An introduction to the animal influenza risk to public health in Scotland and the governance structure in place during a national outbreak.
CONTENTS

EXECUTIVE SUMMARY .................................................................................................................. 3

ABBREVIATIONS .......................................................................................................................... 5

GLOSSARY ..................................................................................................................................... 6

INTRODUCTION ............................................................................................................................ 7

I: INFLUENZA ................................................................................................................................. 7

Figure 1 ........................................................................................................................................ 8
Figure 2 ........................................................................................................................................ 9
Animal influenza ............................................................................................................................. 10
Birds and influenza ......................................................................................................................... 10
Pigs and influenza .......................................................................................................................... 10
Figure 3 ........................................................................................................................................ 11
Contemporary influenza viruses .................................................................................................... 11
Table 1 .......................................................................................................................................... 12
H1N1 pandemic – ‘Swine flu’ .......................................................................................................... 13
H5N1 – 'bird flu' ............................................................................................................................. 14
H7N9 ............................................................................................................................................ 15
Other .......................................................................................................................................... 15
Vaccination and anti-viral medication ............................................................................................ 16

II: POLICY AND CONTINGENCY PLANNING ............................................................................ 17

Statutory responsibilities ............................................................................................................... 17
International Obligations ................................................................................................................ 17
European obligations ....................................................................................................................... 18
United Kingdom Obligations .......................................................................................................... 18
Scottish Obligations ....................................................................................................................... 19
Information Box 1: Duties on Medical Practitioners .................................................................... 21
Information Box 2: Duties on Diagnostic Laboratories .................................................................. 22
Scottish Veterinary Health Legislation ........................................................................................... 23
Influenza Disease Management Principles .................................................................................. 23
UK Strategies for Dealing with Influenza Incursions ................................................................... 23
Role of the Scottish Government .................................................................................................... 24
Figure 3 ....................................................................................................................................... 25
Roles and Responsibilities within Scotland ..................................................................................... 25
Table 2 ....................................................................................................................................... 27
Veterinary Public Health ................................................................................................................. 27
Public Health Surveillance .............................................................................................................. 28
Veterinary Surveillance ................................................................................................................... 29

SOURCES ...................................................................................................................................... 30

Images .......................................................................................................................................... 33
EXECUTIVE SUMMARY

- The emergence of novel and potentially highly virulent strains of influenza virus are a constant possibility.
- The complex dynamics of the human-animal interface, human immunity, viral mutation and global movement of animals and humans makes prediction of outbreaks difficult.
- Pandemic disease refers to an infectious/communicable illness that occurs within a large geographical region (several countries, continents).
- The frequent mutation of influenza viruses means that strains arise to which the human population has no immunity i.e. naïve; this can result in pandemic disease.
- A network of surveillance is in place from local to international level in both humans and animals to detect the emergence of influenza strains at an early stage.
- National contingency plans are in place to allow prompt and flexible responses to influenza outbreaks.
- Strategic Co-coordinating Groups coordinate local, multi-agency responses in Scotland, with the support of other agencies as appropriate.
- The UK Government (in agreement with the Devolved Administrations) had designated the Health Protection Agency (HPA) to act as the national focal point for the whole UK and only the HPA could communicate directly with the WHO on IHR matters. It has been agreed that following the abolition of the HPA in April 2013, and establishment of Public Health England, that the Department of Health will in future fulfil this role.
- The Department of Health is the lead agency that would take the over-arching responsibility for the UK response where an influenza outbreak extends beyond the jurisdiction of the Scottish Government. It will coordinate the public health response to an influenza pandemic.
- An influenza strain may lead to pandemic disease if:
  1. A new subtype of Influenza virus is introduced into a susceptible human population;
  2. The virus causes severe illness in humans;
  3. The virus can spread easily and in a sustained manner from human-to-human.
- Whilst prior exposure to some influenza virus strains may provide some protective immunity to newly emerging strains of influenza in a population this can be variable.
- An antibody is a protein produced by the immune system in response to a viral infection. This may be measured in blood to indicate contemporary or historical exposure to a
There is evidence that there is considerable variation in antibody levels in the population to the 2009 pandemic influenza strain in Scotland. Between 27% and 70% of individuals in any age group or location were considered to be susceptible to infection in one study.

- The seasonal influenza vaccination programme in Scotland is well established and enjoys considerable success – Scotland is one of only three EU countries to consistently achieve uptake rates of greater than 75% in the population over the age of 65. Pre-existing high vaccination coverage may be helpful when considering a pandemic vaccination programme.

- Vaccination in Scotland in response to the 2009 influenza pandemic was generally effective and limited influenza-like illness in risk groups.

- There is currently concern regarding the emergence into the human population of two novel strains of Influenza A, H5N1 and H7N9.

- One of the core features of a pandemic influenza strain is sustained human-to-human transmission. Of the emergent strains this sustained transmission has not been demonstrated so far.

- UK-wide contingency plans, human and animal surveillance and an integrated governance structure are features of the UK Government and Devolved Administrations approach to future pandemic influenza incursions. The World Health Organisation rated the 2009 UK contingency measures as within the top 25 per cent in an international comparative analysis.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHVLA</td>
<td>Animal Health and Veterinary Laboratories Agency</td>
</tr>
<tr>
<td>COBR</td>
<td>Cabinet Office Briefing Room</td>
</tr>
<tr>
<td>CMO</td>
<td>Chief Medical Officer</td>
</tr>
<tr>
<td>CONOPS</td>
<td>Concept of Operations</td>
</tr>
<tr>
<td>DEFRA</td>
<td>Department for the Environment, Farming, and Rural Affairs</td>
</tr>
<tr>
<td>DH</td>
<td>UK Department of Health</td>
</tr>
<tr>
<td>EC/EU</td>
<td>European Commission/European Union</td>
</tr>
<tr>
<td>ECDC</td>
<td>European Centre for Disease Control</td>
</tr>
<tr>
<td>LPAI</td>
<td>Low-pathogenicity avian influenza</td>
</tr>
<tr>
<td>HPA/HPE</td>
<td>Health Protection Agency/Health Protection England</td>
</tr>
<tr>
<td>HPAI</td>
<td>High-pathogenicity avian influenza</td>
</tr>
<tr>
<td>HPS</td>
<td>Health Protection Scotland</td>
</tr>
<tr>
<td>IAV</td>
<td>Influenza A virus</td>
</tr>
<tr>
<td>ILI</td>
<td>Influenza-like Illness</td>
</tr>
<tr>
<td>SCG</td>
<td>Strategic Co-ordinating Groups</td>
</tr>
<tr>
<td>OIE</td>
<td>World Organisation for Animal Health/formerly - Office International des Epizooties</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
</tr>
</tbody>
</table>
GLOSSARY

Antigen/Antigenic - proteins on, or within, a pathogen (such as influenza virus) that are considered foreign by the immune system.

Antibody – pathogen-specific proteins produced by the immune system in response to an infection. Antibodies are specific to antigens.

Avian – referring to birds

Endemic - present or usually prevalent in a population at all times

Epidemic – when new cases of a disease substantially exceed, in time and geographical spread, what is reasonably expected from previous knowledge.

Epidemiology - the study of the factors and interactions that affect the health and illnesses that affect populations by both communicable and non-communicable diseases.

Exotic disease - defined as those not present, or endemic, in the country.

Host – individual human or animal that is infected by a virus.

Notifiable disease - a disease that is required by law to be reported to the government authorities.

