

PANDEMIC

POTENTIAL INSURANCE IMPACTS

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EXECUTIVE SUMMARY

1. A PANDEMIC IS INEVITABLE With historic recurrence rates of 30-50 years it is prudent to assume that a pandemic will occur at some point in the future. The severity of such events is highly variable; some estimates suggest the most severe to date, in 1918, killed up to 100m. Many pandemics affect the old and young; but some (including the 1918 event) can, perversely, affect the most healthy.

2. 1918 MAY NOT BE A WORST CASE It is certainly true that the 1918 event was extreme relative to other pandemics in history. However many published "worst case" scenarios take 1918 as a base. There is a danger that we over optimise to this one scenario. There are other forms of pandemic than influenza, some have higher case mortality. Pandemic preparedness should consider a range of scenarios to ensure plans are appropriately flexible.

3. ECONOMIC IMPACTS MAY BE SIGNIFICANT A repeat of the 1918 event is expected to cause a global recession with estimated impacts ranging from 1% to 10% of global GDP. Most industries will be affected, some more than others. In particular, industries with significant face to face contact will be impacted significantly. Insurers investment assets may be affected depending on the mix held. Wider economic and social effects may lead to secondary forms of loss for insurers.

4. MANY INSURANCE LOSSES ARE POSSIBLE For some classes of business such as, life and health it is clear that the impact will be adverse. For other classes of business it is less clear but many forms of liability covers including general liability, D&O, Medical Malpractice as well as specific products offering business interruption and event cancellation could be triggered. Inner limits for Pandemic losses (vertical and sideways) may help to contain exposure.

5. SECONDARY IMPACTS MAY OCCUR Events causing significant global and societal turmoil can give rise to considerable secondary impacts. It is far from clear which of these, if any, would occur; but for resilience planning purposes it is worth considering them. For example the lawlessness experienced in New Orleans after Katrina could be repeated if police services are affected. Traditional claims such as fire loss may be exacerbated if fire emergency services have depleted efficiency and if tradesmen are in short supply.

PURPOSE

This report will consider the impacts a pandemic might have on the insurance industry. This is not a business continuity report and we mainly focus on scenarios that may lead to underwriting losses and adverse investment returns which drive profitability, rather than operational issues. This is not to understate the importance of such issues. Employees are an insurer's greatest asset and it is vital for insurers (as with other companies) to have robust and regularly tested pandemic preparedness plans; but there are many excellent papers on this subject already available.

A pandemic is certain to occur at some point in the future. They have happened regularly in the past. It is clear that life and health assurers will be adversely affected; but it is less clear how general insurers will fair; this report hopes to provoke some debate on this point.

We believe there are scenarios that could lead to loss in a large number of classes of business. These could arise from primary effects such as successful lawsuits leading to claims under liability policies. Claims could also come from secondary impacts to society, such as reductions in the availability of tradesmen in the short term, which lead to further losses. Some potentially affected policies may not have been written with such claims in mind and one possible response from the insurance industry is to clarify coverage intentions sooner rather than later. Contract certainty is to everyone's advantage.

We hope that insurers will consider the scenarios posed in this report and take action to measure and monitor exposure; consider capital implications and tighten terms and conditions, if necessary.

EMERGING RISKS TEAM

The Emerging Risks team is part of the Franchise Performance Directorate at Lloyd's. We define an emerging risk as an issue that is perceived to be potentially significant but which may not be fully understood or allowed for in insurance terms and conditions, pricing, reserving or capital setting. Our objective is to ensure that the Lloyd's market is aware of potentially significant emerging risks so that it can decide on an appropriate response to them.

The Lloyd's emerging risk team maintains a database of emerging risks which is updated regularly through consultation with the Lloyd's emerging risks Special Interests Group, which consists of experts within the Lloyd's market put together with help from the Lloyd's Market Association. The team also maintains strong links with the academic community, the wider business community and government. Contact with academics is often facilitated through the Lighthill Risk Network a not-for-profit organisation founded by Lloyd's, Benfield, Guy Carpenter and Catlin and open to subscribers from academia and within the financial services industry.

More details can be found at www.lloyds.com/emergingrisks.

DEFINITIONS

“Pandemic: An epidemic (a sudden outbreak) that becomes very widespread and affects a whole region, a continent, or the world.”

Individuals may be infected by the pathogen responsible for the pandemic, but may not die from it. Indeed in many pandemics, thankfully, only a small fraction of those becoming ill actually die. This fraction is known as the “case mortality rate”.

Not all pandemics are influenza related and this is discussed more in the “other forms of pandemic” section. However, due to particular concerns at present, the World Health Organization (WHO) has set out some specific guidance relating to influenza pandemics. They give three conditions for such a pandemic¹: 1. a new influenza virus subtype emerges; 2. it infects humans, causing serious illness; and 3. it spreads easily and sustainably among humans.

The World Health Organization global influenza preparedness plan² defines the stages of pandemic influenza, outlines the role of WHO and makes recommendations for national measures before and during a pandemic . The phases are:

Interpandemic period:

Phase 1: No new influenza virus subtypes have been detected in humans.

Phase 2: No new influenza virus subtypes have been detected in humans, but an animal variant threatens human disease.

Pandemic alert period:

Phase 3: Human infection(s) with a new subtype but no (or rare) human-to-human spread.

Phase 4: Small cluster(s) with limited localized human-to-human transmission

Phase 5: Larger cluster(s) but human-to-human spread still localized.

Pandemic period:

Phase 6: Increased and sustained transmission in general population

¹ World Health Organisation, FAQs http://www.who.int/csr/disease/avian_influenza/avian_faqs/en/

² World Health Organisation, global influenza preparedness plan http://www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_2005_5.pdf

FACTS AND STATS

A pandemic is inevitable. There have been a series of pandemics in history, since the 1600s these have had an average recurrence rate of 30-50 years. We are currently at Phase 3 of the WHO plan due to concerns of Avian Influenza H5N1.

The last influenza pandemic was in 1968³. AIDS is a pandemic that is occurring now. Pandemics vary in their impact from high hundreds of thousands to even hundreds of millions dead.

Severity and impact is very uncertain; some pandemics have affected the young and old; others have impacted those of working age.

