



An alternative approach—combination of lockdown and open in fighting COVID-19 pandemics

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Received: 27 April 2022 / Accepted: 29 September 2022 / Published online: 14 October 2022

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Abstract

As the COVID-19 pandemic enters its third year and the omicron variant becomes dominant, we propose an alternative strategy for dealing with COVID-19, called hybrid lockdown, that is, the combination of lockdown (the centralized and organized lockdown of the high-risk population) and free mobility (normal mobility) of the low-risk population. Such an approach will enable a country or region, especially with a high population density, to achieve significant prevention and control the effects of the COVID-19 pandemic at the least cost.

Keywords COVID-19 · Lockdown · Omicron · Open · Pandemic

As the COVID-19 pandemic enters the third year and the omicron variant becomes dominant, the strategies for dealing with COVID-19 among countries worldwide have become much more diverse (Madhi et al. 2022). While some countries have completely reopened (Zhou et al. 2022; Strain et al. 2022), China and others are still locking down

populations in the millions in their cities (Chan et al. 2020; Zhuang 2022). These measures and policies are based on different situations, economic considerations, and health and medical resources; neither is perfect. Thus, it is a choice between a harmful impact on the economy or loss of lives.

Currently, a tactic taken in China and other countries and regions is also facing challenges. The approach is a limited or partial lockdown based on the timely and accurate epidemic data pinpointing every infected individual or virus carrier. Screening of the population also changed from “full” to “regional/district” populations (Ma et al. 2022). However, countries and regions utilizing this method are losing their battle with the omicron because of its infection power and the many non-symptom carriers. In this case, to prevent high mortality in a country or region, especially confronting the issues of large cities with dense populations, the dynamic lockdown has to continue as long as the COVID-19 pandemic exists, with a lasting detrimental impact on the economy and society.

We propose an alternative approach, called lockdown (the centralized or decentralized but organized lockdown of the high-risk population) and free open (opening the rest of the population with caution) combination. Figure 1 illustrates the screening procedure for such a strategy. The idea is to gather all the people at high risk in a manageable centralized facility or relatively concentrated in a few locations—the application of a complete lockdown for people in these facilities while providing necessary services for living. At the same time, the remaining population is open. The lockdown

Responsible Editor: Philippe Garrigues

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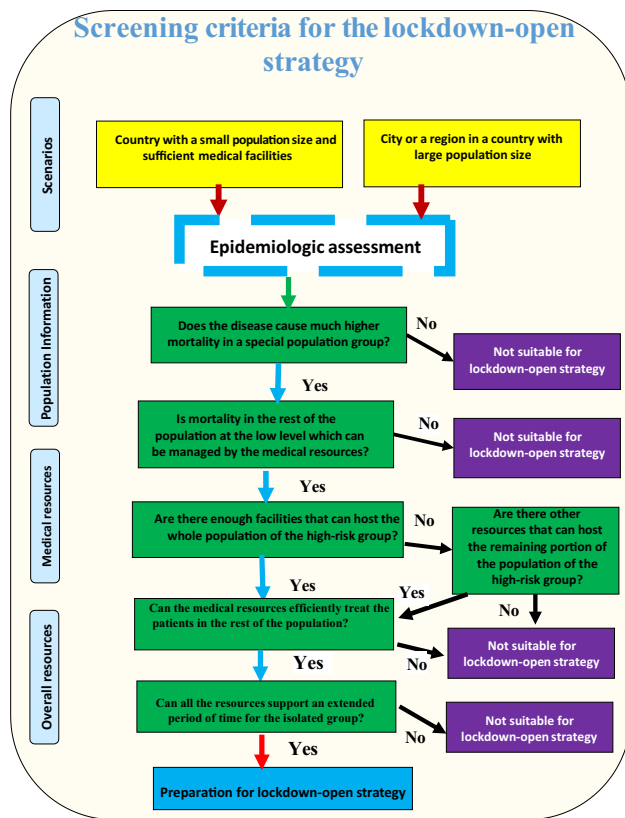


Fig. 1 The schematic figure for screening for the hybrid lockdown and open approach. Countries with a small population size refer to the country population concentrated in one major city or region. A city or region with a large population size means that the population in one city or region can be organized and act together to take the hybrid approach without affecting other cities or regions. Whether a country's or region's population should utilize the hybrid approach will be determined by multiple factors. A centralized evaluation and organizational headquarters in a country, region, or city for such an approach are essential

for isolation of the high-risk group will end when the outside population reaches population immunity.

The major conditions for taking such an alternative approach are as follows: (1) the death rate is high in one age group or a particular group/s while it is low in the rest of the age groups or population; (2) if the pandemic reaches the maximum in the rest of the population, there will be medical resources available to treat the patients in need; (3) the government or/and the society has enough resources to provide isolated groups with enough materials for living and activities for a relatively long period, e.g., until the pandemic is over in the rest of the population; (4) after recovering from the disease infection, the individual does not pose the capability of infecting others; and (5) there is support from the government, politicians, and society.

