

Impact of COVID-19 Pandemic on Emergency Calls and Trauma Emergency Calls in Hangzhou

Guohu Zhang

Hangzhou Normal University Affiliated Hospital

Mingwei Wang

Hangzhou Normal University Affiliated Hospital

Shijin Lv (✉ lvshijin706@163.com)

Hangzhou Normal University Affiliated Hospital

Yongran Cheng

Hangzhou Medical College

Jinming Xia

Hangzhou Normal University Affiliated Hospital

Muding Wang

Hangzhou Normal University Affiliated Hospital

Dengpan Lai

Hangzhou Normal University Affiliated Hospital

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Abstract

Background: This study aimed to investigate the impact of the coronavirus disease 2019 (COVID-19) pandemic on emergency calls and trauma emergency calls in Hangzhou, Zhejiang, China.

Method: This was a single-center retrospective study. Data on emergency calls and trauma emergency calls in Hangzhou during the COVID-19 epidemic (January 23, 2020, to March 15, 2020) were collected from the Hangzhou Emergency Center (HEC). All emergency data were compared with the data during the same period in 2019.

Results: The number of emergency calls from HEC decreased by 17.1%, ambulance assignments by 29.1%, rescue personnel first-aid calls by 22.4%, and trauma emergency calls by 40.8% in 2020 compared with those during the same period in 2019.

Conclusion: The numbers of emergency calls from HEC and trauma emergency calls significantly decreased during the COVID-19 epidemic in Hangzhou, highlighting serious social issues that required the attention of the medical community and the government.

1. Background

Coronavirus disease 2019 (COVID-19) is caused by novel coronavirus infection. Asymptomatic individuals are the main source of infection. Close contact and respiratory droplets are the main routes of transmission. COVID-19 is characterized by typical symptoms, strong infection, and a long incubation period. China was the first country to report the prevalence of COVID-19^[1]. As an acute respiratory infectious disease, it has been included in class B infectious diseases stipulated in the infectious disease prevention act of the People's Republic of China, but should be managed according to class A infectious disease^[2]. Hangzhou, Zhejiang, China, deployed two hospitals (the First Affiliated Hospital of Zhejiang University and Xixi Hospital, Hangzhou, Zhejiang) to treat suspected and confirmed cases. Other tertiary public hospitals in Hangzhou had fever clinics to isolate patients suspected of having SARS-CoV-2 infection from the general population to avoid cross infection^[3]. Hangzhou Emergency Center (HEC) consists of 25 emergency centers. During the COVID-19 epidemic (Fig. 1), HEC developed a transfer process for confirmed and suspected patients (Fig. 2). Patients suspected of having SARS-CoV-2 infection were separated from common patients and transferred to relevant hospitals for treatment. Trauma has always been one of the most common diseases in an emergency center. It is characterized by the destruction of the structural integrity of the human body caused by mechanical energy^[4]. Traffic accidents, falling injuries, mechanical injuries, sharp instrument injuries, and animal bites are the top five causes of emergency trauma^[5], accounting for 43.29%, 22.80%, 14.35%, 5.67%, and 3.01% of cases, respectively. During the COVID-19 epidemic, Hangzhou adopted the first-class response of epidemic prevention and control, applied closed-off community management, reduced the number of people going out, stopped market transactions, implemented construction site shutdown, and so forth. Hangzhou, as the first city with Internet plus development, made full use of advantages of the Internet, such as cloud

lessons, cloud meetings, cloud shopping, and green code trips^[6]. The numbers of emergency calls and trauma emergency calls in Hangzhou decreased significantly compared with those a year ago because of comprehensive prevention and control of the epidemic situation. This study analyzed changes in the numbers of emergency calls and trauma emergency calls, and also explored the correlation between this downward trend and the epidemic trend of COVID-19 in China. The purpose of this study was to analyze the reasons for the decrease in the numbers of emergency calls and trauma emergency calls in Hangzhou, as well as the relationship of these numbers with the social development.

2. Method

2.1 Research object

This single-center retrospective study was performed to assess the impact of the COVID-19 pandemic on the numbers of emergency calls and trauma calls in Hangzhou, China. The data collected during January 23 to March 15, 2020 (total 52 days) from HEC included the numbers of daily emergency calls, ambulance assignments, rescue personnel first-aid calls, and trauma emergency calls. The same data were collected during the same period in 2019 (from January 23 to March 15, 2019).

2.2 Time node selection

On January 23, 2020, Wuhan City, Hubei province, China, announced the closure of the whole city^[7]. The news soon spread across the country. Hangzhou took the lead in initiating the first-level response nationwide, and the residential areas in Hangzhou were closed during the outbreak. This time was used as the starting point for analysis. On March 15, 2020, the residential areas were gradually opened, but Hangzhou residents still needed to wear masks, measure body temperature, and show health code. March 15 was chosen as the end point of analysis^[8].

2.3 Traumatic diseases

Mechanical factors cause damage to human tissues or organs. Traumatic diseases were analyzed according to the location, site, tissue, factors, and skin integrity. They included injuries caused by traffic accidents, falling from height at a construction site, and so forth.

2.4 Analysis objectives

(1) The numbers of emergency calls, ambulance assignments, and rescue personnel first-aid calls were compared between the two periods.

