

The limitation of the expert: the case of COVID-19 pandemic

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Abstract: The US response to the COVID-19 pandemic is a failure in terms of the number of deaths and the economic losses. The primary reason for the failure is the failure of the system strategy of flattening the curve or social distancing. This failure is just one example of the limitation of the expert. We need an exception handling mechanism. The remedy is to back up to the fundamental level and think over the system from first principles.

It has been over a year since the outbreak of the COVID-19 pandemic. The US response to the COVID-19 pandemic is a failure in terms of the number of deaths and the economic losses. The number of deaths is over 500,000 and the US population death rate is about 0.15%, among the highest in major countries along with UK, Italy, Spain, France, Mexico, and Brazil.[1] For comparison, there are about 100 countries with the pandemic under control with a population death rate less than 0.01%. The US economic losses are on the order of \$1 trillion. The essence to reduce the economic losses is to end the pandemic as soon as possible. The US also leads the world in the number of confirmed cases, but this number will not be used as a criterion for the performance of the COVID-19 response due to the differences in testing and the large proportion of asymptomatic cases. In particular, the case-fatality ratio changes drastically in the population, and the case number does not reflect the degree of damage of the pandemic. The number of confirmed cases will be a reference parameter but not a control parameter.

What is the cause of the US failure? Some blame partisan politics. However, if we check the performance of various states, we do not see a significant difference among Republican states and Democratic states. Some blame people for not wearing a face mask. Wearing a face mask does significantly reduce the chance of infection for brief occasional exposure, but its effectiveness decreases with longer exposure, and a false sense of safety may not serve its intended purpose. If we check the data of states with mandatory face mask policy and states without such a policy, we cannot find any significant difference in population death rates.

I will show that the primary reason for the failure is the system strategy of flattening the curve or social distancing. Table 1 is the estimates of different COVID-19 strategies for the US that I predicted in April 2020 and are reasonably verified by data today.[1] The estimates are valid only if the characteristics of the coronavirus remain substantially

unchanged. We can clearly see that the flattening the curve strategy is the worst option in terms of the number of deaths and the time duration of the pandemic. We could have ended the pandemic in about two months by other strategies.

Table 1 Estimates of different COVID-19 strategies for the US

Strategy	Population death rate	Number of deaths	Time (month)
Quarantine	<0.001%	<3,000	~2
Reverse quarantine	0.002%–0.02%	6,000–60,000	~2
Lockdown	0.0001%–0.02%	300–60,000	~2
Doing nothing	~0.03%	~100,000	~2
Herd immunity	0.05%–0.1%	150,000–300,000	~2
Flattening the curve	0.2%–0.3%	600,000–1,000,000	~24

Quarantine is the traditional strategy to fight a pandemic, and it can be cost-effective at the initial stage. Examples of this strategy include Taiwan, Singapore, Vietnam, South Korea, Thailand, and Japan. A well-executed quarantine strategy can achieve a population death rate below 0.001%. A higher death rate means the strategy may have failed in some local areas, such as the case of Japan.

When the virus is widespread, the quarantine strategy has failed. A more effective strategy is reverse quarantine, or isolating and protecting the uninfected.[2,3] The reverse quarantine strategy has been used by some people since ancient time, for example by Isaac Newton in 1665. What makes reverse quarantine an effective strategy for COVID-19 is a characteristic of the coronavirus that most deaths are people with preexisting conditions. By isolating the small number of people with preexisting conditions (mostly the elderly), the population death rate can be drastically reduced to a level comparable to other everyday risks like choking, falling, and car accidents. In reverse quarantine, people are voluntarily divided into two groups, a normal group and a reverse quarantine group. People in the normal group have a normal life, and businesses stay open as they wish. The coronavirus will run its natural course in the normal group, and in about two months the coronavirus will no longer be able to find a host to sustain the infection process. Since we cannot pinpoint the 1.7% of people who would die, at least 10% of the people should be in reverse quarantine. The more people in reverse quarantine, the better the result.

The lockdown strategy is the highest level of isolation. Countries adopting this strategy include China, New Zealand, and Australia, with a population death rate of 0.0003%, 0.0005%, and 0.0035% respectively.

Doing nothing is a hypothetical strategy. If the presence of the coronavirus were unknown, the population death rate would have been 1.7%, or a death number of 5 million people in the United States. When people are informed of the coronavirus, people will take spontaneous reverse quarantine. The result will be not far from a guided reverse quarantine strategy. One can find some examples of approximation with lax government intervention. Cambodia has zero reported deaths. Nigeria has a reported population death rate of 0.0008%. As a worst-case scenario, the slum area in Mumbai, India, has achieved herd immunity with a population death rate less than 0.05%.[4] The data from these regions may not be very accurate, and we also need some adjustments for different demographic and urban conditions, but the data gives us a general picture of the idea. For example, Cambodia and Nigeria have a much younger population than the US.

