Letter to the Editor

DOI: 10.5582/bst.2022.01261

How should designated COVID-19 hospitals in megacities implement a precise management strategy in response to Omicron?

Jing Cao, Min Wen, Yirong Shi, Ting Huang, Yunlan Yi, Youfeng Su, Xiaohui Liu, Yanling Chao, Hongzhou Lu*

National Clinical Research Center for Infectious Diseases, Shenzhen Third People's Hospital, Shenzhen, Guangdong, China.

SUMMARY As a new variant of COVID-19 with varied mutations, Omicron is more transmissible, more rapidly contagious, and has a greater risk of reinfection. Given those facts, a precise manage strategy needs to be formulated and implemented in designated megacities. Here, the precise COVID-19 prevention and control strategy for a designated hospital in Shenzhen, China is summarized, including implementation of a two-wing "On duty/On standby" approach based on busy and calm periods, an identification, classification, and grading system for the occupational exposure risks of medical staff, classification of patient transmission risks, separate admission, and an innovative treatment (nasal irrigation). The strategy has enabled the efficient and orderly integration of resources, it has resulted in zero infections among medical staff even during the peak hours of the pandemic at the hospital (1,930 patients admitted to both wings in a single day), and it has significantly reduced the initial period of no virus detection when patients infected with Omicron received saline nasal irrigation ($P < 0.001$). This strategy has provided evidence of precise prevention and control in a hospital, infection control, and efficient patient treatment in an era when Omicron is widespread.

Keywords COVID-19, precise prevention and control strategy, transmission risk, medical staff

To the Editor,

The World Health Organization officially designated Omicron as a new variant of the 2019 Coronavirus Disease (COVID-19, caused by SARS-CoV-2) on November 26, 2021 (*1*). Based on the number of people infected and the proportion of severe cases, this strain is less virulent than previous strains. However, there may be a sudden increase in the number of people infected due to Omicron's high transmissibility and immune escape capacity, as well as a higher absolute number of hospitalizations and deaths compared to the Delta variant, thus, posing a significant burden on the healthcare system (*2*). Designated COVID-19 hospitals need to formulate a precise strategy to manage the epidemic.

The designated hospital for COVID-19 treatment in Shenzhen has implemented a two-wing "On duty/On standby" approach based on busy and calm periods. The specific operation of the two wings is described in detail in a previous study (*3*). The designated hospital has gone through two "On duty/On standby" shifts since the outbreak of the epidemic in Shenzhen in January 2020. This period included peak hours on March 17, 2022, at 7:00 AM, when a total of 1,930 patients infected with the Omicron variant were admitted to the hospital simultaneously, with 980 admitted to the isolation wing and 950 admitted to the original wing. The "On duty/On standby" shifts allow for the efficient and orderly integration of resources as well as accurate prevention and control measures.

Since the outbreak of COVID 19, China has made significant achievements in pandemic control. Two of the most effective measures in response to Omicron variant are a "dynamic zero COVID-19 policy" and "precise management." Regular staff rotations can protect the physical and mental wellbeing of medical personnel to a significant degree. At the same time, however, it has a negative effect on ward management and the consistency of hospital infection prevention and control. Use of a checklist provides defined procedures for vital steps such as hospital infection prevention and control and ward management, and it directs all staff to complete various tasks in accordance with the checklist, including diagnosis and treatment paths, environmental management, equipment management, and guidance on terminal disinfection. Using a checklist-based approach helps expedite the familiarization of rotating personnel with the surroundings and workflow.

