Policy Lessons From Early Reactions to the COVID-19 Virus in China

The World Health Organization (WHO) declared the COVID-19 virus outbreak to be a Public Health Emergency of International Concern on January 30, 2020. Although the Chinese central government implemented significant measures to control the epidemic from January 20 within China, the crisis had already escalated dramatically.

Between December 1, 2019, and January 20, 2020, a total of 51 days passed before the Chinese central government took full control. Several major factors combined to cause what had been in retrospect a clear break in the governmental information chain between December 1 and January 20. The management of this epidemic also illustrated key organizational limitations of the current Chinese health system, in particular provincial-level senior officials' lack of knowledge and awareness of potential public health risks and insufficient emergency medical material storage and logistics arrangements.

We review the specific disease control actions that the Chinese central government took between January 20 and January 27, the major reasons why the governmental information chain had broken before January 20, and key structural health system limitations highlighted as the epidemic expanded. (*Am J Public Health*. 2020;110:1145–1148. doi:10.2105/AJPH.2020.305732)

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See also Morabia, p. 1111, and the *AJPH* COVID-19 section, pp. 1123–1172.

The COVID-19 epidemic began in the city of Wuhan in Hubei Province, China. Biomedical researchers immediately sought to establish the disease's origins and potential infectious paths.[1,2] Several factors about this particular infectious agent and its timing are important to understand subsequent control efforts. First, clinically, the COVID-19 virus and its disease progression have unique features that present particular challenges for disease prevention and control. Current biological and epidemiological research suggest that COVID-19 can be infectious among humans without symptoms and through aerosol transmission paths[3] and that the incubation period can be as long as 24 days[3] with a preliminary estimated infectious rate of 1.4 to 2.5 according to the World Health Organization (WHO).[4] However, there remains much that is still clinically unknown about COVID-19.

Second, socially, the rapid expansion of the epidemic occurred just before the Chinese Lunar New Year (January 25, 2020), during which period approximately 3 billion holiday trips normally take place in China.[5] Much like Thanksgiving and Christmas Eve in the United States, the Chinese Lunar New Year is a time for reunions with families and friends. This Lunar New Year celebration break was originally scheduled to be from January 24 to January 30. Wuhan's mayor Zhou Xianwang stated in an interview on January 26, 2020, with China Central Television (CCTV) that some 5 million people had left Wuhan before the city's lockdown.[6]

Third, economically, Wuhan has the nickname of "China's thoroughfare"—it has a population of 11 million and serves as the commercial and transportation center of Central China.[7] It also has a substantial number of manufacturing sites, including western automobile companies.

These 3 structural factors combined highlight why it was difficult for local, regional, and central government to successfully control the COVID-19 virus from spreading to other parts of China as well as internationally, despite many Lunar New Year celebration events being cancelled in Wuhan after the city's lockdown on January 23.

Given this set of early events, scrutiny of China's central government's response and the limitations of the current Chinese health care system as illustrated by the development of the epidemic thus far may be helpful to other countries as they in turn fight the epidemic's ongoing spread.

THREE PHASES OF COVID-19 DISEASE CONTROL IN CHINA

The disease outbreak and the Chinese government's emergency response can be roughly divided into 3 phases. Phase 1 took place between December 1, 2019, with the first case of a patient with pneumonia symptoms (later confirmed as COVID-19 based on a retrospective study published in *Lancet*[8]) and January 19, 2020. During phase 1, the main responsibility for disease control responsibilities continued, as was standard in the Chinese governmental system, with officials of the Wuhan municipal government and of Hubei Province. Once the situation began to turn bleak, in late December, this system of local responsibility was then supplemented by 3 different expert team visits sent by the central government to investigate progress in suppressing the disease outbreak. These expert teams' members included the director of the Chinese Center for Disease Control and Prevention (CCDC), the director of the National Institute for Communicable Disease Control and Prevention, and other top scientists in the field of infectious

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and respiratory diseases, with the major role of the expert teams being to investigate and assess the potential epidemic situation.[9]

Phase 2 took place between January 20 and 27, 2020, during which period the Chinese central government rapidly centralized disease control strategies and tasks including political, disease management, financial, and information-reporting activities. Phase 3 dated from January 28, 2020, when the national government stepped in forcefully with centralized direction, and each provincial government was required to contain the disease outbreak through a series of restrictive measures following the strategies designed in phase 2, including mandatory quarantine of individuals and the prevention of human movement between communities, cities, and provinces.

PHASE 2: IMPOSING A CENTRALIZED APPROACH

Starting with the strong measures taken during the brief period between January 20 and 27, the Chinese government suddenly and dramatically shifted gears to implement strict central control measures to contain the spread of the virus. These centralizing policy actions and their results to date (March 19, 2020) illustrate the Chinese national government's capabilities in mobilizing resources and centralizing mass media and propaganda information in a short period of time, even during China's traditional holiday season. Table A (available as a supplement to the online version of this article at http://www.ajph.org) summarizes the national government's major actions on these different dimensions between January 20 and 27.

