



Public Health
England

Pandemic Influenza Response Plan 2014

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through advocacy, partnerships, world-class science, knowledge and intelligence, and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

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Contents

About Public Health England	2
Foreword	5
1. Executive summary	6
2. Introduction	8
2.1 Aim	10
2.2 Objectives	10
2.3 Scope	10
3. Planning assumptions	12
3.1 UK response phases (DATER)	12
4.1 Business continuity during an influenza pandemic	16
4.1 business continuity impact	16
4.2 Human aspects	16
4.3 Risk management and mitigation	17
5. National incident response in an influenza pandemic	18
5.1 PHE national response	20
6. PHE national and local response arrangements during an influenza pandemic	22
6.1 Chief executive	22
6.2 Health Protection directorate	22
6.3 Operations directorate	43
6.4 Communications directorate	51
6.5 Human Resources	54
6.6 Finance and Commercial directorate	58
6.7 Health and Wellbeing directorate	62
6.8 Chief Knowledge Officer's directorate	63
6.9 Strategy directorate	63
6.10 Programmes directorate	63
7. Governance arrangements	64
7.1 Assurance	64
7.2 Training and exercising	64

Appendix 1: Planning assumptions	65
Appendix 2: Roles and responsibilities of the Department of Health, the NHS and the Cabinet Office	66
Appendix 3: Roles of key partner organisations	68
Appendix 4: Summary of the epidemiology of pandemic influenza	70
Appendix 5: Summary of modelling work	72
Appendix 6: Summary of pandemic infection control assumptions	74
Appendix 7: World Health Organization global phases	76
Appendix 8: Mobilisation of the national stockpile of antivirals for pandemic influenza preparedness	78
Appendix 9: The First Few Hundred – FF100	85
Appendix 10: Glossary	87
Appendix 11: Reference documents	88

Foreword



Duncan Selbie
Chief Executive

The prospect of a flu pandemic is one of the highest risks faced by the UK. Ensuring the country is fully prepared and able to respond quickly and effectively is a top priority for PHE and, of course, for the government.

The 2009 H1N1 pandemic certainly tested our plans for dealing with a new pandemic strain. Fortunately it was a mild one, but we need to be confident that our planning and responses are sufficiently flexible to deal with every eventuality.

While the PHE Pandemic Influenza Strategic Framework (2014) describes the approach and overall responsibilities of PHE in a pandemic, this response plan further clarifies PHE's role, responsibilities and response arrangements in each phase of a pandemic and links to the PHE National Incident and Emergency Response Plan (2013).

A handwritten signature in black ink that reads "Duncan Selbie". The signature is written in a cursive, flowing style.

1. Executive summary

Public Health England (PHE) is the expert national public health agency and a Category 1 responder. PHE's first function is to fulfill the Secretary of State's duty to protect the public's health from infectious diseases and other public health hazards. The threat from pandemic influenza remains the top national risk and PHE has a core and critical role working with its local and national partners, in preparing for and responding to influenza pandemic.

This plan details PHE roles and responsibilities during the preparation for and response to a pandemic, and describes the response in the context of the overarching national arrangements set out in the Department of Health's (DH) UK Influenza Pandemic Preparedness Strategy (2011) and Health and Social Care Influenza Pandemic Preparedness and Response (2012).

This PHE plan reflects the roles and responsibilities of all staff within all PHE directorates within the five pandemic phases: detection, assessment, treatment, escalation and recovery (DATER).

PHE recognises that generating and sustaining its pandemic response will only be possible with the support of all staff, such is the extensive nature of tasks. These include surveillance and epidemiological advice, specialist diagnostics, microbiology, statistics and modelling, the provision of expert clinical and infection control advice, communications, managing the national stockpiles of countermeasures, developing and validating new diagnostic tests, undertaking research, and procuring pandemic specific vaccine. This plan also takes into account lessons identified during the response to the 2009 pandemic.

This plan and the learning from the national multiagency pandemic influenza Exercise Cygnus in late 2014, will inform the further development of comprehensive and integrated plans in delivering an effective and sustainable response across the organisation. This system of cross-organisational working will deliver the resources, science and leadership required during the pandemic in order to support the staff and organisational response from local and national centres, and laboratories.

The plan involves:

- PHE local and specialist centres working closely with partners at local, regional and national levels. This will be to gather intelligence, organise testing, and undertake enhanced surveillance (as national response is critically dependent upon these actions)

- the development of integrated and detailed planning arrangements to address response organisation and capacity, mutual aid and surge capacity, training, the establishment of help lines for professionals, co-ordination of media messages, and support and advice to local and national partners and the public
- the role of PHE working alongside and supporting the work of key partners within local health systems with their local authorities and directors of public health, NHS England, the DH, devolved administrations and across other government departments. It also details the international interactions PHE has in an influenza pandemic.

Preparing successfully and responding effectively to pandemic influenza will require PHE to prepare and respond together with its partners. The Pandemic Influenza Strategic Framework 2014 and the Pandemic Influenza Response Plan 2014 provide comprehensive reference documents for PHE staff and partner agencies.

2. Introduction

With unpredictable frequency, novel influenza viruses emerge or re-emerge to cause an influenza pandemic. When this happens, it is likely that global spread will ensue rapidly, affecting large numbers of the population because there will be little or no immunity to this strain. However, until such an event occurs, the impact, expressed as the severity of the illness and proportion of the population that will be most severely affected, will be unknown. As a guide, the impact could range from a 1918-type pandemic, where severe disease was mainly in young adults, to a 2009 pandemic, where the illness was mild in most groups of the population.

Preparations for an influenza pandemic have been developed over a number of years but it was in 2009 that these plans were put to the test. Although a less severe pandemic by 20th century standards, key lessons were learnt and included in the revised DH UK Influenza Pandemic Preparedness Strategy (2011).

Given the unpredictable nature and the potential severity of pandemic influenza, the response must be flexible and proportionate and builds on current business continuity arrangements, while addressing the issues specific to a pandemic. This will require activation and co-ordination of PHE's national emergency response arrangements.

As an executive agency of DH, PHE strategy integrates and uses the expertise and resources from across public health and incorporates new responsibilities inherited as a result of reorganisation. PHE consists of 10 directorates that will need to work together in a co-ordinated way to mobilise an effective response to an influenza pandemic:

- Chief executive's office
- Chief knowledge officer
- Communications
- Finance and Commercial
- Health and Wellbeing
- Health Protection
- Human Resources
- Operations
- Programmes
- Strategy

The Operations and Health Protection directorates provide local and national leadership for PHE's health protection response. The remaining PHE directorates have support roles in response to an influenza pandemic.

PHE's employees are scientists, researchers, public health professionals and essential support staff. It has 15 local centres and four regions, and provides specialist health protection, epidemiology and microbiology services across England.

PHE supports local authorities and NHS England area teams (to support their NHS co-ordination role), and provides direct advice to clinical commissioning groups in the planning phase (as partners around the local health resilience partnership (LHRP) table). As part of the multiagency response, PHE operates by providing evidence and knowledge on local health needs, providing evidence-based and expert advice on what to do to improve health, and, where it makes sense to do so, by taking action nationally. PHE in turn is the public health adviser to NHS England.

The Health Protection directorate

Health Protection directorate comprises teams of health protection specialists co-ordinating services at a local level, a nationally organised integrated epidemiology service based at PHE Colindale, and an emergency response department that works to improve the UK's health emergency response capability, developing the infrastructure for surveillance and early recognition of events.

The Emergency Response Department (ERD) of the Health Protection directorate has a number of functions across all elements of emergency preparedness, resilience and response (EPRR):

- the corporate resilience team works with internal and external partners in the development and assurance of PHE national preparedness, resilience, response and recovery planning requirements
- specialist training and exercise teams organise internal and external training processes and events, to support and test this
- specialist health protection: modeling, epidemiology and microbiology services have involvement in EPRR at local, regional, national and international levels

The corporate resilience team also co-ordinates and manage the PHE response to major (level 3 and above) incidents, with support from the rest of ERD, which maintains a pool of staff trained and ready to activate the PHE National Incident Co-ordination Centre (NICC) and/or for deployment to support other parts of PHE where necessary.

The Operations directorate

PHE regions have partnership arrangements with NHS England Regions and Department of Communities and Local Government (DCLG) teams and oversee the system preparedness and implementation of actions after exercises and incidents. In

response to incidents affecting more than one centre, PHE regions have a co-ordination role across the region and in ensuring mutual aid arrangements.

PHE centres are the first line of response to incidents and they work closely with partners, including local authority directors of public health, within LHRPs and local resilience forums (LRFs), in ensuring pandemic response plans are in place and tested in accordance with current legislation and guidance.

Local health protection teams within PHE centres work with NHS England area teams, health care providers and other agencies in delivering the local pandemic influenza response.

2.1 Aim

To describe PHE's role and actions in the preparation and response to an influenza pandemic.

2.2 Objectives

The objectives of this plan are to:

- define the key PHE national and local roles and responsibilities during each of the pandemic influenza phases – detection, assessment, treatment, escalation and recovery
- support PHE directorates/divisions/centres in local operational planning, working to a common framework and purpose

2.3 Scope

Given the uncertainty and the potential impact of influenza pandemic, pandemic influenza has been classified by the Cabinet Office as the number one threat to the UK population.

DH is the lead government department in England during the health response to an influenza pandemic. It will also perform a number of lead functions for the devolved administrations of Scotland, Wales and Northern Ireland, and take overarching responsibility for the UK response.

PHE has specific responsibilities within England and Wales (the latter, in conjunction with Public Health Wales) and co-operates closely with its counterparts in Scotland and Northern Ireland. PHE collaborates with all UK devolved administrations and their health protection services to optimise the UK's preparedness and response to pandemic

influenza. In the event of a pandemic PHE will collate UK surveillance data for the purpose of providing regular updates to DH and NHS England.

This document is based on flexible planning assumptions consistent with the DH UK Influenza Pandemic Preparedness Strategy (2011) and the DH Health and Social Care Influenza Pandemic Preparedness and Response (2012).

The document does not cover planning for, or the response to, seasonal influenza outbreaks or any incidents involving the prevention or control of avian influenza in birds or other influenza virus infections in animals, or these viruses causing limited numbers of human cases.

However, it does cover the recognition and management of cases of influenza-like illness in humans that either raise suspicions about the emergence or re-emergence of a novel influenza virus with pandemic potential, or which are attributable to a novel influenza virus, which, in turn, may emanate from an animal or avian source.

The appendices include brief summaries of the role and responsibilities of other health organisations and partners. Also included are outlines of the epidemiology and modelling of an influenza pandemic and infection control assumptions (April 2012) and the mobilisation of vaccines and countermeasures (2014).

3. Planning assumptions

The uncertainties in any pandemic mean that the reality of a pandemic may differ from the planning assumptions, and plans will need to be adapted to account for changing circumstances.

The local response may also differ at points throughout the pandemic to take account of local 'hot spots'. PHE advice and response will at all times be:

- evidence-based or based on best practice in the absence of evidence
- based on ethical principles
- based on established practice and systems as far as possible
- co-ordinated at local and national levels.

PHE will provide independent, expert microbiological, epidemiological and modelling advice as well as operational support to DH, the NHS and other organisations whose formal responsibilities include responding to an influenza pandemic.

The planning assumptions used in this plan are consistent with those outlined in the UK Influenza Pandemic Preparedness Strategy 2011 for responding to an influenza pandemic (Appendix 1 and 6).

3.1 UK response phases (DATER)

Although the World Health Organization (WHO) is responsible for identifying and declaring influenza pandemics, the UK was well into the first wave of infection when WHO declared a pandemic in 2009.

The use of WHO phases to trigger different stages of the local response were considered confusing and inflexible and it was decided to develop a more flexible approach, not driven by the WHO phases and determined nationally was needed for the UK. The UK approach uses a series of phases: detection, assessment, treatment, escalation and recovery (DATER). It also incorporates indicators for moving from one phase to another. The rationale for this is described in detail in the UK Influenza Pandemic Preparedness Strategy 2011.

The phases are not numbered as they are not linear, may not follow in strict order, and it is possible to move back and forth or jump phases. There will also be variation in the status of different parts of the country reflecting local attack rates, circumstances and resources.

Each phase sets out the actions and priorities for the response, reflecting the situation as it affects the UK.

The initial overall health response consists of two distinct phases – detection and assessment (these may be relatively short depending on the speed of spread or the impact on individuals and communities).

It is within these phases that PHE will take the lead. In the subsequent treatment, escalation and recovery phases PHE will have more of a supportive role.