(2) The numbers of trauma emergency calls were compared between the two periods.

2.5 Statistical analysis

Categorical variables were expressed as absolute numbers or percentages, and continuous variables were expressed as mean \pm standard deviation. Data were compared using the *t* test. R software (version 3.60) was used in all analyses, and the difference was statistically significant ($P < 0.05$).

3. Results

3.1 Comparison of the numbers of emergency calls, ambulance assignments, rescue personnel first-aid calls, and trauma emergency calls during 2019–2020

In 2020, the number of emergency calls during the COVID-19 pandemic was 28,806. This number was 17.1% lower than 34,739 during the same period in 2019. The number of ambulance assignments was only 8642 in 2020, which indicated a decrease of 29.1% compared with 12,205 during the same period in 2019. The number of rescue personnel first-aid calls was 6403 in 2020, which was 22.4% lower than 8246 during the same period in 2019. The number trauma emergency calls was 1634 in 2020, which was 40.8% lower than 2763 during the same period in 2019 (Table 1).

Table 1. Comparison of the numbers of emergency calls, ambulance assignments, rescue personnel first-aid calls, and trauma emergency calls during 2019–2020

Year	Emergency calls	Ambulance assignments	First-aid calls	Trauma emergency calls
2019	34,739	12,205	8246	2763
2020	28,806	8642	6403	1634
<i>t</i>	6.774	13.866	10.579	9.913
<i>P</i>	0.001	0.001	0.001	0.001

3.2 Comparison of the numbers of daily emergency calls, ambulance assignments, rescue personnel first-aid calls, and trauma emergency calls

During the COVID-19 pandemic in 2020, the daily number of trauma emergency calls was lower than that during the same period in 2019. Further, the numbers of daily emergency calls, ambulance assignments, and rescue personnel first-aid calls were mostly lower in 2020 than during the same period in 2019 (Figs 3 and 4).

4. Discussion

Trauma can be divided into four categories: stab, cut, sprain, and contusion. The main clinical manifestations are swelling, pain in the injured area, tenderness, and other symptoms. If not treated in time, a patient may have shock, massive hemorrhage, shock, disturbance of consciousness, asphyxia, and other serious complications, thus having a certain impact on the patient's health and daily life [9]. The

incidence of severe trauma continues to increase every year with rapid urbanization, including construction industry, high-speed public transportation, and so forth. Most of the severe trauma is caused by traffic, construction sites, and other accidents, which seriously damage the body function of patients and may also affect and damage multiple organs and tissues. The lives of patients are seriously threatened if the injury progresses quickly, the treatment is not given in time, or the rescue effect is not ideal. The golden hour of trauma first aid is within 1 h after the injury, which is of great significance to improve the rescue efficiency^[10].

The numbers of first-aid workers and emergency workers were significantly lower in 2020 than during the same period in 2019. This was probably due to the following reasons. First, the media reported that the hospital lacked protective equipment and effective means of protection, leading to the spread of infection among hospitalized patients and medical staff. Hence, patients were worried about being infected with COVID-19 in the hospital or on the way to treatment. Consequently, they avoided going to the hospital. During the novel COVID-19 epidemic, ordinary patients who did not need emergency treatment were avoided and encouraged to wait until the epidemic situation was under control. Therefore, they delayed the appointment. Many people took drugs to relieve symptoms. Some patients delayed the treatment, leading to wound infection, fracture malunion, and other diseases. Elderly patients, or patients with underlying diseases, often had a secondary injury or even irreversible outcomes^[11]. Second, Chinese governments, including Hangzhou, took measures to stop the transmission of the virus by restricting residents' travel and stopping public transportation during the COVID-19 epidemic^[12], leading to a decrease in population flow. According to news media reports, traffic on the viaduct in Hangzhou decreased significantly. With the decrease in traffic flow, the road was unobstructed, the probability of accidents reduced, and the number of rescue personnel first-aid calls significantly reduced. Third, Hangzhou underwent significant urban development in recent years. Consequently, a large number of patients were injured due to falling or being hit by heavy objects. The production and construction were stopped at the construction sites during the COVID-19 epidemic. Consequently, the number of patients with traumatic injury decreased significantly, leading to a decrease in the numbers of rescue personnel first-aid calls and trauma emergency calls. Fourth, Hangzhou is an economically developed region in China, with an urban population of about 10 million. However, it has a large number of immigrants; the local population accounts for only 10%–15%. The outbreak of the novel COVID-19 epidemic happened during the Spring Festival, a traditional Chinese festival. Many migrant workers went home for the Spring Festival. The total population of Hangzhou decreased significantly during this period as a result of the epidemic, traffic control, and inability to return to work in Hangzhou, which also led to the reduction in trauma emergency calls.

The decline in these trauma data emergency calls was a good sign. The in-depth analysis revealed that travel restrictions and discontinued construction led to a serious decline in the city's economy. The decrease in social productivity and residents' income and the hindered urban development formed a vicious circle^[13]. With an improvement in the COVID-19 epidemic, the Chinese government has lifted travel restrictions and is encouraging enterprises to resume work and production.

