Available online at www.sciencedirect.com
ScienceDirect
journal homepage: www.elsevier.com/locate/burns

Hospitalized burns in Finland: 36305 cases from 1980–2010

Kimmo Tanttula [a,*], *Kari Haikonen* [b], *Jyrki Vuola* [a]

[a] *Helsinki Burn Centre, Department of Plastic Surgery, University of Helsinki and Helsinki University Hospital, P.O. Box 266, FI-00029 HUS, Helsinki, Finland*
[b] *National Institute for Health and Welfare, P.O. Box 30, FI-00271 Helsinki, Finland*

ARTICLE INFO

Article history:
Accepted 15 September 2017
Available online xxx

Keywords:
Burn
Burn injury
Epidemiology
Incidence
Hospitalization
Finnish Hospital Discharge Register

ABSTRACT

To analyse the epidemiology of burns in Finland, a comprehensive study was conducted among all hospitalized burn patients between 1980 and 2010. All patients with burn injury as the main diagnosis, 36305 cases in total, treated in the public and private sectors, were included.

Patient data were obtained from the Finnish Hospital Discharge Register (FHDR). The incidence of hospitalized injuries declined from over 30 to 17 per 100000 persons. Men were at higher risk than women in all age groups. Children aged under ten years were overrepresented throughout the period and the highest incidence was found among one year old boys. The median total length of stay shortened from seven days in 1980–1995 to five days in 1996–2010. The annual number of hospitalized patients is recently under 1000 cases (17/100000). The male predominance (70%) did not change but the age group with the most injuries shifted from 20–39 years to 40–59 years. Injuries were most common during the summer months.

This study of all hospitalized burn injuries of one entire country shows similar tendency of diminishing numbers and rising age of burn victims as in other western countries. The FHDR is a reliable source of data in epidemiological studies but precise recording of E- and N-codes in the registry would enable the accurate analysis of types and extent of injury.

1. Introduction

Although the effects of severe burn injuries have been studied widely, the epidemiology of injuries is still inadequately analysed in many countries. Reasons for this are multifactorial, at least partly due to unstandardized health care systems and lack of centralized data collection.

The World Health Organization estimated in 2004 that 11 million people annually suffer from burns severe enough to benefit from medical attention [1]. In Europe, 4–22% of burn patients admitted to the emergency department were hospitalized for treatment [2].

In Finland, the annual numbers of hospitalized burn patients as well as changes in the incidence have not been recently investigated, although a centralized database has existed for all hospital discharges since 1969. The most recent report on all hospitalized burn patients dates back to 1980 [3]. In that study by Seljavaara et al., an estimated 0.4% of the population seeks medical care due to burn injuries in Finland

* Corresponding author. Present address: Plastiikkakirurgia Kimmo Tanttula Oy Ltd., Antennikatu 25, FI-40640 Jyväskylä, Finland.
E-mail addresses: kimmo.tanttula@gmail.com, kimmo.tanttula@terveystalo.com (K. Tanttula), kari.haikonen@thl.fi (K. Haikonen), jyrki.vuola@helsinki.fi (J. Vuola).
https://doi.org/10.1016/j.burns.2017.09.001
0305-4179/

every year. Of these patients, 10% of adults and 20% of children underwent hospitalization. The purpose of this study was to analyse changes in burn treatment during 1980–2010 in Finland.

This study contains data on all 36305 hospitalized burn patients treated in Finland between 1980 and 2010. The establishment of two burn units in Finland (Helsinki in 1988, Kuopio in 1994) provides another interesting aspect to this study regarding the organization of care.

Patient data has been collected in the Finnish Hospital Discharge Register, which has operated since 1969. During the study period the treatment of burn injuries has become more aggressive and modern burn treatment has been concentrated in burn centres. In comparing our data with that of the 2011 Summary Report of the National Burn Repository (NBR) of United States [4], some conclusions can be drawn.

