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The past 25 years of pediatric burn treatment in Graz and important lessons been learned. An overview☆

Marija Trop [a,*], Sereina A. Herzog [b], Klaus Pfurtscheller [a], Angelika M. Hoebenreich [a], Michael V. Schintler [c], Andrea Stockenhuber [d], Lars-Peter Kamolz [c]

[a] Children's Burns Unit, Department of Pediatrics and Adolescent Medicine, Medical University of Graz, Graz, Austria
[b] Institute for Medical Informatics, Statistics and Documentation, Medical University of Graz, Graz, Austria
[c] Division of Plastic, Esthetic and Reconstructive Surgery, Department of Surgery, Medical University of Graz, Graz, Austria
[d] Division of Anesthesiology for Cardiovascular Surgery and Intensive Care Medicine, Department of Anesthesiology and Intensive Care Medicine, Medical University of Graz, Graz, Austria

ARTICLE INFO

Article history:
Accepted 1 October 2014

Keywords:
Pediatric
Burns
Epidemiology
Prevention
Length of hospital stay (LOS)
Burn center

ABSTRACT

Introduction: The aim of this study was to characterize the epidemiology of pediatric and adolescent burns admitted to the Children's Burns Unit at the Department of Pediatrics and Adolescent Medicine, Medical University of Graz, Austria, between January 1st 1988 and December 31st 2012.
Methods: This is a retrospective review over the past 25-years and describes admission rate by gender and age groups, causes of burns, anatomical sites of burns, extent and depth of injury, length of hospital stay, child abuse and in-hospital mortality.
Results: In the studied 25 year-period, 1586 pediatric burn patients were admitted. 1451 patients were "acute" admissions, 64 "secondary" admissions and 71 patients did not fulfill the inclusion criteria. Of the 1451 patients, 930 (64%) were male and 521 (36%) female. The majority of patients – 880 or 60.6% – were children from 1 to 5 years of age. Domestic burns occurring at home resulted in 1164 (80.2%) of injuries and scalds were the most common type of thermal trauma with 945 (65.1%) patients. According to the extent of injury 1106 (76.2%) patients suffered burns of <10% with an median length of hospital stay of 3 days. 14 children (0.98%) – 8 girls and 6 boys – were confirmed victims of abuse and 4 patients (0.3%) died.
Conclusion: The study provides a good opportunity to review changes in burn care over a long time period, at a single center, including children and adolescents, with stable surgical and rehabilitation staff. The data is also important for the design of prevention programs and establishment of burn care capacities, since the analysis showed no change in the incidence of burn related admissions over the time period studied.

☆ Data presented in this study has been used to some extent for the final year project at the Medical University Graz with the title "Epidemiologische Studie über thermisch verletzte Kinder und Jugendliche in den Jahren 1988–2011", written by Angelika M. Hoebenreich in 2013.

* *Corresponding author at*: Children's Burns Unit, Department of Pediatrics and Adolescent Medicine, Auenbruggerplatz 30, 8036 Graz, Austria. Tel.: +43 316 385 12606.
E-mail addresses: marija.trop@medunigraz.at (M. Trop), herzog.sereina@gmail.com (S.A. Herzog), klaus.pfurtscheller@klinikum-graz.at (K. Pfurtscheller), angelika.hoebenreich@gmail.com (A.M. Hoebenreich), michael.schintler@medunigraz.at (M.V. Schintler), andrea.stockenhuber@klinikum-graz.at (A. Stockenhuber), lars.kamolz@medunigraz.at (L.-P. Kamolz).
http://dx.doi.org/10.1016/j.burns.2014.10.001
0305-4179/

1. Introduction

Burns are as old as a fire; they have always existed and they will always persist, because there is no life without ''fire''. However the questions asked are: how can we prevent the undesirable effects of ''fire'', how can we reduce the number of burn victims and how can we minimize the severity of burns.

To develop proper prevention measures it is necessary to analyze the causes of injuries first; then to draw the right conclusions and finally eliminate those causes. In this respect the etiological and epidemiological studies play a crucial role. Etiology refers to the study why things occur, or even the reasons behind the way that things act. Epidemiology is concerned with the distribution and determinants of health and diseases, morbidity, injuries, disability, and mortality in populations; epidemiology examines the distribution and determinants of disease occurrence among population groups and focuses attention on asking why certain diseases concentrate among particular population groups [1].

