Epidemiological analysis of 4214 emergency trauma patients in Shenzhen

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Abstract

Objective: To analyze case data of emergency trauma patients from May 2018 to May 2023 in a tertiary care hospital in Shenzhen, summarize the patterns of trauma occurrences, and provide references for developing scientific prevention and control measures for emergency trauma patients. **Methods:** Clinical data of trauma patients who visited our emergency and disaster medical center from May 2018 to May 2023 were collected. Patients were grouped according to different criteria, including age, gender, time of injury, site of injury, and cause of injury, to analyze the epidemiological trends. **Results:** A total of 4214 emergency trauma patients were included, with 2609 males (62%) and 1605 females (38%), showing a significantly higher number of male patients. The age group primarily affected was 19–45 years old, accounting for 48%, followed by 46–65 years old at 35%. The top three trauma sites were the upper limbs in 1659 patients (40%), lower limbs in 1330 patients (32%), and the chest in 414 patients (10%). Regarding the cause of injury, the top five were falls, heavy object injuries, traffic injuries, crush injuries, and roller crush injuries. Trauma incidents occurred more frequently from April to May and less frequently from January to February each year. **Conclusion:** The majority of emergency trauma patients were male, and the causes and sites of injury showed clear distribution patterns. These findings provide valuable insights for formulating effective prevention and control measures for emergency trauma patients.

Trauma refers to the destruction of human tissues or organs caused by mechanical factors. With the rapid development of industry, agriculture, transportation, and sports, trauma resulting from various accidents is on the rise. Trauma not only has a high incidence but also varies significantly in severity and complexity, potentially endangering the lives of those affected. According to statistics, trauma remains the leading cause of death in people under 45 years of age[1]. Unlike many other diseases, trauma is highly preventable and controllable. Therefore, understanding the patterns and characteristics of trauma incidents and implementing timely preventive measures can reduce the harm caused by trauma[2]. This article retrospectively analyzes 4214 trauma cases admitted to the Emergency and Disaster Medicine Center of our hospital from May 2018 to May 2023, summarizes the epidemiological trends, and provides a reference for the prevention of trauma in emergency patients.

1   Materials and Methods

1.1   General Information

Inclusion criteria: primary diagnosis of trauma, complete emergency medical records. **Exclusion criteria**: refusal to receive treatment, incomplete data. This study obtained clinical data from 4214 emergency trauma patients who visited the Department of Emergency Surgery at the Emergency and Disaster Medical Center of our hospital from May 2018 to May 2023. The data included age, gender, injury site, and cause of injury.

1.2   Grouping Method

Patients were grouped based on different criteria: (1) Age groups: minors (≤18 years), young adults (19–45 years), middle-aged adults (46–65 years), and elderly (>65 years). (2) Injury site: injuries were classified into five categories—craniocervical, chest, spine, pelvis, upper limbs, and lower limbs. (3) Cause of injury: injuries were categorized into 11 types—falls, heavy object trauma, traffic injuries, crushing injuries, falls, sharp instrument injuries, sprains, bruises, assault, blast injuries, and other causes.

1.3   Statistical Analysis

Data were entered using Excel 2021 and analyzed with SPSS 19.0 statistical software. Categorical data were expressed as percentages (%) and compared using the χ^2 test. A value of $P < 0.05$ was considered statistically significant.

2   Results

2.1   General Information

In this study, there were 2609 male cases (62%) and 1605 female cases (38%), with a sex ratio of 1.66:1, and significantly more males than females. The age group of emergency trauma patients

was mainly concentrated between 19 and 65 years old, accounting for 83%, with the 19–45 years age group having the most cases, accounting for 48%, as shown in Table[1].

Table 1 Gender and age distribution of emergency trauma patients

Age (years)	Male	Female	Total	Proportion
0-18	228	155	383	9%
19 to 45	1295	746	2041	48%
46 to 65	887	593	1480	35%
> 65	199	111	310	7%
Total	2609	1605	4214	100%

