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COMMENTARY

# Temporary COVID-19 Specialized Hospital: Management Strategies for Public Health Emergencies

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**Abstract:** During the coronavirus disease 2019 (COVID-19) outbreak in Shanghai with the Omicron variant in March 2022, locally accessible hospitals and healthcare centres encountered difficulties quickly responding to a demand for hospitals that were rapidly increasing, optimizing clinical results and controlling the infection. In this commentary, we summarize the management strategies of patients in a temporary COVID-19 specialized hospital during the outbreak in Shanghai, China. The present commentary was considered eight characteristics of management system, including general idea, infection prevention team, and efficient time management, and preventive and protective measures management, strategies for the management of infected patients, disinfection management, drug supply management strategies, and medical waste management. Following eight characteristics, the temporary COVID-19 specialized hospital operated effectively for 21 days. A total of 9674 patients were admitted, 7127 cases (73.67%) were cured and discharged, and 36 were transferred to designate hospitals for better treatment. Twenty-five management staff, 1130 medical, nursing staff, 565 logistics staff, and 15 volunteers participated in the temporary COVID-19 specialized hospital, and no infection prevention team member was infected. We speculated that these management strategies could be potential references for public health emergencies.

**Keywords:** novel coronavirus infection, specialized hospital, management strategies, Omicron variant, outbreak

## Introduction

In March 2022, a coronavirus disease (COVID-19) outbreak in Shanghai and cases were reported with suspected Omicron variant infection. Studies showed that the median incubation period of the Omicron variant was short. However, the Omicron variant was more contagious than the Delta variant, and even vaccinated people were infected.[1–3] Twenty thousand individuals were infected daily due to a sudden epidemic in Shanghai, and controlling and preventing the spread may not be sufficient just by staying at home.[4] However, in China, designated hospitals, Fangcang shelter hospitals, and makeshift hospitals for the COVID-19 pandemic have significantly responded.[5] Unlike the Wuhan outbreak, the clinical characteristics of the infected patients showed a potentially weakened pathogenicity.[6–8] About 90% of patients were asymptomatic.[9] Owing to the limitations of locally available hospitals and healthcare institutions, faced challenges to the fast response to a fast-growing demand for hospitals, optimizing clinical outcomes, and minimizing intra-hospital coronavirus infection.[10] Therefore, newly built temporary COVID-19 specialized hospitals could be a potential alternative health approach besides the designated hospitals, Fangcang shelter hospitals, and makeshift hospitals.

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During the outbreak in Shanghai in March 2022, we implemented eight characteristics for the developing temporary COVID-19 specialized hospital in Shanghai and operated effectively for 21 days. The authors are the chief management authority, medical doctor and nurse. The first characteristic is a general idea that ensures an effective strategy via fast and efficient patient admission, and safe and effective workflows for the medical staff.[11] (2) Infection prevention team comprises the medical team, nursing unit and epidemiologists and microbiologists.[12] (3) Effective time management is the capacity to organize plan, and regulate time to accomplish their goals effectively.[13] (4) Preventive and protective measures management are safety measures for the working area protection management and medical staff protection management to reduce infections.[14] (5) Admission management, nursing strategies, and discharge management were all used to treat infected patients.[15] (6) Disinfection management prevention and control of the spreading of the virus in the temporary specialized hospital.[16] (7) Drug supply management strategies comprise medicine supply and medication management.[17,18] (8) Medical waste management to prevent secondary pollution, including medical waste collection, treatment, transportation, temporary storage, and handover.[19,20]

This commentary aimed to provide a reference for treating and controlling COVID-19 and other infectious diseases. We implemented the management experiences, including general ideas, medical work divisions, efficient time management, strict protective measures management, strategies for managing infected patients, disinfection management, drug supply management strategies, and medical waste management.

## Characteristics of Management

The developed temporary COVID-19 specialized hospital management system has implemented eight characteristics to operate effectively (Figure 1). The first characteristic is the general ideas, which include fast and efficient admission, providing the safe and orderly work of medical staff, and confirming the effective operation to control the outbreak.[11]

Second, the temporary COVID-19 specialized hospital strictly carried out diagnosis, treatment, and isolation for quarantine. To provide better services, different initiatives were taken, including (A) an effective plan, (B) organizing work properly, (C) co-ordinate, and (D) controlling the medical process. The nursing unit established the two-channel management system to form an efficient communication system. It was achieving zero infection of the temporary COVID-19 specialized hospital staff. This is achieved in the temporary COVID-19 specialized hospital by formulating safety workflows and allocating sufficient protective equipment, disinfection facilities, and other materials to help staff develop personal protection.[12]

