



### ***Fore-Note***

The **SARS** (2003) and **Avian flu** (2004) incidences remind us on how horrific a pandemic disease outbreak could be. The media helped recalling previous cases - **Hong Kong flu** (1968/69), **Asian flu** (1957/58) and **Spanish flu** (1918/19) when one million, 2 million and 50 million people, respectively, were killed. Over recorded history, and in recent times, there have been sporadic episodes of epidemic outbreaks. The world is now put on high alert for the next pandemic that could literally cause devastations to people across the globe to show itself.

### ***Pandemic, the definition***

A pandemic is an outbreak of an infectious disease that has spread through human populations across a large region, or even over continents. It involves a pathogen, an agent (e.g. bacteria, virus, parasites, fungi, etc) that causes an invasive impact on human organs leading to widespread severe health complications or death. Pandemic diseases include: H5N1/H1N1 influenza, HIV, tuberculosis, smallpox, SARS, etc. Cancers are non-infectious, and are not classified as pandemic diseases. Other health threats such as over-exposure to the sun's UV rays or haze (caused by forest fires) are not within WHO's definition of pandemic diseases because they are not infectious.

### ***Source of pandemic diseases***

About 61% of pathogens that are known to infect humans are zoonotic. This means that the pathogenic agent is transmitted from animals to humans, and, in the process, is mutating to better adapt to living in the new host. Some hosts (carriers) have immunity to the pathogenic agent, which enables it to multiply and awaits the opportunity to jump species. Carriers include: birds, bats, fleas, and monkeys, and even domesticated cattle, dogs and cats.

Pathogens are living organisms - they survive and are active when there is moisture. Even without moisture, many remain alive for some period of time. For instance, anthrax is a bacterium and can survive in harsh condition (e.g. even in the desert) for long periods of time. But when inhaled or digested, or come in contact with a skin lesion, it becomes reactivated and multiplies rapidly. A pathogenic agent of a pandemic disease can be killed (e.g. by applying heat or chemicals) or it dies when the host it lives in dies.

Disease can be spread from animals to human, and from human to human. Transmission is through contact, directly or indirectly. Direct contact occurs by inhaling or ingesting an airborne pathogenic agent from an infected person's saliva droplets into the air (i.e. from sneezing, coughing or even speaking), or by introducing infected bodily fluids into a non-infected person. Indirect contact takes place when a healthy person touches an object that was contaminated by an infected person and then transfers the agent to an exposed part of the body.

When a pathogen enters a human body, the agent goes through an incubation period when it propagates itself to become sufficient in volume to trigger off the body's physiological responses. It is at this time that symptoms (e.g. fever, rashes, etc) show, and the infected person becomes infectious. During the incubation period, some will feel lethargic or have a general sense of weakness that is often thought off as tiredness. When the symptoms appear, contagion becomes real which by then some may have already been exposed to the disease.

### ***Disease Control***

Medical authorities – WHO, Ministry of Health and CDC (Communicable Disease Centre) – are all on high alert to deal with emerging pandemic situations. Much has been learned from the SARS episode, but there is still much more to learn because of the virulence of microbes must never be under-estimated. On the global level, the World Health Organization takes the lead.



In Singapore, MOH provides the needful guidance on the national strategy to combat an emerging pandemic situation. Both citizens and companies should follow such guidance when they formulate their own pandemic response plans should the need arise in future.

There are vaccines and anti-virals available for some strains of influenza. But anti-virals have to be taken early in order for them to be effective. A vaccine can be effective against the particular strain of influenza virus it was developed for but the mutative nature of virus makes disease prevention uncertain. Doctors need time to study the disease, find the remedy, then produce quantities and distribute the remedy to places where it is needed. This process is too long to be depended on as a strategy. Patient treatments are rest and dealing with symptomatic issues.

The **infectivity** and **fatality** rates depend on the type of disease. Airborne transmittable agents naturally have higher **infectivity** rate owing to today's live-styles (international travel, urban living). The **fatality** rate depends on the disease's invasive ferocity and also on the medical solutions available. The Spanish flu (1918/19) reportedly infected 500 million (1/3 of the world's population then), and killed 50 million people. It is clear that prompt control by medical authorities is critical to avoid a tsunami of an uncontrollable disease from hitting the shores of the world.

### ***A Devastating Pandemic***

Many experts say that a devastating pandemic is not an issue of 'if' but a matter of 'when'.

The worst pandemic outbreak is probably an influenza virus that has (1) crossed from birds to human, (2) mutated to infect human-to-human, and again (3) mutated to re-infect birds. Pandemic has no nationality. Pandemics can be carried around by birds across immigration borders. Another terrible pandemic could be the resurgence of a new strain of **Nipah** virus which has a wide incubation window of 4 ~ 45 days, making detection of infected persons much harder.

The impact of a pandemic is not only loss of business opportunities, incomes or even deaths and sicknesses. These impacts constitute only the first wave. Production of food and essentials can be curtailed, their distribution disrupted leading to widespread starvation. The second wave of impact could well be similar to the aftermath of a tsunami – other forms of disease can result from shortage of food and drinking water, social disorder and civil unrest. These can be horrific.