Several additional features of the national government's actions deserve mention. First, the central government emphasized real-time information delivery, as illustrated by CCTV's real-time report and daily press release. In addition, the State Council also opened a direct online channel that allowed local citizens to report to the central government potential misreporting of information from the municipal or provincial government.[10] This activity demonstrated that the central government wanted to avoid the "cover-up" behavior that had been attributed by some to the municipal and provincial governments.

Second, State media run by the central government, such as *People's Daily* (an official newspaper of the Central Committee of the Communist Party of China) and CCTV, began using social media (e.g., Weibo [like Twitter and Facebook in the United States]), as a major tool to disseminate disease prevention guidelines, central governmental policy statements, and scientific breakthrough announcements. For example, in addition to regular updates of confirmed disease cases and central government policies related to COVID-19, on January 28, *People's Daily* started to use Weibo to refute rumors regarding certain disease treatment methods (e.g., that white vinegar and liquor can cure the virus).

Third, several cities and education agencies, including Beijing Normal University, started a psychiatric information hotline within a week from January 20.[11] Although an epidemic emergency may not be as catastrophic as a natural disaster (e.g., an earthquake), the opening of a psychiatric hotline represented an awareness by the central government of the importance of mental health.

WHERE DID THE INFORMATION CHAIN BREAK?

On January 30, 2020, the WHO declared the outbreak of COVID-19 to be a Public Health Emergency of International Concern.[12] This decision reflected the reality that the epidemic had escalated rapidly around the globe, despite emergency efforts by the Chinese central government since January 20 to mobilize and centralize sufficient resources to control the epidemic's spread.[12]

Looking backward, it is instructive to review what happened between December 1, 2019, the first case (later confirmed as COVID-19)[8] and January 20, 2020, which was the first day that a Chinese national health expert officially stated that the COVID-19 had a human-to-human transmission mechanism.[13,14] There had been at least 3 previous opportunities for the central government to recognize the urgency of the situation and to begin strong centralized responses earlier than January 20. Figure A (available as a supplement to the online version of this article at http://www.ajph.org) lists the timeline for key events between December 1, 2019, and January 20, 2020.

First, on December 30, 8 physicians used a Chinese social media tool to warn peer doctors and friends that "seven people had contracted what [is] believed to be SARS."[13] On January 1 and January 2, rather than responding factually to these online claims, the Wuhan municipal government and CCTV announced that these 8 medical personnel were spreading rumors and had been admonished by local police.[13]

Second, on January 8, the National Health Commission in Beijing sent the second expert mission to Wuhan to locally inspect the situation (by January 9 there were at least 59 confirmed cases).[13] On January 8, the CCDC announced that scientists had successfully separated the genomic sequence of the virus and stated that this unknown virus was a novel coronavirus.[15] However, the vice–group leader of the second expert group stated on January 10 that "the epidemic can be controlled and preventable"[16] and Wuhan's municipal government health commission stated that it had "not found newly infected patients" between January 11 and 16.[15]

The third chance to act earlier was on January 15, 2020, when the director of the National Health Commission went to Wuhan to inspect the situation. The Wuhan Municipal Health Commission stated on January 15 that they had

> not found evidence of human-to-human transmission, and while we cannot rule out the possibility of human-to-human transmission, the risk of continuous human-to-human transmission is relatively low.[17]

As these 3 instances demonstrate, the information channels within China that should have delivered the crucial message to the central government and to the public that human-to-human transmission was occurring to stimulate immediate measures to control the epidemic sooner had 3 successive failures.

The Wuhan municipal and Hubei provincial governments (i.e., the local governments) normally would have been important stakeholders in this information chain. It seems that they had reported earlier cases. However, an even more important task of local government in China is economic development and the preservation of social stability. Thus, the Lunar New Year celebration activities

between January 24 and 30 were considered essential to show local economic growth, especially for the service industry.

Furthermore, between January 12 and 17, the prestigious provincial-level meeting of the All-China People's Congresses and Political Consultative Conferences was scheduled to be held in Wuhan, which required the social stability the Chinese central government tried to maintain.[18] Beyond these national political requirements, concerns about economic development and social stability traditionally determine local governmental officials' political future.[19] Hence, local officials in Wuhan and Hubei had strong professional and personal incentives to minimize any potential negative news or events during mid-January 2020, extending even to the severe "human-to-human transmission" infectious disease outbreak within their region.