Swine – referring to pigs (also ‘porcine’)

Pandemic - WHO Member States are grouped into six regions worldwide. WHO definition – pandemic phase 6 - “is characterised by community level outbreaks in at least one other country in a different (second) WHO region” in addition to pandemic phase 5 where an “identified virus has caused sustained community-level outbreaks in at least two countries within a WHO region”.

Pathogen – a disease-causing micro-organism, e.g. bacteria, virus, etc.

Viral tropism - the specificity of a virus for a particular host is determined in part by the interaction between the viral surface structures and receptors present on the surface of the host cell. In very simplified terms, only if viral proteins ‘fit’ into proteins on host cells will the virus pass into the cell.

Zoonotic - a disease that usually occurs in animals that may be transmitted to humans. A reverse zoonotic transmission can also occur, i.e. human to animal.
INTRODUCTION

Seasonal influenza outbreaks and the emergence of novel strains ensure that the risk of pandemic influenza remains a critical public health concern.

This briefing sets out to summarise: the relevant information regarding influenza virus ecology; historical and contemporary pandemics; the pertinent legislative guidance and contingency plans; and, regional and global surveillance strategies that are in place for human and veterinary health.

Although much of the public health contingency for pandemic influenza in Scotland is devolved, consensus strategies exist for the whole of the UK. The briefing refers to documents both from the Scottish Government and those pertaining to the UK response as a whole. Contingency documents are exhaustive and the aim of this briefing is only to clarify the nature of the influenza and the responsibilities that exist in terms of protecting public health.

This briefing covers two main themes: I) Influenza - the nature of influenza and contemporary influenza outbreaks and, II) Policy and Contingency Planning - the public and veterinary health legislation and competencies during pandemic influenza.

The briefing does not consider the current risk to the UK based upon modelling and scientific advice as this is a dynamic situation and likely to be incorrect beyond the publication date. However, links are provided to the official resources for the most recent and relevant information.

I: INFLUENZA

Influenza (‘flu’) is an infectious, viral respiratory disease, caused by Influenza viruses, which may affect many thousands of people often with a seasonal incidence. Influenza A virus(es) (IAV) are a subset of influenza viruses within a larger family of viruses, including Influenza B and C. Influenza A viruses have caused all known flu pandemics.

Symptoms associated with IAV infection range from mild, ‘cold-like’ illness, such as a sore throat, to very severe respiratory disease, and may even be fatal. Susceptibility to the virus may be greater in certain risk groups such as the elderly, the very young and those with pre-existing medical conditions.

With unpredictable frequency novel strains of the virus may emerge that spread rapidly within a population. There are many strains of influenza and the severity of the disease that they cause varies; this may not be well understood at the start of an outbreak. Influenza viruses frequently develop mutations within their genetic material and this is critical in the emergence of new strains.

Influenza viruses maintain on their surface two structures termed ‘haemagglutinin’ (HA) and ‘neuraminidase’ (NA), Figure 1 (see below). These structures have critical roles in the spread of the disease, how virulent the viral strain is, and are also related to the virus’s ability to infect particular species (host), termed its tropism. Some strains seem to be more flexible and can circulate within several species (Figure 2, page 9). For transmission between different species these emerging strains need to have achieved some form of adaptation to that species. No single virus protein ensures successful infection or replication within a host.
There are 17 HA and 10 NA sub-types designated H1-17 and N1-10. The combination of these HA and NA sub-type markers defines the viral strain and may be seen to be written in combination, for example, H1N1. Recently a distinct lineage of influenza, identified in bats, was found to contain H17 and N10 markers. This extends the previously known marker range H1-16 and N1-10 (Tong, et al, 2012). Over the past century the viral strains that have circulated within the human population have been restricted to H1N1, H2N2, H3N2 and H1N2 (Neumann, et al, 2010). Currently in Scotland, Influenza A/H3N2, H1N1 (the 2009 pandemic strain) and Influenza B are the most common cause of seasonal influenza (HPS, 2013a). The complex dynamics of influenza virus mutation, human immunity, animal-human interfaces, global transport, the food industry and animal movement means that the emergence of novel, virulent strains of influenza are a constant possibility.

**Figure 1**

Figure 1: In this schematic a virus is represented as a sphere on the surface of which multiple proteins sit. There are two key proteins on the surface of influenza virus, HA and NA, which are highly variable between strains. The HA protein has relevance as it is partly responsible for **host tropism**, the specificity of a strain for a particular animal species. These viral surface proteins attach to the surface of host cell receptors to start the process of being taken into the cell. Illustration by author. Concept adapted from Medina and Garcia-Sastre (2011).
Figure 2: Graphic indicating the potential for cross-species transmission of influenza strains. Graphic reproduced with the kind permission of David McCandless, www.informationisbeautiful.net (Version 1.1, April 2013)
The evolution of seasonal IAV occurs through **antigenic drift**. This is a process of gradual, cumulative changes arising through mutations in the genetic information of the virus. Immunity to a strain of influenza in the human population encourages the selection and emergence of mutated strains. Consequently, strains arise that partially overcome current human immune protection and these are largely responsible for seasonal influenza, often referred to as 'winter, or seasonal, flu'.

The simultaneous infection of a cell within the respiratory tract (e.g. lungs) of a particular animal host with two or more distinct virus strains can lead to a 'mixing' of genetic material termed **re-assortment**. With Influenza A viruses, an abrupt, dramatic change in the HA component of the virus can occur by **antigenic shift** – often through the mixing of genetic material from human and animal influenza viruses - resulting in the formation of a new sub-type of influenza. Classically this has been associated with the development of novel viral sub-types, to which we have little immunity. This can lead to **pandemic** disease. The 2009 Influenza A/H1N1 pandemic strain challenged this rule as it was a pandemic arising from a well-characterised sub-type (Medina and Garcia-Sastre, 2011).

**ANIMAL INFLUENZA**

Influenza A viruses are shared between humans and animals and many circulate within, and between, these populations. Media reports are often confusing in the use of terminology relating to the source and transmission of influenza between animal and humans. The transmission of an infectious disease between animals and humans is termed a **zoonotic** infection and as such makes influenza in animals a public-health issue. Equally, reverse infections are possible from humans to animals. In both poultry and pigs overt and low-grade disease are caused by Influenza A viruses and represent an important cause of production-limiting disease, i.e. animals do not grow well if they are sick. The risk of zoonotic infection makes swine and avian influenza outbreaks a **notifiable disease**.

**Birds and influenza**

Wild waterfowl (ducks, geese, etc..) represent the principle reservoir for all HA sub-types of influenza A. Influenza A in birds may be divided into High Pathogenicity (HPAI) and Low Pathogenicity (LPAI) strains, which relates to the severity of disease that it causes in avian hosts. LPAI viruses generally cause mild respiratory disease and production losses; HPAI viruses cause significant mortality in domestic and production birds. Recently HPAI strains of LPAI H5 and H7 have emerged. In wild birds, infection with HPAI H5 or H7 subtypes is rare and does not always cause disease (Neumann, *et al*, 2010). Recently there have been exceptions to this with widespread outbreaks of disease caused by H5N1.

The zoonotic origin of human pandemic strains is well-described, and although emergent strains such as HPAI H5N1 have spread through birds and resulted in lethal human infection these novel viruses have yet to achieve sustained human-to-human transmissions necessary for a pandemic. The high fatality rate (50-60%) in some recent human outbreaks has highlighted the relevance of continued vigilance.