The 1918 Influenza pandemic occurred just after the end of World War I and killed more people than the war itself. Estimates of the number of deaths vary considerably between 20 to 100 million. This event stands out by far as the worst influenza pandemic on record. It infected around 30% of the population and had a case mortality rate of up to 2.5%. Unusually, it most affected those aged between 20 and 40 (the young and old were affected, but no more than normal seasonal flu). One possible explanation of this is that the particular strain (H1N1) may have triggered an overreaction from the human immune system (known as a Cytokine storm), ironically this affects the most healthy. Recent research suggests that bacteria taking advantage of weakened immune systems and fluid on the lungs were a major cause of death in the 1918 pandemic; suggesting that antibiotics are a key feature in any line of defence.

There is a continual process of mutation of animal viruses, some of which affect humans. For example the (non exhaustive) list below illustrates how often this happens. Clearly recently more effective monitoring has shown up the frequency of mutation which, we presume, was present in earlier years but not observed:

- 1918 Pandemic "Spanish flu" H1N1
- 1957-58 Pandemic "Asian flu" H2N2
- 1968-69 Pandemic "Hong Kong flu" H3N2
- 1977 new strain in humans "Russian flu" H1N1
- 1997 new strain in humans H5N1
- 1999 new strain in humans H9N2
- 2002 new strain in humans H7N2
- 2003 new strain in humans H7N7, H7N2, H9N2, SARS
- 2004 new strain in humans H7N3, H10N7

**THERE IS A CONTINUAL
PROCESS OF MUTATION
OF ANIMAL VIRUSES,
SOME OF WHICH AFFECT
HUMANS.**

³ though some argue an event in the 1970s was of sufficient size to be counted

At a conference hosted by Lloyd's and XL in 2008 Professor Lindsey Davies, the National Director of Pandemic Influenza Preparedness, noted several key features of an influenza pandemic from a UK perspective:

- Droplets produced when coughing or sneezing are the main route of spread (direct or indirect).
 - Incubation period of 1-4 days.
 - Adults are highly infectious for 4-5 days from the onset of symptoms; children for longer.
 - Adults with uncomplicated flu may be absent from work for up to 10 days.
 - One or more waves lasting about 15 weeks nationally (6-8 weeks locally).
 - Waves may be weeks or months apart.
 - Peak incidence during two weeks in the middle of the wave.
 - Rapid spread across the country.
 - If the pandemic starts elsewhere, it will probably reach the UK within 2-4 weeks.
 - A probable maximum loss based on assumptions of: clinical attack rate 50%; maximum case fatality rate 2.5% of those with symptoms.
- Regarding the last bullet, see the discussion later on whether 1918 is a worst case scenario.

Antivirals- Professor Davies also noted that the use of antivirals for prophylaxis as a prophylactic (i.e. a treatment designed to prevent disease) could reduce spread significantly but may have unwanted side effects. When used for the treatment of people who have flu, antivirals should reduce the incidence of complications, such as pneumonia, by up to 50%, may reduce the length of uncomplicated influenza by a day or so and may reduce infectiousness. Anti-virals purpose is to reduce the length of illness by around 10% not to prevent it. Once a virus has been diagnosed they can substantially reduce the risk of death; and will also (when combined with other common sense measures, like staying at home if sick) reduce the speed of spread of disease; buying time for vaccines to be developed.

**UNTIL A VIRUS HAS
EMERGED THERE ARE SO
MANY UNKNOWNNS WE
CANNOT PREPARE A
VACCINE**

Vaccines- until a virus has emerged there are so many unknowns we *cannot* prepare a vaccine. It then takes several months to isolate the virus and prepare a vaccine; which will therefore not be available to fight the first wave of pandemic. Many sources of advice stress that planning should not count on a vaccine immediately. Recent research by Chen et al⁴ has shown that an alternative approach to vaccine production, based on extracting common "root" DNA from related viruses and producing antibodies from this, is both quicker than the traditional approach and provides protection against a wider range of virus mutations. However research into this promising approach is at an early stage.

⁴ "A consensus-hemagglutinin-based DNA vaccine that protects mice against divergent H5N1 influenza viruses" Ming-Wei Chen et al 2008 <http://www.pnas.org/content/105/36/13538.abstract>

BETTER OFF TODAY?

Many have argued that historical pandemic impacts would be reduced if they were to recur today. Arguments in favour of this include:

THE PUBLIC CAN PLAY AN ACTIVE ROLE IN COMBATING THE SPREAD

- **Better drugs-** (antivirals, vaccines for second wave, fever reduction, antibiotics)
- **Coordinated response-** the WHO will coordinate a global response to the pandemic; the International Health Regulations (see regulations section) place legally binding responsibilities on nations. A recent success story is that of SARS in 2002/3 (see case study later)
- **Influenza models-** have been developed by many stakeholders including within the insurance industry, these help to plan.
- **Better communication methods-** With so many forms of communication (television, radio, internet) the public can play an active role in combating the spread and health professionals are better and earlier informed.
- **Healthier population-** In the developed world the population is well nourished and healthy in many cases. (See below this is, of course, not the case everywhere)

However there are counter arguments that suggest the impact could be worse now than in the past:

THE "JUST IN TIME" MODEL OF MANY BUSINESSES MAY LEAD TO SHORTAGES OF SOME DRUGS OR

- **Global networks-** Many businesses are now part of a global network of suppliers and clients. Goods and materials including food are transported globally, potentially carrying pathogens. The "just in time" model of many businesses may lead to shortages of some drugs or even food.
- **Global travel-** In 1918, the pandemic spread quickly around the world due to demobilisation of troops. The number of people travelling round the world today using air, rail, motor and sea travel surely far exceeds this and would quickly spread disease.
- **Larger population-** The global population is estimated at September 2008⁵ to be 6.7bn, nearly 3.5 times its level in 1918. We can expect the numbers affected to be greater, just as a consequence of this larger pool of exposure, other things equal.
- **More concentration in cities-** For the first time in 2008 more people are living in cities than outside them. In 1918 people were more dispersed due to more rural economies. Pandemics can spread quickly within cities due to density of population and large numbers commuting.
- **Large pools of sick people-** The developing world has large numbers of sick people, including those with AIDS (and hence immune deficiency) these will not be well equipped to fight a pandemic.

