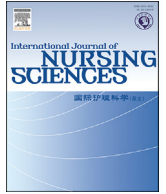


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Responding to the COVID-19 Epidemic

Contingency management strategies of the Nursing Department in centralized rescue of patients with coronavirus disease 2019<sup>☆</sup>

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## ABSTRACT

**Objectives:** This article aims to summarize a series of contingency management strategies of the Nursing Department in the centralized treatment of patients with coronavirus disease 2019 (COVID-19).

**Methods:** The strategies of the Nursing Department included an early warning for prevention and control, taking functions of vertically commanding and horizontally coordinating, and reasonably allocating nursing workforce, to facilitate centralized treatment work in the in-hospital fever clinic, isolation wards and ICU, and referral and admission of critical patients. Five special groups were established in charge of training and examination, management and supervision, psychological support, logistical support, and reporting and publicity, respectively.

**Results:** It was achieved that no deaths from critical patients and no medical staff, no other patients were infected.

**Conclusion:** Through the implementation of these strategies, safe and efficient centralized treatment was ensured timely, orderly and sustainably.

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## What is known ?

- Coronavirus disease 2019 (COVID-19) can be transmitted from human-to-human. World Health Organization declared COVID-19 epidemic a public health emergency of international concern.
- Nurses, as the main force in treating patients, are facing great risks and challenges on the frontline of the anti-epidemic battle, and the Nursing Department is the key department to implement prevention and control work.

## What is new ?

- Contingency management strategies, including an early warning for prevention and control, taking functions of vertically commanding and horizontally coordinating, and reasonably allocating nursing workforce, are effective to facilitate centralized treatment work.
- Five special groups established for training and examination, management and supervision, psychological support, logistical support, and reporting and publicity ensured the sustainability of prevention and control work

Since December 2019, some patients with the Coronavirus disease 2019 (COVID-19) have been found in Wuhan. With the spread of the epidemic, such cases have also been found in other regions of China and abroad [1]. On January 31, 2020, WHO declared COVID-19 epidemic a public health emergency of international concern [2]. Our hospital is a provincial-level designated hospital in Zhejiang Province, which treats critically ill patients transferred from all over the province. It is the main battlefield to fight against the epidemic in the

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province. COVID-19 can be transmitted from human-to-human. Nurses, as the main force in treating patients, are facing great risks and challenges on the frontline of the anti-epidemic battle, and the Nursing Department is the key department to implement prevention and control work. The Nursing Department of our hospital has taken a series of contingency management measures such as early warning, continuous promotion, and tackling difficulties in centralized rescue, and has carried out the task of massive rescue well.

## **1. Initiation of epidemic prevention and control early warning, and reasonable allocation of treatment and nursing human resources**

### *1.1. Vertical command and deployment in phases*

Due to major public health emergencies, the establishment of a command and control system is the key to effective management and rapid action. The Nursing Department set up a nursing prevention and control leading group, with the director of the Nursing Department as the group leader, with a deputy group leader and the group members include the head nurses of key disciplines such as critical care, infections, emergency medicine, respiration, etc., and other head nurses. The group leader would take overall control and adjusts the focus of nursing work at different stages of epidemic prevention and control. (1) Early warning and deployment. When noticed the emergence of viral pneumonia of unknown in Wuhan in December 2019, personnel echelon deployment, emergency training and exercises, public opinion supervision, etc. were deployed. (2) Preparation before involving in the fighting against COVID-19. Contingency management protocols and standards of infection prevention and control of key departments were developed. The Nursing Department distributed information including the organization structure, workforce and deployment, prevention and control requirements, public opinion supervision, and contingency plans to all nurses through head nurse meetings. (3) Centralized rescue. The nursing leading group participated in regular meetings for prevention and control work and multidisciplinary case discussions at the hospital level every day. The nursing work meetings were held at least twice a day to analyze current problems and propose corrective measures through on-site investigation or group discussion.

### *1.2. Horizontal coordination with other departments and integration of rescue settings*

Setting up a rescue center in a general hospital to treat large numbers of patients with infectious diseases requires multi-department joint management. Under the overall deployment of the hospital party committee, the Nursing Department carried out horizontal coordination through hospital-level prevention and control work meetings, as well as coordinating and discussing meetings among functional departments in the hospital. At the same time, special personnel was assigned to communicate with the Medical Affairs Department, the Nosocomial Infection Department, and the Information Department, to form a network system for close cooperation.

