A retrospective analysis of mortality in a Beijing hospital Emergency Department

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OBJECTIVE: *The aim of this study was to analyze the epidemiological characteristics of mortality in the emergency department of Beijing Tongren Hospital from 2014 to 2019. METHODS: A total of 781 cases in the hospital's emergency department that resulted in mortality were retrospectively screened, and epidemiological and analytical methods were used to analyze the epidemiological characteristics and the trend of adult mortality in the emergency department of our hospital.*
RESULTS: *Of the 781 selected cases, 448 were male, and 333 were female. Mortality rates were highest in patients aged 80–89 years, and most of the patients were retired (71.57%). Infection disease was associated with the highest mortality rate (44%), followed by cardiovascular disease and malignant tumors.*
CONCLUSION: *Infectious diseases, cardiovascular diseases, and malignant tumors are the major threats to the lives of patients in the hospital's emergency department. The cause of death differs depending on the patient's age.*

KEY WORDS: Death, Emergency department, Epidemiological characteristics, Etiology, Retrospective analysis

Introduction

The emergency department, which receives the most critical patients, can sufficiently reflect a hospital's medical quality, technical level, service attitude, and management ability [1,2]. It plays an important role in saving patients' lives and reducing rates of mortality. Beijing Tongren Hospital is located in Beijing, the capital of China, and is a grade-A, class-three hospital. Approximately 150,000 patients are admitted to the emergency department annually. Of these patients, many die due to various factors, such as delivery time, injury, and pathophysiological state.
In this study, through an epidemiological analysis of mortality in the emergency department [3], the gender, age, occupation, cause of death, and education level of each patient are analyzed. Such analysis reveals the disease characteristics of residents in the local area and thus improve emergency treatment strategies, the reasonable distribution of hospital resources, and the salvage success rate of critical patients.

Information and Methods

GENERAL DATA

From January 1, 2014 to December 31, 2019, 781 cases resulting in mortality in the emergency department of our hospital (including the emergency rescue room and the emergency observation ward) were enrolled in this study. Since the data was obtained from the Chinese Disease Prevention and Control Information System, all information was considered true and reliable.

RESEARCH METHODS

General demographic information, including gender, age, occupation, cause of death, and education level, was collected from each patient. The causes of death were classified according to the international classification of diseases (ICD-10), which comprise of 12 categories: malignant tumors, cardiac emergency (including sudden death), infectious emergency, internal emergency, digestive emergency, acute renal injury, trauma, poisoning, blood system emergency, endocrine system emergency, allergy, and asphyxia.

STATISTICAL METHODS

Data was statistical analyzed using SPSS 19.0 software. Count data was expressed as frequency and proportion. Measurement data was expressed as mean ± standard deviation (x ± SD). Counting data was compared using a Chi-square test, and Pareto chart analysis was used to analyze the mortality factors. $P < 0.05$ was considered statistically significant.

Results

BASIC INFORMATION

Of the 781 enrolled cases, 448 (57.36%) were male, and 333 (42.64%) were female; the ratio of male to female was 1.35:1. The average age of death was 76.45 years. The majority of the cases (448, 44.81%) were aged 80-89 years. There were 232 cases (29.71%) aged 60-80 years. The age of death corresponded with occupation: most of the patients had been retired (71.57%), followed by

TABLE I - *Mortality in ED in 2014-2019.*

Year	Cases(n)	Death(n)	Mortality(‰)
2014	160509	141	0.88‰
2015	149588	112	0.75‰
2016	156701	124	0.79‰
2017	145336	117	0.81‰
2018	143422	147	1.02‰
2019	139146	140	1.01‰

TABLE II - *Seasonal distribution of death in ED in 2014-2019.*

Seasonal	Death(n)	Mortalit(%)
Spring	202	26%
Summer	182	23%
Fall	176	23%
Winter	221	28%

Unemployed (7%), employed (6%), and farmers (5%). The mortality rate of the study sample fluctuated between 0.75‰-1.02‰ (Table I), and the number of patients who died in spring and winter was slightly higher than that in summer and autumn (Table II).

