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Epidemiological analysis of burn patients in East Bulgaria



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ABSTRACT

Objective: The purpose of the study was to identify the basic epidemiological characteristics of burn patients in East Bulgaria, as well as to analyze trends in burns in the region over the last decade.

Methods: Retrospective data of burn patients treated at Military Hospital-Varna, in the period January 2002–December 2011, was reviewed and statistically interpreted in terms of patients and burn demographics; etiology; place of incidents; hospital stay and mortality. Trends were observed for the entire period and comparative analyses of patients' data were made between two periods: first – 2002–2006 and second 2007–2011.

Results: A total of 2627 burn patients, median age 41 years (IQR 9–61) were admitted to our burn unit. For the entire period the most affected age groups were ≤ 4 years (21.6%) and ≥ 65 years (21.1%). Hospitalized patients increased in the second period ($n = 1701$) compared to the first one ($n = 926$), while the size of total burn surface area decreased (first period – 9.8% vs. second period – 10.6%). Scald (51%) and flame (23.8%) were the most frequent aetiological agents for both periods. Work related burns reduced in the second period (9.4% vs. 4.9%), while home burns (90.6 vs. 95.1%) increased. Hospital stay declined from 17days (2002–2006) to 7days (2007–2011), whereas mortality rate slightly increased (first period – 2.3% vs. second period – 3.6%).

Conclusion: Burns remain a significant health problem in Bulgaria. The future preventive actions should take into account the observed changes in burn demographics and target the most vulnerable groups.

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1. Introduction

Burn is one of the leading causes of injury in the world and is often associated with long term physical and psychological trauma, lifelong disability and poor quality of life for the patients and their families. That is why, burn is often quoted

as a major public health problem [1,2]. Despite significant improvements in burn care, thermal injury still remains a major cause for morbidity and mortality [3,4].

In Bulgaria with overall population approximately 7 364 570 million inhabitants (population census 2011), specialized treatment of burn injury is conducted in three burn units certified by the Ministry of Health [5]. Patients from West and

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Central Bulgaria are directed to the burn department in Sofia, the ones from South Bulgaria are admitted in Plovdiv burn unit, and patients from East Bulgaria are treated in our Department of Burn and Plastic Surgery, which was founded in 1988 at Military Hospital, Varna.

The severity of burn trauma and its heavy consequences motivate many authors to investigate its epidemiology [6–8]. Etiological factors (hot liquids, flame, hot surfaces, chemical agents, electricity) are also significant in the context of epidemiology because of their impact on burn size and depth, length of hospital stay, mortality rate.

Little has been published in literature about the distribution of burn trauma in Bulgaria [6,9]. Our paper represents the first detailed epidemiological study of burn in the region of East Bulgaria. The investigation in epidemiology is important to describe injury patterns, causes and effects in order to identify risk factors and targets for prevention.

2. Materials and methods

This retrospective cohort study was of patients with burn injury admitted in the Department of Burn and Plastic Surgery at Military Hospital Varna, from January 2002 to December 2011.

2.1. Setting

The burn center of Varna Military Hospital is the third largest burn facility in Bulgaria and it is provided with 20 beds and 4 available beds in the Intensive Care Unit. Burn patients are triaged in compliance with the regulations of the Ministry of Health and under the supervision of Regional Inspection for Protection and Control of Public Health – Varna.

Our facility serves a population of about 2 million people from the region of East Bulgaria. We admit civilian and military patients of all ages as well as emergency cases from other regions such as people who have sustained burn injury while on temporary stay in our region.

2.2. Inclusion and exclusion criteria

Inclusion criteria: all patients admitted in our facility for burn care.

Exclusion criteria: patients who were readmitted; patients who did not live in East Bulgaria; outpatients; patients suffered from radiation burn.

2.3. Data collection

The data was retrospectively collected from the hospital records. Patients and burn injury demographics were extracted. Data on etiology; place of injury; length of stay and mortality was also collected. Burns were analyzed by age; a more precise break-down was made for the group of pediatric patients (≤ 4 ; 5–9; 10–14 years), while patients over 15 years were analyzed in decades. Burn size and depth had been assessed by a trained surgeon who had filled in the Lund–Browder chart, documenting the extent of burn in each body

area and calculated the percentage of total burn surface area (%TBSA). Burns were classified as: TBSA ranging from $\leq 10\%$; TBSA – between 11% and 20%; TBSA from 21% to 30%; TBSA between 31% and 40%; TBSA more than 50%. The depth of the wound was diagnosed by visual and tactile assessment by experienced surgeons. The criteria included the following symptoms – the color of the wound, capillary reaction and existence of pain.

2.4. Statistical analysis

Median \pm IQR and whole numbers (n) as % were used for categorical data. The type of the empirical distribution was defined by one-sample Kolmogorov-Smirnov test. Chi-square test (χ^2) and Fisher's exact test were used to analyze relationships between categorical variables. Mann–Whitney U test for two independent samples was used to compare differences in the frequency distribution between groups. A p -value of <0.05 was considered to indicate statistical significance. Data processing was performed with statistical package IBM SPSS Statistics 19.0.

3. Results

Overall a total of 2627 burn patients admitted during the period 2002–2011 were included in our investigation. Demographics, burn characteristics, place of the incident, hospital stay and mortality are demonstrated in Table 1. The number of cases in the second period is bigger ($n = 1701$) compared to the first one ($n = 926$) ($p < 0.001$). For the entire period burns were more common in males 1536 (58.5%), compared to females 1091 (41.5%). The median age of the patients was 41 years (IQR 9–61). Distribution of burn cases by age is presented in Fig. 1.

Burn size in the second period (mean 9.8%, median 5, IQR 1.5–10) was significantly smaller than in the first (10.6%, median 7, IQR 2–12) ($p < 0.001$). Significant difference was observed in wound depth as well; superficial partial thickness burn (grade 2a – 19.2%) ($p < 0.001$) and full thickness burn (grade 3–38.8%) ($p < 0.005$) were considerably more in 2002–2006, while during 2007–2011 deep partial thickness burn was far more common (grade 2b – 65.6%) ($p < 0.001$). Work related incidents decreased in the second period (4.9%) ($p < 0.001$), while a significant increasing of domestic incidents was observed in the same time (95.1%) ($p < 0.001$). The median hospital stay decreased in the second period – (median 7 days, QR 7–12) compared to the first one (median 17 days, IQR 10–22) ($p < 0.001$). The mortality rate was 2.3% ($n = 21$) for the first period and 3.6% ($n = 62$) for the second ($p = 0.061$). The distribution of mortality rate by burn depth and %TBSA is shown in Table 2.

During 2007–2011 the relative share of patients from Varna city decreased (77.6% vs. 67.7%), while the number of patients from rural areas increased (9.6% vs. 15.6%) (Table 3).

Multiple site burn was observed in 1591 (60.6%) patients; burn isolated to one area in 1036 (39.4%) cases. The upper limb was the most common burn site (74.2%), followed by lower leg (67.4%). Distribution of burn by anatomical site is demonstrated in Fig. 2.

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