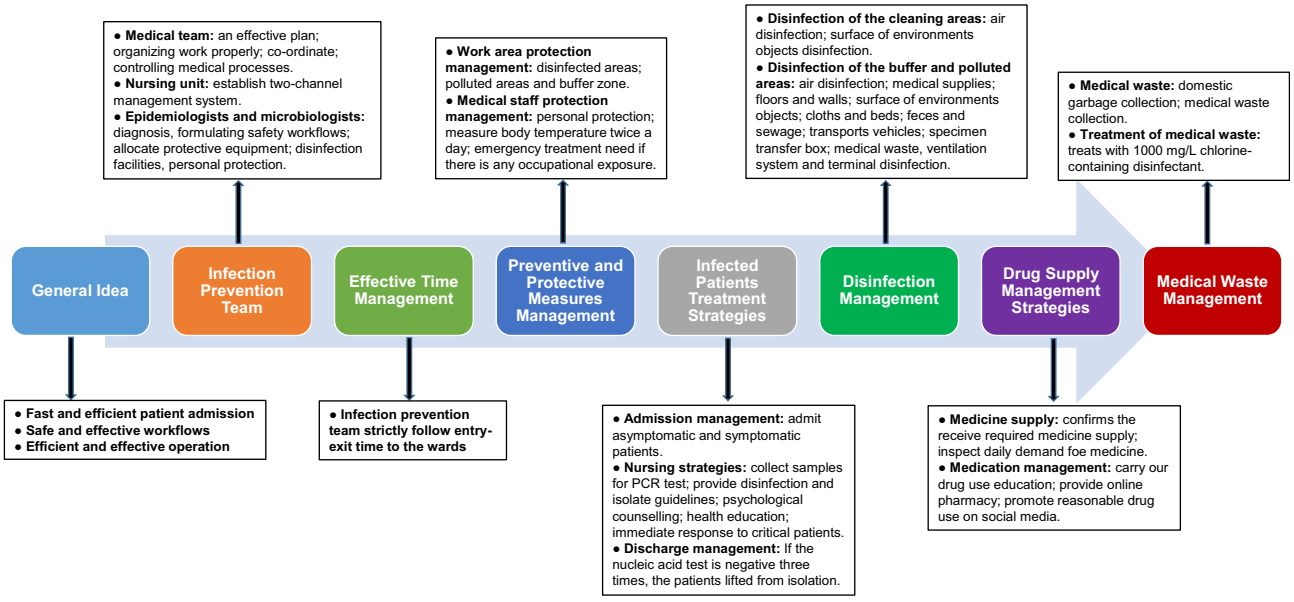


**Figure 1** Schematic presentation of the characteristics of the COVID-19 specialized hospital in response to COVID-19 outbreak in Shanghai.

Third, effective time management is crucial for the infection prevention team. The infection prevention team members strictly follow the scheduled entry-exit time.[13]

Fourth, preventive and protective measures management is divided into working area protection management and medical staff protection management.[14] The temporary COVID-19 specialized hospital's working area comprises disinfected areas, polluted areas, and a buffer zone (set up in the middle of the disinfected and polluted areas). Setting up a warning signboard at the junction of each designated area and strictly monitoring and implementing the people flow control in the "three designated areas and two channels".

The protection of the infection prevention team member is the first priority. Therefore, they should strictly follow the safety instructions. All medical team members' body temperature monitors twice a day. If there is any occupational exposure happens, emergency treatment should be taken immediately.

Fifth, treatment strategies for infected patients included admission management, nursing strategies, and discharge management. The temporary COVID-19 specialized hospital mainly treats symptomatic and asymptomatic patients. However, admitted asymptomatic patients could stay in isolation if they do not have severe complications, including respiratory, cardiovascular, and cerebrovascular disorders. Therefore, infection prevention team members diagnosed through screening and statistics of infected people and promptly referred severe, critically ill, and other infected people to implement necessary treatment.[15]

The nursing strategies of the temporary COVID-19 specialized hospital are divided into routine nursing and emergency nursing. Routine nursing provides infected people with disinfection and isolation guidance, nucleic acid testing, laboratory test results, disease observation, psychological counselling, and health education. Emergency nursing responds immediately to critical patients and cooperates with doctors to take rescue work.[21]