2. Materials and methods

Finland, with a population of 5.5 million, is a Nordic welfare country belonging to Western Europe. Being the fifth largest country geographically in Europe, Finland has a low population density, 17.9 inhabitants per square kilometre. Most inhabitants live in the southern part of the country. The hospital network consists of five university hospitals and their catchment areas, with more than 30 central and district hospitals located in the smaller cities. Nowadays many of the central hospitals also have plastic surgeons. The number of district hospitals has been diminishing and they have traditionally been run by general surgeons. The lowest level of care is provided by about 160 health centres, many of which provide also in-patient care in the smallest towns.

An interesting feature in the Finnish culture is the strong tradition of sauna bathing. It is estimated that in certain areas every fourth burn patient admitted to hospital care has sustained the injury in the sauna (hot water/contact with stove/injury caused by hot air) [5].

The study material consisted of all patients hospitalized due to burn injuries between 1 January 1980 and 31 December 2010 in Finland. Data were derived from the Finnish Hospital Discharge Register (FHDR), which registers all hospital admissions in the country and which has been shown to be a suitable data source for studying fire-related injuries [6]. The FHDR has complete legislative coverage of all inpatient care provided by both public and private sectors in Finland. Every care period with dates of admission and discharge as well as hospital identifier codes is recorded. The register contains data on variables such as ID-code, gender, age and ICD-diagnosis codes with nature of injury (N-code) and external cause of injury (E-code).

Patients hospitalized in Finland due to burn injuries were tracked according to the ICD 8/9/10 codes. A patient was classified as a burn patient if an ICD-code for burn injury was the main diagnosis. Outpatient cases were not studied and thus excluded from the study. When building the database for this study, the differences in the ICD versions were taken into account although exact matching is not possible in all categories. Explanations of the codes and their correspondence in the three versions are described in Table 1.

The length of stay (LOS) in hospital was calculated from the date of arrival to the date of discharge. If a patient was sent for further treatment to another hospital, the LOSs were added together if the time lapse between recordings was a maximum of 2 days and if a code for burn injury remained as the main diagnosis. With this method, all primary inpatient care of the same injury was captured. Each patient was coded with the highest treatment level that the patient had received.

To avoid late reconstructions being considered as new burn injuries, only one acute hospitalization period per patient was included in the study. With this method, admissions after the acute phase were not coded as new injuries. Although no data exist, repeated burn injuries may occur, but are very rare in our clinical experience and would not significantly affect the results.

The recording of E-codes in the FHDR has been incomplete [6]. On the basis of the current registry, analysis of the mechanism and severity of injury would be unreliable due to missing E-code values. This section was therefore left unanalysed.

The annual numbers of inhabitants were provided by Statistics Finland, the Finnish public authority specifically established for statistics. The population rose from 4787778 (1980) to 5375276 (2010) inhabitants.

For analyses, the time period of this study was divided into two parts: 1980–1995 and 1996–2010. The earlier period represents a time when burn care was more conservative than today and centralization of treatment was just beginning. During the later period both burn units in Finland were working with modern methods.

Table 1 – Classification of burn injury according to ICD 8/9/10.

Site of injury	ICD 8	ICD 9	ICD 10
Eye/periorbital area	940	940	T26
Head/neck	941	941	T20
Trunk	942	942	T21
Shoulder/brachium/antebrachium, except wrist	943	943	T22
Wrist/hand	944	944	T23
Lower extremity, except ankle/foot	945	945	T24
Ankle/foot	945	945	T25
Multiple areas/unspecified	946-949	946	T29-T32
Internal organs		947	
Respiratory tract/other internal organs			T27–T28
Other unspecified burn injury	949		

Please cite this article in press as: K. Tanttula, et al., Hospitalized burns in Finland: 36305 cases from 1980-2010, Burns (2017), http://dx.doi.org/10.1016/j.burns.2017.09.001