Chinese CoViD-19 epidemic prevention and control measures: a brief review

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1. Introduction

In December 2019, a cluster of new pneumonia cases were reported in Wuhan City, Hubei Province, China. Shortly thereafter, experts from the China National Health Commission (NHC) arrived in Wuhan to initiate investigations, concluding that the new coronavirus was the causative agent of the pneumonia cases. On December 31, 2019, China informed the World Health Organization (WHO) and relevant countries of the development of the pneumonia cases and shared the genome sequence of the virus. On January 23, 2020, Wuhan City, and cities nearby, were shut down, and all urban public transportation services were suspended. After convening with the WHO Emergency Committee, Dr. Tedros Adhanom Ghebreyesus, Director-General of the WHO, announced on January 30, 2020 that the outbreak of new coronavirus (CoViD-2019) constituted a Public Health Emergency of International Concern (PHEIC).

On January 25, 2020, during the meeting of the Standing Committee of the Political Bureau of the Communist Party of China Central Committee, President Xi Jinping moved to establish the Central Leading Group for Responding to the New Coronavirus Infection Pneumonia. Prime Minister Li Keqiang was designated as the leader of the group, and the State Council's Working Mechanism for Joint Prevention and Control of the New Coronavirus Pneumonia Epidemic (JPCM) was established under the leadership of the Standing Committee of the Political Bureau of the Central Committee. JPCM released relevant policies and procedures for prevention control, holding press conferences regularly to guide the public through understanding and accepting epidemic prevention measures. At the same time, all regions were required to assemble a local special leading group (LSG) for epidemic control. The LSG evaluated the actual risk-level in their jurisdiction to develop regional prevention, control measures, and plans for restoring economic activities and social life[1]. In this review, we will explore the Chinese administrative measures for preventing and controlling the CoViD-2019 epidemic. We will examine the epidemic prevention and control strategies at both the central and regional levels, and will focus on four perspectives: epidemic information disclosure; mobility and regional management; the medical system and medical service management; and resumption of work, production, and school. To examine the prevention measures at the regional level, we chose Wuhan City, Zhejiang Province, and Guangdong Province as examples.

2. Epidemic Information Disclosure

Once confronted with this domestic public health crisis, the NHC issued the *No. 1 Announcement* of 2020 on January 20, 2020. The *Announcement* added CoViD-2019 pneumonia into the infectious diseases category stipulated in the *Frontier Health and Quarantine Law* and

[1] https://bit.ly/2WVmsik (last visited 10/05/2020).

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Law on Prevention and Control of Infectious Diseases[2]. The NHC called on the public to wear masks and reduce large-scale personal gatherings and activities. By issuing a series of guidelines, the NHC kept the general public updated regularly on epidemic prevention measures, medical diagnosis and treatment measures, and the standards for hospital admission and discharge of patients[3]. The NHC collected numbers of the newly confirmed, suspected, and death cases submitted by the local health administrative departments and published the epidemic information for public access through both TV and online media platforms.

In addition to the national data platform, health management departments at the regional levels also leveraged big data techniques to trace the infected patients and count the numbers of patients receiving treatment. While still satisfying personal privacy protection requirements, the information collected was then released via local TV stations and online media platforms to provide the public with the latest information about the epidemic. For example, the government of Wuhan City established a special working unit – the epidemic prevention and control big data unit – to collect and process information on a daily basis from a wide range of organizations, including hospitals, disease control departments, medical insurance organizations, public security, civil affairs departments, communication operators, and other relevant organizations. Through the Authoritative Release Platform on the official website of the Wuhan Health Commission and the Wuhan government's online media platform, Digital Wuhan, the public could access information about the confirmed cases, suspected cases, feverish patients, close contacts, and the availability of hospital beds, all of which were continuously updated and published. The platforms also set up a separate section for addressing the rumors around the epidemic.

In many other provinces, e-government platforms played an important role in disseminating epidemic information. For example, Zhejiang and Guangdong Provinces, both regions with the rapid development of big data technology, also published the latest regional epidemic information, case numbers, health status, and other relevant information on their online platforms. The two regions established the Epidemic Prevention and Control Service Sector, which is affiliated with their online government service platforms, Zheliban (Zhejiang Province) and Yueshitong (Guangdong Province).

3. Mobility and Regional Management

The epidemic outbreak began a few days before the Spring Festival, the biggest Chinese traditional festival of the year. To manage the large-scale flow of people traveling from working cities to their hometowns, the national JPCM required local health departments, transportation systems, customs, and other relevant departments at all levels to develop emergency response plans and take preventive measures. These measures included one-to-one body temperature detection, information registration for the travel population, and building detention stations for suspected virus carriers and treating the infected in isolation[4]. At the same time, China's transportation and public security departments were responsible for tracing and screening close contacts, and the Authoritative Release Platform of the Chinese government network published information about epidemic

[2] https://bit.ly/2ZrbtyT (last visited 10/05/2020).