Considering the aforementioned observations, some countermeasures were proposed. First, community health services should be improved. In the case of less trauma, patients should call their family doctor, visit a clinic, or go to a community hospital for timely treatment. The state should strengthen the investment in appropriate medical equipment in community hospitals, especially for trauma-related x-ray examination, color Doppler ultrasound, computed tomography, and so forth, to detect the degree of injury and reduce the risk of patients going to a larger hospital. Second, the novel coronavirus may exist in humans for a long time, and hence nucleic acid detection should be popularized, especially for high-risk groups, such as medical staff, public transport drivers, window attendants, teachers, and so on. Hangzhou is the first city in China to implement the health code through establishing public health networks using big data of patients. The health records of injured patients should be checked, and doctors should familiarize themselves with the patient's medical history and previous health status. The recent nucleic acid detection report and the health code are convenient for on-site treatment and quick judgment of the risk of COVID-19 infection. These help in deciding whether to go to the designated new coronavirus hospital to prevent the virus from spreading. Third, traffic control and community closure are essential. The epidemic has led to economic recession worldwide, and hence people are encouraged to resume work and production. However, hand hygiene, using masks while moving out, and so on, should be ensured. At the same time, the health and safety education of the whole society should be strengthened. Safe production on the construction site, use of measures of road traffic safety, and reduction in risk factors of trauma are essential while returning to work^[14].

5. Conclusions

In short, the number of ambulance calls during the period of major emergency rescue in 2020 was significantly lower than that during the same period in 2019. At the same time, the number of trauma emergency calls also decreased significantly. These results showed a decrease in the number of trauma accidents, but they highlighted serious social issues, such as low population mobility, a continuous decline in the economy, and social contradictions in the long run. These problems need to be addressed by the government. Further, the epidemic situation should be comprehensively controlled, and work and production should be resumed on an urgent basis.

Abbreviations

1. the coronavirus disease 2019 (COVID-19)
2. Hangzhou Emergency Center (HEC)

Declarations

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Availability of data and material and Consent to participate: This study was a retrospective analysis and the data were from Hangzhou Emergency Center. It was supported from the examination of the Institutional Review Board of Hangzhou Normal University, People's Republic of China.

Consent for publication: We hope that our manuscript would be accepted for publication in BMC Emergency Medicine.

Code availability: Not applicable.

Authors' contributions: GHZ: Conceptualization, Methodology; MWW: Validation; SJL: Data Curation; JMX: Writing - Original Draft; MDW: Writing - Review & Editing; DPL: Supervision; YRC: Formal analysis.