The asymptomatic patients are tested twice daily for the new coronavirus's N gene. (A) ORF gene Ct value $\geq$ 35 (PCR test, the cut-off value is 40; the sampling time interval is 24 hours).[22] (B) Two consecutive new coronavirus nucleic acid tests are negative. (C) The infected patient shall be tested for nucleic acid again three days after the nucleic acid is a double negative. If the nucleic acid test is negative three times, there are no fever and other respiratory symptoms. The asymptomatic and symptomatic patients could be lifted from quarantine.[22,23]

Sixth, Disinfection management; preventing and controlling the spreading of the virus in the temporary specialized hospital is an inevitable task.[16] Disinfection management is divided into (A) Disinfection of the cleaning area and (B) Disinfection of polluted areas.[24] Different personnel using various disinfection tools should carry out the disinfection work of the disinfected area, infected area and buffer zone.

Seventh, drug supply management strategies comprise (A) Medicine supply and (B) Medication management. The temporary COVID-19 specialized hospital management confirms the reception of regular medicines supply, and the nursing staff inspects daily to collect the demand for medicine.[17]

Pharmacists strengthen rational drug use education for patients in the ward and carry out drug use education during hospitalization for common diseases such as hypertension, diabetes, and hyperlipidemia. At the same time, public broadcasting facilities broadcast promote reasonable drug use on WeChat public accounts, provide online pharmacy services, and carry out drug use education, thereby improving patients' medication compliance and promoting rational drug use.[18]

Eight, medical waste management; the temporary COVID-19 specialized hospital implements strict sewage disinfection and medical waste management to prevent secondary pollution, including domestic and medical waste collection, treatment, transportation, temporary storage, and handover.[19,20]

## Implementation

The temporary COVID-19 specialized hospital is comprised of eight buildings with a total of 7380 beds. The hospital divided the isolation ward into three isolation ward areas (A, B, and C) (referred to as "wards") based on being equipped with essential medical equipment and facilities, medicines, and protective equipment. It increases the productivity of infection prevention team members by coordinating departments, ensuring medical observation, daily nursing, and prompt treatment of common and chronic illnesses, as well as by developing critically ill patient rescue systems, emergency procedures, and hospital transfer measures to ensure convenient treatment channels for critically ill patients.

The temporary COVID-19 specialized hospital successfully operated based on eight characteristics for 21 days. 36 patients were moved to designated hospitals for better care out of 9674 patients who were hospitalized; 7127 cases (73.67%) were successfully treated and released. There are 1735 medical staff in the temporary COVID-19 specialized hospital, including 25 management staff, 1130 medical and nursing staff, 565 logistics staff, and 15 volunteers. All medical staff is well trained in respiratory medicine, intensive care, and infectious disease, with efficient clinical front-line nursing and management experience.

## Discussion

In this commentary, we provided an overview of the patient treatment strategies used in a temporary COVID-19 specialized hospital in Shanghai during the outbreak in March 2022. In the current commentary, eight management characteristics were considered, including general idea, infection prevention team, effective time management, preventive and protective measures management, strategies for managing infected patients, disinfection management, drug supply management strategies, and medical waste management. Following eight characteristics, the developed temporary COVID-19 specialized hospital operated for 21 days effectively. Our study demonstrates that no infection prevention team member was infected. Therefore, these management techniques could serve as examples in the case of a public health emergency.

The general idea is the first characteristic of the temporary COVID-19 specialized hospital. It ensures patients' rapid and safe admission to the COVID-19 specialized hospital. It confirms the secure and orderly work schedule of the healthcare staff.[11] A recent study reported consistent practice with our research.[25] Thus, the general idea provides a practical guideline for the temporary COVID-19 specialized hospital to control the outbreak.

The infection prevention team consists of the medical team, a nursing unit, epidemiologists, and microbiologists. To ensure better services, the medical team was taken different initiatives, including (A) an effective plan, (B) organizing work properly, (C) co-ordinate, and (D) controlling the medical process.[12] A two-channel management system was established by the nursing unit for efficient communication.[21] The temporary COVID-19 specialized hospital staff achieved zero infection rate following the two-channel management system. The temporary COVID-19 specialized hospital was achieved by formulating safety workflows and allocating sufficient protective equipment, disinfection facilities, and other materials to help the team develop personal protection.[12] Therefore, the infection prevention team is vital in controlling the epidemic in the temporary COVID-19 specialized hospital.

