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The Statistical Analysis of Patients' Clinical Data in Emergency Department by Using Hospital Information System

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Abstract

Objectives: Using hospital information system (HIS) to classify the patients who were treated in the emergency department and discuss the spectrum of diseases. Methods: We collected the clinical information of the patients who were treated in the emergence department from July 1, 2010 to June 30, 2011. The patients were divided into different groups by their disease, and analyzed the numbers and frequencies of each subgroup. Results: From the data of 12 months, we concluded that the most frequencies of diseases are cardiovascular diseases, respiratory diseases, neurological diseases and digestive diseases. There were no significant difference among the first three diseases, but the patients number of digestive diseases were increased in the winter. And the mortality of critical patients in January and February was higher than other months. Conclusion: 1) The increasing patients number of cardio-cerebrovascular diseases was corresponding to the increasing of aging population, and there were no difference in 12 months. 2) The increasing number of digestive diseases between December to February maybe associated with diet change. 3) The mortality of critical patients in January and February was higher than other months.

Keywords: Hospital information system, emergence department, spectrum of disease

Emergency department, as one of the window departments in hospital, is responsible for the rescues of

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critical patients, the treatments of patients with various acute diseases and the task in public health emergencies. At present, the defect of the community health care system, the lack of clinical statistical data and the high mobility of patients make it impossible to track the clinical data and the disease outcome after the patients leave the emergency room. And this is the main defect in emergency department in China, which formed the gap between emergency department and some other specialized departments.

The collection, preservation and statistical analysis of the clinical data are carried out by Hospital Information System(HIS), based on the management method of establishing the hospital computer networking, which already have some perfect mature examples in other countries[1]. Our hospital began to use HIS since 2008. The related clinical data of the patients during the treatment process can be got by using the real-name registration system, computer inputting and a series of management methods. This study want to analyzed the data of the patients in emergency department, to know the spectrum of disease and help us to manage the clinical work in the future.

1. Materials and Methods

1.1 Data collection

This study collected the data of patients with acute and critical diseases in our emergency department from July 1, 2010 to June 30, 2011. The exclusion Criteria is（1）patients less than 16 years old, these patients should be transferred to pediatric clinic at present;（2）no other complications in patients with fever, these patients should be transferred to infectious disease department;（3）no complications in patients with diarrhea, these patients should be transferred to intestinal department; (4) traumatic patients.

1.2 Analysis methods

The patients' general data, the amount of monthly visits, the monthly distribution of common acute diseases, and the treatment situation and mortality of the acute and critical patients in emergency department in one year were analyzed, based on the clinical data collected, to figure out the data differences among different months.

1.3 Statistical methods

The data is analyzed by using SPSS13.0, including frequency analysis and Chi-square test, $p < 0.05$ means for a statistical difference, and $p < 0.01$ for a significant difference.

2. Results

2.1 General conditions

There are 44182 patients went to emergency department in our hospital from July 1, 2010 to June 30, 2011. And the numbers of the male patients wers 21308, accounting for 48.2%, the female patients were 22874, accounting for 51.8%. Age range was from 16 to 110 years old, and the average age was 60.07 ± 19.73 years old. Table 1 lists the numbers of patients monthly and ratio of the male or female patients.

Table 1 the monthly quantity and the ratio of male or female patients

Month	number	Monthly proportion of total annual（%）	male（%）	female（%）
2010-07	3375	7.6	48.6	51.4
2010-08	2938	6.6	47.2	52.7
2010-09	3699	8.4	46.3	53.7
2010-10	4051	9.2	47.4	52.6
2010-11	3613	8.2	47.1	52.9
2010-12	3685	8.3	49.4	50.6
2011-01	3967	9.0	49.2	50.8
2011-02	3427	7.8	48.0	52.0
2011-03	3783	8.6	49.6	50.4
2011-04	3862	8.7	49.3	50.7
2011-05	4128	9.3	47.1	52.9
2011-06	3654	8.3	49.3	50.7

2.2 Classification of diseases

We use the main diagnosis to divide the patients into different groups, and to discuss the spectrum of disease in one year.

