



SAGE SCIENCE GUIDANCE PAPER

Emerging Infections (H24)

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Purpose of this document

This document is intended to assist the Government Chief Scientific Adviser and the Scientific Advisory Group for Emergencies (SAGE) to provide timely, relevant scientific advice to the Cabinet Office Briefing Rooms (COBR) in the event of an emergency involving a non-influenza emerging or unidentified infectious disease which might affect the UK.

The document includes:

- A brief introduction to emerging infections
- A list of likely questions COBR will ask of SAGE
- A list of potential candidates to supply this information
- A summary of supporting information which might be useful in SAGE discussions

Subsequent iterations of this document intend to include further information on the uncertainty around this information which may need to be stressed when reporting into COBR.

Definition of the risk

Introduction

Infectious diseases are caused by microorganisms including bacteria, viruses, fungi and protozoa; the majority are caused by bacteria and viruses. Although many bacteria and viruses are not associated with serious disease, some cause serious or life-threatening infections, and can result in long-term health problems and/or a high case-fatality rate (CFR). The impact of an outbreak is dependent on the ability of the disease to transmit easily from person to person as well as its severity, and also upon factors such as incubation period and whether affected individuals are infectious for others before they develop overt symptoms, and whether they are well enough to carry on normal routines while infectious.

Some infectious diseases of humans or domestic animals can be transmitted by one or more other animal (vector) species. In these cases the predominant route of infection for people can be from the vector species (a zoonosis). In some such cases both person-to-person, and zoonotic (or domestic animal-to-animal, and vector) transmission may contribute to maintaining an outbreak.

A significant emerging infectious disease is one which is novel or has only recently begun to cause outbreaks in humans or domestic animals; and which has the potential to cause large scale outbreaks in humans or domestic animals. Recent examples are HIV/AIDS, SARS-coronavirus, and MERS-coronavirus in humans; and rabbit haemorrhagic disease virus (RHDV) and Schmallenberg virus in domestic animals. Other already known microorganisms with a previously restricted geographical range can cause concern and pose similar problems to emerging infections if they spread beyond their normal range (e.g. bluetongue disease, African swine fever).

The majority of infections that have emerged in the human population in the last 30 years have been zoonoses, i.e. they have made the jump from animals to humans. In some cases the infection causes no clinical signs in the animal host and it is only when it emerges in humans and causes disease, that the new infection is recognized. Often, the newly emerged infection does not transmit readily from person-to-person, so a certain amount of adaptation to the new host is needed, before widespread infection occurs without exposure to the originating animal. The animal hosts can be various, including rodents, bats, monkeys and avian species (both domestic and wild)

The routes of transmission from the originating animal species and between humans can also vary, depending on the organism. This may include food or water-borne, insect-transmission, blood or body fluid transmission, as well as respiratory transmission.

Emerging bacterial diseases may be treatable with existing antibiotics, however this cannot be known in advance as some types of bacteria are naturally resistant to some antibiotics, and others may acquire antibiotic resistance rapidly from the antibiotic resistance elements that now circulate between and within bacterial communities.

Emerging virus diseases may be treatable with one of the existing antiviral drugs, but as antivirals are often quite specific for a particular type of virus they may only be

effective if the new virus is related to other viruses for which effective drugs exist. It is not considered likely that an existing antiviral drug will be effective in treating an emerging (non-influenza) virus infection.

Emergent infectious diseases with epidemic or pandemic potential have arisen multiple times over the past century. It is difficult to predict where a new infection might emerge or of what type it might be, but it is more likely to occur in areas where there is increased contact with animals through, for example, intensive farming methods that involve large numbers of animals kept in close quarters; farming systems that involve widespread very close contact between people and farmed animals; significant ecological habitat changes; or in areas with poor animal health infrastructure, and/or poor public health infrastructure. In some cases emerging diseases may not be recognized until they have spread beyond the initial geographic focal point.

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The Most Likely Scenario is based on SARS – a completely novel respiratory transmissible virus disease with a CFR of ~10% which was controlled by barrier nursing with isolation of patients, suspect cases, and contacts of confirmed cases; and ebola – an emerging virus disease with a CFR of ~70%, not transmissible by the respiratory route in the natural situation. It should be noted that CFR is not the only measure of severity – a low CFR disease that left 10% of those affected with significant long-term disability would be expected to cause many of the short-term problems of a high CFR disease, with additional health and economic costs post-event.

