

HPA commentary on 'areas of enquiry' in the review of the response to the 2009 influenza pandemic

15 April 2010

Version 3.2 (final)

Numbers refer to the questions provided by the Cabinet Office in the original 'call for evidence – areas of enquiry'.

1 What aspects of the Pandemic Flu Response worked well? What would you wish to do differently in another pandemic?

1.1 Overall, the UK response was very successful. The general civil contingencies arrangements now in place in the UK, and the detailed prior planning for pandemic flu, both contributed to the successful response. The use of pandemic exercises to test response mechanisms and the lessons learnt from the experience of managing avian flu incidents in the UK, also strengthened the response. Collaboration between the health protection organisations of the respective UK administrations worked well and contributed to effective coordination of the overall UK response. UK investment in time and resource in international collaboration on health issues, including with bodies such as WHO and ECDC, paid dividends in terms of access to international intelligence on the pandemic. Vaccine development within the UK, to which the HPA contributed substantially, was generally rapid and efficient and enabled the UK to cooperate effectively with international vaccine development efforts. Surveillance of pandemic influenza activity and impact, and development and deployment of diagnostic tests, provided a sound basis for decision making. The provision of timely and authoritative information and advice to health professionals and the public was well received.

1.2 Within the HPA, staff engagement was remarkable, permitting an effective, flexible and sustained response. The ability to mobilise staff to support activity in hard pressed areas and the effectiveness of team working across traditional organisational and professional discipline boundaries, enabled the HPA to mount a response that could be modified to fit the changing needs and surges in demand. Good collaboration was achieved between the HPA and partners in the health service, particularly at the local level, and other responding organisations. The ability to innovate as needed (for example, the development of additional surveillance systems) was an important element in ensuring the response from the HPA met the changing needs for support and information.

1.3 The initial information arising from reports from Mexico about the severity of the illness associated with the newly emergent influenza caused a high level of concern and justified a robust and precautionary response. Data began to emerge quite early on in the pandemic, however, that the overall severity of the illness caused by the infection was mild, and its impact at a population level no greater than in seasonal influenza epidemics. Cases of

severe illness did occur including in some patients with no prior underlying condition but they represented a small proportion of all infected individuals. Plans for the pandemic had not taken sufficiently into account the possibility of modifying the response according to the level of severity of the threat, and the response in the UK reflected this. Triggers for starting and, as importantly, stopping actions had not been developed.

1.4 Greater clarity and review is needed about the roles in advice to central government of SAGE and the Chief Medical Officer's office, and the way that the advice from JCVI, clinical groups (for example, the Pandemic Influenza Clinical and Operational advisory group) and the HPA are incorporated into this advisory structure.

1.5 The HPA was not set up to provide the service response to 'containment' that it ended up providing in the 2009 pandemic in England, and the system employed had to be established from scratch. The intensity and duration of the response mounted during this phase resulted in a considerable overtime burden for staff for several months. If it is proposed that the HPA will be expected to carry out a similar response in the future, detailed planning would strengthen the ability to respond. Part of this planning is the development of clear criteria for stopping containment activity. Greater clarity is needed about the role of other local health service partners in the provision of containment measures when these are required.

1.6 Individual counting of cases of influenza is not normally carried out in seasonal epidemics and was not planned for. It was, however, an activity that came to be expected as part of the early response to the pandemic. Ad hoc systems were developed to achieve this but a review of the value of such detailed data is warranted and better preparation for future similar activity is needed should it be deemed necessary in the future. Improved connectivity of IT infrastructure between HPA and NHS, to share relevant data on cases, is needed.

1.7 In the light of the experience of responding to the pandemic, the HPA's emergency arrangements have been reviewed.

2 *What aspects of the Pandemic Flu Response would have had to change in the event of a more severe pandemic?*

2.1 A more severe pandemic is assumed to mean one where a large proportion of the population is infected (as in the current pandemic) but with a greater proportion of those infected having a severe illness. This might be as a result of greater intrinsic virulence of the virus but is more likely to be apparent as a result of greater susceptibility to infection in the elderly leading to more illness in individuals in this age group (who are at greater risk of the severe consequences of infection).