### ***Response to Pandemic***

It is important that everyone be made aware that he/she has a role to play should a pandemic break out. There must be concerted effort by all – globally, by WHO; nationally, by governments; organisationally, by managements; and individually, by everyone. But SARS was relatively mild and is now largely forgotten, and the H1N1 (2009) impact was controversial – this lulls one to ignore the gravity or imminence of a real severe pandemic outbreak. It is necessary to create the awareness of the dangers of pandemic and to develop a response plan for the organisation.

A pandemic response plan should start by establishing a basic understanding of the threat. When a pandemic strikes, a common psychology is "*it's the government's problem*" or "*it always affects others, never me*". But when the pandemic situation worsens, many will respond with fear, and often fearing **fear** itself. Whether it is ignorance, or a sense of indifference or of tremendous fear, management of organisations should first gain understanding for themselves of the risks associated with pandemic outbreaks and to share them with their employees.

A key area that is often overlooked is that people working in organisations are faced with three conflicting interests during a pandemic: self, company, and partners (e.g. colleagues, customers, etc). They make decisions or take actions that may favour or prejudice the interest of one over the other. And there are limits to each's ability to tolerate stress. Everyone has therefore an end-point, when they begin to yield to the situation. These human limits must be understood.



### ***Protecting Human Safety***

Of all legitimate concerns, the priority should always be put on human safety. Hence, managing employee's risks of exposure from contracting the disease must always be the first consideration. Business objectives must be second. This means taking decisions to (a) avoid the risk of exposure, when such is possible, (b) reduce the number of occasions of exposure, or (c) use personal protection equipment (e.g. N95 mask, gloves, sanitizers, etc) that can help prevent infection. Carrying out these risk management actions can affect costs or business objectives.

The boundary of protection is unfortunately porous and is easily breached - employees may be infected when they use public transport to work, or when they are in contact with business partners, or when they lunch out, or when their family members are infected. Workers living in private dormitories are also exposed getting the disease from the other workers living on site. The pandemic response plan should take all these exposures into consideration, at different times and at different levels of pandemic severity. Rules and regulations, with education on personal hygiene, places to avoid, and setting up a help desk for employees to seek advice or receive help during the advent of a pandemic situation should be parts of the response plan.

### ***Protecting the Business***

Since business activities are operated by people, the first consideration is to ensure that no work that can potentially affect business continuity is carried out by only one person. The requirement is to split workers into two or more teams, with each team capable of managing and carrying out the business function. Then, have the teams trained to work physically separate, in shift or at different locations (e.g. working from home) and provide them the means of doing so. For shift operations, common work tools, furniture, etc, should be thoroughly sanitised before the next shift comes to the work area. This will lower the risk of business disruption during a pandemic.

The supply-chain partners are to be prepared for pandemic situations as well. Key suppliers and customers can be made incapacitated by the pandemic situation, be it arising from lack of workers, or from financial difficulties or from disrupted logistics. Early communications at the onset of the pandemic threat with these partners are essential to ensure that business operations are not abruptly disrupted. If the situation becomes serious, business services such as banking, ports, internet services, etc can also be affected. These considerations are to be included in the pandemic response plan.

### ***Ultimate Response Action***

In any crisis situation, there will inevitably come a point when adverse operating conditions have escalated to the extent that makes it impossible to continue normal business operations without risking employee deaths or incurring financial losses or damages. This is the end-point where the organisation must consider and decide whether it is required to scale down or even suspend operations. It is necessary for the organisation to know approximately where that end-point is.

### ***Rehearsing the Pandemic Response Plan***

A rehearsal is a practice run on a set crisis situation. First, the rehearsal script has to be prepared based on realistic and plausible events leading to its end point for the organisation. The rehearsal may not reflect the crisis situation because the fear/stress factor that prevails is not sufficiently simulated during the exercise. Nevertheless, rehearsals are necessary and useful. The plan should be rehearsed periodically with all persons involved.



