Dealing With Uncertainty
The SARS Challenge – Singapore’S Experience

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Uncertainty is one of few certain facts of life. An individual may plan his life to the last detail and find it suddenly turned upside down by an unexpected event. It could happen on the proverbial dull Tuesday morning. You could get retrenched or a test may say you have cancer. Dealing with uncertainty is a life skill that not only applies to individual lives but also to businesses and governments. The last 15 years has seen several unexpected events, which created uncertainty to established plans. They include the collapse of the Soviet Union, the Asian financial crisis, and the 9/11 terrorist attack.

The most recent cause of uncertainty is a biological event that was unexpected. This event is the SARS outbreak due to a new virus never seen before- the SARS coronavirus. We do not know the origins of this virus. One of the known human coronavirus could have undergone a major mutation to create a new virus or an animal coronavirus could have undergone a mutation allowing it to infect humans.

The first known case occurred in the city of Foshan in Guangdong province, Southern China in November 2002. There were stories circulating about a new illness in China in December 2002 and January 2003 but the first official report from China emerged on 11 Feb 2003 when the Chinese reported they had controlled an outbreak of atypical pneumonia involving 305 cases with 5 deaths. WHO was not allowed into Guangdong to investigate the outbreak.

On 21 February 2003, a 65-year-old Professor of Medicine at a Guangdong hospital traveled to Hong Kong to attend a wedding. He stayed at the Metropole hotel. He fell ill and was admitted to a hospital in Hong Kong. He told the doctors he was highly infectious and told them to take precautions. He died the next day. Unknown to everyone, at least 12 persons at the hotel had become infected.

Among the infected was a 48-year-old American who would bring the infection to Hanoi, three Singapore women on holiday in Hong Kong, an elderly Canadian lady from Toronto and a Hong Kong resident who visited a guest at the hotel. They were all soon to be admitted to hospitals in Hanoi, Toronto, Singapore and Hong Kong and start outbreaks in these cities.

The 3 Singapore women returned home on 25 February and started having symptoms. The American traveled to Hanoi, became seriously ill and was admitted to the French Hospital in Hanoi. On 28 February Dr Carlo Urbani, a WHO consultant in Hanoi noticed that the American and a few other patients had similar features of atypical pneumonia. He notified WHO about this new illness. Dr Urbani would die of SARS a month later.
The 3 Singapore women were admitted to hospitals in Singapore between the 1st and 3rd of March. The Hong Kong visitor was admitted to The Prince of Wales Hospital in Hong Kong. He was treated with a nebulizer for 7 days. The nebulizer created fine droplets full of virus, that spread through the hospital. The Canadian lady was admitted to a hospital in Toronto and died soon after that.

Let me digress and say a few words about the status of healthcare in Singapore, a city with about 4 million inhabitants. We have one of the lowest infant mortality rates and highest life expectancy rates in the world. Infectious disease are an uncommon primary cause of death. Cancer, heart disease and stroke are the 3 major illnesses in Singapore. The virus would test our health system.

On 6 March, the Communicable Disease Centre in Singapore informed the Ministry of 3 cases of atypical pneumonia they had detected in travelers returning from Hong Kong. The patients had been admitted to the Tan Tock Seng Hospital and Singapore General Hospital. The same day we received an alert from WHO about healthcare workers falling ill with atypical pneumonia in Hanoi. My Ministry instructed CDC to isolate the 3 women at the CDC.

Over the next few days, healthcare workers at Tan Tock Seng Hospital started falling ill in Singapore. WHO issued its global alert on 12 March. On 14 March, a Singapore doctor who treated the atypical pneumonia patients had traveled to New York for an infectious disease conference and was getting ready to return to Singapore. He had symptoms in New York but was certified fit to fly back to Singapore via Frankfort. Just before boarding, he informed a colleague in Singapore who notified us. We had to decide what to do on 14 March at midnight.

We informed WHO and the German authorities who isolated the doctor and his family in Frankfort. The European passengers were quarantined in Frankfort; the Singapore passengers were flown to Singapore and quarantined. The two family members of the doctor on the flight and the air-stewardess would develop SARS. WHO issued a global travel alert on 15 March. My Ministry formed a SARS task force.

We needed to define the disease. WHO had proposed case definitions since there was no confirmatory test yet for the disease. We decided to follow the definitions. A suspect SARS was a patient with fever and respiratory symptoms with a history of contact with a SARS patient or travel to a SARS area. A suspect became a probable case if there were lung changes on X-ray or autopsy.

We studied our first 20 cases to see what were the features of the disease and how it was transmitted. Our cases revealed that fever was the first objective feature and was present in all cases. We found that there was a history of close contact with an ill SARS patient. The incubation period was 2 to 7 days. We also found that not all SARS patients were infectious and not all who were exposed became infected. The SARS patient tended to transmit the illness to others in the later phase of his illness.

