

Revisiting China's response to coronavirus disease 2019

Guangbiao Zhou¹, Saijuan Chen (✉)², Zongjiu Zhang (✉)³, Zhu Chen²

¹State Key Laboratory of Molecular Oncology, National Cancer Center/National Clinical Research Center for Cancer/Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing 100021, China; ²State Key Laboratory of Medical Genomics, Shanghai Institute of Hematology, National Research Center for Translational Medicine (Shanghai), Ruijin Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200025, China; ³Institute for Hospital Management, Tsinghua University, Beijing 100084, China

© Higher Education Press 2024

“The rolling Yangtze River flows eastward, washing away the heroes in its waves.”

These words were written by a poet, Shen Yang, 500 years ago in his poem *Immortal by the River*. “Countless events of the past and present are all turned into laughter and conversation of the white-haired fishermen and woodcutters.”

Some things should be remembered for important events, before they as well as we, who shape or witness the events, become a history. This is particularly true when considering the coronavirus disease 2019 (COVID-19).

Four stages of China's response to the pandemic

COVID-19 broke out in early December 2019 and rapidly spread across the world. This pandemic created an unprecedented challenge to the society, and the medical professionals, the central and local Chinese governments and medical communities made huge efforts to tackle it. These efforts were quite effective, and the war on COVID-19 in China could be chronologically divided into four stages.

Stage I (December 2019–May 2020)

During Stage I, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was isolated first by Wuhan Institute of Virology, Chinese Academy of Sciences, and then the Center for Disease Control and Prevention (CDC) at Hubei Provincial and National level. The genomic information of the primary strain was

shared immediately with the international society. The transmissibility of the disease was relatively strong and the reproduction number (R₀) of SARS-CoV-2 was high (2.2–4.8). Meanwhile, the mortality rate of COVID-19 was high (around 10% in the first series of patients reported). Therefore, the containment of the SARS-CoV-2 and saving the lives of infected patients were the primary missions of this stage. To fulfill these goals, Wuhan and related cities were locked down, population mobility was restricted, and huge resources were input to the regions for public health, medical care, and people's livelihood. Shelter hospitals for mild to moderate cases were built in a short time in addition to the medical institutions specialized for treatment of severe cases, and more than 42,322 medical professionals from outside Hubei selflessly joined the local ones to deal with the emergency. Social workers played a major role in supporting vulnerable households during the crisis. Thanks to these comprehensive efforts, the spread of the virus in China had been slowed down, and some effective therapeutic approaches (such as the high anti-viral neutralizing antibody-containing convalescent plasma and drugs against cytokine storm for severe cases, and effective traditional Chinese medicine (TCM)) had been developed. As of May 2020, 83,017 confirmed cases and 4,634 deaths (mortality rate: 5.56%) were recorded in China, and the lessons learnt from both non-pharmaceutical measures (NPM) in public health and medical diagnosis and treatment for patients were shared with colleagues globally.

Stage II (May 2020–December 2021)

During Stage II, the SARS-CoV-2 variants of concern (VOC) obtained increased transmissibility while the lethality remained relatively high, Delta strain in particular. At this stage, the pandemic in China was under

Received January 20, 2024

Correspondence: Saijuan Chen, sjchen@stn.sh.cn;

Zongjiu Zhang, zhangzongjiu@mail.tsinghua.edu.cn

control, but in other countries COVID-19 rapidly spread, and as of December 2021, 282 000 000 confirmed cases and 5 410 000 deaths were reported. China adhered to its dynamic zero-COVID policy and strategies to prevent both imported and domestic infections. Breakthroughs during this stage included the development of inactivated, recombinant, mRNA and other vaccines, and drugs including TCM, to fight against SARS-CoV-2 infections. Only one digital number of cases died of COVID-19 during that period of time in China. A report made by World Health Organization (WHO) indicated that from early 2020 to the end of 2021, the global deaths due to diagnosed COVID-19 was 5 400 000 and the excess death number reached 14 900 000, whereas excess death in China was -52 000.