**Pigs and influenza**

Pigs and humans have shared IAV since at least 1918, (see Table 1, page 12). Approximately 100 inter-species transmissions have occurred since then, however, much less is understood about the ecology and circulation of IAV between humans and pigs than between birds to humans. Pigs can become infected with influenza viruses from a variety of sources including humans and birds (Figure 2, above). The ability of an influenza strain to infect a species depends on the type of receptor that is found in that species (see 'tropism'). Humans and birds
have distinct receptor types in their lungs. Within their respiratory systems pigs have all the cell receptors that are otherwise distinct between humans and birds. This can mean that they act as ‘mixing vessels’ permitting re-assortment of genetic material from different influenza viruses and creating a ‘new’ viral strain that may be easier to spread in humans (see Figure 3, below). The possibility of HPAI bird strains adapting to humans through a re-assortment event in pigs is of particular concern (Ma, et al, 2009).

**Figure 3**

![Image of Figure 3](image)

**Figure 3**: The natural reservoir for Influenza type A virus sub-types H1-16 is wild water fowl. From these wildlife reservoirs influenza viruses are frequently transmitted to domestic and commercial poultry. Transmission between poultry and pigs also occurs especially within the live animal ‘wet markets’ of South-East Asia. Human and avian strains can both infect pigs where re-assortment can occur. Pigs are proposed to act as ‘mixing vessels’ for Influenza A viruses. Pigs and humans have two-way transmission ecology. Occasionally avian influenza from either domestic or wild birds will be transmitted to humans, as is seen in the recent H5N1 and H7N9 outbreaks in China, with resultant human fatalities.

In this schematic representation frequent and/or confirmed transmission is represented by solid lines; possible and/or occasional transmissions are represented by dotted lines.

CONTEMPORARY INFLUENZA VIRUSES

There have been four pandemic influenza events in recent history, which are defined in Table 1, below. A global influenza pandemic may occur if three conditions are met:

1. A new subtype of Influenza A virus is introduced into a susceptible human population.
2. The virus causes serious illness in humans.
3. The virus can spread easily from person to person in a sustained manner.

Table 1

<table>
<thead>
<tr>
<th>Pandemic</th>
<th>Area where virus arose</th>
<th>Estimated Case Fatality Rate</th>
<th>Estimated attributable mortality worldwide</th>
<th>IAV sub-type</th>
<th>Age groups most affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1918-1919</td>
<td>Unclear</td>
<td>2-3%</td>
<td>20-50million</td>
<td>H1N1</td>
<td>Young adults</td>
</tr>
<tr>
<td>‘Spanish Flu’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1957-1958</td>
<td>Southern China</td>
<td>0.1-0.2%</td>
<td>1-4 million</td>
<td>H2N2</td>
<td>Children</td>
</tr>
<tr>
<td>‘Asian Flu’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968-1969</td>
<td>Southern China</td>
<td>0.2-0.4%</td>
<td>1-4 million</td>
<td>H3N2</td>
<td>All age groups</td>
</tr>
<tr>
<td>‘Hong Kong Flu’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009-2010</td>
<td>Mexico</td>
<td>&lt;0.025%</td>
<td>WHO estimates awaited.</td>
<td>H1N1</td>
<td>Children (5-14), young adults, pregnant women</td>
</tr>
<tr>
<td>‘Swine Flu’</td>
<td></td>
<td></td>
<td>Predicted to be &lt;1 million; ~18,000 confirmed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 highlights the four historical pandemic influenza events, the strains associated with them and the case fatality rate. Recent outbreaks have been associated with much lower case fatality rates and a higher incidence in younger individuals. Sources: WHO; [www.flu.gov](http://www.flu.gov) (U.S. Department of Health & Human Services)
H1N1 pandemic – ‘Swine flu’

2009-2010

Influenza A/H1N1 strains have circulated in the human population for many decades and a strain of H1N1 was responsible for the 1918 ‘Spanish Flu’ pandemic. A novel H1N1 strain of swine origin emerged in 2009 causing the first influenza pandemic of the 21st century. In twelve months it spread world-wide and was attributed to more than 18,000 deaths (see Table 1, above). Fortunately, however, illness for most was no more severe than symptoms of the common cold. There were several differences in the 2009 pandemic that did not fit the classical understanding of influenza outbreaks.

The 2009 strain, termed Influenza A/H1N1pdm2009, contained viral sub-units that had origin in both North American and Eurasian swine influenza lineages. However, this combination of sub-units had not previously been recognised and exposure to swine was not a fundamental risk feature of human cases. The pandemic of 2009 was inappropriately referred to as ‘swine flu’, a phrase that resulted in considerable public misinformation and financial impacts on pork production (Vincent, et al, 2013). The primary documented human cases of the 2009 pandemic preceded swine outbreaks and the rapid spread within pigs of the H1N1pmd2009 strain could be attributed to spread by humans rather than the trade in pork. Furthermore, there was evidence of multiple ‘reverse zoonosis’ events with humans infecting pigs (Vincent, et al, 2013).

Epidemiological studies suggested that the H1N1pdm2009 strain possibly emerged through a single introduction into humans in North America, most likely in Mexico, an area with poor surveillance of humans and susceptible animal hosts. It has been suggested that precursors to this virus would have circulated in pigs for many years prior to the first transmission to humans. This strain was then likely to have spread for three months in humans prior to being detected (Medina and Garcia-Sastre, 2011).

Although seasonal influenza virus outbreaks are largely influenced by the global migration of viruses, especially with cold, wintery conditions favouring transmission (Lowen, et al, 2007), unusually the H1N1pdm2009 strain started in spring in the Northern Hemisphere, spread during summer and produced a larger, second phase of infections in the autumn.

Recently a cycle of human-to-swine transmission, subsequent evolution of the virus in pigs and re-transmission to the human population has been established (Vincent, et al, 2013). This means that sporadic zoonotic infections represent a continuous threat to public health. This is particularly relevant as population immunity acquired from seasonal vaccination or natural exposure may not be sufficiently protective against emerging swine-evolved strains.

H1N1 in Scotland

The 2009 pandemic strain spread much more slowly through the Scottish population than expected (Scottish Government, 2009). A study of 1563 individuals between October 2009 (when targeted vaccination of high risk individuals commenced) and April 2010 found that up to 44% of the study population had produced antibodies to H1N1pdm2009. The rate of infection was higher for younger than older adults, suggesting the older population had some pre-existing immunity, or protection, to the pandemic strain. Overall the central estimate for the incidence of the infections was ~5/1,000 people per day (McLeish, et al, 2011). At the peak of the pandemic 10.3% of unvaccinated health care workers were found to have mounted an immune response to H1N1pdm2009 with the conclusion that the vast majority of health care workers were still at risk of illness at the introduction of the vaccination programme (Smith, et al, 2011). There has been subsequent evidence that there is considerable variation in antibody levels to the
H1N1pdm2009 strain by age and location across Scotland with between 27% and 70% of any age group or location being susceptible to infection (Adamson, et al, 2011).