2.2 Early delivery of anti-virals (preferably within 24 hours of onset of symptoms) should be a priority in order to reduce the occurrence of severe

illness (and death) in those at greatest risk. Focussing efforts on those at greatest risk of severe illness (and not offering anti-viral prophylaxis to those not at increased risk, or to contacts of cases) may be the most effective way to maximise early administration of anti-virals to those most likely to benefit.

2.3 If the level of threat had been judged to be much greater, more aggressive public health measures might have been deployed such as school closures on a larger scale, limiting mass gatherings, greater emphasis on social distancing measures, and even more high profile promotion of personal hygiene measures

2.4 Ad hoc systems were developed during the pandemic to collect information on the occurrence of severe illness and deaths due to pandemic influenza in hospitals. More robust systems need to be established in seasonal epidemics that would be able to provide reliable information in a severe pandemic.

2.5 Robust systems for collecting information on confirmed cases of influenza, including the linking of NHS and HPA IT systems for sharing of results, would be particularly important in the event of a more severe pandemic, as ad hoc arrangements would be more difficult to establish when resources are stretched.

6 *What were the factors driving the distribution policy of focusing on high risk groups?*

6.1 Advice on vaccination policy came from JCVI. HPA contributed information from surveillance of influenza activity, serological surveys and modelling.

6.2 The surveillance data indicated that while children of school age were the most likely to become infected, severe illness and deaths occurred more often in older age groups (and in infants and very young children). Those with high risk underlying illnesses and pregnant women were at considerably increased risk of severe disease. Although the elderly were infrequently infected, those who become ill were at greatest risk of severe illness and death.

6.3 Mathematical modellers from the HPA, in collaboration with the London School of Hygiene and Tropical Medicine, submitted a health economic analysis to the JCVI which compared the cost-effectiveness of different vaccination policy options targeting different groups in the population. The analysis incorporated the transmission dynamics of infection and the impact that vaccination might have upon the spreading of infection, as well as the direct protection offered to those vaccinated. The analysis considered the impacts of the infection on quality of life (including mortality and morbidity) and costs to the health service of hospitalisations, demands on GPs, etc, as well as the cost of administration of the vaccine. This analysis concluded that

it would be most cost-effective to offer vaccine to those in the groups at highest risk of severe disease.

6.4 As vaccine was only going to be available in small quantities to begin with, a risk based approach appeared the most sensible way of prioritising its use.

10 How were the decisions made on containment? What issues drove the policy?

10.1 The early reports of the extent and severity of illness occurring in some population groups in Mexico suggested that a robust public health response was appropriate – at least until more was known about the imminent threat. The ‘containment’ approach adopted in the UK in the 2009 pandemic was a modified form of a concept originally developed by WHO. WHO containment was envisaged as the use of isolation, quarantine, anti-viral treatment and prophylaxis in a confined geographical area in which a new pandemic virus first emerged, with the objective of ‘stamping out’ the infection before it spread more widely. This could apply if the initial focus of infection happened to be in the UK. Once the infection had spread beyond that geographical focus, however, no role for containment was envisaged.

10.2 The UK national framework for pandemic flu (2007) stated that “if the virus enters the UK through travellers from infected areas, such internal containment efforts are considered unlikely to succeed due to the large number of initial contacts expected”. The possibility of the use of a limited proportion of the large UK stockpile of anti-viral drugs for prophylaxis of contacts of early cases had been considered in discussions following the publication of the national framework in 2007, but plans for this activity had not been formalised.

10.3 A set of measures were implemented in the UK as soon as the first cases of pandemic influenza were identified, which were described as ‘containment’ but had objectives that were modified from those of the original concept. The decision to implement this approach was taken by CCC(M) and based on the balance of the advice available to them.

