

RESEARCH ARTICLE

Impact of COVID-19 on emergency patients in the resuscitation room: A cross-sectional study

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Abstract

Objective: The purpose of this study was to evaluate the impact of COVID-19 outbreaks on emergency patients in a resuscitation room in Nanning, China.

Methods: A single-center cross-sectional retrospective study was conducted in the emergency department of a tertiary public hospital from January 1, 2019, to December 31, 2020, in Nanning, Guangxi, China. We collected the data of patients in the resuscitation room to investigate the number of patients accessing emergency services during the study period. Data in 2020 were compared to the data during the same period in 2019.

Results: The number of emergency patients in the resuscitation room during the COVID-19 pandemic has decreased in intrinsic diseases, extrinsic diseases, and pediatric cases, especially in the early stages of the pandemic. Additionally, the length of stay of emergency patients in the resuscitation room was reduced.

Conclusions: The number of emergency patients in the resuscitation room during the pandemic of COVID-19 in 2020 was reduced compared to that in the same period in 2019 in Nanning, China. This situation shows a serious social problem, which should arouse the attention of the medical profession and the government.

KEYWORDS

COVID-19, emergency patients, pandemic, resuscitation room

1 | INTRODUCTION

The pandemic of coronavirus disease 2019 (COVID-19) has spread over 200 countries, has caused a major crisis in the whole healthcare systems of many countries, and is still ongoing,^{1,2} which has been restructured to cope with the large increase in critical patients. China was the first country to report about the epidemic of COVID-19 with closure of Wuhan City, Hubei Province, on January 23, 2020.³ The

World Health Organization (WHO) announced that COVID-19 became a pandemic on March 11, 2020.⁴ Globally, as of 5:54 pm CEST, October 1, 2021, there have been 233,503,524 confirmed cases of COVID-19 reported to the WHO, which includes 4,777,503 deaths, 354,168 new cases, and 5812 new deaths in the last 24 h.⁵

The rapid spread of COVID-19 has led many countries to close their borders to international travel and implement social distancing and lockdown isolation measures aimed at reducing or minimizing community

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transmission.⁴ In China, rapid and strict regulatory measures have been implemented to curb the spread of the epidemic.⁶ The government launched a first-level major public health response in 30 provinces from January to April and then launched a second-level response through early June. Thanks to the positive measures, the outbreak has been retarded.⁷

The public health measures related to controlling the virus have led to extensive economic damage⁸ but may have positive environmental impacts; for instance, reducing carbon emissions caused by travel.^{9,10} The global lockdown has also impacted the health of the population in other ways, such as reducing the spread of influenza, accidents and injuries, and possibly preterm births. Increasing evidence recommends that patients with emergencies deliberately avoid the emergency room due to worry about the risk of contracting severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection.¹¹ Recently, a reduction has been reported in the number of emergency calls in Hangzhou, China by 21.63%, ambulance calls by 29.02%, and rescue calls by 22.57% in 2020 compared to those in 2019.¹² In Beijing, the emergency attendance rates were decreased in half at the beginning of the lockdown period.¹³ The accident and emergency room attendance rates also significantly decreased in Hong Kong.¹⁴ Additionally, the number of prehospital transportation events decreased in Japan and Australia in 2020.^{15,16}

Guangxi is a border area located in southern China. All suspected and confirmed COVID-19 patients were strictly quarantined and treated in designated hospitals. A special procedure was implemented during the epidemic of COVID-19 in which patients with suspected of COVID-19 were isolated from the general group of patients, including those admitted via emergency department procedures.

Moreover, the number and characteristics of patients in the resuscitation room during the COVID-19 pandemic might have changed significantly compared with those during the period before the pandemic. This study analyzed changes in the number and characteristics of patients in the resuscitation room before and during the COVID-19 in China.

