ORIGINAL ARTICLE

Impact of violence by firearms on adolescent and young adults hospitalized in a referral hospital based in the International Classification of Functioning, Disability and Health

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ABSTRACT

The International Classification of Functioning, Disability and Health (ICF) generates health information and allows identification of the impact on the functionality in different clinical situations, for example in drilling by firearms (PAF). **Objective:** The aim of the study was describe the impact of violence by firearms on adolescent and young hospitalized in a referral hospital in trauma based in the international classification of functioning, disability and health. **Method:** Descriptive, cross-sectional, quantitative, conducted from June to December 2014, in Fortaleza-CE, Brazil. The sample consisted of 231 participants of both genders and aged 12 to 24 years. Applied a summary list of ICF in two moments, the admission and discharge. **Results:** The most altered categories of Activity and Participation component at admission were mobility (72.27%), interactions relationships (65.4%) and self-care (37.8%); Body component and respiratory functions were (26.71%), and sensory pain (25.35%), voice and speech (20.1%), mental (13.26%) and neuromusculoskeletal (11,04%). At discharge, the most altered categories of Activity and Participation component were interactions relationships (64.5%), mobility (36.79%) and self-care (29.29%); and the Body Functions component were sensory and pain (23.38), voice and speech (16.8%), mental (13.26%), neuromusculoskeletal (10.45%), and respiratory system (5.05%). The categories related to mobility and breathing, were those with the highest percentages of improvement in high, while the sensory functions and activities related to interpersonal interaction showed the lowest percentage of improvement. **Conclusion:** This classification made it possible to trace a feature profile of these individuals and encode information by CIF, detecting the risk of functional impairment at admission and discharge, decisive for the resolution of the clinical realities.

Keywords: International Classification of Functioning, Disability and Health, Violence, Wounds, Gunshot, Adolescent, Young Adult

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Received on September 15, 2016.
Accepted on April 19, 2018.

DOI: 10.5935/0104-7795.20170036

INTRODUCTION

The hospitals are currently dealing with a significant challenge, which is the attempt to avoid function deficits of hospitalized patients, a situation that requires changes of paradigm of all multiprofessional staff. By focusing functionality, it is easier to address healthcare towards outcomes requested by the patients, since admission to discharge and beyond.[1]

The issues that will be addressed by the healthcare professionals oriented to the comprehension of the relationships among structures and functionality disabilities must include therapeutic and preventive advancements towards functional recovery of patient with chronic health conditions. This rationale emphasizes that these professionals need to consider therapeutic tools based on risk factors for functional disabilities of their patients, addressing all recovery potential during the planning of the intervention.[2]

The means to classify the functional status of hospitalized patients are: description (data used for establishing the treatment goals); screening and evaluation (for details in detection of disabilities and for establishing interventions); and monitoring (activity that is conducted along the treatment, with lower demands for details, although suitably adequate for identifying functionality changes and the treatment evolution conditions).[1]

The prevalence of chronic health conditions of hospitalized patients, such as those with firearms injuries, usually combined with several disabilities, are paired with the complex Brazilian epidemiological condition, and, therefore with the lack of means to assess the impact of these conditions in this population. Moreover, the classical indicators, such as the mortality rate and morbidity indicators, are insufficient to reveal the real health statuses and health demands of these patients, once they do not cover the patients' health and morbidity situation with precision.[3]

The functionality changes of patients aging 12 to 24 years is correlated to the considerable number of adolescents and young adults who undergo serious consequences of gunfire. In Brazil, it is estimated that, for every dead underaged person, there are other 12 individuals either hospitalized or with permanent disabilities. The social impact of these events is enormous. This impact affects economical areas, given these individuals usually leave their job and, therefore, increase the financial load of the public health system, their productivity may be reduced or even lost, whereas there may be irreparable consequences to quality of life, and occurrences of mental disorders. At last, there are also irreparable emotional impact to the victims and to their families as well.[4] It has been shown that approximately 20% of non-lethal firearm injuries cause physical or neurological disabilities.[5]

The International Classification of Functioning, Disability and Health (ICF) is a model and reference for disability classification, regardless the disease. It is multidimensional and extensive, covering different aspects, such as biological, psychological, functional, and environmental, and it can be applied by any multiprofessional health team for classifying disabled patients.[6]