10.4 The objectives of ‘containment’ were to reduce transmission arising from cases occurring in the UK and, by so doing, slow both the development of widespread community transmission and an epidemic wave of illness in the population. This, it was hoped, would provide some more time to learn about the new threat and develop countermeasures. A similar ‘containment’ approach was used in a number of other industrialised countries, including some countries in Europe.

10.5 As summer in the UK was approaching, and as influenza does not generally spread in the population in the warmer months, there was the possibility that any slowing of the development of widespread transmission

might be augmented by the warmer weather and postpone the arrival of a pandemic wave.

10.6 It was recognised that ‘containment’ measures would not stop the eventual emergence of influenza activity and that there was no good evidence that such measures would be effective. Further it was recognised that once sustained transmission began to occur in the wider community (ie beyond the circle of those to whom containment measures had been applied), there was no possibility at all that continuation of the containment measures would slow the development of the epidemic in the wider population.

10.7 Following the identification of the first confirmed case in the UK on 27 April 2009, efforts were made to identify, isolate, test and treat all suspected cases, offer prophylaxis to their contacts, and keep a detailed tally of the confirmed cases. At the end of April, it was decided that this approach should continue until 3000 cases had been identified. This figure was subsequently increased to 5000 and, by the time that the ‘containment’ approach was stopped in early July, approximately 10,000 cases had been reported.

10.8 The implementation of the containment approach was led by the HPA and implemented by HPA staff working with NHS staff in the rapidly established Flu Response Centres. The workload on HPA staff to implement all the facets of containment was substantial and grew throughout this phase of the pandemic. The burden was uneven with some regions (notably London and the West Midlands) being exceptionally heavily affected. This work diverted HPA staff from other aspects of health protection work and became unsustainable in some areas.

10.9 The ability of the HPA to test all suspected cases during this early phase of the pandemic (albeit with immense efforts on the part of HPA laboratory staff), and the availability of a large stockpile of antivirals, may have been factors which made it possible to consider continuing with the containment approach for a considerable period. Evidence was mounting, however, during late May and June, of transmission of infection more widely in the community.

11 *What were the triggers for moving away from containment, and what were these based on?*

11.1 As ‘containment’ in the way that it was implemented in the UK had not been envisaged as part of the pandemic response (other in certain very specific and limited circumstances – see response to question 10), no triggers had been established for moving from ‘containment’ to a ‘mitigation’ (WHO term) or to a ‘treatment only’ approach. It was recognised, however, that if transmission of infection was occurring within the community beyond those included in the ‘containment’ measures, further efforts at containment were unlikely to prevent widespread transmission of infection in the community.

11.2 No definition, however, had been agreed either nationally or internationally as to what constituted sufficient evidence of transmission in the community to trigger the end of 'containment' measures. The concept of 'sustained community transmission' emerged, which included the identification of multiple sporadic community cases in different parts of the country. Virological surveillance of cases of influenza-like illness in the community was carried out at this time through sentinel general practitioner schemes and extended to include a subset of patients reporting influenza-like illness symptoms to NHS Direct. Sporadic cases began to be reported through these schemes in May.

11.3 The occurrence of sporadic cases from sentinel general practice schemes and NHS Direct surveillance, and reports from experienced public health professionals working with schools and communities in local districts, suggested that sustained transmission in the community was beginning to be apparent in late May and early June. This was supported by the increasing pressure (in some cases overwhelming pressure) on local services to maintain the 'containment' response.

11.4 The evidence for sustained community transmission was further supported by the estimation of the case reproduction number of the pandemic infection in the UK population. This number, R , is the average number of new cases generated in the population by transmission from an existing case. An R above 1.0 indicates sustained population transmission and that an epidemic may occur. Data on cases and contacts were analysed by HPA mathematical modellers to estimate the case reproduction number. Although there was uncertainty around individual estimates of R , it began to approach 1.0 in late May and early June, and exceeded 1.0 in mid to late June.

