

Targeted Prevention of COVID-19, a Strategy to Focus on Protecting Potential Victims, Instead of Focusing on Viral Transmission

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Abstract: The lockdown strategy used to prevent the spread of COVID-19 (coronavirus disease 2019) has disrupted the global economy. Some countries have started reopening their economies under the threat of a second wave because studies show that only 4% of the population is infected so far and more waves will be needed to achieve herd immunity. Lockdowns have been used with a primary purpose of regulating the demand for healthcare while ignoring the economic consequences. Contrary to the lockdown strategy, some countries such as Brazil have given priority to their economy leading to very high infection and mortality rates. After a first wave of the pandemic, we now know something critically important—those who are likely to become seriously ill and potentially die if SARS-CoV-2 infection is not prevented. That information cannot be ignored in our strategy and is used to control the pandemic. The paper proposes to focus on managing the risk of the virus being transmitted to the vulnerable rather than focusing on controlling all who can potentially transmit it. It argues that only 4% of the global population is at high risk of severe COVID-19 and would require hospital admission if infected. We propose to target this 4% of the population for preventive efforts. Protecting the vulnerable via lockdowns and other measures will be more effective and efficient than locking down the entire population and destroying their economies that are equally critical to life. We hypothesize that such “targeted prevention” strategies are more likely to help achieve our goals: 1) reduce mortality by preventing the infection reaching its potential victims, 2) spend the resources efficiently by knowing the “target” of our preventive efforts, and 3) achieve effective and efficient control of the pandemic without causing disruption to the socio-economic activities until an effective vaccine is available.

Keywords: COVID-19, lockdown, targeted prevention, infection control, SARS-CoV-2, coronavirus

Introduction

Some countries have already been through the first wave (eg, Spain) of SARS-CoV-2 infection-causing COVID-19 (Coronavirus Disease 2019) while others are hoping for the first wave to end soon (eg, the U.S.A.). The infection control strategy used has been “untargeted” because it placed the entire population on a socio-economic lockdown with freedom-deprivation measures including travel bans, flight cancellations between countries, and business closure. Governments are doing what they can to control the pandemic while their economies are crippled including the shutdown of globally inter-dependent supply chains and plummeting

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stock markets with millions of people losing their jobs. These are some examples of how this strategy has “shaken” the socio-economic pillars of the society that sustain the same lives that the lockdown is supposed to save.

The World Bank has forecasted a 5.2% contraction in global GDP in 2020.¹ In fact, the direct economic loss caused by the lockdown—coupled with public spending in unemployment payments, bailout of major corporations such as airline companies, compensation and stimulus packages for small and medium enterprises among other measures—might reduce resource availability for health-care in the future, which in turn might lead to the loss of more lives in some countries.² However, despite all of these strict control measures and economic sacrifices by their populations, about a half a million lives across the globe have already been lost, and new cases are still surging on a global scale.³

One study estimated that the lockdown may have averted 3.1 million deaths from COVID-19 across 11 European countries. This same work suggests that the risk of a second wave is real when lockdown measures are lifted.⁴ This study points out that countries are very far from achieving herd immunity because the first wave has infected fewer than 4% of their populations. In other words, there is a risk of losing the lives that were saved in the earlier lockdown if a new wave is not controlled again through another lockdown. What the lockdowns may have done is simply delayed deaths in the absence of vaccination. Can countries really afford more lockdowns? Can a tourism-based economy such as Spain, which may have already suffered a contraction of 12.8% of its GDP⁵ afford a new lockdown?

During the initial exposure, governments did not have all the required scientific data when the lockdown measures cascaded into their countries due to travel restrictions enforced across borders. Now that we have morbimortality data related to COVID-19, we can plan an alternative strategy before the second wave. The first experience has shown that the lockdown strategy is not meant to prevent the spread of COVID-19 permanently in the absence of an effective vaccine. Indeed, herd immunity cannot be achieved unless we perpetuate lockdowns, which is unviable from both a social and economic standpoint. Experience does show that lockdowns have played an effective primary role in regulating the demand for health services. The question to ask now is, “Can we flatten the demand curve and keep it within the health system capacity without destroying the economy until an effective vaccine is available?”

Some countries have gone to the other extreme via a diagonally opposite strategy based on protecting the economy at the cost of higher infection and mortality rates. For example, Brazil had just 50 cases of COVID-19 on 11 March 2020 but in just 63 days this reached 177,589 cases⁶ and 1,146,906 as of June 24, 2020, with 52,645 deaths.³ It is unimaginable how many more lives need to be lost for this strategy to take effect by creating the necessary herd immunity in its population.