In this context, it has become evident that health organizations must comply and promote good quality health care for adolescent and young adults who become a victim of firearm violence.[7] A study on functionality of these subjects may contribute to its understanding and to establish public policies towards this population, reaching the health assistance of these patients.[8]

This reality is the starting point to analysis and questionings regarding the real impact of this type of violence: what functional impacts are caused by a firearm injury? The search to answer this question was the main motivator of this study, whose emphasis is to classify the health conditions and functionality of hospitalized adolescents and young adults due to firearm injuries at a tertiary trauma public hospital.

Therefore, the functionality analysis could be conducted in a broad manner, what elevated the importance of this research, given there was an association between the health status and the functional diagnosis, a deeply important issue for the therapeutic planning.

OBJECTIVE

The objective of this study is to describe the impact of firearm violence in adolescents and young adults hospitalized in a reference hospital, based on the ICF classification.

METHODS

This is a prospective descriptive and quantitative research conducted from June to December of 2014 in the city of Fortaleza – CE, Brazil.

The study was conducted in the Hospital Institute Dr. Jose Frota (IJF), a tertiary public hospital, the biggest emergency Hospital of the Ceará state, a reference of high complexity trauma care. It is also considered a school hospital for research on public health policies.[9]

The study population was composed of adolescents and young adults (12 to 24 years of age) of both sexes, hospitalized after firearm injury between June and December of 2014, from a list of 420 individuals. Given the impossibility to evaluate all the patients in the list, a sample was calculated for finite population and 231 was the number of participants who was studied. All cases of suicide and accidents were excluded.

A reduced ICF list was used to classify functionality. This assessment was conducted in two timepoints: at admission (or 10 after the hospitalization admission), and at discharge, or as soon as the discharge was decided. The functional evaluation used the hospital standardized methods and scales. Active recruitment, according to the inclusion criteria, was conducted three times a week.

The reduced ICF list was filled after the functional evaluation, based on the rules for qualifier codes. Its purpose was to focus on the Part 1 of the ICF (Functioning and Disability), given the primary objective of this study. From the Part 1, two components were used: Functions and Body Structures and Activities and Participation. However, due to the study goals, the domains and categories below were used:

- Functions (b): mental functions (b1), sensory functions and pain (b2), voice and speech functions (b3), Functions of the respiratory system (b4), and Neuromusculoskeletal and movement-related functions (b7);
- Body structure (s): structure of the nervous system (s1), structures involved in voice and speech (s3), structures of the cardiovascular system (s4), and structures related to movement (s7);
- Activities and Participation (d): Mobility (d4), self-care (d5), and Interpersonal interactions and relationships (d7).

In each domain, the specific functions mostly related to our study was chosen to compose the reduced list used to classify the patients.

The codes for classifying functionality were based on the qualifiers. In this study, regarding Body Functions and Structures, the qualifiers were applied to identify whether the patient had the disability, however, the magnitude of the disability was not considered. Therefore, the code zero (0) was used when the patient

did not have any disability (bXXX.0) and the code 8 (8) indicated that the patient had a non-identified disability, i.e. the disability was onset, but was not classified according to magnitude (bXXX.8). Whenever a certain category was not possible to be evaluated due any problem with the patient, the code 9 was used, which stood for non-aplicable (bXXX.9). This was the method used with the reduced ICF list of classifications, once it was more practical and it did not confuse the classification itself, the primary outcome, with unnecessary disability magnitude.

The confirmation of the patients' functionality recovery was addressed by investigating whether the disability was absent at discharge, regardless the extent of their recovery, once the disability magnitude was not addressed.

Both domains of Activities and Participation were classified combined. The qualifiers were: (dXXX.YZ) – performance (Y) and capacity (Z). In our study, however, the qualifier "performance" was not analyzed, once it is the classification of what the patients can perform in a normal environment, not in a standardized setting, such as a hospital. For this reason, the performance and capacity qualifiers were reported as dXXX.Z.