Stage III (January 2022–December 2022)

The dominant Omicron variant in China was extremely highly transmissible (R_0 reaching 25) at Stage III, while the virulence of the virus gradually weakened. The containment of Omicron waves from spring to summer in several cities, especially in Shanghai, prevented more than a million people from mortality in view of the still relatively high crude case fatality rates (CFR) (0.09%). From September, the crude CFR further decreased to about 0.03%. Meanwhile, more than 90% of Chinese people had been fully vaccinated against SARS-CoV-2, and in addition to Paxlovid, new anti-COVID-19 drugs Azvudine, VV116 and SIM0417 had been developed. Over three years of COVID-19 prevention and control, China had equipped herself with technology and drugs that are effective in COVID-19 diagnosis and treatment. Therefore, the opportunity was emerging for China to make a policy change from containment to mitigation so that epidemic response and socio-economic development could be balanced.

Stage IV (December 2022–February 2023)

During Stage IV, China announced measures to ease her COVID-19 restrictions on visits to public venues and travels, and to reduce the scope and frequency of mass nucleic acid testing. On January 8, 2023, China downgraded the management of COVID-19, putting it on a par with avian flu rather than the more serious infectious diseases such as bubonic plague and cholera. Accordingly, normalcy of social life was gradually restored in China. Notably, from mid-December 2022 to the end of January 2023, about 80% of Chinese population was infected by Omicron, and the healthcare system was under unprecedented pressure. To protect the vulnerable patients, in particular the elder ones, vast numbers of medical workers made outstanding contributions, fighting tirelessly in the front lines of

epidemic response and treatment, and have displayed their noble professional spirit of saving the dying and healing the wounded. In total, 83 150 COVID-19 associated deaths were documented in medical institutions of 31 provinces (autonomous regions, municipalities directly under the central government) and Xinjiang Production and Construction Corps in China from December 8, 2022 to February 9, 2023.

A better health care system has been built in China

As of December 31, 2023, 773 819 856 confirmed cases and 7 010 568 deaths have been reported globally, according to the WHO COVID-19 dashboard. However, estimation by WHO expert indicated a threefold death toll compared to the reported number. With regard to the excess death in China, the estimated number could be 498 000 in 2023, if death toll of more than 2% increment being taken as a threshold and compared to 2022 (11 100 000 all deaths covering the period of December 2022 to November 2023, and 10 410 000 all deaths, covering the period of December 2021 to November 2022, respectively), while China has a huge population of 1.41 billion and was the victim country of SARS-CoV-2. These facts indicate that China has taken sound strategies against this pandemic. Significant progress in China's health system reforms is fully exemplified on the fronts of disease prevention and control as well as medical care delivery. Science and technology have been shown to be essential means in combating the pandemic. The advantages of the combination of TCM and Western medicine and the combination of clinical medicine and preventive one have also been fully utilized. However, some shortcomings existed at the level of implementation of the policy in some cities, especially unnecessary lockdown but insufficient drug preparation and inappropriate risk communication at the end stage of mitigation.

The life-first principle

The guiding policy of Chinese health care system is the people-oriented, people-first, and life-first principle. Indeed, China puts human life on top of the human rights and put strict NPM (e.g., mask wearing, vaccination, and social distancing) like many other Asian nations, at the cost of temporary suspension of population mobility, schooling and even economic growth. In addition, international collaboration should accelerate, while national insularity and international conflicts, sanctions, and wars of every kind, can only hamper human's conquering of COVID-19.

Perspectives

It is of the utmost importance to review the pandemic prevention and control and scientific research work in the past years and solve some of the remaining challenges such as long COVID and new trends of SARS-CoV-2 evolution including new variants of interest (VOIs) such

as JN.1. Scientific assessments should be made from the aspects of pattern recognition, innovation, and implementation, so as to provide reference for the prevention and control of infectious diseases in the future. We believe that the trajectory of COVID-19 response will certainly contribute to evidence-based policy-making and to building a global community of health for all.