

HOW DO WE PREPARE FOR THE NEXT PANDEMIC?

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The world did not recognize the threat of the 2019 novel coronavirus (COVID-19) until the outbreak of pneumonia of unknown cause started killing people in China and quickly spread worldwide. Urbanization, globalization, climate change, and the continuous invasion and destruction of the wildlife and consumption of wild animals have contributed to the global spread of COVID-19 to humans with an estimated 650,000 to 840,000 unknown viral species capable of infecting humans existing in wildlife⁴. Healthcare professionals and community leaders have a responsibility to both cooperate to decrease the spread of COVID-19 and prepare for similar events. Creating strong public health system, minimizing spillovers, and creating effective communication systems could help prevent the next pandemic⁴.

A strong health care system should rapidly identify threats, help to prevent the spread of the disease, and care for infected patients. Taiwan, South Korea, and Singapore are examples of countries with strong public health systems. These countries use lessons learned from previous experience with the SARS outbreak in 2002-2003 to deploy massive technological and human resources, ramp up testing and contact tracing, and provided trustworthy and transparent information to the public⁴.

In 2004 after the SARS outbreak, the Taiwanese government built hospitals with negative pressure rooms and created legislation policies to prepare for another pandemic event⁵. The government leveraged its national health insurance database and integrated it with its immigration and customs database to begin the creation of big data for analytics⁵. It generated real-time alerts during clinical visits based on travel history and clinical symptoms to aid in case identification. New technology, including Quick Response code scanning and online reporting of travel history and health systems, was used to classify traveler's infectious risks based on flight origin and travel history over the previous fourteen days. Persons with low risk (no travel to level 3 alert areas) were sent a health declaration border pass via short message service messaging to their phones for faster immigration clearance⁵. Those with higher risk (recent travel to level 3 alert areas) were quarantined at home and tracked through their mobile phones to ensure that they remained isolated during the incubation period.

Taiwan proactively identified patients with severe respiratory symptoms (based on information from the National Health Insurance database) who had tested negative from influenza and re-tested them for COVID-19. Likewise, a hotline for citizens to report suspicious symptoms or cases in themselves or others was initiated. When the hotline reached full capacity, the government asked each major city to create its own hotline as an alternative⁵.

South Korea's strategy involved aggressive and transparent information campaigns, mass testing, quarantining the infected, treating those in need, and disinfecting contaminated environment.

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Appropriate information, an effective testing program and consistency were essential to the effort². Information on newly contaminated environments and infected patients was disclosed in real-time through government websites and text messages so people could determine whether they may have been at risk. This process promoted transparency regarding government measures but also enabled testing to focus on those most likely to be infected². South Korea authorized four companies to manufacture over twenty-thousand kits per day, which were rapidly distributed and utilized with the assistance of the military, 118 test centers throughout the country were reached daily². Finally, South Korea follow a strict protocol to ensure consistency: any contaminated location was immediately closed and sterilized and the exposed populace quarantined and required to undergo testing².

Similarly, Singapore focused on providing transparent and consistent communications. The government provided the latest metrics on coronavirus cases, both within the country and worldwide, and communicated and discussed the country plan. In addition, the government began an awareness campaign via popular online cartoons resulting in over 1million views⁶.

Protecting natural habitats can prevent future pandemics by minimizing the risk of spillovers. Wild animals carry unique viruses that can be harmful to humans. Deforestation and the capture and slaughter of animals for food provide viruses with the opportunity for spillover and transmission to humans. When a virus such as coronavirus is transmitted from an infected animal to a human, it can spread globally and become a threat to humanity¹. Wu Yi-Chi *et al.*, (2020), reported that the COVID-19 outbreak began at a local seafood market, an environment similar to that in which SARS originated. Two-thirds of the first 41 confirmed cases were found to be related to the Huanan Seafood Wholesale Market, which also sold live animals⁷. Some recommendations to stop spillovers are to create strong regulations and monitor or shut down live animal markets like those in Wuhan, as well as to enforce international law to combat the illegal wildlife trade⁴.

An early warning system could facilitate early detection of an emergency event and enable a rapid response to an outbreak before it spreads. In the United States, the Centers for Disease Control (CDC) developed the Epidemic Information Exchange Program (Epi-X) and the Health Alert Network (HAN) to enable access to and sharing of surveillance information nationally³. Lu MC (2020) reported that pandemics usually begin via zoonotic spillover. The coronavirus's that caused the severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and COVID-19 pandemics all jumped from bats to humans through intermediary animal hosts: civets in SARS, camels in MERS, and a still unknown intermediary in the case of COVID-19⁴. Artificial Intelligence (AI) can help by using machine learning algorithms to sift through various types of data (epidemiological, ecological, genetic, and climate). Scientists have mapped out geographic areas vulnerable to zoonotic spillovers⁴. The Global Public Health Intelligence Network, an AI-based surveillance system was credited with sending the first alerts for SARS and MERS⁴. In China, a private company, using AI-driven algorithms, warned of the coronavirus outbreak before the CDC or the World Health Organization⁴. Lu MC (2020) claimed

that the existent AI surveillance systems and outbreak investigations need extensive modification and integration into a global early warning system.

Preventing future pandemics requires international collaboration with organizations such as the World Health Organization and the ministries of health of various countries.

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