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Original Article

"Five-Early" Model: The Magic Weapon against COVID-19

Qingjie YI [1,2], Wei FANG [1,3],Chunhui LANG [1,4], Huaming MOU [1,5], *Jinglong LV [1,6] , Sux-in WAN [1,3], Lian GUO [1,7], Yilin WANG [1,2], Huawen LIU [1,8], Qing XIAO [9], Chunqiu LIU [1,10], Min HUANG [1,11], Bangshuo ZHANG [1,6]

1. *Chongqing University Three Gorges Hospital, Chongqing 404100, China*
2. *Quality Control Department of Chongqing Three Gorges Central Hospital, Chongqing 404100, China*
3. *Pharmaceutical Department of Chongqing Three Gorges Central Hospital, Chongqing 404100, China*
4. *Department of Clinical Nutrition, Chongqing Three Gorges Central Hospital, Chongqing 404100, China*
5. *Department of Cardiology, Chongqing Three Gorges Center Hospital, Chongqing 404100, China*
6. *Department of Hematology, Chongqing Three Gorges Central Hospital, Chongqing 404100, China*
7. *Department of Endocrinology, Chongqing Three Gorges Central Hospital, Chongqing 404100, China*
8. *Department of Oncology, Chongqing Three Gorges Central Hospital, Chongqing 404100, China*
9. *Department of Hematology, The First Affiliated Hospital of Chongqing Medical University, Chongqing 400016, China*
10. *Department of Nephrology, Chongqing Three Gorges Central Hospital, Chongqing 404100, China*
11. *Department of General Medicine, Chongqing Three Gorges Central Hospital, Chongqing 404100, China*

***Corresponding Author:** Email: 13608388377@163.com

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Abstract

Background: COVID-19(2019 novel coronavirus disease)has brought tremendous pressure to the prevention and control of the national epidemic due to its concealed onset, strong infectivity and fast transmission speed.

Methods: In this retrospective study, 226 patients diagnosed with 2019 novel coronavirus pneumonia (NCP) in the Chongqing University Three Gorges Hospital were included. The patients' clinical data, including general information, initial symptoms at the onset, time of disease diagnosis, time to treatment in hospital, time of nucleic acid conversion to negative, disease classification, total time of hospitalization were collected. The clinical data of the mild and severe patients were compared.

Results: Fever, cough, sore throat, poor appetite andfatigue were the main symptoms of the diagnosed patients. The time of diagnosis was significantly shorter in the mild patients (4.96 ± 4.10 days) than severe patients (7.63 ± 9.17 days) (P=0.004). Mild patients had shorter time to treatment in hospital (6.09 ± 4.47 vs. 8.71 ± 9.04 days) and less time of nucleic acid conversion to negative (7.58 ± 2.51 vs. 11.6 ± 4.67 days) compared to the severe patients.

Conclusion: The above results can be used as a quantitative basis for the "five-early"(early detection, early screening, early diagnosis, early isolation treatment, and early recovery) model. The government, the masses, and the hospitals' joint prevention and optimization of the "five-early" model will provide important scientific reference for further prevention and control of the epidemics.

Keywords: COVID-19; "Five-early" model; Current situation; Investigation

Introduction

At the end of December 2019, a cluster of acute respiratory illness, now known as 2019 novel coronavirus pneumonia (NCP) first broke out in Wuhan, China and formed a situation of rapid diffusion and spread. In the face of the sudden major public health events, China took the extraordinary measure of locking down Wuhan on January 23, 2020, and then a series of strong prevention and control measures were taken all over the country.

As of Jan 29, 2020, 31 Chinese provinces, municipalities, and autonomous regions covering over 1.3 billion people have initiated first-level responses to major public health emergencies, which is of great practical significance to prevent the spread of the epidemic and enable patients to recover early. WHO (World Health Organization) has pointed out that early detection, early diagnosis, and early treatment are important weapons for controlling major outbreaks.