The diseases of patients are divided into 16 class system diseases, there are 1）cardiovascular diseases; 2）respiratory disease; 3）digestive disease; 4）urinary diseases; 5）nervous disease; 6）hematological diseases; 7）endocrine disease; 8）immune disease; 9）allergic diseases, including drug allergy and food allergy;10）all causes of acute poisoning, such as taking sleeping pills overdose, rodenticide poisoning, and alcohol abuse, etc; 11）the various causes in shock, such as hypovolemic shock, infection toxic shock and anaphylactic shock; 12）all causes of sudden death, respiratory and cardiac arrest happened outside the hospital; 13) tumor, expect the blood system diseases; 14）other causes, some light disorder diseases, such as respiratory alkalosis .

Table 2 lists the number of cases and the proportion of different diseases in 12 months, it can be concluded that cardiovascular disease, respiratory disease, digestive diseases and nervous diseases are the most common types.

Table 2 the number of cases and the proportion of different diseases

Classification of diseases	Number of cases	Ratio
Cardiovascular diseases	8843	20.0%*
Respiratory diseases	8444	19.1%*
Digestive diseases	6663	15.1%*
Urinary diseases	2221	5.1%
Nervous diseases	7914	17.9%*
hematological diseases	3846	8.7%
Endocrine diseases	1177	2.7%

Immune diseases	216	0.5%
Allergic diseases	152	0.3%
Acute poisoning	358	0.8%
Shock	63	0.1%
Sudden death	19	0.04%
Tumor	558	1.3%
Other causes	3708	8.4%

* Compared with other groups, the data of these four groups have statistical difference, p <0.05. And there is no statistical significant difference between the four groups compared with each other.

We list the main diseases described above in table 3, and analyze disease ratio in every month. There is no significant difference among cardiovascular diseases, respiratory diseases and nervous diseases between each month in one year. The incidence of digestive diseases in December, January and February is increased significantly, and there is significantly difference between the data in January and July.

Table 3 The number of cases and proportion of four common diseases in each month

Month	Cardiovascular diseases		Respiratory diseases		Digestive diseases		Nervous diseases	
	Case number	Ratio	Case number	Ratio	Case number	Ratio	Case number	Ratio
2010-07	680	19.7%	658	19.5%	365	10.8%*	652	19.6%
2010-08	486	16.8%	608	20.7%	375	12.8%	541	18.7%
2010-09	631	17.0%	737	20.0%	620	16.8%	694	18.8%
2010-10	749	18.5%	746	18.4%	625	15.4%	801	19.8%
2010-11	694	19.3%	725	20.1%	598	16.6%	706	19.8%
2010-12	834	22.7%	638	17.2%	637	17.2%	672	18.3%
2011-01	772	19.5%	785	19.8%	720	18.1%*	664	16.7%
2011-02	707	20.6%	694	20.3%	586	17.1%	548	16.0%
2011-03	860	22.8%	720	19.0%	586	15.5%	636	16.9%
2011-04	929	24.3%	770	19.9%	563	14.6%	668	17.3%
2011-05	877	21.2%	743	18%	506	12.3%	712	17.3%
2011-06	624	17.0%	620	17.0%	482	13.2%	620	17.0%

* There is significant difference between these two groups, p **<** 0.05.

2.3 The statistics of treatment and mortality of critical patients

Table 4 the number and mortality of critical patients

Month	Number of critical patients	Number of deaths	Mortality
2010-07	142	7	4.93%
2010-08	168	12	7.14%
2010-09	172	4	2.32%
2010-10	191	15	7.85%

2010-11	202	14	6.93%
2010-12	169	15	8.88%
2011-01	198	24	12.12%*
2011-02	170	19	11.18%#
2011-03	244	15	6.15%
2011-04	213	17	7.98%
2011-05	203	18	8.88%
2011-06	204	22	10.78%#

* Campared with the data in February and June, there is no difference ,but it is higher than other nine months, $p < 0.05$.

Compared with the data in other groups, there is no statistical difference.

Table 4 shows the data of critial ill patients treated in th emergency department. The numbers of patients have no differnce in each month. But the mortality in January and February are higher than other months.