H5N1 – ‘bird flu’

1997-present

Outbreaks of HPAI Influenza A/H5N1 virus infections were first recorded in poultry in Gaungdong province, Southern China (1996) arising from geese strains. There were only a few mutations in the LPAI H5N1 strain that resulted in a novel HPAI H5N1 strain. This led to the death or culling of large numbers of domestic and production poultry. In March 1997 the HPAI H5N1 strain broke out in Hong Kong poultry markets and spread to humans. In early outbreaks there were occasional transmissions to humans from birds with fatality rates of 60% in individuals with overt illness. There were only sporadic cases between 1997 and 2003 when there was re-emergence of human infections. H5N1 is now considered endemic in Asia having spread to approximately 60 countries. Local conditions, including the presence of live animal ‘wet markets’, is related to the continued presence of H5N1 within a region (Yin, et al, 2013).

Highly Pathogenic Avian Influenza (HPAI) H5N1- Cellardyke Harbour, East Neuk of Fife, Scotland

A dead Whooper swan was found in Cellardyke harbour in April 2006. The swan was submitted for routine testing as part of the on-going UK wild bird survey. The H5N1 virus was isolated and characterised as HPAI by the national reference laboratory at the Veterinary Laboratory Agency, Weybridge. There were no further detections of HPAI H5N1 in wild birds or domestic poultry during that year (Scottish Government, 2007).

In June 2013 the World Health Organisation (WHO) confirmed that since 2003 there had been 630 confirmed cases of H5N1 infection with 375 deaths (WHO, 2013a). The majority of these were in Indonesia, Egypt and Vietnam. Almost all the people that have become infected with H5N1 have had close contact with infected birds or their environments; human-to-human transmission was not a feature of the H5N1 strain.

Given the high mortality rate in humans that have become infected, public health scientists were keen to establish what mutations in the H5N1 virus would facilitate human-to-human transmission. Influenza H5N1 strains maintained in laboratories were modified and were found to have increased transmission potential in the model this group used (Imai, et al, 2012). These studies were undertaken to aid the early detection of emerging H5N1 viruses that are highly transmissible. Naturally the development of strains of influenza with a greater potential of being transmissible between humans caused concern. In January 2012 a voluntary moratorium was imposed within virology research groups to allow biosecurity to be re-assessed and findings to be discussed with national public health bodies. This moratorium was lifted in January 2013 (Fouchier, et al, 2013).

Although there are potential vaccines being developed to protect against H5N1 none are currently available for population level use; the vaccines used for seasonal influenza strains would not be protective. As an alternative strategy the Roslin Institute, Edinburgh, is part of a UK collaboration which has developed commercial chickens with genetic modifications that would prevent the onward transmission of HPAI (Lyall, et al, 2011). This research is on-going.
**H7N9**

### 2013-present

In spring 2013 outbreaks of Influenza A/H7N9 were reported in Eastern mainland China, and Taiwan, by WHO (2013b). In recent history this subgroup of IAV had only been detected in birds and this is the first time that human infection with H7N9 subtype has been detected. Concern was raised because most of the human infections resulted in severe illness and little was known about the scope of the disease and the source of exposure.

By early June there had been a total of 132 laboratory–confirmed cases of Influenza A/H7N9; this included 37 deaths. Although most patients were elderly, illness in younger patients was also reported with ages ranging from 4-87 years old. Sporadic outbreaks in previous years due to Influenza A (H7) had generally resulted in mild illness (WHO, 2013c).

Testing of more than 20,000 people with influenza-like illness (ILI) in China in March and April has confirmed only six infections with H7N9. This finding suggests that milder cases of H7N9 infection are not occurring in large numbers and this does not support human-to-human transmission.

The main sources and reservoirs have not been defined and the virus had not been associated with reports of severe disease in poultry. The risk of extensive international community spread is considered unlikely. The conclusion of the WHO risk assessment was that special screening at points of entry was not necessary, nor was any restriction on travel or trade (WHO, 2013c).

The European Centre for Disease Control (ECDC) published an updated Rapid Risk Assessment on 8 May 2013 with recommendations for the European Union (EU) (ECDC, 2013). The main conclusion of this publication was that the most likely scenario for H7N9 incursions into the EU was from travellers who have been infected in China and that public health authorities should be prepared for importation of the disease. It was the ECDC’s view that:

> “...if the virus persists in poultry, it will represent a significant long-term threat, either as a zoonosis or perhaps a pandemic virus. Both eventualities should be prepared for”.

This publication also highlights the major developments in the risk assessment and provides recommendations for the EU. Health Protection Scotland (HPS) published the following flow-diagram, in May 2013, (HPS, 2013b) for the investigation and management of possible human cases of avian influenza A/H7N9, in returning travellers. In a recent publication considering the triggers, or thresholds, beyond which European countries might initiate contingency plans the following were considered events of medium, or high, significance. Medium significance triggers included: increasing geographical spread of human infections within China and its neighbouring countries; isolation of virus in animals other than domestic birds; the isolation of virus from wild birds in Europe (Schenk, et al, 2013). Highly significant trigger events were related to: transmission in countries distant from China; isolating virus from domestic birds in Europe; the presence of sustained human-to-human transmission. The publication re-iterated the need for comprehensive human and veterinary surveillance, so called ‘one health’, strategies to ensure detection of virus incursions into Europe.

### Other

A case of Avian Influenza - believed to pose only a low risk to public health – was identified at a site in East Anglia on the 17 April 2013. Initial tests on poultry ruled out the H5 or H7 strains of the influenza. As a precaution the premises were to remain under restriction pending further routine veterinary investigations (DEFRA, 2013a).
VACCINATION AND ANTI-VIRAL MEDICATION

Each year, in early autumn, the Seasonal Influenza Vaccination Programme is implemented in Scotland, see Scottish Government (2012a) for the 2012/13 programme. Further information may be found in The Green Book, which has all the latest information on vaccines and vaccination procedures (PHE, 2013). This programme is distinct to a response to pandemic influenza.

WHO makes annual statements predicting the seasonal influenza strains against which vaccines should provide protection. This is based upon careful mapping of known circulating viruses worldwide. The current recommendation for the 2013-14 northern hemisphere seasonal influenza vaccines is that they should be composed of three strains, including H1N1pdm2009-like and H3N2-like strains (WHO, 2013d). WHO recommendation (WHO, 2013e) on vaccination of at-risk groups is reflected in the 2012/13 Scottish Government position (2012a) to vaccinate elderly individuals (>65 years old), those with chronic medical conditions, pregnant women, nursing home residents and NHS employees directly involved with delivering care. Vaccination uptake in the over 65 age group in Scotland is 76.6%. From autumn 2013 a phased implementation of the seasonal influenza vaccination programme, to be extended to children from aged 2 to less than 17 years, will begin (Scottish Government, 2013a). Vaccination will be offered to some pre-school children, accompanied by a limited pilot programme involving primary school children.

During the 2009 pandemic two vaccines were adopted by the UK’s national immunisation strategy group and in Scotland the Chief Medical Officer (CMO) instituted a targeted vaccination programme delivered through primary health-care. This began in October 2009 targeting healthcare workers, older people and those with pre-existing medical conditions likely to be worst affected (Scottish Government, 2009). Later the campaign was broadened to include infants from 6 months to 5 years old. The majority of individuals were vaccinated with Pandemrix (GlaxoSmithKline). One observational study, of a 5% representative sample of the Scottish population (n=247,178), considered the strategy in terms of vaccination effectiveness. It found 15.5% of the target group received the vaccination within the first five months following the start of the vaccination strategy. The study concluded that there were fewer hospital admissions and deaths from influenza-like illness in patients that received the vaccination for H1N1pdm2009. The vaccine effectiveness in preventing lab-confirmed cases was estimated at 77%. This was in line with figures for the effectiveness of vaccines for seasonal influenza strains (Simpson, et al, 2012).