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Figures

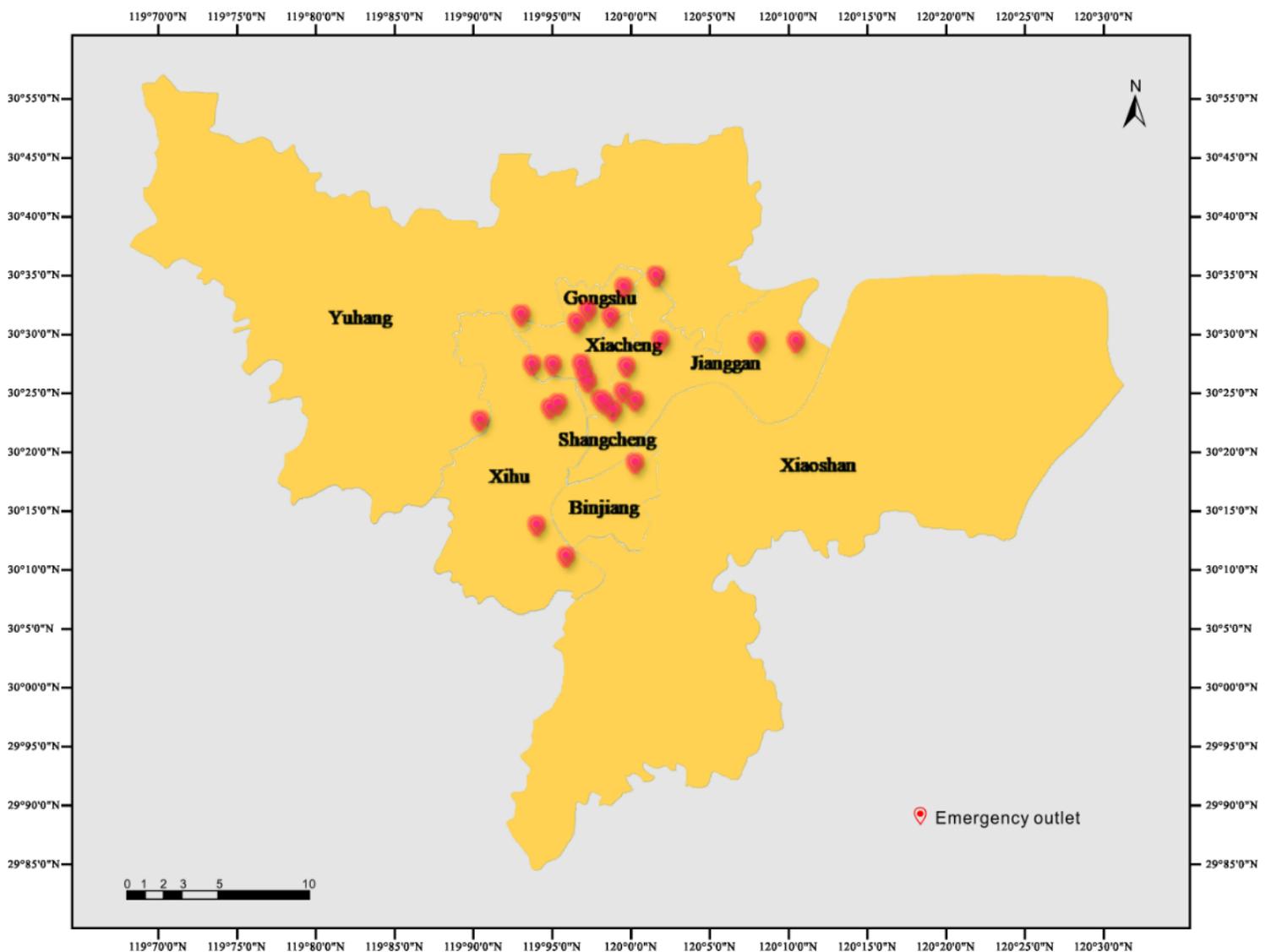


Figure 1

Twenty-five first-aid outlets of Hangzhou Emergency Center (HEC). Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