This Paper Proposes a Middle Way: the strategy of “Targeted Prevention.” We hypothesize that it is possible to save lives by protecting the vulnerable as well as the economy. This will allow the productive population to work, consume, and sustain the economy. This methodology is a comparative literature review for different strategies, and the creation of a test scenario for estimating the percent of the vulnerable population that would have to be controlled to implement the proposed “Targeted Prevention” strategy that only governments can validate.

The Case for a “Targeted Prevention” Strategy

When COVID-19 began in Wuhan, their government acted decisively against their socio-economic system to contain the virus. Such a reaction was taken because nothing was known about the disease at first: how the virus spreads, its mortality rates, and who it kills. Although we still have some unanswered questions even after the Chinese Center for Disease Control had shared its data, we now know something very important about the virus—who it can potentially kill if infection is not prevented.⁷ Another study estimates that 1.7 billion people comprising 22% of the global population have at least one underlying condition that puts them at increased risk of severe COVID-19 if infected. One estimate suggests that 349 million people (4% of the global population) are at high risk of severe COVID-19 and would require hospital admission if infected.⁸ This information cannot be ignored in our strategy used to control the infection. Our prevention strategy design has to “guard” the potential victims but not the entire public.

Indeed, we also know that 80% of the population has mild symptoms and their lives are not at risk. Thus, our strategy is a “targeted prevention” on the remaining 20% of the population, which is where our 4% potential victims

are concentrated. Instead of focusing our efforts on the entire population—most of whom will not reach life-threatening conditions—we could focus our energy and resources on potential victims. We know that elderly people are the most at-risk (people of 70 years or above). We also know the mortality is high in patients with comorbidity conditions such as cardiovascular diseases, hypertension, diabetes, and in patients who are immunosuppressed. We also know that children are at less risk because there was not a single death in children below 10 years of age in the Chinese data.⁷

A recent study conducted in Europe showed that children can indeed be infected by SARS-CoV-2 causing COVID-19.⁹ The study showed that 19 out of 21 children and adolescents (range 3.7–16.6 years of age) admitted in hospitals with features of Kawasaki disease tested positive for IgG antibody for SARS-CoV-2, but all of them were safely discharged after an average of 8 days (range 5–17). Another study evaluated 48 children admitted in the PICU (Pediatric Intensive Care Unit) in the US and Canada and showed that SARS-CoV-2 can cause severe illness in children, but the mortality was found to be far less frequent compared to adults (2 deaths). This work concluded that the important cause of COVID-19 in children was also found to be prehospital comorbidity¹⁰ due to possible specific congenital background.

It is paradoxical that in our lockdown strategy, we let our elderly die, often alone, in nursing homes and residences because we did not have a plan to protect them by providing additional staff or personal protective equipment for the workers there. Nor did we perform sufficient tests or treatment efforts for vulnerable groups. Rather, we spent energy and resources in preventing people from leaving their homes! If we had designed a “Targeted Prevention” strategy to quarantine our elderly and others with comorbid conditions of all age groups, then we might be able to let non-vulnerable individuals to do business as usual. Contact tracing is not possible in community spread—especially if 80% of cases are asymptomatic. Rather, we should focus our efforts on isolating and controlling the vulnerable population; this can prevent them from getting ill using strict preventive protocols.

Creation of a Scenario for the “Targeted Prevention” Strategy

To develop this new “Targeted Prevention” strategy, a possible scenario was created with real data to estimate how many people need to be controlled if only the vulnerable population is considered. Data from Catalonia region of Spain with

a population of 7.5 M people were used. The population was classified into two hypothetical groups: 1) a non-vulnerable group that would be expected to transmit the virus without getting sick enough to be hospitalized, and 2) a vulnerable group that might develop COVID-19 including some who might require intensive care; the potential mortality lies within this group. Demographic and healthcare databases¹¹ available in Catalonia were used to identify how many people are really vulnerable to developing serious COVID-19 requiring hospitalization if infected with SARS-CoV-2 based on two criteria: 1) vulnerable age and 2) vulnerable comorbidity conditions. The total number of potentially vulnerable people present in the region was estimated based on vulnerable age groups and on the prevalence of patients with heart disease and respiratory disorders, patients under cancer treatment and other immune-suppressed conditions, and patients with uncontrolled hypertension and diabetes.^{7,11-15} Data on these criteria overlapped to a certain extent, and total vulnerable population was graphically represented for all criteria (Figure 1).

