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Risk management comparison of UK with Taiwan and South Korea

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Summary

In any risk domain, improvement comes from comparison with those who have been especially successful at risk mitigation. Comparison with others less successful may lead to a false sense of complacency. A global pandemic is the ultimate societal risk. Every individual has to forego some personal freedom for the sake of collective public health. The Taiwanese and South Korean governments have been amongst the most successful to contain COVID-19. A comparison is made between UK, Taiwanese and South Korean risk management approaches to identify the scope for future enhancements to UK public health policy, particularly in dealing with more lethal pathogens.

Taiwan

Located 80 miles from the coast of mainland China, Taiwan is a country of 23 million citizens, of whom 850,000 reside in, and about half work in, mainland China. In January 2020, it would have been expected to suffer the highest number of cases of COVID-19 after mainland China. Yet, remarkably, in the whole of 2020, there were under a thousand cases, and just seven deaths, without a lockdown. Highly effective execution of testing, contact tracing and quarantine are crucial for controlling the spread of COVID-19. Taiwan has world-class contact tracing: on average 20 to 30 contacts are linked to each case. To demonstrate the scope of the Taiwanese system, as many as 150 contacts were traced from a single worker at a Taipei hostess club who tested positive.

Such capability in pandemic management comes from embracing new technology. One of the key factors in Taiwan's success has been the use of innovative information technology, which works with the National Health Insurance (NHI) system and the national Central Epidemic Command Center (CECC)[1]. This system has played a vital role in controlling the covid-19 pandemic in Taiwan.

Taiwan established its National Health Insurance system in 1995, and uses a reimbursement system to guide and prioritise the nation's healthcare organisations. This system was found to be effective in 2003 in helping to combat the SARS epidemic. It takes a pandemic crisis for a country to substantially strengthen its pandemic control measures. Following SARS, the Taiwanese National Health Insurance Administration (NHIA) developed two forms of information technology that are critical in its pandemic preparedness and control. The first is the NHI Smart Card that allows all providers real-time access to upload patient records and claims. The other is the MediCloud system, developed in 2018, that provides providers and patients real-time access to health records.

The Central Epidemic Command Center was established after SARS in 2003, and was activated on 20 January 2020, before Taiwan had its first case of COVID-19. It incorporated the NHIA and MediCloud into the pandemic control system immediately and used MediCloud to develop a real-time alert system by linking it with

[1] Lee P-C et al. (2020) What we can learn from Taiwan's response to the COVID-19 pandemic. BMJ Opinion, July 21.

immigration data. This allows providers to obtain patients' travel history, occupation, contact history, and clustering at mass gatherings in real-time. This information system is vital for Taiwan's precision testing strategy that is efficient in testing a small but critical number of people, instead of mass-testing.

Another vital part of technology for Taiwan's contact-tracing and quarantine monitoring is a GPS-based information system called Intelligent Electronic Fences System (IEFS). It is a collaboration between the Central Epidemic Command Center and mobile phone carriers that was developed in early February 2020. Based on an individual's mobile phone signals and nearby cell towers, it triangulates the location of quarantined individuals. It monitors the nation's entire quarantined population and any potential people with whom they may come into contact. It tracks them in real time and retrospectively for up to a month.

This advanced tracking technology was used to contain two major crises. The first was after 3,000 passengers from the Diamond Princess cruise ship visited multiple places in northern Taiwan; the IEFS was able to track as many as 627,386 potential contacts, advised them to quarantine at home, and thereby helped prevent community outbreaks. The second crisis was in mid-April 2020 when a naval vessel returned from overseas, and 36 of its 377 crew were found to be infected, after they had visited several cities over the course of three days. The IEFS succeeded in identifying all the public places they visited, informed potential contacts, and averted community outbreaks.

Taiwan's pandemic control measures have been complemented by considerate and effective social care. As well as free access to testing, the government also finances the cost of 14 day quarantine. Everyone under quarantine receives compensation of USD $35 per day. Local government staff make daily phone calls to those under quarantine to offer assistance, and provide them with a care package that includes 14 surgical masks, detailed instructions on quarantine, free online access to exercise videos, and free online access to movies.

