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## The Innovative Fever Clinic Vertical Management Model in Response to COVID-19 at Zhejiang Provincial People's Hospital

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The Fight against COVID-19 has now entered a crucial stage. In face of the serious situation and the pressure from work resumption across the nation, early detection is becoming increasingly important with the aim to contain the spread of virus and avoid its resurgence. The fever clinic is at the forefront in the battle against COVID-19 at our hospital. Therefore, this article intends to summarize our practice in the *management of the fever clinic* during the epidemic, known as the *“Integration + Three Responsibilities in One”*. It will address the innovative fever clinic vertical management model featuring “integration and three responsibilities in one” so as to demonstrate the detailed measures adopted to guarantee the high efficiency of the fever clinic, early screening and the containment of nosocomial spread. Our efforts have been translated into optimistic results. To date, our fever clinic has managed to operate in a smooth rhythm and there is zero new cases inside the hospital and zero missed diagnosis.

The fever clinic, as the crucial window of the hospital in the prevention and control of contagious diseases, functions as a key part of the preventive and early warning mechanism in response to an acute epidemic by carrying out the early screening and treatment of the febrile patients. The fever clinic is an important tool to avoid



nosocomial spread as well as the first barricade in the fight against the epidemic in the hospital. In face of the sudden outbreak of COVID-19, our hospital immediately activated the emergency response plan. The Department of Medical Affairs took the lead to activate the “wartime” management model by taking over the fever clinic which at ordinary times reported to the Outpatient Department, and established the innovative model of “Integration + Three Responsibilities in One” so as to mobilize and strengthen the wartime fever clinic vertical management mechanism and effectively facilitate efforts in epidemic containment. The article intends to summarize our experience in the innovative management of the fever clinic during the epidemic, known as the “Integration + Three Responsibilities in One”. It will address the establishment of the integrated system and the practice of the three responsibilities.

### **1. “Integration”: the establishment of the integrated fever clinic vertical management system**

In face of the sharp increase of confirmed cases, we took the lead in the province in the implementation of the innovative fever clinic management model, i.e. “Integration + Three Responsibilities in One” so as to strengthen the role of the fever clinic and encourage solidarity. We are the first in the province to roll out such a model during the epidemic by changing the management structure.

The fever clinic used to report to two departments, respectively the Outpatient Department for administrative affairs and the Department of Contagious Diseases for clinical affairs. With the implementation of the new model, it manages to put in place *an integrated vertical management system that engages “a designated vice president – the Department of Medical Affairs – the Department of Contagious Diseases –the fever clinic ”*, a resident-general in charge and a designated team of physicians working exclusively at the fever clinic. By that, the fever clinic is managed as an independent department with a clear structure of accountabilities, i.e. “a designated vice president, a functional department, a designated team”, and thus successfully integrated into the hospital’s full-process epidemic prevention and control system. During the epidemic with all efforts oriented on epidemic prevention and control, the *resident-general in charge acts as the head of the fever clinic and claims responsibility to all aspects of work concerned including administration, training and*



supervision. In case of any omission in the process, the resident-general is required to directly report to the Department of Medical Affairs. In case of events of significance, the resident-general is expected to directly report to the designated vice president of the hospital. By that, should any concern emerge, it would be immediately addressed without delay, thus substantially improving the efficiency in management.

In addition, the fever clinic of our hospital follows strictly the requirements from the National Health Commission. It is an independent facility totally separated from the rest of the outpatient area and can be easily located by the clearly marked signs along the road once one enters the campus. Inside the fever clinic are well-arranged working areas such as the triage desk, the waiting area, the observation area, the infusion room, consultation rooms, the lab, the radiology unit and the pharmacy etc. The whole clinic, as what is strictly required, has **three zones and two passages**, i.e. the clean zone, the potentially soiled zone, the soiled zone, the staff passage and the patient passage. On top of that, in order to better control infection, break the transmission routes and prevent the spread of the pathogens, a **self-service area** is designed for the patients to register, make payment and claim test results. The 5-1 West Zone, during the “wartime”, is used as the isolation area with 17 independent observation rooms for suspected cases of COVID-19 after the screening at the fever clinic. At the same time, the 5-1 East Zone is reserved as a back-up isolation area **fully equipped** with emergency facilities such as crash carts, ECG monitors, ventilators, infusion pumps, medications and protective gears etc.