Public health activities in each phase

Detection – Triggered on the basis of reliable intelligence or if an influenza related “Public Health Emergency of International Concern” (PHEIC) is declared by the WHO or by the WHO declaring a Pandemic Alert Phase¹, the focus in this stage would be:

- intelligence gathering from countries already affected
- enhanced surveillance within the UK
- the development of diagnostics specific to the new virus
- information, specific advice, and communications to the public and professional
- the indicator for moving to the next stage would be the identification of the novel influenza virus in patients in the UK

Assessment – The focus in this stage would be:

- the collection and analysis of detailed clinical and epidemiological information on early cases on which to base early estimates of impact and severity in the UK (First Few Hundred (FF100), Appendix 9)
- reducing the risk of transmission and infection with the virus within the local community by:
 - actively finding cases
 - advising community voluntary self-isolation of cases and suspected cases
 - advising on the treatment of cases/suspected cases and use of antiviral prophylaxis for close/vulnerable contacts, based on a risk assessment of the possible impact of the disease

The indicator for moving from this stage would be evidence of sustained community transmission of the virus, ie cases not linked to any known or previously identified cases.

¹ Appendix 7: World Health Organization global phases

Treatment – The focus in this phase would be:

- advising on the treatment of individual cases and population treatment, if necessary, using the National Pandemic Flu Service (NPFSS)
- to consider enhancing public health measures to disrupt local transmission of the virus as appropriate, such as localised school closures based on public health risk assessment

Depending upon the development of the pandemic, to prepare for targeted vaccinations with NHS as the vaccine becomes available (NB the vaccine will not be available for 5-6 months after the decision to order vaccine is given).

Arrangements will be activated to ensure that necessary detailed surveillance activity continues in relation to samples of community cases, hospitalised cases and deaths. When demands for services start to exceed the available capacity, additional measures will need to be taken. This decision may be made at a regional or local level as not all parts of the UK will be affected at the same time or to the same degree of intensity.

Escalation – The focus in this phase would be:

- escalation of surge management arrangements PHE to advise NHS
- prioritisation and triage of service delivery with aim to maintain essential services
- resilience measures, encompassing robust contingency plans
- consideration of de-escalation of PHE response if the situation is judged to have improved sufficiently

These two phases – treatment and escalation – form the treatment component of the pandemic. While escalation measures may not be needed in mild pandemics, it would be prudent to prepare for the implementation of the escalation phase at an early stage, if not before.

Recovery – The focus in this phase would be:

- normalisation of services, perhaps to a new definition of what constitutes normal service
- restoration of business as usual services, including an element of catching-up with activity that may have been scaled-down as part of the pandemic response eg reschedule routine operations
- post-incident review of response, and sharing information on what went well, what could be improved, and lessons learnt
- taking steps to address staff exhaustion
- planning and preparation for resurgence of influenza, including activities carried out in the detection phase

- continuing to consider targeted vaccination with the NHS, when available
- preparing for post-pandemic seasonal influenza

The indicator for this phase would be when influenza activity is either significantly reduced compared to the peak or when the activity is considered to be within acceptable parameters. An overview of how service capacities are able to meet demand will also inform this decision.

It needs to be stressed again that the uncertainties in any pandemic mean that the actual characteristics of the pandemic may be different from the planning assumptions, and that planned actions may need to be modified to take account of changing circumstances.

4.1 Business continuity during an influenza pandemic

Business continuity management is a holistic process that identifies potential threats to an organisation and the impacts to the business operations that those threats, if realised, might cause.

It provides a framework for building organisational resilience with the capability for an effective response that safeguards the interests of key stakeholders, reputation, brand and value-creating activities.

PHE, during a pandemic, must be able to maintain its critical functions and activities. The business impact analysis is the process of analysing functions/activities that PHE performs and the effect that a business disruption might have upon them. The results of the business impact analysis is universal for all incidents.

4.1 business continuity impact

This plan focuses on pandemic influenza related activities and provides a strategic overview. Section 6 lists the essential influenza functions for each centre and directorate within PHE. How these are prioritised in the context of an emergency, together with non-pandemic activities, is the responsibility of each centre and directorate, which must maintain their business continuity.

The impact on PHE's income earning activities should be addressed in local and organisation-wide business continuity management plans. Appropriate records should be kept and used to support financial management during and after the incident.

4.2 Human aspects

Pandemic influenza can impact staff either directly or indirectly, therefore human aspects are an important component of the broader business continuity planning considerations. The direct impact to PHE staff is such that they may be absent from work due to themselves becoming ill or to care for a family member. The impact to the wider community may result in reduced service or loss of services throughout the pandemic which may necessitate staff absence. Examples of indirect impact may be closure of schools and children's nurseries, resulting in staff unavailability for child care reasons. There may be transport disruptions due to industrial action, and staff sickness/fear.

4.3 Risk management and mitigation

Alternate working arrangements can reduce the impact on critical activities, such as staff redeployment or reassignment of activities to alternate locations. However, these actions may themselves cause disruption, especially if staff are requested to work away from their usual place of work.

To enhance the planning of actions involving the availability and redeployment of staff, HR will monitor and record absenteeism as a result of pandemic infection. This will facilitate trend analysis within PHE, to identify 'hot spots' where staffing numbers have the potential to fall below the level at which 'mission critical activities' can continue to be maintained.

Individual plans for PHE centres and directorates must address the availability of technology, system access rights and remote access capability/capacity. These need to remain flexible to respond to a changing situation. High staff attrition rates may require staff to multi-task where relevant, in order to support any required back-filling of roles. Plans will identify alternatives for key senior staff. Cross-training and succession planning, as part of good management practice as a 'business as usual' activity addresses multi-skilling and mitigates the risks from high attrition rates. Job sharing or sharing of responsibilities where mixed skills are required is a further risk mitigation technique.

While PHE can implement its own plans to manage continuity of business, it is also dependent on its end-to-end supply chain management for both outsourced services and internal processes. In preparation for a pandemic event, the robustness of suppliers' (internal and external) business continuity plans should be verified to provide the necessary assurance that PHE has the ability to deliver on behalf of its stakeholders. The avoidance of single suppliers for any key product or service contributes to risk mitigation.

5. National incident response in an influenza pandemic

The New and Emerging Respiratory Virus Threats Advisory Group (NERVTAG) will act as an advisory group to provide the Chief Medical Officer (CMO) and, through the CMO, ministers, DH and other government departments, with scientific risk assessment and mitigation advice for the planning of threats posed by new and emerging respiratory viruses and on options for their management.

The group will draw on the expertise of scientists and healthcare professionals, including clinicians, microbiologists and public health practitioners, and colleagues in related disciplines. The group is supported by a scientific secretariat from PHE, and is scientifically independent. England's CMO acts as the UK government's principal source of public health advice and information. At the beginning of a pandemic this group will be re-constituted as Health Services Advisory Group (HSAG) chaired by the CMO.

There will be uncertainty about the effects of the disease and course of the pandemic. As part of the central government response 'Responding to Emergencies, the UK central government approach, response and concept of operations' (CONOPS) (2010), Cabinet Office Briefing Room (COBR) will request the activation of the Scientific Advisory Group for Emergencies (SAGE), ('Enhanced SAGE Guidance: A strategic framework for the Scientific Advisory Group for Emergencies' (2012)). SAGE will co-ordinate strategic scientific and technical advice to support and direct UK cross-government decision making.

PHE has a key supporting role to support the CMO and the SAGE process, providing expert clinical and scientific advice, in partnership with other key health protection partners. Each of the devolved administrations also has a CMO and, working collaboratively, they ensure a comprehensive and co-ordinated UK-wide public health response.

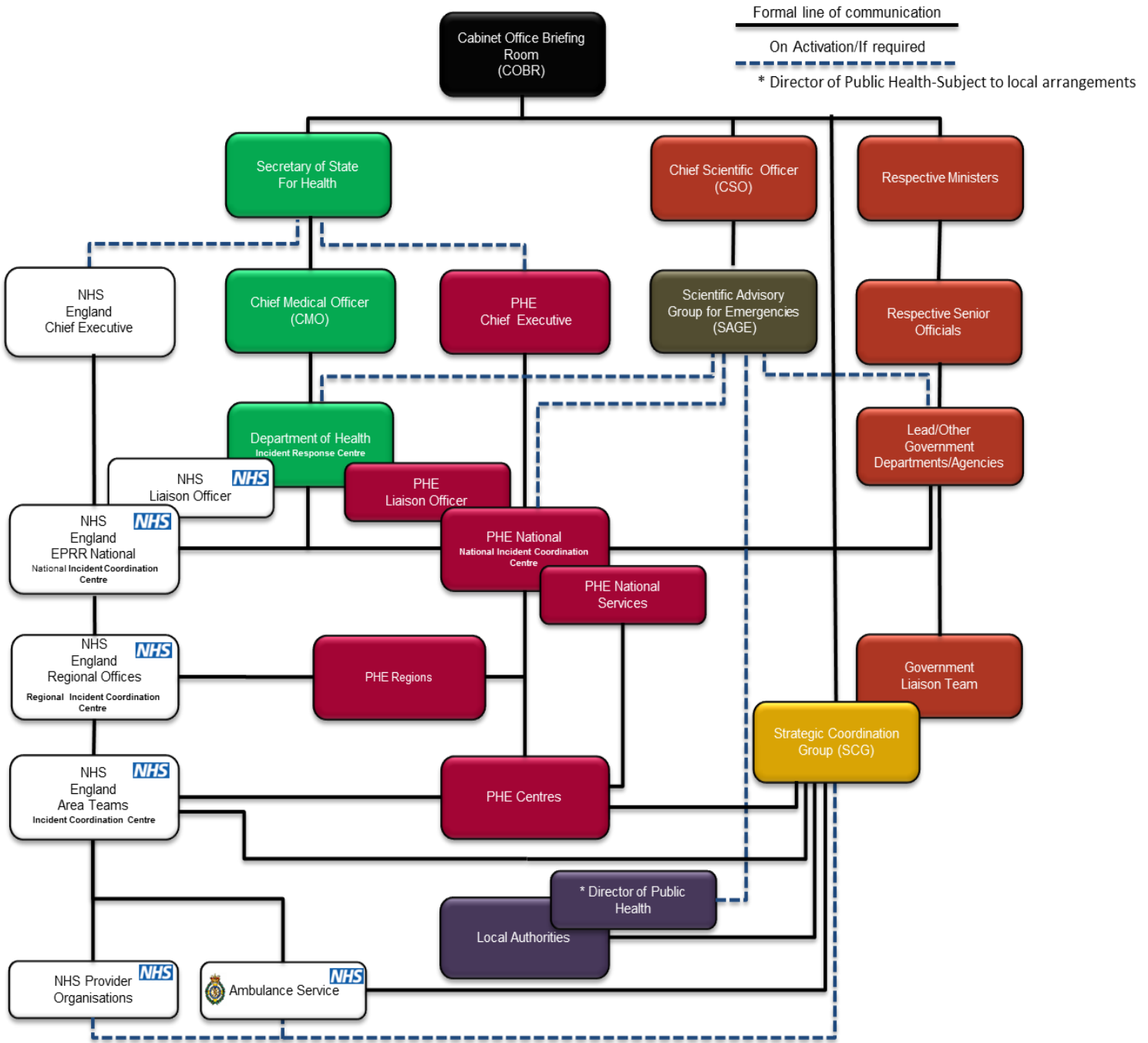
The role of SAGE in pandemic influenza is to:

- ensure a common understanding of the scientific aspects of the pandemic
- provide advice on prognosis and scientific evidence supporting decision making
- highlight the nature and extent of any uncertainties or differences in expert opinion

During an influenza pandemic, science and technical advice cells (STACs) are not expected to be activated at local level, however public health interpretation of SAGE advice and guidance to partners will be provided by PHE centres who will provide

liaison with strategic co-ordination groups (if established) and NHS area team/Local authority response structures. This should be defined in local plans.

Figure 1: Formal lines of communication in a pandemic influenza response



5.1 PHE national response

This plan (Pandemic Influenza Response Plan (2014)) sets out in detail PHE's operational response to an influenza pandemic in the context of the PHE Pandemic Influenza Strategic Framework (2014) in alignment with the UK Influenza Pandemic Preparedness Strategy (2011).

PHE will provide specialist expert advice and operational support to DH, NHS England, NHS, and other organisations whose formal responsibilities include responding to an influenza pandemic. Operational support at local (LHRP) and national (EPRR Partnership Board) levels will be provided to assist the development and implementation of inter-agency planning for pandemic influenza.

The PHE chief executive has overall responsibility for ensuring that PHE has the capability and capacity across its services to respond to an influenza pandemic. It is the PHE National Executive group's responsibility to ensure that the actions within each directorate are implemented effectively during each response phase.