2 | METHODS

2.1 | Setting

Our study was conducted at The Second Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China, which is a tertiary public hospital serving more than 1.64 million residents, without the public sector tasked to manage suspected and confirmed COVID-19 patients, as all the COVID-19 cases were strictly quarantined and treated in the designated hospitals. This institution is tasked with managing all-cause emergency and elective inpatient and outpatient services, in addition to its normal activity of more than 160,000 emergency patients per year.

2.2 | Study design

We conducted an observational study with retrospective data collection to investigate the number of patients accessing emergency

services. This analysis included all patients in the resuscitation room conducted by the Second Affiliated Hospital of Guangxi Medical University from January 1, 2020, to December 31, 2020. The same data were collected from January 1, 2019, to December 31, 2019, to determine whether this pandemic period differed from the same period in 2019.

2.3 | Measures

Data collected included basic demographic information, the number of daily and hourly emergency patients in the resuscitation room the number of intrinsic diseases, extrinsic diseases or pediatric diseases, and the length of stay of patients.

To survey the relationship between the time and differences in the number and characteristics of emergency attendance in the resuscitation room, each patient interaction was assigned according to the date of the emergency visit. Two periods were defined as follows: before the pandemic period, which was chosen as the baseline period (January 1, 2019, to December 31, 2019); during the COVID-19 pandemic period from January 1, 2020, to December 31, 2020.

The outcomes included the following: the number of patients in the two study periods, proportions and percentages of intrinsic diseases, extrinsic diseases and pediatric diseases, and patient demographics in the two periods studied.

2.4 | Statistical analysis

Continuous variables are summarized as the means \pm standard deviation (SD) and were compared using the *t*-test or one-way ANOVA; medians and interquartile ranges (IQRs) were compared using the Kruskal–Wallis test. Categorical variables are summarized as absolute numbers or percentages. The relationship between the time period and the number of intrinsic diseases, extrinsic diseases, or pediatric diseases in 2020 was investigated using the Pearson chi-square test with magnitudes of association reported as odds ratios (ORs) with respective 95% confidence intervals (95% CIs) using before the pandemic period as a reference category. The frequency distribution of daily and hourly emergency attendance across the two studies was compared using the chi-square test. The SPSS software (version 16.0) was used for all analyses. Differences were considered statistically significant at $p < 0.05$.

3 | RESULTS

A total of 6569 patients were in the resuscitation room during the observational period, including 3119 patients throughout 2020, and 3450 patients during the same date range in 2019. Of the total number of patients, there were more males than females, with 1976 male patients and 1143 female patients in 2020 and 2151 male

patients and 1299 female patients in 2019. Patients in 2020 were older on average than patients in 2019 (56.11 ± 20.35 years vs. 54.82 ± 21.98 years) ($p < 0.05$). The length of stay of patients in the resuscitation room was shorter in 2020 than in 2019 [310.00 (IQR 123.00–856.00) minutes vs. 344.50 (IQR 158.25–964.25) minutes] ($p < 0.05$). (Table 1).

Comparing 2019 with 2020, we found that in addition to the monthly number of patients in August, the number of patients in the resuscitation room during 2020 was lower than the respective number during the same period in 2019. During the lockdown period, the number of patients decreased significantly in February by 82 cases (27.33%) and by 50 cases (17.61%) in March. (Figure 1).

Table 2 shows the number of patients in the resuscitation room for intrinsic diseases, extrinsic diseases, and pediatric diseases in 2020 and 2019. Compared with 2019, there was a decrease in odds ratio of pediatric cases during 2020 (OR 0.536, 95% CI 0.419–0.685). In 2020, the most common intrinsic disease was neurological disease (774/2570, 30.12%), followed by cardiovascular disease (755/2570, 29.38%) and respiratory disease (353/2570, 13.74%), compared to 662/2803 (23.62%), 933/2803 (33.29%), and 410/2803 (14.63%), in 2019. In 2020, the most common extrinsic-related condition was associated with trauma (249/446, 55.83%), followed by neurological disease (45/446, 10.09%) and digestive disease (37/446, 8.30%), compared to 248/442 (56.11%), 37/442 (8.37%), and 48/442 (10.86%), respectively, in 2019. The most common pediatric disease in 2020 was respiratory disease (31/99, 31.31%), followed by neurological disease (27/99, 27.27%) and cardiovascular disease (10/99, 10.10%), compared to 52/199 (26.13%), 94/199 (47.24%), and 14/199 (7.04%), respectively, in 2019.

