Comparing the American and South Korean testing approaches for controlling the spread of COVID-19

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Abstract

Background: Coronavirus disease 2019 (COVID-19) is a respiratory tract infection cause by a novel coronavirus. The outbreak started in Wuhan, China, in December 2019 and began to spread rapidly to more than 100 countries and territories. By March 11, the World Health Organization (WHO) had officially declared COVID-19 a pandemic.

Objective: To review the effectiveness of American and South Korean testing approaches of the COVID-19 plan.

Method: Daily reports of the USA's and South Korea's COVID-19 cases from February 15 to April 15, 2020 were examined. The outcome of interest was total number of cases and tests per one million population, daily cases reported, and percentage of recovered cases and case fatality rate (CFR). Data were analysed using Microsoft excel sheet and tables and figures generated.

Result: As of April 15 2020, USA's and South Korea's number of cases per million population are 1,946 and 207 cases, respectively. The daily American confirmed cases of COVID-19 had been increasing steadily from February 15 to April 15, 2020. Our study shows that South Korea and the USA recovered cases were 97% and 63%, respectively, while the case fatality rate in the USA was 37% and 3% in South Korea.

Conclusion: Despite its advanced health care systems, the USA is currently experiencing a devastating virus that has claimed many lives. This is because the USA has approached the outbreak differently. The evidence suggests that South Korea's aggressive testing has effectively managed to control the spread of COVID-19, it increases the recovered rate and reduced the CFR more than the USA's conservative testing approach. Although the South Korea health care system is not comparable to those in the developing countries, it worth mentioning that its plan would suit well these countries and should be adopted.

Keywords: USA, South Korea, Coronavirus, Testing, COVID-19

Introduction

Coronavirus disease 2019 (COVID-19) is a respiratory tract infection caused by a novel coronavirus. The outbreak started in December 2019, in Wuhan, China. The genetic sequencing of the virus suggests that it is a beta-coronavirus closely related to the Severe Acute Respiratory Syndrome (SARS) virus.[1] Since then, the virus has been spreading rapidly across the world. By March 11, 2020, the virus had reached more than 100 countries, which forced the World Health Organization (WHO) to officially declare COVID-19 a pandemic.[2] As of April 15, there were more than 1.9 million confirmed cases and more than 123,000 deaths reported worldwide. On that date, the USA had 578,268 confirmed cases and 23,476 deaths while South Korea had 10,591 confirmed cases and 225 deaths reported.[3]
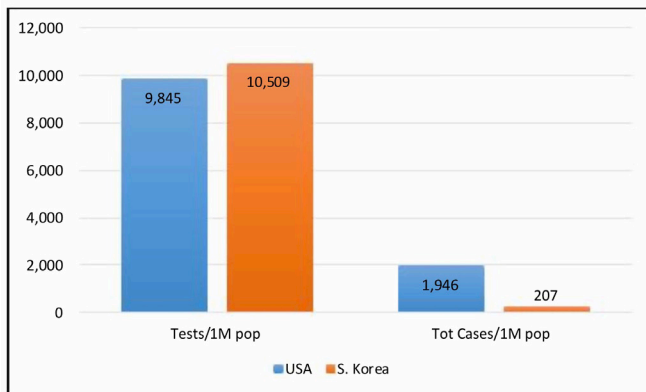
Figure 1. USA and South Korea. Total number of cases and tests per 1 million population [6,9]
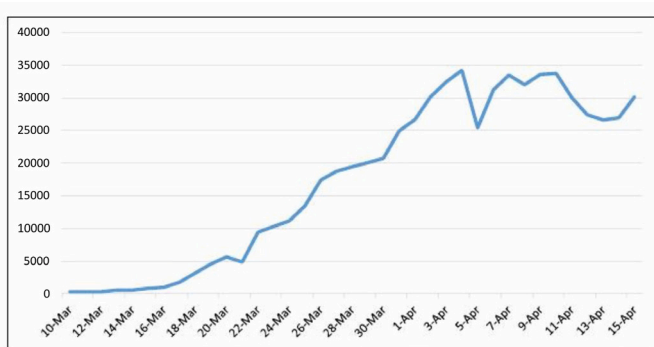