[3] http://www.nhc.gov.cn/wjw/gfxwjj/list.shtml (last visited 10/05/2020).

[4] https://bit.ly/2LQsFGb (last visited 10/05/2020).

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risk and vehicle queries for public to access. The Ministry of Transport, the Civil Aviation Administration of China, and the State Railway Group announced free refund policies to facilitate the reduction of travel flow.

On January 23, 2020, Wuhan announced the lockdown order, and all public transportation, airport, railway stations, and other departure routes were temporarily closed eight hours after the announcement. In the central urban area, all motor vehicles were prohibited from operating on the streets, and all residential communities in the city were under a 24-hour closed management. For those who did not obey the shutdown rule, compulsory measures were to be taken according to the law. At the same time, the Wuhan Financial Bureau provided special assistance and a temporary subsidy of 3000 RMB (appr. 390 euros) for those who were stranded in Wuhan. During the shutdown period, Digital Wuhan began offering online services for government affairs, transportation, food, health, and education to ensure the daily needs of residents being met. The food industry shifted its service operations online and offered food delivery in a "non-contact" manner via the delivery mobile apps.

Health service centers and community health institutions worked as "family doctors" in their areas, thus playing an important role in confirming the infected and suspected cases. Based on the real-time data, Zhejiang province developed the health QR code system and became the first province to use the health QR code to assist the provincial epidemic prevention and control departments to track the flow of people. The National Government Service Platform later adopted the health QR code model and established «health information QR code for epidemic prevention and control» to promote the recognition of health QR codes across provinces. The health QR code is a COVID-19 status certification for residents and people returning to work and school, shopping in supermarkets, and traveling to other cities. By scanning the health QR code, residents receive a corresponding color code – green, yellow, or red – that automatically indicates the exposure risk level of CoViD-2019 infection. Green QR codes represent the lowest risk and freedom of travel, while yellow and red indicate the middle and highest risks, respectively. For users with yellow codes, they are required to be isolated in a centralized way or at home for 7 days. Users with red codes are directed to centralized isolation for 14 days. By using big data technology, Zhejiang province further developed an emergency management system for reporting the epidemic as well as a platform that can visualize the epidemic map. In addition, 5G technologies (e.g., the 5G thermal imaging temperature measurement system, and the 5G VR remote diagnosis and treatment platform), were widely used to promote the management of public health and epidemic control.

In Guangdong, the provincial government implemented grid management throughout the whole region. The province was divided into 140,000 grids and equipped with more than 170,000 grid personnel. The grid personnel guided and ensured residents in his/her grids to strictly follow rules for disease prevention and control such as temperature detection, health declaration, cleaning and disinfection, etc. As Guangdong borders both Hong Kong and Macao SARs, it established a joint prevention and control mechanism with the governments of the two SARs, building a comprehensive health management network for monitoring overseas epidemic input.

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4. Medical System and Medical Service Management

According to the NHC's *Announcement*, diagnosed patients, CoViD-2019 carriers, and suspected patients should all be treated in isolation. However, in the beginning of the epidemic outbreak, there was a severe shortage of healthcare providers and equipment. In order to make efficient use of the national medical resources, the JPCM ordered 19 provinces to establish counterpart support relationships with cities in Hubei, aiming to bring the national superior medical teams and resources to the pandemic center. In Wuhan City, the local government designated hospitals for treating CoViD-2019 positive patients. These hospitals were converted in just days to satisfy the special requirements for treating infectious diseases. To mitigate the pressure placed on the designated hospitals, temporary shelter hospitals were built within weeks and hotel rooms were expropriated to receive the suspected carriers and treat confirmed patients who were not able to be admitted to designated hospitals. In addition, based on lessons learned from the Beijing Xiaotangshan Hospital during the 2003 SARS outbreak, Wuhan urgently built two hospitals, Huoshenshan and Leishenshan, to treat infectious patients with severe conditions. Similar to Zhejiang, the big data center of the Wuhan Public Security Bureau developed a «heat map of epidemic prevention and control», which contributed to the analysis of real-time data, helping to uniformly distribute medical staff, transfer vehicles, and dispatch hospital beds.

According to the requirements of the NHC, regions outside of Hubei would be required to develop similar plans for the control of the pandemic. Under the principle of centralizing the treatment of confirmed patients in isolation, each city designated special hospitals and set up a fever clinic in a separate area of the hospital[5]. Both the National Healthcare Security Administration and National Financial Department bear the treatment costs of both confirmed patients and suspected carriers[6]. For foreign patients, if they had participated in the basic medical insurance in China, they were covered under the compensation policies of both basic medical and serious illness insurance[7]. In addition, Internet-based healthcare platforms were developed to provide residents with telemedicine and online consultation services. Consumers who received eligible Internet-based medical services were also covered under the basic medical insurance[8]. Zhejiang and Guangdong provinces moved even further by establishing online prescription circulation platforms to realize the distribution of drugs after an online consultation. Indeed, Internet-based healthcare services played an important role in improving the efficiency of medical services while reducing the risk of cross-infection.

