

The priority for prevention and control of infectious diseases: Reform of the Centers for Disease Prevention and Control – Occasioned by "the WHO chief declares end to COVID-19 as a global health emergency"

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SUMMARY The novel coronavirus disease 2019 (COVID-19) pandemic has revealed that infectious diseases will present a significant worldwide threat for a long time in the future. Centers for Disease Prevention and Control (CDCs) worldwide have developed for nearly 80 years to fight against infectious disease and protect public health. However, at the advent of the 21st century, the responsibility for prevention and control of infectious diseases has gradually been marginalized in the CDC system. The COVID-19 pandemic has also provided a glimpse into the overburdened operational process and inadequate personnel reserve of the current system of CDCs. In addition, a long-term multisectoral joint mechanism has not been created for sharing information and cooperation to facilitate public health. Reform of the system of CDCs or public health is very necessary. A global prevention and control system should be envisioned and implemented worldwide, and vertical management should be implemented throughout all levels of CDCs to improve their structure and administrative status. The WHO should expand its scope of responsibilities, especially with regard to mechanisms for joint prevention and control of infectious diseases, to substantially implement the "One Health" concept. The International Health Regulations (IHR) and relevant laws and regulations should enshrine the CDC's authority in administration and policy-making to deal with outbreaks or pandemics of infectious diseases.

Keywords reform, infectious disease; Center for Disease Prevention and Control, health policy

At the beginning of 2020, the novel coronavirus disease 2019 (COVID-19) pandemic began in China and then swept around the world. The World Health Organization (WHO) declared the COVID-19 outbreak a global pandemic on March 11, 2020. Three years later, the WHO finally announced that COVID-19 is no longer a global health emergency (1) (Figures 1 & 2). The new norm for COVID-19 may be smaller, more frequent, and less fatal outbreaks rather than seasonal outbreaks. Since the COVID-19 pandemic has passed, now is the time to enhance the public health system to respond to normalized management of COVID-19 and potential risks of other emerging infectious diseases (EIDs).

Characteristics of infectious diseases

The ability to spread is the most significant characteristic

of infectious diseases. If effective prevention and control strategies are not implemented at critical points, the spread of an epidemic can rapidly reach critical proportions, resulting in substantial harm to public health, socioeconomics, and people's livelihoods.

In history, common infectious diseases have caused enormous harm. During the fourteenth century, the bubonic plague killed about 25 million people (2). The third plague pandemic began in Yunnan Province, the border area between China and Burma, and it continued in Yunnan province for 184 years (1772-1995), with nearly one million people dead (3). After Spanish colonists brought smallpox to the Americas, the native Indian population in central Mexico was decimated to one tenth of its original size by 1568 (4). During the seventh global cholera pandemic, the disease reached its worst level in 1991, and more than 594,000 cases were