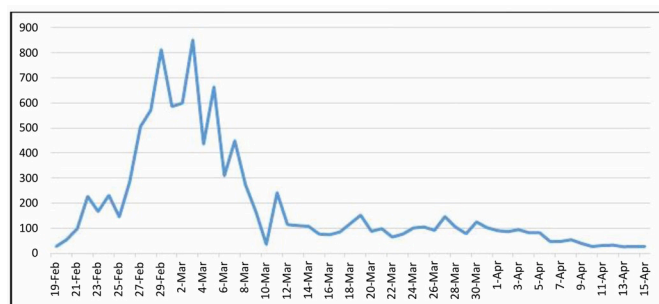*Figure 2. United States of America daily cases of Coronavirus [9]*

Figure 3. South Korea daily cases of Coronavirus [6]
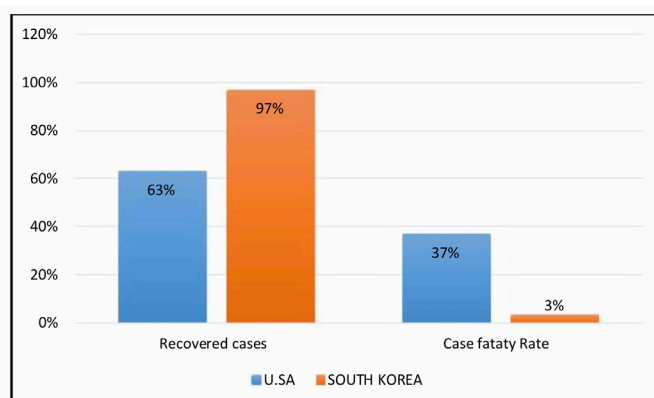

Figure 4. Percentage recovery rate and case fatality rate in USA and South Korea [6,9]

Recent observation studies have shown that while the majority of COVID-19 patients have mild symptoms (81%) that don't require hospital admission, some developed severe symptoms that required hospitalization (19%). Out of those admitted, 14% were seriously ill and required oxygen therapy; 5% of the critically ill patients needed admission to an intensive care unit. Of those sick critically, most required mechanically assisted ventilation. Furthermore, those with mild symptoms did not require hospital admission unless they developed breathing difficulties or conditions that urgently need medical attention.[4, 5]

For the purpose of this review, the USA approach is defined as the conservative testing approach which restricts the testing of coronavirus to those who meet the Centers for Disease Control and Prevention (CDC) guidelines, namely seriously ill patients that require hospitalization; adults with underlying chronic medical conditions such as cardiovascular, respiratory disease, and asthma, and immunocompromised patients. The Korean approach is defined as the aggressive testing approach where every suspected case of coronavirus regardless of severity of disease or underlying medical conditions is tested.

Most studies published since the onset of this outbreak focused mainly on the characteristics, pathophysiology, mode of transmission, and management of COVID-19. Some focused on public health measures such as social distancing, self-quarantine, and containment. However, none have reviewed the effectiveness of South Korea's aggressive testing and USA's conservative testing. The next wave of the outbreak is already happening in developing countries where the health care systems are fragile. Hence, it appears that an outbreak that has overwhelmed the best health care systems in developed countries such as the USA, United Kingdom, Italy, Spain, and France, will have devastating effects on developing nations. Therefore, learning from the experience of other countries that flattened their disease curves early is essential. This study aims to review the effectiveness of South Korea's aggressive and the USA's conservative testing approach and recommend the best approach appropriate for adoption in developing countries.

Ethical consideration

Our review is a secondary data analysis from the WHO daily reports on the COVID-19 pandemic. The datasets used for this review are publicly available.

Method

We reviewed the World Health Organization's COVID-19 daily reports from the USA and South Korea published online from February 15 to April 15. Our review focused mainly on the total (number of cases and tests) per 1 million population, daily cases reported, the percentage

of recovered cases and the case fatality rate (CFR). The percentage of recovered cases and CFR were computed by dividing the number of recovered cases by the total number of recovered cases and deaths respectively, by the total number of closed cases. Data were analysed using Microsoft excel sheet and tables to generate figures.