The director of health protection takes responsibility on behalf of the chief executive and National Executive to ensure relevant plans are in place for an effective response to pandemic influenza.

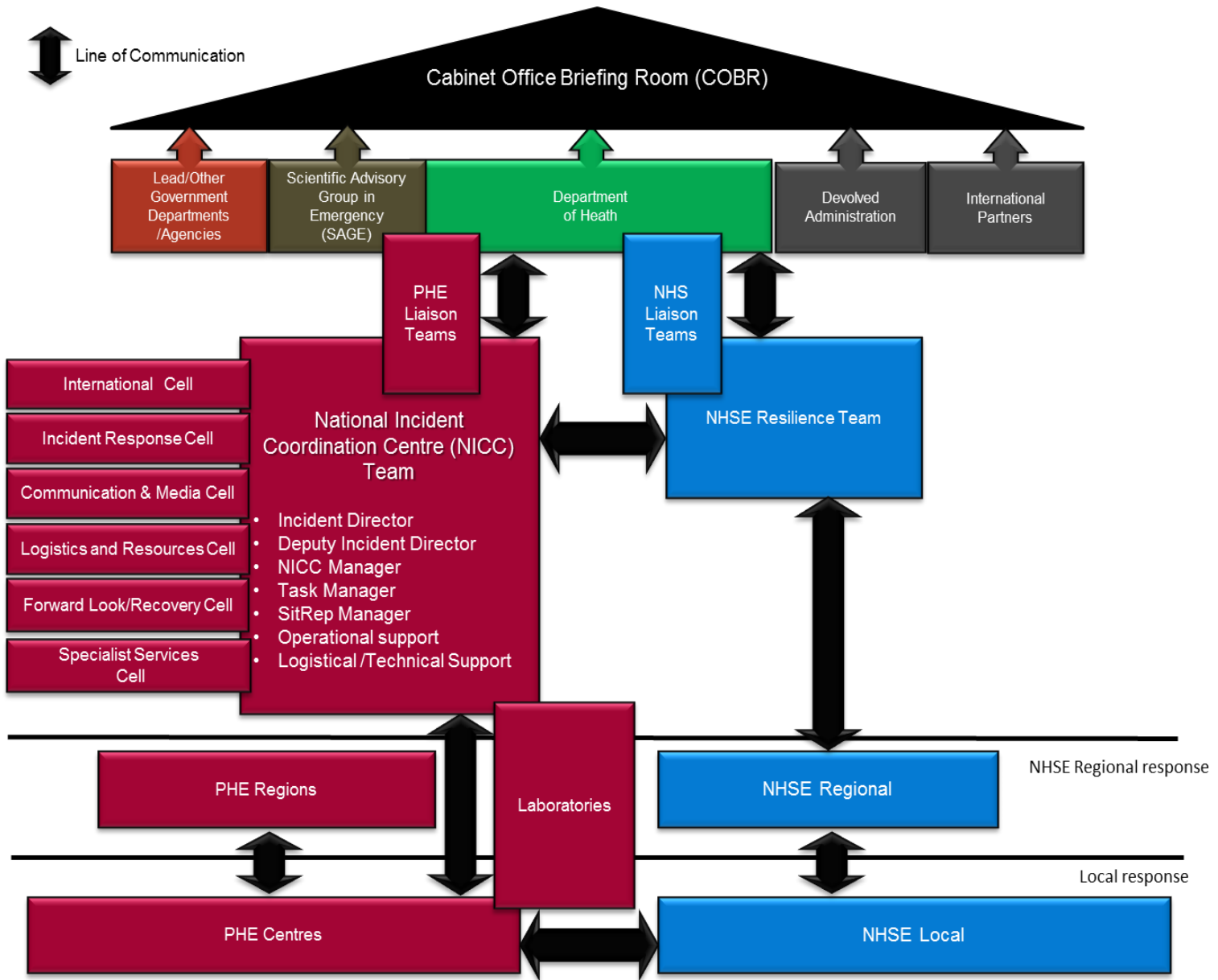
PHE's national response during a pandemic will be delivered through the NICC, as detailed in the PHE National Incident Response Plan (2013) and PHE Concept of Operations (2013) (to be superseded by PHE Integrated Emergency Response Plan (2014)). This describes the mechanisms and structures by which an emergency, including an influenza pandemic is managed, taking into account experience in swine flu 2009 and the Hine Review (2010)

The PHE pandemic response requires a national incident director supported by an incident response cell comprising the nominated leads from PHE directorates closely involved in delivering the response. These will include Operations, Health Protection staff at Colindale, Microbiology Services and Communications. The NICC will also be supported by the Forward Look Group. This group comprises of senior PHE personnel with expertise in key areas.

The PHE national internal response is organisational wide and fully dependent on collaborate working arrangements between directorates. The following tables of actions required by directorates in each stage of a pandemic, highlights the need for co-ordination at local and national levels to ensure an effective integrated PHE response is achieved.

Figure 2 shows how the NICC is generically structured in the PHE response in an influenza pandemic.

Figure 2: PHE generic structures for local and national engagement



6. PHE national and local response arrangements during an influenza pandemic

6.1 Chief executive

The PHE chief executive has overall responsibility and command of PHE's response to a national incident. In pandemic influenza he/she will:

- ensure PHE continues to deliver its core functions during the response and recovery phases
- provide liaison between DH, NHS England and central government on public health matters
- decide or review the appropriate level and scale of the response according to the PHE National Incident Response Plan (2013) and PHE Concept of Operations (2013) (to be superseded by PHE Integrated Emergency Response Plan (2014))
- delegate authority to the director of health protection to oversee the delivery of PHE's response to the incident

6.2 Health Protection directorate

The director of health protection has delegated authority to:

- provide leadership and strategic co-ordination to the PHE response to a pandemic
- move PHE through UK response phases during a pandemic
- ensure strategic co-ordination of the PHE-wide response in conjunction with the incident response cell
- designate deputies to undertake below functions as appropriate
- advise the chief executive on matters of public health and clinical governance

* not all leads in the following table are part of the Health Protection directorate

Phase	Action	Responsible
Detection	Monitor and co-ordinate PHE responses to international requests for briefings and expertise on pandemic influenza in conjunction with relevant centres and divisions	Director of health protection/director of CIDSC Programme director/director of public health strategy
	Review and update briefing requirements of DH and other government departments	Director of health protection
	Review experience to date in dealing with the resource demands within PHE and the profile of experience from countries that have suffered/are suffering the pandemic	Director of health protection/NICC
	Work with government to ensure that appropriate data and advice is supplied and to act as the conduit for downward tasking	Director of health protection/NICC
	Work with PHE centres to establish the local and nationwide epidemiological picture and wider situation as it evolves, and ensure this informs national briefing and advice to government	Director of health protection/NICC
Assessment	Activate NIRP and NICC (if not already activated)	Chief executive/designated deputy
	Establish a daily 'battle rhythm' for meetings and information	Incident director

	Review experience to date in dealing with the resource demands within PHE and the profile of experience from countries that have suffered/are suffering the pandemic and refine strategy (Forward Look Cell)	Director of public health strategy
	Work with government to ensure that appropriate data and advice is supplied and to act as the conduit for downward tasking	NICC
Treatment	Participate in discussions and activities led by WHO, the European Centre for Disease Prevention and Control (ECDC) and the Community Network of Reference Laboratories for Human Influenza (CNRL)	Director global health/designated deputy
	Review and update briefing requirements of COBR and other government departments	Director of health protection and director for emergency response
	Activate NIRP and NICC (if not already activated)	Chief executive/deputy
	Establish a daily 'battle rhythm' for meetings and information	Incident director
	Work with PHE centres to establish the local and nationwide epidemiological picture and wider situation as it evolves, and ensure this informs national briefing and advice to government	Director of health protection/NICC
	Work with PHE centres to establish the local and nationwide epidemiological picture and wider situation as it evolves, and ensure this informs national briefing and advice to government	Work with PHE centres to establish the local and nationwide epidemiological picture and wider situation as it evolves, and ensure this informs national briefing and advice to government

	Consider the need to establish incident response cell to assess potential impact of heightened alert state on PHE business continuity and resource options to deliver plan	Director of health protection/HR director
	Prepare to divert IT resources to ensure that all systems are prioritised to support pandemic influenza response	Head of information systems
Escalation	Review and update briefing requirements of COBR and other government departments	Director of health protection/executive director for emergency response
	Establish a daily ‘battle rhythm’ for meetings and information flows to meet PHE and government needs	Incident response cell lead
	Review experience to date in dealing with the resource demands within PHE and the profile of experience from countries that have suffered/are suffering the pandemic and refine strategy	Director of health protection/NICC
	Work with government to ensure that appropriate data and advice is supplied and to act as the conduit for downward tasking	Incident director/NICC
	Establish daily ‘battle rhythm’	Director of health protection/incident response cell lead response
	Establish routine for briefing DH, Cabinet Office Briefing Room (COBR) and other government departments	Incident director

	Plan PHE input into DH and SAGE and allocate these roles	Director of health protection/director EPRR
	Set up a liaison cell at DH major incident co-ordination centre (MICC) discussions and activities	NICC
	Implement mechanisms for redeployment of staff from 'non-influenza' areas	HR director/divisional directors
	Consider implications of possible cancellations of all annual leave	HR director
	Participate in discussions and activities led by WHO, ECDC and CNRL	Director global health
Recovery	Review and update briefing requirements of DH, COBR and other government departments	Director of health protection
	Review experience to date in dealing with the resource demands within PHE and the profile of experience from countries that have suffered/are suffering the pandemic and refine strategy	Director of health protection/NICC
	Review actions taken and adapt existing plans in the light of lessons learned	Director of health protection
	Review international liaison and identify lessons learned	Director global health

	Take stock of the pandemic's impact on PHE and implement actions to return PHE to business as usual	Director of health protection
	Assessment of overall health impact of pandemic	Director of health protection
	Support re-activation of PHE national and international activities that had been affected by the pandemic	Director of health protection

6.2.1 Centre for Infectious Disease Surveillance and Control (CIDSC)

CIDSC Colindale, working in close collaboration with the reference laboratory, is responsible for/to:

- co-ordinating the gathering and assessment of intelligence (nationally and internationally) on any new pandemic strain
- co-ordinating the collection and analysis of epidemiological and clinical data on the early cases and throughout the pandemic
- developing and co-ordinating guidance in relation to the investigation and management of cases, clusters and outbreaks (including infection control measures)
- monitoring the spread of the pandemic and using this data, in conjunction with modelers
- undertaking risk assessments on the size of the likely impact on the UK
- undertaking surveillance within the community to inform public health and pharmaceutical countermeasures
- monitoring hospitalised cases and deaths in order to derive estimates of severity
- providing information and guidance to healthcare professionals and the general public
- undertaking vaccine efficacy studies; in conjunction with colleagues in Microbiology Services
- undertaking sero-epidemiological studies and provide data, expert advice and support to DH, the CMO, COBR and SAGE

Phase	Action	Responsible
Detection	Activate the Colindale incident co-ordination centre (ICC)	Director CIDSC Colindale
	Gather, assess and verify intelligence from countries already affected	Head of respiratory diseases department
	Using international data attempt to provide an initial assessment of the likely severity and impact on the UK	Head of respiratory diseases department/virus reference laboratory
	Identify and undertake rapid public health investigations necessary to address important gaps in evidence required to inform public health and clinical countermeasures	Director CIDSC Colindale/head of respiratory diseases department/virus reference laboratory
	Work with data management team in the NECC to ensure investigation protocols and databases (including FF100, community, hospital and sero-epidemiology systems) are current, ready to go and reflect intelligence gathered from countries already affected	Head of respiratory diseases department/ modeling and statistics unit/data management team/virus reference laboratory

	<p>Lead and co-ordinate the development of early expert guidance around the management of patients and outbreaks including advice on infection control and use of antivirals</p>	<p>Head of respiratory diseases department/virus reference laboratory</p>
	<p>Liaise with occupational health team to develop information/guidance for staff and ensure there is a direct communication link to ensure there is consistency of advice to staff and that is appropriate for their particular needs</p>	<p>Head of respiratory diseases department/head of occupational health</p>
	<p>Provide expert input to the development of information to health professionals and the public</p>	<p>Head of respiratory diseases department/ Communications</p>
	<p>Provide intelligence and expert advice to the CMO and SAGE as required</p>	<p>Head of respiratory diseases department/virus reference laboratory</p>
	<p>Refine vaccine efficacy and safety protocols</p>	<p>Head of immunisation department</p>
	<p>In conjunction with health protection services (local) agree advice and information on port health and travel issues</p>	<p>Head of respiratory diseases department</p>