The Reasonable Worst Case scenario is based on smallpox – a virus disease with a case fatality rate of ~40%, transmissible by respiratory droplets. Eventually eradicated by internationally co-ordinated vaccination, the disease had nevertheless circulated worldwide prior to the introduction of vaccination. Once established, immunity among survivors was high, and new outbreaks became possible when the population of susceptibles had built back to a level that could sustain an outbreak and provide onward transmission to other communities.

Key issue: impact on public and animal health from emerging infectious diseases

Emerging infectious diseases can pose a hazard to human health. The population is unlikely to have immunity to an emerging pathogen, so the majority of the population will be susceptible. If the disease is readily transmissible and particularly if transmission can occur before clear symptoms arise in those affected, then there is potential for the majority of the population to become infected during an epidemic that may last from months to one or two years. The possibility exists for significant excess deaths, short-term morbidity, and long-term morbidity.

There is a further possibility of a disproportionate incidence among healthcare workers, especially in the initial stages of a major epidemic. This was a feature of the early stages of the 2003 SARS event, MERS, and Ebola in West Africa.

Emerging infectious diseases can also affect domestic or wild animal species, either exclusively or in conjunction with infection of humans. As with humans there is unlikely to be population level immunity and most animals of an affected species will be susceptible. Effects can range from high levels of mortality (e.g. RHDV; African swine fever) to reduced growth rates and yields (e.g. foot-and-mouth disease, Schmallenberg disease). Outbreaks can result in restrictions in transboundary movement of livestock and livestock products, imposed unilaterally by trading partners, or by the World Organization for Animal Health (OIE), of which the UK is a member.

Emerging infectious diseases of animals are not expected to adversely impact UK food security, due to the broad based nature of indigenous UK agriculture.

Key issue: impact on social and civil society from emerging infectious diseases

An epidemic of a novel infectious disease with perceived or actual risk to life or long-term health is likely to result in altered behaviours in some or all sectors of society. Altered behaviours are likely to be aimed at avoiding infection. These might be limited to following official advice, or might extend to altered travel or working patterns, or pre-emptive removal of children from otherwise open schools. Where some sectors are perceived as foci of infection (e.g. healthcare workers involved in

care of affected patients; diaspora communities in some scenarios) there is the potential for stigmatization or ostracism of individuals and their family members.

In a serious outbreak, there is likely to be a threshold at which individuals may begin to stockpile essential items such as non-perishable foods, fuel, bottled water, or over-the-counter medicines, against the possibility that supplies may be interrupted through illness of key sector personnel. If stockpiling by a few leads to noticeable reductions in availability, more widespread stockpiling may result, possibly leading to disruptive shortages.

In the event of a serious and spreading human disease that is also associated with a common animal species, there may be avoidance of that species. This may cause friction if the animal species is a companion animal species and avoidance escalates into demands for removal or destruction of pets owned by others.

Key issue: impact on economic stability from emerging infectious diseases

In the Most Likely Scenarios, economic disruption is not anticipated as a direct result of excess morbidity and mortality in the UK population. Although the cost of control measures in the event of a UK based outbreak might be significant they would not be expected to overstress national finances. However, the economic effects of population level pre-emptive actions by the public are an unknown quantity. Absenteeism from schools and workplaces has the potential for additional negative effects on the economy; and disruption to supplies of essential commodities, either through stockpiling or worker absenteeism, has the potential to cause unrest which may also have difficult-to-quantify economic impacts.

In recent decades the UK has experienced multiple outbreaks of infectious animal diseases that have prevented or severely limited the export of specific livestock species and products, and/or led to widespread culling to eradicate the disease (e.g. Bovine Spongiform Encephalopathy; foot-and-mouth disease). Consequently, the economic consequences of a major animal disease outbreak and the available measures to control it are well understood.

Possible areas of focus for SAGE

Hazard Assessment

The potential impact on the UK will be affected by the period of advance warning before the disease arrives in the UK, and the level of understanding of the disease and the pathogen that is available prior to arrival. Although it is likely that any novel disease will arise elsewhere than the UK, there is a possibility that the outbreak will start in the UK (as with BSE), in which case advance warning will be solely dependent on UK biosurveillance efforts.