The herd immunity strategy is supported by some epidemiologists but criticized by many experts. The doing nothing strategy and herd immunity strategy are variants of the reverse quarantine strategy since people are divided into two groups: a normal group and a protection group. The difference is the proportion of the two groups. The reverse quarantine strategy has the minimum size of the normal group, and it does not strive for herd immunity. The herd immunity strategy has the maximum size of the normal group. The population death rates in some slum areas are in agreement with the range of prediction.[4]

The flattening the curve strategy is to reduce the spread of infections through social distancing so that the number of patients is below the hospital capacity. From the perspective of public health experts, this makes perfect sense. In fact, the US government experts have been working on the strategy since 2005 and the last update was finalized in 2017.[5] Despite some glitches, the strategy has been successfully implemented, and hospital overrun has seldom happened. Therefore, the failure is not a failure of implementation but a failure of strategy. From a system perspective, the very measure meant to reduce the spread of infections creates a condition for persistent exposure of the vulnerable to the coronavirus and hence the high number of deaths. If the measure is more restrictive, it will stop the spread of the coronavirus. If the measure is more lax, the coronavirus will finish the spread quickly.

Only from a system perspective can one realize the problem of the flattening the curve strategy. Fig. 1 shows the daily number of cases for some strategies. The natural course of the coronavirus epidemic will take about three months in a city. For the initial stage of about one month, there are only a small number of cases and the quarantine strategy is effective. Afterwards, we need to switch to other strategies. If one just looks at the immediate effects of the strategies, the reverse quarantine strategy has an exploding number of cases and also possibly a higher number of deaths in its first month, and the

lockdown strategy has more economic losses. For the reverse quarantine strategy, some patients may even die at home rather than dying in the hospital in the peak week. If one thinks through the whole cycle of the pandemic, the flattening the curve strategy has far more deaths and economic losses than other strategies. The number of deaths is mainly determined by the exposure of the vulnerable to the coronavirus.

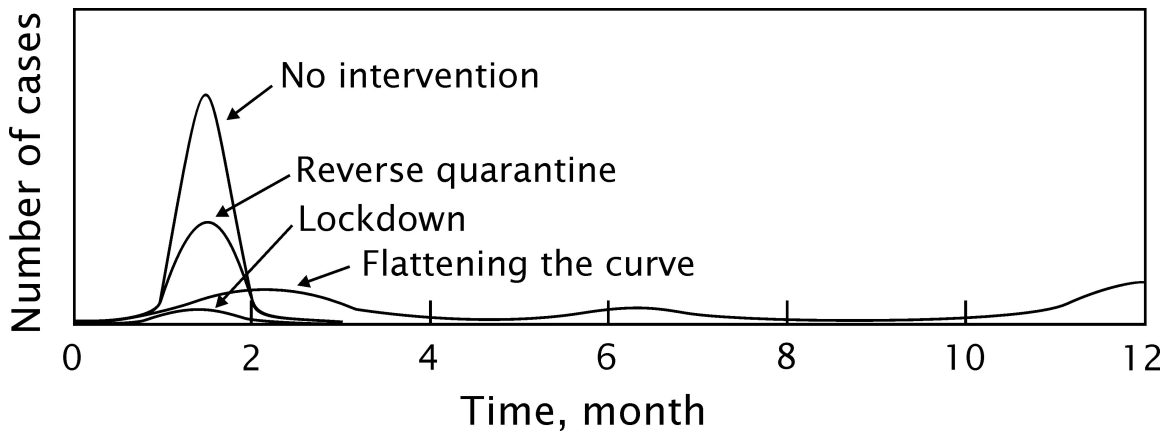


Fig.1 Schematic diagram of daily number of cases for different strategies.

A major system risk is the probability that the coronavirus may mutate to become deadly to kids and young people, as the Spanish flu did. A strategic consideration is to end the pandemic as soon as possible to avoid a more devastating consequence. In this sense, we cannot passively wait for the vaccination process. If the coronavirus makes a significant mutation in the waiting period, we may need to start all over again. It is better to treat vaccines as a tactical tool rather than a strategy.

The failure of the strategy is just one example of the limitation of the expert. It is not the fault of any individuals, but the limitation of the expert. As systems become more complicated, experts are more specialized in their narrow field. The system becomes protocols that experts follow, but few people have a deep understanding of the system as a whole. Experts may not be able to foresee a system failure, or even not realize what is wrong after a system failure. When experts make a system failure, we are stuck. The public may not necessarily know the exact cause but they know the consequences, as many people have died in the COVID-19 pandemic. There is a growing distrust of the expert. Individual experts may have done some excellent research in their field, but fragmented knowledge does not deliver the benefits to the public as a system.

We need an exception handling mechanism. The remedy is to back up to the fundamental level and think over the system from first principles. At the fundamental level, there are no experts but fundamental thinkers or system thinkers. At this level, a fundamental

thinker often has to use intuition, the highest form of intelligence. It is hard to evaluate something from intuition. Trust a fundamental thinker, as a fundamental thinker has the capacity to know what is right. Or one can set up the experiment or gather facts to settle the debate. Since a fundamental thinker figures out a system, he can discern small clues at an early stage.

In summary, the failure of the US response to the COVID-19 pandemic is a failure of the system strategy as a result of the limitation of the expert. We need an exception handling mechanism. The remedy is to back up to the fundamental level and think over the system from first principles.

References:

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