2.2 Monthly Distribution

The statistical analysis of the monthly distribution of trauma patients showed that there were more trauma patients from April to May each year, accounting for 10%, and fewer trauma patients from January to February, accounting for 6%, as shown in Figure 1[2].
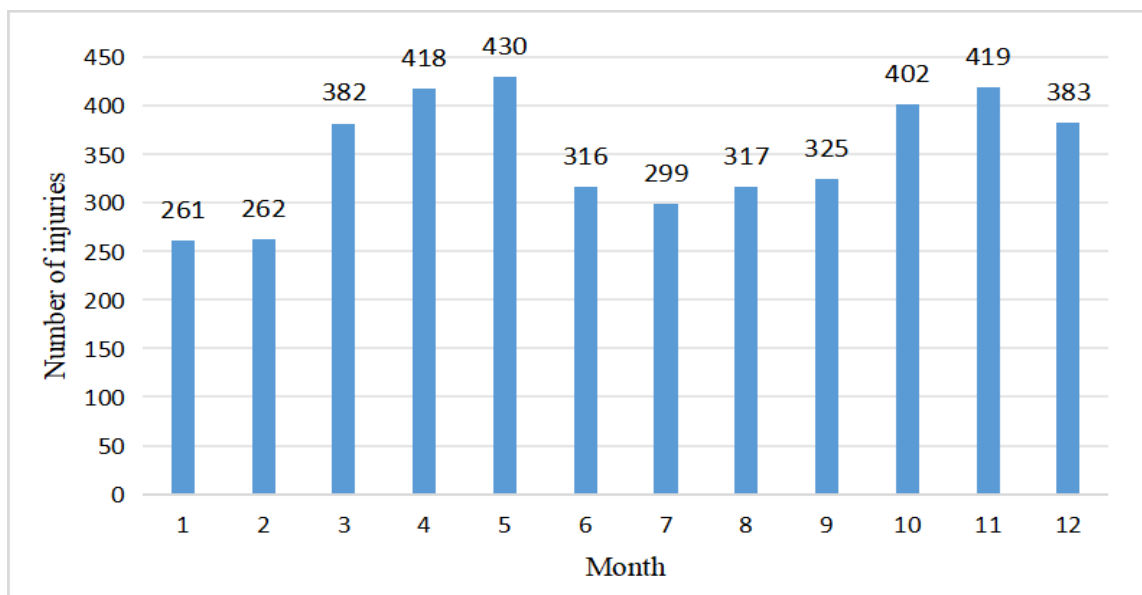

Figure 1: Distribution Plot of Months of Trauma Events

2.3 Trauma Sites and Types

The upper and lower limbs were the most common trauma sites, with 1659 cases (39.37%) in the upper limbs and 1330 cases (31.56%) in the lower limbs, followed by 414 cases (9.82%) in the chest, 366 cases (8.69%) in the spine, 344 cases (8.16%) in the craniocervical region, and 83 cases (1.97%) in the pelvis[3].

2.4   Causes of Trauma

The most common cause of injury was falls, accounting for 1659 cases (40.22%), followed by heavy object injuries in 694 cases (16.47%), traffic injuries in 369 cases (8.76%), crush/roller crush injuries in 361 cases (8.57%), sprains in 290 cases (6.88%), bruises in 213 cases (5.05%), sharp instrument injuries in 125 cases (2.97%), beating injuries in 113 cases (2.68%), other causes in 32 cases (0.76%), and blast injuries in 6 cases (0.14%)[4].

2.5   Age Distribution of Injury Causes

Falls were the most common injury cause across all age groups. In the 19–45 years age group, the main injury factors were heavy object injuries (409 cases, 9.71%), traffic injuries (192 cases, 4.56%), and crush/roller crush injuries (221 cases, 5.24%). Fall injuries were primarily concentrated in the 19–65 years age group, with 159 cases (3.77%) and 143 cases (3.39%) in the 19–45 and 46–65 years age groups, respectively. There were significant differences in the distribution of injury factors across different age groups ($\chi^2 = 5164.81$, $P < 0.01$)[5].

Table 2 Analysis of causes of injury in trauma patients of different ages

Injurious factors	< 18 years	19 to 45 years	46 to 65 years	> 65 years	Total
Falls	221	641	585	248	1695
Heavy object injury	17	409	262	6	694
Traffic injury	14	192	140	23	369
Crushing/crushing injury	27	221	111	2	361
Fall injury	11	159	143	3	316
Sharps injury	12	57	54	2	125
Sprain	36	169	75	10	290
Crash	35	109	63	6	213
Battery injury	9	62	39	3	113
Blast injury	0	6	0	0	6
Other reasons	1	16	8	7	32
Total	383	2041	1480	310	4214

2.6   Trauma Injury Sites

The main injury sites for trauma patients were the upper limbs (1659 cases, 39.37%), lower limbs (1330 cases, 31.56%), chest (414 cases, 9.82%), and spine (366 cases, 8.69%). The distribution of injury sites among different age groups was statistically significant ($\chi^2 = 4980.06$, $P < 0.01$)[6].

Table 3 Analysis of injury sites in trauma patients of different ages

Injured part	< 18 years	19 to 45 years	46 to 65 years	> 65 years	Total
Craniocervical injury	49	168	106	21	344
Chest injury	6	177	209	22	414
Spinal injury	9	148	158	51	366
Pelvic injury	2	37	25	19	83
Upper limb injury	229	771	552	107	1659
Leg injury	88	728	424	90	1330
Multiple injuries	0	12	6	0	18
Total	383	2041	1480	310	4214

2.7   Distribution Characteristics of Injury Factors by Injury Sites

The most common injury sites for falls were the upper limbs, lower limbs, and chest. For heavy object injuries, the most common sites were the lower limbs, upper limbs, and chest. Traffic injuries predominantly affected the lower limbs, craniocervical region, and upper limbs. Crush/roller crush injuries primarily involved the upper and lower limbs, while high-altitude falls mainly affected the spine and lower limbs. Significant differences were observed in the distribution of injury factors at different injury sites ($\chi^2 = 6483.01$, $P < 0.01$)[7].