Although the existing literature is inconclusive for children with some comorbid conditions such as asthma,¹⁶ for precautions, they were also considered to be part of the vulnerable population. However, data are unavailable in the literature related to any specific congenital background that may be causing COVID-19 with features of Kawasaki disease. Vulnerable populations at risk of getting COVID-19 using the age criterion was estimated to be 1,099,000. The population under vulnerable comorbidity conditions below 70 years of age was 650,000 approximately. This meant that the total target number was 1,749,000 in a regional total population of 7,500,000, which is 23% of the total population of Catalonia. This percentage coincides with an independent global study⁸ in which 22% of the global population was estimated to be vulnerable of getting COVID-19.

To implement “Targeted Prevention” strategy for the vulnerable group, the authorities need to develop and update their evidence-based guidelines for a surveillance program as more and more scientific data become available on the natural history of COVID-19. The following are examples of items on such a surveillance program:

- Identify individuals that belong to this group (in Catalonian health database—all of them can be traced with legally required data protection).
- Implement strict social distancing and travel restrictions without restricting physical exercise and family interactions as long as obligatory social distancing can be monitored.

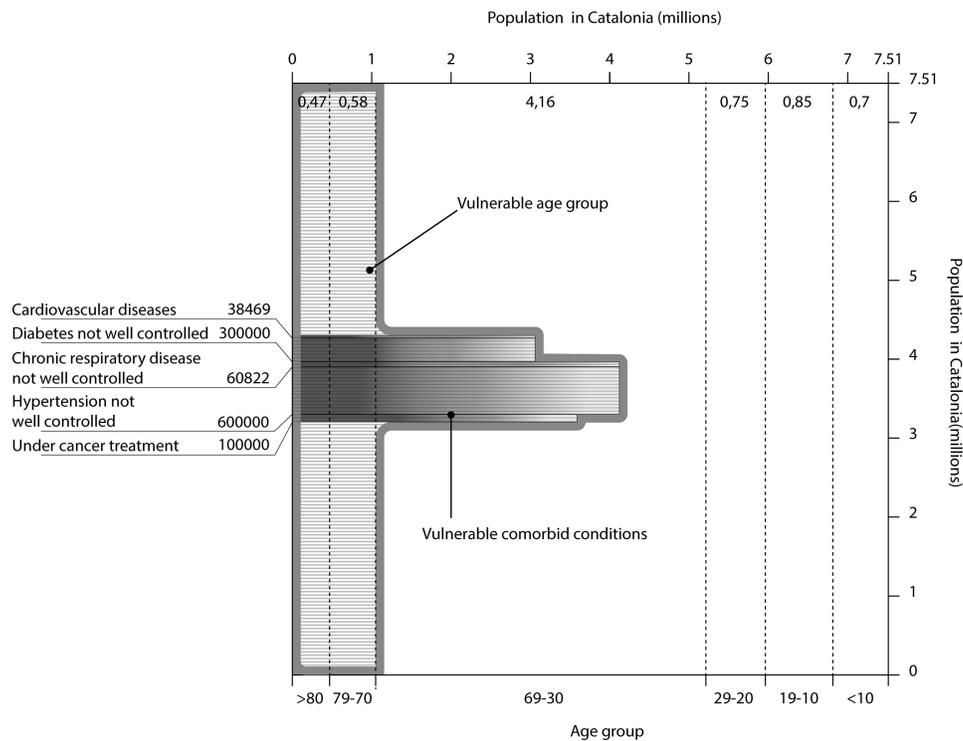


Figure 1 Population that needs to be controlled under "Targeted Prevention".

- Cancel events specifically designed for the elderly if necessary depending on cluster locations.
- Test this group frequently, contact trace, isolate, and treat as needed.
- Consider issuing n95 masks to protect them when they must mix with the non-vulnerable population (eg, during family visits).
- Restrict travel for the elderly if social distancing cannot be respected (flights, trains, ...).
- Provide health advisory specific to each comorbid condition including weight control. Proactive medical checkups for people above age 70 and especially patients with comorbid conditions to check and ensure adherence to treatments. The risk of becoming seriously ill with COVID-19 may be controlled if the underlying comorbid condition is proactively improved through treatments.
- When vaccines against SARS-CoV-2 become available, they will be most indicated for this group and should be given maximum priority.
- Outsiders interacting with the vulnerable group must follow strict social distancing, mask use, and hand hygiene.
- Healthcare and social workers including employees of nursing homes and residences and other frontline

workers such as police, supermarket employees, cleaning staff, public transport employees, among others, need to be protected to minimize the absenteeism that the virus may cause even if their lives may not be at risk due to age and comorbidity criteria. All frontline workers need to be provided with n95, n99, or n100 masks (and other personal protective equipment as needed) depending on the tasks performed and in accordance with the updated recommendations of the scientific community such as CDC (Center for Disease Control), U.S.A.¹⁷ If any of these comply with the age or comorbidity criterion to belong to the vulnerable group, then obviously they should be relieved from their responsibilities and be included in the vulnerable group.