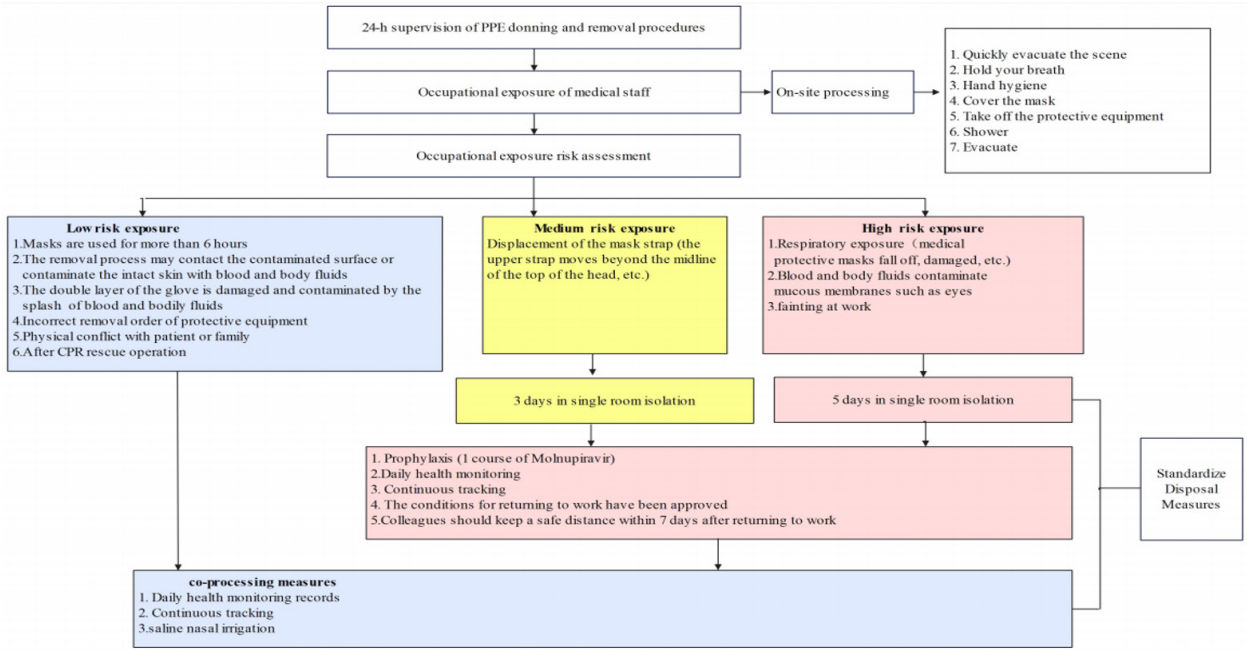

Figure 1. Guidelines for the classification of the occupational exposure of medical staff.

Omicron variant strains are more transmissible, spread more quickly, and have a higher risk of reinfection (*4*). Occupational exposure risks for medical personnel are identified, graded, and managed in the designated hospital. Key links to occupational exposure hazards are identified and appropriate procedures are devised to reduce the infection risk for medical staff and to achieve zero infections through 24-hour supervision of the wear and removal of personal protective equipment (*5-6*). Grades and classifications of occupational exposure risks for medical staff are shown in Figure 1.

The duration of the Omicron infection is significantly shorter, and patients with an infection for longer than 15 days are considered to be far less of a danger. The cycle threshold (Ct) is the minimum number of PCR cycles required to detect SARS-CoV-2 viral RNA. Higher Ct values are associated with less viral replication (*7*). Patients admitted to Shenzhen's designated hospital for COVID-19 treatment were assigned to various wards based on the course of their disease and their Ct value. If the course of disease exceeds 15 days or the Ct value is 30, which indicates that infectivity is decreasing, then they are admitted to the original wing; otherwise, they are admitted to the isolation wing.

Since a relatively large number of children have been infected with the Omicron strain, accurate classification and treatment are critical. According to the American Academy of Pediatrics and the Children's Medical Association, the proportion of children under the age of 18 infected with an Omicron strain was as high as 19% as of February 24, 2022, with children from different continents accounting for 1.4% of inpatients (*8*).

Children under the age of 14 account for 20% of patients with COVID-19 admitted to the designated

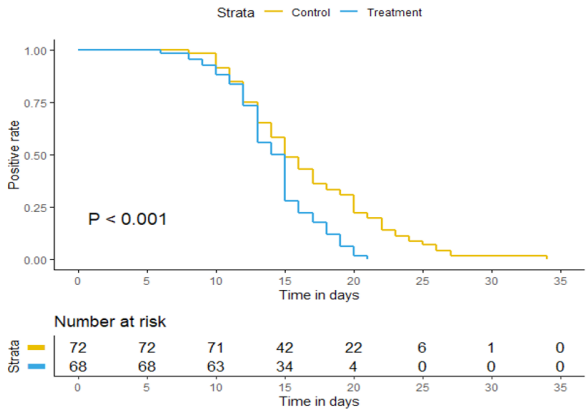

Figure 2. Survival curve analysis of the first negative conversion time of the two groups of patients.

hospital, with 50.4% being under the age of 6 (the youngest patient: one month old). Special precautions are taken for children infected with an Omicron strain: (*i*) The personal protection level is raised from grade 2 to grade 3; (*ii*) Treatment and care are centralized and performed by 2 persons; (*iii*) When cuddling children and providing care, the child is placed near the return air outlet while the caregiver is on the opposite side; (*iv*) Children who are able to walk are hugged for less time; (*v*) There is a special nursing assistant to act as a 24-hour escort for children who are able to walk; (*vi*) A child-friendly environment is created to comfort patients; and (*vii*) When bathing a child, a caregiver should try to avoid soaking personal protective equipment.