	Contribute to international collaborations and assessments	Director CIDSC Colindale/head of respiratory diseases department/virus reference laboratory
	Refine surge capacity plan	Director CIDSC Colindale
Assessment	Continue to gather and evaluate intelligence from countries already affected	Head of respiratory diseases department/virus reference laboratory
	Identify key clinical and epidemiological features of the new pandemic virus in collaboration with Microbiology Services and health protection services (local) using the FF100, community and hospital based systems	Head of Respiratory Diseases Dept./virus reference laboratory
	Provide early estimates of the likely severity and impact on the UK using data from the FF100 and data from other countries	Head of respiratory diseases department/modelling and statistics unit
	Using enhanced surveillance data attempt to model the likely course of the pandemic	Modelling and statistics unit
	Provide data from the enhanced surveillance schemes	Head of respiratory diseases department

	<p>Activate the daily mortality data streams with the General Registry Office</p>	<p>Director CIDSC Colindale/Head of respiratory diseases department</p>
	<p>Look for evidence of sustained community transmission in conjunction with health protection services (local)</p>	<p>Head of respiratory diseases department</p>
	<p>Assess the need for public health interventions such as school closures</p>	<p>Head of respiratory diseases department/ Modelling and statistics unit</p>
	<p>Develop public health guidance on the potential use of antivirals for treatment and prophylaxis</p>	<p>Head of respiratory diseases department/virus reference laboratory</p>
	<p>Carry out vaccine safety trails and efficacy studies</p>	<p>Head of immunisation department/Head of respiratory diseases department/virus reference laboratory</p>
	<p>Lead and co-ordinate the review of expert guidance, including guidance covering hospital infection control and communicate the national infection control guidelines and case management algorithms to local partners</p>	<p>Head of respiratory diseases department</p>

	Provide expert input to the development of information to health professionals and the public	Head of respiratory diseases department
	Provide intelligence and expert advice to the CMO and SAGE as required.	Head of respiratory diseases department/virus reference laboratory
Treatment	As for detection and assessment phases	
	Reassess antiviral strategies and public health interventions	Head of respiratory diseases department/virus reference laboratory
	Collect aggregate data and produce information on trends	Head of respiratory diseases department
	Monitor deaths and excess mortality	Head of respiratory diseases department
	Depending on the development of the pandemic, prepare for evaluation of targeted vaccination programmes as vaccine becomes available.	Head of immunisation department/Head of respiratory diseases department

Escalation	Implement surge capacity plan driven by specific characteristics of the pandemic.	Director CIDSC Colindale
	Reassess antiviral strategies and public health interventions	Head of respiratory diseases department/virus reference laboratory
	Assess the need for ongoing surveillance and identify minimum requirements	Head of respiratory diseases department
	Continue to monitor deaths and excess mortality	Head of respiratory diseases department
	Lead and co-ordinate the review of expert guidance, including guidance covering hospital infection control	Head of respiratory diseases department/virus reference laboratory
	Provide expert input to the development of information to health professionals and the public	Head of respiratory diseases department

	Provide intelligence and expert advice to the CMO and SAGE as required.	Head of respiratory diseases department/virus reference laboratory
Recovery	Re-introduction of normal surveillance and response operations and rescheduling of work delayed by the impact of the pandemic	Head of respiratory diseases department
	Write up findings from the pandemic	All
	Generate and contribute towards the review of lessons learned	All
	Review guidance on the investigation, management of cases outbreaks etc	Head of respiratory diseases department
	Review epidemiology and surveillance capability in preparation for the next influenza season	Head of respiratory diseases department

6.2.2 Vaccines and countermeasures

CIDSC has responsibility to support an effective response to an influenza pandemic by:

- securing the cost-effective procurement and supply of antivirals, antibiotics, vaccines and consumables
- maintaining robust pandemic infrastructure and distribution logistics
- ensuring accurate accounting and reporting for expenditure in relation to the countermeasures and infrastructure required for an influenza pandemic

For more information see Appendix 8: Mobilisation of the National Stockpile of Antivirals for Pandemic Flu Preparedness.

Phase	Action	Responsible
Detection	Review current preparedness capability and current work programme in relation to maintaining the stockpiles of countermeasures and infrastructure to identify if any procurement work needs to be accelerated.	Head of vaccines and countermeasures response, CIDSC
Assessment	<p>Confirm whether the pre-pandemic vaccine stockpile will be required as part of the response, which will be dependent on the virus strain.</p> <p>Confirm arrangements for accessing needles and syringes with NHS Business Services Authority if pre-pandemic vaccine is to be part of the response.</p>	Head of vaccines and countermeasures response, CIDSC
Treatment	<p>Following confirmation of the appropriate use of antivirals for the response, provide instruction to the NHS Business Services Authority for the mobilisation of the national stockpile of antivirals to be distributed to the antiviral collection points being established by NHS England.</p> <p>Provide instruction to the designated hospital manufacturing units to start the production of Oseltamivir solution for use by children aged under one year old. Confirm that consumables required for the solution are available to the hospital manufacturing units.</p> <p>Provide instruction for the printing and mobilisation of antiviral vouchers to be used when antivirals are being authorised during the pandemic.</p> <p>Following confirmation of the amount of vaccine required using the advanced purchase agreement for pandemic-specific vaccine; provide instruction to the DH Commercial Medicines Unit for the contract to be triggered based on the agreed</p>	Head of vaccines and countermeasures response, CIDSC

	<p>volumes.</p> <p>Monitor the receipt of the pandemic-specific vaccine supply with deliveries expected to start around six months after the Advanced Purchase Agreement was triggered. Provide instruction to the NHS Business Services Authority and Immform for the support required in relation to the storage and distribution of the vaccine and the related consumables.</p> <p>Following confirmation of the delivery locations and volumes, provide instruction to the NHS Business Services Authority for the mobilisation of the national stockpile of personal protective equipment for use by health and social care workers who are required to come into close contact with symptomatic individuals.</p> <p>Following confirmation of available funding, provide instruction to the NHS Business Services Authority to undertake the “just in time” procurement agreements for consumables that are in place to supplement the stockpiles that are held for pandemic flu preparedness.</p> <p>Provide instruction to the Commercial Medicines Unit if it is decided that any additional antiviral or antibiotic stockpiles are required, having obtained the necessary approvals,</p> <p>Following agreement of the available funding, provide instruction to the suppliers and call centre providers for the mobilisation of the National Pandemic Flu Service and the related systems in order to be able to enable symptomatic individuals to be able to access antivirals, if appropriate, so that it can be triggered if primary care arrangements need to be supplemented.</p>	
<p>Escalation</p>	<p>Provide instruction to the NHS Business Services Authority for the mobilisation of the national stockpile of antibiotics if there are concerns about</p>	<p>Head of vaccines and countermeasures response, CIDSC</p>

	<p>the level of complications resulting in shortages in the business as usual antibiotic supply arrangements for primary and/or acute care. Provide instruction to the NHS Business Services Authority for the mobilisation of the related stockpile of antibiotic consumables.</p> <p>Following confirmation of delivery locations and volumes, provide instruction to the NHS Business Services Authority for the mobilisation of the liquid hygiene and oxygen consumables held in the national stockpile to be available in the event of shortages occurring in the normal business supply arrangements because of the pandemic.</p> <p>Monitor the demands being placed on the National Pandemic Flu Service with the Health and Social Care Information Centre and the suppliers to inform the ongoing requirement for call centre handlers and any system issues arising.</p>	
<p>Recovery</p>	<p>Confirm arrangements for closing down the National Pandemic Flu Service as pressures on GPs decrease.</p> <p>Confirm the arrangements for the return of the antivirals to the national stockpile from the antiviral collection points where stocks have not been used for symptomatic individuals including receiving the storage records maintained by the NHS and confirming that the Medicine and Healthcare products Regulatory Agency (MHRA) is content for the antivirals to be returned to the national stockpile.</p> <p>Provide instructions to the DH Commercial Medicines Unit for the advanced purchase agreement for pandemic-specific vaccine to be brought to a conclusion, based on the contract terms.</p> <p>Review the stockpile levels following the pandemic to inform future procurement</p>	<p>Head of vaccines and countermeasures response, CIDSC</p>

	<p>requirement priorities, budget requirements and likely timescales.</p> <p>Provide input for the independent review including information on the expenditure required for both the preparedness and response costs in relation to the pandemic flu countermeasures and infrastructure.</p> <p>Work with the Commercial Medicines Unit and the NHS Business Services Authority to integrate lessons identified into future procurements.</p>	
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6.2.3 Field Epidemiology Services

The role of the PHE Field Epidemiology Services in pandemic influenza is:

- collection of epidemiological and clinical data on the early cases and throughout the pandemic including co-ordination and assistance with tracing cases and contacts for gathering information on exposure and clinical details
- provision of epidemiological support to local PHE centres including support with outbreak investigation
- lead or support the design and conduct of epidemiological studies to inform public health action and evaluate public health action
- contribute to the development of guidance in relation to the investigation and management of cases, clusters and outbreaks (including infection control measures)
- support surveillance activity including data collection, analysis and interpretation and contribution to sit-rep production
- support the provision of information and guidance to healthcare professionals and the general public
- support vaccine efficacy studies; in conjunction with colleagues in CIDSC and Microbiology Services
- undertake sero-epidemiological studies working with CIDSC and Microbiology Services

Phase	Action	Responsible
Detection	Identify and undertake rapid epidemiological investigations necessary to address important gaps in evidence required to inform public health and clinical countermeasures working with colleagues across PHE and other organisations	Director of the Field Epidemiology Service
	Support the local response to pandemic influenza across PHE	Field epidemiology teams
	Support local PHE centres with outbreak detection and investigation in schools, care homes and other community settings	Field epidemiology teams
	Provide scientific and technical advice to staff in PHE centres and the local health economy	Field epidemiology teams
	Co-ordination or assistance with the development and implementation of surveillance systems including FF100	
Assessment	Work with CIDSC and local centres to Identify key clinical and epidemiological features of the new pandemic virus using the FF100, community, and hospital based systems	Field epidemiology teams
	Provide data for enhanced surveillance schemes	Field epidemiology teams
	Look for evidence of sustained community transmission in conjunction with CIDSC and PHE local centres	Field epidemiology teams
	Apply epidemiological methods to assess the need for public health interventions	Field epidemiology teams
	Contribute to the development of guidance materials for professionals and the public	Field epidemiology teams

	Provision of surge capacity to other parts of PHE	Director Field Epidemiology Service
	Contribution to data analysis and sitrep production	Field epidemiology teams
Treatment	As for detection and assessment phases	
	Contribution to data analysis and sitrep production	Field epidemiology teams
	Support work to monitor deaths and excess mortality	Field epidemiology teams
	Undertake or support the evaluation of targeted vaccination programmes as vaccine becomes available, working with CIDSC	Field epidemiology teams
	Provision of surge capacity to other parts of PHE	Director Field Epidemiology Service
	Provide support to PHE centres with the investigation and management of cases and clusters or outbreaks, particularly in settings such as schools, care homes and prisons, and apply epidemiological methods to assess the efficacy of control measures	Field epidemiology teams
	Maintain surveillance systems of influenza-like illness cases and outbreak	Field epidemiology teams
	Support and collate local reports of aggregate influenza activity in primary care	Field epidemiology teams
Escalation	Provision of surge capacity to other parts of PHE	Director Field Epidemiology service
	Continue to support surveillance activity including the monitoring of deaths and excess mortality	Field epidemiology teams

	Write up findings from epidemiological studies	All
Recovery	Contribute to the update of algorithms, pandemic preparedness plans, business continuity plans as required	Field epidemiology service lead
	Re-introduction of normal surveillance and response operations and rescheduling of work delayed by the impact of the pandemic	
	Generate and contribute towards the review of lessons	All
	Maintain regional surveillance mechanisms for evidence of resurgence in activity during second wave	Field epidemiology teams

6.2.4 Centre for Radiation, Chemicals and Environmental Hazards (CRCE)

The provision of any CRCE resources to support PHE’s overall response is subject to the availability of those resources which may be committed to the response to a radiation or chemical incident. All actions listed below are therefore subject to the aforementioned caveat. CRCE must also maintain its ability to provide a response to chemical and radiological emergencies which may arise during the period of response.

In addition to contributing to the staffing of the FF100 team under Field Epidemiology Service co-ordination, CRCE would contribute to PHE’s overall response to a flu pandemic by providing generic support to response co-ordination roles.

