

H24 (DH)

Overall Assessment = HIGH
Overall Impact Score = Moderate (3)
Likelihood Score = Medium (3)

Risk

Emerging infectious diseases.

Outcome Description

Severe Acute Respiratory Syndrome (SARS) is a viral respiratory disease of zoonotic origin caused by the SARS coronavirus (SARS-CoV) and is highly transmissible from person to person, particularly in a healthcare setting. Based upon the experience of the outbreak of SARS in 2002, the reasonable worst case impact of such an outbreak originating outside the UK would involve cases occurring amongst returning travellers and their families and close contacts, with spread to healthcare workers within a hospital setting.

- Short-term disruption to local hospital intensive care facilities.
- Possible disruption of several weeks to elective procedures.

Fatalities & Casualties

Based upon a fatality rate up to 10%, from global experience of SARS, it is possible that there could be a maximum of 200 fatalities across the country and 2,000 casualties. Expect 10 potential cases and 100 follow-up contacts for every single confirmed case of infection, as seen in past SARS outbreak.

Transport

Public concern about travel within and beyond the UK, and possibly international travel restriction advice.

Antimicrobial Resistance

It is important that the possibility of sensitivity to existing anti-microbial agents is assessed on the emergence (or re-emergence) of an infection⁵⁴.

As far as viruses are concerned there are effective antivirals in use against HIV, herpes viruses, hepatitis B and C and influenza A. All of them are subject to the development of resistance in the virus to a greater or lesser extent. If the new or emerging virus was in one of these groups, sensitivity would be assessed. If the virus was not in one of these groups, it is likely that the

⁵⁴ Davies, S. C. 2013. Annual Report of the Chief Medical Officer, Volume Two, 2011. Infections and the rise of antimicrobial resistance. Department of Health, London.
<http://media.dh.gov.uk/network/357/files/2013/03/CMO-Annual-Report-Volume-2-20111.pdf>

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directly or indirectly from animals to man. It is highly probable that such an infection will arise in another country and possible that it could be brought to the UK before it is identified. SARS spread to infect over 8,000 people worldwide within an eight month period before it was contained.

The figures in the outcome description and specific assumptions are based on historical data from the SARS outbreak 2002-2003 and have been endorsed by the Advisory Committee on Dangerous Pathogens.

An emerging infection would not necessarily be a respiratory infection as is the case for SARS and could be a food-borne or a vector borne infection. When they emerge, the risks for new infections might be similar, irrespective of the way in which they are spread. However, the specific detail on management and treatment of patients is dependent on the type of infection.

The Advisory Committee on Dangerous Pathogens recommended the following types of infectious disease that may have sufficient impact and likelihood.

- Food-borne: this is based on the German outbreak of VTEC O104 (Vero cytotoxin-producing *Escherichia coli*) in May 2011⁵⁹ and the French outbreak in June 2011⁶⁰. VTEC symptoms can range from mild gastroenteritis to severe bloody diarrhoea, mostly without fever, through to two serious conditions known as haemolytic uraemic syndrome (HUS) and thrombotic thrombocytopenic purpura (TTP) that affect the blood, kidneys and in severe cases the central nervous system. VTEC are relatively rare as the cause of infectious gastroenteritis in England and Wales, and when they do occur it is usually another serogroup. However, the disease can be fatal, particularly in infants, young children and the elderly. There were around 4,000 cases and 50 deaths. Adjusting for population this would suggest around 3,000 cases in a UK outbreak and around 40 deaths.
- Vector-borne: A vector-borne infection is not transmitted directly from person to person, but via another animal which may, or may not, have symptoms itself. The world's fastest-growing vector-borne disease is dengue fever⁶¹ – transmitted by a mosquito. Others include Chikungunya⁶² the first outbreak of which was reported in 1952

⁵⁹ Outbreak of Shiga toxin-producing *Escherichia coli* (STEC) O104:H4 infection in Germany causes a paradigm shift with regard to human pathogenicity of STEC strains. Beutin L, Martin A. *J Food Prot.* 2012 Feb;75(2):408-18

⁶⁰ Outbreak of Shiga toxin-producing *Escherichia coli* O104:H4 associated with organic fenugreek sprouts, France, June 2011. King LA, Nogareda F, Weill FX, *et.al.* *Clin Infect Dis.* 2012 Jun;54(11):1588-94

⁶¹ The 2012 Madeira Dengue Outbreak: Epidemiological Determinants and Future Epidemic Potential. Lourenço J, Recker M. *PLoS Negl Trop Dis.* 2014 Aug 21;8(8):e3083.