At present, most of the existing studies focus on the clinical characteristics, epidemiology, nucleic acid detection methods, gene sequence, drug efficacy and other aspects of COVID-19 patients (1-6), but there is still a lack of in-depth discussion on the early detection, early screening, early diagnosis, early isolation treatment and early recovery (i.e. "five-early" mode) of COVID-19. Therefore, this study intends to explore the status of the COVID-19 "five early" model by analyzing relevant data of 226 patients from the Chongqing University Three Gorges Hospital, and aims to provide an important reference for epidemic prevention and control.

Materials and Methods

This study was approved by the Ethical Committee of Chongqing Three Gorges Central Hospital (No.2020-4) and informed consent was obtained from each patient.

From January 20, 2020 to February 13, 2020, patients diagnosed with COVID-19 and admitted to the Chongqing University Three Gorges Hospital were collected. All cases were diagnosed according to the World Health Organization interim guidance for NCP. The patients' clinical data, including general information, initial symptoms at the onset, time of disease diagnosis, time to treatment in hospital, time of nucleic acid conversion to negative, disease classification (mild includes asymptomatic, mild and common illness, while severe includes severe and critical illness), total time of hospitalization were collected by using the Hospital Information System (HIS). The clinical data of the mild and severe patients were analyzed and compared.

Statistical analysis

Statistical analysis was performed by R 3.0.1 and SPSS 23.0 software (SPSS Inc., US). Quantitative data was expressed as means± standards (standard deviation) and compared using the two independent samples t-test. Qualitative data was expressed as numbers or percentages and compared using χ^2 test. $\alpha = 0.05$ was taken as the inspection level. $P<0.05$ was considered statistically significant.

Results

As of February 13, 2020, a total of 226 COVID-19 patients (123 males (54.42%) and 103 females (45.58%)) were admitted to the Chongqing University Three Gorges Hospital. Overall, 183 mild patients with a mean age of 43.01 ± 14.50 years and 43 severe patients with a mean age of 59.88 ± 15.10 years were included in this study. The main symptoms of mild patients were fever, cough, other, sore throat, poor appetite and fatigue. The main symptoms at the onset of severe illness were fever, cough, poor appetite, other, and sore throat. The time of diagnosis was significantly shorter in the mild patients (4.96 ± 4.10 days) than severe patients (7.63 ± 9.17 days) ($P<0.05$). Mild patients had shorter time to treatment in hospital (6.09 ± 4.47 vs. 8.71 ± 9.04 days) compared to the severe patients (Table 1).

Table 1: Age, main symptom, time of diagnosis and time of hospitalization of the 226 COVID-19 patients

Characteristic	*Disease classification*		P
	Mild patients	*Severe patients*	
Age(n,y)	183,(43.01±14.50)	43,(59.88±15.10)	0.000
Fever(n,d)	70,(6.30±3.56)	27,(7.26±4.60)	0.278
Cough(n,d)	55,(7.87±5.28)	12,(12.08±15.31)	0.366
Sore throat (n,d)	10,(7.70±4.52)	0	0.176
Poor appetite and fatigue(n,d)	7,(6.14±4.52)	3,(6.67±0.577)	0.007
Other(n,d)	11,(7.73±3.467)	1,(13.00±0)	0.004
Time of diagnosis (n,d)	183,(4.96±4.10)	43,(7.63±9.17)	0.004
Time totreatment in hospital (n,d)	183,(6.09±4.47)	43,(8.71±9.04)	0.598

As of February 13, 2020, there were 73 COVID-19 patients discharged from Chongqing University Three Gorges Hospital, including 63 mild patients and 10 severe patients. There was no significant difference in the time of diagnosis, time to treatment in hospital and the time of nucleic acid conversion to negative between the mild and the severe patients. The total hospitalization time of the mild patients was significantly shorter the severe patients ($P < 0.05$) (Table 2).