In reasonable worst case scenarios it is envisaged that advance warning will allow mitigation of impact upon arrival of the disease in the UK.

In the event that an outbreak starts outside the UK, international bodies such as the European Centres for Disease Control (ECDC), WHO, and the US CDC may be early responders and sources of data. The UK is member of the EU (ECDC) and UN (WHO), and thus has formal access to ECDC and WHO. DH and PHE are engaged with the US CDC. For animal diseases, FAO and OIE may be early responders and sources of data. The UK is a member of the UN (FAO) and OIE and thus has formal access to both organizations.

DH, DEFRA and PHE have well established systems for biosurveillance, and for outbreak control with known pathogen threats. There is also a well-established relationship between the three organisations and FSA in which risk assessments of potential zoonoses is carried out and any relevant responses coordinated between veterinary and human health.

COBR requests SAGE advice on:	Key questions for SAGE:
Hazard Assessment	
<p>1.) <u>What do we know about the disease and the microbe that causes it?</u></p> <ul style="list-style-type: none"> • What is the case fatality rate? • How ill are patients, and for how long? • Has the microbe been isolated? • How is it transmitted? • Is the genome sequence known? • What is the incubation period? • Is it infectious before symptomatic? • Are there asymptomatic infections 	<p><u>What data are needed and by when?</u></p> <ul style="list-style-type: none"> • Preliminary (not complete) sequence data is needed immediately • Description of clinical progression is needed immediately • Geographical distribution is needed immediately – to be updated daily if necessary • Numbers of confirmed/suspected cases and outcomes is needed immediately – to be updated daily if necessary • Update on UK biosurveillance

<p>and do these contribute to transmission?</p> <ul style="list-style-type: none"> • What advice/information has been received from international bodies and other nations? • Is it similar to any known microbe/pathogen in any species? • Is there any pre-existing immunity in the population (or any specific sub-groups) <p>2.) <u>What is the likelihood of the disease coming to the UK, and on what timescale?</u></p> <ul style="list-style-type: none"> • Where did it start? • Where is it now? • How is it spreading? • How fast is it spreading? • Can we stop it getting to the UK? • How bad could the situation get? • Is it necessary (or advisable) to repatriate UK nationals from affected countries or regions? • What is the uncertainty, and how can we communicate this to COBR? <p>3.) <u>Once in the UK, can we slow the spread?</u></p> <ul style="list-style-type: none"> • Would restrictions on mass gatherings slow the spread? • Should we close schools (individual classes, local, regional, national, pre-emptive, scheduled or reactive) • Would voluntary home isolation reduce the spread?_ <p>4.) <u>Can we diagnose infected people or animals in time to</u></p>	<p>reports; any evidence of unusual unexplained disease/illness, is needed immediately – to be updated daily if necessary</p> <ul style="list-style-type: none"> • Logistics of monitoring airport/seaport arrivals • Expertise in this class of microbe • Outputs from serological surveys <p><u>What are the sources of the data?</u></p> <ul style="list-style-type: none"> • PHE • DH • PHE/DH co-ordinated modellers • NHSBT • DEFRA • DEFRA co-ordinated modellers • FSA • ECDC • WHO • US CDC • FAO • OIE • Promed • CIDRAP • Other nation health and veterinary authorities • UK Visas and Immigration • Maritime & Coastguard Agency • National or international reference laboratories <p><u>Who are these data shared with?</u></p> <ul style="list-style-type: none"> • Promed and CIDRAP reports are publicly available through their websites and via email. • ECDC, WHO, FAO and OIE reports
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<p><u>prevent/reduce onward spread?</u></p> <ul style="list-style-type: none"> • Do we have a diagnostic test(s)? Where and how can it be used, and by whom? • Can we diagnose people who are not showing symptoms? • Are simple generic tests (e.g. temperature) useful for screening? <p>5.) <u>How long will the outbreak last?</u></p> <ul style="list-style-type: none"> • How long will individual illness last? • If the outbreak is not halted, at what rate will it progress? 	<p>will be sent to country representatives in member states. Some information will also be available through their websites.</p> <ul style="list-style-type: none"> • PHE and DH, and DEFRA will report to the Chief Medical Officer, and Chief Veterinary Officers for the UK and devolved Administrations. • UK Visas and Immigration reports to the Home Office. • Maritime & Coastguard Agency reports to the Department for Transport.
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Health