11.5 Nevertheless, it was difficult to demonstrate conclusively that sustained community transmission was occurring. In early June, an epidemiological investigation was carried out by the HPA in the West Midlands, where multiple school outbreaks were occurring, to determine whether sustained transmission was occurring outside the schools in that area. This investigation, which presented to SAGE on 15 June, concluded that sustained community transmission was occurring.

11.6 On 2 July, in view of the accumulating evidence of widespread community transmission, the Government announced that England would move to a 'treatment-only' approach. The National Pandemic Flu Service was commenced on 23 July as it was not yet ready at the time that the 'treatment only' phase began.

11.7 Decisions about the implementation of 'containment', including detailed aspects of the measures involved, were taken by Ministers at CCC. This level of central control was potentially inappropriate and insufficiently flexible to modify the measures in response to the clinical and public health information coming from the population at local level. The centralised approach did not adequately take into account the widely varying level of impact by region around the country and the need to modify public health responses locally.

12 What drove the policy on school closures, and how were individual decisions made?

12.1 Initial information from Mexico about the occurrence of widespread severe illness, and the early information from the USA about the occurrence and rapid spread of pandemic influenza in schools, contributed to the adoption of a precautionary approach in schools in the UK.

12.2 The early introduction of pandemic influenza into schools in the UK, the rapid spread through those schools and the transmission to family household contacts outside school reinforced the view that intervention in schools was appropriate.

12.3 Previous modelling work had suggested that early and prolonged school closure across a geographical area could reduce the transmission of influenza in a population, albeit at the expense of considerable societal disruption due to absenteeism to care for children not at school.

12.4 It was recognised, however, that any effect of school closure on reducing transmission in a community would be reduced if transmission of infection was already occurring in the community.

12.5 School closure, combined with treatment of cases and prophylaxis of contacts, was initially considered in all schools in which a case occurred. The intention was to protect other children within the school and, potentially, to slow the spread within the school, to other schools, to the families of schoolchildren and to the wider community.

12.6 As evidence emerged of the generally mild nature of the illness in most, though not all, children and there was increasing recognition of the occurrence of transmission outside schools, the approach was modified to focus protection of those groups within the school at highest risk of having been infected by exclusion and prophylaxis of more confined groups.

12.7 A risk assessment was carried out by the HPA at each school, and a course of action agreed, taking into account the certainty of the diagnosis, the number of cases, the period over which illness had been occurring, the number and distribution of close contacts, the presence of pupils at high risk of complications, the occurrence of transmission in the wider community, and the guidance existing at the time provided by the HPA.

13 What was the policy on port health inspections, and what issues drove this policy?

13.1 The HPA has submitted evidence about the actions it implemented in the early containment phase. On 29 April, in a statement from the Prime Minister, the following commitment was made: all direct flights from Mexico were to be met by a HPA staff member who would deal with any queries

relating to swine flu and all passengers to be given an information leaflet about swine flu. In addition, the HPA was asked to follow up airline contacts of confirmed cases. This activity was primarily one of reassurance to the public as it was recognised that such activity could not prevent the importation and subsequent transmission of infection from elsewhere in the world.

13.2 No entry or exit screening was implemented. The UK national pandemic flu framework states that 'no practical level of travel restriction is likely to allow a country to avoid a pandemic altogether' and that 'modelling does suggest that the imposition of restrictions on all travel to the UK is likely to delay the arrival of the virus by one or two weeks if the measures were 90% effective and by some two months if 99.9% effective'.

13.3 The occurrence of cases and subsequently community transmission in the USA, and the large number of travellers entering the UK from the USA, meant that, at a very early stage of the pandemic, cases of infection would be likely to be entering the UK on flights that would not be subject to any public health action.

