

Pandemics: Preparedness and Prevention

It is now generally accepted that there is a significant chance of the occurrence of future pandemics and of health system collapse, especially in poorer countries. It is estimated that any pandemic arising from natural/animal causes could lead to as many as 10 million deaths worldwide.

History of Causes

Appeasement of vengeful or unforgiving Gods

In the Iliad, Homer describes Apollo raining down plague on the Greek army. The Bible describes plagues as reflecting the wrath of God, as in the 'Plagues of Egypt'.

Astrological movements

On 20th February 1345 the alignment of Saturn, Jupiter and Mars in the constellation of Aquarius was blamed for the outbreak of the Black Death. Expectation of such events could help to put prevention steps in place.

Miasma

The presence of bad or poisoned air was to be avoided, as associated with marshes, human waste dumps etc. Avoidance of areas of slum and overcrowded housing areas. Henry VII orders slaughterhouses to be placed outside city walls. Henry VIII banned kissing and imposed Social Distancing.

Religion

Accusing Jewish people of poisoning wells was commonplace in the Middle Ages. On 14th February 1349, 2000 Jews were burned to death in Strasbourg.

Vermin

In 1647, Aberdeen council orders the poisoning of rats and mice.

Change in land use

Deforestation and the changes in land use to farming, mining and oil extraction results in closer contact between humans, wild animal and rodent reservoirs (so-called 'spillover' events).

History of Prevention

To end of 17th Century

Disease assumed to be sign of poor moral and spiritual conditions. Public effort to control disease included isolation of the ill and to quarantine travellers. In 1665, houses in London placed under quarantine in an attempt to stop the plague.

18th Century

Isolation and quarantine become more common across Europe, especially in sea ports around the Mediterranean.

- Lady Mary Wortley Montagu – Having recovered from smallpox in 1715, she reports on the use of 'variolation' against smallpox in her visit to the Ottoman Empire in 1717. Her six-year-old son is variolated in 1718, and her two-year-old daughter in 1721. She imports variolation into England in 1721.
- Benjamin Jesty – In 1774 he uses cowpox to 'vaccinate' against smallpox.
- Edward Jenner – In 1796 he uses smallpox 'vaccine'.

19th Century

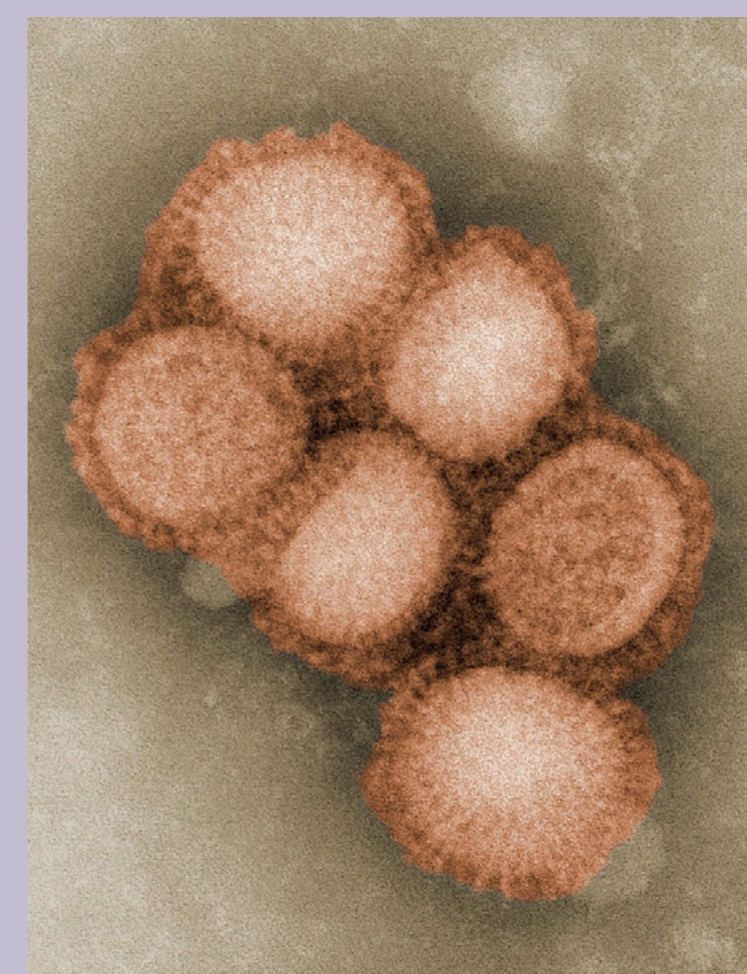
- 1853: Vaccination against smallpox made compulsory.
- Louis Pasteur and Robert Koch develop the Germ Theory of disease, and suggest that disease is caused by bacteria and 'unfilterable agents'. Identification of filth as a cause and vehicle of transmission is termed The Great Sanitary Awakening. Sanitation changes thoughts about health.
- Disease recognised as an indication of poor social and environmental conditions. Cleaning and improving the environment included in measures for the prevention of diseases.
- Sanitary Problem – Increasing urbanisation leads to increasing numbers of diseased individuals.
- London experiences unprecedented numbers of cholera, typhoid and tuberculosis (consumption) cases, and isolation and quarantine became difficult.