Studies have indicated that the pulmonary virulence of Omicron is lower, resembling that of an upper respiratory virus that is especially susceptible to nasal mucosa (*9*), and they have confirmed that patients

frequently exhibit five cold-like symptoms, including a runny nose, headaches, fatigue, sneezing, and a sore throat.

Nasal irrigation with normal saline is recommended by the designated COVID-19 hospital in Shenzhen as an innovative measure to prevent occupational exposure and to treat patients in the early stages of infection. The initial period of no virus detection for patients infected with Omicron was significantly reduced with saline nasal irrigation ($P < 0.001$), according to a study conducted at this facility (Figure 2).

In this era of the Omicron variant, an integrated two-wing "On duty/On standby" approach based on busy and calm periods has been implemented, and it includes identification, grading, and classification of occupational exposure risks, classification of patient transmission risks, separate admissions, and use of a "checklist" in isolation wards. This strategy can help to achieve precise prevention and control of infectious diseases.

Funding: None.

Conflict of Interest: The authors have no conflicts of interest to disclose.

References

1. World Health Organization. Classification of Omicron (B.1.1.529): SARS-CoV-2 Variant of Concern. *https://www.who.int/news/item/26-11-2021-classification-of-omicron-(b.1.1.529)-sars-cov-2-variant-of-concern* (accessed June 5, 2022).
2. Burki T. The origin of SARS-CoV-2 variants of concern. Lancet Infect Dis. 2022; 22:174-175.
3. Liu X, Cao J, Ji Y, Li T, Zhu Z, Huang T, Lu H. An innovative two-wing model for balancing the demands of inpatients with COVID-19 and general medical service in a designated hospital for COVID-19 in Shenzhen, China. Biosci Trends. 2022; 16:163-166.
4. Saxena SK, Kumar S, Ansari S, Paweska JT, Maurya VK, Tripathi AK, Abdel-Moneim AS. Characterization of the novel SARS-CoV-2 Omicron (B.1.1.529) variant of concern and its global perspective. J Med Virol. 2022; 94:1738-1744.
5. Huang T, Guo Y, Li S, Zheng Y, Lei L, Zeng X, Zhong Q, Liu Y, Liu L. Application and effects of fever screening system in the prevention of nosocomial infection in the only designated hospital of coronavirus disease 2019 (COVID-19) in Shenzhen, China. Infect Control Hosp Epidemiol. 2020; 41:978-981.
6. Li S, Guo Y, Zheng Y, Lei L, Zeng X, Cao J, Wen M, Liu Y, Huang T. Practice and exploration of 24-hour supervision model in personal protection supervision in a COVID-19 isolation ward. Infect Control Hosp Epidemiol. 2021; 42:1027-1028.
7. Gniazdowski V, Paul Morris C, Wohl S, Mehoke T, Ramakrishnan S, Thielen P, Powell H, Smith B, Armstrong DT, Herrera M, Reifsnyder C, Sevdali M, Carroll KC, Pekosz A, Mostafa HH. Repeated coronavirus disease 2019 molecular testing: Correlation of severe acute respiratory syndrome coronavirus 2 culture with molecular assays and cycle thresholds. Clin Infect Dis. 2021; 73:e860-e869.
8. American Academy of Pediatrics. Children and COVID-19: State-Level Data Report. *https://www.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/children-and-covid-19-state-level-data-report/* (accessed June 5, 2022).
9. Hui KPY, Ho JCW, Cheung MC, *et al*. SARS-CoV-2 Omicron variant replication in human bronchus and lung *ex vivo*. Nature. 2022; 603:715-720.

Received May 27, 2022; Revised June 14, 2022; Accepted June 17, 2022.

**Address correspondence to:*
Hongzhou Lu, Department of Infectious Diseases, National Clinical Research Center for Infectious Diseases, Shenzhen Third People's Hospital, Shenzhen 518112, Guangdong, China.
E-mail: luhongzhou@fudan.edu.cn

Released online in J-STAGE as advance publication June 22, 2022.