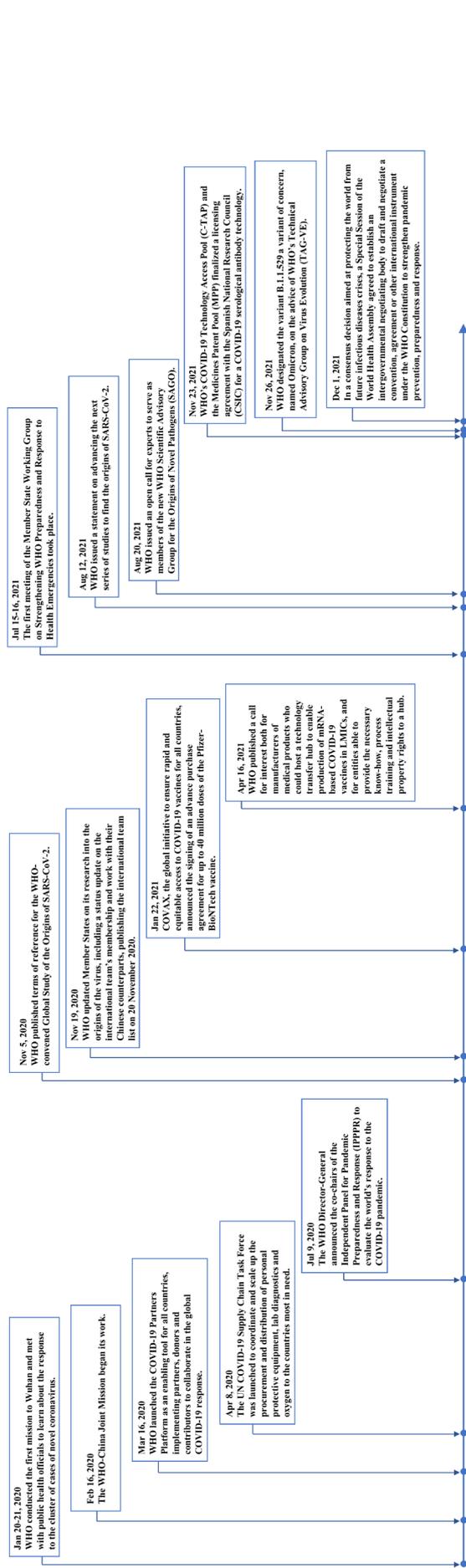


Figure 1. WHO's significant responses to COVID-19 since 2020.

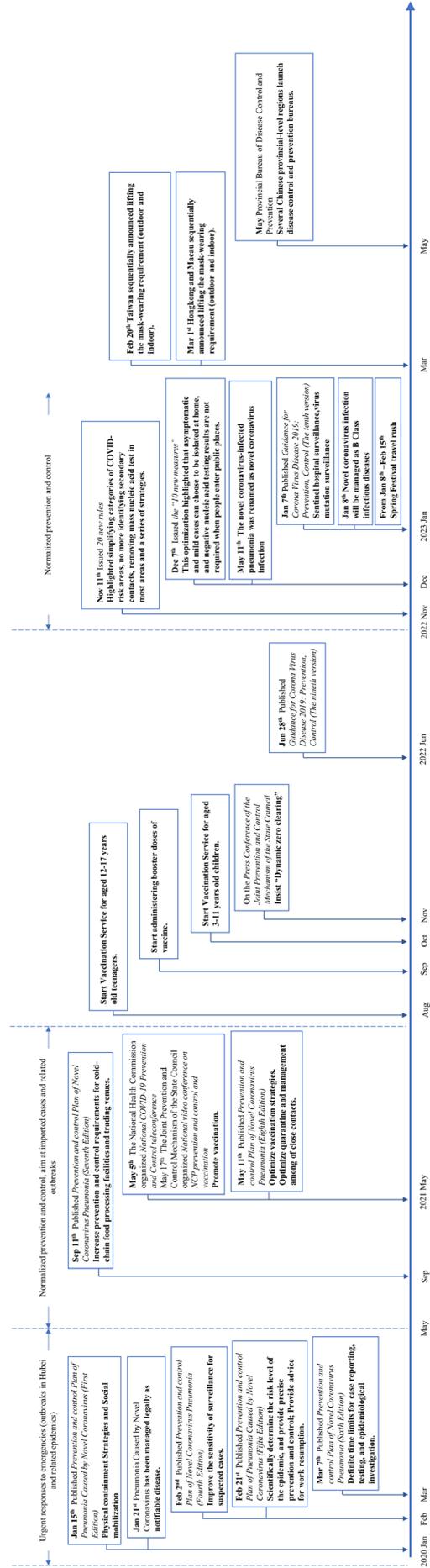


Figure 2. Prevention and control processes and strategies to combat COVID-19 in China since 2020.