The mammalian immune system is well adapted for dealing with infectious diseases. Where a debilitating or potentially fatal infection has no vaccine or treatment, supportive care can in some cases be effective by stabilizing the patient until the immune response develops to combat the disease. The health infrastructure of the UK will thus go some way to reducing morbidity and mortality of diseases that may have been initially recognized and characterized in poorer countries with less robust public health systems.

The impact on the healthcare system will depend on the efficacy of supportive care in preventing mortality and long term morbidity, and crucially on the number of patients and the capacity of the healthcare system to accommodate them. Beyond a certain number of affected patients, provision of care for other unrelated or routine health issues will be degraded. The impact will also depend on the generation time of infection, a longer period of disease progression in individuals will spread the load on the healthcare system.

Public Health Messaging

Public health messaging will need to take note of the effect on earnings of disruption of work patterns, and the potential for the public to ignore health messages because of pressure on family finances. Conversely, the messaging must also take into account the potential for over-reaction by the public and the negative economic impacts this may have for individuals, the wider community, and the nation.

It is likely that messages to the public will change over the course of an outbreak, either because improved understanding of the disease has been achieved, or the outbreak is not interacting with the control measures in an expected way. Care should be taken to ensure the public appreciate that this is to be expected, and is an indication that the authorities are both vigilant and robust in the approach to tackling the outbreak. Departmental Comms are expected to undertake tracking surveys to monitor public attitudes, and this information may be useful for optimizing messaging to control disease spread and minimize disruption.

Health	
<p>1.) <u>What is the situation like on the ground?</u></p> <ul style="list-style-type: none"> • What is the immediate short term risk to individuals and their close families? • Are there any particularly vulnerable groups? • What is the current impact on public health? • What is the projected impact on public health? • What precautionary measures can be taken? 	<p><u>What data are needed and by when?</u></p> <ul style="list-style-type: none"> • Known or predicted vulnerable groups (e.g. by age; health status; demographics) • Mode and efficiency of transmission • Current and predicted burden on hospital beds and GP services • Duration of morbidity; predicted long-term sequelae • Protocols to prevent transmission in healthcare setting

<ul style="list-style-type: none"> • Is there anything the Government can do to minimise the impact on public health? • What measures are international partners taking, and why? • How do we ensure early detection of cases? <p>2.) <u>What interventions are available?</u></p> <ul style="list-style-type: none"> • Are there medical countermeasures, and do they work? • If they work, how much is needed? • How much have we got? • What resources and timescales are required to get more? • What is the timeline to an effective, licensed vaccine? <p>3.) <u>What if?</u></p> <ul style="list-style-type: none"> • What would be the impact of the reasonable worst case scenario on public health? • Could it be eliminated from the UK? • What does uncontrolled transmission in the UK look like in terms of hospitalizations, excess deaths and absenteeism? • What is the risk to healthcare workers – is barrier nursing required? 	<ul style="list-style-type: none"> • Advice for public to prevent household and contact transmission • Analysis and outputs from PHE real time syndromic surveillance of health care contacts • Relevant licensed and pipeline drugs • Manufacturing capacity (e.g. pharmaceuticals; personal protective equipment) • Laboratory test availability and capacity (personnel, kits, hardware) • International responses <p><u>What are the sources of the data?</u></p> <ul style="list-style-type: none"> • PHE • DH • PHE/DH co-ordinated modelling community • Pharmaceutical companies • DH co-ordinated comms • WHO • ECDC • US CDC • MHRA <p><u>Who are the data shared with?</u></p> <ul style="list-style-type: none"> • Modelling outputs and analysis will be provided to government stakeholders. • Information on licensed pharmaceuticals will be in the public domain. • Information on pipeline pharmaceuticals will be proprietary to the owners,
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	<p>although some may be in the public domain via press releases, websites or journal publications.</p> <ul style="list-style-type: none">• Some information on manufacturing capacity may be in the public domain; however accurate, up-to-date information will be available through the owners.•
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Transport and Workplaces

Public transport is a critical service that affects all sectors of the economy. With respect to bus services, bus drivers have high levels of face-to-face interaction with the public, and may be (or perceive themselves to be) at increased risk of infection because of their work. Absenteeism by bus drivers, who may not be easily replaceable in the short term, has the potential to disrupt the work patterns of a large proportion of the workforce, with concomitant effects on economic activity.

