Method used to estimate new pandemic (H1N1) 2009 influenza cases in England in the week 3 August to 9 August 2009

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Summary: This week an amended method has been used to estimate the number of pandemic cases which incorporates data from National Pandemic Flu Service (NPFS) and GP consultations. This method has been compared to, and found to be consistent with, an alternative method that used GP consultations alone with a correction for the impact of NPFS on GP consultation rates.

The number of pandemic influenza (H1N1) 2009 cases is estimated using a statistical approach developed by statisticians and epidemiologists at the HPA Centre for Infections. The approach relies on data from various surveillance systems and parameters derived from observational and analytical studies. The key surveillance systems that are used consist of the primary care based Q Surveillance® scheme, the Royal College of General Practitioners (RCGP) and HPA Regional Microbiology Network sentinel surveillance scheme. Latterly data from the National Pandemic Flu Service (NPFS) have been added.

Estimates of the daily number of people consulting their GP with a diagnosis of an influenza-like illness (ILI) are derived from Q Surveillance® and are aggregated by age group (less than one year, one-to-four years, five-14 years,15-24 years, 25-44 years, 45-64 years, 65 years and older), by Strategic Health Authority (SHA) and by week. The sum of the average size of the GP lists for these categories is also obtained from Q Surveillance®.

The data from the RCGP/HPA sentinel surveillance scheme provide information on the number of cases with an influenza-like illness who test positive for the pandemic (H1N1) 2009 virus. This is then used to estimate how many people who present with an ILI are likely to have influenza. Due to the small number of swabs taken in certain SHAs, the SHAs are grouped into four regions: London, West Midlands, North (North East, North West, Yorkshire & Humberside, and East Midlands), and South (East of England, South Central, South East Coast, and South West). From this approach, the estimated positivity rates for swabs is obtained by region for the same weeks and age groups as used for ILI consultations from Q Surveillance®.

The observed numbers of ILI consultations from Q Surveillance® are multiplied by the estimated positivity rate in each of the SHAs, by age group categories for each week. The 2007 ONS population estimates are then used to adjust the figures for the Q Surveillance® population in each category to provide estimates of the numbers of pandemic (H1N1) 2009 cases that visit their GP each week by SHA and age group.

There is currently no reliable information about the proportion of people with pandemic (H1N1) 2009 who consult their GP. Based on research demonstrating that about 10% of people with symptoms visit their GPs during normal flu seasons and the assumption that this percentage is likely to be higher at present due to heightened awareness (and anxiety) about the pandemic; it is suggested that between 20% to 50% of those with pandemic influenza are likely to visit their GP. Preliminary estimates from flusurvey (an internet-based system for monitoring the activity of ILI in the population, see www.flusurvey.co.uk) are within this range. Prior to the launch of the NPFS these two extremes have been used to scale the estimated numbers of pandemic (H1N1) 2009 cases who consult their GP to give a range within which the likely number of pandemic flu cases occurring in England that week is likely to fall.

The NPFS started on 23 July and will undoubtedly have reduced the proportion of those with pandemic flu who consulted their GP during that week. Two methods for estimating cases have therefore been compared for the week of 3 August to 9 August.

The principle method uses the total NPFS antiviral issued for the week with an estimated positivity rate obtained from the NPFS self-testing scheme. These are used to provide an estimate of the number of cases using the NPFS. In the previous week an assumed positivity rate of 5% was used prior to the availability of virological results from NPFS. The estimated number of cases contacting NPFS was then added to the estimated number of cases consulting GPs. A correction for contact with either a GP or NPFS was then

made by assuming a range of 30% to 70% (mid-point 50%). This is an increase on the 20% to 50% to allow for additional NPFS contacts.

The secondary method uses the fact that those aged under one year are not managed by NPFS and will continue to be referred to their GP. The change in consulting rates since the week prior to NPFS starting has been compared between each age group and the under ones. For those aged one to 64 years a relative reduction of 50% compared to under-ones has been observed and this has been assumed to be attributable to the NPFS. Therefore for the weeks commencing 27 July the new limits used for the correction for GP consultation are 10% to 50% for those aged one to 64 years. For those aged 65 years and above, the higher incidence of risk factors is likely to result in GP referral and in this age group changes in consultation rates were similar to those seen in under-ones, so rates of 20% to 50% are still used for this age group. To incorporate the additional uncertainty due to the estimated positivity from the testing schemes, the upper and lower case estimates are further scaled by 1.3 and 0.7 respectively – to give an estimate which is plus or minus one standard deviation around the positivity.

The results of the principle method are used for the final estimate after checking that they were consistent with the secondary method.

In summary:

- The data on primary care attendance (Q Surveillance) and the estimated positivity rates from testing within sentinel GP schemes (RCGP and RMN) are combined to estimate the number of pandemic (H1N1) 2009 that present to their GP.

- The number of NPFS antiviral authorisations combined with a range of estimated positivity rates obtained from the NPFS testing scheme is used to estimate the number of pandemic (H1N1) 2009 that present to NPFS.

- The estimates are combined and then scaled up to allow for a range of 30% to 70% of pandemic (H1N1) 2009 cases contacting either NPFS or a GP. Prior to the NPFS the scaling used was 20% to 50%.

- The estimate using the NPFS/GP data is compared to one obtained using only GP consultations where an additional adjustment is applied to allow for the reduction in the proportion of cases contacting GPs due to NPFS.

- The reduction due to NPFS is estimated by comparing pre to post NPFS changes in each age group to under ones who should be unaffected.

- The effects of NPFS on these other surveillance sources are uncertain and although adjusted for in the analysis, may be greater (or less) than that allowed. The introduction of these changes at the same time as school closures, which may well impact on transmission, mean that there are still uncertainties in the estimated figure.

- We have no reliable evidence to suggest what percentage of ILI cases present to GPs and given this uncertainty a wide range of estimates is given.

- The estimated percentage positivity in the NFPS is currently based on a few hundred swabs and this is therefore subject to uncertainty.

- These results are checked against the rate of change in hospital admission for pandemic (H1N1) 2009 to provide further reassurance from data that may not be so likely to be affected by health seeking behaviour.