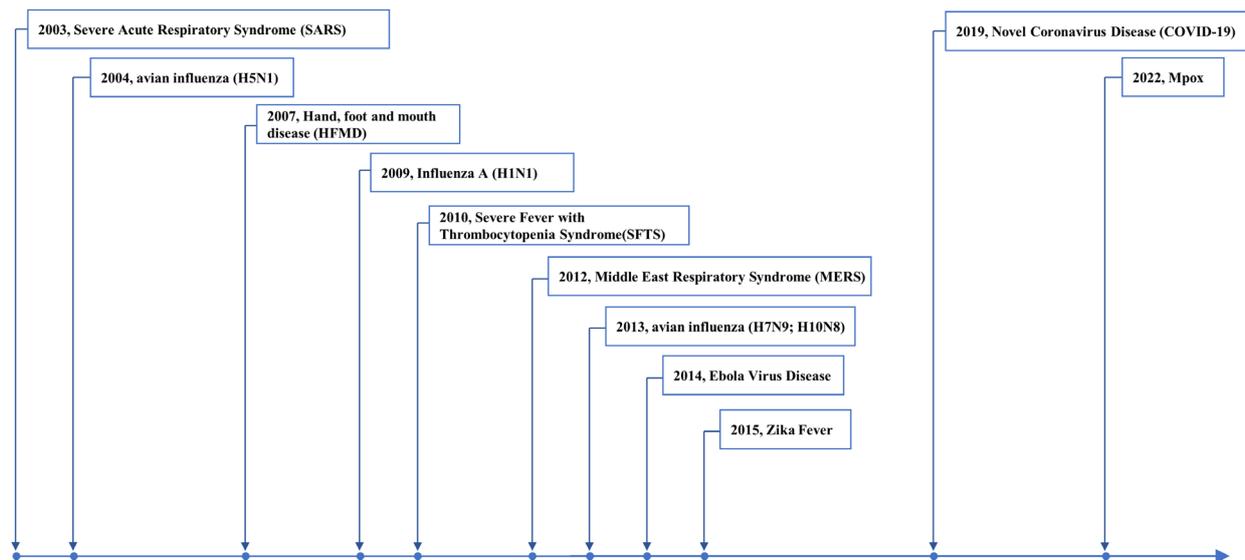


Figure 3. Emerging infectious diseases worldwide since 2000.

reported (5). The incidence of cholera remained high throughout the 1990s, and 140,000 to 590,000 cases were reported in 59 to 94 countries and regions around the world (6).

Unlike other diseases such as non-communicable chronic diseases (NCDs), the cause of an infectious disease can usually be identified as a single pathogenic microorganism. Vaccines targeting a specific pathogenic microorganism are the most crucial intervention to achieve herd immunity and prevent the spread of infectious diseases. In addition, if a pathogen has yet to be identified or while a vaccine is still being prepared, physical containment strategies such as patient isolation, contact tracing, and personal protective equipment can also intercept transmission and protect public health in the early stage of an outbreak. After thousands of years of efforts, mankind has accumulated vast experience in fighting infectious diseases. Numerous common infectious diseases such as smallpox and poliomyelitis have been effectively controlled and successfully eradicated (7,8).

However, EIDs have been attracting increasing attention in the 21st century. (Figure 3). In 2003, an outbreak of severe acute respiratory syndrome (SARS) was identified in China and then spread to four other countries. During the SARS pandemic, 5,327 cases and 349 deaths were reported on the Chinese mainland (9). The COVID-19 pandemic continues to ravage the world; as of May 24, 2023, over 766 million confirmed cases and over 6.8 million deaths have been reported globally (10) (Figure 4). The public needs to realize that infectious diseases such as respiratory infectious diseases and vector-borne diseases remain a major threat to public health. At the same time, governments should consider the enormous disruption that infectious diseases bring to economic and social stability. Thus, strategies to prevent

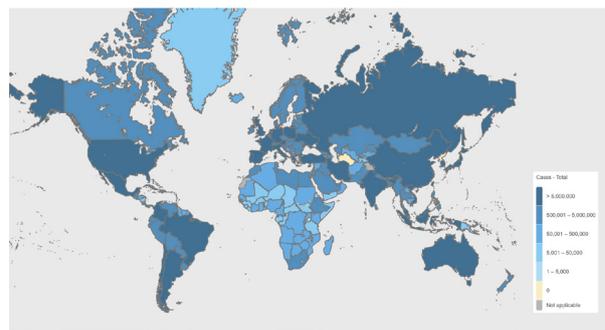


Figure 4. Global confirmed cases of COVID-19 reported to the WHO as May 24, 2023. Globally, as of 6:03 AM CEST, 24 May 2023, there have been 766,895,075 confirmed cases of COVID-19, including 6,935,889 deaths, reported to the WHO.

and control infectious diseases affect not just public health but also political and national security.