In 2020, the number of patients in the resuscitation room was 1180, 1331, and 608 at 8:00 am–15:59 pm, 16:00 pm–23:59 pm, and 0:00 am–07:59 am, respectively, compared to 1296, 1475, and 679 patients during the same time periods in 2019 ($p > 0.05$). There was no difference in numbers of patients with intrinsic diseases, extrinsic diseases, and pediatric patients or those from other departments during 8:00 am–15:59 pm, 16:00 pm–23:59 pm, and 0:00 am–07:59 am in 2020 and 2019 ($p > 0.05$). The length of stay of patients in the resuscitation room was reduced at 8:00 am–15:59 pm,

16:00 pm–23:59 pm, and 0:00 am–07:59 am in 2020 compared with that in 2019 ($p < 0.05$). (Tables 2 and 3).

4 | DISCUSSION

To the best of our knowledge, this is the first report to analyze the details of the emergency patients in a resuscitation room in an undesignated hospital for COVID-19 in Guangxi China between the time of the COVID-19 pandemic and before the COVID-19 pandemic. As a result, the number of emergency patients in the resuscitation room during the COVID-19 pandemic decreased, especially for pediatric cases. Additionally, the length of stay of emergency patients in the resuscitation room was reduced. Various reasons may be associated with a decline in the utilization of healthcare services.

One possible important reason for the reduction in the number of emergency patients in the resuscitation room during the COVID-19 pandemic was that the patients visited the designated hospitals for COVID-19 when they encountered signs of infection, such as fever, cough, sputum, dyspnea, or a low oxygen saturation, as our hospital was not a designated public facility sector tasked to manage suspected and confirmed COVID-19 patients. Hong Kong reported that the implementation of emergency measures to contain the epidemic of COVID-19 may prevent people from seeking medical care in time.¹⁴

Another possible reason may be the concerns from patients and their families about the fear of getting COVID-19.¹⁷ In addition, during the lockdown period with strict regulations for social distancing, people were encouraged to avoid hospitalization for general patients with nonemergency conditions. These patients were encouraged to wait until the epidemic was controlled before admission to the hospital for nonemergency treatments. Therefore, patients with mild to moderate symptoms may choose not to go to the hospital due to a lack of medical knowledge. Patients were afraid of contracting COVID-19, and thus postponed seeking medical aid. Many patients attempted to relieve their symptoms by voluntarily taking medications and sought help only when they could no longer manage their condition. In addition, during the COVID-19 pandemic, people

TABLE 1 Characteristics of the patients in the resuscitation room during 2020 and 2019 periods

	During 2020	During 2019	<i>p</i> value
Overall (<i>n</i>)	3119	3450	
Age (years)	56.11 ± 20.35	54.82 ± 21.98	0.014
Sex			
Male (<i>n</i>)	1976	2151	0.400
Female (<i>n</i>)	1143	1299	
Length of stay (min, M, IQRs)	310.00 (123.00–856.00)	344.50 (158.25–964.25)	0.000
Male	291.00 (120.00–811.00)	346.00 (154.25–961.75)	0.000
Female	338.50 (130.00–946.75)	342.00 (161.25–970.25)	0.000

Abbreviation: IQR, interquartile range.