20th Century

- Sir Arthur Newsholme – a local Government Board Physician who advised people to stay at home if they were sick and to avoid large gatherings during the 1917–1918 influenza pandemic. His advice was not published by the British Government. He argued that many lives could have been saved if his suggestions had been followed. There was no imposed lockdown, and no attempt to limit crowds at some sporting events.
- Influenza – vaccine introduced in the 1930s, with large-scale availability in the 1940s.
- Vaccines – development becomes priority for many countries from the 1950s.



Miasma: a representation of the cholera epidemic of the early 19th century



Virions from a 2009 pandemic influenza A (H1N1) virus isolate (colourised transmission electron micrograph).



Lady Mary Wortley Montagu

Time Magazine

Robert Seymour, National Institutes of Health National Library of Medicine

Credit: CDC/CS Goldsmith, A. Balish

Wellcome Images



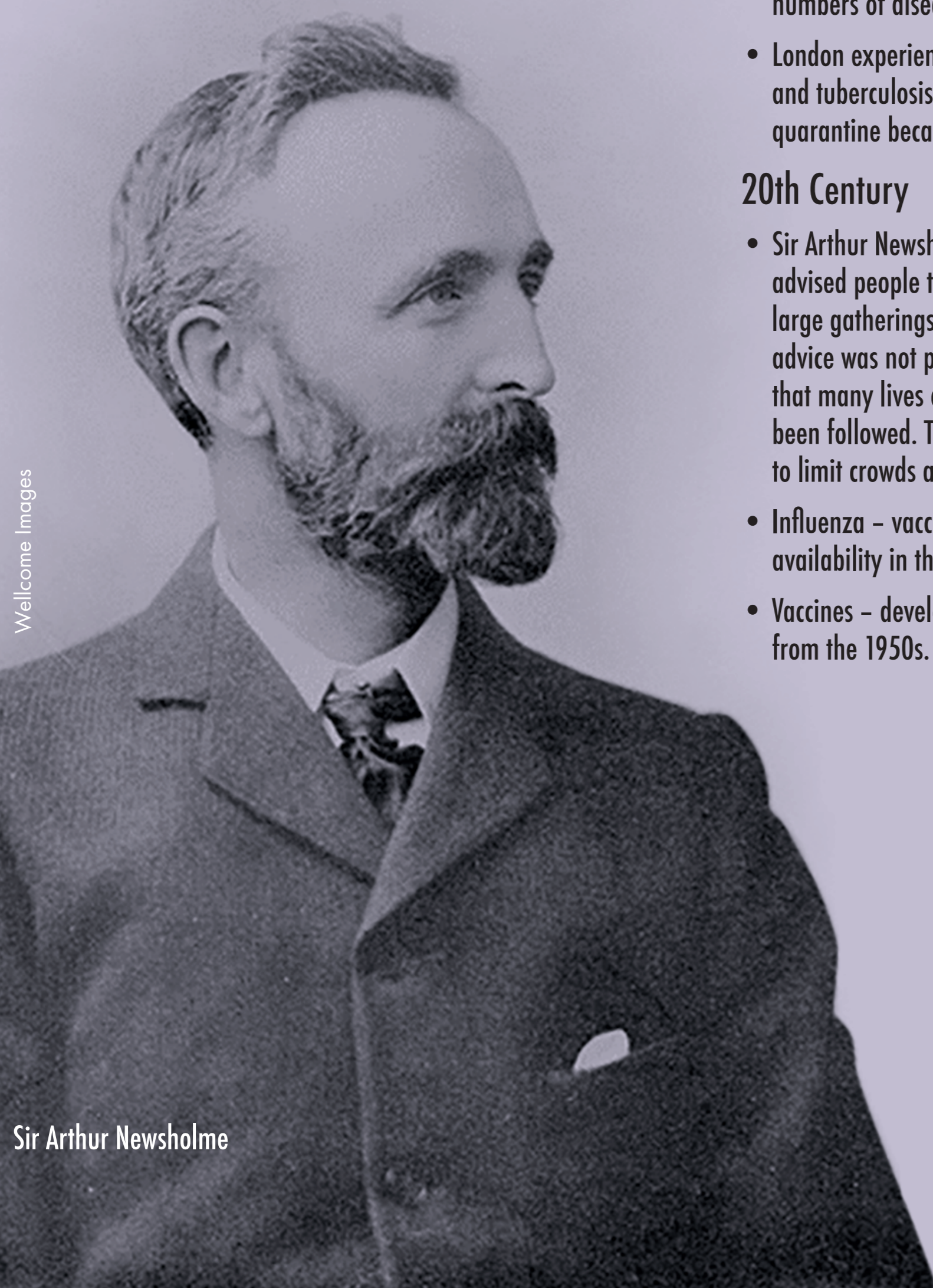
1918 Influenza pandemic poster

The Black Death, Spanish Flu and Coronavirus *et al.*: What have we learned?

Epidemics and pandemics of infectious diseases have destroyed civilisations, and over the centuries we have developed effective tools to deal with these outbreaks. Initially we understood the need for quarantine and better hygiene. Our clearer understanding of causes of these infections has led to the development of better hygiene, antibiotics, antiviral drugs, diagnostics, vaccines, reporting and surveillance.

- Early warning and detection – The need for early warning has led to the development of not only local, national and international epidemiological surveillance. As a result, there is a worldwide network of bodies that monitor, report and advise infectious disease control organisations such as PHE (now the UK Health Security Agency [UKHSA]), the European Center for Disease Prevention and the World Health Organization Global Outbreak Alert and Response Network.
- Preparedness – History has shown that the lack of training, poor engagement of clinical staff, politicians and the general population, together with poor surveillance, isolation and the response capacity leads to poor control of outbreaks.
- Laboratory capacity – It has also been recognised that a resilient network of laboratory services has become essential for the detection and diagnosis of infectious diseases, especially when these are novel.
- Development of novel diagnostics – It has become recognised that international collaboration is essential for disseminating information necessary for the identification, detection and epidemiological typing of outbreak and pandemic strains to enable a clearer understanding of their epidemiology.
- Development of effective vaccines, antimicrobial agents and vector control – Without doubt, if this knowledge and these skills had been available in earlier pandemics their impact would have been greatly reduced.

Pestilence, Plague and Pandemics: A Troubled History
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Sir Arthur Newsholme

Wellcome Images