Details of the candidate influenza A/H7N9 vaccines that are currently in development have been released by WHO, discussion of which may be found here (WHO, 2013f). Details of vaccine recommendations for other influenza sub-types may be found here (WHO, 2013g).

Anti-viral treatments

Two main categories of anti-viral drugs are available. One family targets the NA component of influenza viruses to prevent viral release; these are oseltamivir (Tamiflu, Roche) and zanamivir (Relenza, GlaxoSmithKline). Adamantase drugs are also used to prevent viral infection of cells. Although these drugs have been used in the face of the 2009 H1N1 pandemic their use can result in the selection of resistant viruses. Influenza virus strains resistant to these drugs do occur in nature. During the 2009 H1N1 pandemic nearly 100,000 people in Scotland were prescribed courses of antiviral treatment on the basis of guidance issued at the time (Scottish Government, 2010).

The current advice from the CMO for Scotland was that anti-viral drugs were still to be used where necessary (Scottish Government, 2012b).
II: POLICY AND CONTINGENCY PLANNING

Since notifiable, zoonotic disease can spread throughout the UK irrespective of political or geographical boundaries any approach to the management of an influenza outbreak relies on a consistent, consensus response across the administrative countries and regions of the UK. As such, much of the contingency strategy outlined here is the result of consultation between the Department of the Environment, Farming and Rural Affairs (DEFRA), UK Department of Health (DH), Public Health England (PHE), and the Scottish Government. Additionally, the control strategy is required to be consistent and compliant with: International and European law; obligations to international trading partners; considerations of animal welfare and, regional administrative contingency plans related to exotic disease.

Surveillance and contingency related to both public and veterinary health will be considered as these are inextricably linked.

WHO undertook a comparative analysis of international influenza contingency plans for data up to 2009. Although these are historical plans the UK preparedness was ranked in the top 25% based upon 88 indicators defining functional areas of planning, monitoring and response. Few countries, including the UK, scored highly for pandemic vaccine preparedness (WHO, 2011a).

STATUTORY RESPONSIBILITIES

In this section the legislative frameworks are outlined. Given that pandemic influenza is a global consideration, obligations in terms of international and European legislation are also highlighted as these influence national legislation.

International Obligations

The WHO International Health Regulations (IHR), 2005 are a legally binding international instrument on 194 countries to:

“...prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international trade and traffic”.

The regulations place a duty on the signatory States to notify the WHO of all events, irrespective of cause, occurring in their territory that potentially constitute a public health emergency of international concern. Human influenza caused by any new sub-type is one of the defined diseases that must be reported to WHO.

WHO is responsible for identifying and declaring an influenza pandemic. A graduated definition of pandemic phases is used to define the stages an outbreak (WHO, 2013h). WHO guidance for a pandemic preparedness framework, to improve international preparedness and response, has also been published (WHO, 2011b). Global surveillance of influenza is performed through the WHO’s Global Influenza Surveillance and Response System (GISRS). This monitors the evolution of the influenza viruses, serves as the global alert mechanism for viruses with pandemic potential, and provides recommendations in areas including vaccines and risk assessment.

The UK Government (in agreement with the Devolved Administrations) had designated the Health Protection Agency (HPA) to act as the national focal point for the whole UK and only the
HPA could communicate directly with the WHO on IHR matters. It has been agreed that following the abolition of the HPA in April 2013 and establishment of Public Health England, that the UK Department of Health will in future fulfil this role.

European obligations

Early Warning and Reports System (EWRS)


The EWRS sets out obligations on Member States to report specified threats to public health to other Member States so that they can determine if measures may be required to protect public health in their country. The information is transmitted by specified Competent Bodies through an accredited structure and process managed by the European Centre for Disease Control (ECDC). The ECDC systematically gathers, analyses and interprets epidemic intelligence data. In doing so they fulfil their mandate for risk assessment and developing guidance for Europe (Schenk, et al, 2013).

The Competent Body for the UK is Public Health England (PHE). Health Protection Scotland (HPS) liaises with PHE if there is need to send out, or respond to, an EWRS alert relevant to Scotland. EWRS alerts originating from the UK are approved by the relevant Health Departments.

Community Measures for the Control of Avian Influenza

Contained within Directive 2005/94/EC, ‘Community Measures for the Control of Avian Influenza’ (AI), are specific measures to regulate the control and prevention of AI. These specific measures are laid down by the EC with respect to latest advice (from the World Organisation for Animal Health/OIE and the Standing Committee on the Food Chain and Animal Health) to control AI as soon as there is any suspicion of the disease.

The Member States are responsible for:

i) Undertaking surveillance intended for the detection of the virus and increasing knowledge in this area;

ii) Ensuring that the presence of this disease is notified to the competent authority and that epidemiological (public health investigation) enquiries take place in accordance within an action plan approved by the Commission.

United Kingdom Obligations

The Civil Contingencies Act 2004

Preparing Scotland for national emergency events, such as an influenza pandemic, is underpinned by the Civil Contingencies Act 2004 – the ‘2004 Act’ - and the Civil Contingencies Act 2004 (Contingency Planning) (Scotland) Regulations 2005. This legislation defines the key organisations responsible for ensuring the effective management of emergencies in Scotland and within the legislation are referred to as:
• Category I responders: these include Local Authorities, Police, and Health Boards
• Category II responders: Utilities companies, NHS NSS, HSE.

Under the terms of the 2004 Act, the structure which supports multi-agency co-ordination are the Strategic Co-ordinating Groups (SCG), which comprise category 1 organisations in each region. Currently there are eight such groups in Scotland based statutorily on the pre-2013 police force areas. This arrangement will be modified in autumn 2013 to take account of the single Police Service for Scotland which began operating in April 2013. The legal duties outlined by the 2004 Act and associated regulations are described in the framework paper Preparing Scotland (Scottish Government, 2012c).

The development of resilience to public health emergencies in Scotland is based upon the doctrine of Integrated Emergency Management (IEM). The aim of emergency and resilience planning includes ensuring that essential public health needs are met effectively when normal services become overloaded, restricted or non-operational. This approach permits the development of flexible and adaptable arrangements for dealing with emergencies whether these are foreseen or unforeseen. The IEM approach is underpinned by five principles:

• Assessment
• Prevention
• Preparation
• Response
• Recovery

Separate documents outline the civil contingency strategies and management structures guided by these principles within the Preparing Scotland website.

National Veterinary Health Legislation

Specific legislation covers actions relevant to animal health and zoonotic diseases of production animals:

• Animal Health Act (1981) c.22 - consolidated powers within this Act and secondary regulations relate to actions permissible by the UK Government, including the entry of land and the definition of those authorised to do so. Some provisions within this Act have been revised within the Animal Health and Welfare (Scotland) Act (2006) (section 12 – Powers of Entry etc.). The latter act also enshrines principle legislation in this field.

• The Diseases of Animals (Seizure) Order (1993) – this Order extends the powers of inspectors to seize things (other than live animals) that may permit the spread of diseases which incite the slaughter provisions of the Animal Health Act 1981.