Of course a key factor on the impact of a pandemic is the strength of the pathogen itself: how easily it is spread, how infectious and what the case mortality rate is. The next pandemic could be stronger or weaker than past examples.

⁵ US census bureau. World POPClock Projection <http://www.census.gov/ipc/www/popclockworld.html>

POTENTIAL PANDEMICS?

Much of the recent focus has been on influenza pandemic. This is for good reason because the H5N1 bird flu virus has already led to limited human to human transmissions and hence caused the WHO to move to level three of the pandemic plan. The WHO states that “*Experts at WHO and elsewhere believe that the world is now closer to another influenza pandemic than at any time since 1968*”

However, when planning for emerging risks it is important to consider alternative issues. There are many other pathogens that could give rise to a pandemic and have in the past. The following short discussion comments on a few examples, but this list does not attempt to be exhaustive.

Hendra virus - First identified in 1994 and mainly affects horses. Human cases have been observed which gives cause for concern. Australia is currently suffering a large outbreak but so far the virus has been contained within its borders.

Nipah virus – This is biologically related to the Hendra, and was discovered in 1999. To date the only means of transmission appear to be close contact and fluids from affected animals; so does not easily transfer to humans. The WHO suggest Nipah transmission is easier than for Hendra but assess the risk as low at present. However a case mortality rate approaching 50% is high and therefore this virus has been classified as *biohazardous*.

Cholera - At one time Cholera was a major cause of death around the world. Current outbreaks are generally contained by good sanitation practices. The last Cholera pandemic took place over the 60s and 70s involving Italy, USSR and India, amongst others. Recently there has been an emergence of resistance to drugs typically due to misuse of antibiotics.

Small pox- Now thankfully eradicated, apart from some strains kept in laboratories around the world. Prior to its containment it killed hundreds of millions and had a case mortality rate of 30%. Some of the earliest recorded pandemics are believed by some to be small pox. Given its virulence there are concerns that small pox could pose a terrorist threat if the virus were to be accessed.

HIV/ AIDS- Has killed 25m people since 1981 which makes it one of the most destructive pandemics ever, and of course it is in current progress. Transmitted by bodily fluids it has not progressed as rapidly as initially feared in the developed world. In Africa, with two thirds of all HIV cases, the story is regrettably different. HIV’s high genetic variability and regular mutations makes an effective vaccine difficult to develop.

Bubonic plague- believed by many to be responsible for the Black Death which killed 30%-60% of Europe’s population in the 1300s. Transmitted by fleas it was able to progress rapidly around the world. It can now be treated by antibiotics and the disease is rarely seen in the developed world.

Tuberculosis (TB)- Is spread through the air and the WHO estimates that 1/3 of the world’s population has been infected at some time, with a new infection occurring once a second. Few new infections develop into the full disease. TB is a major cause of death amongst AIDS sufferers. It is cautionary to note that the first effective antibiotic was only developed in 1946. Since the 1980s drug resistant strains have arisen requiring significantly more expensive and longer treatment, there are now cases of fully drug resistant strains which are effectively untreatable. Proper completion of antibacterial programs is vital to reduce the threat of such resistant strains. The use of medicines to suppress the immune system has been shown to increase TB risk.

TUBERCULOSIS: THERE ARE NOW CASES OF FULLY DRUG RESISTANT STRAINS WHICH ARE EFFECTIVELY UNTREATABLE

Lassa fever, Rift Valley fever, Marburg virus, Ebola virus and Bolivian hemorrhagic fever- are all dangerous diseases that require close contact to spread. They are contagious but symptoms appear quickly and the spread of disease can usually be prevented by quarantine. There is a concern that these diseases could mutate and become more easily transmitted. Ebola has the highest biosafety level and is considered a potential terrorist weapon.

MRSA and SARS: See case study.

CASE STUDY

MRSA

A GROWING CONCERN

“MRSA” = **Methicillin Resistant Staphylococcus Aureus**

Methicillin – a type of antibiotic, typically not prescribed now, MRSA bugs are resistant to other antibiotics as well, but the name has stuck.

Resistant - these bacteria are resistant to many commonly prescribed forms of antibiotics, hence their danger.

Staphylococcus Aureus (SA): A particular type of bacteria of which MRSA is a particular strain. 1 in 3 people carry the general SA bacterium. If they enter the body they can cause infection.

MRSA is causing concern, as it appears to be a growing epidemic in some regions. Initially found in hospitals (HA-MRSA), there are now several strains in the community (CA-MRSA). A study in 2006 (see below) showed that CA-MRSA is now the predominant cause of certain types of skin infections in the US.

HISTORY:

- Penicillin, which revolutionised traditional SA treatment, was only introduced in the 1940s.
- Methicillin a new antibiotic was developed in 1959 and for a time held new strains of SA at bay.
- HA-MRSA was first discovered in 1961, CA-MRSA strains became an issue in the 1990s
- It is believed that MRSA developed due to overuse of antibiotics and people not completing the full course.

WHAT EFFECTS?

- Most SA infections are skin related including boils and abscesses and similar but more serious conditions. However complications can arise leading to: blood poisoning, bone marrow, lung or heart infections, inflammation of brain and spinal chord.
- MRSA acts very fast; after 72 hours the bug can take hold of human tissue and become very resistant to treatment.
- MRSA is not more infectious than other SA bacteria; but it is harder and more costly to treat.
- In hospitals, patients with various risk factors are at greater risk than the general public. Such factors include: weakened immune systems and open wounds.
- Various groups appear at elevated risk: Community centres (e.g. schools), Hospitals and Prisons.
- Some reports suggest that MRSA is responsible for more deaths in the US than AIDS annually.
- Some new antibiotics like linezolid and platensimycin appear successful treatments.
- MRSA can be spread by person to person contact or via contaminated materials.
- Good hygiene standards are critical to stop spread: Employers have a duty to ensure these are upheld.
- Professor Gerald Pier from Harvard Medical School and his team may have developed a method which could be used to produce a vaccine within 2-3 years.

CA-MRSA

- CA-MRSA the community version of MRSA are currently uncommon in the UK but a leading cause of infection in the US.
- CA-MRSA is more virulent than HA-MRSA.
- CA-MRSA is susceptible to more antibiotics than HA-MRSA.
- It is not known why some people develop fatal CA-MRSA infections and others don't.

