

The Race against COVID-19 in the US

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COVID-19, an enveloped, positive-sense single-stranded RNA virus, is spreading quickly and growing exponentially world-wide [1]. As of March 27, 2020, in the US, there are 103,321 individuals who have contracted it and 1,246 have died [2]. Despite the US's knowledge of the virus since the end of 2019, lack of sufficient preparation is beginning to prove devastating for the American people. One reason for COVID-19's vigor may be that RNA viruses with spikes on their envelopes have been presumed to have likely outbreak potential due to their high mutation and recombination rate [1]. Coronaviruses can be divided into four types: α , β , γ , and δ , depending on the serotype and genotype. COVID-19 is a β -coronavirus, which causes infections in humans. The most prevalent symptoms of coronavirus include fever, dry cough, lethargy, and muscle pain. The less common symptoms are sore throat, rhinorrhea, hemoptysis, diarrhea, and chills. About 25% of confirmed cases can lead to complications, such as Acute Respiratory Distress Syndrome (ARDS), sepsis, and septic shock. Such complications are seen more often in the elderly population with comorbidities [3].

According to public health professionals, the most strategic method to avoid further spread seems to be extensive social distancing. One article demonstrated simulations of COVID-19 in four different situations: 1) free for all, 2) forced quarantine, 3) social distancing, and 4) extensive social distancing. Out of the four simulations tested, "extensive social distancing," or when only one out of eight people is allowed to continue socializing normally, resulted in the lowest number of sick people and maintained the highest number of healthy people [4]. Extensive social distancing has been shown to decrease the chance of transmitting the virus, which is especially crucial for COVID-19 since not all confirmed cases are symptomatic [5]. A report generated by the Imperial College COVID-19 Response Team states that if no action is taken, 326.079 million people could become infected and 2.981 million people could die in North America. If a suppression strategy, which includes aggressive testing, isolation of all cases, and wider social distancing, is implemented early on, when there are only 0.2 deaths per 100,000 population per week, it would amount to 17.73 million infections and 92,000 deaths in North America. On the other hand, if a similar strategy is implemented but with 1.6 deaths per 100,000 population per week, then there will be 90.529 million infections and 520,000 deaths in North America [6].

Although for many weeks the US had a low number of confirmed cases compared to other countries, this largely seems to be due to under-testing of the virus [7]. Even though

the US has six times the population of South Korea, only 103,945 Americans have been tested as of March 19th, 2020 in contrast to 316,664 South Koreans as of March 20th, 2020 [8]. One South Korean company, Seegene, initiated making test kits to identify the virus four days before there were any confirmed cases in the country. Eventually, Seegene also developed the ability to provide testing for 1 million patients per week. Usually, it takes about 1.5 years for such testing kits to get approved in South Korea, but for COVID-19, it only took a week for Korea Centers for Disease Control & Prevention to approve it. South Korea has been providing free and easy access to testing for all of its residents in a timely manner [9]. However, in the US, when the first cases were appearing in Seattle on February 5th, the CDC found itself ill-equipped to deal with the rising demand for the diagnostic test. Due to a lengthy verification process, they only managed to send out a small numbers of tests—many which returned inconclusive by mid-February [10]. Meanwhile, despite this, the FDA prevented private sector companies and foreign-developed tests, including the test kit produced by the World Health Organization, from being distributed across the US. It wasn't until February 29th when the CDC opened up testing to private and public sector labs to shorten the length of clinical trials needed for approval [11]. The CDC's mishandling of the diagnostic tests and unnecessary bureaucratic red tape led to American public health experts inability to use tools for contain an early-stage pandemic, such as contact tracing, isolation, individual quarantines and delay in tracking the spread of the disease [10]. Although quickly testing citizens is important, but it is not enough if the test itself has a slow turn-around in a pandemic. To combat this issue, China prepared diagnostic assay tests, which can give results within 4 hours [12]. In the US, COVID-19 test results take 3-4 days to reach the patient. The FDA has recently approved the country's first point-of-care diagnostic test, Xpert[®] Xpress SARS-CoV-2 test manufactured by Cepheid, that can detect the virus in about 45 minutes. This will help mitigate the current shortage of personal protective equipment and protect healthcare workers and other non-COVID-19 patients from longer exposure to COVID-19 patients spending more time in the waiting areas to get tested [13]. Unfortunately, rural hospitals in the US have been in low supply and have work forces that are stretched thin. Several rural hospitals may be forced to shut down due to lack of revenue from elective procedures, which have been prohibited due to COVID-19. This makes it difficult for rural Americans to access testing even if quicker testing with short turn around time is available [14].

Countries like South Korea and Singapore have effectively limited the spread of COVID-19 and limited the number of

deaths by enforcing social distancing on a massive scale, cancelling crowded events, quarantining, and closing schools and businesses. By providing testing for all, including the uninsured and the homeless, these countries have managed to protect their population, treat the sick, and collect important data to inform public health policies [15]. The US is only 11 days behind Italy and is on track to repeat such a tragic trajectory. The window for widespread, aggressive action has almost closed [16]. The US must follow the examples of these countries that have controlled the spread of COVID-19 to “flatten the curve” and to avoid overwhelming its healthcare system. When millions of lives are at stake worldwide, it is necessary for countries to share data, learn from mistakes, and act definitively and quickly.

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