Scottish Obligations

The Public Health etc. (Scotland) Act 2008 – (the ‘2008 Act’)

Circumstances may arise where the health of a population is at risk as a consequence of groups of individuals that are exposed, or may have been exposed, to infectious disease agents (e.g. influenza virus), harmful substances or adverse environmental conditions. These are public
health incidents and NHS Health Boards have a duty to protect public health. The 2008 Act defines various responsibilities in terms of dealing with incidents that impact public health. This Act also assists Scottish Ministers to meet their obligations under the IHR 2005. Specifically the first two parts of the Act are most applicable to an influenza pandemic:

1. **Part 1: Public Health Responsibilities** - this defines the responsibility of Scottish Ministers, Health Boards and Local Authorities to make provision to protect public health in Scotland, including from infectious disease. Health boards and local authorities are required to designate ‘competent persons’ to undertake functions assigned to them under the Act.

2. **Part 2: Notifiable diseases, notifiable organisms, and health risk states** - this section puts in place a hierarchical statutory notification system for notifiable diseases (listed in Part 1 of Schedule 1) and notifiable organisms (Part 2 of Schedule 1). Suspected or diagnosed infectious diseases and health risk states are to be notified by registered medical practitioners and diagnostic laboratories in Scotland that are focussed on human infections with notifiable organisms.

Specific sections of Part 2 of the 2008 Act specify public health responsibilities regarding notifiable diseases and organisms, and statutory reporting times (see Information Boxes 1, page 21, and 2, page 22).

Where the patient information refers to a patient that resides out-with the area of the notified health board the return should be conferred to the appropriate Health Board in the timeframe referred to above. In Scotland, Health Protection Scotland (HPS) is responsible for the co-ordination of public health protection although other divisions providing operational, statistical and screening services may also be required.

Where a health board receives a notification of a disease or health risk state from a registered medical practitioner and the patient to whom the information relates usually resides in that health board area, the board must send a return, in writing (in practice electronic transmission via Scottish Infectious Disease Surveillance System (SIDSS)) to HPS. In practice the health risk state means that if there is a suspicion that new influenza strain is emerging and causing ill health, but a diagnostic test is not yet available to reliably detect it, the CMO can request that all patients with indicative symptoms and signs of the infection are reported under the 2008 Act to allow public health measures to be taken to reduce the transmission of the infection to others and reduce the risk to the population. This would be important if Scotland was the first country to experience the impact of any newly emerging strain that was subsequently declared to meet the criteria of having achieved pandemic potential.
Information Box 1: Duties on Medical Practitioners

The Public Health etc. (Scotland) Act 2008

Section 13: Notifiable disease: duties on registered medical practitioners

1. The practitioner must, before the expiry of three days, provide to the relevant health board, in writing (including electronic transmission), information related to the suspected notifiable disease;

2. Additionally, where this is deemed urgent based upon knowledge of the disease and its transmission, the relevant health board should be notified orally without prejudice to subsection 13.1. New subtypes of influenza are considered to require ‘urgent’ notification.

‘Suspected’ in section 13.1 refers to a ‘reasonable suspicion’ and does not require laboratory evidence.

Section 14: Health Risk States: duties on registered medical practitioners

Section 14 contains the same duties as Section 13 but refers to ‘Health Risk States’. This is defined as meaning,

“…a highly pathogenic infection (i.e. an infection highly likely to cause a serious disease), or exposure to any contamination, poison or other hazard that is a significant risk to public health. A patient’s exposure to a health risk state means either physical contact with or contamination by a health risk state or physical contact with or contamination by a person who, or an object which, has been in physical contact with, or been contaminated by, a health risk state”.

Section 15: Notifiable diseases and health risk states: duties on health boards

When health boards receive information under section 13 and it relates to persons living with the area of the health board the health board must:

1. Send a return, in writing, to the common services agency (NHS NSS) containing, in relation to each person, the information stipulated in section 13, relating to the suspected notifiable disease.

2. This return is to be sent no later than:
   i) The end of the week in which the information is received, or;
   ii) As soon as is practically possible if (i) is not possible.
There are also statutory requirements for notification of laboratory confirmation of notifiable diseases:

**Information Box 2: Duties on Diagnostic Laboratories**

*The Public Health etc. (Scotland) Act 2008*

*Section 16: Notifiable organisms: duties on directors of diagnostic laboratories*

The director of the laboratory must supply within 10 working days, starting with the day of the identification, to the health board within which the laboratory is based, and to the NHS NSS, information relating to the individual and the organism identified. Where this is considered especially urgent the director of the laboratory may make oral returns additionally.

- Notification must take place, in writing, within 10 days of identification. Electronic notification, e.g. through Electronic Communication of Surveillance in Scotland (ECOSS), is acceptable.
- Where a diagnostic laboratory requires, under an arrangement, to send a sample to another laboratory for analysis (e.g. to a specialist facility in Scotland or elsewhere in the UK), statutory notification is required from the originating laboratory. In these cases, the day of identification for the purposes of notification will be the day on which the first diagnostic laboratory becomes aware of the identification by the other laboratory with which it has the arrangement.

Other relevant provisions within the 2008 Act include:

- Offences relating to failure to comply with the sections outlined above;
- Scottish Ministers to add or remove notifiable diseases and organisms from the list of notifiable disease and organisms;
- Investigatory powers – entry to premises, collection of samples, interview, medical examination, and investigation warrants;
- Emergency powers - Part 4 of the 2008 Act includes Public Health Functions of Health Boards. Quarantine and short-term detention orders may be enforced for those who are infected, contaminated or exposed to an infectious disease if this minimises significant risk to public health. Exclusion and restrictions orders may also be placed upon individuals that prohibit a person from entering or remaining within a place or from carrying out an activity.
- Mortuaries – Part 6 of the 2008 Act defines the required provisions that must be made by Health Boards and Local Authorities with regard to the availability of mortuary facilities.
- International travel – Part 7 of the 2008 Act includes provisions giving effect to the International Health Regulations.
- Compensation.

Guidance to assist the implementation of the 2008 Act may be found [here](https://www.gov.scot) (Scottish Government, 2012d).
Scottish Veterinary Health Legislation

There are numerous regulations in place in Scotland specifically relating to the control of avian and swine influenza. The principle order is the Avian Influenza and Influenza of Avian Origin in Mammals (Scotland) Order 2006 and covers the measures for the control of avian influenza and provisions for surveillance.

INFLUENZA DISEASE MANAGEMENT PRINCIPLES

There are extensive contingency policies in place for the management of pandemic influenza in the UK and it is not possible, within the scope of this briefing, to detail all of these. However, the main principles of the disease management are outlined below.

Risk management of notifiable diseases and organisms involves:

i. Reducing the likelihood of incursions and outbreaks by notifiable disease by putting in place pre-defined preventative measures;

ii. Ensuring rapid detection if incursion does occur;

iii. Taking preparatory measures to reduce the impact of such an incursion.

The principle disease control objective is to restore the UK’s disease-free status as quickly as possible through the selection of control strategies that:

i. Protect public health;

ii. Minimise the number of animals that need to be culled on welfare or disease control grounds;

iii. Cause the least possible disruption to food, farming, tourism, industry and the wider economy;

iv. Minimise damage to the natural environment;

v. Minimise the burden on the taxpayer and the public.

UK Strategies for Dealing with Influenza Incursions

There are a number of strategy documents developed for Scotland and UK level responses to pandemic influenza incursions. This are outlined below:

1. Notifiable Avian Disease Control Strategy for Great Britain 2012 – Defines how an outbreak of notifiable avian disease in Great Britain would be managed and what measures would be applied in such an eventuality. It also describes the measures and wider framework in place to prevent and limit an incursion of notifiable avian disease. Also covers actions for influenza in pigs. This document is endorsed by DEFRA, Scottish Government and Welsh Government (DEFRA, 2012).

