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EPIDEMIOLOGICAL CHARACTERISTICS AND TREATMENT OUTCOMES OF HOSPITALIZED BURN PATIENTS AT DA NANG HOSPITAL, VIETNAM

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ABSTRACT

Objective: This study aimed to describe the epidemiological and injury characteristics of hospitalized burn patients and evaluate inpatient treatment outcomes at Da Nang Hospital, Vietnam.

Methods: A cross-sectional study was conducted at the Department of Burn Surgery and Plastic Surgery, Da Nang Hospital, from October 2025 to March 2026. A total of 75 hospitalized burn patients were enrolled using convenience sampling. Data on demographic characteristics, burn causes, burn agents, injury severity, treatment interventions, and clinical outcomes were collected from medical records and structured data forms. Descriptive statistics were analyzed using SPSS 27.0.

Results: Patients aged 30–59 years accounted for the largest proportion (56.0%), and male patients predominated (66.7%). Domestic accidents were the leading cause of burns (69.3%), while dry heat (37.3%) and wet heat (36.0%) were the most common burn agents. Most patients were admitted within 8 hours after injury (58.7%). Burns involving less than 10% total body surface area accounted for 68.0% of cases, and deep burn areas below 10% were observed in 98.7% of patients. Upper extremities were the most commonly affected anatomical site (33.6%). Most patients had mild-to-moderate burns according to the American Burn Association classification. Conservative treatment was performed in 77.3% of patients, and debridement was the most frequent surgical procedure. The mean hospital stay was 12.04 ± 9.70 days. Most patients were discharged successfully (96.0%), and no in-hospital mortality was recorded.

Conclusion: Burn injuries in this study were predominantly mild-to-moderate and mainly resulted from domestic accidents. Most patients had favorable treatment outcomes with relatively short hospital stays and low surgical intervention rates.

Keywords: Burn injury; epidemiology; treatment outcome; hospitalized patients; Vietnam.

1. INTRODUCTION

Burn injury is an acute form of trauma caused by exposure to thermal agents, chemicals, electricity, or radiation. It is considered one of the most severe types of injury due to its high risk of mortality, long-term functional impairment, and cosmetic sequelae [1]. Burn management is often prolonged, complex, and costly, creating a substantial socioeconomic burden on patients, families, and healthcare systems [2]. Globally, burns remain a major public health challenge. According to the Global Burden of Disease 2019 study, approximately 8.37 million new burn cases and more than 111,000 burn-related deaths were reported worldwide, with the highest burden occurring in low- and middle-income countries [3]. In Vietnam, burn injuries continue to be a significant clinical problem, particularly among children, with thermal burns accounting for the majority of cases [2].

Burn epidemiology and treatment outcomes vary across regions depending on socioeconomic conditions, population characteristics, and healthcare capacity [2]. Several studies in Vietnam have also reported the severe consequences of electrical burns, including high rates of limb amputation [4,5]. Da Nang Hospital is a major burn treatment center in the Central and Central Highlands regions of Vietnam, receiving a large number of patients with varying degrees of burn severity. However, limited data are available regarding the epidemiological characteristics and treatment situation of burn patients at this hospital. Therefore, this study was conducted to investigate the admission and treatment patterns of burn patients at Da Nang Hospital, with the objectives of describing the epidemiological and injury characteristics of hospitalized burn patients and assessing their inpatient treatment process.

2. MATERIALS AND METHODS

2.1. Study design, settings and participants

A cross-sectional study was conducted at the Department of Burn Surgery and Plastic Surgery, Da Nang Hospital, from October 2025 to March 2026. The study included hospitalized burn patients who met the inclusion criteria. Patients who discontinued treatment or were admitted for burn sequelae such as contracture scars or keloids were excluded.

2.2. Sample size and sampling techniques

The sample size was calculated using the formula for estimating a population proportion, with a confidence level of 95%, margin of error of 5%, and an estimated survival proportion of 0.954 based on a previous study. The minimum required sample size was 68 patients. Convenience sampling was applied, and a total of 75 eligible patients were enrolled.

2.3. Variables

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The study collected data on demographic characteristics, burn circumstances, burn agents, time to admission, burn extent and depth, burn location, severity of injury, surgical interventions, length of hospital stay, and treatment outcomes. Burn severity was classified according to the American Burn Association criteria.

2.4. Data collection procedures

Data were collected using a structured data collection form. Eligible patients were identified from the hospital management system. Information was obtained from patients, caregivers, and electronic medical records, then checked and entered into the study database.

2.5. Statistical analysis

Data were cleaned, coded, and analyzed using Excel 365 and SPSS version 27.0. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using means and standard deviations.

2.6. Ethical considerations

The study was approved by the Board of Directors and Ethics Committee of Da Nang Hospital. Patient information was anonymized and used solely for research purposes. All participants were informed about the study and had the right to withdraw at any time without affecting their treatment.