13.4 Meeting flights from Mexico and follow up of contacts of confirmed cases on aircraft were implemented by the HPA from the end of April 2009. The requirements to meet flights was lifted on 19 May and to follow up contacts of airline cases on 18 June. During the period that these measures were in place, however, the resource implications for the HPA were substantial. In addition to the deployment of staff to meet aircraft from Mexico, the HPA established a single national centre to coordinate the follow up of contacts of confirmed cases in airline passengers so as to maximise the efficiency of the work in this area.

13.5 Future planning for a pandemic should consider whether there is justification for these activities at all and, if so, the criteria for implementing public health measures of this kind, with a view to restricting their use to those circumstances where there is a high likelihood of action being effective so as to conserve limited resources. This would need to be combined with the development of information to the public providing the rationale for the action taken.

14 *What was the policy on travel advice, and what issues drove this policy?*

14.1 WHO stated at the outset of the pandemic that the illness did not justify imposition of trade or travel restrictions. Countries around the world responded in different ways, with many imposing travel restrictions or advisories.

14.2 Groups providing travel advice to the British public on health related issues, including the National Travel Health Network and Centre, the Travel Advice Team at the Foreign and Commonwealth and the HPA's Travel and Migrant Health Section concurred with the WHO advice. Their views,

however, were sometimes superseded by discussions occurring between government departments and the HPA through Civil Contingencies Committee processes (for example, in a decision to issue a travel advisory relating to Mexico). In early May, the USA was reporting more cases than Mexico and with sustained community transmission. The UK travel advisory for Mexico was finally rescinded on 15 May.

14.3 The mechanism for communication between key stakeholders for determining and agreeing travel advice during crisis situations needs to be reviewed. The mechanism would more sensibly reflect the processes in place outside crisis periods to take advantage of the UK expertise in this area.

15 *What was the policy on mass gatherings, and what issues drove this policy?*

15.1 Although it is recognised that influenza infection transmission may occur at mass gatherings, there is little evidence that cancelling such events contributes to a slowing of the spread of the infection in the wider community. The continuation of mass gatherings is seen as an important indicator of 'normality' or 'business as usual'. The UK national pandemic flu framework therefore states that 'for planning purposes, the presumption should be that the Government is unlikely to recommend a blanket ban on public gatherings. If international events are to be held in the UK with participants from affected areas, the Government may recommend postponement'.

15.2 The HPA kept in close contact with the WHO International Advisory Group on the approach to mass gatherings to assess any new data that came to light, the approach adopted by other countries and the policy implications. The HPA saw no reason to change the recommendation that mass gatherings be permitted to go ahead and this recommendation was sustained throughout the pandemic.

15.3 In the event of a more severe pandemic, the recommendation to implement additional social distancing measures might include banning of mass gatherings as a public confidence measure, but consideration would need to be given to practical aspects of implementing such a recommendation and the limited impact it would be likely to have on wider transmission in the community.

16 *What was the policy on prophylaxis and what issues drove this policy?*

16.1 The use of prophylaxis (administration of anti-virals to well contacts of cases of pandemic influenza) was a key element of the 'containment' approach adopted in the UK.

16.2 In the earliest stage of the containment phase, prophylaxis was intended to reduce onward transmission of infection from contacts who might

otherwise become ill and infect others and, as a result, potentially buy time. In addition, at a time when relatively little was known about the clinical impact of infection in individuals, prophylaxis offered protection to individuals at high risk of becoming ill with pandemic influenza.

16.3 Prophylaxis was offered to household and other close contacts of cases, and to schoolchildren contacts irrespective of whether or not they were at high risk of the complications of influenza. Staff of the HPA, subsequently working with NHS staff in Flu Response Centres, dispensed anti-viral medication. Initially prophylaxis was offered widely in schools. This meant that many children received prophylaxis who were not infected with influenza virus. A significant proportion of children complained of side-effects and, in the light of the relatively mild illness experienced by most, this contributed to a reduction in uptake of prophylaxis. In the light of the information emerging that illness was generally mild in children, a stronger clinical and public health perspective in the process of decision making about policy on the use of antivirals might have led to a more targeted use of these drugs.