CAUSES OF DEATH

The causes of death of the cases in the study sample are shown in Fig. 1. The disease associated with the highest death rate was infectious disease (44%), and pulmonary infection accounted for approximately 50% of infectious disease cases; cardiovascular and cerebrovascular diseases ranked second (31%), and malignant tumors ranked third (9%).

MORTALITY RATES ASSOCIATED WITH MALIGNANT TUMORS

Of the 70 patients who died of malignant tumors, most died from digestive tumors (approximately 44%), followed by respiratory tumors (29%), throat tumors (7%), gynecological tumors (7%), hematological tumors (7%), and urinary tumor (6%) (Table III).

TABLE III - *The order of death causes of malignant tumors in emergency*

The order of death causes of malignant tumors	Death(n)	%
Gastrointestinal Malignant Tumor	31	44%
Respiratory Malignant Tumor	20	29%
Throat Malignant Tumor	5	7%
Gynecology Malignant Tumor	5	7%
Hematological Malignant Tumor	5	7%
Urologic Malignant Tumor	4	6%
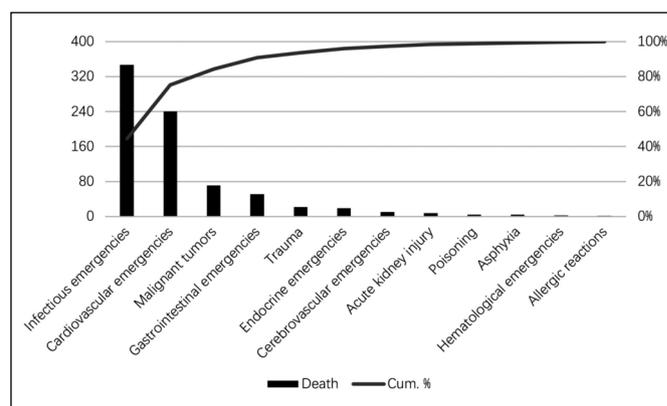
Fig. 1: Composition of cause of death of 781 deaths in emergency department.

Discussion

The mortality rate in our hospital's emergency department from 2014 to 2019 was analyzed and determined to fluctuate between 0.75‰-1.02‰ and, compared with previous years, has been slightly higher in the past two years. The reason for this may be related to the increased population and life expectancy of elderly individuals. Previous studies have reported that [4,5] 70% of elderly patients have been admitted to the emergency department at least once in the past year. In this study, 448 patients were 80+ years old (57.4%) and 232 were 60–80 years old (29.71%). The results of this study are consistent with the results of other studies conducted in China [6]. The elderly are the target population for the prevention and treatment of disease and death intervention. The hospital should work to provide better emergency medical services to elderly patients.

In terms of gender, the mortality rate of male cases was slightly higher than that of female cases. Men tend have bad habits, such as smoking and drinking, thus making them a high-risk population in terms of cardiovascular and cerebrovascular diseases. Furthermore, statistical data of the present study has revealed a correlation between mortality and season: The number of patients who died in spring and winter was slightly higher than that in summer and autumn. This is related to the fact that our hospital is located in the North, where the temperature is lower in spring and winter and is thus more likely to exacerbate sudden cardiovascular and cerebrovascular diseases and other severe health issues [6]. As such, hospitals should allocate rescue and treatment resources accordingly.