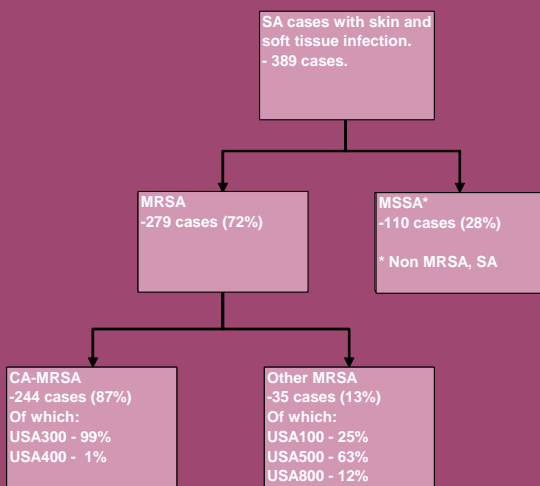
IMPORTANT ACTIONS

- Hospital staff wash hands carefully
- Isolate infected cases
- Staff and visitors should wear gloves and gowns
- Disinfect surfaces

KING ET AL

A paper "Emergence of Community Acquired MRSA US300 Clone as the predominant cause of skin and soft tissue infections" by King et al in 2006 noted that the CA-MRSA strain US300 was now the predominant cause of SA skin infections in their US study. They commented that "*Clinicians did not realise that community acquired MRSA emerged as the leading cause of community-onset skin ...infection*".

- Their paper also noted that certain groups had higher or lower risk than average, in particular:
- Black race: Prevalance increased 53%
- Female: Prevalance increased 16%
- Patients in hospital in last 12 months: Prevalance decreased 20%



Source: Based on King et al figure 1

ACTION GROUPS AND LEGAL DAMAGES

Groups such as MRSA Action UK have been set up, founded by those deeply affected by MRSA. They are lobbying hard for safer standards in hospitals and arguably set the scene for legal cases. No Win No Fee legal firms have set up in UK to offer legal advice and take cases to court. They suggest that the list of damages that plaintiffs may be able to claim for include: pain and loss of amenity, loss of salary, private medical expenses and costs of care provided by family for example.

1918 – A WORST CASE?

Many of so called “worst case” scenarios in the pandemic literature are based on the 1918 influenza pandemic. The “Spanish” Flu in 1918 was certainly an extreme example of the effects of pandemic. Spread by troop movements it was arguably a prelude of how global trade can accelerate the rate of infection. However the case mortality rate was around 2.5% compared with the Black Death which had an equivalent rate of 50%.

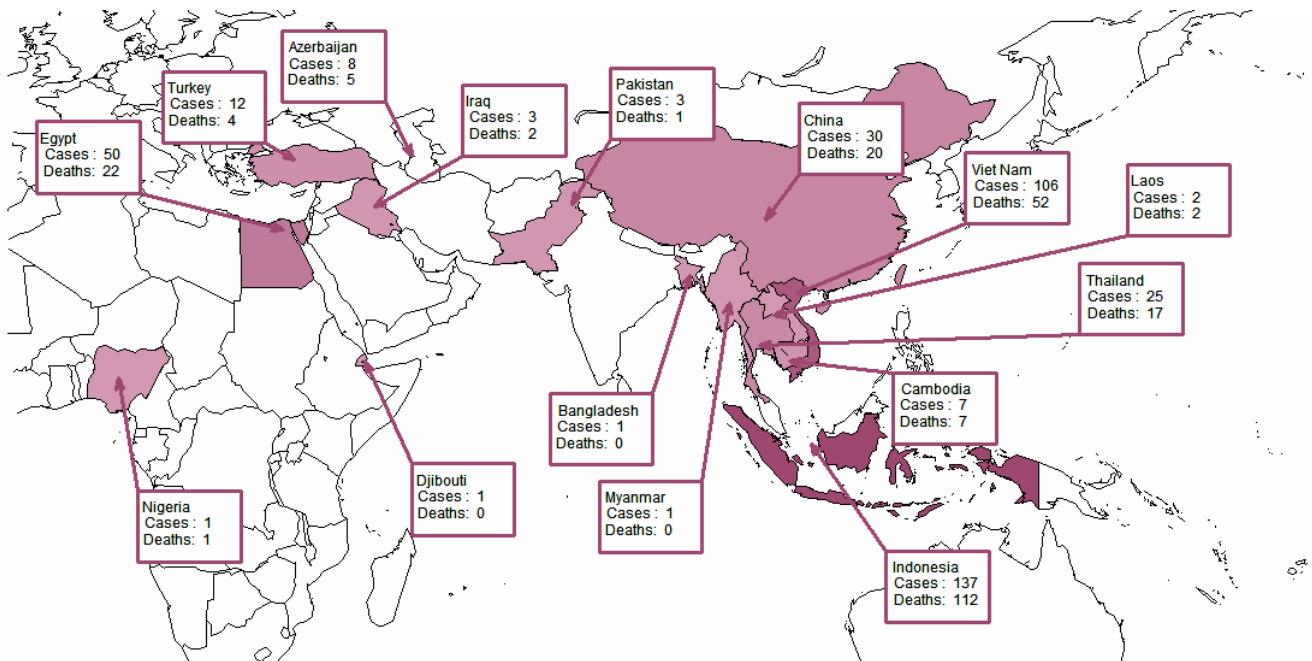
Based thankfully on a very few cases the current H5N1 virus has over a 60% case mortality rate. There is some reason to hope that if the H5N1 virus mutates to be easily transmissible to humans it will also weaken; but this is not certain. H5N1 already appears to be resistant to some of our key antiviral drugs.

The previous sections have suggested that there a number of reasons to be concerned that a major pandemic could affect our globalised world more than in previous generations. We have also noted that many forms of pathogen exist beyond bird flu.

This section does not seek to scare monger; but it is important to consider alternatives. The key point is that we should not over optimise our pandemic preparedness either as governments or businesses to one particular pathogen. All stakeholders need to ensure that their plans are flexible and robust to a variety of scenarios.