Regarding the qualifier "capacity", it was recorded as: code zero (0) for no difficulty, or eight (8) for non-specified difficulty, i.e. onset, but not quantified. The qualifiers were used for identifying whether the difficulty was present or not, regardless its magnitude. Whenever the patient unable to have the "capacity" qualifier addressed, the data was considered non-applicable a code nine (9) was used.

For the evolution of capacity from admission to discharge, whenever a difficulty that was present at admission and that was not reported at discharge, we considered there was functionality recovery, regardless of how much of that difficulty was changed or improved, once the difficulty magnitude was not addressed.

The statistical pack SPSS 20.0 was used for data compilation and analysis. A descriptive analysis of all variables with absolute and relative frequencies for categorical variables, and means, standard deviations, minimum and maximum for the continuous variables. The categorical and continuous variables were used for identifying possible associations. The Mann-Whitney test was used for comparing numerical variables, and chi-squared and Fisher's exact test was used for comparing categorical data. Significance level was set at 5% ($p<0.05$).

The study was approved by the Ethics Review Board (ERB) of the IJF under Brazilian regulations and was approved with registration number 692.559.

RESULTS

The study population was formed of 231 adolescents and young adults from 12 to 24 years of age, who were hospitalized at a tertiary trauma facility in Fortaleza, a city of Ceara State in Brazil.

Regarding the functionality aspects analyzed, we emphasize that all alterations and difficulties reported by the patients were considered and we comprehend that a sigle patient may have more than one difficulty. This explains the total number of events is wider than the number of patients.

Per methodology, the ICF is formed by codes which in turn is composed of letters and numbers. For this reason, the aspects of functionality were related with their respective code in the description of the results.

Functionality aspects at admission

Based on the ICF components, the categories and their levels mostly affected at admission are listed below (Figure 1):

- Activities and Participation associated to mobility (d4) with 331 (72.27%) observations of functionality difficulties, in which postural changes (d410._8) and gait (d450._8) are included;
- Activities and Participation associated to Interpersonal interactions and relationships (d7) with 151 (64.4%) observations of functionality difficulties, in which basic interpersonal interaction (d710_.8) is included;
- Activities and Participation associated to self-care (d5) with 262 (37.8%) observations of functionality references, in which independence for process of bodily excretion (d530._8), eating (d550._8), and drinking (d560._8) are included;

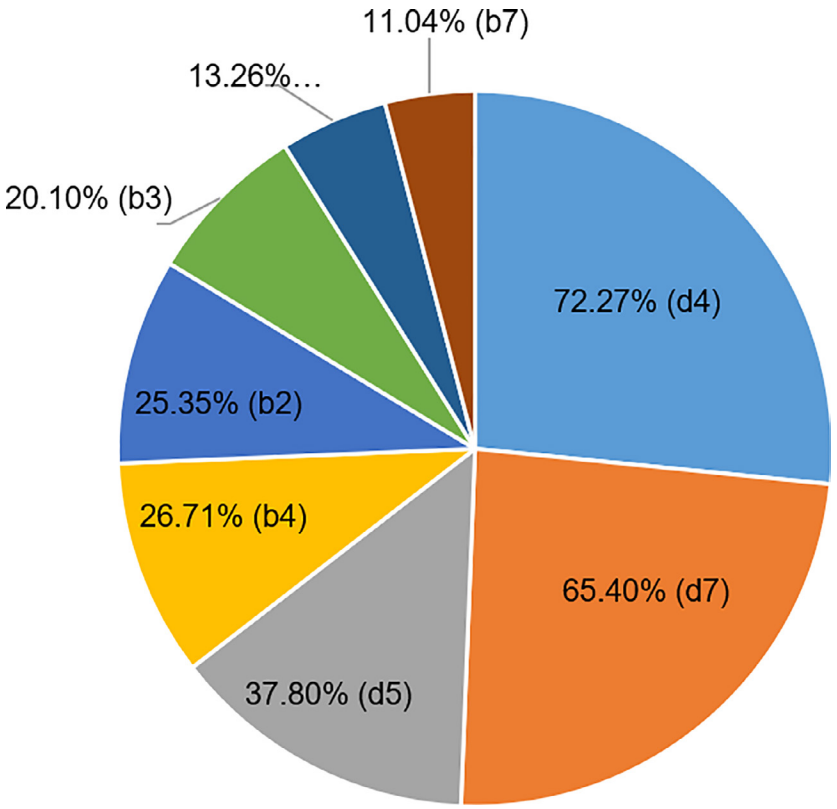

Figure 1. Proportion of functionality according to category changes observed in patients after gunfire injury, at hospital admission. d4, mobility; d7, Interpersonal interactions and relationships; d5, self-care; b4, respiratory system; b2, sensory functions and pain; b3 voice and speech functions; b1, mental function; b2 neuromusculoskeletal and movement-related functions.

