause that motivated the hospitalization, it was verified that 58.1% of cases were due to car accidents, 81.4% of which involved motorcycles. In 66.20% of cases, surgical treatment was needed.

Generally, trauma or multiple trauma victims need emergency or urgent surgical procedures, demanding an intervention from the health team that is focused on risk prevention and preserving the patient's life. In this situation, patients are often forwarded from the Emergency Unit and the most relevant information for an anesthetic-surgical act to occur tends to be precarious or inexistent. Fasting may not be adequate, as a minimum period of eight and ideally 12 hours is due to avoid the risk of aspiration. Important information like alcohol consumption; smoking; use of medication, drugs or narcotics often is not obtained, which makes it difficult to prevent adverse events associated with the use of anesthetics. Data on the health-disease history are insufficient too. These should be collected upon this patient's arrival at the Surgical Center and include: allergies, previous diseases and earlier surgeries<sup>(12-13)</sup>.

Motorcycle drivers are even more vulnerable and the accidents they are involved in big city traffic tend to be more severe. Their potential mortality in Brazil is ten times higher than that of car drivers. This high danger level,

however, is unparalleled in international literature, which mentions three to four times more accidents involving cars than motorcycles<sup>(14)</sup>. Studies in Londrina also appoint motorcyclists as the main traffic accident victims, with more than 40.0%, including survivors and lethal victims<sup>(10)</sup>.

Incidence levels of orthopedic trauma per weekday and time of day were higher on Wednesdays, Fridays and at weekends (20.3%, 16.2% and 20.3%, respectively) and between 18 and 24 hours (31.1%). These results are very similar to literature, where different authors describe higher traffic accident and victim levels at weekends<sup>(15)</sup>.

Victims are normally more frequent during the night, as accidents tend to be more severe in the night period, due to several factors related with the environment (speeding, ignoring traffic lights, less light), in addition to personal factors like alcohol and drugs use, among others. These data indicate that solving or at least mitigating this important public health problems obligatorily involves, in the first place, understanding and identifying determinant factors of vehicle drivers' behavior and, second, a health education process directed at promoting not only behavioral changes in terms of careful and prudent driving, but also putting in practice victim care programs for the population.

In Brazil, resolution 168/04, which the National Traffic Council approved in December 2004, obliged drivers with a license (CNH) issued before November 19th 1999 who wanted to renew their CNH to take a first aid course. To receive their CNH for the first time, people are also obliged to take this first aid course. These are important but incipient determinations as, in Brazil, no wide ranging programs have been established in public and private schools yet, which train the population for care delivery to trauma or cardiac arrest victims.

In a study held at a private emergency care service, looking at 54 cases of care delivery to people with a cardio-respiratory arrest, most victims (88.8%) passed away. Trained passers-by performed resuscitation procedures in only 3.7% of these victims, all of whom (100%) reached the hospital alive<sup>(16)</sup>. These data lead to the conclusion that the population is not prepared to act in emergency situations, which would be very valuable in a region where emergency services face many obstacles to achieve an ideal response time with a view to guaranteeing victims' survival<sup>(16)</sup>. This scenario reveals the importance of early care delivery to victims, started by lay persons, in a city like São Paulo, where variables like overcrowded traffic rates can impede or complicate the emergency medical service's arrival and, consequently, victims' survival.

### **Functional independence of adults with fractures**

The Anova table and the adjusted Bonferroni test reveal significantly different averages among the three assessment times ( $p < 0.001$ ) for motor and total FIM; and no

statistically significant difference for cognitive-social FIM averages ( $p > 0.05$ ).

With regard to the motor and, consequently, the total FIM score, a considerable increase in average FIM scores was found upon discharge and one month after returning home, suggesting increased functional independence in comparison with the immediate trauma state. As mentioned, the average cognitive-social score maintained a linear pattern for the three assessment times.

The interviewees are also expected to obtain better motor and, consequently, better total FIM scores during the three application times. The treatment established during hospitalization, such as surgeries, immobilizations to stabilize the fracture, use of analgesics and physiotherapy, is important to increase scores in this domain, as patients feel more capable, willing and confident to perform activities, despite difficulties imposed by the clinical situation.

When comparing the average scores at the three FIM application times, it was verified that, although they are a minority, women score better, especially one month after their return home. It should also be highlighted that falls, aggressions and animal bites were the predominant causes of trauma in women, which could explain their higher scores, as these events cause less impact than automobile accidents.