WE SHOULD NOT OVER OPTIMISE OUR PANDEMIC PREPAREDNESS EITHER AS GOVERNMENTS OR BUSINESSES TO ONE PARTICULAR PATHOGEN

CASES OF H5N1 GLOBALLY – TO SEPTEMBER 2008



CASE STUDY LESSONS FROM SARS

**SOME ESTIMATES SUGGEST
SARS CAUSED ECONOMIC
LOSSES OF BETWEEN
\$30BN AND \$150BN**

SARS = SEVERE ACCUTE RESPIRATORY SYNDROME

- Caused a near-pandemic from November 2002 to July 2003.
- Over 8000 infections and a case mortality rate of nearly 10%.
- SARS was a wake up call; it was not predicted.
- Pandemics don't have to be avian influenza, other sources are possible. In this case SARS was a corona virus.
- Just six weeks after official reporting of the virus some 27 countries had experienced outbreaks of SARS.
- Economic effects did occur:
 - Some estimates suggest SARS caused economic losses of between \$30bn and \$150bn.
 - Face to face industries (including entertainment and air travel) were the most affected.
- Infectious diseases will travel quickly via international travel.
- There were weaknesses of public health infrastructure in some countries;
 - many hospitals did not have the ability to rapidly deploy skilled staff.
 - there was little consensus on how to quarantine infected people.
- SARS provided a real test and the world is better prepared now.
- Emerging infections can be contained with high-level government commitment, the role of the WHO was successful.
- Powerful diagnostic tests were developed; and are now helping to identify other respiratory diseases.
- Practices and health conditions in the developing world affect the developed world.
- Health care professionals discharged their responsibilities admirably.
- Modern methods of communication were critical; the use of email and other on-line resources enabled a much earlier warning that would otherwise have been possible.
- On-line health resources were a powerful aid to medics.

CATCH IT

Germs spread easily. Always carry tissues and use them to catch your cough or sneeze.



BIN IT

Germs can live for several hours on tissues. Dispose of your tissue as soon as possible.



KILL IT

Hands can transfer germs to every surface you touch. Clean your hands as soon as you can.



NHS

UK Department of Health, Campaign Poster.

See:

www.ukresilience.info

www.dh.gov.uk/pandemicflu

pandemicflu@dh.gsi.gov.uk

REGULATIONS

This section gives a few examples of regulations and guidance to illustrate the significant amount of information now available to businesses. This information sets the scene for what directors and their advisors can have reasonably foreseen in any legal case; and has relevance for consideration by those offering liability insurance.

- A Prudential Practice Guide from APRA sets out expectations on regulated businesses and calls for cross disciplinary action to deal with a pandemic if it arises. It suggests that a 30% infection rate is a reasonable WHO assumption.
- For those wishing to keep a track of diseases notified in UK, DEFRA have pages devoted to this subject.
- The International Health Regulations¹ are legally binding and form international law. They were enacted in 2005 and came into force in 2007. They give a new framework under which countries must detect, assess, notify and respond to public health threats. Assuming the regulations operate as hoped they will help to reduce the risk of a pandemic gaining hold.
- A variety of media have been used to help communities and businesses learn about pandemic planning. For example Planfirst is a series of WebCasts from the U.S. Department of Health and Human Services. They have covered topics such as workplace preparedness and, state and health care agency planning.
- The Whitehouse has issued a national strategy for pandemic influenza which covers how the US government will approach the pandemic threat. The strategy covers: Preparedness and Communication, Surveillance and Detection, and Response and Containment. It specifically considers an allocation of responsibilities between the Federal Government, States and Localities, Private sector, Individuals and International Partners.

ECONOMIC IMPACT AND INVESTMENT RISK

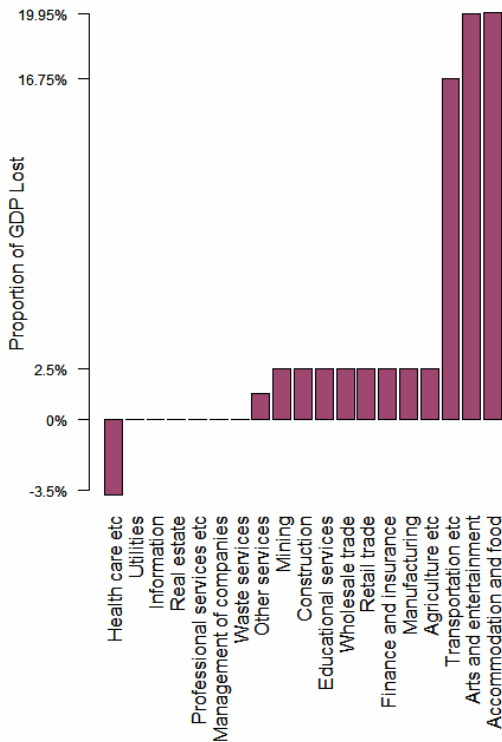
A repeat of the 1918 pandemic is expected by many to lead to a major global recession, estimates of the impact range from 1% to 10% reduction in global GDP. The impact will vary depending on country and within countries.

Most industries will be affected, typically adversely (see figure below). Those industries requiring a significant amount of face to face interaction are expected to be the most affected. These include: travel companies, airlines, restaurants/bars, hotels and the entertainment industry. The impact on local communities will somewhat depend on the mix of business activity.

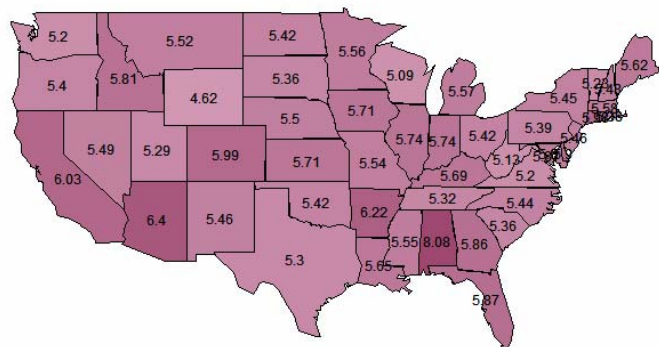
It is important to appreciate the magnitude of these impacts. A report

by the organisation Trust for Americas Health, notes that under the SARS outbreak which led to 774 deaths (compared to the millions anticipated from a major pandemic) there was a 66% reduction in travel arrivals to Hong Kong with cinemas in the region noting a 50% reduction in takings. It is estimated that the Asia Pacific Region lost some USD 40bn in this outbreak. They have built a model to estimate the impact of a major pandemic on the US economy, the figures below use data from their report.

