

Pandemic

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Mika Mäkinen

Retro Life Assurance Company LTD, Finland

mika.makinen@retro.fi

Introduction

A little more than a week ago, the influenza A (H1N1) – which is thought to have originated in Mexico – started attracting major media coverage. Initially known as the swine influenza or 'swine flu', the disease has spread around the world. By 5th May 2009, over 1,000 cases had been reported in a total of 21 countries. The disease is of a type that may develop into a pandemic.

This document provides a brief summary of pandemics and their potential implications for the insurance business as well as an update on the current pandemic situation with regard to the known diseases that pose such a risk.

What is a pandemic?

Influenzas are infections of the respiratory tract that spread as epidemics from one country to another. There are three types of influenza viruses endemic in humans: A, B and C. Of these, influenza viruses A and B can cause extensive epidemics while C rarely does. Additionally, influenza virus A may be communicated as a pandemic whereas influenza virus B mutates less readily and less often leads to widespread epidemics. Typical of influenza virus A are the numerous sub-types classified according to the mutation of the surface glycoproteins hemagglutin (H) and neuraminidase (N) that are capable of circumventing any immunity acquired by the human population during previous

epidemics. H and N are the key surface proteins in terms of the transmissibility of the influenza virus and human immunity.

While all pandemics have been caused by a virus during the last century, according to a more extensive virological definition a pandemic could theoretically also be triggered by bacteria or other such organism. What is essential is high communicability, lack of immunity and a resulting serious infection.

An epidemic may evolve into a pandemic if the pathogen is of a type that spreads quickly in close human-to-human contacts and causes a serious illness in the host. Additionally, several definitions also assume that the cause of a pandemic is a new virus or bacteria alien to man and against which humanity has no immunity. For a disease to become a pandemic, it must have a sufficiently long incubation period in order to spread efficiently. Additionally, the disease must, when contracted, be at least as severe or even more severe in those exposed to it than in the people who carry it.

An influenza pandemic is a pandemic caused by a virus. All the pandemics during the last millennium have been influenza pandemics. Typical of all them were that the virus developed in an animal and mutated into such a form that it was capable of being transmitted to humans who had no resistance to it. The animal in which the virus mutates into a form that can be transmitted to humans must be similar to man in terms of its viral structure or be capable of processing human viruses in order to be able to produce a form communicable to man. Of all the common domestic animals close to man, at least swine and birds are capable of developing a virus that is endemic in the human population.

Any deaths occurring in connection with normal influenza are not usually directly due to the pathogenic virus. Normally, the final cause of death is a bacterial infection contracted when immunity is low, most commonly pneumonia. Often in a pandemic, the opposite is true, with the virus itself causing so much damage to the human organism as to kill the host. Experts assume that the typical incubation period in a pandemic is one to two weeks while the disease itself lasts 7 to 8 days. According to estimates, the immunity of those who recover is approximately 80 to 90 per cent and they seldom sustain any permanent damage from the disease.

In the past, pandemics have appeared as recurring waves of disease with an average duration of 1 to 1.5 years.

Pandemics of the past

Pandemic and major influenza epidemics before 1850

An early description of an influenza dating back to 41 B.C. is provided by Titus Livius of Rome. Since the 12th century, there are records of widespread epidemics, and a document from 1379 says that the fever epidemics were due to the “mysterious influence of the heavens”.

Worldwide epidemics have occurred from time to time. In 1510, a major epidemic broke out in Africa spreading across the continent and into Europe. In summer of 1580, an epidemic from Asia reached Europe, Africa and North America. During 1732-33 an extensive two-wave epidemic spread from Russia to the rest of Europe and South and North-America, the latter wave being more deadly than the first. During 1761-62 an epidemic starting in Poland spread across Europe all the way to North America. In 1781-82, a pandemic broke out in Russia and China in two waves, again the second wave being more deadly. During 1830-33 a new two-wave pandemic developed in Russia and China, the second wave, once again, being more deadly. During 1847-48 a pandemic spread from Russia across Europe and into North America.