Phase	Action	Responsible
Detection	Identify staff available to provide support to other parts of PHE and deploy as appropriate. Carry out impact assessment on CRCE business operations at current time	Director of CRCE
Assessment	Open and operate the CRCE Emergency Operations Centre (ICC) to co-ordinate CRCE response activities	Director of CRCE
	Provide additional support to other parts of PHE as necessary	
	Discuss with director of FES need for additional support for FF100 team and identify staff as appropriate	
Treatment	Provide additional support to other parts of PHE as necessary, stopping other non-essential work to allow additional staff to be made available	Director of CRCE
	Provide staff for FF100 team under FES co-ordination, if required	
Escalation	Re-evaluate impact assessment on CRCE response capabilities for chemical and radiological emergencies. Continue to support where possible the wider PHE response	Director of CRCE
Recovery	Gradual reduction in CRCE staffing in support of the pandemic response	Director of CRCE
	Evaluation of impact on business as a result of supporting the response	
	Prioritise restart of normal work	

6.3 Operations directorate

PHE regions and centres, and National Specialist Laboratory Service

In England, PHE centres (part of the chief operating officer's directorate) provide local health protection services and will discharge PHE's responsibilities at local and regional levels by supporting local and regional planning and delivering local PHE response. This will include working with NHS England area teams, local trusts, directors of public health/local authorities, LHRPs and LRFs regarding pandemic preparedness. In response, local health protection teams:

- co-ordinate community control measures
- manage local outbreaks and investigations
- gather epidemiological evidence
- liaise with laboratories
- assist with the support arrangements for the administration of antivirals and vaccine
- provide advice and guidance to Local authorities, the NHS and to the local multi-agency response
- support internal and external communications activity

PHE regions will co-ordinate the response between centres and ensure mutual aid arrangements are in place as appropriate. This will include working in partnership with NHS England regional teams and DCLG Resilience and Emergencies Division (RED) teams.

Phase	Action	Responsible
Detection	Provide accurate and timely information for the public (including reinforcing social distancing messages, good hand and respiratory hygiene) using agreed communication channels	PHE centre director/deputy director health protection/ Communications
	Provide leadership for the investigation and management of local incidents and outbreaks as necessary	PHE centre director/deputy director health protection

Assessment	Support NHS England area teams to contact all GPs, primary care providers, out of hours services and NHS trusts to ensure surveillance, management and infection control guidance is in place	PHE centre director/deputy director health protection
	Liaise with PHE regional laboratory and hospital laboratories to ensure testing arrangements are in place and appropriate swabs available widely in hospitals and primary care/out of hours	PHE centre director/deputy director health protection
	Provide updates through locally agreed systems to the NHS and LRFs	PHE centre director/Communications
	Establish an outbreak control team if locally indicated	PHE centre director
	Use the FF100 systems (Appendix 9) to rapidly investigate initial pandemic cases, clusters and contacts in order to gain insights into the clinical presentation, epidemiological features including severity and other aspects of the illness associated with the new virus to inform real-time modelling	PHE centre director/health protection team
	provide leadership for the investigation and management of local incidents and outbreaks as necessary	PHE centre director
	Activate PHE incident control centre (likely to be nationally determined)	PHE centre director/emergency preparedness manager
	Ensure an adequate understanding of the local epidemiology and response, supported by FES	PHE centre director
	Lead the investigation and response to pandemic influenza outbreaks, particularly in settings such as schools, care homes and prisons, and assess the efficacy of control measures	PHE centre director/health protection team

	Provide updates through locally agreed systems to the NHS and LRFs	PHE centre director/Communications
Treatment	Actively engage with NHS command structures and multi-agency co-ordination structures (as they are established), providing specialist health protection advice	PHE centre director/
	Communicate the national infection control guidelines and case management algorithms to the NHS and other local partners as indicated and through agreed channels	PHE centre director Protection
	Provide timely and accurate information for the public and health professionals on the pandemic and the clinical effects of the infection working within agreed local communications arrangements (and depending on establishment of multiagency command structures)	PHE centre director/influenza lead/Communications
	Ensure an adequate understanding of the local epidemiology and response, supported by FES	PHE centre director
	Provide specialist advice to support local decision making about measures to control the spread of the virus (eg school closure), through agreed multiagency co-ordination structures	PHE centre director
	Develop/modify framework for delivery of vaccination to target groups, depending on disease severity	Screening and immunisation lead
	Coordinate specialist health protection advice to NHS command structures and to multiagency co-ordination structures, including local interpretation of advice from SAGE	PHE centre director Protection
	Provide updates through locally agreed systems to the NHS and LRFs	PHE centre director/Communications

	Support to the NHS in the implementation of the immunisation programme, providing operational capacity if rapid programme delivery advised nationally	PHE centre director/health protection team
Recovery	Carry out internal debrief to contribute to the overall PHE debrief (by the end of first wave)	PHE centre director/emergency preparedness manager
	Review response activities and identify lessons learned for possible and subsequent waves/other wide-scale emergencies	PHE centre director/emergency preparedness manager
	Contribute to the update of algorithms, pandemic preparedness plans, business continuity plans as required	PHE centre director/emergency preparedness manager
	Issue regular communications to internal and external stakeholders via agreed mechanisms	PHE centre director
	Provide updates through locally agreed systems to the NHS and LRFs	PHE centre director/Communications
	Contribute to the scientific evaluation of the impact of the pandemic	PHE centre director/All staff

6.3.1 Microbiology Services – reference laboratory (Respiratory Virus Unit), PHE Colindale

The reference laboratory at Microbiology Services Colindale is responsible for detection and surveillance of respiratory viruses including influenza viruses. At an early stage of an influenza pandemic, the key roles of the reference laboratory are to develop diagnostic assays for specific detection of the novel pandemic virus, diagnosis and confirmation of pandemic virus infections in the first UK cases and then to undertake

virological surveillance for the new pandemic strain and other circulating influenza viruses. Once developed, roll-out of the pandemic specific diagnostic assay(s), to PHE (and possibly other) laboratories will be implemented. The quality assurance of assay detection will be ensured across the lab testing network through the provision of National Standard Methods developed by the reference laboratory, provision of positive control reagents and proficiency testing.

The reference laboratory performs both genotypic and phenotypic characterisation of influenza virus susceptibility to currently available antiviral drugs. In a pandemic, the reference laboratory will be responsible for developing assays specific for identification of both genotypic and phenotypic antiviral resistance in the pandemic virus. In addition, the reference laboratory will provide support for pandemic virus specific antiviral genotypic testing in the network as required.

Isolation of pandemic influenza virus strains from clinical samples in the reference laboratory during a pandemic will provide antigenically characterised virus isolates as candidate pandemic vaccine strains and allow monitoring of antigenic drift in circulating strains compared to the available reference strains. The reference laboratory will obtain additional pandemic reference virus (es) through the WHO Global Influenza Surveillance and Response System (GISRS) which, together with UK pandemic viruses, will be used to generate reagents, including ferret antisera, to aid detection and characterisation of the novel virus. Genetic characterisation of circulating pandemic viruses, including development of whole genome sequencing capability, will be performed by the reference laboratory throughout a pandemic to monitor mutations in the viral genome that might affect virulence, transmissibility, and antigenicity, antiviral susceptibility or any other characteristics of the pandemic virus.

Specific serological assays will be developed for the pandemic virus in order to perform sero-incidence and sero-prevalence studies. The reference laboratory will also provide support to vaccine trials.

At all phases, the reference laboratory will liaise with CIDSC, national and international bodies, and will provide timely and accurate virological information.

6.3.2 Microbiology Services – Specialist Microbiology Network

Laboratories within the Specialist Microbiology Network will lead the laboratory testing of samples for the diagnosis of influenza, primarily using nucleic acid based amplification technology and generating information on influenza type and subtype. Specialist Microbiology Network laboratories will test respiratory samples for a range of other common respiratory viruses whenever feasible.

Phase	Action	Responsible
Detection	Detection and confirmation in the reference laboratory and the development of laboratory diagnostic tests specific for the pandemic virus	Head of reference laboratory
	Confirm all suspected cases in UK and report collated UK case numbers both nationally and internationally	Head of reference laboratory
	Roll out validated diagnostic tests for novel influenza subtype	Reference laboratory and Specialist Microbiology Network
	Ensure quality assurance of testing in virology laboratories	Reference laboratory and Specialist Microbiology Network
	Antiviral testing/confirmation and development of antiviral susceptibility assays specific for the pandemic virus	Head of reference laboratory
	Liaise with WHO to obtain pandemic reference strains	Head of reference laboratory
Assessment	Continue to detect the virus	Reference laboratory and Specialist Microbiology Network
	Undertake testing of national virological surveillance schemes (eg NHS11 self-testing, Royal College of General Practitioners, FF100)	Head of reference laboratory
	Characterise strains of influenza virus isolated in the UK to assess antigenic drift, genetic mutations and antiviral susceptibility	Head of reference laboratory

	Support accelerated vaccine development including efficacy and safety data, and culture of candidate vaccine strains	Head of reference laboratory
	Liaise with national and international organisations, such as the Animal Health and Veterinary Laboratories Agency, ECDC, WHO, serology test development	Head of reference laboratory
Treatment	Undertake sero-incidence testing	Head of reference laboratory
	Continue to characterise viral isolates in order to detect any changes that may affect virulence, antiviral resistance, transmission or any other characteristic	Head of reference laboratory
	Provide support for pandemic virus specific genotypic screening for antiviral susceptibility in the Specialist Microbiology Network as required	Reference laboratory and Specialist Microbiology Network
Escalation	Continue to monitor the characteristics of the virus, including antigenic characterisation, whole genome sequencing and antiviral susceptibility testing	Head of reference laboratory
Recovery	Continue to monitor the virus and susceptibility in the population	Head of reference laboratory

6.3.3 Microbiology – Porton

Will:

- work with the National Institute of Biological Standards and Control (NIBSC) towards candidate vaccine development and standardisation, if requested by DH, and supported by appropriate funding
- work with industry in diagnostics, screening and efficacy testing
- make available its high containment laboratories and expertise in microbiological services, in support of the plan. Potentially store and distribute the stockpile of PHE antivirals

Phase	Action	Responsible
Detection	Liaise with NIBSC and DH over vaccine development plans	Deputy director, PHE Microbiology Services research
	Consider need to activate PHE Porton pandemic flu plan	Director, PHE Microbiology Services
	Provide surge capacity for novel influenza subtype diagnostics development	Deputy director, PHE Microbiology Services research
	Review arrangement for the deployment of relief staff to CIDSC, Microbiological Services and Health Protection	Deputy director, PHE Microbiology Services research
Assessment	Review arrangements to provide surge capacity for novel influenza virus diagnostics	Deputy director, PHE Microbiology Services research
	Consider establishing a forward look group to identify potential future threats and risks	Director, PHE Microbiology Services
Treatment	Open site ICC	General manager – site operations
	Collaborate with DH, industry and others to support rapid development of new vaccine(s)	Deputy director, PHE Microbiology Services research
Escalation	Provide surge capacity for novel influenza subtype diagnostics	Deputy director, PHE Microbiology Services research
	Deploy relief staff as required	Director, PHE Microbiology Services
	Open site ICC	General manager – site operations
Recovery	Continue to review site resilience arrangements and maintain capability	Director, PHE Microbiology Services
	Review response activities and lessons identified and put in place an action plan to mitigate these for possible and subsequent waves/other wide-scale emergencies	Director EPRR (Interim), Director, PHE Microbiology Services

	Review effectiveness of pandemic preparedness plan and business continuity activities	Director, PHE Microbiology Services
	Continue to produce and/or contribute to status reports as required	Director, PHE Microbiology Services
	Issue regular communications to internal/external stakeholders	Director, PHE Microbiology Services

6.4 Communications directorate

The Communications directorate works as a single cohesive unit, providing mutual support as required to deliver an effective response at all stages of a pandemic. The communications director with support from the three deputy directors of communication, the senior communications manager for emergency response and the national press office at Colindale would lead the organisation’s response, with support from communications colleagues across the directorate as necessary.

Depending on the local or national situation, for example if an identified hotspot occurs or there is particular pressure from the media for information, resources will be mobilised from across the directorate to assist and work as an integral part of the centre team and as part of the wider local multiagency response centre.

The Communications directorate operates round-the-clock on-call systems 24/7 365 days a year. During a pandemic situation, rotas for increasing communications staff cover both in and out of office hours would be introduced if necessary, using colleagues from across the directorate for support.

