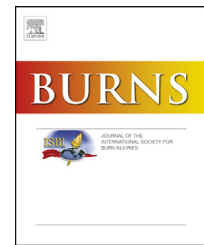


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## Firework injuries at a major trauma and burn center: A five-year prospective study

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### ABSTRACT

**Background and objective:** In China, fireworks are an integral part of the celebration of the annual Spring Festival, but the number of injuries associated with their private use seen in emergency rooms increases dramatically. To raise awareness and help guide future prevention practices in this city, we investigated the epidemiology of firework-related injuries presented at our trauma and burn center in Beijing during the Spring Festivals of 2007–2011. **Methods:** Patients were interviewed using a pre-coded questionnaire to elicit information regarding age, gender, causes, injured body part, type of injury, diagnosis, and disposition. **Result:** From 2007 to 2011, during the Spring Festivals 734 patients with fire-work related injuries were seen at our trauma and burn center in Beijing, the median patients of the five year were 140(136–150). The mean age of the patients was  $26 \pm 15.3$  years (range, 1–95 years). Of the 734 patients, the highest proportion of injuries were the 5–14 year-old age group The majority of the patients were male (87.9%), the overall male:female ratio was 7.41:1, and males were predominant in all age groups. For all 5 years, the incidence of firework-related injuries during the Spring Festival Holidays peaked specifically on the first, fifth, and last days, respectively. Injuries were mainly due to improper handling (415/610, 68.0%) or setting off illegal fireworks (195/610, 32.0%). The most frequently injured body parts were the hands and fingers (32.0%), head or face except eyes (28.3%), and trunk (22.4%). Burns were the most common type of injury (65.7%), most of the burned patients (437/453) were between 1% and 10%, and the most common region burned were hands and fingers (218/754). Contusions or lacerations were the second common type of injury (34.3%). Most of the patients (642, 87.5%) were treated and released, while 37 (5%) were treated and transferred, and 55 (7.5%) were admitted for advanced treatment.

**Conclusion:** The private use of fireworks during the Spring Festival Holidays is associated with a considerable number of injuries to various parts of the body. We can minimize the number and severity of accidents by raising awareness of safety practices, encouraging professional displays only and motivating manufacturers to adhere to strict quality control.

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## 1. Introduction

People use fireworks worldwide to celebrate national and cultural holidays [1–18], but the mishandling of fireworks by private individuals is associated with serious preventable injuries. Many studies from countries around the world have recognized the importance of this global issue [3,5,13,19–24]. Setting off fireworks during the Chinese Spring Festival Holidays is an ancient custom traditionally thought to drive away evil spirits. Yet such activity was completely forbidden in Beijing from 1993 to 2005, after the government took safety, noise, and pollution factors into consideration. Since 2006, the use of fireworks has been allowed, but only during the Spring Festival.

The Spring Festival is the most important holiday for the Chinese people, a time when all family members get together in a way similar to Thanksgiving and Christmas in Western countries. Beginning in the early days of the last (12th) lunar month, the holiday continues until the 15th day of the New Year. The most important days are Spring Festival (New Year's) Eve and the first three days. During the Spring Festival, we see many patients with firework-related injuries in our emergency room at the Trauma and Burn Center of Beijing, the Fourth Clinical College of Peking University.

In developed countries, studies that describe firework-related injuries have raised awareness of the seriousness of this issue and have led to strong legislation regulating the use or distribution of fireworks [6,8,9,11–16,19,20,25–30]. Such studies in China have been very rare [4,31,32], especially for major Chinese cities such as Beijing. This study investigated the epidemiology of firework-related injuries, based on patients who visited our trauma and burn center. Our findings should help guide future firework-related safety practices in this city.

