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Should China be closed forever? A *Preventive Medicine* Golden Jubilee commentary

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ARTICLE INFO

Keywords

COVID19

Zero policy

Death

Prevention

Control

Screening

Antiviral treatments

Cardiometabolic

Shanghai

China

The situation in China is very challenging. These past few months have seen multiple COVID-19 outbreaks ripping through communities from north to south in the country. Most Chinese people in the mainland have never been infected by SARS-CoV-2, the virus that causes COVID-19, thanks to the zero COVID policy implemented uniformly with mass PCR testing and strict lockdowns of millions of people throughout the country since SARS-CoV-2 was first identified early 2020 in Wuhan.

Using publicly available data released by the Shanghai government as of 4/29/2022, we calculated the ratio of asymptomatic positive to symptomatic positive cases to be >10, with a case fatality rate (CFR) of 0.73% and infection fatality rate (IFR) of 0.066% during the lockdown in Shanghai (daily downloaded from <https://wsjkw.sh.gov.cn/yqtb/index.html>) (Commission, S.M.H, 2022). Even considering differences in the definitions of COVID-19 cases between Shanghai and elsewhere, these statistics indicated that the current harsh measures for early detection and control appear to be successful in controlling the new outbreak. Of the >583,000 with PCR test positive, there are only 384 deaths. Moreover, the COVID-19 related deaths were all elderly people who have not been vaccinated and all had underlying diseases. Since the current wave of Omicron began in March, however, some of the 25 million people in Shanghai has been in lockdowns for 2 months. The IHME model estimated that the current wave would peak in the third week of May (<https://covid19.healthdata.org/global?view=cumulative-deaths>

&tab=trend) (<https://covid19.healthdata.org/global?view=cumulative-deaths&tab=trend>, n.d.). Meanwhile, new COVID-19 cases are being confirmed in many cities across the country, including Beijing, and there are reports of panic buying, widespread anxiety, and frustration among its citizenries.

Aside from economic pressure and tremendous sacrifice in personal freedoms endured by the Chinese people, prolonged and harsh lockdowns have also exerted heavy physical and mental tolls on the people, particularly among the most vulnerable: the elderly and those with existing cardiometabolic disorders. As the Omicron variant appeared to have little infectivity to the lungs, and the vast majority of the infected have no symptoms (1), more concerning are severe outcomes (excess deaths from other medical conditions and problems in mental health); in Wuhan, China's CDC estimated excess deaths from cardiometabolic diseases were up more than 20% in two months of lockdown when medicine and routine management of these diseases and risk factors (high blood pressure, hyperglycemia, and dyslipidemia) were unfortunately being compromised. (Liu et al. BMJ 2020 <https://www.bmj.com/content/372/bmj>) (Liu et al., 2020).

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<https://doi.org/10.1016/j.ypmed.2022.107102>

Received 3 May 2022; Received in revised form 23 May 2022; Accepted 24 May 2022

Available online 31 May 2022

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How to solve the predicament of Shanghai and beyond?

China has now 3 options to deal with the pandemic, each with some pros and cons (Table 1). And option 2 seems the best strategy as Omicron and its variants are much harder to contain. What China should do in the coming months is to:

- Ramp up vaccination rates using the highest efficacious mRNA vaccines, particularly targeting those 60+ and those with underlying high-risk conditions.
- Apply different levels of restrictions according to the level of infections in a community. The focus should be on preventing severe outcomes while minimizing hospitalizations and excess deaths from other medical problems. Indeed, when key medical resources are protected, both population and individual health are protected.

Table 2.)

China could apply different levels of restrictions according to different degrees and stages of the outbreak in different communities. The level of restrictions should match the specific situation on the ground that aiming to maximize the pros and minimize the cons

Table 1

	Option 1: Dynamic-zero policy	Option 2: Adaptive, Multi-stage, and multi-levels policy	Option 3: Full opening policy
Pros*	<ul style="list-style-type: none"> • Less infections, hospitalizations, and deaths • Effective in controlling more virulent variants and/or new variants 	<ul style="list-style-type: none"> • Readily accessible to early detection and control measures • More balance of benefits and risks, and cost-effective measures • Resume economic activities and some normalcy of individual freedom • Improve care, mental health, and education services 	<ul style="list-style-type: none"> • Release socioeconomic pressure • Restore individual freedom • Improve mental health • Help build immunity on the long run (as in Sweden) • May increase immunizations and non-pharma interventions
Cons*	<ul style="list-style-type: none"> • Costly and damage to economy (local and global) particularly small business • Increase in risky behaviors (smoking, alcohol, and drug abuse) • Increase in suicide cases • Impact on mental health • Not sustainable 	<ul style="list-style-type: none"> • Initial education and vaccination campaign could be costly • Deaths and severe outcomes may rise 	<ul style="list-style-type: none"> • The number of deaths and severe outcomes will rise • Overrun the health care system

* Estimating excess mortality due to the COVID-19 pandemic: a systematic analysis of COVID-19-related mortality, 2020–21 <https://www.sciencedirect.com/science/article/pii/S0140673621027963>; Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic <https://www.sciencedirect.com/science/article/pii/S0140673621021437>; Pandemic preparedness and COVID-19: an exploratory analysis of infection and fatality rates, and contextual factors associated with preparedness in 177 countries, from Jan 1, 2020, to Sept 30, 2021 <https://www.sciencedirect.com/science/article/pii/S0140673622001726>; Quantifying the effects of the COVID-19 pandemic on gender equality on health, social, and economic indicators: a comprehensive review of data from March 2020, to September 2021 <https://www.sciencedirect.com/science/article/pii/S0140673622000083>

Table 2

Definition of Terms.