In terms of disease, foreign literature [7] reported that the leading cause of death in elderly patients is cardiovascular and cerebrovascular diseases, followed by tumors. Most elderly patients have health problems, such as organ failure, advanced cancer, and chronic weakness [5], but the present study revealed that, unlike in other countries, in China, the disease associated with the highest mortality rate is infectious disease (44%), and pulmonary infection patients accounted for approximately 50% of patients with infectious diseases. This is directly related to the long-term bedrest and high incidence of aspiration pneumonia and deposition pneumonia of elderly patients in the emergency department of our hospital. In addition, the incidence rate of chronic obstructive pulmonary disease (COPD) is high in China; a large proportion of the patients who visit the emergency department do so because of an aggravation of symptoms caused by COPD and acute infection.

Cardiovascular and cerebrovascular diseases are the second leading cause of death in our hospital (31%). With increased age, the degree of arteriosclerosis is increased, and vascular elasticity is decreased; moreover, slow blood flow significantly increases the incidence of stroke and coronary heart disease.

Malignant tumors are the third leading cause of death in our hospital (9%). The physical function and immunity of elderly patients with malignant tumors decreases with age [8] in addition, elderly patients typically suffer from underlying diseases or complications, which often makes the treatment of malignant tumors ineffective and inhibits organ function. Elderly patients usually cannot tolerate the side effects of tumor treatment and thus cease treatment; therefore, most deaths in the emergency department comprise elderly patients with malignant tumors [9-11]. Strengthening the prevention and treatment of malignant tumors and actively screening for malignant tumors in elderly patients reduce this population's risk of mortality from malignant tumors. The type of malignant tumor associated with the highest mortality rate in our hospital is the digestive tract tumor, whereas in the literature, bronchogenic carcinoma is associated with highest mortality rates [12,13]. This could be related to the fact that the majority of our study sample consisted of elderly patients.

Due to the influence of traditional Chinese culture, a significant proportion of elderly patients only receive palliative treatment; this contributes to the high mortality rate. Foreign literature [5] reported that, although 67.4% of the patients were hospitalized within six months prior to death, only 20.9% had a record of recovery, even though more than half of these patients received cardiopulmonary resuscitation. In addition, an Australian study [14] revealed that, due to a lack of proper communication, the measures taken in the emergency department are often futile. This suggests that medical personnel need to communicate with these patients and their families and make emergency treatment decisions methodically [15]. The present study has certain limitations: (1) This study is a single-center study; thus, the results cannot be generalized across all emergency departments in Beijing. (2) Our hospital is located near the railway station, and much of the death seen in the emergency department is from the railway station. (3) Although our hospital is a large-scale teaching hospital, it is renowned for its ophthalmology and otolaryngology departments; many patients might visit our emergency department for this reason, which could have had an impact on our results.

Conclusion

In summary, infectious diseases, cardiovascular diseases, and malignant tumors are the major threats to the lives of patients who visit our hospital's emergency department; the causes of death differ based on the patient's age; and most of the cases that end in mortality are elderly retired patients. Therefore, medical departments at all levels should summarize their experience in time and carry out targeted strategies and measures tailored to population, season, and disease to reduce the overall mortality rate and improve patients' health.

Riassunto

Lo scopo di questo studio era quello di analizzare le caratteristiche epidemiologiche della mortalità nel pronto soccorso del Beijing Tongren Hospital dal 2014 al 2019. Sono stati esaminati retrospettivamente e dal punto di vista epidemiologico un totale di 781 casi deceduti nel pronto soccorso del nostro ospedale, analizzando le caratteristiche epidemiologiche e l'andamento della mortalità degli adulti.

RISULTATI: dei 781 casi selezionati, 448 erano maschi e 333 femmine. I tassi di mortalità erano più alti nei pazienti di età compresa tra 80 e 89 anni e la maggior parte dei pazienti era in pensione (71,57%). La malattia infettiva è stata associata al più alto tasso di mortalità (44%), seguita da malattie cardiovascolari e tumori maligni.

CONCLUSIONE: Malattie infettive, malattie cardiovascolari e tumori maligni sono le principali minacce per la vita dei pazienti nel pronto soccorso dell'ospedale. La causa della morte varia a seconda dell'età del paziente.

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