⁶² Chikungunya and dengue autochthonous cases in Europe, 2007-2012. Tomasello D, Schlagenhauf P. *Travel Med Infect Dis.* 2013 Sep-Oct;11(5):274-84

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(mosquitoes), yellow fever (mosquitoes), Lyme disease (ticks), Hantavirus (rodents) and Schistosomiasis (aquatic snails)⁶³. The Health Protection Analytical Team (HPAT) modelling team have carried out a high level preliminary analysis of vector-borne diseases.

Likelihood

There has been no recurrence of SARS since the outbreak in 2003 was contained and the last cases since that time were from laboratory exposure and not community acquired. Although new zoonotic risks arise with a greater frequency than the 1/20 in 5 years, the ability of these infections to spread with such severity between people, as SARS did, is in fact unusual. This is evidenced by the H5N1 avian flu scenario, which represents a serious new zoonosis but, shows no evidence of rapid or easy person to person transmission, so far over a 4 year period. On balance, a likelihood score of 3 (<1/20 but >1/200 over 5 years) is therefore considered a reasonable assumption.

Food-borne disease is based on VTEC. The likelihood of such an outbreak in Europe is estimated at around 1 in 20 years by Public Health England (PHE). This translates to a UK figure of between 1 in 400 and 1 in 200 years on the basis of population, and hence, a probability of about 1 in 50 to 1 in 100 in an NRA period of 5 years.

The modelling suggests that for a vector-borne disease there is a likelihood of between 1 in 2 and 1 in 20 over a five year period.

Score = 3

Economic Impact

Fatalities and casualties - £28 million

Impact on tourism - £2.5 billion

A reduction in tourism for the UK as a whole of 4% over 12 months. Tourism represents 4% of GDP (£1.46 trillion)

Score = 4

Fatalities and Casualties

- A maximum of 200 fatalities across the country and 2,000 casualties based upon fatality rate up to 10%, from global experience of SARS.
- Expect 10 potential cases and 100 follow up contacts for every single confirmed case of infection as seen in past SARS outbreak.

⁶³ Public health and vector-borne diseases - a new concept for risk governance. Schmidt K, Dressel KM, Niedrig M, *et.al.* *Zoonosis Public Health*. 2013 Dec;60(8):528-38

Fatalities Score = 3
Casualties Score = 4

Social Disruption

Effects may include:

- Significant restrictions on travel to and from the country of origin.
- “Worried well” impact would be felt at a national level. This would be due to elevated levels of public concern, particularly due to the unknown nature of the disease. In addition, if the disease is spread by foreign travel there are a number of different entry points into the UK and so we could see cases spread across the UK relatively quickly, increasing public concern.
- Prolonged regional (or even short-term national) disruption to the availability of primary care appointments (due to surge in appointments owing to concerns over symptoms).
- Short-term disruption to local hospital intensive care facilities.
- Possible disruption of several weeks to elective procedures.
- Sporadic closures of schools anticipated where cases in children are confirmed.

Score = 3

Psychological

public outrage

Even though the Government and other authorities can do little to prevent the emergence of natural diseases, there would be some outrage directed at the authorities associated with a perceived failure to contain the outbreak, given the numbers of fatalities and casualties. There would also be anger that diseases were not prevented from spreading to the UK. Blame would be dependent on where the disease has come from but there would be strong views that this should have been prevented.

Score = 2

Public Anxiety

Given the ‘unknown’ factor of new and emerging infectious diseases, there would inevitably be public fear/anxiety as a result of this risk, especially due to the indiscriminate nature of the hazard. The government handling of the outbreak and the media reaction will also play a key part in the level of anxiety.

Score = 3