Estimated GDP Lost in US by industry



Estimated GDP Lost in US by State (percent)



Source: Trust For Americas Health

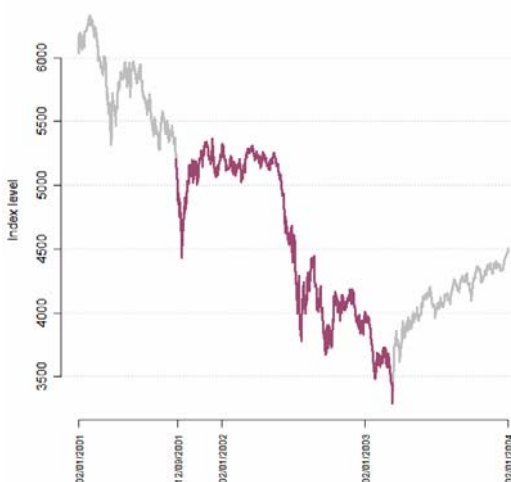
Insurers are major investors and a global recession is likely to impact the investments we hold. Many expect a “flight to quality” where investors switch from riskier assets to those perceived to be safer (typically government securities). Such securities will then increase in price and those holding them will see an appreciation in value. Conversely we can expect many sectors of the equity markets to be adversely affected.

A global pandemic will be a time of great insecurity and we witnessed in the years following the 9/11 attacks how large an impact a drop in confidence can have on the markets. The current financial crisis in 2008 gives us a stark reminder of the interconnected nature of the global economy and the financial services industry in particular.

Corporate bond spreads may widen, though risk free interest rates would fall if there was a flight to quality. Whether these opposing effects will cause an overall increase or decrease in the value of a diversified basket of corporate bonds is unclear. Liquidity may be effected which can affect short term claim paying ability.

A key issue is that past pandemics occurred at a time when global trade was significantly different than now. We do not know how the shockwave of a pandemic will impact supply chains. Many businesses operate a “just in time” model and stock only what they need for sales in the next period of trade. If supply chains are adversely affected we may see knock-on effects throughout the economy leading to shortages in some areas and backlogs in others. Hospitals are no different here and rarely stockpile drugs or supplies.

Impact of loss of confidence on stock markets (FTSE 100 INDEX) – after the 9/11 terrorist attacks and prelude to the 2nd gulf war.



INSURANCE IMPACT

When considering pandemic scenarios and the impact on our business we must have an image in mind. For a severe pandemic we have seen that a global recession would be a likely result; so many businesses will be struggling, food may be short in some areas if supply chains are affected. Society will not be operating as it ordinarily does. We saw in the aftermath of hurricane Katrina the breakdown of law and order, and the looting that followed. This was at a time when the majority of the US was not affected; in a pandemic it is possible that the entire planet will be suffering the effects simultaneously or in quick succession.

To offset this bleak view, we stress that emergency services have: planned ahead to secure their supply chains, stockpiled antivirals and expect to be able to offer a close to normal service. However, for the purposes of scenario planning it is appropriate to consider what might happen if these plans are not as successful as hoped. The purpose of scenario planning is precisely to consider outcomes that are *not* the most likely and to see how our businesses will fair if these events come to pass.

If a deep recession has been triggered, history tells us there will be a search for deep pockets and possibly an increase in fraudulent claims. Some will be looking to claim on any policy they believe could be valid and will be creative in their interpretation of the policy wording.

It is also important to note that whilst the impacts discussed below may not all be capital damaging issues on their own, taken together they will have a larger impact. This is an example of “tail dependency” that we witnessed with the terrorism attacks of 9/11; for very large scale events, things tend to go wrong at the same time. A global pandemic potentially affects every industry, every person and every country at the same time.

The following is a brief discussion of the potential impact on various classes of business:

Many classes of business

A global recession means, by definition, there will be a reduction in economically active stakeholders. Inevitably this will lead to a reduced demand for insurance, so premium income will be reduced yet many overheads will remain. Offsetting this we might expect a reduction in available capital to cause a hardening of premium rates.

Life/health

Although life and health insurance is not the focus of this paper it is clear that the impact on these businesses will be very significant. Research by various life insurers and reinsurers suggest that profitability will be damaged for several years but that capital is adequate to withstand this. The “natural hedge” against a rush of life assurance claims is that annuity payments may cease earlier than expected (due to premature death of the annuitant). This is not certain to work; in 1918 the pandemic affected those of working age and was little worse than a “normal” winter flu for the elderly; so such hedging should not be relied upon. Some reinsurers for the general insurance markets also offer life reinsurance; their balance sheet may be weakened at a time when P&C cedants are also looking to claim.

General Liability

Issues of liability are settled in the courts. However, insurers may be able to prevent unexpected claims by proactive consideration of pandemic scenarios.

Third parties rely on others to keep them from harm of personal injury. Certain key industries (though this list is far from exhaustive) such as

entertainment (e.g. pop concerts), hospitals, hotels, travel and universities involve a significant amount of close interaction between humans; a breeding ground for pandemics. These industries can be expected by third parties to have thought through the impact of pandemic fully and have robust and tested plans in place. Those that don't plan adequately and perform badly in a pandemic, putting others at risk, may face legal action. Clearly there will be considerable uncertainty during a pandemic; mistakes will be made and hindsight will show that certain planned actions were not appropriate. We hope that such errors will not cause liability provided they were the result of reasonable planning. However, those that have not planned, or whose plans are clearly deficient relative to their peers, may be at targets for shareholders, employees and other financial stakeholders.