With regard to age range, groups were divided into: 18 to 29 years; 30 to 39 years, 40 to 49 years, 50 to 59 years. No differences among the groups and mean motor, cognitive-social and total FIM averages were observed ( $p = 0.503$ ;  $p = 0.868$ ;  $p = 0.650$ , respectively). The same was true for civil status and FIM scores.

To analyze the association between external causes and total FIM and its domains, this factor was classified into: 1) Others; 2) Injuries by Firearms (FAF); 3) Falls; 4) Runovers; 5) Automobile Accidents. In this variable, the adjusted Bonferroni test evidenced that, with regard to total FIM, significantly different average scores were found between groups 1 and 2 ( $p = 0.04$ ); 1 and 4 ( $p = 0.02$ ) and 3 and 4 ( $p = 0.02$ ). As for motor FIM, averages significantly differ between groups 1 and 4 ( $p = 0.02$ ), 1 and 5 ( $p = 0.003$ ) and 3 and 5 ( $p = 0.03$ ). Finally, with respect to cognitive-social FIM, averages were significantly different between groups 2 and 3 ( $p = 0.03$ ) and 3 and 4 ( $p = 0.02$ ).

The following subgroups were considered to analyze the body region affected by the fracture variable: 1) Lower limbs and hips; 2) Lower and upper limbs; 3) Upper limbs; 4) Lower limbs. Significantly different averages were found in total FIM between 1 and 3; 2 and 3; 3 and 4 (all with  $p < 0.001$ ); 1 and 4 ( $p = 0.031$ ) and 2 and 4 ( $p = 0.020$ ). As for motor FIM, averages significantly differ between groups 1 and 3; 3 and 4; 2 and 3 (all with  $p < 0.001$ ) and 2 and 4 ( $p = 0.020$ ).

People affected by lower limb injuries or an associated between hip and lower limb fractures presented a lower mean motor FIM and, hence, total FIM score. It should be



highlighted that, in the motor FIM domain, eight of the 13 activities assessed directly or indirectly depend on good lower limb functionality in order to perform that task without external help and/or greater demand for time. These factors contribute to the assessed persons' lower scores.

Functional independence for these activities is quite affected in the acute trauma period, especially in victims of lower limb traumas, which later demand surgical treatment. These patients need more professionals for care delivery, not only due to pain complaints but also to motor problems, determining the diagnosis of impaired physical mobility. The start of the intra-operative period demands a rapid and adequate set-up of the surgery room, and also help to induce anesthesia and start the surgery. Hence, surgical-anesthetic procedures in this context need a qualified nursing team for patient care delivery in urgency or emergency situations, where surgical risks are more susceptible and complications more frequent.

The Surgical Center and the Material and Sterilization Center (CME) are units directly related to trauma victim care. A consignment system is recommended for Orthoses, Prostheses and Special Materials (OPSMs), which attend to a range of traumas. OPSMs should already have gone through all phases of the sterilization process and be stored adequately with a view to decreasing surgical site infection risks. This comes before the operative process and the start of patients' recovery.

Patients with this functional deficit should undergo rehabilitation actions, whose results should promote the best possible independence, in line with their own, relatives' and caregivers' clinical and social expectations and

possibilities. Therefore, the multiprofessional team should explain the patients' situation to relatives or friends, with a view to encouraging effective participation in physical and emotional help to these patients<sup>(17-18)</sup>.

## CONCLUSIONS

These results reveal that, as for subjects' sociodemographic data, ages ranged from 18 to 59 years, with 31.8 years as the average age; 91.9% were men; 51.3% declared they were white and 31.1% mulatto; 47.2% were single, while 45.9% were married or lived in consensual union. As for the education level, 36.5% had finished secondary education and 25.7% had not finished primary education.

With regard to the trauma and functional independence-related aspects, the data reveal that 73.0% were victims of lower limb and 13.5% of upper limb injuries; 47.2% of the interviewees had exposed fractures; 58.1% were victims of automobile accidents and 20.2% of falls; 32.7% of events occurred at weekends and 20.3% on Wednesdays; cases were concentrated between 18h and 23:59 h (31.1%) and between 12h and 17:59h (29.7%). Average motor and total FIM scores considerably increased upon discharge and one month after returning home when compared with the time of hospital admission. On the other hand, insignificant variation was found for mean scores in the cognitive-social domain at different assessment times, maintaining a linear pattern. Finally, it was observed that functional disability increased in cases of car accidents, runovers and injuries by fire arms, as well as a significant association between lower limb fractures and greater functional impairment.

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