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Swine Flu
Health officials reached their

Global pandemics

We are likely to see two to three major pandemics start in regions with limited public healthcare and rapidly spread globally and so demand fast response.

Since the Spanish Flu pandemic of 1918, which killed over 50 million people and infected 500 million others, national governments have had an eye on the risks from widespread pandemics. With the advent of SARS a decade ago, the avian flu pandemic in Asia in 2007 and the swine flu (H1N1) pandemic that started in Mexico in 2009, the incidence and impacts of such events are causing more and more concern at international levels. The reasons for this are threefold: 1) the speed at which pandemics can spread around the world has significantly accelerated due to increasing mass air travel; 2) the consequential time available to track the source and initial progress is decreasing; and 3) the capability to get the right drugs into the right place at the right time is not necessarily up to the challenge.

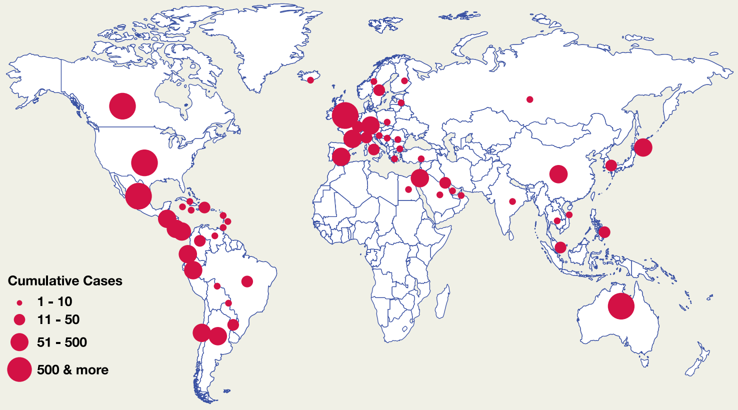
To understand the implications of future pandemics, we need to be clear on what the difference is between a pandemic, an epidemic and an outbreak. The Center for Disease Control and Prevention (CDC) in the US defines an outbreak as simply the start of an infection in a localized geographic area. An epidemic occurs when a large geographic area is involved and which has a higher than expected mortality rate. A pandemic is a global outbreak that exceeds the 'normal' levels of mortality and infection levels for typical diseases. The key word here is 'global'. There are two major factors that effect whether or not an outbreak will lead to a pandemic: pathogenesis and virulence. Pathogenesis refers to how a virus will cause disease and how easily it is spread. The virulence refers to how sick a certain virus will make the host and how easily it can cause death.

The World Health Organisation maps out a pandemic based on six distinct phases. Phase 1 is when non-human infections are spreading and there is no animal-to-human transmission. In Phase 2, an animal influenza virus, which is known to have caused infections in humans, circulates among non-human animals. Phase 3 sees animal-to-human transmission but no person-to-person transmission under normal conditions – when this is seen, the risk of pandemic rises. Phase 4 occurs when there is known human-to-human transmission of the virus. This allows outbreaks then epidemics to occur and even further increases risk of a pandemic. In phase 5, human-to-human spread is documented in at least two countries in one WHO region and may well indicate that a pandemic is imminent. Phase 6, the pandemic phase, is characterized by outbreaks in at least one other country in a different WHO region in addition to the two or more countries defined in phase 5. Designation of this phase indicates that a global pandemic is under way.

A core problem with pandemics is that 'they often arise in regions with low levels of public health and they rapidly spread across the world to more advanced countries'. It is highly unusual for one to start in, say, the US or Europe. In tracing the cause

New Influenza A (H1N1)

Number of laboratory confirmed cases as reported to WHO (8 June 2009)



Source: World Health Organisation

of a pandemic, it is therefore vital to focus on 'patient zero' – the first personal to become ill. So, for example, the 2009 swine flu pandemic started in Mexico and H1N1 patient zero was found in the village of La Gloria, Veracruz, next to a large industrial pig farm. Notably, this highlighted the rising risk from people and animals in many parts of the world increasingly sharing the same limited water sources. Although the 2009 pandemic was in some ways a false alarm, as mortality rates were not excessive, it is seen in many circles as a good model for how global health authorities will need to cooperate in the future when more lethal strains of virus spread.