A few scenarios worth discussing are:

- At the start of a pandemic wave, the organisers of a pop concert host a planned event despite several other events being cancelled claiming, in answer to questions from the press, that it is safe to do so. Later, attendees claim that they contracted the flu at the event; a legal case ensues and the organisers are found to have acted inappropriately. Will their liability policy be triggered?
- Several airlines (in accordance with their pandemic plans) have cancelled all flights to avoid people being in such close proximity for an extended period of time. A few airlines are keeping services going. Some travellers are known to be showing the signs of flu (sneezing, coughing etc), passengers complain but are reassured that they are safe. Several passengers go on to develop the flu and, suspecting that they caught it on the flight, start a campaign. A statistical review ensues and demonstrates that a higher than average proportion of people become infected and were also on flights in that period. A class action is taken against the airline.
- A catering company is responsible for the food for a particular global airline. It is discovered that the pandemic can be spread on packaging and after a review the global explosion of the pandemic is tracked back to a sick individual in the company whose health procedures were inadequate. Is the company responsible?
If they are not already doing this, insurers could start to ask: whether companies have robust plans in place; how regularly they are tested; and what amount of budget is assigned to Business Continuity Planning. These simple indicators of exposure and risk management would illuminate the most *at risk* businesses and perhaps even encourage additional planning.

D&O

Following a similar line of argument as that discussed under the general liability section, one might conclude that any company that did not properly plan and was disproportionately financially impacted, when compared to their peers, may see their directors sued for loss of shareholder value.

There is very clear guidance on how business should prepare, as illustrated in the regulations section. Yet, speaking at the Lloyd's/ XL Pandemic event Robert Hall a managing consultant at Marsh noted that:

- Over three-quarters of companies have inadequate plans for coping with a flu pandemic.
- Around a third of businesses have no strategy at all, while 14% have only rudimentary contingency plans.
- Around a third of executives are unaware of how their companies intend to deal with the threat, only 22% are comfortable that they are prepared.

Employers Liability/ Workers compensation

We can expect a significant level of absence from work during a major pandemic. To avoid major economic impacts companies may well be urging their staff to return to work stressing that they are only thought to be contagious if they display symptoms of illness. If the company's plans are shown to be weak compared to their peers (for example if most companies close their canteens to avoid large gatherings of people but a few don't) might they have failed in their duty of care to their employees?

Certain employers appear to be a higher risk than others, in particular those employing health care workers. Under the SARS outbreak many patients who became ill were medical workers; particularly those working close to patients whose illness had not yet been diagnosed. Hospital staff and those of other health facilities are being asked to perform in extraordinary circumstances and can expect their employers to have taken particular care over their safety. For private medical facilities in particular, those employers whose plans are shown to be inadequate in an absolute sense, or relative to their peers, may be targets for legal action. Were enough masks bought? Do they work? Did they hold a high enough volume of antivirals? Were standards of cleanliness sufficient? These questions and others will be asked. Insurers can monitor risk levels by tracking exposure to these companies and asking what plans they have in place.

Medical Malpractice

Some have forecasted that around 30% of total hospital beds will be required to deal with serious flu cases. Yet hospitals already operate at 100% capacity, there are few, if any, spare beds. Who goes home, how do doctors decide? Were such decisions consistent across different medical centres? The example of MRSA has shown that in some circumstances hospitals spread disease and legal challenges follow.

Marine issues

Due to the discrete nature and isolated populations of large cruise ships certain scenarios may be possible, for example:

- If a ship has been at sea for longer than the incubation period of the illness and has no cases of pandemic sickness, it is likely to be free of the pandemic. If the ship then docks in a region known to have the pandemic and passengers become ill the action of docking might be deemed to be the cause of their illness. Should the captain have checked before docking? Were procedures faulty? It is possible that liability will arise in this scenario and typically cruise ship passengers are wealthy individuals so claims could be large.
- If a ship carrying those with the flu comes to port without informing the authorities in a region that is currently free of the illness, might they be deemed to be the cause of the illness in that region and liability be sought?
- It is conceivable that, with a large proportion of the workforce absent during the pandemic, safety standards will fall. Might this lead to an increase in general risk levels? Will all procedures be followed as thoroughly as usual? The existence of a thorough and tested plan may give some reassurance to insurers here.

Product Liability

If it could be established that a faulty air conditioning system exacerbated the spread of the pandemic through an office building, aircraft, (as has been argued in cases of legionnaires disease), this could lead to a class action against the manufacturer under a GL/Products policy.

Property, business interruption

For business interruption under property policies to be triggered there has to be an insured event. It is hard to see how the presence of a pandemic could constitute such an event; but, if history is any guide, there will be a search for deep pockets, particularly for extreme pandemics if the expected global recession occurs and particularly from the hardest hit industries. Contract certainty may be a useful defence here. However higher than average property damage may result from a pandemic in some scenarios and this is discussed in the secondary impacts section later.

Hotel/ hospitality Business Interruption

Some policies have specifically included business interruption cover for the hotel/hospitality industry. The cover is triggered if guests exhibit symptoms of disease. This may be a quantifiable insurance risk when the outbreak occurs in isolated cases and where global diversification will help to cap total portfolio losses. But in the case of a pandemic there is potential for significantly many, and perhaps even all policies, claiming simultaneously. We may also see multiple claims from the same policy if there are several waves of pandemic over the year of cover.

Event cancellation cover

Within the Lloyd's market Contingency Business Event Cancellation Cover excludes communicable diseases as a norm on all event cancellation business.

Travel Insurance

Under travel insurance policyholders can claim for lost deposits or other costs if they have to cancel a trip because either they or close family are ill. If illness strikes whilst abroad cover is provided to cover hotel costs and medical expenses until the policyholder is fit to travel or released from quarantine. The conditions for claims are presumably far more likely to be triggered during a pandemic and could give rise to many more claims than expected. Whilst such claims are unlikely to cause significant solvency problems for large diversified insurers it is possible that the profits from this line of business would take many years to climb back into the black.

Credit Insurance

For a large pandemic there may be a number of company insolvencies; particularly from the most affected industries. This might lead to payments from credit insurers. Those providing credit life or accident and health cover can also expect to see significant payouts.

Professional Indemnity

An architect, for example, could be sued under a PI policy if it was claimed that a particular feature of the building design contributed to the spread of the virus throughout the building. Should the Architect have been aware of the potential and tried to plan accordingly? Did they receive specific instructions from the client to take account of the pandemic? A possible defence could be State of Art i.e. the exposure was

not clearly established when then the advice was given and the steps taken were reasonable based on the level of knowledge available at that time. Clearly the likelihood of a successful defence using this argument depends on the level of knowledge which changes rapidly. Hence it is important to monitor emerging information.