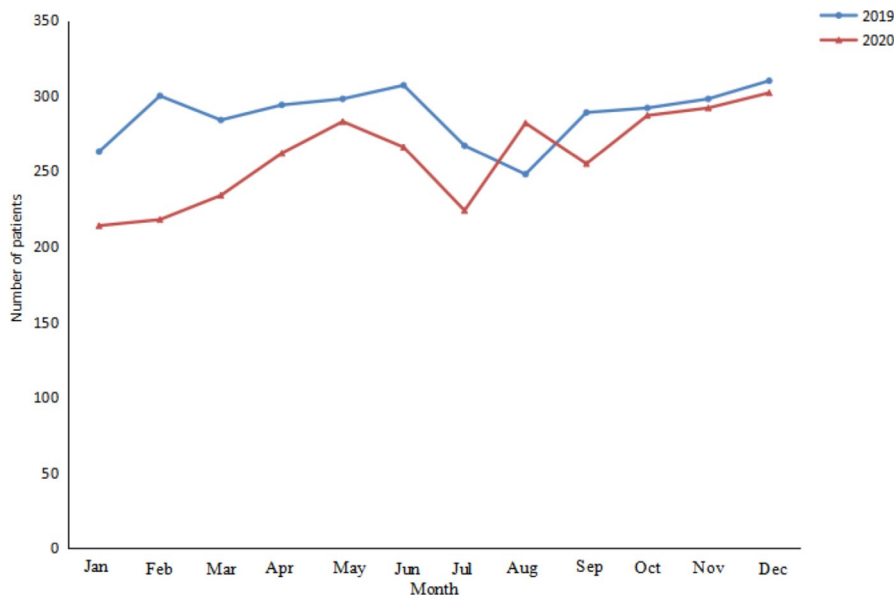


FIGURE 1 Numbers of monthly emergency patients in resuscitation room during epidemic

	During 2020	During 2019	<i>p</i> value
Intrinsic diseases (<i>n</i>)	2570 (OR 1.081, 95% CI 0.953–1.225) ^a	2803	0.227
8:00 am–15:59 pm	993	1076	
16:00 pm–23:59 pm	1080	1194	
0:00 am–07:59 am	497	533	
Extrinsic diseases (<i>n</i>)	446 (OR 1.136, 95% CI 0.986–1.308) ^a	442	0.078
8:00 am–15:59 pm	160	139	
16:00 pm–23:59 pm	199	202	
0:00 am–07:59 am	87	101	
Pediatric diseases (<i>n</i>)	99 (OR 0.536, 95% CI 0.419–0.685) ^a	199	0.000
8:00 am–15:59 pm	26	80	
16:00 pm–23:59 pm	50	77	
0:00 am–07:59 am	23	42	
Others (<i>n</i>)	4 (OR 0.737, 95% CI 0.208–2.614) ^a	6	0.757
8:00 am–15:59 pm	1	1	
16:00 pm–23:59 pm	2	2	
0:00 am–07:59 am	1	3	
Length of stay (min, M, IQRs)			0.000
Intrinsic diseases	347.50 (128.00–941.75)	366.50 (162.00–1078.8)	
Extrinsic diseases	206.00 (99.00–414.50)	236.50 (128.00–507.50)	
Pediatric diseases	266.00 (137.50–645.50)	348.00 (175.50–612.75)	
Others	142.00 (34.25–1170.0)	141.50 (57.25–207.50)	

TABLE 2 Diseases with significant changing trends in 2020 and 2019

Abbreviation: IQR, interquartile range.

^aThe Odds Ratio is in reference to the 2019.

chose to isolate at home.¹⁸ Therefore, the number of accidents, such as traffic accidents may have been reduced.¹⁹ Li Chen also reported that the number of patients in the resuscitation room decreased

by 23% in 2020.²⁰ There were fewer emergency department visits in 2020 than during the period before the epidemic in the United States and Turkey, and there were fewer calls to emergency medical

TABLE 3 The change in the daily visit period of the patients in the resuscitation room in 2020 and 2019