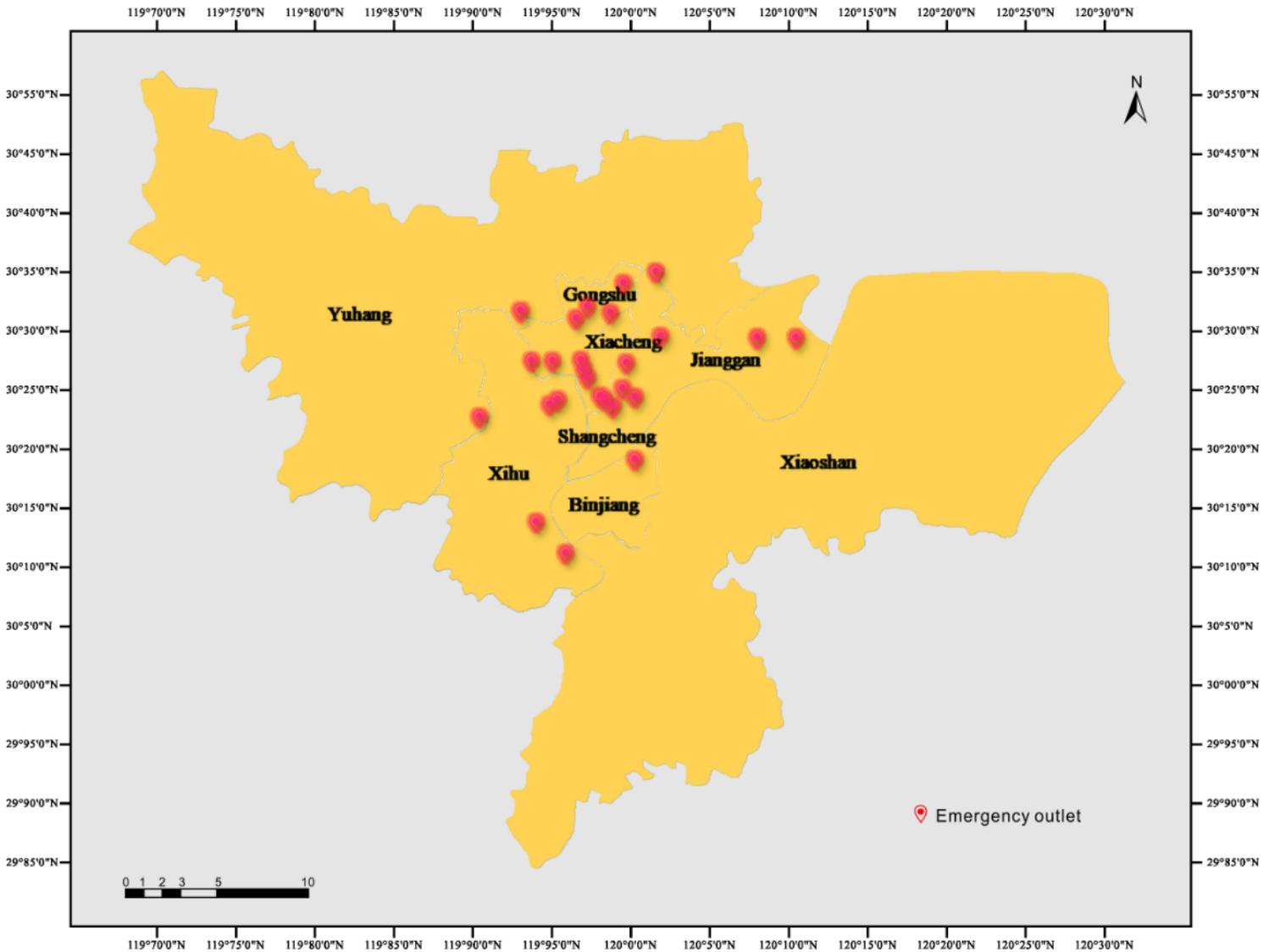


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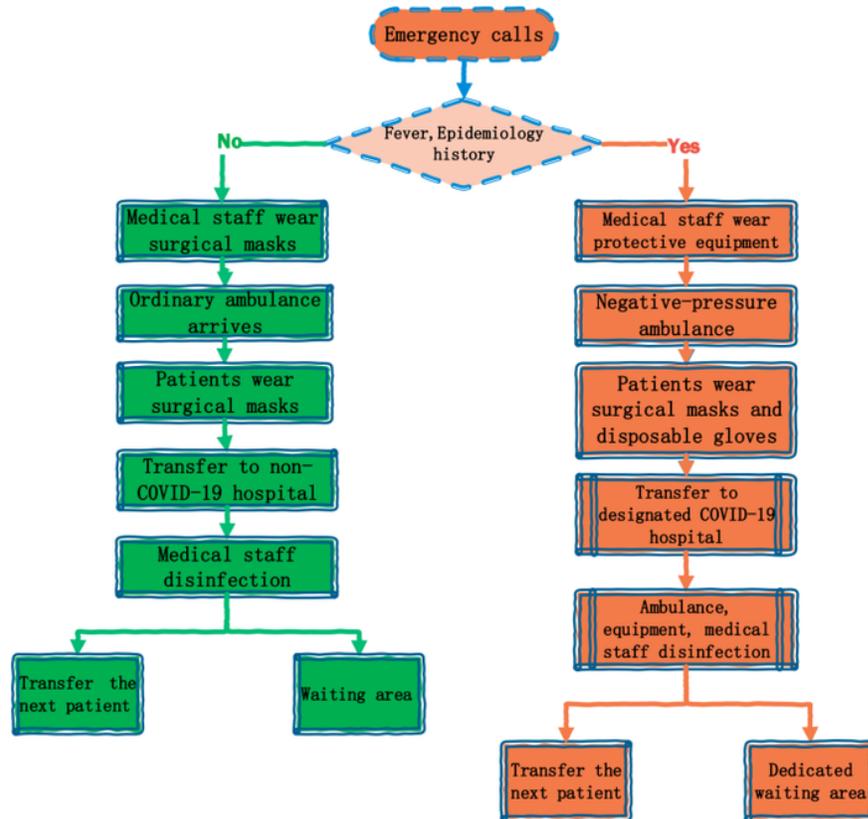


Figure 2

Transfer process developed by HEC for confirmed and suspected patients.