## History of Some Major Pandemic Disease Outbreaks

- **Black Death**, started 14th century. The total number of deaths worldwide is estimated at 75 million people.
- In England, epidemics continue in 2–5-year cycles from 1361 to 1480. By 1370s, population was reduced by 50%.
- **Third Pandemic**, started in China, spreading plague to all continents and killing 10 million people in India alone.
- Half the native population of Hispaniola in 1518 was killed by smallpox.
- Smallpox also ravaged Mexico in the 1520s, killing 150,000 in Tenochtitlán
- Measles killed a further two million Mexican natives in the 17th century.
- In 1618–1619, smallpox wiped out 90% of the Massachusetts Bay Native Americans.
- During the 1770s, smallpox killed at least 30% of the Pacific Northwest Native Americans.
- Smallpox epidemics in 1780–1782 and 1837–1838 brought devastation and drastic depopulation of the Plains Indians.
- Smallpox devastated the native population of Australia, killing around 50% of Indigenous Australians and many M ori
- 1848–49, as many as 40,000 Hawaiians are estimated to have died of measles, whooping cough and influenza.
- In 1875, measles killed over 40,000 Fijians, approximately one-third of population.
- **First cholera pandemic** 1816–1826. Pandemic began in Bengal, spread across India by 1820. 10,000 British troops and countless Indians died during this pandemic. It extended as far as China, Indonesia (where more than 100,000 people succumbed in Java alone) and the Caspian Sea before receding. Deaths in India between 1817 and 1860 are estimated to have exceeded 15 million persons. Another 23 million died between 1865 and 1917. Russian deaths during a similar period exceeded 2 million.
- **Second cholera pandemic** 1829–1851. Reached Russia, Hungary (100,000 deaths) and Germany in 1831, London in 1832 (more than 55,000 persons died in the UK), France, Canada, and New York in the same year, and the Pacific coast of North America by 1834. A two-year outbreak began in England and Wales in 1848 and claimed 52,000 lives. 150,000 Americans died of cholera between 1832 and 1849.
- **Third pandemic** 1852–1860. Mainly affected Russia, with over a million deaths. In 1852, cholera spread to Indonesia and later invaded China and Japan in 1854. The Philippines were infected in 1858 and Korea in 1859. In 1859, an outbreak in Bengal again led to the transmission of the disease to Iran, Iraq, Arabia and Russia. Throughout Spain, cholera caused more than 236,000 deaths in 1854–55. It claimed 200,000 lives in Mexico.
- **Fourth pandemic** 1863–1875. Spread mostly in Europe and Africa. At least 30,000 of the 90,000 Mecca pilgrims fell victim to the disease. Cholera claimed 90,000 lives in Russia in 1866. In 1866, there was an outbreak in North America. It killed some 50,000 Americans.
- The 1889–1890 flu pandemic, also known as **Russian Flu**, was first reported in May 1889, spread to North America in December 1889, South America in February–April 1890, India in February–March 1890, and Australia in March–April 1890. The H3N8 and H2N2 subtypes of the Influenza A virus have each been identified as possible causes. It had a very high attack and mortality rate. About 1 million people died in this pandemic.
- **Spanish flu**, 1918–1919. By October 1918, spread to become a worldwide pandemic on all continents, and eventually infected about one-third of the world's population (or 500 million persons). Unusually deadly and virulent, it ended nearly as quickly as it began, vanishing within 18 months. In six months, some 50 million were dead. 17 million died in India, 675,000 in the USA and 200,000 in the UK. The H1N1 virus has a small, but similar to the Spanish Flu.
- **Asian Flu**, 1957–58. An H2N2 virus caused about 70,000 deaths in the United States. First identified in China in late February 1957, the Asian flu spread to the United States by June 1957. It caused about 2 million deaths globally.
- **Hong Kong Flu**, 1968–69. H3N2 caused 34,000 deaths in the United States. This virus was detected in Hong Kong in early 1968, and spread to the United States. This pandemic of 1968 and 1969 killed approximately one million people worldwide. Influenza A (H3N2) viruses still circulate today.
- **Fifth pandemic** 1881–1896. The 1883–1887 epidemic cost 250,000 lives in Europe and at least 50,000 in Americas. Cholera claimed 267,890 lives in Russia (1892), 120,000 in Spain; 90,000 in Japan and 60,000 in Persia.
- In 1892, cholera contaminated the water supply of Hamburg, and caused 8606 deaths.
- **Sixth pandemic** 1899–1923. Russia was badly affected again (more than 500,000 people dying). Pandemic killed more than 800,000 in India. Claimed over 200,000 lives in Philippines.
- **Seventh pandemic** 1962–66. Began in Indonesia, reached Bangladesh in 1963, India in 1964, and the USSR in 1966.
- Thirty Years' War (1618–1648), about 8 million Germans were killed by bubonic plague and typhus. In early 1813, over 219,000 of Napoleon's soldiers were to die of typhus.
- During World War I, typhus epidemics killed over 150,000 in Serbia. There were about 25 million infections and 3 million deaths from epidemic typhus in Russia from 1918 to 1922.
- Smallpox is a highly contagious disease, killed an estimated 400,000 Europeans per year during the closing years of the 18th century. During the 20th century, it is estimated that smallpox was responsible for 300–500 million deaths.
- Historically, measles was prevalent throughout the world, as it is highly contagious. In roughly the last 150 years, measles has been estimated to have killed about 200 million people. In 2000 alone, measles killed 777,000 worldwide.
- In 19th century, tuberculosis killed one-quarter of the adult population of Europe; by 1918 one in six deaths in France were still caused by TB. By the late 19th century, 70 to 90% of the urban populations of Europe and North America were infected with *M. tuberculosis*, and about 40% of working-class deaths in cities were from TB.
- During the 20th century, tuberculosis killed approximately 100 million people.
- SARS, in 2003, started in South China, Hong Kong, and spread to Vietnam, Singapore, Canada
- In February 2004, avian influenza virus (H5N1) was detected in birds in Vietnam

Modified from Source: <http://en.wikipedia.org/wiki/Pandemic>