Burns in South Korea: An analysis of nationwide data from the Health Insurance Review and Assessment Service

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ARTICLE INFO

ABSTRACT

Introduction: The purpose of the study was to identify and describe the incidence of burn injuries in patients seen and treated in South Korea. Characteristics of inpatients and outpatients with burns were analyzed according to gender, age, burn site, and burn severity.

Methods: This retrospective study examined the characteristics of a stratified sample of burn patients seen and treated in South Korea during the calendar year 2011. The sample was drawn from the national patient database Health Insurance Review and Assessment (HIRA).

Results: Approximately 1.71% of the total patients in the Patient Sample of HIRA for 2011 were burn-injured patients. The numbers of patients treated for burns were $913/10^5$ males ($n = 8009$) and $1454/10^5$ females ($n = 11,881$). Nearly all of these patients (94.1%) were covered by national health insurance and the majority of these patients (80.6%) were treated as outpatients. Nearly half of the burn injuries were of the upper extremities (43.5%), and most of these injuries (71.5%) were rated as second-degree burns.

Conclusion: A review of the national data on patients seen and treated for burns in 2011 revealed that people in South Korea may experience higher numbers and more severe cases of burns and burn-related injuries than found in other countries. General burn prevention programs as well as gender- and age-specific prevention strategies are needed to reduce the risk of burns in this population.

1. Introduction

Burn injuries are not only major personal catastrophic events for individuals but can also result in significant medical and economic burden on national health services [1].

As technology and clinical medical science have advanced over the last few decades, burn-related mortality rates have declined [2]; however, burns are still reported as the most expensive of nonfatal injuries [3] and one of the leading causes of death from accidental injuries [4].

Most of the worldwide epidemiological studies have been based at single hospitals and have used specific group sampling and only hospitalized patients [3,5–7]. Previous studies from South Korea have also been based on single hospital data. The results provide limited epidemiological

information and descriptions of burn patients and their characteristics [8,9].

The purpose of the study was to identify and describe the incidence of burn injuries in patients seen and treated in South Korea. Characteristics of both inpatients and outpatients with burns were analyzed according to gender, age, burn site, and burn severity.

2. Methods

This retrospective study examined the characteristics of a stratified sample of burn patients seen and treated in South Korea during the calendar year 2011. The sample was drawn from the national patient database Health Insurance Review and Assessment (HIRA).

2.1. Data source

The Patient Sample data from the Health Insurance Review and Assessment (HIRA) database was used in this study. South Korea has National Health Insurance (NHI), which is a compulsory social insurance system and insures about 97% of the population. The remaining population is covered by Medical Aid. All hospitals or clinics in South Korea submit medical records of patients covered by NHI and Medical Aid to HIRA for review in order to be reimbursed for any healthcare services provided.

The claim database of HIRA includes 46 million patients per year, approximately 90% of the total population in Korea, from almost 80,000 healthcare service providers [10]. The HIRA database is both nationally representative and contains data on multiple variables important to epidemiological research, such as diagnosis, treatment, procedures, surgical history, and treatment prescriptions. Because of the tremendous volume of data in the database, HIRA provides cross-sectional datasets on a yearly basis, which is called as the Patient Samples, to make national medical data more accessible to researchers to conduct population-based studies. The patient samples are selected randomly by HIRA from the HIRA database with stratification by gender and including 1% of outpatient data and 13% of inpatient data.

The representativeness and accuracy of the sample datasets are reported to be satisfactory [10]. The Patient Sample datasets include de-identified information to protect patient anonymity, and alternative identification numbers are assigned in order to facilitate matching descriptive data about the same patient within the entire dataset. The datasets are in the public domain and available upon request to researchers for health-related studies (http://www.hira.or.kr). In addition, step-by-step guidance is provided on the HIRA to ensure appropriate analyses.

2.2. Study design and patient selection

This retrospective study analyzed the 2011 Patient Sample dataset of both inpatients and outpatients treated with burns. We identified burn patients by their main or accessory diagnoses. For this purpose, we used the following International Classification of Diseases, 10th revision (ICD-10) codes

for burns: T20.0-T20.3 (burn of head and neck), T21.0-T21.3 (burn of trunk), T22.0-T22.3 (burns of shoulder and upper limb, except wrist and hand), T23.0-T23.3 (burns of wrist and hand), T24.0-T24.3 (burns of hip and lower limb, except ankle and foot), T25.0-T25.3 (burns of ankle and foot), T26.0-T26.4 (burns confined to eye and internal organs), T27.0-27.3 (burns of respiratory tract), T28.0-T28.4(burns of other internal organs), T29.0-T29.3 (burns of multiple and unspecified body regions), T30.0-T30.3 (burn, body region unspecified), and T31 (burns classified according to extent of body surface involved).

Patient data for those treated with the above ICD-10 codes as either a main or accessory diagnosis were included in this study. Among 1,165,113 patients in the 2011 Patient Sample dataset, 19,890 patients were treated with burns, and therefore, included in this study (weighted $n = 598,016$. This means that the 19,890 burned patients included in the 2011 Patient Samples represented 598,016 patients in the original HIRA database in 2011). Patients admitted with the above ICD-10 codes from T20.x to T31.x in their either main or accessory diagnosis were classified as burn-injured inpatients, and those with only ambulatory visits and/or emergency room visits were identified as burned outpatients.

Burn sites were identified with the first two numbers of ICD-10 codes. In this study, we categorized burn sites as follows: head (T20.x), trunk (T21.x), upper limbs (T22.x-T23.x), lower limbs (T24.x-T25.x), internal organs (T26.x-T28.x), multiple sites (T29.x), and unspecified (T30.x-T31.x). For those with more than one burn-related ICD-10 codes specifying different sites were classified as burned on multiple sites.

In order to analyze the severity of burns, we used the first decimal number of the ICD-10 codes. In cases of those with more than one burn-related ICD-10 code indicating different severity, the most severe degree of burn, regardless of which burned site was used. For example, a patient with ICD-10 codes of T20.2 (burn of second degree of head) and T21.1 (burn of first degree of trunk) was classified as burned patient with second degree of multiple sites in this study. To calculate the rate of reconstructive surgery, we identified those who had received surgery with the burn-related ICD codes. In addition, age, gender, and level of treatment facility were included in this analysis.

2.3. Statistical analysis

Analyses were conducted using PROC SURVEYFREQ and PROC SURVEYMEANS in SAS 9.2 (SAS Institute, Cary, NC). All study variables were screened for missing data and/or outliers. Among 1,165,113 patients included in the 2011 Patient Sample dataset, 19,890 patients had the abovementioned burn-related ICD-10 codes in their main or accessory diagnoses, and therefore, were included in this study's analyses. The Patient Sample dataset consisted of 1% of outpatients and 13% of inpatients randomly selected from the HIRA database, thus 19,890 burned patients analyzed in this study represent 598,016 burned patients in HIRA database (weighted n). To account for the stratified sampling design of the Patient Sample dataset, weighted percentages and/or means were presented to describe characteristics of burn patients, burn sites, and burn degree (Tables 1–3). Chi-square tests were used to identify any differences in the distribution of burn-related