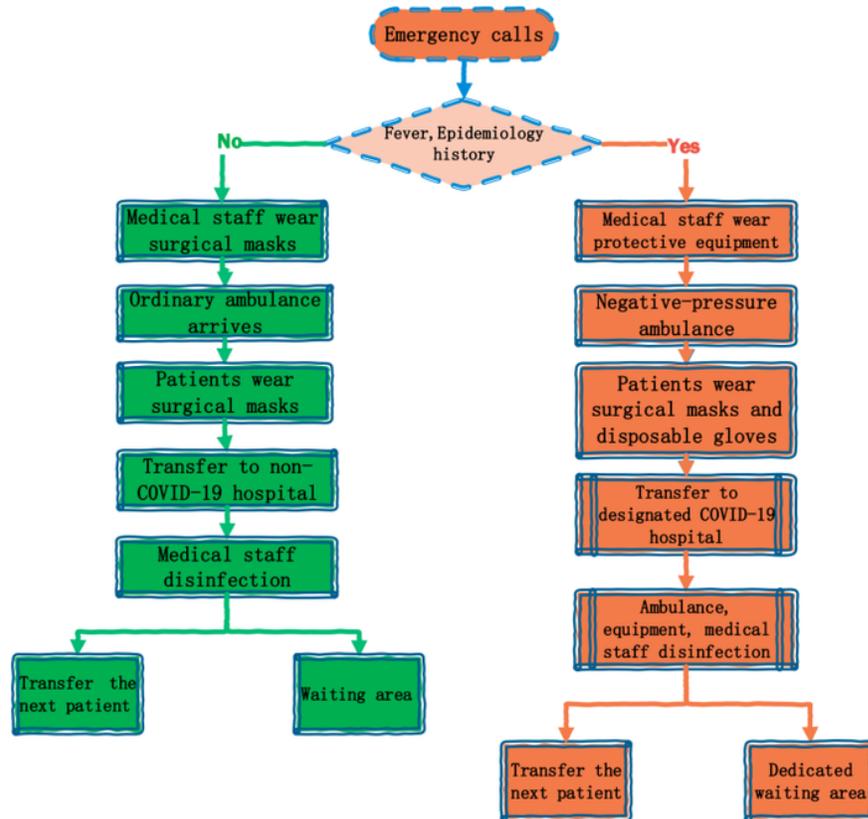


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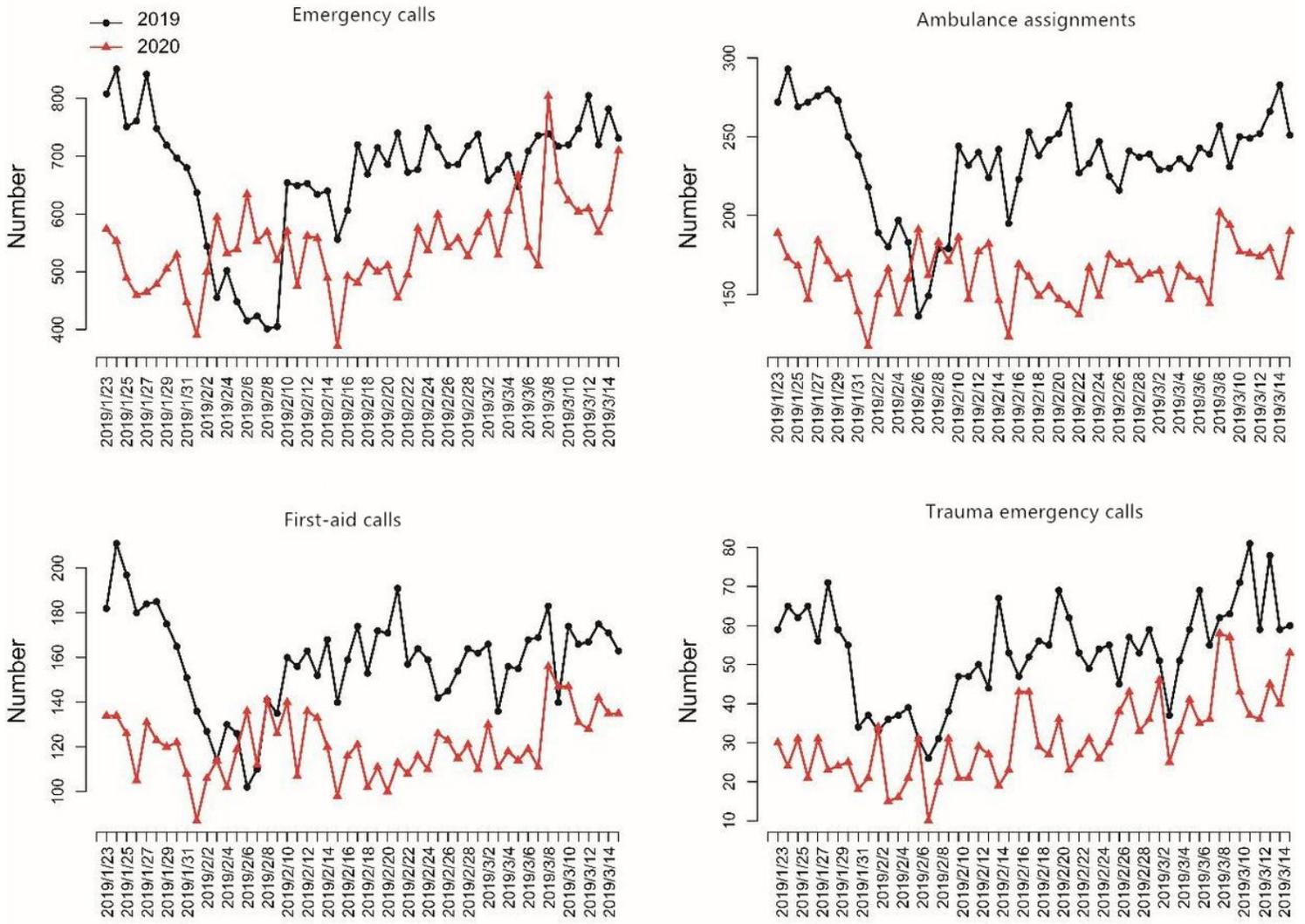


Figure 3

Comparison of the numbers of daily emergency calls, ambulance assignments, rescue personnel first-aid calls, and trauma emergency calls between the groups.