Looking back at this early stage communication process, it is likely that the Wuhan and Hubei officials were incentivized primarily by economic development and social stability, leading them to underestimate the potential hazard of the emerging epidemic. Even with this consideration, there were at least 3 groups of national-level health experts and officials who went to Wuhan between December 31, 2019, and January 15, 2020. These health experts and officials should have sensed the potential danger of human-to-human transmission given their years of experience and expertise. Indeed, all confirmed patients by December 30 were isolated.[20] However, these health officials understood that they were only technical supports intended to provide necessary guidance for higher governmental officials' decisions. The CCDC Web site described its role and function as "Under the leadership of National Health Commission, China CDC exerts its function in technical guidance and support of public health."[21] Expert team member Guang Zeng also said the following in an interview on January 29:

> However, government officials' consideration of these issues are not purely from a scientific perspective. This is only part of their decision-making basis. They have to consider the political factor, consider the issue of maintaining stability, the economic issues. . . .[22]

Under these circumstances, with the health experts' guidance, local government officials designed their initial strategy in response to the epidemic as "internally closely inspection and monitoring, and externally loosely report the severity."[23] The technical supporting role of the health care professionals limited their ability to deliver urgent information to higher-level government and to react in a faster manner, which otherwise could have better controlled the disease's spread at an earlier stage.

Lastly, it is reasonable to expect that frontline medical staff should have noticed that this disease had a human-to-human transmission path, given that at least 7 medical staff contracted the disease between January 1 and 11.[2] Normally these medical personnel would have raised their voice to the media or publicly disseminated their concerns. However, they knew that the earlier 8 physicians who expressed concerns about SARS were silenced.[13] In addition, in China, zero infected medical staff during any epidemic is an important nationally imposed performance measure for all hospitals.[24] Clearly, such a performance evaluation method created a strongly negative incentive for Wuhan's hospitals to report any infected medical staff member.

RELATED LIMITATIONS OF CHINA'S HEALTH SYSTEM

The outbreak of the COVID-19 virus and the early governmental responses to contain the disease illustrated several additional limitations of the current Chinese health system. First, better public health emergency response education may be necessary for municipal and provincial-level governmental officials. None of the top governmental officials of Wuhan and Hubei Province (mayor, governor, and party secretaries) had a medical or public health background. This lack of public health awareness may have contributed to their underestimation of the urgency of early action. By comparison, Sichuan Province (which had a later onset of COVID-19) started disease prevention and control activities as early as January 21. Sichuan Province's current governor formerly was vice-director of the National Health Commission and has a medical background. His knowledge and consciousness of public health issues may have helped him make decisions when the epidemic had just broken out.[25] Sichuan, one of the provinces with the largest population in China (approximately 81 million people) situated close to Hubei province, had in total 539 officially confirmed cases as of March 14, 2020.[26] (Anhui, a province close to Hubei Province with approximately 62 million population, had a total of 990 officially confirmed cases as of March 14, 2020.[26])

The second system-level limitation revealed by the COVID-19 epidemic concerns the inventory and management of emergency response supplies. On January 22, Hubei Province intended to request emergency support of medical supplies from the central government.[27] On January 24, many hospitals in Wuhan nearly ran out of essential inventory and sought to raise hospital supplies from the broader society directly, including medical gloves and protection gowns, N95 face masks, and medical goggles.[28] The lack of appropriate protection for health care workers may have contributed to the high number of hospital-acquired infections for health care workers during the early epidemic control period.[29] Subsequently, the supply management arm of the Wuhan Red Cross Society that had sought these donated supplies to support Wuhan's local hospitals was strongly condemned online by many in the citizenry.[30] The full-time deputy director and other 2 officials of the Hubei branch of the Red Cross Society of China were fired for dereliction of duty on February 4.[31] Given that China is a large country with a massive population, the inventory and coordination of critical medical supplies for emergencies ought to be better organized.

CONCLUSION

Between January 20 and January 27, 2020, the central government in China reacted rapidly to contain the epidemic. However, based on the subsequent development of the disease outbreak, these centralized efforts were not instituted as early as they should have been. Looking backward at events from early December 2019, it appears that 3 factors were the main contributors to the breakdown of the

central government's response before the disease broke out from its initial stage: an economic- and stability-driven local government, an exclusively technical supporting role for health-monitoring agencies, and a group of silenced frontline doctors. The subsequent results of this suppression of the public-sector reporting chain helped create a much larger and more serious national and international medical emergency. The outbreak and early governmental response also reflected other limitations of the current Chinese health system, in particular provincial-level officials' lack of training concerning potential public health risks and inadequately coordinated emergency medical material storage and logistics.

Looking backward, it can be argued that the previous SARS epidemic in 2003 ultimately had a positive impact on the structure of China's health system, encouraging the central government to recentralize CCDC and to invest more resources in primary care.[32] The early centralized responses to COVID-19, once initiated, also demonstrated faster responses by the Chinese central government than at the time of SARS.[33] Although this new epidemic is not over, hopefully the experience of dealing with it will spur further positive developments in the Chinese health sector and in other public agencies as well. AJPH

CONTRIBUTORS

Both authors conceptualized the idea. Y. Liu collected the data and drafted the initial article. R. B. Saltman made substantial revisions to that initial draft. Both authors together wrote the final draft.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

HUMAN PARTICIPANT PROTECTION

Human participant protection was not required because no human participants were involved.

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