Results

Figure 1 shows the total number of cases and tests per one million of the population; Figures 2 and 3 graphs the number of USA and South Korean daily confirmed cases from 10 March until 15 April, and Figure 4 compares the percentage recovery rate and case fatality rate in the two countries.

Discussion

As of April 15, 2020, in USA and South Korea, the number of cases per million population was 1,946 and 207 cases, respectively (see Figure 1). Although the health care institutions and population age distribution in both countries are comparable, the number of USA cases per million are more than nine times those of South Korea. South Korea and the USA confirmed their first case on January 19 and 20, respectively, so the only possible differences between the two countries are the way each approached the outbreak. For example, the USA's efforts have been significantly affected by a shortage of COVID-19 testing kits. These shortages have forced the United States health authorities to restrict the COVID-19 testing for seriously ill patients that require admission and patients with underline chronic conditions, namely diabetes, cardiovascular diseases, hypertension, asthma, and respiratory disease, as well as immunocompromised patients.

By adopting this conservative testing, the USA has focused mainly on 19% of patients who were seriously ill and needed hospital admission. Therefore, there is a possibility that 81% of asymptomatic and mild symptom patients have been spreading the infection in the community, especially before introducing public health measures of social distancing, prohibiting public gathering, and total lockdown in some cities. This conservative testing approach left many mild and moderately ill people spreading the infection more rapidly. These may explain the reason behind steady increases in many new cases in the USA since March (see Figure 2) or they had not taken the public health guideline seriously, especially when patients are denied a testing opportunity.[5] Furthermore, they may assume they were not infected, and the result is spreading of the infection more rapidly.

In contrast, South Korea has been more successful than the USA in controlling the spread of COVID-19 because of experience from the prior outbreaks, such as the 2015 Middle Eastern Respiratory Syndrome (MERS) outbreak[7] and its aggressive testing approach.

This approach provides a testing opportunity for every individual regardless of their underline medical condition. Besides, South Korea has responded rapidly by inventing and implementing the idea of a drive-through testing centre. This brilliant invention of the drive-through free testing makes the testing process faster, keeps clinicians and patients safe, removes ten minutes from cleaning rooms, and cut the length of the test in half.[7] Also, South Korea has managed to flatten its curve rapidly because its approach has not left mild and moderate ill patients without testing; therefore, effectively slowing the spread of the infection within communities.

The daily USA's confirmed cases of COVID-19 had increased steadily from February 15 to April 15, 2020 (see Figure 2). Experts believe that the numbers do not accurately reflect the sharp picture of the epidemic. This is because the USA is still unable to produce enough testing kits to meet the urgent surge in demand for testing as the number of infected people continue to increase. Without enough testing available, many patients have to wait a long time before being scheduled for testing. The availability of tests is a significant factor in the control of the outbreak since isolation, tracing of contacts, and quarantine of suspected cases depends on how robust and fast the testing process is. Even though South Korea has confirmed its first cases one day ahead of the USA, it flattened its curved as early as March 11, 2020, leaving the USA struggling with the spread of infection (see Figures 2 and 3).

Although the recovered cases and death toll depend mainly on the quality of health care services, number of hospital and ICU beds, and trained medical personnel, still the recovered rates and CFR are in favour of South Korean aggressive approach. For example, our review shows that recovered cases reported in South Korea and the USA were 97% and 63%, respectively. While the CFR was 37% in the USA and 3% in South Korea (Figure 4), even though estimating the case fatality rate at the beginning of the outbreak overestimate the case fatality, it can give us an overview of the clear picture that may be looming.[8]

Limitations

The reliance on population data limited our review. It may lead to a deficiency in collecting some key data about the demographic distribution of COVID-19 patients as well as any underlined medical conditions. Also, it is very hard to compare the CFR and recovery rates of different countries due to different settings.

Conclusion

The conservative testing approach in the USA has led to a devastating pandemic that has claimed thousands of lives. The evidence suggests that South Korea's aggressive testing has effectively managed to control the spread of COVID-19, it increases the recovered rate and reduces the CFR more than the USA approach. With no capacity for

case management of severe COVID-19 illness, developing countries should focus on testing of all suspected cases and tracing the contacts to limit the spread of the disease.

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