## 2. “Three Responsibilities” : the three responsibilities of the fever clinic

### A . Responsibility One: the diagnosis and treatment of febrile patients

The fever clinic is a special set-up in response to SARS in 2003. It intends to better contain the epidemic by **early detection, early report, early isolation and early diagnosis and treatment** of the febrile patients carrying contagious diseases. The physicians at the fever clinic are required not only to learn about the patients’ current symptoms and medical history, but also their epidemiological history and contact history so as to early detect suspected cases for triage and prevent cross infection, thus fulfilling the clinic’s role as an early-warning setup. Febrile patients tend to show



up with various and changing symptoms. Therefore, **it is highly important to have timely and correct triage after the initial assessment of the patients in the fever clinic.** Only by that, can we prevent cross infection, protect the patients and guarantee timely and effective treatment. Infective fever is commonly seen in the clinic and ED and it is often difficult to judge if the infection is bacterial or viral by the symptoms presented. The routine tests, for example, the complete blood cell count, with low sensitivity and specificity, cannot effectively reveal the causes of the fever. The recent years have seen frequent occurrences of new contagious respiratory diseases and the fever clinic is considered to be a more effective tool in terms of early warning by some scholars. The traditional disease monitoring system makes its judgement on the presence of a substantial increase in confirmed cases before it is established as an outbreak. Therefore, there is a delay in monitoring and response. Here at Zhejiang Provincial People's Hospital in the **training of the fever clinic staff**, we highlight the importance of thorough, standard and differential diagnosis and the comprehensive analysis of the epidemiological history, signs, symptoms and objective examination of the patients so as to locate the causes of the fever in a timely and accurate manner.

## **B. Responsibility Two: the screening of COVID-19**

The National Health Commission has declared COVID-19 a Category B Contagious disease which requires control measures in response to Category A Contagious diseases. It has rolled out the guideline focusing on the “prevention of internal spread and exported cases” and elaborated on the prime responsibility of the fever clinic at this stage, i.e. early detection and early report. Accordingly, our hospital quickly took measures based on the principle of “early detection, early report, early isolation, early treatment” so as to enhance the fever clinic's capability in the monitoring of the epidemic, strengthen the centralized isolation and observation of suspected cases, effectively control the source of transmission, break the transmission routes and protect the vulnerable population. The fever clinic is required to prescribe complete blood cell count+CPR and chest X-ray to suspected patients; nucleic acid tests of SARS-CoV-2 for highly suspected cases , both to go with isolation and clinical observation.

With the fever clinic at the center, our hospital has established a **four-level pre-check**



and triage model for the outpatient and ED services in response to suspected cases of COVID-19 ( It is learned by literature and enquiry that most hospitals adopt a pre-check and triage model of three levels ). That is of significant help for the quick, effective, and thorough detection of suspected cases, timely assessment of patients with severe illnesses, appropriate arrangement and efficiency of treatment, prevention of cross infection. **Level one of triage:** We put up at the single entry point of the campus, the west gate, a pre-check point with our volunteers equipped with infrared thermometers and temperature guns testing the body temperature and Hangzhou Health QR Code of every single individual entering the campus while directing people to different areas in accordance with the color shown on their health QR codes. **Level two of triage:** We set up a triage desk specifically for temperature checks totally independent from the information desk in both the outpatient hall and the ED to double-check the patients' body temperature and inquire about their epidemiological history so as to timely detect suspected cases. **Level three of triage:** We set up an ear temperature testing point at the nurse station within each waiting area, for a second time inquire about the patients' epidemiological history and ask them to fill in the form COVID-19 Survey for Outpatients as required in the hope of timely detection of potential suspected cases. **Level four of triage:** Upon meeting the patients in the consultation rooms, both in the clinic and the ED, physicians are required to first of all read the COVID-19 Survey for Outpatients, then with that as a reference ask the patients if they are experiencing symptoms such as fever and coughing, inquire about their epidemiological history and take notes. In case of suspected symptoms or epidemiological history, a nurse shall be immediately notified and a triage nurse be designated to lead the patients to the fever clinic for screening. With the four-level pre-check and triage model in place, febrile patients above the threshold (with epidemiological history and history of close contact) are guided by designated staff to the fever clinic. All patients with fever are required to fill in the form [COVID-19 Survey for Patients Visiting the Fever Clinic](#) and make sure the address is truthfully filled in. In the meanwhile, the patients who are assessed as non-suspected shall continue their journey of care as usual. Our hospital strictly follows the national authority's guidelines that all medical staff involved in the pre-check and triage process shall receive uniform training organized by the Department of Medical Affairs and pass the evaluation



before they take up the responsibility. The pre-check and triage system has proven to be a highly effective and practical approach since it can early detect the infected and suspected cases among the febrile patients and improve the efficiency of the medical staff. Only by that can we guarantee early detection , early isolation and early report. With the multi-layer temporary pre-check and triage setup, the triage nurses can learn about the patients' epidemiological history, history of close contact, respiratory symptoms and measure their body temperature with contactless infrared thermometers for maximum detection of any missed suspected cases should any occur. All medical staff working at the fever clinic in our hospital has passed the evaluation on COVID-19 prevention and control. The pre-check and triage system has played an essential role in the hospital's screening efforts by reducing nosocomial infection and our medical staff's exposure to potential source of infection and improving rapid response in the treatment of the suspected cases.