Current status of and problems with the system of Centers for Disease Prevention and Control

In a classic epidemiological case - the Broad Street cholera outbreak, John Snow made full use of epidemiological methodologies and he introduced comparison, probability, and other epidemiological concepts (11). In 1946, the Communicable Disease Center was established in Atlanta in the US. Its primary mission was simply to prevent malaria from spreading across the nation, and that was then expanded to other communicable diseases (12). In the 1950s, the Epidemiological Intelligence Service (EIS) was established, and the EIS began systematically training epidemiological field specialists.

In China, the Communist Party of China and the Government emphasize the prevention and control of

infectious diseases. Multiple levels of sanitation and epidemic control stations (at the provincial, prefectural, and county level) were established nationwide by 1953. Through the hard work of three generations of health workers, epidemics of serious infectious diseases such as the plague and cholera were successively controlled, and smallpox was eradicated. Public health has significantly improved in China.

In 1946, the Harvard School of Public Health became an independent, degree-granting body and was no longer affiliated with the medical school (13). Since then, the gulf between public health and clinical treatment has become ever wider. With the advent of the 21st century, academics generally believe that the highest proportion of deaths has changed from acute infectious diseases to chronic diseases, and especially in developed countries. The Center for Disease Prevention and Control (CDC) has begun to take on more responsibilities with regard to providing health education and monitoring risk factors for chronic diseases. The prevention and control of infectious diseases has gradually been marginalized, and related departments have been abolished or merged with other departments; departments which are mainly responsible for disinfection and vector control have been merged with other departments. The attrition of specialists and loss of expertise are serious.

Although a long-term multisectoral joint mechanism has prescribed by the Law on the Prevention and Treatment of Infectious Diseases in the People's Republic of China, this mechanism has not been fully created. An uninterrupted mechanism of sharing public health information, such as sharing information between the clinical medical system and CDCs, a channel for sharing information between health administrative departments and other departments (such as the environmental protection department and the agricultural department) has not been created. In addition, CDCs are responsible for disease surveillance and data reporting, but they are not authorized to announce information on the status of infectious diseases.

Suggested reforms for the system of CDCs

This COVID-19 pandemic has provided a glimpse into the overburdened operational process and inadequate personnel reserve of the current system of CDCs. Public health is essential to national stability and essential to global economic development, global political security, and even globalization. Reform of the system of CDCs or public health is very necessary.

(1) A global prevention and control system should be devised and implemented worldwide (14). Governments should be mindful of improving the administrative status of CDCs, and vertical management should be implemented throughout all levels of CDCs. In addition, global public health education and creation of teams of public health specialists should be enhanced, and a public

health system that includes integration of medical care and prevention in colleges should be created. Clinicians should enhance the awareness of public health; especially when treating patients suggestive of infectious disease, clinicians should pay attention to sources of infection and further proliferation. This would enhance the prevention of infectious diseases in the field of clinical medicine rather than simply enhancing methodologies of clinical epidemiology.

The WHO should expand its scope of responsibilities, especially with regard to joint mechanisms for prevention and control of infectious diseases. The new International Health Regulations (IHR) should be revised to enshrine a joint mechanism of preventing and controlling infectious diseases in the law. The "One Health" concept should be substantially implemented by the WHO, the World Organization for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO), and other authorities to facilitate interdisciplinary, cross-departmental, and cross-regional cooperation and to ensure harmony among human health, animal health, and the state of the environment (15,16). CDCs should also search for supports of social forces and explore public mobilization for prevention and control of infectious diseases. For example, the construction of "mosquito-free villages" by Zhejiang Provincial CDC since 2016 has provided a sustainable mechanism supported by whole local villagers to prevent mosquito-borne diseases. Globally, mechanisms of cooperation and sharing information should also be enhanced between CDCs and clinical healthcare systems to combat infectious diseases.