16.4 Investigation by the HPA, through follow up of household contacts of cases of pandemic influenza, demonstrated that the likelihood of contacts subsequently becoming ill was substantially reduced in those who took prophylaxis in comparison to those who did not.

16.5 Once community transmission of pandemic influenza infection was established, a policy of 'treatment only' was implemented. Thereafter prophylaxis was reserved for contacts of cases who were at high risk of having been infected and who were also at high risk of the complications of infection eg children in schools or homes for the disabled.

17 *What was the policy on antivirals procurement and distribution, and what factors under-pinned this policy?*

17.1 A large UK antiviral stockpile had been procured so as to ensure the availability of treatment for a substantial proportion of the UK population, if this was needed. In addition, the possibility that a small proportion of the stockpile might be used for prophylaxis in the very early stages of the emergence of a pandemic in the UK had been considered.

17.2 The distribution of antivirals was organised principally to enable their use for treatment and prophylaxis in the 'containment' phase and for treatment in the 'treatment only' phase. Plans had been developed for the deployment of a telephone system for making antivirals available for treatment during a treatment only phase but this was not ready at the time the pandemic arrived. The National Pandemic Flu Service (NPFS) was eventually introduced in late July.

17.3 The NPFS was designed to relieve the burden of managing influenza cases on primary care. The decision to offer treatment to anyone presenting with influenza-like illness (within 48 hours of onset) rather than to only those in

groups recognised to be at high risk of the complications of influenza, meant that large numbers of the population would be eligible for treatment. The use of NPFS allowed large numbers of individuals, not otherwise at high risk, to be assessed and offered anti-viral treatment.

17.4 Some other countries, notably the USA, took an early decision to offer treatment only to those at high risk of the complications of influenza (and others severely ill with influenza in hospital). Experienced clinical and public health opinion in the UK was divided on whether or not anti-viral drugs should be offered to all who became ill irrespective of their risk of severe illness. The consequence, however, of the UK approach to offer anti-virals to all who became ill was that large numbers of people received anti-viral treatment, many of whom were either unlikely to become severely ill with influenza or did not have an illness due to pandemic influenza virus infection at all. An additional consequence of the decision to offer treatment to all was that many patients were not assessed by an experienced health care professional and in some cases, having been judged to have an influenza-like illness, developed an illness completely unrelated to influenza infection.

20 What was the rationale for the membership of CCC and CCC(O)?

20.1 Membership of CCC (M) formally excluded HPA despite its statutory advisory role. In practice HPA was always invited to attend the meetings, but this did not guarantee the opportunity to fully and formally express its views or advice on key issues. In national emergencies where the HPA is the principal technical agency, there is a strong case for the HPA to have a formal place in the membership of CCC(M).

21 What was the reason for the introduction of Four Nation Health Ministers meetings? What impact did this have on the response?

21.1 There was considerable advantage, particularly with respect to messages to health care workers and the public, of a coordinated UK wide approach to the management of the pandemic. The health protection organisations of the four UK administrations collaborate effectively on technical health protection issues and their work is made easier by a coordinated UK approach. The four nation health ministers and their respective CMOs sometimes held different positions on policy issues. While compromises were developed to get round these issues, the lack of full detailed resolution sometimes complicated implementation of policy in individual countries.

21.2 A framework would be helpful for agreeing the areas in which unified UK policy is expected and other areas where devolved administrations may make decisions on policy which may differ from each other.

24 What was the balance of expertise on SAGE?

24.1 The respective roles of SAGE and the four UK CMOs in providing advice on public health and clinical matters to CCC were not completely clear. In addition, the mechanism for input from clinical experts (for example, from the Department of Health's Pandemic Influenza Clinical and Operational advisory group) was not clear.