3. Discussions

As a window department of the hospital, emergency department is a important place to rescue the critical ill, and would face lots of urgent and complicated situation. In these days, the informatization was rapidly developed in the hospital. And how to use it to improve the advantage of the discipline and the quality of medical care, is the keystone for the development of emergency department. The data of patients who went to emergency department from July 2010 to June 2011 had been analyzed after the emergency doctor workstation was used in the clinical work in our hospital.

Showed from the statistical data, the numbuer of patients had no difference between each month, no matter the mild or critical ill. It maybe have consequent relationship with the development of emergency medical system and urban trasportation in Beijing. Choosing to call 120 or 999 emengency system or self-driving to the hospital nearby, the patient numbers had not been influenced by the environmental factors as before, such as climate changes.

As we analyzed the visiting reasons of the patients, we found that the main causes of the disease is still cardiovascular disease, respiratory disease, digestive diseases and nervous diseases, which account for 72.1%. The increasing number of the patients of cardio-cerebrovascular diseases were associated with the aging of the urban population. And increasing of incidence of hypertension, diabetes, obesity, and the change of dietary structure is also associated with the increasing of cardio-cerebrovascular diseases. Although the age distribution is from 16 to 110 years old, the average age was 60.07 ± 19.73 years old, so we can draw the conclusion that most patients are elderly. And this made the number of patients with tumor increased in these years, accounting for 1.3% of the total number of cases. Finally, some patients who should choose community hospital, such as hysteria, migraine headaches, and chronic cough patients, always tended to choose central hospital. There are 8.4% of total patients who should receive treatment in the community hospital, but went to central hospital mainly because of the less development of community hospital and the patient's medical view.

There is a significant rise of digestive disease incidence in December, January and February, which might be related to two factors. First, the statistics exclude patients with uncomplicated diarrhea, and the exclusion criteria lead to the decrease of the statistical number in the summer and autumn of infectious diarrhea patients. Second, during the period from December to next February, the Chinese intake more high-fat high fever diet. And some patients suffered from digestive disease, often because of uncontrolled diet, and the incidence of cholecystitis, pancreatitis was significantly higher than in other months.

From the results, there is no significant difference in the number of critical patients in the 12 months. But

in January and February, the patient's mortality was significant higher than those in other month. It may be related with patients who didn't want to go to the hospital and delayed for treatment during the Spring Festival. There are 2276 critical patients received urgent treatment in our hospital, as there are 18 beds in emergency intensive critical unit, the average length of stay is 2.89 days.

The retention of patients in emergency department, including critical patients is still very serious. Most of time, the emergency intensive critical unit was saturated, so some critical patients couldn't get suitable therapy, and there were some patients who had been transferred to other hospitals because of the lack of beds. We can't draw the conclusion that there were any difference between the patients number in each month from the data, and it only reflected the retention in the emergency intensive critical unit.

Based on the statistics, we found that there were 19 sudden death patients who were sent to the emergency in one year. Reviewing the clinical data, it took the ambulance more than 10 minutes to get to the hospital, and none of these patients received cardiopulmonary resuscitation on the ambulance. All 19 patients were dead when they arrived the hospital. Although the CRP guidelines of the American Heart Association emphasized the importance of the pre-hospital emergency treatment, the clinical data showed that the mortality of arrest occurred out of the hospital was higher that those happened in the hospital, and the patients received less treatment before the professional arrived.

4. Conclusions

Because of the high mobility of the patients and the incompleteness of the clinical information saved in the emergence department, a large number of clinical data was lost after treatment in previous emergency work. And the statistics work of these clinical data was failed due to a heavy workload.

Hospital information system in China has just started, and how to use the relevant technology and improve the informatization for collecting emergency clinical data is an important work for us[2]. Using our hospital information system, we collected the the patients' clinical data from July 1, 2009 to June 30, 2010, and analyzed the spectrum of disease in the emergence department. It can provide the data to consummate the data bank in the hospital and form an early warning mechanism in the future, and it also can help us to manage the public health emergencies and epidemic disease[3].

Analyzing the data from the emergency medicine and patients, it is possible to draw the following three conclusions: 1) the increase of the aging population leads to the increased attendance rate of patients with cardiovascular and cerebrovascular disease, and no significant difference between the number of visits for 12 months; 2) from December to next February digestive disease incidence increased, and this is because the diet change; 3) in January and February, the mortality of critical patients is higher than other months in the critical unit.

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