- Functions of the respiratory system (b4) with 370 (26.71%) observations of functionality difficulties, in which respiratory function (b440.8), respiratory frequency (b4400.8), respiratory rhythm (b4401.8), respiratory depth (b4402.8), use of artificial respiratory tract and oxygen (b4409.8), as well as additional respiratory functions such as cough efficacy (b450.8) are included;
- Sensory functions and pain (b2) with 232 (25.35%) observations of functionality difficulties, in which functions of sight (b210.8), hearing (b230_8), tactile function (b265.8), and pain (b280.8) are included;
- Voice and speech functions (b3) with 45 (20.1%) observations of difficulties in this function;
- Mental function (b1) with 61 (13.26%) observations of difficulties, in which awareness (b110.8) and orientation (b114.8) are included;
- Neuromusculoskeletal and movement-related functions with 306 (11.04%) observations, in which strength and individual and group muscles tonus (b730.8 and b7350.8 respectively), strength and tonus of muscles of a single (b7301.8 and b7351.8 respectively), strength and tonus of muscles of one side of the body (b7302.8 and b7352.8 respectively), strength and tonus of the muscles of the lower part of the body (b7303.8 and b7353.8 respectively), strength and tonus of muscles of all limbs (b7304.8 and b7354.8 respectively), and strength and tonus of all muscles of the body (b7306.8 and b7356.8 respectively).

We also observed that, still at admission, among the activities and participation categories (d) were the most evident categories affected. By analyzing each specific category at admission, the most affected categories are listed below (Figure 2):

- Gait (d450._8), with reference to mobility function (d4): 191 (84.1%) observations of difficulties;
- Changes in basic posture of the body (d410._8), with reference to mobility function (d4): 170 (73.6%) observations of difficulties in this function;
- Basic interpersonal interactions (d710._8), with reference to interpersonal relationship and interaction (d7): 151 (65.4%) observations of difficulties;
- Gait standard (b770.8), with reference to neuromusculoskeletal function (b7): 57 (57%) observations of difficulties;
- Pain sensation (b280.8), with reference to sensory functions (b2): 108 (46.8%) observations of difficulties.