Effective time management is essential for the infection prevention team. The infection prevention team strictly follows the working areas scheduled entry-exit time.[13] The preventive and protective measures management consist of the working area protection management and medical staff protection management in the temporary COVID-19 specialized hospital.[14] According to the guideline of the "Technical Guidelines for Prevention and Control of Novel Coronavirus Infection in Medical Institutions (Third Edition)", the temporary COVID-19 specialized hospital's working area protection management is set up with Disinfected area, infected area, and a buffer zone in the middle of the disinfected and infected areas.[26] The safety of the infection prevention team member is inevitable Therefore, they strictly follow the safety guidelines. All the infection prevention team members' body temperature was measured twice daily. If any occupational exposure happens in the infected area, an emergency treatment for occupational exposure should be taken immediately.[26]

The fifth characteristic is the infected patient's treatment strategies. It includes admission management, nursing strategies, and discharge management. Patients with symptoms and those asymptomatic are often treated in the temporary COVID-19 specialized hospital. However, if they do not have serious problems, such as respiratory, cardiovascular, or cerebrovascular disorders, newly admitted asymptomatic patients may continue to be isolated. As a result, members of the infection prevention team identified cases of infection through screening and statistics on infected individuals, and they swiftly forwarded such cases to the appropriate medical unit for treatment.[15] Routine nursing and emergency nursing are the two categories into which the nursing strategies of the temporary COVID-19 specialized hospital are separated. Routine nursing offers advice on isolation and disinfection, illness observation, psychological counselling, laboratory test observations, nucleic acid analysis, and health education to infected patients. Emergency nursing immediately works with doctors to perform rescue procedures when a patient is in serious condition.[21] The N gene of the novel coronavirus is examined twice a day in asymptomatic individuals. (A) ORF gene Ct value 35 (PCR test, cut-off value 40; sampling period 24 hours).[22] (B) Two recent coronavirus nucleic acid tests conducted in a row came back negative. (C) The

infected patient must undergo another nucleic acid test three days after the initial test results in a double negative. If the nucleic acid test returns three times negative, there is no fever or other respiratory symptoms. Then the asymptomatic and symptomatic patients might be freed from quarantine.[22,23]

Disinfection management is the sixth characteristic of the management system. Preventing and controlling the spreading of the virus in the temporary specialized hospital is a crucial task.[16] Cleaning area disinfection and polluted area disinfection are the two categories of disinfection management.[24] However, the cleaning of the disinfected region, infected area, and buffer zone should be done by different cleaning workers using diverse cleaning instruments.

The seventh characteristic is drug supply management strategies. Medication management and medication supply are both included in drug supply management strategies. The nursing staff conducts daily inspections to gauge patient demand for medications, and the administration of the temporary Covid-19 specialized hospital ensures the receipt of regular drug supplies.[17] When patients are hospitalized for common disorders, including hypertension, diabetes, and hyperlipidemia, pharmacists reinforce rational medication use education for patients in the ward and conduct drug education activities. Public broadcasting organizations also work on drug use education, offer online pharmacy services, and broadcast messages that support reasonable drug use on WeChat public accounts, which help patients take their medications as prescribed and encourage rational drug use.[18]

Medical waste management is the eighth characteristic of the management system. To prevent secondary pollution, the temporary Covid-19 specialized hospital strictly adheres to sewage disinfection and medical waste management, including domestic and medical waste collection, treatment, transportation, temporary storage, and handover.[19,20] Wastes generated in infected areas and buffer zones, including medical and domestic wastes, are collected and considered medical wastes. Before leaving the infected area, the potentially infected area and the medical waste generated in the infected areas and buffer zones should be disinfected with 1000 mg/L chlorine-containing disinfectant.[20]

The current study contains several drawbacks. Due to the sudden response to the COVID-19 pandemic, the temporary COVID-19 specialized hospital was established with no prior experience to refer to. A control group using a different management technique was not possible during the epidemic in Shanghai, and the sample size was limited. Additionally, we could not follow up on the outcomes of patients who were moved to designated hospitals. Following eight management system characteristics, the temporary COVID-19 specialized hospital performed effectively for 21 days, and no infection prevention team member was infected. Therefore, these management systems could be helpful references for public health emergencies.

## Conclusion

In summary, the temporary COVID-19 specialized hospital has eight characteristics that have aided in developing management strategies for public health emergencies. Improving self-protection management may help to achieve "zero" infection. These management strategies could be potential references for public health emergencies.

## Abbreviations

COVID-19, Coronavirus disease 2019; ORF, Open Reading Frame.

## Ethics

Shanghai Pudong New Area Zhoupu Hospital (Zhoupu Hospital affiliated with Shanghai Medical College of Health) ethic committee approved (SZH-03-2022) this study.

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## Disclosure

The authors declare that they have no competing interests regarding this paper.

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