Hypothetically, several benefits can be expected if this strategy is implemented and governments need to validate them. This Targeted Prevention strategy has the potential to be more effective (fewer cases and mortality), more efficient (fewer resources for infection prevention), and less disruptive to our economies:

Effectiveness of Control

The strategy applies surveillance on the vulnerable group, and it has the potential to 1) protect the vulnerable from

SARS-CoV-2 infection, and 2) increase their survival rate if they do contract the virus because their comorbid conditions are controlled/improved through proactive medical visits. The 4% of the population under risk⁸ of becoming seriously ill is within this vulnerable group and will be targeted for surveillance. Therefore, this strategy is proactive and can reduce overall cases and case mortality versus a lockdown strategy where people go to hospital when they are already infected or have symptoms of COVID-19.

Efficiency of Control

While a lockdown would indiscriminately control 100% of the population with correspondingly grave economic consequences, the “Targeted Prevention” strategy would reduce that to mere 23% of the population. The target group comprises citizens who are probable “frequent users” of the health system because of their age and comorbid conditions, which means that it is more efficient to establish surveillance on them using the primary health-care network, social workers, and NGOs (non-governmental organization) depending on the country and its health system. In addition, proactive testing is economically viable (only 4–10% of the population may need it versus testing the entire country). Even when an effective vaccine is available, it may not be viable to vaccinate the entire population of the whole planet within next few years; however, the vaccine will be most indicated for this group who has been readily identified. These targeted approaches should not only reduce resources needed but also spend them where they are most needed.

Minimal Disruption of the Productive Economy

Most people in the vulnerable group are retired, and therefore there will be minimal disruption to the society if they are under surveillance or lockdown. The most productive workforce will be in the non-vulnerable group, which is 77% of the population—this group can continue to actively participate in the productive economy because they have a very low risk of becoming ill with COVID-19. They can perform social distancing when possible, use masks when social distancing is not possible, and use frequent hand hygiene. If such recommendations are not followed, then they may contract the SARS-CoV-2 virus and increase absenteeism, but this will not disrupt the economy. If they contract the virus, they will contribute toward achieving herd immunity, as the chances of them

becoming seriously ill with COVID-19 are very low. In any case, if they interact with people in the vulnerable group such as their parents, grandparents, etc., then they need to comply with strict social distancing, mask use, and hand hygiene.

According to this strategy, once the target population is identified and the prevention measures are designed, the non-vulnerable group is free to carry on with their societal duties with only recommendations of social distancing, masks when social distancing is not possible, and hand hygiene. Employees need to be encouraged to take time off from work if they are not feeling well and to receive medical advice as needed. People can travel and enjoy freedom as before the pandemic. In this strategy, even schools can reopen (so parents can go to work), but school administrations can be empowered to decide depending on possible clusters and risks. Obviously, children with comorbid conditions will be added to the vulnerable group, and they will have to have home-based study programs and protected using special surveillance.

Conclusion

Lockdown measures have been effective in slowing down infection rates and creating waves that regulate the demand for health services. Lockdown can keep the demand within the capacity of the health system if well planned. However, this strategy has had many limitations versus the proposed Targeted Prevention strategy. The effectiveness of lockdown in mortality reduction may be temporary because the lives it saves in one wave may be lost in another subsequent wave if lockdown measures are not perpetuated. A single infectious wave causes such a serious damage to the economy that more lockdowns may not be economically viable for most countries. The lockdown approach does not consider the scientific knowledge available about the virus and its target population. It causes panic, disrupts socio-economic activities, and forces quarantine of entire populations.

If we target our preventive measures on minimizing the risk of the vulnerable population becoming infected and on proactively maximizing control of their comorbid conditions before they get infected, then the prevention may lead to less cases among the vulnerable and therefore potentially lower mortality rates.

In the Catalonia example (controlling 23% of the population), the pandemic can be managed until vaccine is available for all. This study lays the foundation for a “Targeted Prevention” strategy and urges governments

to come forward to test and validate them. With this strategy, governments are likely to achieve all three goals that they are fighting for: 1) minimize the viral transmission on the vulnerable and potentially reduce the mortality; 2) maximize the efficiency in use of resources because only 23% of the population is using the resources—this facilitates contact tracing, testing, and prevention of the infection; and 3) minimize the disruptions so most of the productive population can continue their role in the economy leading to a sustainable economy and social well-being.

Disclosure

The author reports no conflicts of interest for this work.

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