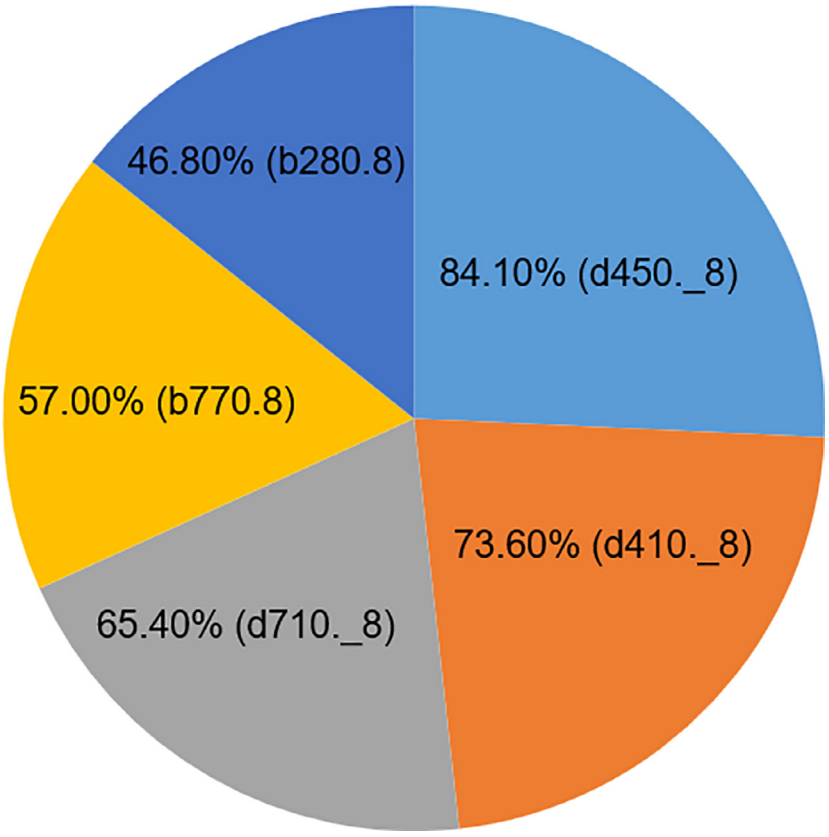

Figure 2. Proportion of functionality according to category changes observed in patients after gunfire injury, at hospital admission. d450._8, gait; d410._8, changes in body posture; d710._8, interpersonal relationship; b770.8, gait standard; b280.8, pain sensation.

Among activities and participation classifications (d) observed at admission, the least affected categories at admission was neuromusculoskeletal function (b7), i.e. functions of the body (b), as listed below (Figure 3):

- Muscle tonus of all limbs (b7354.8) with four (1.7%) observations of difficulties;
- Muscle strength of all limbs (b7304.8) with five (2.2%) observations of difficulties;
- Muscle tonus of all muscles of the body (b7356.8) with seven (3%) observations of difficulties;
- Muscle tonus of isolated or groups of muscles (b7350.8), and muscle tonus of muscles of one side of the body (b7352) with nine (3.9%) observations of difficulties;
- Muscle strength of all muscles of the body (b7306.8) with 10 (4.3%) observations of difficulties.

Functionality aspects at discharge

Based on the ICF components, the categories and their levels mostly affected at discharge are listed below (Figure 4):

- Activities and Participation, with reference to interpersonal interactions and relationships (d7._8) with 149 (64.5%) observations of difficulties;
- Activities and Participation, with reference to mobility (d4._8) with 170 (36.79%) observations of difficulties;
- Activities and Participation, with reference to self-care (d5._8) with 203 (29.29%) observations of difficulties;
- Sensory functions and pain (b2.8) with 214 (23.38%) observations of difficulties;

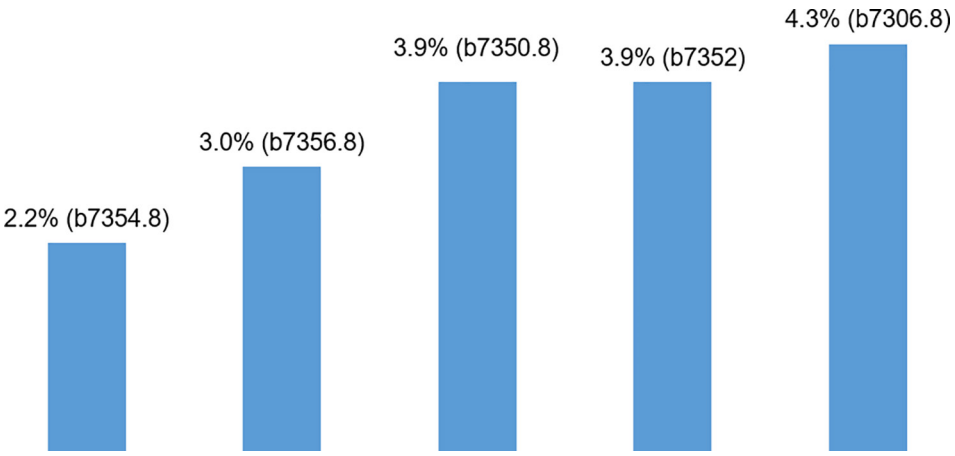

Figure 3. Proportion of functionality of the least affected categories observed in patients after gunfire injury, at hospital admission. b7354.8, muscle strength of all limbs; b7356.8, muscle tonus of all muscles of the body; b7350.8 muscle tonus of isolated or groups of muscles; b7352.8, muscle tonus of muscles of one side of the body; b7306.8, muscle strength of all muscles of the body.