24.2 The balance of expertise on SAGE was heavily weighted in favour of independent academic input, notably modelling, with few medical and public health generalists and very little operational response expertise. Overall SAGE members as a group did understand the issues, but SAGE was exclusively concerned with verifiable evidence, and did not adequately take into account the clinical and public health expertise providing the response at the coal face.

25 How was the relationship between SAGE and JCVI?

25.1 Generally considered to have worked well. The limited expertise in SAGE on vaccines was complemented by the expertise available in JCVI.

27 What surveillance systems were in place in April across the different countries of the UK, and how did these develop over the course of the pandemic?

27.1 A key HPA responsibility was surveillance of pandemic H1N1 infection. These are described in greater detail in the HPA's submission of evidence to the review.

27.2 In summary, as the pandemic evolved, this involved the initial rapid comprehensive assessment of the earliest cases of this novel influenza virus to ascertain the emerging epidemiology, clinical features and virology; monitoring the subsequent spread and impact of the virus and assessing the uptake, impact and effectiveness of the various clinical and public health interventions.

27.3 A series of surveillance systems were used by HPA. These systems represent an amalgam of pre-existing generic surveillance systems used for wider infectious disease surveillance; specific systems used for monitoring seasonal influenza, and systems that have been rapidly developed specifically as part of the pandemic response. The novel systems that were developed include:

1. the First Few Hundred: an in-depth investigation of the first cases of pandemic influenza and their close contacts to provide to provide a picture of the emerging clinical and epidemiological picture;
2. enhanced syndromic surveillance in the community in order to obtain daily detailed assessments of levels of clinical illness in the wider population;

3. enhanced collection of laboratory results for influenza and other respiratory virus infections through the HPA Regional Microbiology Network to provide a fuller picture of the range of causative infections;
4. self-swabbing of persons contacting NHS Direct and, subsequently, the National Pandemic Flu Service, to monitor the contribution of true pandemic influenza virus infection to influenza-like illness in the community. This was augmented by extension of virological surveillance in general practice sentinel surveillance schemes over the summer periods of both 2009 and 2010
5. a web-based reporting system, developed by the HPA with the CMO's office, on hospitalised cases of H1N1 infection;
6. monitoring excess mortality using data from the General Registry Office Registration-on-line system;
7. population sero-prevalence of H1N1 antibody to estimate the population exposure to pandemic H1N1;
8. systems to monitor the effectiveness and safety of the pandemic H1N1 vaccine programme;
9. a series of field investigations of outbreaks in various settings.

27.4 The HPA produced a series of regular detailed reports and commissioned briefings on the surveillance and epidemiology of pandemic H1N1 infection for various audiences throughout the pandemic using data from these systems.

27.5 Although it proved possible to develop ad hoc systems for monitoring indices of influenza virus impact, such as hospitalisation, risk factors for severe disease, and mortality, these systems would have been more robust, and would have provided results more easily assessed in comparison to other periods, if they had been established outside the pandemic period. Support to the HPA for the development and maintenance of such surveillance is needed.

27.6 Better mechanisms are needed, including pre-agreed ethical frameworks, for obtaining population representative samples of blood for antibody testing to determine levels of population immunity before and after a pandemic wave which can feed into estimation of population impact, modelling of future transmission and vaccination policy.

28 *What data was collected and how was it used?*

28.1 What data were collected - see response to question 27.

28.2 How were data used?

1. Activity and trend. These data were used to assess the level of activity of influenza in the community and in hospital, in different areas of the country and in different population subgroups. The data provided a clear picture in the trend over time in the occurrence of the disease and contributed to decisions about when to begin or cease control and

prevention measures. The data provided the basis for comparison with previous pandemics and seasonal epidemics.

2. Virus characteristics and severity. The data provided information about the behaviour of the virus with respect to transmission in the population, the occurrence of drug resistance and the clinical severity of illness caused.
3. Modelling. The data contributed to the development of models for assessing current levels of activity (taking into account the extent of the occurrence of infection and disease not ascertained within routine surveillance), potential future development of the pandemic and possible impact of control measures.
4. Specific interventions. Information on the effectiveness and safety of specific interventions (anti-viral for treatment and prophylaxis and pandemic flu vaccination) were derived from these data in combination with epidemiological studies.
5. Overall impact. These data provide the basis for an assessment of the overall impact of the pandemic in the population and the effectiveness of control measures.