2. UK Influenza Pandemic Preparedness Strategy 2011 - This document describes the consensus strategic approach to an influenza pandemic including the Devolved Administrations. It provides background information and guidance to public and private organisations developing response plans. It takes account of the experience and lessons

3. **UK Pandemic Influenza Communications Strategy 2012** - This strategy provides an updated communications framework for the UK consensus response to an influenza pandemic. It builds on the 2008 pre-pandemic strategy and the lessons learned from the evaluation of communications activity during the H1N1 (2009) Influenza Pandemic. It is a companion document to the *UK Influenza Pandemic Preparedness Strategy* and should be read alongside this (Department of Health, 2012).


These documents, and additional specified resources, serve as the source of the contingency strategies outlined in the sections below.

**Role of the Scottish Government**

The handling of a civil emergency occurring wholly in Scotland will depend on whether the subject is a devolved or reserved matter. Whilst national security is a reserved matter, the emergency services and NHS are the responsibility of Scottish Ministers. In areas of reserved responsibility the UK Government’s lead department will lead the response in respect of these aspects, working alongside the devolved administrations.

The Scottish Government is responsible for setting policy and strategic direction and this includes policy and strategy issues that arise during the course of or because of an incident, such as pandemic influenza. The extent of the Scottish Government’s involvement will depend on the scale of the incident – far less active involvement will be expected for a smaller single NHS Board incident (e.g. a traveller returning to Scotland infected with H5N1) than a national incident in which civil contingency procedures may be engaged (pandemic influenza).

If the Scottish Government requires the assistance of UK central government resources to support an emergency response this would be requested through the relevant UK territorial department, unless other arrangements exist. The Cabinet Office Briefing Room (COBR) would be activated to facilitate the collaboration between the Scottish Government, other Devolved Administrations, and the UK Government in response to a Concept of Operation (CONOPS) Level 2 emergency, for example pandemic influenza.

The UK Department of Health is the lead government department for England. It will coordinate the public health response to an influenza pandemic. It would also take an over-arching responsibility for the UK response and perform a number of key functions on behalf of the devolved administrations. PHE collaborates closely with the Scottish Government and Health Protection Scotland with the aim of optimising the UK preparedness for an influenza pandemic. In this eventuality HPS would collate data to provide regular updates to the DH/HPE and the Civil Contingencies Committee (CCC). The DH/PHE will work closely with Devolved Administrations, see guidance in: *[Cabinet Office: Responding to Emergencies, the UK Central Government Response: Concept of Operations]* (Cabinet Office, 2013).

The key resilience governance structures at a Scottish and UK level are defined below in Figure 3.
Roles and Responsibilities within Scotland

Scottish Government

In the circumstances of a national level emergency, such as pandemic influenza, Scottish Government emergency planning procedures may be implemented including establishment of the Scottish Government Resilience Room (SGoRR). A lead Scottish Government department (and lead Minister) is likely to be designated according to the nature of the emergency. There may also be meetings of a cabinet level sub-committee (CSC – SGoRR) supported by meetings of senior officials (SGoRR(O)). The Resilience Advisory Board for Scotland (RABS) may be convened depending on the nature of the emergency. If this becomes, or is part of, a UK Major Incident then the Cabinet Office Briefing Room (COBR) may be established, and the Scottish Government will link into COBR at Officer and Ministerial level. The UK Government would convene their Civil Contingencies Committee and Civil Contingencies Committee (officials). The lead government department would be defined, and in this scenario it would be the UK Department of Health.

All Scottish Government activity in a national level emergency is co-ordinated through the SGoRR. It is supported by an Emergency Action Team (EAT) of senior officials and an Emergency Support Team (EST). From a health perspective this would be through the NHS.
Resilience Team. The Resilience Team is likely to produce regular situation reports which cover all aspects of an incident. It is likely that the Resilience Team would request information from the relevant Health Board(s) for inclusion in the report. This would be in addition to the ongoing liaison between the Board and the senior medical officers in Scottish Government.

At the beginning of a pandemic there will be uncertainty about the effects of the disease and course of the pandemic. A Scientific Advisory Group for Emergencies (SAGE) will coordinate strategic scientific and technical advice to support UK cross-government decision making. This would include ensuring a common understanding of the scientific aspects of the pandemic, providing advice on prognosis and scientific evidence supporting decision making and highlighting the nature and extent of any uncertainties or differences in expert opinion. The Scottish Government may be represented at SAGE through the Scottish Government professional advisers (Chief Scientific Advisors, Chief Medical Officer, Chief Veterinary Officer). Where SAGE is active and where its considerations touch on devolved matters, it will link directly to the SGoRR arrangements with professional advisers. Scientific and Technical Advice Cells (STAC) is a discrete expert advisory group formed in Scotland under local area arrangements that provide expert advice on a range of public health, environmental, scientific and technical issues in order to deal effectively with the immediate and longer term consequences of an emergency. Any direct communication between SAGE and STAC (see below), if required, would be facilitated and coordinated by SGoRR (Scottish Government, 2013b).

**Health Protection Scotland**

When an incident requires the activation of the SCGs the HPS role will be to support the relevant NHS Board in discharging its functions regarding health protection advice to the SCG. HPS will advise and support the STAC on the health protection response with NHS Boards cooperating with, and taking advice from HPS.

When an incident requires the establishment of a national strategic multi-agency group by the Scottish Government, HPS will support Scottish Government (and in particular the Chief Medical Officer) in discharging its functions regarding health protection advice to the strategic lead. HPS will be responsible for coordinating the tactical health protection response by the NHS Boards (i.e. surveillance, investigation, risk assessment and management and risk communication).

**Health Boards**

The responsibility for the operational provision of health protection services in Scotland lies with NHS Boards. The HPS role would be to ensure a consistent and effective approach in the delivery of these services. Under the terms of the Public Health (Scotland) Act 2008, NHS Boards have a duty to ‘continue to make provision, or secure that provision is made, for protecting public health in its area. This is without prejudice to its general duty to promote the improvement of the health of the people of Scotland’ and a duty to ‘co-operate with any relevant person who appears to have an interest in or a function relating to the protection of public health’.

**Other Agencies**

Other agencies may become involved in the investigation and control of an influenza pandemic. These agencies have statutory responsibilities that overlap with those of the NHS Boards and local authorities. These include the Animal Health and Veterinary Laboratories Agency (AHVLA), which is the principle agency for delivery of animal health responsibilities and covers England, Scotland and Wales. It implements the policies of the Chief Veterinary Officers in
DEFRA and the Devolved Administrations. It exercises the Scottish Government’s statutory responsibilities for responding to notifiable diseases in animals, including zoonotic influenza.

The governance groups involved in i) preparation, and ii) response and recovery to a pandemic influenza event consist of a defined hierarchy. These are outlined in Table 2.