Public transport by train may be less susceptible to disruption than transport by bus, because of the sequestration of drivers and passengers on trains. However, there may be some disruption to public facing (support) aspects of train transportation, such as information, ticketing and ticket checking, and potentially station-side safety.

In general, public facing jobs, and work environments involving interaction with large numbers of co-workers (e.g. organizations with large workforces) may be at risk of unscheduled absenteeism if public perception of risk is exaggerated. There may also be impacts on social care and services for vulnerable groups, who may experience disproportionate negative effects if services are interrupted.

Transport of goods is less likely to be disrupted than public transport, because of the lower levels of interaction of staff with the public. However, there is the potential for stockpiling of essential items in a perceived severe situation, and this may place a stress upon supply chains. Problems with resupply may lead to an escalation of stockpiling, which may exacerbate problems with resupply. There is the potential for genuine hardship from shortage of some basic goods, and further potential for shortages to inappropriately amplify public concerns about the severity of the outbreak. The public health impact of workplace and public transport closures will be dependent on a number of variables; advice on this could be sought from PHE and PHE/DH co-ordinated modelling communities.

Transport/Workplaces	
<p>1.) <u>What is the risk of transport/workplace disruption?</u></p> <ul style="list-style-type: none"> • Is public transport likely to be a significant source for exposure to infection? • Are public transport workers (e.g. bus drivers) likely to be at increased risk of infection? • Are the risks of infection from public transport likely to be exaggerated in the public mind? • Are some types of workplace (e.g. open plan offices, large workforces, high levels of public interaction) likely to be significant sources of 	<p><u>What data are needed and by when?</u></p> <ul style="list-style-type: none"> • Mode of disease transmission • Breakdown of UK cases by demographics, including profession/economic sector • Abnormalities in work patterns and attendance, by sector • Public perception of the risk of infection <p><u>What are the sources of the data?</u></p> <ul style="list-style-type: none"> • PHE • Local Authorities

<p>infection?</p> <ul style="list-style-type: none"> • What is the potential for shortages due to disruption of, or stresses on the transport of goods? <p>2.) <u>What are the consequences of transport/workplace disruption?</u></p> <ul style="list-style-type: none"> • Will disruption or avoidance of public transport result in significant absenteeism? • Will absenteeism be at a level to cause significant shop/store closures, school closures, or office closures? • To what degree will absenteeism or office closures degrade public and private sector service provision? • What is the potential for disruption of supply of essential goods? 	<ul style="list-style-type: none"> • Trades Unions • Industry/professional associations and governing bodies • Retailers • Retail Associations • Communications Tracker Surveys <p><u>Who are the data shared with?</u></p> <ul style="list-style-type: none"> • PHE will report to relevant government stakeholders and may make press releases and/or respond to press queries. • Local Authorities will report to relevant government stakeholders and may make press releases and/or respond to press queries and queries from the public. • Trades Unions and Retail/industry/professional associations and governing bodies may make information publicly available.
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Child Safety

Child safety is an important concern, and also an emotive issue. Parents are likely to desire definitive information that may not at the time be available, and are likely to make immediate decisions on the basis of the available information, even knowing that that information is incomplete. Parents are likely to desire to err on the side of caution, and where personal circumstances/finances allow, may do so even against official advice. Where personal circumstances or finances will be stretched by pupil absenteeism, there may still be pressure to close schools, especially if a mandated closure will mitigate pressure from employers for continued attendance of parents at work.

Conversely, school closures will negatively affect parents who wish/need to continue attending work but cannot because of childcare conflicts. Public pressure to close schools will not necessarily be based on evidence, and if the evidence indicates that school closures will not contribute to control measures, this message may be challenging to communicate effectively. Widespread unnecessary school closures will have negative economic impacts, and may also have significant educational impacts depending on the length of closures. The public health impact of school closures will be dependent on a number of variables; advice on this could be sought from PHE and PHE/DH co-ordinated modelling communities.