## 2. Materials and methods

The Trauma and Burn Emergency Center of Beijing Jishuitan Hospital, the Fourth Clinical Medical College of Peking University, is a tertiary referral center, serves a local population of about 23 million. We estimate about 1–1.5 million people in Beijing play firework during Spring Festival, and the rough incidence is 0.1–0.2%. We prospectively studied 734 cases of injuries due to fireworks presented at our trauma and burn emergency center in Beijing from 2007 to 2011. History of injury was obtained from the patients or accompanying persons. Patients were received 24 h per day and 7 days per week, and were interviewed by the doctors using a pre-coded questionnaire, and age, gender, causes, injured body part, type of injury, diagnosis, and disposition were recorded. Patients were then classified by age (0–4, 5–14, 15–24, 25–44, or  $\geq 45$  years), causes of injury (misuse, which means people set off firecrackers not in accordance with the instructions, illegal fireworks, which means people buy them from illegal stores, and the fireworks have problems in quality, and missing), injured body part (head/face except eyes, eye, extremities, trunk, and missing), injury type (burns, contusions/lacerations, missing), and disposition (treated and released from the emergency room to the clinic for further treatment, treated and transferred to the specialty hospital, such as an eye

hospital, or the patients were injured seriously enough to be admitted to the hospital). The Ethics Committee of Beijing Jishuitan Hospital approved the study. All the patients or their parents gave written informed consent.

Statistical analyses were performed using SPSS 15.0 software. Differences between various groups were assessed using the chi-squared test. A  $P$ -value  $< 0.05$  was considered statistically significant.

## 3. Results

### 3.1. Numbers of patients

From 2007 to 2011, 734 patients with firework-related injuries were treated in Beijing Jishuitan Hospital, the median patients of the five years were 140 (136–150). Although there were some year-to-year fluctuations, no statistically significant trend was observed over the 5-year period in regard to the total number of patients per year ( $P > 0.05$ ; Fig. 1).

### 3.2. Age and gender distribution

The mean age of the patients was  $26 \pm 15.3$  years (range, 1 to 95 years). Of the 734 patients, the highest proportion of injuries were the 5–14 year-old age group, Although injury rates by age group fluctuated over time, there was a significant increasing trend only for the 25–44 year-old age group ( $P < 0.05$ ; Fig. 2).

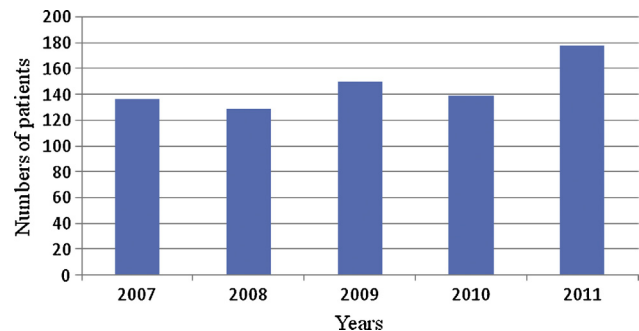


Fig. 1 – Number of patients injured annually by fireworks from 2007 to 2011.

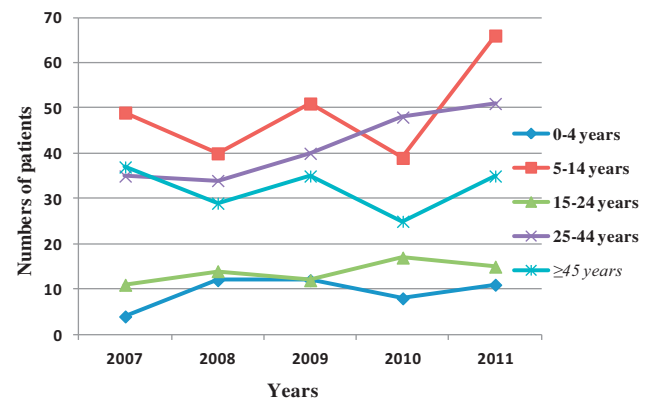


Fig. 2 – Age distribution of patients injured by fireworks from 2007 to 2011.

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