3. RESULTS

Table 1 presents the general characteristics of the study population. Patients aged 30–59 years accounted for the highest proportion (56.0%), followed by the 18–29 years group (25.3%). The mean age was 40.2 ± 18.4 years. Male patients predominated, representing 66.7% of the sample. Most participants lived in urban areas (54.7%), and freelance workers constituted the largest occupational group (46.8%). The majority of patients had no comorbidities (85.3%).

Table 1. General characteristics of burn patients (n = 75)

Characteristics	Group	n	%
Age group	< 18 years	5	6.7
	18–29 years	19	25.3
	30–59 years	42	56.0
	≥ 60 years	9	12.0
Gender	Male	50	66.7
	Female	25	33.3
Residential area	Urban	41	54.7
	Rural	34	45.3
Occupation	Worker	16	21.3
	Farmer	7	9.3
	Intellectual worker	4	5.3
	Student	10	13.3
	Retired	3	4.0
	Freelance worker	35	46.8
Comorbidity	No	64	85.3
	Yes	11	14.7

Table 2 summarizes the characteristics of burn accidents among the patients. Domestic accidents were the most common cause of burns, accounting for 69.3% of cases, followed by occupational accidents (25.3%). Dry heat and wet heat were the two most frequent burn agents, representing 37.3% and 36.0%, respectively. More than half of the patients (58.7%) were admitted to the hospital within 8 hours after injury.

Table 2. Characteristics of burn accidents among patients (n = 75)

Characteristics	Group	n	%
Cause of burn	Domestic accident	52	69.3
	Occupational accident	19	25.3
	Traffic accident	3	4.0
	Intentional injury	1	1.4
Burn agent	Wet heat	27	36.0
	Dry heat	28	37.3
	Electrical burn	16	21.3
	Chemical burn	4	5.4
Time from burn to admission	<8 hours	44	58.7
	8–24 hours	9	12.0
	>24 hours	22	29.3

Table 3 describes the burn injury characteristics of the patients. Most patients had a total burn surface area of less than 10% (68.0%). Deep burn areas below 10% were reported in 98.7% of cases. According to the American Burn Association classification, mild burns accounted for the highest proportion (41.3%), followed by moderate burns (37.3%) and severe burns (21.3%).

Table 3. Burn injury characteristics (n = 75)

Characteristics	Group	n	%
Total burn surface area	<10%	51	68.0
	10–19%	14	18.7
	20–39%	8	10.7
	≥40%	2	2.6
Deep burn area	Superficial burn	56	74.7
	<10%	18	24.0
	10–19%	1	1.3
	20–39%	0	0.0
	≥40%	0	0.0
Burn severity (ABA)	Mild	31	41.3
	Moderate	28	37.3
	Severe	16	21.3

Table 4 shows the distribution of burn locations and burn depth classifications. The upper extremities were the most frequently affected site (33.6%), followed by the lower extremities (28.8%) and head/neck region (15.7%). Regarding burn depth, degree II burns accounted for the largest proportion (55.6%), while degree I and degree III burns represented 28.2% and 16.2%, respectively.

Table 4. Burn location and burn depth characteristics

Characteristics	Group	n	%
Burn location*	Head/neck	23	15.7
	Upper extremities	49	33.6
	Lower extremities	42	28.8
	Anterior trunk	14	9.6
	Posterior trunk	10	6.8
	Perineum	7	4.8
	Eye	1	0.7
	Respiratory tract	0	0.0
	Gastrointestinal tract	0	0.0
Burn depth*	Degree I	33	28.2
	Degree II	65	55.6
	Degree III	19	16.2

**: One patient could have multiple burn locations and burn depths.*

Table 5 presents the treatment characteristics and clinical outcomes of the patients. Most patients did not require surgery (77.3%). Among surgical procedures, debridement was the most commonly performed intervention (60.9%). The largest proportion of patients had a hospital stay of 6–10 days (32.0%). Most patients were discharged after treatment (96.0%), while no in-hospital deaths were recorded during the study period.

Table 5. Treatment characteristics and outcomes (n = 75)

Characteristics	Group	n	%
Number of surgeries	No surgery	58	77.3
	1 surgery	11	14.7
	≥2 surgeries	6	8.0
Surgical methods*	Debridement	14	60.9
	Skin grafting	5	21.7
	Amputation	3	13.0
	Fasciotomy	1	4.4
Length of hospital stay	≤5 days	18	24.0
	6–10 days	24	32.0
	11–15 days	13	17.3
	>15 days	20	26.7
Treatment outcomes	Discharged	72	96.0
	Referred	1	1.3
	Death	0	0.0
	Discharged against medical advice	2	2.7

**: A patient could undergo more than one surgical procedure.*

4. DISCUSSION

Domestic accidents were identified as the leading cause of burn injury in the present study, accounting for 69.3% of all cases. This finding is consistent with reports by Le The Trung and studies conducted at Nghe An Friendship General Hospital, where household-related burns remained the predominant mechanism of injury [4]. The high proportion of domestic burns may reflect common exposure to cooking activities, boiling liquids, electricity, and heat sources within the home environment. Although traffic-related and intentional burns accounted for only a small proportion of cases, these injuries are often associated with severe tissue damage and more complicated management [4].