Children	
<p>3.) <u>Do risks to children present additional challenges to control and/or routes to impact?</u></p> <ul style="list-style-type: none"> • Is the outbreak associated with children? Are children classed as superspreaders? • Are children at greater risk of infection than adults? • Is the disease more severe in children? • Are schools/nurseries significant sources of exposure? • Will school closures be effective as a control measure? <p>4.) <u>What are the drivers and consequences of school closures?</u></p> <ul style="list-style-type: none"> • What pressures (local and national) are there for widespread school closures? • What is the impact of 	<p><u>What data are needed and by when?</u></p> <ul style="list-style-type: none"> • Breakdown of UK cases by demographics • Abnormalities in pupil attendance • Abnormalities in staff attendance <p><u>What are the sources of the data?</u></p> <ul style="list-style-type: none"> • PHE • NHS Trusts • Local Authorities • Teaching unions <p><u>Who are the data shared with?</u></p> <ul style="list-style-type: none"> • PHE and NHS Trusts will report to relevant government stakeholders and may make press releases and/or respond to press queries. • Local Authorities will report to relevant government stakeholders

<p>widespread school closures on the economy?</p> <ul style="list-style-type: none">• What level of pupil absenteeism is expected?• What level of staff absenteeism is expected and can schools cope with these absences (can they stay open)?• What level of pupil absenteeism will have significant knock-on effects on parental work patterns?	<p>and may make press releases and/or respond to press queries and queries from the public.</p> <ul style="list-style-type: none">• Teaching Unions may make information publicly available.
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Social Cohesion

The impact of stigmatization and ostracism of individuals or communities due to real or perceived association with an outbreak is unknown. Conceivably this could affect the ability of ostracized individuals and stigmatized groups to access services such as shops, education, the workplace, and public transport. The impact would depend on the scale in terms of numbers of people denied access, and the extent to which access was denied.

Interruption to supplies of water and essential foodstuffs would have the potential to cause significant unrest. In the reasonable worst case scenario, such interruptions are unlikely to be a direct result of the disease, and are more likely to be a result of inappropriate behaviours such as pre-emptive absenteeism in the supply chain, or excessive stockpiling by individuals.

In the reasonable worst case scenario, significant migration away from affected areas within the UK is likely to be the result of inappropriate messaging (e.g. news sources or amateur news sources) and/or active distrust of official messaging. Perceived large-scale migration away from affected areas may have the potential to cause social disruption in unaffected areas.

Social Cohesion	
<p>5.) <u>Is there any risk of social disruption?</u></p> <ul style="list-style-type: none"> • Is the outbreak associated with particular ethnic or religious groups or communities? • Is the outbreak associated with any readily identifiable distinct group or community? • What is the likelihood, and likely level, of migration away from affected areas or regions within the UK? • Is there likelihood of interruption to or shortage of essential services (e.g. power, water, A&E) or supplies (e.g. fuel, essential foodstuffs)? <p>6.) <u>So what?</u></p> <ul style="list-style-type: none"> • Is social disruption likely to interfere with overall disease control measures? • Is social disruption likely to impact (any particular sector of) the economy? 	<p><u>What data are needed and by when?</u></p> <ul style="list-style-type: none"> • Breakdown of UK cases by demographics, including profession/economic sector • Abnormalities in retail sales patterns, especially with regard to essential items <p><u>What are the sources of the data?</u></p> <ul style="list-style-type: none"> • PHE • NHS Trusts • Local Authorities • Essential service providers • Retailers • Retail Associations • <p><u>Who are the data shared with?</u></p> <ul style="list-style-type: none"> • PHE and NHS Trusts will report to relevant government stakeholders

	<p>and may make press releases and/or respond to press queries.</p> <ul style="list-style-type: none">• Local Authorities will report to relevant government stakeholders and may make press releases and/or respond to press queries and queries from the public.• Retailers may make sales information publicly available.
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Animal Health

DEFRA have experience with controlling serious epidemics of animal disease. DEFRA has the authority to order local or national culls, and impose local or national movement restrictions for domestic animals in certain situations defined by legislation. Although animal welfare is a concern, the main drivers for control measures where animals are a reservoir or vector for a human disease are likely to be public health, and economics (where an animal disease affects export capability or growth rates and yields). Although the UK imports foodstuffs, it nevertheless has the ability to feed the nation through indigenous agriculture in an emergency. The broad base of UK agriculture means that an animal disease is unlikely to directly threaten food security.