In terms of medical personnel protection, the central government ascribed great importance to the safety and protection of healthcare providers. The government required medical institutions to reasonably allocate protective equipment and arrange adequate shift rotation of medical personnel. Infections, disabilities, or the death of healthcare providers who were infected as a result of their participation in the epidemic prevention and control work, were recognized as work-related injuries, allowing for subsidies and pension pay-outs.

In addition, the necessity to address mental health gained increasing attention as the epi-

[5] https://bit.ly/3e8zgI8; https://bit.ly/2Zvy51g (last visited 10/05/2020).
[6] https://bit.ly/2XrFRa2 (last visited 10/05/2020).
[7] https://bit.ly/36oT2wn (last visited 10/05/2020).
[8] https://bit.ly/2XzCuxR (last visited 10/05/2020).

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demic continued. The NHC directed regional departments to provide offline psychological counseling and mental health hotline services for people affected by the epidemic, including patients, healthcare providers, and other front-line workers. The NHC also developed special psychological assistance work guidelines and provided psychological assessment and emotional support programs[9].

5. Resumption of Work, Production, and School

On January 26, 2020, the general office of the State Council announced the extension of the Spring Festival holiday and encouraged companies and schools to use online conferencing and teaching platforms for distance working and learning. On 7 February, 2020, the National Financial Department launched financial funds and loans to support enterprises' return to work and the production of materials for epidemic prevention and control. In particular, for the enterprises that transferred their production to the manufacturing of emergency materials, such as masks and protective clothing, green channels for qualification approval were granted to simplify the procedures for medical product registration and production licensure. For ordinary enterprises, especially for private small and medium-sized businesses seriously affected by the epidemic, owners received various government support to reduce social security fees, medical insurance fees, taxes, as well as the postponement of housing funds payments, and reduced standard charges for electric power. At the same time, the government required trade associations and chambers of commerce to provide necessary oversight for enterprises resuming production, regulating businesses so as to not artificially inflated prices or hoard goods, and thus ensuring market order.

In Wuhan, the Financial Department of Wuhan City, together with other financial institutions, established the first phase of rescue funds at 20 billion RMB (appr. 2.61 billion euros) for supporting enterprises returning to work and production on 5 April, 2020. Preferential policies, such as interest subsidies and fee reduction, were applied to qualified enterprises. To balance the epidemic control and work resumption, every return-to-work employee must pass a physical examination and must establish a personal file with action track and residence address[10]. Zhejiang and Guangdong provinces also developed policy measures for small and medium-sized businesses, such as reducing operating costs, allowing the extension of their current business licenses, and supporting import and export foreign trade and cross-border e-commerce business. The Alibaba Group, which is based in Zhejiang Province and is China's largest online business corporation, helped the government of Zhejiang province to develop an application platform for managing the resumption of production. Enterprises can apply for the resumption of production on the platform, and problems that occurred during the reopening of businesses can also be collected via the platform in real-time. For the migrant workers who traveled from other places to Zhejiang, the government arranged chartered buses and special trains to provide workers with "point-to-point" transportation between their hometowns and work locations. To encourage the development of the e-commerce platform industry in the province, the Market Supervision

[9] https://bit.ly/2WT435M (last visited 10/05/2020).

[10] The physical examination includes novel coronavirus nucleic acid test, novel coronavirus nucleic acid antibody, lung CT examination and other examination items.

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Department of Zhejiang and the Alibaba Group launched the Credit Restoration Plan to support and subsidize e-commerce businesses that lost the confidence of the public due to the epidemic.

In terms of education resumption, the National Ministry of Education guided provinces to safely reopen schools, with each province tailoring its own plan for returning to school based on the local epidemic situation. For example, Qinghai province began reopening junior and senior high schools started from 11 March 2020, becoming the first province to reopen its schools. In general, graduating classes would be given priority when arranging to restore schooling. All school staff are expected to complete nucleic acid tests before returning to work, and teachers and students can enter the campus only when both health codes and temperature measurements are in the acceptable range. For students who cannot start school, free online education resources are available. In many provinces, such as Guangdong, tablet computers and online traffic packages for Internet learning are provided by the government for low-income students.

6. Concluding Remarks

The lockdown in Wuhan City and cities nearby were both massive and absolute. In fact, the majority of cities in China underwent severe containment measures during the initial weeks after the Wuhan City announcement. We found that the governments' official websites and various social media platforms played a major role in disseminating epidemic information and prevention messages. Online shopping websites and mobile apps provided important channels for the continuation of daily life and accessibility of food supplies for many citizens. The web-based applications for online medical consultations proved to be a crucial service for the general public seeking medical diagnoses and psychological evaluations. In China, electronic tracking and tracing systems combined with big data and AI technologies dramatically helped the prevention and control of the epidemic, and will continue to play an important role in safely resuming work and school.

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