28.3 Considerable caution had to be exercised in the interpretation of these data due, in some cases, to the newness of some of the surveillance schemes and the lack of comparable data, and in other cases to the changes in the way in which the health service and the public responded to the pandemic. Where possible it is sensible to use or adapt surveillance subsystems already in place rather than to try and develop and roll out new systems in the middle of a crisis.

28.4 Despite the availability of real time intelligence from UK surveillance, there sometimes appeared to be a failure to use the data to mount a more flexible response. Information accrued rapidly, for example, on the relatively mild disease experienced by the young and the relatively low hospitalisation rates indicating an illness of less severity than anticipated in planning. These data did not, however, lead to any reduction in the level of the response.

32 How were the media and social networks monitored and engaged?

32.1 Initially the HPA responded through provision of experts for interview. Subsequently regular press briefings were provided by both HPA and DH. The HPA website was used extensively to provide information to health professionals and the public.

32.2 Managing the media's expectations. The provision of detailed information in HPA press statements led to increased expectation for more and more information. The use of estimated numbers (not usually attempted during seasonal influenza due to the considerable difficulty in obtaining

meaningful absolute numbers), and subsequently aggregate indices of activity (such a GP consultation rates), may have provided a sufficient representative indication of the trend in occurrence of the disease and could have been adopted earlier.

32.3 Spokespeople - There is a balance to be struck between responding to the pandemic and making time available to talk to the media. As there were large demands on HPA experts to be leading aspects of the response, opportunities for direct interaction with the media were limited. Nevertheless, HPA experts participated in a wide range of media communication activities throughout the pandemic.

32.4 Website - the HPA website was a very valuable and trusted source of information for people looking for information on swine flu and the format and document accessibility of this should to be addressed early on.

34 *How was scientific advice communicated to the media and public?*

34.1 Scientific advice communicated in various ways:

1. HPA Expert interviews.
2. Regular press briefings from HPA
3. HPA Website.
4. CMO office briefings.
5. Peer review publications

35 *What evidence is there on clinical responses to the handling of the pandemic?*

35.1 The HPA developed web-based algorithms for the diagnosis and management of suspected and confirmed cases of pandemic influenza. Although, early on, some mixed messages were perceived by colleagues in primary care (due, for example, to limited availability of anti-viral and rapidly evolving advice in the algorithms), the HPA advice was well received and the feedback from clinicians was used to refine the algorithms.

35.2 In addition there were regular meetings with various Royal Colleges such as the Royal College of Obstetricians and Gynaecologists, the Royal College of General Practitioners, the Royal College of Paediatrics and Child Health, the Intensive Care Society and the Faculty of Emergency Medicine to clarify clinical issue and to work on joint guidance on pandemic influenza topic specific issues. HPA also co-ordinated, on behalf of the WHO, a network of international exchange of information on clinical care of pandemic flu cases in intensive care.

35.3 The degree of consensus on many of the clinical issues and lack of criticism within the medical press and literature was also a good indicator that clinicians felt engaged and that the outputs from the HPA and others was meeting their needs. On the other hand, the relatively low uptake of

pandemic influenza immunisation in some groups suggested that clinicians, particularly in general practice, were not wholly persuaded of the need for wide scale vaccination.

35.4 A number of articles have been published in the medical and other scientific literature on the question of the level of the response in the UK and by international organisations such as the WHO. Some authors have criticised the level of response suggesting that it was more than was warranted by the threat posed by the pandemic. This could influence the ability to mobilise such a high level of public and cross government support in the face of a future threat. It is important, however, when assessing the level of the response to consider both what was known and the range of expert opinion available at the time.