Table 2: Time of diagnosis, time of treatment in hospital, time of nucleic acid conversion to negative and total time of hospitalization of 73 COVID-19 patients discharged from hospital

Characteristic	*Disease classification*		P
	Mild patients	*Severe patients*	
Time of diagnosis (n,d)	63,(5.71±4.22)	10,(7.70±3.46)	0.162
Time to treatment in hospital (n,d)	63,(7.89±4.56)	10,(9.10±3.44)	0.425
Time of nucleic acid conversion to negative (n,d)	59,(7.58±2.51)	5,(11.60±4.67)	0.126
Total time of hospitalization (n,d)	63,(10.46±2.90)	10,(12.60±3.77)	0.042

Discussion

The results showed that fever, cough, sore throat and poor appetite were the main symptoms of COVID-19 patients, which is consistent with the current public data (6-8). The time to develop the above symptoms was about 6-7 days in mild patients and 6-12 days in severe patients, which is a different concept from the incubation period of disease. This reminds the masses who have no history of epidemiological contact, once the above symptoms appear, they should see a doctor as soon as possible, be alert to the possibility of COVID-19, and pay attention to the asymptomatic patients to avoid missed diagnosis. It is of great significance for the prevention and control of the epidemic to find out the disease ahead of time with the strong publicity of the government departments and the great attention of the masses.

The average time of diagnosis for mild patients and severe patients was about 5 days and 7 days, and time to treatment in hospital was about 6 days and 9 days, respectively. The time from diagnosis to hospitalization of severe patients was longer than that of mild patients. Most patients can be assigned to a designated treatment unit within 1-2 days after the disease is diagnosed. Most of the patients admitted to Chongqing University Three Gorges Hospital come from 13 surrounding districts and counties, covering an area of 3457 square kilometers. The long distance and the traffic control caused by the closure of the

city are also important factors affecting early screening, early diagnosis, and early isolation and treatment of patients, which may be potential factors for the aggravation of the disease. Therefore, it is recommended that the relevant departments coordinate to open the emergency channels, and strive to screen in advance, seek timely medical treatment and perform isolate treatment at the existing time point.

Among the discharged patients, the time of nucleic acid conversion to negative was about 8 days in the mild group and 11 days in the severe group. According to the current data, the time of nucleic acid conversion to negative was faster in the mild group, but there was no statistical difference between the two groups, which may be related to the small sample size. In addition, the total hospitalization time of discharged patients in the mild group was significantly shorter than that in the severe group, which was consistent with the logic of slower recovery of patients in the severe group. It is undeniable that with the deepening of the understanding of the disease and the improvement of the treatment plan, the time of nucleic acid turning negative will be further advanced, and the total time of hospitalization will be further shortened.

It is advocated that the government, the masses and the hospital should cooperate to optimize the "five-early" model. Therefore, the government needs to further refine the control measures, coordinate the work of various departments, open up the material support channels, strengthen the publicity of the epidemic (using tools such as television, radio, WeChat, and SMS) to ensure that all people comply with the epidemic rules, know the main symptoms of the disease and master scientific protection methods. At the same time, the hospital needs to further integrate high-quality medical resources, optimize the treatment plan, improve the treatment effect, and care for the physical and mental health of front-line personnel and their families. The characteristic measures taken by the Chongqing University Three Gorges Hospital and the results achieved are as follows: Firstly, Novel coronavirus pneumonia mixture, Chinese medicine granule and decoction were established according to the patient's disease dialectics. The participation rate of TCM (traditional Chinese medicine) was 90.82%, and the total number of patients receiving TCM intervention reached 450.Secondly, the patients' psychology was evaluated after admission and targeted counseling was carried out according to the evaluation results by telephone and WeChat to teach patients how to reduce stress and adjust emotions, and change their wrong cognition. Thirdly, nutritional evaluation and treatment were carried out for critical, severe patients as well as mild patients who could not eat. The enteral nutrition preparations prepared from the general hospital were sent to each ward by specially assigned person. At present, more than 100 patients have received nutrition intervention, more than 90% of them are willing to eat on their own. Lastly, for the patients with mild disease, the time in bed was reduced, and early respiratory rehabilitation treatment (mainly Trinity breathing exercise) was actively carried out. For patients with poor physical ability who cannot maintain the standing position, the body position was changed, and appropriate activities were carried out to improve the immunity of the body, so as to prevent further damage to the body caused by bed rest and immobilization.

This study has certain limitations. Most of the patients included in this study come from the surrounding cities where our hospital is located, which may have some impact on the statistical results. It is hoped that with the joint efforts, the "five-early" model will be further improved so that the epidemic situation can be controlled at an early date, and the society return to normal vitality.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The author promises that there is no conflict of interest in this study.

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