Pandemic; the Russian Fever 1889-1891

In Finland, the pandemic that broke out during 1889-1891 is known as the ‘Russian Fever’. It is the oldest pandemic that has detailed data available as to its origin. The disease was caused by a subtype of the H3 virus and it was suspected to have originated in Russia from where it spread to all the five continents.

The first references to the disease were from 1889 and placed it in Central Russia but it did not develop into an actual pandemic until later in the autumn in Western Russia. By the

summer of 1890 it had spread around the world. Locally, the epidemic lasted from four to six weeks and advanced in several waves, the later ones always being more serious.

It is estimated that the Russian Fever was caught by 30 to 50 per cent of the world population of which 0.1 per cent were killed by the disease.

Pandemic; the Spanish flu 1918-1919

The 'Spanish flu', a misnomer given to the disease by western media, was mistakenly believed to have originated in Spain. In reality, the disease spread in belligerent countries, such as France and the United States, before reaching Spain but war censorship suppressed that fact. The flu did not hit the headlines until towards the end of World War I when it reached Spain, which had stayed out of the war. Even today there are conflicting views as to the geographic origin of the virus. South China, northern France and the US Midwest have all been proposed as potential candidates.

Probably, the high mortality rate was due to the combined effect of several factors. The tuberculosis epidemic raging at the same time easily killed people weakened by the Spanish flu. World War I had just ended and the disease seems to have had the greatest impact on the belligerent countries, meaning that the post-war conditions may have contributed to the propagation of the disease among young people. Another explanation for the high percentage of youth among the victims is explained by demographics; at that time, the average life expectancy was much less than today.

The virus causing the Spanish flu remained a mystery up until 2005 when its genetic map was unravelled from lung samples taken from soldiers who had died of it and the remnants of victims buried in the Alaskan permafrost. It proved to be an avian virus (H1N1), which was subsequently revived and found to be 100 times more lethal in mouse tests than ordinary viruses causing epidemics. With the Spanish flu, death was often caused by a direct viral attack.

The Spanish flu spread in waves. The first wave broke out in the spring and summer of 1918 and initially spread among combat troops in the belligerent countries, to be later caught by the civilian population. The spreading of the disease was facilitated by World

War I when hundreds of thousands of soldiers were shipped across the world by sea and rail. During the first wave, the infection rate was high but mortality rate still low. However, the second and most deadly wave of the flu started in autumn 1918, to be followed by a third wave in 1919 and a fourth in 1920. The last two waves of the disease were less severe and geographically more sporadic than the first two.

The Spanish flu was the most deadly of all the pandemics during the past few centuries. It is believed to have killed between 40 and 50 million people, equivalent to approximately 2 per cent of the world's population. According to the wildest estimates, the disease killed up to 100 million. Aside from the high mortality rate, another interesting and partly unexplained fact is that 99 per cent of those who died from the disease were under 65. Studies also showed that the mortality rates varied considerably from one country to another. The biggest losses in terms of both absolute and relative numbers were sustained by poor African and Asian countries with large populations. According to research data, the mortality rates were as follows: Australia less than 0.5%; North America and Europe 0.5% to 1.0%; South America 1.0%; Africa approx. 1.8%; and Asia approx. 3.5%. Differences between certain isolated locations are considerable, one of the darkest examples being the demographic catastrophe caused by the Spanish flu in West Samoa where it killed 20 per cent of the population. The latest research findings suggest that the Spanish flu was socially selective in that the infection and mortality rates for those in the weakest position in society were higher than for the more well-to-do. To a great extent, this can probably be explained by crowded living conditions, malnutrition, lack of medical care and non-existent social security.

Studies have been conducted in the United States on how insurance companies coped with the impact of the Spanish flu. The disease increased claims expenditure substantially but no clear proof of business failures has been found. Some sources, however, suspect that individual new companies may have failed. Clearly, the Spanish flu did not impact insurance companies as much as a comparable disease would today. This is due to the development of the life assurance markets and products. In 1918 there was no significant group life assurance market to speak of and the products involved lower risks, consisting mostly of burial grants.