The IHR and the Law on the Prevention and Treatment of Infectious Diseases should enshrine CDC's authority in administration and policy-making to deal with outbreaks or pandemics of infectious diseases.

(2) In China, the mechanism for internal management of the current CDCs should be improved. The goal of the reformed CDCs should be to focus on improving prevention of, detection of, and responses to infectious diseases and to protect public health and socioeconomic development from the threats of infectious diseases (especially EIDs).

(i) An elite team should be created for prevention and control of infectious diseases, and the members of this elite team could be individually drawn from current CDCs. The current CDC can be merged into the Administration of Disease Prevention and Control. The "National Directorate General of Health and Epidemic Prevention" can be established at the national level; each province can set up bureaus of Health and Epidemic Prevention (just like combat zones), and each county or district can establish county-level sub-bureaus that directly answer to provincial leadership. Major cities such as sub-provincial cities and cities with separate state planning can establish agencies with personnel dispatched from the province (sub-bureaus).

Hiring requirements should be improved. Quality

field epidemiological investigations, disinfection, vector control and prevention, epidemic analysis and assessment, emergency management, and emergency detection can be performed with specialists in acute infectious disease surveillance at their core; chemical, nuclear, and biological warfare units can be added. This elite team should fall under the direct leadership of the Party Central Committee or be subordinate to the armed police force and have military vertical management. This team should participate in daily efforts to achieve a "Healthy China" and serve society, and it should be supplied efficiently and nationwide after the outbreak of an epidemic.

To ensure that this team is focused on infectious disease surveillance, outbreak detection, and rapid response, it must be subject to preferential policies and have more authority. An independent mechanism for performance evaluation should be created, and the staff's performance should not be evaluated based on areas, papers, or income generated to encourage staff members to improve their ability to identify and solve problems in practice. On March 23, 2023, the General Office of the Central Committee of the Communist Party and the General Office of the State Council published opinions on further improving the medical and health care system. During the handling of outbreaks or pandemics, laws and regulations should give CDCs the administrative right to announce epidemics, to quarantine epidemic sites and areas, and to isolate patients and contacts. Laws and regulations should authorize public health physicians to treat, investigate, and deal with infectious diseases.

(ii) National and provincial preventive medicine research needs to be enhanced. Since the COVID-19 pandemic began, the National CDC has made great achievements in virus sequencing, isolation, and elucidation of disease transmission dynamics. However, applied research on epidemic analysis and assessment, decision-making, and handling are still inadequate.

More quality research projects in preventive medicine should be implemented at the national and provincial levels to improve CDCs' ability to rapidly detect pathogens, to screen diagnostic reagents, and to develop vaccines and to provide technical support to control infectious diseases. In 2021, the Zhejiang Provincial CDC and Hangzhou Medical College jointly established a school of public health (17). Since 2022, a course on "Prevention and Control of Infectious Disease" has been offered to undergraduates and a course on "Field Epidemiology" has been offered to graduate students. This is a significant reform, introducing the latest developments and infectious disease prevention and control practices in university.

(iii) Surveillance and studies on chronic diseases, nutrition, and mental health, and related health education can be conducted by hospitals and colleges. General testing can be left to third-party agencies. Public education about science can also be left to third-party

agencies and colleges.

Infectious diseases will present a significant worldwide threat for a long time in the future. To protect the public from infectious diseases, the system of CDCs should lead the way and stand at the forefront of the clinical medical system. Qualitative improvements should be implemented to reform the system of CDCs. The public is looking for an effective and long-term multisectoral mechanism to jointly respond to infectious diseases that can be implemented soon.

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