Table 4 Analysis of causes of injury at different injured sites

Injured part	Falls	Heavy object injury	Traffic injury	Crush/Entrapment	Fall injury	Sharps injury	Sprain	Crash	Battery injury	Blast injury	Other reasons	Total
Craniocervical injury	138	27	84	4	20	4	0	25	37	3	2	344
Chest injury	169	28	48	9	58	1	1	54	36	1	9	414
Spinal injury	165	22	42	3	84	0	21	13	8	0	8	366
Pelvic injury	37	0	19	2	21	0	0	2	0	0	2	83
Upper limb injury	778	254	71	281	56	99	40	54	18	2	6	1659
Leg injury	406	363	103	62	64	21	228	64	14	0	5	1330
Multiple injuries	2	0	2	0	13	0	0	1	0	0	0	18
Total	1695	694	369	361	316	125	290	213	113	6	32	4214

3   Discussion

3.1   Regional Characteristics of Trauma in Guangming District

Guangming District is a developing functional district in Shenzhen City, Guangdong Province. In recent years, it has experienced rapid growth, especially in road traffic and the real estate industries. As a result, the trauma incidence in this district differs from other more established regions. This study found that from 2018 to 2023, there were significantly more male trauma patients than female patients, with young adult males (18 to 45 years) being the most affected. This is consistent with similar studies in China[3]. The higher incidence among males may be attributed to their involvement in high-risk physical labor, such as construction and transportation. These young males often perform intensive work and engage in high-risk activities but may lack safety experience, making them more susceptible to accidental injuries. Therefore, trauma prevention strategies should prioritize young adult males. Additionally, safety management on construction sites and factories should be strengthened, alongside safety education and publicity efforts.

3.2   Temporal Distribution of Trauma Cases

This study also found distinct seasonal patterns in trauma incidence. More trauma patients were reported from April to May each year, while the fewest occurred from January to February. This may be related to Shenzhen's highly mobile population. Trauma events were lowest from January to February, likely because many migrant workers return home during the Chinese New Year festival[4]. In contrast, the increase in trauma cases from April to May may be attributed to the rainy season, where wet and slippery conditions, impaired vision, and slower reaction times contribute to a higher likelihood of incidents such as falls and traffic accidents.

3.3   Common Injury Sites

The extremities were found to be the most common site of injury. Extremity damage is often the result of fractures in traffic accidents or collisions, as these areas have less fat coverage, making them more prone to injury[5]. Wearing appropriate safety harnesses and following operating procedures when performing high-risk tasks can reduce the risk of limb injuries. Strengthening emergency rescue training and on-site first-aid knowledge is urgently needed.

3.4   Causes of Trauma by Age Group

Among the causes of injury, falls were the most common, followed by heavy object injuries, traffic accidents, and crushing injuries. A comparison of injury causes across different age groups revealed statistically significant differences ($P < 0.05$). Falls were especially prevalent in people over 65 years old, with studies estimating that about one-third of the elderly population over 65, and about half of those over 80, experience falls each year[6]. This correlation between falls and aging, as well as environmental factors, is consistent with studies from other Chinese cities[7].

The National Institute on Aging recommends interventions such as strength and balance exercises, monitoring environmental hazards, regular medical checkups to ensure optimal vision and hearing, and medication management[8]. It is crucial to enhance fall prevention facilities and provide education in places where the elderly are active, such as homes, parks, and senior activity centers.

3.5 Prevention of Heavy Object Injuries Among Young Adults

Young adults aged 19 to 45 were the most affected by heavy object injuries, a finding consistent with other domestic studies[9]. As the primary labor force, many of these workers have limited safety awareness, often neglecting to wear personal protective equipment, failing to check for sharp objects on the items they carry, or lacking coordinated efforts when carrying heavy loads. These factors increase the likelihood of falls and bruises. Therefore, it is essential to strengthen safety training for workers and raise their awareness of safe practices.

3.6 Global and Local Impact of Trauma

According to the World Health Organization (WHO), trauma accounts for 10% of global deaths and 16% of disabilities[10]. Trauma is a significant public health issue, especially as many trauma patients belong to the social labor force, placing a heavy burden on society and families. Areas with concentrated manufacturing and construction activities are particularly affected, necessitating enhanced safety management and public awareness of safe operations. The type and location of trauma injuries vary across age groups, and tailored preventive measures are required. The findings of this study reflect the epidemiological characteristics of trauma in this region and provide valuable insights for formulating effective trauma prevention and control strategies.

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