- **Closed loop** is the idea borrowed from 2022 Beijing Winter Olympics. The core is that all participants in treating COVID cases, including physicians, nurses, and support staff, are operating within dedicated buildings in a hospital.
- **Dynamic-zero policy**: is a transitional strategy to be adopted after a successful containment strategy, when the population immunity barrier is not yet established in the face of continued risk of foreign importation and high transmission of variants. The core is to take effective and comprehensive measures to deal with localized COVID-19 cases precisely, to quickly cut off the transmission chain, and to end the epidemic in a timely manner (to “find one, end one”).
- **Fangcang shelter hospital** is a novel concept borrowed from military field hospitals, which refers to: large, temporary hospitals built by converting public venues, such as stadiums and exhibition centers, into health-care facilities to isolate patients with mild to moderate symptoms of an infectious disease from their families and communities, while providing medical care, disease monitoring, food, shelter, and social activities. [Chen S, et al. Fangcang shelter hospitals: a novel concept for responding to public health emergencies. *Lancet*. 2020 Apr 18;395 (10232):1305–1314. PMID: 32247320]
- **R&D**: research and development
- **Point of Care Test (POCT)**: involves performing a diagnostic test outside of a laboratory that produces a rapid and reliable result, aiding in identifying or managing chronic diseases and acute infections.
- **NAAT-POCT**: a POCT based on nucleic acid amplification tests technology

(Table 1). While recognizing evolving scientific understanding and discoveries, we recommend 4 levels of restricted measures to inform prevention and control measures for specific local communities:

- **Level-1: Community transmission (< 10 per 100,000 population in one week) and no evidence of hospitalization of COVID-19 patients - Minimal requirement for mask wearing to get access to medical facilities without the need for quarantine.**
- **Level-2: Community transmission (>10 per 100,000 population in one week) with new COVID-19 hospitalization - Mask wearing, and COVID-dedicated medical facilities (including a Fangcang shelter hospital for care).**
- **Level-3: Community transmission (> 100 per 100,000 population in one week) – A comprehensive protection of critical or intensive care resources in all medical facilities. A complete closed loop between critical care resources and dedicated COVID facilities is established, and patients can only access critical care resources through dedicated COVID facilities.**
- **Level 4: Community transmission (> 200 per 100,000 population in one week) - A complete closed loop between medical facilities and/or Fangcang shelter hospitals, like during the 2022 Beijing Winter Olympics.**

At the same time, China should double down on public education campaign about the status of COVID pandemic with timely dissemination of effective self-guided care for early detection and control measures. This could be achieved in 3 steps:

1. Ramp up education campaign to relieve public fear and anxiety with special emphasis on risk perception and the key differences between the current circulating Omicron variant and the original COVID variant that started the pandemic. In doing so, death due to specific causes from other medical problems should be provided for public awareness of excess deaths from chronic disease which could be reduced via risk factors modification and control measures.
2. Control “the epidemic of misinformation” from social media by establishing One Single Comprehensive and Authoritative Data Source for COVID-19 Outbreak for public use. Precise and authoritative definitions of COVID-19 cases and deaths should be communicated and used in data comparison.
3. Revise protocols for prophylactic treatment, stock antiviral drugs, teach basic self-care, and reduce public resistance of COVID-specific restriction.

On the long run, the country should continue support innovative surveillance and screening research, as well as pharmaceutical R&D following an adaptive multistage policy which include:

- Emergency Use Authorization (EUA) for rapid Point of Care Tests such as the NAAT-POCT
- Increase production and stockpile the oral antiviral Paxlovid. In the randomized intervention trial supporting the EUA, Paxlovid was shown to reduce hospitalizations and deaths by 88% amongst those who tested positive for COVID-19 and are at high risk for severe outcomes (<https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-first-oral-antiviral-treatment-covid-19>) (<https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-first-oral-antiviral-treatment-covid-19>, n.d.).
- Support new vaccine development.
- Support COVID research through data sharing, including contact tracing data. Research areas should include how to reduce the socio-economic impacts of the COVID-19 pandemic and ensuing lockdowns.

In dealing with this once a century pandemic, the difficulties faced by our Chinese colleagues is unprecedented. In adherence to the zero COVID policy, the enormous resources and effort devoted to implementing mass PCR testing and stringent quarantine measures to hundreds of millions of people for early detection and control has also no precedent in contemporary public health response to any epidemics. We salute the public and medical health professionals in China and the world should stand in their support. Throughout this COVID19 pandemic, health professionals and scientists throughout the world often experienced push back from politicians who decided on policy that

also reflect their value-based constituents. We are cognizant of political pressure that may ensure on those who propose a policy change in China. Yet, difficult as it may seem, the middle option#2 represents the best path forward, as preponderance of the scientific evidence now indicates that covid19 will be around the world for a long time. China should not be closed forever.

Declaration of Competing Interest

Dr. Liu reports consulting payments and honoraria or promises of the same for scientific presentations or reviews at numerous venues, including but not limited to Barilla, Johns Hopkins University, Fred Hutchinson Cancer Center, Harvard University, University of Buffalo, Guangdong General Hospital, Fuwai Hospital, and Chinese Academy of Medical Sciences, and the National Institutes of Health. He is also a member of the Data Safety and Monitoring Board for several trials, including the SELECT Trial -Semaglutide Effects on Cardiovascular Outcomes in People With Overweight or Obesity sponsored by Novo Nordisk and a trial of pulmonary hypertension in diabetes patients sponsored by at Massachusetts General Hospital. He receives royalties from UpToDate. Dr. Liu receives an honorarium from the American Society for Nutrition for his duties as Associate Editor.

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