This enlightened social care provision is one of the factors which has enabled Taiwan to achieve extremely high 99.7% compliance with quarantine[1]. Fourteen days of self-isolation for 340,000 have been exchanged for normal lives of 23 million; less than one thousand have been fined for breaking quarantine. Belatedly at the end of September 2020, as the second wave of COVID-19 was developing in UK, a support payment of £500 was offered to those in England who were required to self-isolate. However, the payment is conditional on a number of means-test criteria, and a high proportion of discretionary payments have been rejected by councils. Concern over UK fraud has blocked the introduction of a universal compensation payment, such as that used in Taiwan.

Internal control of COVID-19 has been complemented in Taiwan by tight control of its borders, which were closed to non-residents shortly after the pandemic broke out in January. This border control has included symptom-based surveillance before passengers board flights. Great Britain also has island borders, but has a very much larger airport and tourism industry, which has made it more problematic economically to close borders.

South Korea

The population of South Korea is 52 million, which is about four million less than that of England. Unlike Taiwan, South Korea has cold winters, forcing citizens to stay indoors much more. This has led to a winter wave of COVID-19 cases. Even so, it was only on 11 February 2021 that the total number of South Korean deaths reached 1,500; a threshold attained in UK on a handful of days in January. In the previous February, a major cluster of cases spread from a large church infecting thousands. Through pervasive and aggressive contact tracing, developed after the 2015 MERS outbreak, South Korean authorities succeeded in suppressing the first wave of COVID-19 in just twenty days, without the need to close private businesses.

[1] Wang C. et al. (2020) How Taiwan's COVID response became the envy of the world. *Fortune*, October 31.

As a teaching manual for other nations on how to flatten the curve on COVID-19, a South Korean government report was written in April 2020 documenting how South Korea responded well to a pandemic using Information and Communication Technology[1]. The rigorous and authoritarian approach has been named 'K-quarantine'. It encompasses digital surveillance, mass testing and tight border control. To illustrate the latter, on arrival in Seoul, a COVID-19 tracking app has to be downloaded. Next the temperature is taken of the passenger, who is then taken by designated taxi to a clinic nearest home. After a PCR test, the passenger is required to self-isolate at home for two weeks. However, in the event of the PCR test being positive, the passenger is required to spend two weeks in a hostel, with food and essential supplies provided.

This South Korean border protocol is much stricter than that adopted in UK in 2020, but would be more acceptable in 2021 with the threat of foreign variants evading vaccine protection. Personal privacy and individual rights have always to be weighed against broader societal concerns over public health, and protection of the vulnerable. This balance shifted in UK with the emergence of more transmissible variants of COVID-19. It would shift even further towards South Korean and Taiwanese practice if a pathogen emerged which was far more lethal than COVID-19.

The Big One

At the end of December 2020, the WHO director for emergencies, Dr. Mike Ryan, warned that COVID-19 is not 'The Big One': a readily transmissible pathogen with a much higher case fatality rate. The chance of such a pathogen emerging is high enough to warrant the more stringent preparedness measures advocated by Dr. Ryan. There have been five near-misses of 'The Big One' in the first two decades of this century: SARS coronavirus in 2003; H5N1 influenza in 2004; MERS coronavirus in 2012; H7N9 influenza in 2013 and Ebola filovirus in 2014. Each had a double digit case fatality rate.

The disastrous global impact of SARS-CoV-2 might have happened in the aftermath of SARS in 2003. Later in that year, there emerged a SARS coronavirus variant which fortunately turned out to bind less well to the human receptor, and so was less transmissible. But, had the variant been more transmissible, (as has happened a number of times with COVID-19), the variant could have spread much more widely than SARS ever did.

The emergence of 'The Big One' would be likely to overwhelm UK ICU capacity without far more draconian measures to suppress the spread of contagion than have been adopted with COVID-19. This would be a UK national crisis of the highest order, similar to a military crisis. Just as in time of war, a degree of population surveillance is essential to thwart enemy intelligence gathering, so during a highly lethal pandemic, some electronic surveillance would be necessary for highly effective contact tracing and self-isolation enforcement. Dr. Ryan of WHO has referred to COVID-19 as a wake-up call for a worse pandemic. UK risk management of such a future pandemic crisis should learn from Taiwan and South Korea experience with COVID-19. As in wartime, where very many lives are threatened, UK population behaviour can adapt to strict risk mitigation measures, notwithstanding doubts in Whitehall.

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[1] Government of South Korea report, April 15, 2020.