Animal Health	
<p>1.) <u>What species are affected?</u></p> <ul style="list-style-type: none"> • Are domestic or companion species affected? • Are wildlife species affected? • Is culling of infected animals required? • Is area culling required? • Will culling and/or surveillance of companion animals or wildlife be accepted or resisted? • Is there a potential or actual wild animal reservoir? • What is the impact on productivity in domestic animals? • Is quarantine an acceptable control measure for affected animals and/or farms? • What are the impacts on animal welfare for infected or quarantined animals? <p>2.) <u>Can animals transmit the disease to humans?</u></p> <ul style="list-style-type: none"> • Do we have reason to be concerned about food safety? Are there any mitigating actions which need to be taken? • Does contact with infected animals constitute a risk to humans? • Could there be an impact on 	<p><u>What data are needed and by when?</u></p> <ul style="list-style-type: none"> • National veterinary surveillance data • International veterinary surveillance data • Modelling analysis of projected spread and effect of interventions • Agricultural yield and production data • Livestock, companion animal and wildlife demographic data <p><u>What are the sources of these data?</u></p> <ul style="list-style-type: none"> • APHA • DEFRA • FAO • OIE • DEFRA co-ordinated modelling community <p><u>Who are these data being shared with?</u></p> <ul style="list-style-type: none"> • Veterinary Risk Group • Chief Veterinary Officers • Surveillance Intelligence Unit

<p>food supply or availability of particular foodstuffs?</p> <p>3.) <u>What if?</u></p> <ul style="list-style-type: none"> • What is the expected impact of the reasonable worst case scenario on animal health? • In the case of a zoonosis, what are the options for controlling the reservoir species? • In the case of a vector borne disease, what are the options for controlling the vector (e.g. biting insects)? • What is the expected impact of the reasonable worst case scenario on the environment? 	<ul style="list-style-type: none"> • Species Expert Groups • Industry bodies • Farming and veterinary press if necessary • FAO and OIE will report to country representatives in member states, and may publish information on their websites and by press release. • Human-Animal Infections and Risk Surveillance Group (HAIRS) • Science Advisory Council – Exotic Disease Sub Committee (SAC ED)
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Public Understanding

The responses of the public to a severe emergent disease, and to official advice on control measures are critical to both controlling the disease and minimizing the economic disruption that arises from the disease and the control measures. Disease control may be undermined by public apathy in the case of public perception that the severity is over-stated. Equally disease control may be undermined by failure to follow advice that is publicly perceived as population level control that puts some individuals at risk under some circumstances.

A major concern is the provision of advice from non-official sources, which in some cases will be ill-informed but may appear to be authoritative. This can operate in both directions – to encourage apathy or to encourage over-reaction – and can have negative impacts on both control measures and economic activity. Lack of highly responsive official advice; conflicting advice from different official sources; and lack of confidence in official advice all have the potential to exacerbate deficits in public understanding.

Public Understanding	
<p>1.) <u>How do the public perceive the immediate short term risk to themselves and their close families?</u></p> <ul style="list-style-type: none"> • What unofficial information sources are the public likely to access? How will these interact with official messaging? • Do the public accept that advice will change as understanding of the disease increases? • To what extent is outbreak control dependent on widespread adoption of official advice? • To what extent is economic continuity dependent on widespread adoption of official advice? • How is official messaging co-ordinated to ensure timely release of information, timely response to requests for information, and avoidance of contradictory messages from different government sources. • To what extent is social cohesion dependent on widespread adoption of official advice? 	<p><u>What data are needed and by when?</u></p> <ul style="list-style-type: none"> • Continuous attention to formal and informal news reporting by traditional and web based (e.g. bloggers) sources. • Departmental policies across government on requests for interviews/information (which departments will respond and which will pass requests on to other departments). • Defra 'Core Groups' (advise on impact on particular livestock sectors) <p><u>What are the sources of these data?</u></p> <ul style="list-style-type: none"> • Departmental comms and policy teams. <p><u>Who are these data being shared with?</u></p> <ul style="list-style-type: none"> • Departments, CO, and potentially news outlets.

