Potential global pandemics: the role of the WHO and other public health bodies

In light of the emergence of the new coronavirus in China, Emeritus Professor **Alan Glasper**, from the University of Southampton, discusses the response strategies adopted by international and national public health agencies

Epidemics (diseases that affect specific populations within known geographical areas) and pandemics (which cause infection among people in all parts of the world) have developed in parallel with the evolution of human beings. Viral respiratory illnesses such as influenza have periodically caused worldwide pandemics. The latest potential pandemic has been caused by a novel (ie new) coronavirus, which first appeared in the city of Wuhan in China at the end of 2019 and will certainly not be the last.

The World Health Organization (WHO) has recently renamed the new coronavirus as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease the virus causes is named coronavirus disease (COVID-19) (WHO, 2020a). Although not yet declared a pandemic at the time of writing, the International Health Regulations (2005) Emergency Committee of the WHO agreed on 30 January 2020 that the outbreak of COVID-19 now meets the criteria for a public health emergency of international concern (PHEIC) (WHO, 2020b). Simply put, this constitutes a public health risk to numerous countries outwith China, and one which potentially requires a coordinated international effort. Furthermore, in February 2020, the WHO hosted a meeting in Geneva to accelerate and fund research into a virus that is a clear danger to mankind (WHO, 2020c).

The potential source of this novel coronavirus has been identified as a type of mammal known as a pangolin or scaly anteater. Researchers believe that this animal could have been the vector or intermediate host that transmitted the virus to humans, which first occurred at a live animal market in Wuhan (Telegraph, 2020).

Background

Once humans began to live in close proximity to their fellow man the lack of good personal hygiene and sanitation ultimately led to the emergence of communicable diseases. Perhaps the best known of the prehistoric epidemics were the 10 plagues of Egypt described in the *Bible*'s Old Testament. Ehrenkranz and Sampson (2008) endeavoured to throw scientific light on the real origin of these Egyptian plagues and suggest that the primary cause was unseasonable and progressive climate warming in the region.

On a guided tour of Rome some years ago, I was told that, after the Vandals invaded in the 5th century, they destroyed the aqueducts, which brought fresh, clean water to Rome. Within a century the skills and knowledge that had allowed Rome to thrive were lost. This was allegedly attributed to waterborne communicable diseases that occurred in the aftermath of the aqueduct destruction and caused by the drinking of contaminated water directly from the polluted river Tiber.

The Black Death in the 14th century devastated the populations of countries around the world. The disease had a kill rate with a magnitude never seen before or since, causing the death of up to one-third of the world's population. Some 40% of the population of Europe died, fundamentally changing feudal society (Duncan and Scott, 2005).

A similar pandemic subsequently named the Great Plague infected many people in the UK, but particularly in London, during the mid-17th century. Many towns and villages were depopulated and no one was safe from contracting the disease. So strong is the collective memory of the great plague pandemic that a well-known children's song about it remains popular. 'Ring a ring o' roses' describes the features of this plague with the 'ring of roses' being the classic red rash and the posies referring to the carrying of sweet smelling herbs or flowers (which were thought to offer protection against catching the disease) and the final line 'all fall down' referring to the final moments of the dying victims. In just one village, Hurworth near Darlington, only 75 people survived the plague out of a population of 750 (River Tees Rediscovered, 2018).

Almost within living memory is the 1918 Spanish flu pandemic, the worst since the Black Death (Billings, 1997). It is estimated that one-third of the world's population became infected, leading to the deaths of some 50 million people worldwide (Dowling, 2020).

The first pandemic of the 21st century was swine flu in 2009, which caused an estimated range of deaths of between 151 700 and 575 400 people (Centers for Disease Control and Prevention, 2012).

The role of public health agencies

The WHO, the global health organisation, was created on 7 April 1948 in the wake of the formation of the United Nations after the Second World War. Its initial priorities were to tackle communicable diseases such as tuberculosis and venereal disease. Over the years WHO has endeavoured to eradicate many diseases among human populations with significant success. For example, the WHO campaign to eradicate smallpox was accomplished by 1977 (McCarthy, 2002). The WHO continues in its quest to reduce the impact of acute health emergencies and in the eradication of high-impact communicable diseases. The WHO cascades information to the public health institutions in individual countries.