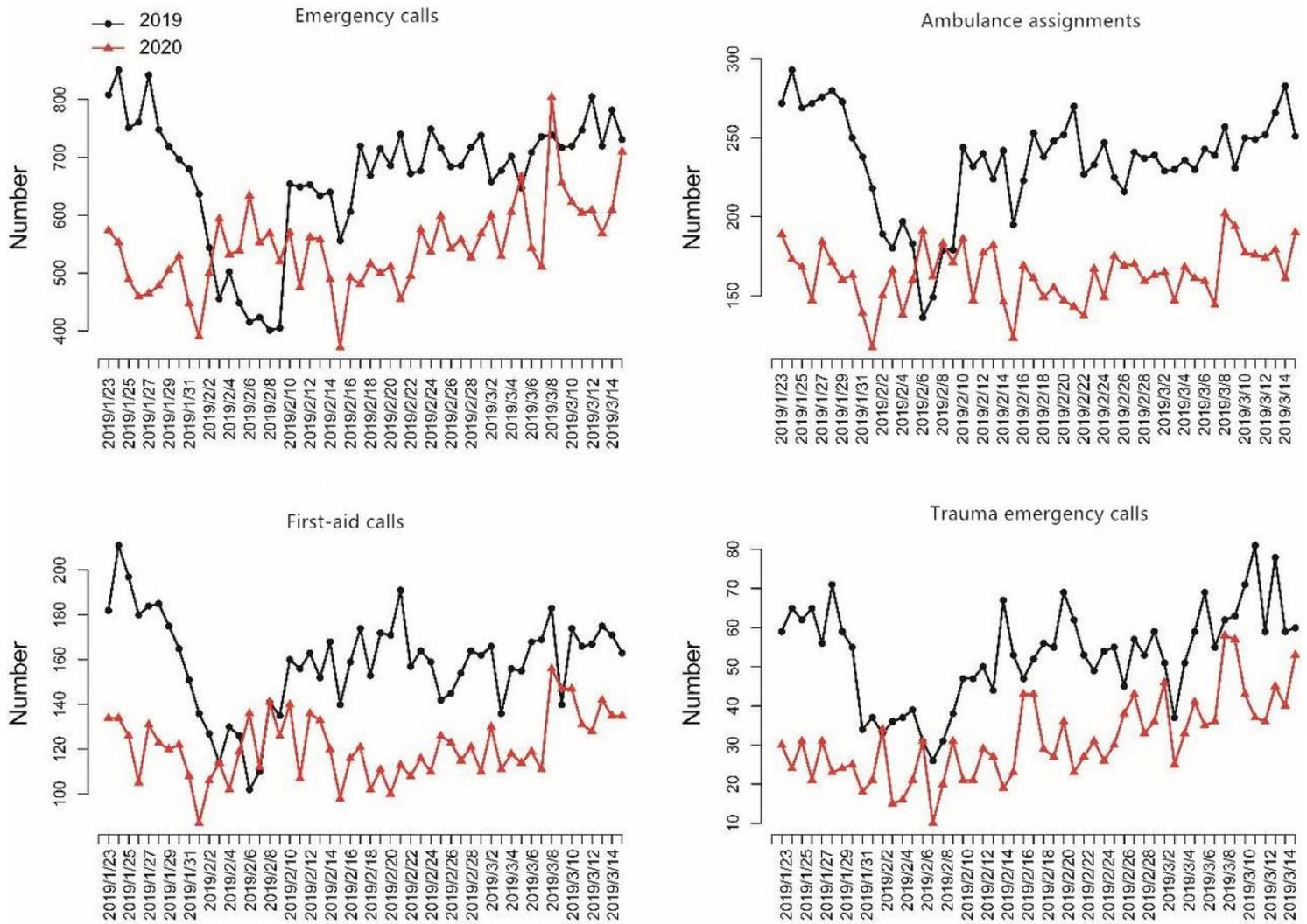


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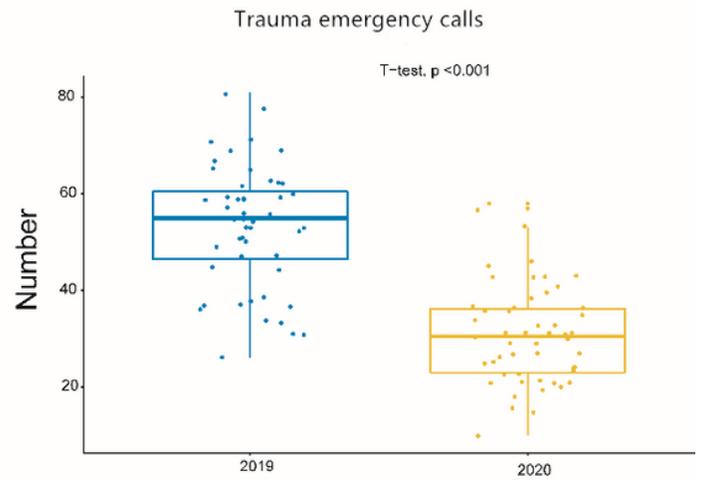
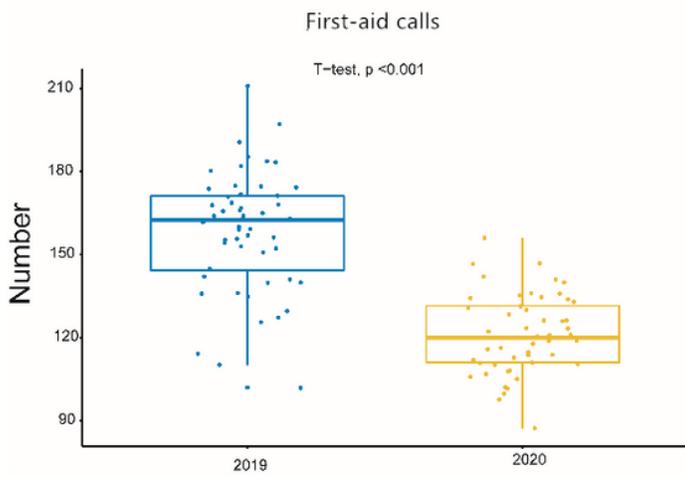
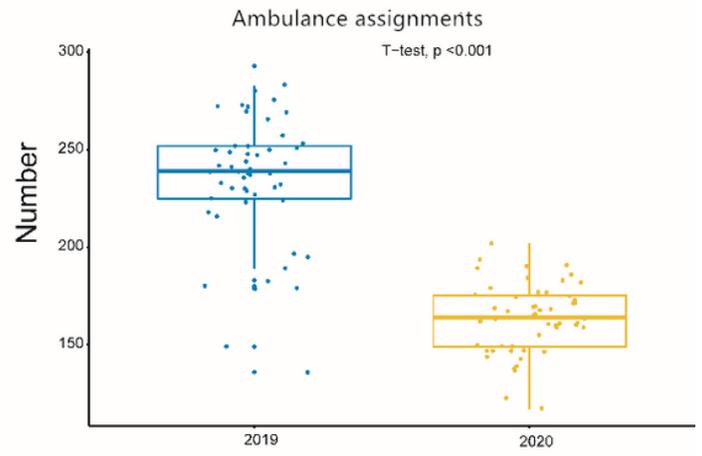
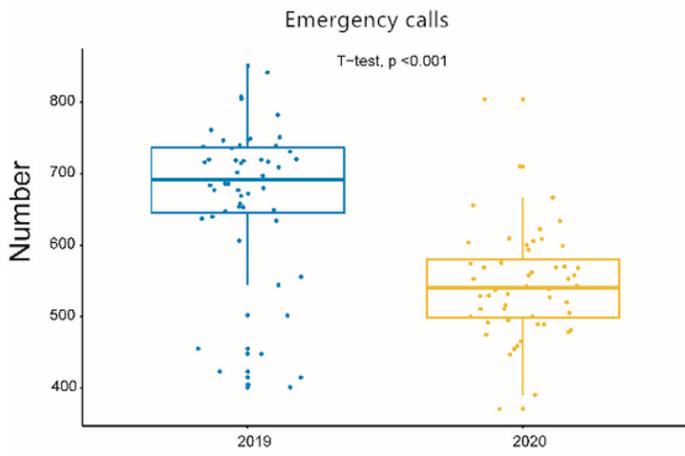