Such an approach will enable a country or a region, especially where the population density is high (Yin et al. 2021),

to achieve significant prevention and control the effects of the COVID-19 pandemic at the least cost. The major costs are (1) the expenses of isolating the high-risk age group, (2) the illness among the remaining population and the potentially small number of deaths, and (3) the medical and social resources for dealing with the pandemic in the remaining population. The benefits are (1) the populations at risk are efficiently protected; (2) the level of population immunity is reached; (3) economic activities are nearly unaffected, as most sick populations do not or are less likely to participate in economic activities; (4) the costs for large-scale population screening and disinfection measures are saved (Gu et al. 2021); and (5) last and most importantly, the pandemic will end, at least for a time before other infectious diseases or new variants occur.

The current situation in Hong Kong may be suitable to test such an approach. (1) Although the death rate of the whole infected population is around 0.5%, 80% of the deaths are among aged people with chronic disease conditions (Hong Kong press release 2022). (2) Less than half of the population testing positive or infected are asymptomatic cases. (3) The known affected population reached more than 100,000 and went to 200,000. With the high transmissibility of omicron and a large number of undiscovered and asymptomatic cases, it is impossible to eliminate the transmission of COVID-19 among the Hong Kong population. (4) The approximately 20,000 hospital beds in local medical facilities and community isolation facilities supported by the mainland which can provide about 20,000 isolation beds and can be used for the patients among the rest of the population. Considering the total population of 7 million, if the number of people who need healthcare in the ICU among the rest of the population is less than 0.1%, these facilities are adequate for these patients [Hong Kong press release, 2022]. (5) Designated governmental buildings and facilities in Hong Kong can be used for hosting isolated groups. According to the World Bank (<https://data.worldbank.org/indicator/SH.MED.BEDS.ZS>), Hong Kong hospitals have approximately 4.9 beds per 1000 people. Thus, Hong Kong is estimated to have a total of 36,200 beds. Not all these beds can be used to host COVID-19 patients, but these facilities will be good resources for successfully practicing the hybrid approach.

It is essential to realize that the lockdown measure aims to protect as many people at high risk as possible, but it is not necessary to isolate everyone among the high-risk groups. Whether a person should be isolated depends on several key factors:

1. How to define a person in the high-risk population depends on factors such as age and health conditions.
2. Whether a person must be isolated, i.e., does the person's current living conditions support isolation?
3. Whether the person is willing to be isolated.

Alternatively, a country such as Israel, with relatively small population sizes and high-quality medical facilities [Skorecki et al. 2017], may be able to test such an approach. In countries with large populations, testing such an approach can be conducted in regions or cities. With support from the central government and society, such a test can be done relatively quickly in a region or country. Where the population density is low, funding and other support are essential for the self-isolated people to live during the entire period of reopening for the rest of the population.

Dynamically utilizing such a combination of lockdown and open strategy or similar methodologies may be a solution or realistic way to combat the highly transmissible variants of COVID-19 or similar infectious diseases. However, there are limitations in the utilization of such an approach. The first one is the complexity of the pandemic of COVID-19. For example, a mutation with much more severe cause may occur during a pandemic. The new mutation may lead to a much more powerful infection and the capability to infect young people. Thus, monitoring the virus variation and pandemic patterns is essential for the success of such a hybrid approach. Secondly, there is a great range of medical resources, social and economic systems, and capabilities among different countries and regions. This approach may not be suitable for every place. Furthermore, isolation of a population at high risk may also bring social and economic issues; family members may not be willing to follow such an approach. Therefore, careful consideration and adjustment should be made with individual countries or regions to improve their capacity to fight a highly infectious disease such as COVID-19.

Different mathematical models have been published to stimulate the results from a variety of fighting strategies for the COVID-19 pandemic, such as school lockdown with different open hours (Lazebnik et al. 2021), effectiveness of global COVID-19 vaccination (He et al. 2022), and transmission dynamics (Althouse et al. 2020). These models may be utilized for the prediction of mortalities and scale of pandemics among non-locked populations (Wang et al. 2020).

Authors' contributions LY, WG, and JCG conceived and designed the project and prepared, revised, and approved the manuscript. LA and EG revised and approved the manuscript. The authors read and approved the final manuscript.

Funding This work was partially supported by funding from the University of Tennessee Health Science Center (R073290109) to WG in Memphis, TN, USA, and grant 90DDUC0058 to CG from the US Department of Health and Human Services, Administration for Community Living. The funders had no role in the study's design; the collection, analysis, or interpretation of the data; the writing of the manuscript; or the decision to publish the results.

Data availability All the data are available in the public databases as provided in the manuscript.

Declarations

Ethics approval and consent to participate Not applicable.

Consent for publication Not applicable.

Competing interests The authors declare that they have no competing interests.

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