The H1N1 virus is endemic to pigs. It reappeared in 1977 as a worldwide epidemic known as the 'Muscovite epidemic'. This strain of the Spanish flu was weak and contracted mainly by people under 25 years of age.

Pandemic; the Asian flu 1957

Most likely, the pandemic known as the 'Asian flu' started in China in February 1957. It came in two waves, the latter in the spring of 1958. The virus causing the pandemic was H2N2.

The Asian flu is believed to have killed 1 to 4 million people worldwide, equivalent to 0.04-0.15 per cent of the world population at that time. By nature, the Asian flu was very similar to a normal seasonal flu except that it was more virulent and was contracted by 25-30 per cent of the population. With the Asian flu, the infection rate was the highest among young people but those who died were mostly the elderly, children or in poor health. Usually, death was not caused directly by the virus but was due to bacterial pneumonia caught by the victims because of their debilitated state of health.

An influenza vaccine had been developed in the United States in 1943 and so the Asian flu was the first pandemic during which a vaccine existed. Various countries took action early in summer 1957 to produce a vaccine against H2N2. Vaccine production was, however, slow and failed to provide the desired immunity against the Asian flu.

Pandemic; the Hong Kong flu 1968

The Hong Kong flu was caused by the H3N2 virus which is very similar to the Asian flu in terms of effect, infection rate, mortality rate and geographic incidence. It started in China and spread in two waves. It infected 25 to 30 per cent of people killing an estimated 0.03 per cent of the-then world population.

Various strains of the H3N2 virus have been circulating since 1968.

Wave-like nature of pandemics

Throughout history, pandemics and intense epidemics have occurred in waves. For instance, the Spanish flu came in three distinct waves of which the second one was the most destructive. The third wave was followed by a fourth which was, however, distinctly sporadic in nature. As already indicated, a pandemic is created when a highly infective and powerful strain of virus evolves to which there no immunity. In order to produce a true pandemic, the virus must infect new victims with at least the same intensity as the carrier in order to be able to infect further new victims seriously enough after several re-infections. Therefore, it may be assumed that during the first wave of the Spanish flu, the virus got stronger reaching the peak of its virulence during the second wave whereas by the third wave it had mutated into a less serious form or become less virulent because people had developed immunity against it.

Present-day pandemics

In reality, many major killer diseases have been eradicated in the western world in the course of the 20th century but influenza still continues and there is nothing to suggest that the historical chain of pandemics would have been broken.

It is hard to predict the time, function and impact of the next pandemic. Pandemics have occurred throughout human history and most likely will continue to do so in the future. Thus, the question is not “Will there be a new pandemic?” but rather “When will there be a new pandemic?”

Evaluating the impact of a pandemic is difficult because its cause is never known in advance. No matter how serious a pandemic may be in terms of mortality rates, it is nevertheless more likely that the next pandemic will be closer to an ordinary seasonal flu than some highly deadly disease.

The accepted view is that it takes six months to develop a medicine for a specific, closely defined strain of virus.

New factors contributing to the spread of a pandemic

When the last pandemics were spreading in the 1950s and '60s, the conditions were different. Since then, the volume of passenger and goods traffic and speed of travel have increased hugely; population growth has been explosive; and social structures have undergone major changes, as a result of which population density has multiplied and people's habitat extended to new areas.

During the previous pandemics, it was assumed that the disease spread at a rate of 40 kilometres per day but now the rate of advance is probably many times higher due to the increased volume and speed of travel. According to certain scenarios, a highly communicable pandemic could, from the first occurrence, spread so widely within three hours that it could no longer be contained.