According to the ''World report on child injury prevention 2008'' by WHO in 2004, 310,000 people died as a result of fire related burns, of whom 30% were under the age of 20 years. Children are at high risk for death from burns, with a global rate of 3.9% deaths per 100,000 population. Among all people globally, infants have the highest death rates from burns [2]. Burns can also result in significant long-term consequences which can leave children physically and physiologically impaired for the rest of their lives. The most common problems include hypertrophic scaring, extensive contractures, and the formation of keloids. The most vulnerable groups in all countries for burns are children and the elderly. Lack of supervision of children, frailty and co-morbid illnesses of the elderly, clothing made of flammable materials, parental illiteracy, congested housing, pre-existing impairment of a child, and low socioeconomic status are important risk factors for burns. Infants and toddlers up to the age of four years make up almost one-third of all burns [3,4] in high income countries (HIC) the number of burn children is reported to be decreasing; whereas in low-income (LIC) and middle-income countries (MIC) the number of burn victims has stayed consistent or even shows an upwards tendency [2].

In 2012 Austria had a population of 8.43 million; the percentage of the population under the age of 20 years was 20.2%. At the same time Styria had a population of 1,209,466 people, of which 231,242 (19%) were under 20 years. The provincial capital of Graz had a population of 404,093 [5]. In 2012 Austria's GDP (gross domestic product) was 307 milliard Euro [6]. Health care expenditure as a percentage of the GDP amounted to 11.1% in 2012. The human develop index (HDI) was 0.895. This ranked Austria in 2012 at number 18 in terms of most developed countries [7].

In mid-1987, the Children's Burns Unit at the Department of Pediatrics in Graz was established. Prior to that, burnt children were treated at the Department of Pediatrics as well, but depending on their age they were scattered throughout the baby, toddler or schoolchildren wards. The victims with the most severe thermal injuries were admitted to the pediatric intensive care unit. Since 1988 all pediatric patients with burns have been concentrated at the burns unit and in 1989 an additional outpatient clinic opened.

With the analysis of our data over a period of 25 years we investigate aspects mentioned and examine the change of burn admissions to our Burns Unit at the Department of Pediatrics and Adolescent Medicine, Graz, Austria. We are convinced that our study is representative in many respects for HIC and we will discuss our findings regarding socioeconomic factors in Austria.

2. Methods

2.1. *Patients*

This retrospective study took place at the Children's Burns Unit at the Department of Pediatrics and Adolescent Medicine, Medical University of Graz, Austria and was approved by the ethical commission of the Medical University of Graz, Austria (#26-269 ex13/14). We studied pediatric and adolescent patients who were admitted for treatment of acute burns or their sequelas at our unit between January 1st 1988 and December 31st 2012. Our catchment area includes South-East Austria (Styria and bordering regions of Carinthia and Burgenland) with a population of approximately 1.35 million people. Through retrospective analysis, the data obtained from the medical records provided detailed information about the patients as well as the accident itself. Of particular interest were the incidence, the development over time, the accident characteristics, the gravity of the injury and the associated risk factors such as length of hospital stay (LOS) and mortality. The study analyzed in-patients and was made up of acutely admitted patients, meaning burned patients who received immediate intensive medical treatment, as well as secondary in-patients with chronic wounds from a burn who underwent either a follow-up treatment or reconstructive surgical intervention. Acute and secondary admissions were distinguished from one another by means of the time interval between the date of the accident and the date of admission. In doing so, acute burns were characterized by the fact that the date of the accident was no more than 30 days from the date of admission. When admitting patients with chronic injuries, however, this time interval was set at 31 days and above. In order to be considered an in-patient, patients had to have spent a minimum of one full day in the Burns Unit.

2.2. *Data*

This study is a retrospective data analysis of a total of 1586 acquired data records. For the analysis, all burn-injury in-patients with an ICD-classified code between January 1st 1988 and December 31st 2012 were consulted. Thereby all patient charts with an ICD code T20-32 as well as ICD code (L55) for sunburns were included in the study. A structured questionnaire was established in order to filter out the relevant data from the medical records. This included personal risk factors such as age and gender, as well as the circumstances of the accident such as the cause, location, type of injury and date of admission. Further clinically relevant data for the questionnaire included the affected body areas, the depth and extent of