A rescue center for patients with COVID-19 was established in the main area of the hospital, where the Infectious Disease Department was located. This independent five-story building was divided into the fever clinic, isolation wards for suspected cases, isolation wards for confirmed patients, and intensive care area after the former hospitalized patients were transferred to other wards for infectious patients in another area. The Nursing Department cooperated closely with other departments to provide sufficient supplies for the first line.

On January 26, according to the principle of “centralization of patients, centralization of experts, centralization of resources, and centralization of treatment,” an independent branch area of the hospital began to provide healthcare service for patients with COVID-19. The branch area is an independent general hospital with more than 1,000 beds, and 100 of them are for critical care patients. The Nursing Department, together with the Infection Control Department and the Medical Affairs Department of the hospital, put forward the renovation design of isolation wards and isolation ICUs including dividing the clean area, semi-contaminated area, and contaminated area. Detailed rules for the staff to enter and leave each area and for disposal of waste were specified according to requirements for the hospitalization and management of infectious diseases. The branch hospital had opened 5 isolation wards and 2 ICUs to treat suspected, confirmed, and severe cases, respectively, while 4 isolation ward areas were on standby.

### *1.3. Quick assembly of nursing staff*

Adequate human resources are the basis for epidemic prevention and control, and reasonable allocation is the guarantee for sustainable prevention and control work. Responding to the mobilization of the Nursing Departments, all nurses volunteered to work at the front line. Nursing staffing was allocated according to clinical classification and the number of patients. The nurse-patient ratio was 1: 5 to 8 per shift in wards for suspected cases, or confirmed mild and moderate patients of, 1: 3 to 5 in wards for severe patients, 1:1 to 3 in ICUs. The nurse-patient ratio of 1:1 per shift must be guaranteed for patients with ventilation in the prone position, with invasive mechanical ventilation and hemodynamic instability. A group work system was implemented, and each shift was assigned by the group leader according to the patients' conditions, and nurse level division. According to direct nursing and indirect nursing positions, direct nursing refers to works of nurses who directly contact patients in isolation wards and are engaged in clinical nursing. Indirect nursing refers to works of nurses who are engaged in auxiliary work such as medical order handling and material management in isolation wards. Direct nursing nurses worked at a 4-h shift, while indirect nursing nurses at an 8-h shift. At the same time, back-up nurses were reserved in case of emergency.

## **2. Setting up special groups for continuous work of epidemic prevention and control**

The Nursing Department set up five special groups in charge of training and examination, management and supervision, psychological support, logistical support, and reporting and publicity, respectively. The group leaders were selected from the director and deputy directors of the Nursing Department, and head nurses of disciplines, and the work contents of each group were complementary to jointly ensure the sustainable progress of centralized rescue work.

The goal of the training and examination group was to ensure qualified skills of nurses working at the frontline. The training and examination group included a leader who was the deputy director of the Nursing Department, 8 head nurses and 8 education nurses as members. Through step-by-step training [3], professional and competent echelons of nurses for front-line and back-up personnel were prepared. Through online courses, the hospital-wide nursing staff was trained in diagnosis and treatment protocol, prevention and control protocol, infection control process, and protection grade standards [1,4,5]. For nurses of ICU, nursing skills training of patients with ventilation in the prone position, extracorporeal

membrane oxygenation support, invasive hemodynamic monitoring, etc were strengthened.

With the goal to ensure the safety of nurses and nursing quality, the management and supervision group's leader was the deputy director of the Nursing Department responsible for quality control, and group members included head nurses in departments of emergency, critical care, infection control, and isolation wards. The three-level nursing management structure of the Nursing Department, head nurse, and nursing group leader was applied to ensure staff safety and patient safety [6].

With a mental health expert as an advisor of the psychological support group, the head nurse of the Mental Health Department as the leader, the group involved 8 front-line head nurses. Their tasks focused on providing psychological support for frontline nurses, relieving stress and fear of infection and reducing various psychological and behavioral changes that may be brought about by isolation. Psychological support was mainly provided by a support group by setting up a video call group. The mental health expert, the group leader and 20 nurses at the front-line provided supports for nurses via the video call group.

The logistics support group consisted of a deputy director of the Nursing Department as a leader, and 7 head nurses as members. Their main task was to coordinate with the General Affairs Department to provide logistic support for frontline nurses based on the hospital's conditions. For example, with their coordinated effort, plasma air disinfection machines were installed in apartments for medical staff on shift rest, the purchasing list of living goods for staff was sorted out timely, and facilities in the apartments, even a hairdryer, were checked regularly and repaired in time. The logistic support group had effectively guaranteed the daily life of frontline healthcare personnel, cooperating with the General Affairs Department.