Population growth and social changes have created a large number of densely populated areas. In all probability, the next pandemic will evolve in and spread from such areas. Cities in emerging countries in particular have large populations living in conditions of poor hygiene and in close interaction with domestic animals. Most likely, the consequences of a pandemic will be the most serious in areas in which the standard of health care, nutrition and hygiene is lower than the average. At the same time, these nations have more limited resources than developed countries to protect their citizens by means of vaccines and other preventive or palliative measures.

Pandemic monitoring by WHO

The WHO monitors the pandemic situation worldwide on an on-going basis. The organization applies a 6-level pandemic alert system to describe the situation at any given time. The system is designed with a view to influenza pandemics and is not directly applicable to pandemics other than those caused by influenza virus A. The first two phases in the system represent periods between pandemics and pose no risk of any outbreak. Phases 3-5 are periods in which the risk of a pandemic is imminent, meaning that an influenza virus is spreading that may develop into a pandemic. This is the time when the

first cases are detected and the virus is capable of spreading from person to person, causing local epidemics, but it cannot yet spread as a worldwide epidemic. In Phase 6, a global pandemic is spreading or already in progress. Furthermore, after the first wave, this pandemic phase is subdivided into three additional sub-phases: Post-peak period, Possible new wave, and Post-pandemic period.

On 29 April 2009, the WHO raised the pandemic alert level from Phase 4 to Phase 5. That is, we are one phase away from a pandemic.

Local preparedness for the pandemic

A couple of years ago, the avian flu was considered a potential pandemic. As a result, a lot of research and preparations were made all over the world in case of an outbreak of a pandemic. Many countries and organizations have created or updated their pandemic strategy which includes an action plan in the face of an outbreak.

Under the threat of a worldwide pandemic, governments issue instructions for the citizens in order to limit the transmission of the disease at the point when it is already spreading. Typical actions include restrictions to movement, ban on public assemblies, distribution of respirators, restricted access to infected areas and isolation of those infected. If the situation escalates into a worldwide pandemic that spreads across borders, action is taken to limit the damage.

An overview of the implications of the pandemic for the insurance business

A pandemic will affect insurance companies in several ways. However, it is difficult to determine the extent of the effects in financial terms because the pandemic situation is still unclear.

From the point of view of the insurance companies' survival in times of a serious pandemic, the instructions issued by government agencies regarding the activities of the insurance companies and their solvency regulations play a central role.

Immediate effects

The immediate effects on insurance companies include the increase in mortality rates and disruptions to investment and operational activities.

Insurance technical risks

The impact of the increase in mortality and disease incidence rates will mostly be felt by life assurance companies whose insurance portfolios naturally include a large number of high-risk life insurance and health insurance policies. Additionally, a pandemic will affect companies that reinsure life risks.

As far as non-life insurance is concerned, the effects will mostly be felt in business interruption insurance, domestic animal insurance and travel insurance.

Under the threat of a pandemic, a sharp increase in the demand for life assurance policies is to be expected, something that insurance companies should be prepared for.

Evaluation of insurance technical risks

During the pandemic scare caused by the avian flu a few years ago, a number of working parties and insurance companies worked out simulation models for predicting the impact of pandemics on the insurance industry. As a rule, the models are based on the effects of previous pandemics. Many simplified standard models include only two parameters, the infection rate and mortality rate. Several reports estimate the infection rate to be 20% to 50% of the population. Mortality rates are usually forecast as the mortality rate among those infected, which varies from 0.05% to 1.5% depending on the scenario. A number of more sombre scenarios put infection and mortality rates even much higher.

Investment risks

The general view is that a pandemic will cause a shock in investment activities that will be reflected in falling stock prices (with the potential exception of certain medical industry shares), soaring interest rates for loan papers involving commercial risks and currency rate fluctuations particularly in the case of smaller currencies. Traditionally, large amounts of investment funds have, in times of crisis, been transferred to risk-free interest instruments such as government bonds, as a result of which long-term interest rates have fallen.