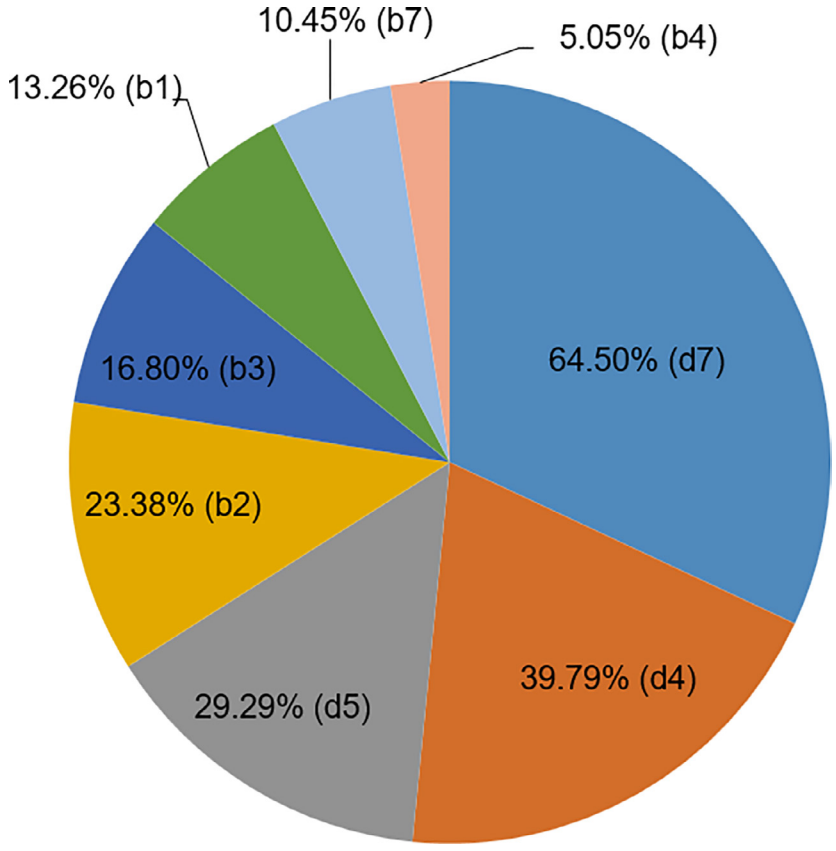

Figure 4. Proportion of functionality changes according to category changes observed in patients after gunfire injury, at hospital discharge. d7, interpersonal interactions and relationships; d4, mobility; d5, self-care; b2, sensory functions and pain; b3, voice and speech function; b1, mental function; b7, neuromusculoskeletal functions; b4, functions of the respiratory system.

- Voice and speech functions (b3.8) with 38 (16.8%) observations of difficulties;
- Mental functions (b1.8) with 61 (13.26%) references of difficulties;
- Neuromusculoskeletal functions (b7.8) with 300 (10.45%) observations of difficulties;
- Functions of the respiratory system (b4.8) with 70 (5.05%) observations of difficulties;

We also observed that, within the categories described as changed at hospital discharge, those related to activities and participation (d) were the most reported by the patients. The specific categories and their levels that mostly affected the patients are listed below (figure 5):

- Basic interpersonal interactions (d7), with reference to interpersonal interactions and relationships (d710._8):149 (64.5%) observations of difficulties;
- Gait (d450._8), with reference to mobility function (d4): 110 (47.6%) observations of difficulties;
- Strength of a single limb (b7301.8), with reference to neuromusculoskeletal function (b7): 102 (44.2%) observations of difficulties;
- Tactile function (b265.8), with reference to sensory functions (b2): 98 (42.6%) observations of difficulties;
- Pain sensation (b280.8), with reference to sensory functions (b2): 92 (39.8%) observations of difficulties.