Phase	Action	Responsible
Planning	Provide input to DH and NHS England communications materials and planning process as required	Communications directorate
	Develop internal key message documents, Q&As, templates for statements and press releases. These to be shared with colleagues in DH and NHS England as appropriate	

	Develop and agree national and regional communications strategy and media handling plan with DH and NHS England including media handling protocol	
	Identify national and regional spokespeople and ensure media training is delivered	
	Prepare templates and sleeping pages for PHE website and PHE net	
Detection	Ensure that PHE centres and directors of public health in local authorities are kept up to date with key messages and Q&As	Communications directorate
	Check and update if necessary directorate business continuity plan	
	Prepare a staff rota to ensure resilience	
	Link with communications colleagues in ECDC and WHO to ensure early alerting of public health messages and international media approaches are in place	
	Monitor traditional and social media for new angles	
	Communicate any necessary messages with media, including social	
	Make pandemic web pages live with current public health Information	
Assessment	Handle requests for information from the media	Communications directorate
	Provide advice on release of early information	
	Agree timings of announcements with DH, NHS England, Local Government Association and devolved administration communications colleagues	
	Daily multi-agency communications teleconferences to be established to update colleagues on the situation	
	Ensure national and regional spokespeople are kept up to date on latest information	
	Facilitate media interviews and provide support to spokespeople	

	<p>Make use of Twitter, Facebook and LinkedIn accounts to promulgate public health messaging</p> <p>Monitor traditional and social media for new angles and rumour busting</p>	
Treatment	<p>Media handling of national and regional requests for information/expert spokespeople</p> <p>Multi-agency communications teleconferences to be used to update colleagues on the situation (may be led by Cabinet Office/ Civil Contingencies Secretariat)</p> <p>Take part in daily CMO briefings and brief and provide expert spokespeople as required by DH</p> <p>Review national coverage daily and liaise with DH and NHS England on handling of issues as they emerge</p> <p>Horizon scan traditional and social media to prepare for new news angles and to rebut any misinformation</p> <p>Keep website updated with statements, Q&As and use Twitter feed to promote this</p>	Communications Directorate
Escalation	<p>Work with DH and devolved administration communications colleagues to provide any new or revised public health advice</p> <p>Media handling of national and regional requests for information/experts</p> <p>Daily multi-agency communications teleconferences to be used to update colleagues on the situation</p> <p>Ensure accurate and updated national figures to be available to regional colleagues through the weekly report, unless reporting schedule is made more</p> <p>Take part in daily/weekly CMO briefings and brief and provide expert spokespeople as required by DH</p> <p>Review national coverage daily and liaise with DH, NHS England and the Local Government Association on handling of issues as they emerge</p>	Communications Directorate

	Horizon scan traditional and social media to prepare for new news angles and to rebut any misinformation	
	Keep website updated with statements, Q&As and use Twitter, Facebook and LinkedIn feeds to promote this	
Recovery	Review media coverage	Communications Directorate
	Evaluate and identify any lessons from the response for implementation in refined communications strategy	
	Work with DH, NHS England, Local Government Association and devolved administration colleagues to prepare any new information/guidance based on latest information available from PHE experts	
	Evaluate the impact of the pandemic in terms of public perception of risk, infection control and public health issues	
	Issue a summary press release when the pandemic is declared officially over	

6.5 Human Resources

HR has a vital role in ensuring PHE has preventative measures in place to reduce the impact of a pandemic and will plan to ensure key functions can continue to be carried out should the workforce be affected.

HR key roles:

- support managers in the creation of a business continuity/disaster recovery plan in order to identify and source key skills to sustain vital functions
- co-ordinate with other areas to plan operations during a time of reduced workforce
- ensure policies are maintained/developed and activated when required. Once formalised and tested, HR will then be responsible for communicating the policies and procedures to workers, and arranging training as necessary

Phase	Action	Responsible
Detection	Finalise mapping of the workforce including liaison with ERD	Director/HR management team
	Ensure departments have up-to-date workforce information	Director/HR management team
	Continue to work with ERD and the skills database to ensure	Director/HR management team
	Review existing guidance on terms and conditions and related issues that apply to employees involved in emergency operations	Director/HR management team
	Finalise relevant pandemic flu HR information for staff and a staff communication plan with Communications	Director/HR management team
	Start to formulate redeployment options with the relevant department managers	Director/HR management team
	Ensure administration and support arrangements are in place so that relief staff can be deployed seamlessly to support pandemic response functions in different locations	HR director
	Identify mechanisms for re-deployment of staff from 'non-influenza' areas and prepare staff for imminent deployment	HR director
	Consider implications and repercussions of cancelling all annual leave.	Director/HR management team
Assessment	Consider sharing staff between other category one responders including the NHS	HR director/HR management team
	Review lists of bank and part-time staff available	Director/HR management team

	Identify mechanisms for supporting staff required to work extended hours	Director/HR management team
	Consider contacting relevant OGC registered agencies to ensure a pool of agency staff could be available if required	Director/HR management team
	Contact other current/retired public health practitioners as required and if appropriate	Director/HR management team
	Ensure sound business continuity plans are in place with any outsourced HR providers, eg payroll	Director/HR management team
	Liaise with occupational health to ensure advice is available for reducing infections at work	Director/HR management team
Treatment	Activate a staffing cell based in HR to support with redeployment of staff across PHE and the rotas for the various ICCs/NICC	HR director/HR management team
	Ensure the up-to-date terms and conditions applicable during a declared 'emergency' are available on the intranet.	HR director/HR management team
	Analyse workforce availability across the agency including a continuous review of absence	HR director/HR management team
	Review and carry out disciplinary issues and the management of poor performance only where necessary	HR director/HR management team
	Assist managers in the monitoring of European Working Time Directive rules	HR director/HR management team
	Liaise with health and safety to ensure staff welfare is considered	HR director/HR management team
	Provide advice and staff support as appropriate	HR director/HR management team

	Ensure that remote access to Electronic Staff Records System (ESR) is available for key HR staff	HR director/HR management team
Escalation	Consider the implementation of an opt-out clause of the European Working Time Directive	HR director/HR management team
	Ensure mechanisms are in place for contact with absentees	HR director/HR management team
	Consider suspension of the sickness absence triggers	HR director/HR management team
	Work with occupational health to ensure advice is readily available for all staff on possible symptoms	HR director/HR management team
	Support managers regarding any absence of staff following	HR director/HR management team
	Consider certification levels for occupational sick pay	HR director/HR management team
	Support managers with staff working patterns	HR director/HR management team
	Support managers with business continuity arrangements	HR director/HR management team
	Ensure adequate down time and recovery for affected PHE staff	HR director
	Assist managers with organisational recovery and recognition	HR director/HR management team
	Ensure there is a formal way of recognising staff commitment during the pandemic	HR director/HR management team
	Deal with any deferred organisational development matters such as appraisal and induction	HR director/HR management team
	Allow staff the necessary time to recover from the pandemic through the use of annual leave, time off in lieu or special leave	HR director/HR management team

	Rescind any European Working Time Directive waivers, and revert to usual working terms and conditions of employment	HR director/HR management team
	Engage with staff regarding the pandemic and run workshops/after action reviews regarding lessons learnt	HR director/HR management team
Recovery	Assist managers with organisational recovery and recognition	HR director/HR management team
	Ensure there is a formal way of recognising staff commitment during the pandemic	HR director/HR management team
	Deal with any deferred organisational development matters such as appraisal and induction	HR director/HR management team
	Allow staff the necessary time to recover from the pandemic through the use of annual leave, time off in lieu or special leave	HR director/HR management team
	Rescind any European Working Time Directive waivers, and revert to usual working terms and conditions of employment	HR director/HR management team
	Engage with staff regarding the pandemic and run workshops/after action reviews regarding lessons learnt	HR director/HR management team

6.6 Finance and Commercial directorate

In a pandemic scenario, frontline staff will need to be supported by the Corporate Services. The head of the directorate office, or other nominee determined by the director of finance and commercial, acts as the divisional resource co-ordinator in an emergency response situation and will act as the prime point of contact for Finance and Commercial directorate staff redeployment, for example to ICCs or to support other functions.

Much of the work for the Finance and Commercial directorate occurs in the planning phase. The new DH definitions for activities start with the detection phase, which assumes all the planning work is already in place. For completeness, the planning activities are shown below in a separate table.

The Finance and Commercial directorate will support PHE's frontline staff both directly and indirectly. The direct support will include accommodation arrangements, including IT systems in the ICCs and in simplified procurement and cash capabilities. The indirect support will include, among other things, provision of staff.

Planning activity	Responsible
Maintain list of essential staff and staff who can be redeployed	Senior management team
Make staff available to attend appropriate ICC training	Senior management team
Raise awareness of reporting needs	Head of financial decision support
Maintain generic procurement framework contracts (for example for hotels)	Head of procurement
Develop and publish procurement procedures for incidents	Head of procurement
Procurement and Microbiology Services to work very closely to ensure key products/services are identified in advance to ensure contingent stocks held at a convenient location (consignment stock – so suppliers managed stock rotation etc) and dual sources of key goods approved and contracted for	Head of procurement
Have file structures, email accounts etc on standby for ICCs	Head of ICT
Engage with emergency planning to ensure ICC staff are actively trained in using ICC IT equipment, eg smart boards	Head of ICT
Ensure business continuity plans are up to date across the directorate	Head of directorate office
Maintain contact lists for senior management team	PA to director of finance and commercial

Phase	Action	Responsible
Detection	Not applicable	
Assessment	Not applicable	
Treatment	Maintain awareness of staffing/sickness levels, briefing	Senior management team
	On standby to provide urgent advice on their specialism (eg procurement, IT)	Senior management team
	Identify non-negotiable deadlines and deploy plans to achieve them	Senior management team
	Engage with NICC and ICCs, ascertain requirements for space, support, admin, catering and provide these	Head of estates and facilities
	Ensure resilience of PHE IT systems	Head of ICT
	Set expectations about level of IT support available to emergency response	Head of ICT
	Ensure security of data, back up of email and data systems is in place	Head of ICT
Escalation	Redeploy staff from development onto first and second line support role	Head of ICT
	Publish on-call rotas to incident teams, adjusting for current levels of absenteeism	Head of ICT
	Ensure ICCs have sufficient IT equipment, if necessary commandeering equipment (PCs, laptops, phones etc) from elsewhere	Head of ICT
	Ensure petty cash provisions are in place	Head of financial accounting

	Increase credit card limits	Head of financial accounting
	Publish on call rota for finance support	Senior management team
	Redeploy staff to cover essential roles	Senior management team
	Support potential alternate sourcing of key supplies	Head of procurement
	Home working used in agreed work areas	Senior management team
	Circulate up-to-date contact lists	PA to director
Recovery	Collate 'lessons learned' document, develop actions list	Senior management team
	Re-engage with internal and external stakeholders	Senior management team
	Provision of costing information to external parties	Head of financial decision support
	Coordinate withdrawal from short-term leased properties with other functions and the return the NICC to a day-to-day suite of meeting rooms facility	Head of estates and facilities

6.7 Health and Wellbeing directorate

Will identify staff available to provide support to other parts of PHE and deploy as appropriate. Will carry out impact assessment on business operations stopping other non-essential work to allow additional staff to be made available if needed.

Phase	Action	Responsible
Detection	Identify [specialist and non-specialist] staff available to provide support to other parts of PHE response and deploy as appropriate. Carry out impact assessment on Health and Wellbeing business operations at current time	National Executive director for health and wellbeing
Assessment	Provide additional support to other parts of PHE as necessary: <ul style="list-style-type: none"> specialist staff to be deployed in ICC/PHE centre support (direct and indirect) other staff to be deployed as appropriate <p>Discuss with director of FES need for additional support for FF100 team and identify staff as appropriate</p>	National Executive director for health and wellbeing
Treatment	Provide additional support to other parts of PHE as necessary, stopping other non-essential work to allow additional staff to be made available Provide staff for FF100 team under FES co-ordination, if required	National Executive director for health and wellbeing
Escalation	Re-evaluate impact assessment on Health and Wellbeing programme delivery	National Executive director for health and wellbeing
Recovery	Gradual reduction in Health and Wellbeing staffing in support of the pandemic response Identification of specific staff to support any recovery work over longer period of time, eg epidemiological work, health impact assessment, health service evaluation Evaluation of impact on business as a result of supporting the response Prioritise restart of normal work	National Executive director for health and wellbeing

6.8 Chief Knowledge Officer's directorate

The directorate will:

- facilitate and support appropriate research
- identify staff available to provide support to other parts of PHE and deploy as appropriate
- carry out impact assessment on business operations stopping other non-essential work to allow additional staff to be made available if needed
- support the Health Protection team monitoring deaths, excess mortality and hospital admissions
- with the Communications team, update the website content and ensure the messages are consistent and that content does not include internal contradictions

6.9 Strategy directorate

The directorate will:

- identify staff available to provide support to other parts of PHE and deploy as appropriate
- carry out impact assessment on business operations stopping other non-essential work to allow additional staff to be made available if needed

6.10 Programmes directorate

The directorate will:

- identify staff available to provide support to other parts of PHE and deploy as appropriate
- carry out impact assessment on business operations stopping other non-essential work to allow additional staff to be made available if needed

7. Governance arrangements

7.1 Assurance

PHE undertakes an annual EPRR assurance programme set against core standards, to provide evidence of assurance from all arms of the organisation in all elements of emergency preparedness, response and recovery. These standards and measures are a PHE reporting requirement to DH, Cabinet Office and the Care Quality Commission.