Currently we are undergoing a really serious worldwide financial crisis in which nearly all investments risks have been realised in one way or another over the preceding 18 months. Stock prices have already declined to quite a low level and the risk premiums on commercial papers are very high. As a result of the supportive actions taken by central banks in response to the crisis, the risk-free interest rate is now relatively low. If a pandemic breaks out in the spring 2009, its impact on investment activities is extremely hard to predict as we already are in the middle of a serious financial crisis.

Operative risks

During a pandemic, the disease incidence rate is high, which in itself complicates business operations. Insurance companies, just like other organizations, may experience a slowdown in or even a suspension of operations. The companies' operating environment will be seriously affected while confidence in the continuity of the partner network will be eroded.

Long-term effects

Similarly, it is hard to predict the long-term effects of a pandemic. If it is mild, i.e., the mortality rate does not increase substantially, social, business and other operations will be restored with some delay. A serious pandemic with high mortality rates may mean that society does not necessarily recover completely. A worst-case scenario suggests that the old operational structures fail to be restored and will be replaced by new *modi operandi*. The mortality rate at which the threshold to a serious pandemic is crossed is hard to predict.

A brief overview of the possibilities of insurance companies to hedge a pandemic outbreak

Insurance companies can hedge a pandemic risk by means of reinsurance and various risk transfer models. In reality, it will be difficult to obtain such protection in conditions where the threat of a pandemic exists.

Risk transfer within the insurance market

Direct insurers and reinsurers may limit specific risks by means of excess-of-loss reinsurance or seek to protect the entire insurance portfolio by using stop-loss reinsurance. However, in case of a pandemic, a problem will be posed by the limited capacity and availability of such insurance because the phenomenon is global and regional redistribution of risk is not possible. A further practical problem is the erosion of confidence in the reinsurer's ability to honour its obligations in case of a pandemic outbreak.

Another example of risk transfer within the insurance industry is the arrangement under which a life assurance company makes a risk swap with a pension insurance company.

The conventional catastrophe insurance contracts provide no protection for insurance companies in case of a pandemic.

Risk transfer to outside the insurance market

An insurance company can hedge a pandemic by passing on the catastrophe and pandemic risk to outside the insurance sector. A typical example is a catastrophe or pandemic bond by which total risk, within specified capacity limits, is transferred to investors in the form of a bond. Under the threat of a pandemic, selling such products is difficult and the risk premiums required by investors may be quite high.

Current pandemic situation

Avian flu

Sporadic cases of the avian flu are reported every year (WHO's statistics). The first known cases date back to 2003. During 2005-2006, the average number of recorded cases per year was 110 of which about half led to death. For 2009, approximately 30 cases have been reported with fewer than 10 deaths.

The avian flu virus H5N1 has not developed into a form that would be easily transmitted in human-to-human contact. At present it is thought to be unlikely that the disease would escalate into a worldwide pandemic.

Influenza A (H1N1)

The situation continues to evolve rapidly. As of 06:00 GMT, 5 May 2009, 21 countries have officially reported 1085 cases of influenza A (H1N1) infection. The United States Government has reported 286 laboratory confirmed human cases, with one death. Mexico has reported 590 confirmed human cases of infection including 25 deaths.

The following countries have reported laboratory confirmed cases with no deaths – Austria (1), Canada (140), China, Hong Kong Special Administrative Region (1), Costa Rica (1), Colombia (1), Denmark (1), El Salvador (2), France (4), Germany (8), Ireland (1), Israel (4), Italy (2), Netherlands (1), New Zealand (6), Portugal (1), Republic of Korea (1), Spain (54), Switzerland (1) and the United Kingdom (18).

The WHO raised its pandemic alert level from Phase 4 to Phase 5 on 29 April 2009.

The WHO has launched an extensive project to analyze the disease and is actively reporting on the situation. For the latest information, see the WHO website at www.who.int.

Additional information in case of emergency

Additional information on the worldwide situation is available on the WHO's website www.who.int. If the pandemic poses a real threat, local information will be provided by the authorities and the media.

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