	During 2020	During 2019	p value
8:00 am–15:59 pm	1180	1296	–
16:00 pm–23:59 pm	1331	1475	–
0:00 am–07:59 am	608	679	–
Length of stay (min, M, IQRs)			0.000
8:00 am–15:59 pm	267.00 (115.75–508.25)	319.20 (164.00–903.50)	
16:00 pm–23:59 pm	330.50 (120.00–1094.2)	356.00 (151.00–1100.0)	
0:00 am–07:59 am	400.50 (150.75–708.00)	422.00 (162.00–757.00)	
Male (n)			0.121
8:00 am–15:59 pm	775	785	
16:00 pm–23:59 pm	802	937	
0:00 am–07:59 am	399	429	
Female (n)			0.048
8:00 am–15:59 pm	405	511	
16:00 pm–23:59 pm	529	538	
0:00 am–07:59 am	209	250	

Abbreviation: IQR, interquartile range.

services (EMS) in Israel.^{21–23} However, data from the Chongqing and Guangdong China did not show significant changes in the number of patients with severe conditions.^{24,25} The discrepancy between studies is due to differences in study design, the local regulations to control the pandemic of COVID-19, the local COVID-19 infection rates, and public attitudes toward the COVID-19 pandemic.

In our study, the length of stay in the resuscitation room was reduced during the pandemic, probably due to the decrease in hospitalization of general patients. It was reported that hospital admissions of patients with the severe cardiovascular-related conditions unpredictably fell during the COVID-19 pandemic in northern Italy.²⁶ Andrew Affleck et al. reported that the inability of admitted patients to access inpatient beds from the emergency department was the most significant factor causing emergency department overcrowding in Canadian hospitals.²⁷ Philip L Henneman et al. reported that the length of stay of 16,017 (17%) of the 96,562 patients was >6 h (51% admitted).²⁸

The decreasing trend in the number of emergency patients in the resuscitation room during the COVID-19 pandemic in China was particularly obvious in the first half of the year, probably owing to the sharp rise in COVID-19 during the epidemic; the gradual recovery of the number of emergency patients in the resuscitation room in the second half of 2020 may be related to the gradual stability of the epidemic situation. Medical services and other social activities gradually resumed. The public attitudes have changed with the prolongation of the pandemic and the increasing likelihood of patients seeking medical attention. Despite these improvements, the sharp decline in the early stages of the pandemic should remind medical and patient organizations to emphasize the need for emergency medical services for various diseases, especially life-threatening diseases, even during the special lockdown period. It was reported that the number of hospitalized patients in life-threatening situations has decreased during the COVID-19 pandemic in the United States.²⁹ Dong Eun Lee et al. reported that the temporary closures of the

emergency department due to the unpredicted exposure to COVID-19 resulted in an increase in in-hospital mortality rates of emergency patients of 8.7% and 7.4% for the temporary-closure and no-closure groups in the EMS-use group, respectively.³⁰ The public needs nationwide information and clarification. We should strengthen the education of the importance of rapid treatment for emergency patients among the general population, especially in high-risk groups. It should be stressed that during the pandemic, non-COVID-19 patients are supplied medical aid in appropriate areas. It is crucial to prepare the regional EMS systems to respond to new epidemics to protect the safety of all residents. As the pandemic continues, all stakeholders need to strengthen their efforts to jointly maintain the order of medical services.

This study was limited to a single-center study. In addition, the database used in this research was initiated in 2019, and earlier emergency care was not available. Nevertheless, the large number of emergency visits throughout the region contributed to reliable estimates. Because this research did not include the clinical follow-up processes and clinical outcomes of the patients, the relationship between the number of visits and in-hospital mortality could not be evaluated. In addition, the research was conducted in Nanning, where there were no more than 100 cases of COVID-19 in 2020, and the infection rate of COVID-19 was relatively lower. Additionally, the strictest regulations were implemented during the lockdown. The study findings should be interpreted with caution in other regions.

5 | CONCLUSIONS

The number of emergency patients in the resuscitation room during the epidemic of COVID-19 in 2020 was reduced compared to that in the same period in 2019. It shows a serious social problem, which should arouse the attention of the medical profession and government.

CONFLICT OF INTEREST

None declared.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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