**Table 2**

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Response and Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic Co-ordinating Group (SCG)</strong> - The SCG lies at the centre of the formal co-operation process at local level. In addition to the emergency services the SCG is comprised of key local ‘Class I’ responders. SCGs have generic plans which enable them to respond to a variety of emergencies. Those plans must contain details of multi-agency alerting and activating arrangements.</td>
<td><strong>CSC SGoRR</strong> – see below</td>
</tr>
<tr>
<td><strong>Cabinet Sub-committee</strong> – Scottish Government Resilience (CSC SGoRR) – Provides a ministerial oversight of strategic policy and meets to prepare emergency responses. As a matter of course they are kept up-to-date with matters concerning the preservation of civil protection contingency planning and preparing for specific contingencies such as pandemic influenza.</td>
<td><strong>SGoRR Officials (O)</strong> – senior Scottish Government officials drawn from relevant directorates</td>
</tr>
<tr>
<td><strong>Resilience Advisory Board for Scotland (RABS)</strong> – strategic policy forum for resilience issues that provides advice to Scottish Ministers. It includes senior officers from category I and representatives from category II agencies. It is chaired by the SG Director General for Governance and Communities.</td>
<td><strong>Scottish Government Resilience Room (SGoRR)</strong> – where the scale and complexity of a developing situation is such that some degree of central government co-ordination of support becomes necessary the Scottish Government will activate its emergency response activities through SGoRR. These activities will be supported by the local SCGs. The Scottish Government Resilience Division will lead the operation of SGoRR and will gather and process the information from external responders including SCGs.</td>
</tr>
<tr>
<td><strong>Strategic Co-ordinating Groups (Chairs)</strong> – Representative strategic leaders of category I responder organisations meet at regular intervals with senior SG officials and have a role in formulating policy and practice. Although this group has no role during emergency situations as individuals they will be critical within the eight Strategic Co-ordinating Groups in that eventuality.</td>
<td><strong>Cabinet Office Briefing Room (COBR)</strong> – where UK level arrangements are initiated SGoRR will work with the COBR, the Scotland Office, and other relevant Whitehall departments. SGoRR, however, will remain the central point for all eight SCGs.</td>
</tr>
</tbody>
</table>

**Veterinary Public Health**

Following confirmation by the Chief Veterinary Officer (CVO) of a primary case of Avian Influenza defined by the National Reference laboratory, a series of actions is instigated through the implementation of Scottish Government contingency plans. These may include the declaration of disease control zones, movement restrictions, veterinary investigations, and prescribed actions within the zones and at the infected premises. This can include culling and disposal if necessary. These actions are provided for through the Animal Health Act 1981. Although IAV may be confirmed, tests could be on-going to further define sub-types and
virulence of the strain. The types of control zones that are put in place will be defined by the nature of the viral strain and epidemiological knowledge.

There are international obligations where IAV is confirmed. The UK Chief Veterinary Officer should notify the World Organisation for Animal Health (previously known as the OIE) of the presence of AI within 24 hours of disease confirmation. The European Commission and ECDC would also be notified. Regular situation reports would be submitted to both of these organisations. By informing these organisations the UK will lose its ‘disease-free’ status (if the outbreak is within production poultry, not captive or wild birds). This has important consequences on UK trade.

Using the infected premises (IP) as the centre, zones will be established by the national Government within which the IP resides. Where the IP is close to a border, and where the legislation requires the zone to be extended into the jurisdiction of a second country (i.e. Scotland-England, Wales-England borders), the relevant Government will declare the zone within their administration (second country).

There should be close dialogue between each affected administration to discuss, and agree where possible, on the measures to be declared if zones cross national boundaries. Close communication should also be maintained throughout the outbreak to ensure consistency of approach and measures wherever possible (e.g. the issuing and conditions of movement licences, the ending of zones).

The responsibility for the protection of public health during an outbreak with pigs or poultry remains with HPS. Where an outbreak occurs, or incidence of AI is suspected, the priority is the health of those who are coming into contact with infected animals, for example, poultry workers or AHVLA staff.

Public Health Surveillance

Scotland

HPS maintains an extensive suite of surveillance measures for early identification of the emergence of new strains of influenza in the Scottish population and monitors measures to reduce the impact of the infection of the health of the Scottish population. These are detailed in the HPS weekly national influenza report. The rates of influenza-like illness reported by general practitioners have been monitored on a weekly basis across Scotland since 1972 (HPS, 2011). Since 2009 the source for general practice data has been the Scottish Influenza Surveillance Reporting Scheme (SISRS). This provides daily consultation rates for influenza-like illness, acute respiratory illness and suspected flu by practice, age and sex. Approximately 96% of all practices in Scotland report into the scheme.

European Commission

The European Influenza Surveillance Network (EISN) is organised within the ECDC. The EISN consists of contact points for influenza surveillance nominated by the competent bodies for surveillance of the Member States. Epidemiological and virological surveillance data is collected through The European Surveillance Systems (TESSy). Weekly reports drawing on the surveillance data from all Member States (including the UK as a whole in addition to separate data from Scotland) is published.
Global

The Global Influenza Programme within the WHO publishes weekly updates from global surveillance of influenza outbreaks. These updates are collated from the available epidemiological and virological data available including those reported through the Global Influenza Surveillance and Response System (GISRS) in additional to reports from WHO Regional Offices and Member States.

Veterinary Surveillance

Veterinary surveillance is a critical component in the disease prevention strategy. This surveillance may be passive or active. The European Commission (EC) requires Member States to undertake active annual surveillance for the presence of avian influenza and this has been undertaken each Spring since 2003 (DEFRA, 2013b). This is specifically in place to detect H5 and H7 subtypes that may be introduced to poultry. This surveillance involves the collection of blood from selected farms and slaughterhouses and requires collaboration and cooperation between the AHVLA, DEFRA, Scottish Government, Welsh Government and Department of Agriculture and Rural Development Northern Ireland (DARDNI).

In addition to this active surveillance there is further passive surveillance relating to the testing of wild birds. Wild bird ecologists and wardens may submit dead birds to survey for the presence of avian influenza in wild birds, especially waterfowl. This testing would be carried out at the National Reference Laboratory, VLA Weybridge. Where five or more birds are found this may stimulate a separate investigation into mass mortality events in wild birds.

For pigs the AHVLA has run a national swine influenza surveillance programme since 1991 funded by DEFRA (DEFRA, 2013c). This provides laboratory testing at no cost for the detection of swine influenza from samples of pigs that may be considered to be infected. As with wild birds and poultry, consultation with Scottish Agricultural College (SAC) Veterinary Services, via the Scottish Agricultural College Disease Surveillance Centres, is recommended.
SOURCES


31


**IMAGES**

Cover Image:
3D Render of Influenza virus representation. Copyright ©2013 iStockphoto. With permission

Figure 1:
Illustration by author. Adapted from concept by Medina and Garcia-Sastre (2011).

Figure 2:

Figure 3:
Illustration by author. Adapted from concept by Ma, *et al* (2009).
Scottish Parliament Information Centre (SPICe) Briefings are compiled for the benefit of the Members of the Parliament and their personal staff. Authors are available to discuss the contents of these papers with MSPs and their staff who should contact Jude Payne on extension 85364 or email jude.payne@scottish.parliament.uk. Members of the public or external organisations may comment on this briefing by emailing us at spice@scottish.parliament.uk. However, researchers are unable to enter into personal discussion in relation to SPICe Briefing Papers. If you have any general questions about the work of the Parliament you can email the Parliament’s Public Information Service at sp.info@scottish.parliament.uk.

Every effort is made to ensure that the information contained in SPICe briefings is correct at the time of publication. Readers should be aware however that briefings are not necessarily updated or otherwise amended to reflect subsequent changes.

www.scottish.parliament.uk