In preparation of a pandemic influenza response, PHE:

maintains and evaluates business continuity plans
exercises and/or tests 'localised' PHE EPRR emergency/business continuity plans
provides ongoing rolling support and training to meet the needs of PHE colleagues who are affected or may be required by incidents and emergencies
conducts a structured debriefing post incident/emergency/exercises

7.2 Training and exercising

PHE staff training requirement for response is agreed by the corporate resilience team and ERD training team. Development and delivery of training and exercising is undertaken by the ERD Training and Exercise team. This may include (but is not limited to):

- face-to-face training
- exercising (including the PHE pandemic influenza off-the-shelf exercise available May 2014 from erd@phe.gov.uk)
- e-learning
- provision of ongoing support and training to meet the needs of PHE colleagues who are affected or maybe required by incidents and emergencies
- FF100 – identifying any developments that have training implications

In October 2014 Exercise Cygnus, a DH-led Tier 1 pandemic influenza exercise as part of the UK government national exercise programme, aims to assess the preparedness and response to an influenza pandemic in the UK. PHE and NHS England together with health and social care partners are participating in this three-day exercise. PHE will have full participation in the required response.

Following the post-exercise lessons identified process, PHE will review and revise this and all associated plans as appropriate.

Appendix 1: Planning assumptions

1. In developing the PHE response to a new pandemic, account must be taken of a number of assumptions described within the UK strategy:
2. The plan should be adaptable, to be used in outbreaks of other infectious diseases.
3. Stopping the spread or introduction of the pandemic virus into the UK is unlikely to be a feasible option
4. Any pandemic activity in the UK may last for a significant period of time and therefore a sustained response will be required
5. A novel virus would reach the UK very quickly
6. Once established in the UK, sporadic cases and clusters will be occurring across the country in 1-2 weeks
7. About 50% of the population may be affected in some way or another
8. Up to 50% of staff may be affected over the period of the pandemic, either directly by the illness or by caring responsibilities, thereby creating potential pressures on the response
9. The severity of the virus will be unknown; the groups of the population most affected will be unknown as will the efficacy of antivirals
10. No vaccine will be available for 4-6 months

Appendix 2: Roles and responsibilities of the Department of Health, the NHS and the Cabinet Office

The following responsibilities have been identified in other plans with which the PHE plan must integrate. They are repeated here in order to clarify responsibilities.

The UK Influenza Pandemic Preparedness Strategy 2011 outlines the government's roles as follows.

DH is the lead government department for pandemic preparedness and response. It has overall responsibility for developing and maintaining the contingency preparedness for the health and social care response, maintaining liaison with international health organisations and providing information and specialist advice to ministers, other government departments and responding organisations.

NHS England has assumed responsibility for many pandemic preparedness and response activities previously delivered by primary care trusts and strategic health authorities. These include assurance that the NHS in England has effective plans and arrangements in place to respond to an influenza pandemic and commissioning of the primary care aspects of a response (for example vaccine delivery to patients and arrangements of antiviral collection points). The roles and responsibilities of providers of NHS-funded care remain largely unchanged. More details about the NHS England plans are available at: <http://www.england.nhs.uk/ourwork/eprr/>

The devolved administrations and England share a common strategic approach to pandemics, and the four health departments work closely together during both planning and response. Strong clinical and senior official liaison across the four nations strengthens the UK-wide co-ordination and co-operation.

All government departments are directly or indirectly involved in preparing for an influenza pandemic and play an active role in informing and supporting contingency planning in their areas of responsibility.

The National Security Council (Threats, Hazards, Resilience and Contingencies) (NSC (THRC)) Committee, comprising ministers from across central government departments and the devolved administrations, oversees and co-ordinates national preparations for all key UK risks including pandemic influenza.

During a pandemic NSC (THRC) will co-ordinate central government activities, make key strategic decisions such as the countermeasures required and determine UK priorities. It is also likely that Cabinet Office Briefing Room (COBR) will activate a Scientific Advisory Group for Emergencies (SAGE) to co-ordinate strategic scientific and technical advice to support UK cross-government decision making. DH, as lead government department, would work closely with the devolved administrations using meetings of the four nations' health departments at official and ministerial level, which worked particularly well during the influenza A(H1N1)pdm09 pandemic, to agree health specific issues ahead of NSC(THRC) discussions. 'Responding to emergencies – The UK Central Government Response Concept of Operations' details how the UK government responds to emergencies.

Exercises and testing are still needed on an ongoing basis within individual organisations and with partner organisations to test assumptions and interrelated aspects of plans:

- co-ordination of a pandemic response is key to ensure best use of resources and to achieve the best outcome for the local area
- continuity plans are needed to underpin pandemic influenza response, in common with many other emergency response plans

Appendix 3: Roles of key partner organisations

The WHO Influenza Collaborating Centre at Mill Hill has an international role as one of the four WHO international collaborating centres in the surveillance of new influenza strains, obtaining or sharing new virus isolates, properly characterising the new virus isolates and working on providing agreed diagnostic methods.

The WHO will announce the onset of the various pandemic phases, co-ordinate international efforts to characterise and diagnose new viruses, co-ordinate international efforts to develop a new vaccine, and promote uniform international surveillance through the development of guidelines.

The European Centre for Disease Prevention and Control (ECDC) provides timely information to the European Commission, the member states, community agencies and international organisations active within the field of public health and also provides scientific opinions and scientific and technical assistance, including training. ECDC also exchanges information, expertise and best practices, and facilitates the development and implementation of joint actions.

The European Influenza Surveillance Scheme will continue to monitor influenza activity across the EU and exchange timely information between the 23 participating national centres.

The European Union will co-ordinate a response between the member states of Europe including where possible sharing of surveillance strategies, entry screening processes and stocks of vaccine and antiviral medications. ECDC in Stockholm will play a major role in co-ordination and liaison between the public health authorities in individual member states.

The Department of Environment, Food and Rural Affairs (DEFRA) is responsible for surveillance and control of influenza in animal populations in the case of a contemporaneous or initial pandemic in animal populations.

NHS 111 provides a confidential 24 hour telephone health advice service using standard algorithms to provide advice on self-treatment and direct people to treatment services as necessary. In addition, data on calls received for relevant clinical syndromes will be supplied to Health Protection, Colindale for the purpose of integrating into daily SitReps sent to DH.

The Royal College of General Practitioners through its Birmingham Research Unit Weekly Returns Service contributes to national surveillance by reporting new episodes of influenza and other respiratory infections.

The European Union will carry out the licensing of candidate influenza vaccines in preparation for a pandemic.

The UK Vaccine Industry Group (UKVIG) will collaborate with the DH and other government agencies over the supply of pandemic vaccines for the UK.

Appendix 4: Summary of the epidemiology of pandemic influenza

Influenza is an acute viral infection typically characterised by sudden onset, fever, and cough with or without a sore throat or other respiratory symptoms. Other common symptoms include headache, prostration and muscle and joint pains. The acute symptoms can last for about one week, although full recovery may take longer. Influenza is a seasonal illness, typically occurring during the winter months. The very young, pregnant women, the elderly and people with certain underlying medical conditions are at particular risk of serious illness or death from influenza and its complications

Pandemic influenza occurs when a novel influenza A virus emerges or re-emerges in humans, which is capable of producing clinical illness, spreads efficiently, and against which there is little or no pre-existing immunity in the worldwide population. As a consequence, the scale and severity of illness (and hence consequences) of a pandemic could be substantially higher than even the most severe winter epidemics (although this was not the case in 2009). Mortality in typical seasonal influenza is usually confined to older age groups but in pandemics it is typically increased in younger age groups. The size of any increase in morbidity and mortality and the extent to which a shift in age distribution occurs will depend on a variety of factors including the nature of the pandemic virus, and pre-existing immunity. In the 20th and 21st centuries, pandemics occurred in 1918, 1957, 1968 and 2009.

Clinical attack and case fatality rate

The clinical attack rate is the proportion of a population with symptomatic illness. Planning assumptions are based on a reasonable worst-case-scenario of an attack rate of up to 50% and a mortality rate of up to 2.5%, should no treatment prove effective. The DH position (outlined in the UK Influenza Pandemic Preparedness Strategy 2011) is that the combination of a high attack and high mortality rate is unlikely but unpredictable.

Case fatality rate

The case fatality rate is the proportion of persons with symptomatic illness who die. Case fatality rates have ranged between 2-2.5% in the 1918 pandemic and 0.025% in 2009.

Age-specific impact

Age-specific impact is difficult to predict in advance. In the UK in 1918 and 2009 pandemics, there was a shift in terms of morbidity and mortality towards younger adults. Younger age groups account for proportionally more mortality in influenza pandemics than in seasonal influenza epidemics.

Appendix 5: Summary of modelling work

Mathematical modelling has been employed to explore many aspects of influenza pandemics, including the likely spread both temporally and spatially, and the effectiveness of potential control programmes. Inherent uncertainty remains in the results obtained from modelling, due in part to a scarcity of data from past pandemics, and limited available data from the pandemic in 2009 on important factors such as dynamic changes in contact patterns and health systems, the impact of the media on healthcare-seeking behaviour and widespread popular use of the internet. Nevertheless, the modeling results broadly suggest that:

Containment strategies to prevent a pandemic spreading in the UK are unlikely to be effective as simultaneous, multiple importations would be expected, and antiviral stocks would be rapidly depleted. If some infectious individuals are not symptomatic, or symptomatic cases do not seek care or delay obtaining care, then interventions could not be implemented rapidly enough or with sufficient coverage to be effective. Treatment, prophylaxis, and effected school closure during spring 2009 did not contain the pandemic.

International travel restrictions are highly unlikely to interrupt the spread of an epidemic significantly. For example, imposing a 90% restriction on travel to the UK might delay the peak of a pandemic by only 1-2 weeks. Entrance screening appears less effective than general travel restrictions. The majority of those who board a flight incubating influenza would not display symptoms until after arrival and so would not be prevented from entering the country.

Prompt treatment of confirmed cases with neuraminidase inhibitors can reduce the severity of disease in patients, and prophylaxis of household contacts can reduce household transmission

Assuming such a vaccine was available, prior vaccination, even with a poorly matched (pre-pandemic) vaccine, could reduce the severe impact of the pandemic on hospitalisation and mortality.

Social distancing, especially school closures might reduce clinical attack rates in children and slow epidemic spread somewhat from reduced interpersonal contacts. However, the impact of school closures depends on the nature (local/national, pre-emptive/reactive) and duration of closures and may not necessarily have the same effect as school holidays where interpersonal contacts may be further reduced by vacations. It might also significantly aggravate absenteeism issues.

It is envisaged that new modelling approaches that had been developed before the 2009 pandemic and further developed and refined in light of the experiences during the 2009 pandemic, will be used during future pandemics.

During the early stages of a pandemic individual-level data from the FF100 will provide the most complete data source and this together with data from ad hoc outbreak studies will provide an initial assessment of important epidemiological parameters.

Subsequently aggregate data from a variety of surveillance systems will be used in an age and regionally structured SEIR model incorporated within a Bayesian synthesis framework of multiple evidence sources and alternative Bayesian evidence synthesis approaches to provide both current estimates of important epidemiological parameters and projections with uncertainties of the evolution of the pandemic required to assess the possible future demand for health services.