We also observed that, activity and participation (d) were reported as the mostly affected at hospital discharge, by the patients. Concerning the categories with the least reports of alterations at discharge were those within the body functions categories (b), as listed below:

- Muscle strength of all limbs (b7304), and muscle tonus of all limbs (b7354.8), both with reference to neuromusculoskeletal function (b7) with four (1.7%) observation of difficulties;
- Oxigen thehrapy needs (b4409.8), with reference to respiratory tract functions (b4) with five (2.2%) observations of difficulties;
- Respiratory system (b4401.8), with reference to respiratory tract functions (b4) with six (2.6%) observations of difficulties;
- Muscle tonus of all muscles of the body (b7356.8), with reference to neuromusculoskeletal function (b7) with seven (3%) observations of difficulties;
- Muscle tonus of isolated or group of muscles (b7350.8), with reference to

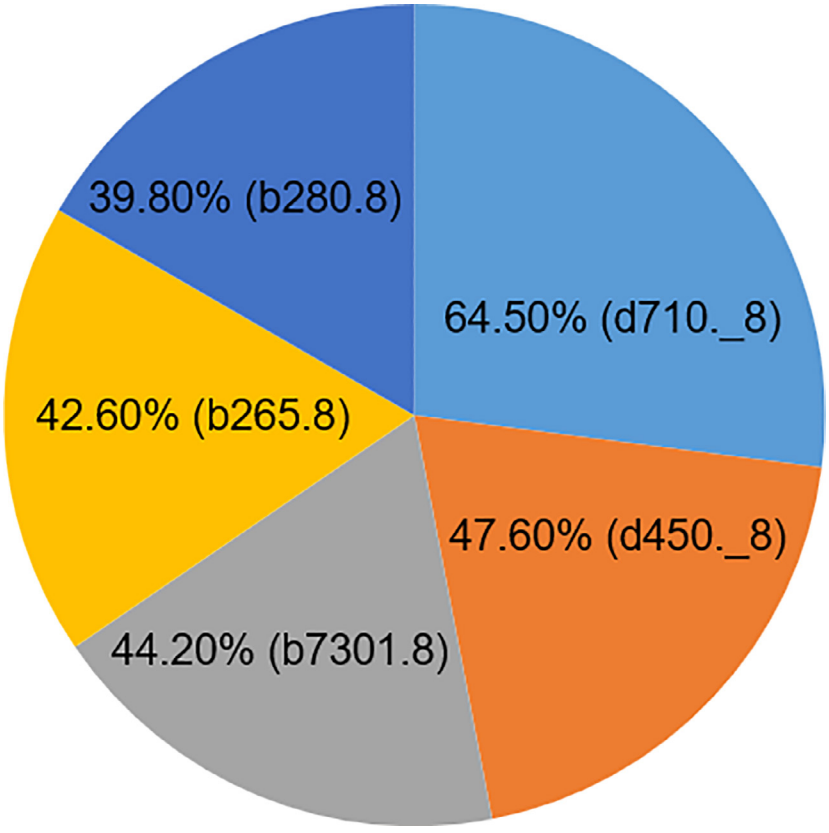

Figure 5. Proportion of functionality changes according to category changes observed in patients after gunfire injury, at hospital discharge. d710._8, interpersonal interactions and relationships; d450._8, gait; b7301.8, strength a single limb; b265.8, tactile function; b280.8, pain sensation.

neuromusculoskeletal function (b7) with eight (3.5%) observations of difficulties.

DISCUSSION

It is known that, with the International Classification of Functioning, Disability and Health (ICF) is not classified according to a specific disability, so that the emphasis is given functionality and to aspects that facilitate or jeopardize the performance of activities.[10]

In this study, the ICF was used to classify 231 adolescents and young adults after firearm injury. At admission, changes in the categories of mobility (d4) were the most observed in this study, as well as those with reference to interpersonal interactions and relationships (d7), followed by those with reference of self-care (d5). Within these categories, in order of occurrences, the specific categories were gait alterations (d450._8), changes in body posture (d410._8), and basic interpersonal interactions (d710._8).

Some authors emphasize that mobility reduction due to gait disability, means difficulties to freely move around the house or in other areas. Motor alterations may arise from muscle weakness, spasticity and abnormal movement patterns, what may jeopardize, or even restrict, transferences, gait and activities of daily life, and, consequently, restrict social participation.[11]

In general, the participants of this study demonstrated deficiencies in several functions, such as respiratory (b4), speech and voice (b3), mental (b1), sensory (b2) and neuromusculoskeletal (b7) functions. For the elaboration of a therapeutic plan, preserved capacities and known difficulties are important information.

