

## Epidemiological Data of Amputations in Children

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### Abstract

**Aim:** The aim of this study was to identify epidemiological data and the main complications in under 15-year-old amputees of a regional reference center in Brazil.

**Methods:** A descriptive and quantitative retrospective cross-sectional study was made of the main causes for amputations performed in the period from January 1998 to January 2008 in Hospital de Base, São José do Rio Preto in under 15-year-old individuals. Data, including the age of the patient, gender, rehospitalizations or further procedures and the reason for surgery were obtained from hospital records identified by the international classification of diseases (ICD) code for amputation. For descriptive statistics, the frequency of events is reported.

**Results:** A total of 44 children, with ages ranging from 7 months to 15 years old, were submitted to amputations. Eleven (25%) of the children were girls and 33 (75%) were boys. Forty-eight procedures were performed including three re-operations: one to revise the level of amputation, one review of the stump and one debridement. Fifteen surgeries (31.81%) were major amputations of the lower extremities and 1 (2.27%) was of an upper extremity, 18 (40.90%) were amputations of fingers and 11 (25.0%) amputation of toes. The review of the stump was for infection. No deaths occurred.

**Conclusion:** Major amputations are less common in children than in adults, and normally involve the lower extremities. The mortality rate is low but rehabilitation is necessary.

**Keywords:** Epidemiology; Amputations; Children

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### Introduction

Amputation surgery in children is a relatively uncommon procedure. The most frequent indications for amputation are congenital limb deformities and trauma; tumors, infection and other rare conditions are less common [1]. Important differences exist in the management of child and adult amputees. Many factors, including the etiology of childhood limb deficiencies, expected skeletal growth, functional demand on the locomotor system and the prosthesis, appositional bone stump overgrowth, and psychological challenges, make caring for these young patients particularly challenging [2].

Studies show that no statistically significant relationship exists between amputation injury and the child's age, and 98% of amputations occurred to either the foot/toe (50%) or the hand/finger (48%). Amputations account for only 5% of total injuries;

however, amputations had a statistically significant relationship with disposition from the emergency [3].

Despite the available multidisciplinary diagnostic and treatment modalities at tertiary care pediatric trauma centers, traumatic vascular injuries in children and adolescents are associated with significant morbidity and mortality in the contemporary surgical practice [4]. Prospective long-term follow-up of pediatric patients with lower-limb tumors are needed to determine in a uniform manner the long-term complications, quality of life, and functionality of this population and describe differences within this patient population based on age at diagnosis and surgical procedure [5].

The aim of this study was to identify epidemiological data and the main complications in under 15-year-old amputees of a regional reference center in Brazil.

## Methods

The main causes for amputations performed in under 15-year-old individuals in the period from January 1998 to January 2008 in Hospital de Base, São José do Rio Preto was retrospectively evaluated in a descriptive and quantitative cross-sectional study.

Data, including the age of the patient, gender, rehospitalizations or further procedures and the reason for surgery were obtained from hospital records identified by the international classification of diseases (ICD) code for amputation. The data were input on an Excel spreadsheet. For descriptive statistics, the frequency of events was reported.

This work was approved by the Research Ethics Committee of the Medicine School in São José do Rio Preto (FAMERP).

## Results

A total of 44 children, with ages ranging from 7 months to 15 years old, were submitted to amputations. Eleven (25%) of the children were girls and 33 (75%) were boys.

Forty-seven procedures were performed including three re-operations; one to revise the level of amputation, one review of the stump and one debridement.

Fifteen surgeries (31.81%) were major amputations of the lower extremities and 1 (2.27%) was of an upper extremity, 18 (40.90%) were amputations of fingers and 11 (25.0%) amputations of toes, as **Table 1**. The review of the stump was for infection. No deaths occurred.

The causes for major amputations of the lower extremities were: trauma (10), neoplasm (3), vasculitis (1) and vascular malformation (1). The amputation of the upper extremity was due to an accident. The amputations of the toes and fingers were due to: trauma (24), gangrene (4), osteomyelitis (4) and genetic malformation (1).

**Table 1** Shows the levels of amputation of the extremities.

(31.81%) were major amputations of the lower extremities
(2.27%) was of an upper extremity
(40.90%) were amputations of fingers
(25.0%) amputations of toes

## Discussion

The current study shows that major amputations of the lower extremities are more common than of the upper extremities however, amputations of the fingers are more prevalent than of the toes. An epidemiological study reported that the feet and hands have a similar number of injuries [3]. Boys were more frequently affected than girls with accidents being the main cause of amputations. No deaths occurred in this study however amputations cause significant morbidities. In adults the mortality rate after amputation is significant [6].

The causes of amputations in children have regional variations and may vary with the type of accidents common to each region [7-9]. These causes are important as they may interfere in social, emotional and economic aspects. When neoplasms are the cause of amputation, the emotional aspect is important due to the expectation of surgery and the evolution of the disease.

Studies have shown that the majority of traumatic amputation injuries occur to young children, to boys, and to fingers, with the majority involving doors. Adolescents experience a higher proportion of more serious amputation injuries [10]. Although accidents are possible at any age, more care is needed for infants. As several studies have previously reported, the precautions taken to prevent injuries in children are insufficient, and so this serves to reinforce the warning about this type of complication [3,10].

Neoplasms are an important cause of amputations and despite of the evolution of treatment over recent years this procedure is still a treatment option for many neoplasms in both children and adults [11,12].

The complications of amputation are less severe and less common in children than in adults however some aspects should be remembered such as the possibility of greater bone growth than cutaneous muscle tissue; at the time of the study, further amputations of the bone were required to normalize the stump [13]. Rehabilitation of children requires specialized centers and thus it is essential to minimize the consequences of amputations.

## Conclusion

Major amputations are less common in children than in adults, are associated to a low mortality rate and in this study affected the lower limbs more frequently.

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