Secondary Impacts

Terrorism/political risk

The political environment after a pandemic may be different to before. We can hope that a coordinated global response is formulated and the political environment is better rather than worse; but some scenarios may tell a different story. Scientists tell us that developing countries will be the worst affected. This will be for many reasons, but may include the fact that in the developed world: medical facilities are much better and governments may have bought all the available supplies of antivirals/vaccine. This may increase tensions globally particularly against a backdrop of other global trends such as water shortages and global warming. Insurers offering political risk cover are at risk if the political scene shifts; particularly as some construction projects agree premium terms over a multiple year deal.

Property damage

If emergency services are affected (again we stress they have taken reasonable steps to avoid this; but in scenario planning it pays to consider alternatives) then, due to a reduction in fire suppression capacity, fires may be more severe than otherwise and burst gas or water pipes may go unnoticed and remain unattended for longer due to a shortage of plumbers. As more people are at home than usual this may lead to lower residential risk as they will be present to avoid these risks; however in this case there will be less people at work and for the opposite reasons this may lead to higher commercial risk at a time when the fire services will be most stretched.

We typically see that the longer the delay between property damage and its eventual rectification the larger the claim. Lost tiles that are not replaced quickly can let water into a property and turn a small claim into a large one. Yet the supply of roofers and builders during a pandemic is likely to be reduced either by sickness or not wishing to go into others' homes. We may see, so called, "loss amplification", as this reduction in supply leads to an increase in prices, again causing the average claims cost to rise. This may not be a capital damaging event but will be an unwelcome drain on an insurer's resources.

Theft

It is not clear whether theft will increase. During the July 2005 bombings in London when police services were stretched we did not see a rise in crime; perhaps society will pull together. However, in New Orleans following hurricane Katrina (a much larger event) looting and a localised breakdown of civic order were witnessed. If supply chains fail and food is short; or if a recession causes high unemployment, it is conceivable that crime will rise. This may occur during a pandemic or in the months after the pandemic, as the economy recovers. Civil commotion exclusions may apply; but an increase in frequency caused by isolated crimes may not be covered by these.

Motor

As large volumes of people stay at home either because of sickness, caring for others or fear of travel we can expect the volume of traffic to fall. Offsetting this we can expect many people to avoid public transport and take to their cars. If on balance there is less traffic we can expect

accident frequency to fall. However accidents will still occur and conceivably bodily injury claims could be more severe if the number of paramedic staff is reduced or response times increased. Such increases in severity will tend to increase the average claims size. It is not clear which affect will dominate.

OPERATIONAL ISSUES

Lloyd's has detailed business continuity plans in place to manage the continuation of business activities for a variety of events as far as is practically possible. We were one of 70 organisations that took part in the Financial Services Authority's market-wide pandemic exercise in 2006 and we hold annual business continuity exercises for the market and the Corporation.

Media outlets are growing in number. Global communication is becoming ever more rapid. We can expect sensationalism from some sources. The level of media interest in a subject is not a guide to underlying risk levels; for example in 2005 the focus on bird flu was much higher than now, yet the WHO alert level has not changed over this period. Business Continuity Plans should consider media response in advance.

Insurers regularly calculate capital requirements allowing for a combination of many adverse outcomes from various risk types (investment market risk, insurance risk, credit risk, operational risk, liquidity risk and group risk). This will stand insurers in good stead as a pandemic is likely to impact several of these areas simultaneously.

Pandemic preparedness requires cooperation between stakeholders: Government, Business, Health centres and the community.

CONCLUSIONS

Pandemics are inevitable and have happened regularly in the past. They have been of variable impact, at worst leading to approaching 100 million deaths.

There are reasons to assume that the world would be better prepared than ever before to face a pandemic due to international cooperation and better health care. However, population growth, urbanisation and increased global mobility may lead to a more rapid and widespread disease.

The parameters of the 1918 event, which led to between 20 and 100 million deaths, is often used as a worst case scenario. Whilst this was an extreme event compared to past pandemics it is important to consider other scenarios and other pathogens, so society doesn't over optimise its response to one scenario.

Economic impacts are likely to occur and a pandemic as severe as 1918 may lead to a global recession with reductions of between 1% and 10% of GDP. These may impact the investment assets of insurers and will also impact the general business environment.

Many classes of business will be affected by a pandemic. Clear cut cases include life and health insurance. Other forms of cover including D&O, General Liability, Medical Malpractice and Event Cancellation policies may be affected depending on policy wordings and legal judgements.

General economic and societal affects may give rise to secondary forms of loss, particularly if there is a reduction in the efficiency of the emergency services. Those leading such essential national services are taking significant steps to plan for and avoid this; nevertheless as part of sensitivity planning insurers should consider scenarios where such plans are not 100% effective.

SOURCES OF INFORMATION

The following were useful sources of information used when drafting this report. Links are shown for ease of use and were valid at the time of publishing the report:

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Flu wiki – discussion around cytokine storms (this is a user contributed page)
<http://www.fluwikie.com/index.php?n=Science.PrimerCytokineStorm>

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<http://www.annals.org/cgi/content/abstract/139/7/589>

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http://www.hannover-re.com/resources/hlr/generic/hlr/publications/Schriftenreihe_Nr12_engl.pdf

Prudential Practice Guide PPG 233 — Pandemic Planning and Risk Management APRA
<http://www.apra.gov.au/ADI/upload/Prudential-Practice-Guide-233-Pandemic-Planning-and-Risk-Management.pdf>

DEFRA Table of Exotic Notifiable Disease Investigations
<http://www.defra.gov.uk/animalh/diseases/notifiable/ndi.htm>

World Health Organisation - About the International Health Regulations
<http://www.who.int/csr/ihp/prepare/en/index.html>

PandemicFlu webcasts page
http://www.pandemicflu.gov/news/panflu_webinar.html

National Strategy for Pandemic Influenza: The White House
<http://www.whitehouse.gov/homeland/pandemic-influenza.html#section1>

Pandemic Flu and the Potential for U.S. Economic Recession A STATE-BY-STATE ANALYSIS – Trust for America's Health
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