Economic Disruption

A significant outbreak of an unknown disease will have economic as well as public health impacts, and the immediate priority of disease control may have secondary economic effects. This is true for precautionary control measures as well as for reactive control measure, and it is important that control measures be assessed for both disease control and economic impact. If apparently reasonable measures are assessed by public health experts to have little impact for disease control, then potential negative economic

impacts should be carefully considered if there is public pressure to pursue them. The possibility exists for pressure from industry/business groups to minimize economic disruption, with competing pressure from healthcare groups to maximize control efforts. Government will have to achieve balance between these requirements, bearing in mind that control of an infectious disease before it becomes widespread is likely to require interventions before it is absolutely clear that it will become widespread if left unchecked. In effect, if a robust plan is in place, there is a reasonable expectation that control measures will be applied to some outbreaks that turn out to be false positives. Emergency plans must therefore include assessments of economic damage from implementation (for false positives); economic damage from lack of implementation (for false negatives); and routes to achieve disease control with the least possible acute disruption to economic activity.

Economic Disruption	
<p>1.) <u>At peak incidence, what proportion of the workforce will be incapacitated, and for how long?</u></p> <ul style="list-style-type: none"> • Are particular sectors of the economy likely to be disproportionately affected? • Is any particular sector of the economy likely to be affected <i>en masse</i> at the same time? <p>2.) <u>What is the impact of control measures on economic continuity?</u></p> <ul style="list-style-type: none"> • Are large scale school closures advisable? • Is closure of public (mass) transport systems advisable? • What travel guidance should be given (nationally and internationally)? • What is the potential for economic disruption from pre-emptive actions by the public, against or in the absence of official advice? 	<p><u>What data are needed and by when?</u></p> <ul style="list-style-type: none"> • Severity and duration of disease • Transmission rates • Demographic patterns in transmission • Expected magnitude of peak incidence <p><u>What are the sources of this data?</u></p> <ul style="list-style-type: none"> • PHE • DH • PHE/DH co-ordinated modelling community • CBI • DoE <p><u>Who are these data being shared with?</u></p> <ul style="list-style-type: none"> • Modelling outputs and analysis will be provided to government stakeholders. • CBI may communicate directly with news outlets.

Annex A- SAGE Agenda Template

AGENDA

Scientific Advisory Group for Emergencies

[DATE]

[TIME]

35 Great Smith Street
London, SW1P 3PQ

Agenda Item	Reference and Title
1. Welcome <ul style="list-style-type: none"> • Minutes from previous meeting • Actions • Update on COBR 	
2. Situation Report <ul style="list-style-type: none"> • Characteristics of the outbreak • Geographic incidence • Rate of transnational spread [PHE]	
3. Indicative scenarios <ul style="list-style-type: none"> • Most likely • Reasonable Worst Case • Conceivable Extreme Worst Case 	
4. Hazard Assessment [PHE]	
5. Health [DH]	
6. Social Cohesion [HO]	
7. Animal Health [DEFRA]	
8. Public Understanding [DH]	
9. Economic Disruption [GOSci]	
7. AOB	

Annex B – CRIP Headings

Title	Sequentially numbered to include DTG (date time group) on information cut off Include contact details
Overview slide	Summary of key issues/impacts
Aims and objectives	Aim <ul style="list-style-type: none"> •
Current situation UK International	Human health impacts
modelling	<ul style="list-style-type: none"> • forecast • forecast <p>To include reasonable worst case scenario. Include key detailing such as facts of case/s Risk assessment UK/ECDC</p>
Transport impacts	
Health impacts	
Environmental Impacts	
Repatriation of British Nationals (BNs)	
Wider sector impacts	Other transport impacts, particularly rail. Public anxiety
International response	Wider EU/USA impacts/closures – Government response UK co-ordinating activity
Recovery	Work underway to ensure recovery of disrupted services
Media	Key media reporting
Parliamentary	Ministerial statements