Appendix 6: Summary of pandemic infection control assumptions

Infection control assumptions for pandemic influenza are based on current knowledge about seasonal influenza viruses. These include:

- person-to-person spread of human influenza viruses is well established
- the patterns of transmission observed during nosocomial outbreaks of influenza suggest that large droplets, airborne or fine droplets and contact (direct and indirect) may all play a part in the transmission of influenza. Certain aerosol generating procedures in healthcare settings have also been implicated in transmission.
- the incubation period of human influenza ranges from 1-5 days (typically 2-3)
- infectivity is proportional to symptom severity and maximal in the first few days after the onset of symptoms
- the period of communicability is typically up to seven days after symptom onset in adults and possibly longer in children, although longer periods of virus shedding have been documented in a small proportion of children
- virus excretion may be considerably prolonged in immunocompromised patients.
- virus may be recovered from infected but pre-symptomatic persons, but there is little published evidence to support person-to-person transmission of influenza from a pre-symptomatic individual to a susceptible host
- influenza viruses are easily deactivated by washing with soap and water, alcohol based hand sanitizers, and cleaning with normal household detergents and cleaners

Pandemic infection control measures in all general settings will be based around:

- persons with symptoms staying in their own homes
- persons who develop symptoms at work or while away from home, returning to home as quickly as reasonably possible
- good respiratory hygiene practised by all
- frequent handwashing practised by all
- appropriate cleaning of frequently touched hard surfaces in the home and in public places
- avoidance of unnecessary contact with others and unnecessary overcrowding (reduction of contact rates)
- rapid access to antiviral treatment for symptomatic persons (reduction in transmissibility)

In health and communal care settings, additional measures will include:

- prompt recognition (and treatment) of staff with influenza

- exclusion of staff with respiratory symptoms unless being used to care for patients with influenza
- segregation of staff into those dealing with influenza patients and those not (with exceptions)
- maintaining physical and/or temporal separation between 'flu' and 'non-flu' patients/clients
- standard infection control principles
- droplet precautions
- personal protective equipment according to risk of exposure
- environmental cleaning and disinfection

Appendix 7: World Health Organization global phases

(Adapted from: Pandemic Influenza Risk Management WHO Interim Guidance 2013)

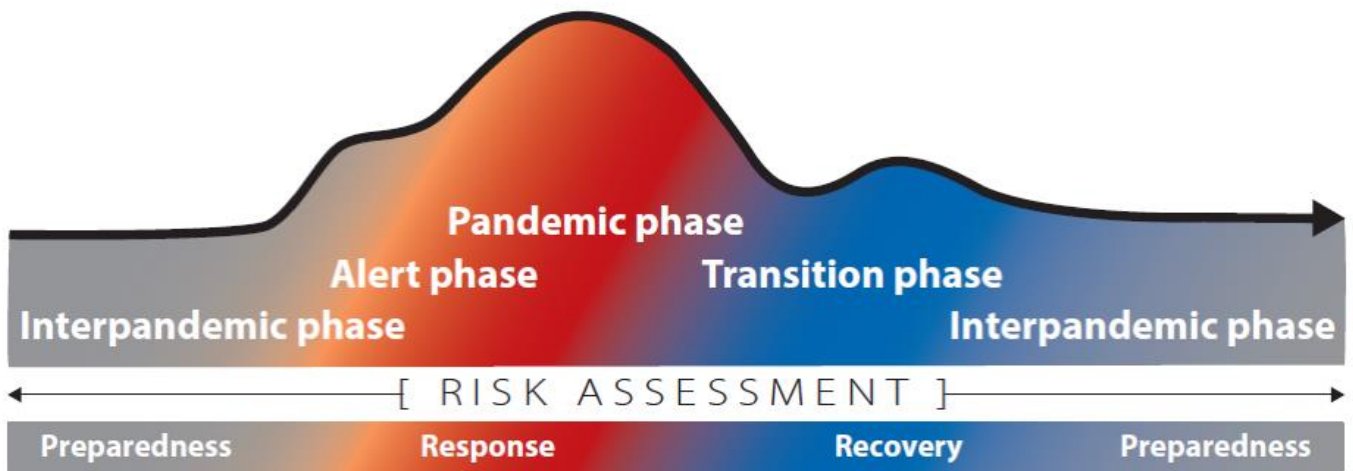
In 2013, WHO issued interim guidance on risk management of pandemic influenza. This guidance included new nomenclature to describe the spread of a new influenza subtype. Within the guidance, countries are encouraged to develop their own national risk assessments – informed by global risk assessments. The guidance acknowledges that countries encounter differing risks at differing times and that risk management decisions should be based on local risk assessments.

Actions at a national level, at any point in time, should be based on national/local risk assessments and be proportionate to risk, with consideration to the global situation. This uncoupling of global and national risk assessments is necessary as the global risk assessment (by definition) will not represent the situation in any individual country.

The new phases are as follows:

Inter-pandemic phase	<ul style="list-style-type: none"> the period between influenza pandemics
Alert phase	<ul style="list-style-type: none"> a new subtype of influenza causing disease in humans has been identified increased vigilance and risk assessment at local, regional, national and global levels if risk assessments suggest this is not developing into a pandemic strain, a de-escalation of activities to those of the inter-pandemic period may occur
Pandemic phase	<ul style="list-style-type: none"> period of global spread of human influenza caused by a new sub-type movement between the inter-pandemic, alert and pandemic phase may occur quickly or gradually as indicated by the global risk assessment
Transition phase	<ul style="list-style-type: none"> as the assessed global risk reduces, a de-escalation of global actions and reduction in response activities, or a movement toward recovery activities, based on countries own risk assessment

The continuum of pandemic phases



^a This continuum is according to a “global average” of cases, over time, based on continued risk assessment and consistent with the broader emergency risk management continuum.

The WHO global phases are distinct from both the determination of a Public Health Emergency of International Concern (PHEIC) under the IHR 2005, and from the declaration of a pandemic.

Specific assessments will be used for the determination of a PHEIC or a declaration of a pandemic, and they will be used to communicate the need for global action.

Determination of a PHEIC	Responsibility for the determination of a PHEIC lies with the Director General of WHO under article 12 of the IHR (2005). The determination of a PHEIC will lead to communication of temporary recommendations.
Declaration of a pandemic	During the period of spread of human influenza caused by a new subtype, the Director General may make a declaration of a pandemic.

Actions by WHO will occur throughout the phases continuum relative to the global risk assessment.

Appendix 8: Mobilisation of the national stockpile of antivirals for pandemic influenza preparedness

Department of Health	NHS England	Public Health England	NHS Business Services Authority	NHS Supply Chain
Establish governance arrangements for the pandemic response to include representatives from DH, NHS England and PHE for the health response in England				
Establish four nations health group to include representatives from Scotland, Wales and Northern Ireland for the health response in the UK				

<p>Response governance for England and UK to consider available evidence/expert advice on nature of the virus to date to inform whether antivirals are considered to be effective.</p>				
<p>Response governance for England and UK to consider available evidence/expert advice to inform response policy for use of antivirals – treat all, targeting, any limited prophylaxis</p>				
<p>Response governance for England to provide instruction for the national stockpile of antivirals to be mobilised – including agreement of funding required for the antiviral response and volume of antivirals to be issued</p>				

	NHS England to confirm the first tranche of antiviral collection centres to be used and to provide information of addresses, contacts and telephone numbers to PHE	PHE to arrange for the current stocks of vouchers to be accessed by NHS Supply Chain and confirm the printing of additional antiviral vouchers for use by GPs		
	NHS England to reissue guidance to the first tranche of antiviral collection points to ensure that business requirements for operating an antiviral collection point are met	PHE to provide confirmed delivery locations to the NHS BSA with the instruction that the antiviral stocks need to be mobilised		
		PHE provides the instruction for the hospital manufacturing units to produce the oseltamivir solution for children aged under one and inform NHS BSA to ensure that the bottles required are available to the hospital manufacturing units	NHS BSA to provide instruction to NHS Supply Chain to start the arrangements for mobilising the antivirals and for ensuring that bottles are available at the hospital manufacturing units	

				NHS Supply Chain to confirm when antivirals and oseltamivir solution plus voucher ready to be despatched – two weeks
			NHS BSA confirms delivery schedule for the first deliveries to be made to the antiviral collection points to NHS England and PHE	
	NHS England informs antiviral collection points about delivery schedule for receiving antivirals and confirms receipt of stocks and at they are ready to operate	PHE confirms that vouchers have been distributed to GP surgeries		
Response governance for England confirms that antiviral collection points are ready to operate and confirms start date with NHS England				

<p>Response governance to confirm communications for notifying the public that antiviral collection points are going to start operating</p>	<p>NHS England provides information to GPs on how to authorise antivirals – using vouchers or the right hand side of the prescription form Information also provided to all NHS staff</p>	<p>Information on operation of antiviral collection points provided to PHE staff</p>		
	<p>Antiviral collection points to provide information to NHS England on the number of antivirals being issued and NHS England to report on this as part of the governance for the response</p>			
	<p>NHS England to receive requests for additional stocks of antivirals and to confirm orders with NHS BSA</p>		<p>NHS BSA to provide orders for additional stock to NHS Supply Chain</p>	

				NHS Supply Chain receive orders and confirm delivery schedule for follow-up deliveries to antiviral collection points
	NHS England monitor pressure on antiviral collection points to inform whether second tranche of antiviral collection points is required			
Response governance monitors the take up of antivirals to assess the overall impact on the national stockpile and any changes in treatment policy – in conjunction with four nations				
	NHS England to monitor pressures on primary care to inform recommendation to response governance about mobilising the NPFS			

Appendix 9: The First Few Hundred – FF100

It has long been recognised that a comprehensive assessment of the first few cases and their contacts in an emerging pandemic will be a key requirement of pandemic influenza planning and delivery. The early availability of scientific data on a new pandemic strain will provide insights into the clinical picture associated with infection, the severity, allow the derivation of serial interval and household secondary attack rates, as well as providing evidence of antivirals effect on household transmission and timely inputs to key decision and policy makers.

Collection of this data will only be possible if a systematic approach to gathering detailed information has been developed in advance of the emergence a new strain of pandemic influenza. Therefore, in July 2008, the Health Protection Agency (HPA) convened a meeting of key stakeholders and a formal project plan was subsequently initiated with a view to completing the first few hundred (FF100) protocol and questionnaire and testing the operation of this and associated database by the end of 2009. The emergence of the 2009 pandemic accelerated this work and a protocol and working database were developed to collect data on the first cases of A(H1N1)pdm09. The data and information emerging from this were used for modelling purposes and to inform policy and guidance developed during the pandemic. The adopted protocol and design of the FF100 is that of a prospective observational cohort study. It has been developed around the tracing of close contacts (both household and non-household) of confirmed cases in the early stages of a pandemic in the UK.

The primary objectives are to provide estimates of:

- household secondary attack rate
- serial interval
- clinical presentation and course of disease
- symptomatic proportion of cases
- antibody dynamics in confirmed cases

The secondary objectives are to provide data to support estimation of:

- basic reproductive number
- incubation period
- preliminary case-severity ratios
- effectiveness of clinical countermeasures

The FF100 will collect clinical, epidemiological and virological information from the earliest laboratory confirmed cases and their close contacts. This includes:

- demographic data
- details of the clinical illness (eg date of onset, signs and symptoms, severity)
- follow-up information on a case's final outcome (eg death, recovery), the development of complications and use of antivirals and antibiotics
- active contact follow up to query possible development of illness and respiratory swabs if clinical symptoms developed
- final follow-up at >14 days for cases and contacts
- serology requested from cases and contacts at day 0 and 21+ day

Appendix 10: Glossary

CIDSC	Centre for Infectious Disease Surveillance and Control
CMO	Chief Medical Officer
CNRL	Community Network of Reference Laboratories for Human Influenza
COBR	Cabinet Office Briefing Room
CRCE	Centre for Radiation, Chemicals and Environmental Hazards
DATER	Detection, assessment, treatment, escalation, recovery
DCLG	Department of Communities and Local Government
DEFRA	Department for Environment Fisheries and Rural Affairs
DH	Department of Health
ECDC	European Centre for Disease Prevention and Control
ERD	Emergency Response Department
FF 100	First Few 100
GISRS	Global Influenza Surveillance and Response System
HSAG	Health Services Advisory Group
ICC	Incident co-ordination centre
LHRP	Local health resilience partnership
MHRA	Medicine and Healthcare products Regulatory Agency
NICC	National incident co-ordination centre
NERVTAG	New and Emerging Respiratory Virus Threats Advisory Group
NHS BSA	NHS Business Services Authority
NIBSC	National Institute of Biological Standards and Control
NPFS	National Pandemic Flu Service
PHEIC	Public health emergency of international concern
RED	Resilience and Emergencies Division
SAGE	Scientific Advisory Group for Emergencies
STAC	Science and technical advice cell
UKVIG	UK Vaccine Industry Group
WHO	World Health Organization

Appendix 11: Reference documents

Public Health England (2013) PHE National Incident Response Plan (available on PHE intranet)

Public Health England (2014) Pandemic Influenza Strategic Framework (available on PHE intranet)

NHS England (March 2013) NHS Commissioning Board Emergency Preparedness Framework 2013

<http://www.england.nhs.uk/wp-content/uploads/2013/03/eprf-framework.pdf>

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