The swine flu pandemic also highlighted the problems in availability of suitable vaccines – both in terms of the right drugs and their global distribution. Although the re-emergence of influenza as a pandemic threat has stimulated the influenza vaccines market to be one of the fastest-growing sectors of the global pharmaceuticals industry, many see that current vaccines will not help in the future. A critical issue here is that the rate at which a virus variant can develop is faster than the speed at which new vaccines can be developed: unlike many other diseases where a known condition already has an established therapy in place, pandemics are often caused by new strains of virus and so need a new antiviral vaccine. Typically, creating the new vaccine takes around six months and so there is a significant gap between pandemic outbreak and treatment availability. Much hope is being pinned on DNA-based vaccines, where DNA rather than dead virus particles grown in eggs is used as the base for developing new vaccines. These offer the potential for quicker responses and so enable faster global distribution.

In the next decade, many healthcare organisations agree with Jack Lord's initial view that 'we will see two or three major pandemics that will have a significant global impact'. Given that Spanish flu killed around 3% of the world's population at the time and infected around a third, the consequences of a similar event today are massive. If, for example, a new strain of avian flu were to spread quickly from its source globally, then some estimate that as many as 3 billion people could be infected within twelve months. If the right vaccines are not developed and distributed quickly, one in five of these could die within the year. As was highlighted in one workshop: 'In many ways, a global pandemic has to be seen as a greater threat to us than nuclear terrorism and global warming combined.'

There is, therefore, a significant global focus on ensuring global cooperation between health authorities and on improved monitoring of populations. The WHO has already taken a lead in the former area and, as shown with swine flu, many of the processes are

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now in place and are being built upon. Potential global hot spots are continuously being identified to highlight emerging virus outbreaks and prevent future pandemics from reaching their full potential. Emerging infectious disease identification is seen as a major area for healthcare investment and is a top priority for public health systems globally.

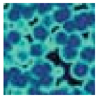
In terms of monitoring, several organisations believe that this is where we will now see a significant increase in investment. Already several countries have advanced approaches in place. Most notably, Singapore has developed a highly integrated system that ranges from detailed public information through to advanced surveillance. Singapore's 'Quarantine System' was developed during the SARS outbreak and people who had come into contact with infected persons were placed on home quarantine for five or more days. Thermometers were issued to all citizens and daily reporting to a centralised system ensured that early rises in body temperatures were noted as an indication of likely infection so that quarantining could take place.

Emerging economies find the monitoring and tracking of disease particularly challenging. They are hindered by several core obstacles, among them a global shortage of healthcare workers. According to the WHO, among 57 countries, mostly in the developing world, there is a critical shortfall in healthcare workers, representing a total deficit of 2.4 million healthcare workers worldwide. In South Africa, where we held a workshop there are four nurses per 1,000 people, a figure which, although high for an African country, pales in comparison with a developed country such as Norway where there are sixteen nurses per 1,000. This human resources constraint intensifies the already increasing pressure on developing-world health systems as not only must they cope with the need to contain the spread of communicable diseases associated with extreme poverty, they must also contend with the growing incidence of chronic diseases, such as diabetes and heart disease, an effect of new-found (relative) affluence. As a result, in some instances the wherewithal to monitor disease is extremely limited.

Moving forward, many countries expect to roll out more sophisticated systems for full population monitoring. Global bio-surveillance initiatives are in place to, for example, enable enhanced monitoring at border crossings and key transport hubs, such as airports, as these are the primary areas where cross-infection can occur and spread the virus. At a wider level, mass monitoring of vital signs is also under way in some countries where, for example, daily infra-red satellite images are being cross-referenced with location of mobile phones so that the individual body temperature of each member of a population can be monitored and, at the first sign of significant increase, just as in Singapore with SARS, they can be contacted and quarantined.

Global pandemics will happen in the next decade; the problem is that we don't know from exactly where they will emerge and what form they will take. As such, the key challenges are in the fast and effective response to the initial outbreak and ensuring that epidemics do not become pandemics.

Related insights



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