Based on this knowledge we developed our strategy to contain SARS. Our strategy
involved detecting SARS patients early and isolating them. We also decided to isolate all contacts of SARS patients for 10 days from the day of exposure. This was to ensure that if any of them developed symptoms, they would already be isolated. Since the transmission occurred to healthcare workers, we needed to protect them with adequate masks, gowns and gloves.

To carry out this containment strategy we allocated the entire resources of a major hospital, Tan Tock Seng Hospital, to fight SARS and designated the hospital as a SARS hospital. Screening for SARS was carried out at this hospital and all observation, suspect and probable cases were admitted to special SARS wards where every patient was isolated and all healthcare workers were protected. Home quarantine orders were issued to contacts and to ensure compliance, telephone-camera monitoring and electronic tagging were used. New public health legislation was also passed to ensure compliance.

As a result of these measures the outbreak was successfully controlled at Tan Tock Seng Hospital by end March. However, in April, we realized that the infection had spread to two other hospitals, a nursing home and a market. The setbacks were due to atypical cases which occurred in immuno-compromised patients and patients with multiple illnesses.

We refined our containment strategy and expanded the categories for admission to Tan Tock Seng Hospital in order not to miss those who might be masking symptoms. We also restricted movement of patients and healthcare workers between hospitals. There were restrictions on visitors to hospital. The measures together with quarantine orders for contacts brought the spread under control. The last known transmission of the virus occurred on 27 April.

With the outbreak under control, our focus is now on measures to make our country SARS resistant so that even if a SARS infected person were to enter the country, he would be identified and isolated early. For an outbreak to occur, the SARS virus must cross our borders through an infected person and enter into the community. It must escape detection by the primary health care system and, again, after the infected person’s admission to the hospital, it must escape detection in the hospital system. To ensure that this chain of events does not occur, we have instituted comprehensive control measures that serve as four concentric rings of defense around our hospitals. The first defense ring protects our hospitals. The next defense ring is around the primary healthcare system. The third defense ring is in the community and the last defense ring is at our borders.

Our first defense ring is in the hospitals. I have described our measures in the hospitals earlier. The Genomic Institute of Singapore has decoded the genome of the virus and developed a PCR diagnostic test kit that allows early definitive diagnosis of SARS. This has helped diagnose SARS patients in the hospitals.

In Singapore, a SARS infected person is very likely to consult a medical general practitioner or a traditional Chinese medicine practitioner when he first falls sick. They are the first contact between the SARS virus and the health system. These practitioners are our second line of defense. We have trained these practitioners to detect SARS and to
take adequate protective measures to ensure they don’t catch SARS. The workflow of their clinics has been modified to isolate patients with fever. Special ambulances will take the patients to the hospital for further evaluation if SARS is suspected.

The third defense ring is the community. Through an intensive public education program, that includes a special SARS television channel, Singaporeans have access to information about SARS. SARS creates fear, and the fear of SARS may create more problems than SARS itself. Information is a powerful tool in the fight against fear. It empowers every Singaporean and allows him to fight SARS by becoming a socially responsible person. Singaporeans are encouraged to take their temperature twice daily and if they develop a fever, they are advised to seek medical attention. Our school children, about 600,000 students in all, are given a thermometer each. Every home will be given a thermometer and every citizen has the ability to monitor his temperature and his family’s temperature twice daily. This is an important measure as the SARS infected person is not infectious in the early stages of the illness.

The last barrier to spread of the SARS virus is at our border checkpoints. Through health declaration forms and thermal scanning technology developed by our local scientists, we are screening both outbound as well as inbound travelers for fever. We work with other countries to trace the contacts of suspected SARS patients who have traveled across borders.

Because of these defense measures, there has been only one case of SARS detected this month. Life in Singapore has normalized. Schools are open. Singaporeans and foreigners fill our restaurants and shopping malls without fear and without wearing masks. We are a SARS resistant country. Meaning even if a SARS infected person enters Singapore, he will be detected before an outbreak can occur.

There are 3 lessons, which we have learnt from the SARS outbreak I believe that the first lesson we learnt is the importance of investing in people and facilities. We could not have carried out our measures without good infectious disease doctors and epidemiologist to advice us. Investment in developing the skill and knowledge of people pays during a crisis. We would not have the facilities to treat SARS if we had not built good hospitals, like the new Tan Tock Seng Hospital.

The second lesson is the importance of transparency and communication. At the start of the outbreak dealing with SARS was a case of dealing with the unknown. The unknown causes fear. The fear of SARS can cause more damage than SARS itself. Information is a powerful weapon against fear. By disclosing all that we knew and all that we did not know, we helped manage fear.

The third lesson is the importance of public support. The battle against SARS cannot be won by governments alone. It requires the the support and cooperation of every citizen. Because Singaporeans rallied together to fight SARS, we succeeded.

Thank you.

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