Figure 4

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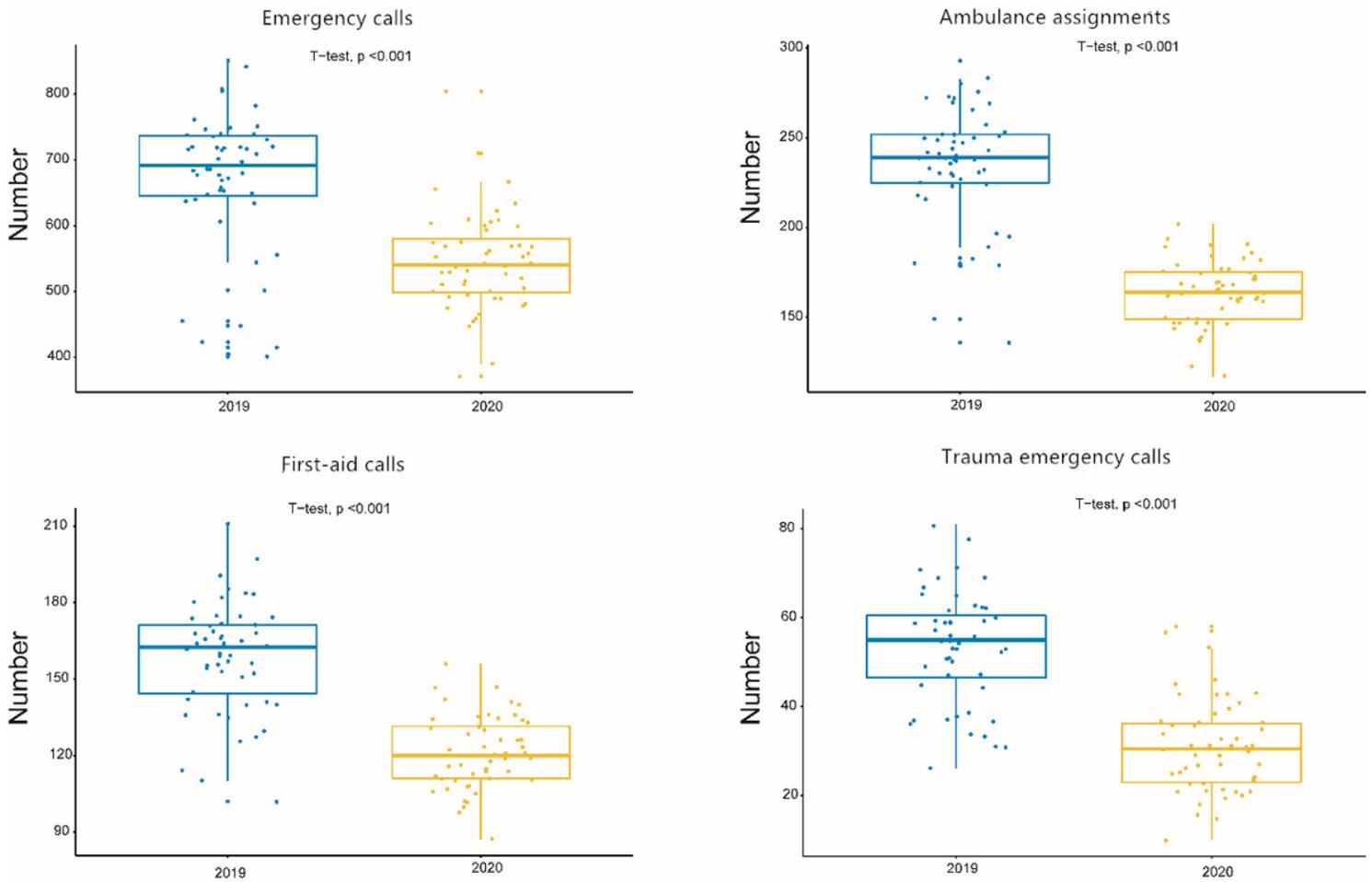


Figure 4

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