At all times, the patient's independence is sought in relation to the physical, cognitive and behavioral limits imposed by the disability. In people affected by firearm injury, locomotion and loss of postural control represent common affected functions. The individual's physical and psychological health conditions are important in the promotion, prevention and recovery of health in the rehabilitation process.[12]

In this study, at discharge there was a lack of improvement in mental function (b1) when compared to admission and a discrete improvement in interpersonal interaction (d7) and sensory (b2) functions. At discharge, there was also improvements in the categories with reference to mobility (d4) and respiratory functions (b4). Despite the improvement, however, not even half of the participants experienced improvements, neither in the mobility categories (d4) nor in the respiratory function (b4).

Regarding the alterations in the function component (b), two categories that were not observed as altered at the time of admission, tactile function (b265.8) and single limb strength (b730.8), were among the most altered at discharge. It can also be observed that two categories of the activity and participation component (d), found in the list of the most altered at admission, are no longer included in the list of most altered at the time of discharge, what suggests improvements, such as a change in the basic position of the body (b730.8) and walking pattern (b770.8).

Concerning the analysis of categories that were altered both at admission and at discharge, only the gait category (d450._8) showed improvement, what indicates that some of the participants who did not walk or who had difficulty during gait, were able to walk at discharge. Nevertheless, pain sensation function (b280.8) and activities and participation (d) with reference to basic interpersonal interactions (d710.8) barely improved.

We emphasize that in the hospital where the research was conducted, there is a significant lack of psychologists and only one occupational therapist. In this perspective, the approach of the interdisciplinary health team for improving their assistance aims at sharing knowledge, skills and attitudes, in order to reduce or mitigate possible sequelae that may arise as a result of firearm injury.[13]

Two categories related to respiratory function (b4) are in the list of the least altered at discharge and both were not among the least affected at the admission, meaning that from admission to discharge there was a decrease in the number of difficulties of these functions, that is, they improved. It is worth mentioning that the hospital the study was conducted has physiotherapeutic respiratory assistance every day of the week.

According our study, in patients with thoracic trauma due to firearm injury, respiratory physiotherapeutic intervention brings benefits in the physiological parameters of pulmonary auscultation, oxygen saturation and blood gases, reducing the risk of

complications of respiratory functions and hospital infections.[14]

Other categories of the function component (b) included in the list of least changed at discharge, as well as all categories listed among the least changed at admission, are included in the neuromusculoskeletal functions category (b7). There was no evident improvement in these categories between admission and discharge. Dysfunctions related to muscle strength deficits and movement difficulties interfere with the ability to maintain postural control, which interfere with the performance of the individual's functional activities.[15]

When analyzing the state of functionality at the time of admission and discharge, we observed that the categories of the components functions (b) and activity and participation (d) mostly affected were those related to mobility, neuromusculoskeletal functions and respiratory functions.

CONCLUSION

The ICF allowed the health professionals of the hospital of the study to draw a profile of functionality specific for the situation experienced by adolescents and young adults, victims of gunfire injury according to their specific context, allowing the identification of deficiencies, limitations and restrictions that keeps the patients disabled, decisive elements for the resolution of clinical realities.

Based on the components of the ICF, it was shown that the functional impairment was more evident in relation to the categories of activities and participation (d), both in hospital admission and discharge, confirming that the injuries resulting from gun violence can cause different kinds of disabilities.

If institutions could better identify these disabilities by analyzing the status of functionality and encoding information by the ICF, this information could be systematically monitored and used to provide efficient referencing for services in the Health Care System and for other sectors beyond Health, ensuring the rehabilitation process of these adolescents and young people.

The functional evaluation of adolescents and adolescents after firearm injury during the study period made it possible to know the functional status of these victims in an interdisciplinary manner, based on the multidirectional model of the ICF, detecting the risk of functional disability at the time of admission and at discharge. It also made it easier to identify structural and functional disabilities, limitations on the execution of human activities, and participation restriction.

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