Coronaviruses are a large family of viruses that cause many different diseases, including severe acute respiratory syndrome (SARS). The novel coronavirus is a new strain that has not

been previously identified in humans. Although it originated in China, the virus is now an international phenomenon and its spread to other countries was made possible through infected people travelling from Wuhan to other parts of the world via public transport.

To help individual countries take appropriate action in the event of a potential pandemic, the WHO has developed six specific pandemic phases that are designed to help countries prepare for and respond to pandemics. Phases 1–3 relate to preparation and phases 4–6 clearly signal the need for response and mitigation efforts to be activated (WHO, 2009):

- Phase 1: the lowest level of pandemic alert, phase 1 indicates that an influenza-type virus either newly emerged or previously existing, is circulating among animals but where the risk of transmission to humans is low
- Phase 2: isolated incidences of animal-to-human transmission of the virus are observed, indicating that the virus has pandemic potential
- Phase 3: characterised by small outbreaks of disease, generally resulting from multiple cases of animal-to-human transmission, though limited capacity for human-to-human transmission may be present
- Phase 4: confirmed human-to-human viral transmission that causes sustained disease in human populations. At this stage, containment of the virus is deemed impossible but a pandemic is not necessarily inevitable. The implementation of control methods to prevent further viral spread is emphasised in affected parts of the world
- Phase 5: marked by human-to-human disease transmission in two countries, indicating that a pandemic is imminent and that distribution of stockpiled medicines and execution of strategies to control the disease must be carried out with a sense of urgency
- Phase 6: characterised by widespread and sustained disease transmission among humans.

When the WHO upgrades the level of a pandemic alert, such as from level 4 to level 5, it serves as a signal to countries worldwide to activate any appropriate predetermined disease-control strategies.

Despite the January 2020 WHO PHEIC warning, COVID-19 has not yet been declared a pandemic, although its rapid spread remains worrying and it is likely that it may be declared a pandemic in the coming months.

Public Health England is the body responsible for co-ordinating strategies to deal with pandemics and to protect public health by identifying the source of infection and implementing control measures to prevent further spread or recurrence of the infection in England. Health Protection Scotland (https://www.hps.scot.nhs.uk/), Public Health Wales (https://phw.nhs.wales/), and the Public Health Agency (https://www.publichealth.hscni.net/) in Northern Ireland do the same within the other countries of the UK. In light of the WHO PHEIC warning, the Secretary of State for Health in England has instigated regulations to ensure that the public are protected as far as possible from the transmission of this virus. A part of the response to the WHO warning, the Secretary of State designated a hotel at Heathrow airport, Arrowe Park Hospital in the Wirral and Kents Hill Park, a training and conference centre, in Milton Keynes, as isolation facilities for British citizens returning from Wuhan and Hubei province. Arrowe Park Hospital has also hosted quarantined people from the Diamond Princess cruise ship (Department of Health and Social Care, 2020).

Are NHS trusts prepared?

All NHS trusts have policies and plans to deal with an emerging pandemic. Such polices form part of trusts' major incident plans and are designed to help them develop a blueprint with clearly defined roles and responsibilities. This is so that in the event of a serious disease outbreak, trusts can coordinate and manage a safe and effective response to caring for patients and staff while simultaneously protecting and maintaining core services.

It is not just the deaths caused by pandemics such as flu that are of concern, but the sheer numbers of people who may become ill once infected, often for weeks before symptoms abate. During the swine flu epidemic of 2009, for example, a total of 540 000 people in England were infected with the virus, leading to 138 deaths (NHS website, 2009; Glasper, 2014). The greatest threat facing trusts is one of patient capacity, coupled with staff shortages caused by illness. Perhaps of greatest concern is new research published in the *New England Journal of Medicin*e, which indicates that novel coronavirus may turn out to be more infectious than the 1918 Spanish influenza pandemic virus (Li et al, 2020).

With millions of people under lockdown in China, and reports of more than 1000 cases in Japan, South Korea, Iran and Italy at the time of writing (BBC News, 2020), the challenge for international researchers is to develop a vaccine to halt the spread of the virus. **BJN**

KEY POINTS

- A potential pandemic is now threatened, caused by a novel coronavirus that first appeared in Wuhan, China, in late 2019
- The International Health Regulations (2005) Emergency Committee of the World Health Organization (WHO) agreed on 30 January 2020 that the outbreak of coronavirus meets the criteria for a public health emergency of international concern (PHEIC)
- Despite the January 2020 WHO PHEIC warning, novel coronavirus has not yet been declared a pandemic although its rapid spread remains worrying

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