Now our fever clinic has expanded its responsibility to cover the screening of regular patients, suspected patients and the small group of medical staff exposed to source of infection in addition to its initial focus of febrile patients. With the country's encouragement of work resumption, we are seeing more population movement and we need to bear in mind that SARS-CoV-2 is highly contagious and most people are susceptible to infection. Under such circumstances, the hospital is faced with new challenges in the prevention and control of COVID-19. The national authority is making frequent adjustments in measures taken in different epidemic areas under different circumstances, therefore, the fever clinic needs to accordingly adjust the target group and the corresponding screening model. To follow up, the Department of Medical Affairs will summarize and further improve all the efforts adopted during the epidemic and generate a systemic report concerning the management model of the pre-check and triage system in response to major public health emergencies, in the hope to better protect the health of the providers and the patients.

### **C. Responsibility Three: leading the efforts in epidemic prevention and control**

In accordance with the Zhejiang Provincial Health Commission's requirements, our hospital quickly adopts the **"Clinical Immediate Report"** mechanism during the



epidemic by designating the resident-general in charge of the fever clinic as the “Immediate Report” to respond to all COVID-19 related concerns from all clinical departments. [In case of COVID-19 events, it shall be directly reported to the leadership of the hospital for immediate actions.](#) The Department of Medical Affairs generates daily report summarizing the concerns detected and organizes targeted training that requires 100% attendance of all staff which is a must-have for them to continue with their duties. By that, it will be guaranteed that all medical staff working at the front can keep pace with the diagnosis and treatment protocols, guidelines and consensus issued by the national and provincial health commissions and the experts within the hospital, constantly update their knowledge about the disease so as to further enhance diagnosis and treatment and better protect the medical staff working at the front.

In addition, [the fever clinic has accumulated immense experience in the screening of suspected cases and the throat swab nucleic acid tests.](#) Therefore, [the hospital arranges for training and evaluation sessions led by designated staff working in the fever clinic on the sampling of the throat swab.](#) All medical staff involved have to complete the training and pass the evaluation before they can take up their duties. At the same time, the designated staff working at the fever clinic will provide advice and guidance in the sampling of the throat swab at the clinic and in the inpatient area to improve accuracy and reduce exposure of the medical staff.

### **3. Results from the innovative vertical management model of “Integration + Three Responsibilities in One”**

During the epidemic, i.e. from Jan 22<sup>nd</sup> to Mar 9<sup>th</sup>, 2020, the fever clinic of our hospital has received altogether 3064 patients. 1305 were received between Jan 22<sup>nd</sup> and Feb 1<sup>st</sup>, 2020, among which 32 are suspected cases. Later Hangzhou saw a minor increase in imported cases. On Feb 1<sup>st</sup>, strict social distancing measures in the communities were rolled out. Since then the fever clinic has been on high alert and running in full capacity. Between Feb 1<sup>st</sup> and Mar 10<sup>th</sup>, the fever clinic received altogether 1759 patients among which 884 were assessed as needing further group consultation. The group consultation performed by an expert group detected 104 suspected cases out



of the 884. The suspected patients were thus put into isolation for observation and received nucleic acid tests. At last 5 patients were confirmed and referred immediately to Xixi Hospital of Hangzhou. During the period, the expert group at the fever clinic had 30 telephone group consultations on average everyday. **To date, there is zero nosocomial infection and zero missed diagnosis.**

**In terms of resource consumption, the fever clinic of our hospital ranks low** compared with other hospitals of the same level inside the province, meaning, we have made the best use of the resources at hand. The resources consumed in epidemic prevention and control in large general hospitals usually go to the following aspects: (a) the personnel of the fever clinic; (b) the protective supplies at the fever clinic; (c) rooms and beds for isolation. The prevention and control of COVID-19 mainly rely on the medical staff. The Department of Medical Affairs creatively reformed the staffing model of the fever clinic based the location of our hospital and the patients received at the fever clinic in January. **In January, the fever clinic was staffed by a rotating team of 20 and that was replaced by a designated team of 9 in February.** This special squad of 9, solely dedicated to the fever clinic, directly reports to the fever clinic. We totally separated the staff working at the fever clinic from the departments they used to work at so as to prevent nosocomial spread. We organized **centralized training** for the 9 designated physicians on protocols, diagnosis, treatment and health monitoring. By that, we managed to take control of the whole situation by tackling a concentrated point. After the team of the fever clinic grew more experienced with practice, they moved on to improve scheduling by arranging shifts. That indirectly reduced the resources such as the protective coveralls consumed and strengthened the immune system of the physicians working at the fever clinic by giving them more time to rest. It is owing to the professionalism of the expert group and the well-trained physicians at the fever clinic that we are able to avoid unnecessary isolations so that our hospital can operate in high efficiency with fewer isolation wards compared with other hospitals with similar fever clinic volume inside the province.