Regarding burn agents, dry heat and wet heat were the two most common causes, accounting for 37.3% and 36.0%, respectively. Similar distributions have been reported in studies from Nghe An Friendship General Hospital and the National Burn Hospital Le Huu Trac [4]. The predominance of dry heat burns may be related to the large proportion of adult patients in the working-age population, who are more frequently exposed to flames, hot metal, and industrial heat sources. Electrical burns accounted for 21.3% of cases, which was higher than the average proportion reported at the National Burn Hospital but comparable to several provincial and adult-based studies [2]. Chemical burns represented 5.4% of cases and may reflect occupational or domestic exposure to corrosive substances and cleaning chemicals [4].

More than half of the patients in this study were admitted within the first 8 hours after injury, indicating relatively early access to healthcare services. Similar findings were reported in previous Vietnamese studies [4]. However, nearly one-third of patients were admitted after 24 hours, which is comparable to reports from Spain and the United States [6, 7]. Delayed admission may be associated with underestimation of burn severity, self-treatment at home, economic difficulties, or limited access to specialized burn care facilities [7]. Early admission remains important for fluid resuscitation, wound management, infection prevention, and improving overall outcomes in burn patients.

The majority of patients in the present study had a total burn surface area below 10%, while only 2.6% had burns involving ≥40% of body surface area. These findings are consistent with studies conducted at Children's Hospital 1 and Nghe An Friendship General Hospital [4, 8]. Similar trends have also been reported internationally, including studies from Catalonia, Spain, where most patients had burns involving less than 10% TBSA [6]. Deep burn areas were also predominantly below 10%, and no patient had deep burns ≥20% TBSA. This distribution suggests that most injuries in the current study were mild to moderate in severity, likely related to the predominance of domestic and isolated occupational accidents.

Upper and lower extremities were the most frequently affected anatomical sites, accounting for 33.6% and 28.8% of injuries, respectively. This pattern has been consistently reported in both domestic and international studies, as the limbs are commonly exposed during work and daily activities [9]. Burns involving the head, face, and neck accounted for 15.7% of cases, which is clinically important because these injuries may be associated with airway complications and long-term cosmetic sequelae [10]. However, no inhalation injuries were recorded in the present study, which corresponds with the generally limited burn depth and surface area observed in the study population [11]. Injuries involving the eyes and perineum were uncommon but remain clinically significant

because of the risk of long-term functional impairment [12].

According to the WHO burn depth classification, second-degree burns accounted for the highest proportion of injuries (55.6%), while third-degree burns represented only 16.2%. This pattern is similar to several international studies where superficial and partial-thickness burns predominated [13]. The relatively low proportion of third-degree burns compared with major burn centers may reflect the lower severity profile of patients treated at the study site. Classification according to the American Burn Association criteria showed that mild and moderate burns together accounted for 78.6% of cases, whereas severe burns represented 21.3%. Although severe burns were less frequent, some patients were classified as severe because of burn location or burn mechanism, particularly electrical injuries and burns involving functional areas such as the face, hands, feet, or perineum [14].

Most patients in the present study were managed conservatively without surgery, and only 22.7% required operative intervention. This surgical rate was lower than reports from specialized burn centers in Vietnam and Europe, likely due to the predominance of mild and moderate burns in the current cohort [4, 6]. Among surgical procedures, debridement was the most commonly performed intervention, followed by skin grafting. Amputation was mainly indicated in severe electrical burn cases, consistent with previous Vietnamese reports [4,5]. The mean length of hospital stay was 12.04 ± 9.70 days, which was comparable to findings from the National Burn Hospital and international studies from Spain and Türkiye [6,15]. Most patients were successfully discharged, and no in-hospital deaths were recorded. The favorable treatment outcomes may be associated with the predominance of superficial burns, limited deep burn areas, and the relatively low proportion of severe injuries in the study population.

5. CONCLUSION

Burn injuries were predominantly observed in working-age male patients and were mainly caused by domestic accidents. Most patients had mild-to-moderate burns with limited burn surface area and superficial burn depth, commonly affecting the extremities. Dry heat and wet heat were the leading burn agents. Most patients were treated conservatively, with favorable clinical outcomes and no recorded in-hospital mortality. The average hospital stay was relatively short, reflecting the generally mild severity of burns in the study population.

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