The leader of the reporting and publicity group was the director of the Nursing Department, and the members were 3 propagandists. The main tasks are: to report on advanced deeds, to publicize outstanding collectives, and to spread positive energy through WeChat public platform and hospital intranet, and to inject strong spiritual strength to overcome the epidemic. As of February 16, a total of 24 articles had been published with a total reading of 395,496. The single article "Thank you, nurse, but please don't get too close to me" had 42,080 views, which was forwarded by 8 media units and fully demonstrated a good mental outlook of nurses during the extraordinary period.

### 3. Optimization of workflows and improvement of nursing standards

#### 3.1. Optimization of workflows

##### 3.1.1. Optimization of the online pre-screening triage process for fever clinics

In response to the epidemic, to identify suspected cases from common fever patients and reduce the hospital acquired infection, the Nursing Department and the Information Department improved the information pre-screening triage process. Patients attending the clinic scanned the two-dimensional code with their mobile phones for online pre-screening and triage and filled in personal information, epidemiological history, and fever-related symptoms. After submission, the system would automatically prompt patients to enter fever clinic area A (for common fever) or fever clinic area B (for suspected cases) for treatment. This process improvement is simple and convenient to operate, and is conducive to reducing the occurrence of cross infection in the hospital.

#### 3.1.2. Workflow optimization of patient admission, referral, and transfer

According to the principle of "centralization of patients, centralization of experts, centralization of resources, and centralization of treatment," on January 26, the hospital started emergency support in the branch area. The branch area would focus on the treatment of confirmed patients, while the main hospital area retained the fever clinic. In order to treat patients safely, orderly, and efficiently, various procedures need to be formulated and optimized; for example, the admission process for outpatients from different fever clinics, the referral process for patients from other hospitals in the province, the patient transfer process in hospital and ICU admission process, etc. The actual status in front-line work was investigated to optimize. For example, details of patient information were filled on the hospitalization application form, especially noting "suspected" or "confirmed". The one-way flow of patient admission was confirmed. After patients being released by the fever clinic, the nurse's station of the isolation ward would be notified in on time to receive the patient for treatment. Preparation of protection and isolation should be completed before the implementation of intra-hospital transfers. All documentary processes and the address list were sent to all nurse stations in the hospital.

#### 3.2. Improvement of nursing standards

To ensure the safety of patients and frontline nurses and improve the quality of nursing, nursing standards for batch patient transfer, occupational protection levels and critical care nursing were formulated. (1) The Nursing Department, in coordination with relevant departments, formulated guidelines for batch patient transfer based on documents and relevant researches [7–9], including setting up multi-department transfer groups, making transfer verification forms, training of transfer personnel on protection knowledge, determining transfer procedures, monitoring during transfer and disinfection after transfer, etc. Thirteen patients were safely and orderly transported from the main hospital area to the branch area for centralized treatment. (2) Occupational protection levels were determined according to relevant documents [4,5]. COVID-19 has characteristics of interpersonal transmission and cross-city transmission [10]. Healthcare professionals working in the isolation ward should wear medical protective clothing (plus disposable anti-infiltration isolation gown), medical protective mask, working cap, goggles, and double-layer latex gloves when providing airway care may come into contact with aerosol. Personnel in the fever clinic should wear work clothes, disposable anti-seepage isolation gown, medical protective mask, working cap, goggles and latex gloves. All staff that may be exposed should wear surgical masks and have good hand hygiene. (3) Critical care and nursing standards: According to the clinical guidelines for COVID-19 issued by WHO [11] on January 28 and the diagnosis and treatment protocol issued by the National Health Commission [1], standards of early supportive treatment and monitoring, prediction and early warning of severe cases, nasal high-flow oxygen therapy for hypoxic respiratory failure, examination and protection of ventilation in the prone position, etc. were formulated.

### 4. Conclusion

During prevention and control of the epidemic, the Nursing Department, as one of the main functional departments of the hospital, has broken the conventional operation mode and implemented contingency management strategies based on clinical practice, ensuring timely, orderly, safe, and efficient centralized rescue. After several tests of SARS, H1N1, H7N9, Ebola in West Africa, and COVID-19, a set of perfect emergency system should be

established to deal with public health emergencies based on contingency management strategies in the future. Prospective training and exercises, establishing a talent echelon for all kinds of public events based on the current comprehensive emergency echelon mainly composed of head nurses, and standardizing processes in new hospital areas and new wards should be considered. Contingency plans should be regularly rehearsed and continuously improved.

#### Author statement

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#### Ethical consideration

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#### Declaration of competing interest

None.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnss.2020.04.001>.

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