

ECDC HEALTH INFORMATION

Pandemic (H1N1) 2009 planning assumptions to end of May 2010 for EU/EEA countries

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(Applies to countries that did not have a significant first wave of infection in early to mid-2009)

This brief note indicates recommended planning assumptions for the pandemic influenza (H1N1) 2009 that is now increasingly affecting countries in the European Union (EU) and European Economic Area (EEA). However, the assumptions may be applicable to other countries. Following a number of requests, this document has been prepared by ECDC, which was advised by a group drawn from its Advisory Forum and other experts¹. To aid planning as far as is possible, data are expressed per 100 000 (10^5) population. No allowance is made for the effect of countermeasures, which include vaccines and antivirals.

Background

Prior to this pandemic, a number of Member States already had default pandemic planning assumptions. However, all pandemics are different and it was accepted that once a pandemic had started default assumptions might need to be adjusted [1]. That is proving the case with the 2009 pandemic, since a significant proportion of the population possess some immunity and the default assumptions were based on different and more severe scenarios in terms of transmissibility and lethality [1,2]. Hence a number of countries have been adjusting their assumptions taking into account what is now known about this particular pandemic, using surveillance and other data from countries outside and inside Europe and combining this with modelling techniques. At least two countries have published those revised assumptions [3–7]. One EU Member State (the United Kingdom) was particularly affected by the pandemic in the spring and summer of 2009 and has been using the modelling and surveillance techniques to make its own adjustments [4–6]. This paper draws particularly on that work, though the assumptions are somewhat higher than what would apply to the UK, since a significant amount of transmission has already taken place in that country [7].

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What are pandemic planning assumptions?

Planning assumptions represent recommended figures that those preparing services should ensure they can deal with. They represent the 'reasonable worst case' that could be expected. They are not predictions, and actually represent a quite unlikely scenario. They represent a group of scenarios that national and local planners should prepare for if they want to have confidence that they will be able to cope with the peak demand in a pandemic. They also ensure a degree of standardisation across large populations. Pandemic planning assumptions have some special features, notably they have to recognise the heterogeneity of influenza transmission – so that even in a small country some areas may be heavily affected but others can get off quite lightly– and that local epidemic waves differ somewhat from what is observed nationally.

Attack rates

The experience in the Southern Hemisphere epidemics and modelling based on this suggests overall infection rates in the range of 10–40% when both symptomatic and asymptomatic infections are combined. Taking the conventional figure of 50% of influenza infections being asymptomatic suggests clinical attack rates in the range of 5–20% [2]. Detailed analysis of the multiple wave epidemic in the United Kingdom is consistent with these assumptions. These relatively low attack rates are consistent with significant background levels of immunity in the adult population that increase with age. Hence clinical attack rates can be expected to be twice as high in people under 16 years than it is in older people. This is consistent with serological information from Australia and (unpublished) surveys in the UK [8]. The limited immunity in younger adults is considered to arise from multiple exposures to the seasonal H1N1 virus, while the higher levels in older adults due to exposure to the pre-1957 seasonal H1N1 virus (which was replaced by the 1957 pandemic virus). Experience in the Southern Hemisphere is that, in most countries where there is good preparation, overall absenteeism is no higher than in the other winters.

People seeking care – Primary care consultations

This is the most difficult parameter to estimate at European level, not least because of the variability across European countries of the arrangements for delivering primary care. An estimate previously cited is that around 15% of those with clinical symptoms will seek primary care [5]. However, the relatively mild nature of infection in many individuals may reduce this proportion. Conversely, a number of countries are expecting primary care to deliver antivirals, which will tend to increase the proportion of people seeking care – although some countries are using call lines or pharmacies to provide antivirals to reduce pressure on primary care. Additionally, a number of countries are providing pandemic vaccines via primary care. For these reasons, no useful EU/EEA figure can be given and countries may seek to estimate their own values. However, the crucial point is that it is important to have primary care and hospitals working together to ensure that hospitals and emergency services are not suddenly overloaded, as has happened in some settings outside Europe. The risk of this rises especially during weekends and holidays, when primary care may reduce the services available. Countries may need to make special provisions for this.

Hospitalisations

Given the difficulty in identifying clinical cases, hospitalisation rates per head of population are a more useful indicator of severity for the current pandemic than case hospitalisation proportions. Analyses of Northern and Southern Hemisphere countries suggest overall hospitalisation rates (per capita) of 1 per 10^5 to 25 per 10^5 population) [2], though an important complication is that the criteria for hospitalisation vary from country to country, and that is likely to apply also in Europe. Experience from the UK suggests rather higher rates of hospitalisation, which would lead to overall rates possibly as high as 100 per 10^5 . This higher figure is the planning assumption estimated attack rate combined with data on hospitalisations and may be due to different

hospitalisation criteria or definition of a pandemic case. Hence a maximum reasonable estimate would be of the order of 100 per 10^5 population. An additional justification for this higher planning level than suggested by the experience in the Southern Hemisphere is that there are now some indications from North America (where the pandemic is running ahead of that in Europe) that the Northern Hemisphere winter epidemics could result in more hospitalisations and numbers of severe cases than what was seen in Australia and New Zealand. The United States is seeing higher rates of influenza-like illness than in relation to the most recent influenza season and mortality due to influenza or pneumonia that is above normal variation (though, as yet, well below what was seen in more severe seasonal influenza seasons) [10]. On average, about 10–20% of hospitalisations require advanced critical care including intensive care. However, because of the length of stay in intensive case is generally greater than the length of stay for general influenza hospitalisations, intensive care patients may represent up to 25% of the patients in hospital on any given day [2,7].

Mortality

Again, given the difficulty in identifying clinical cases, mortality rates (deaths per head of population) are a more useful indicator of severity for the current pandemic than the case fatality. Analysis of the Southern Hemisphere epidemics suggests mortality rates of between 0.4 per 10^5 and 1.4 per 10^5 population. Taking account of infection attack rates might suggest a maximum reasonable estimate of up to 3 per 10^5 . With the usual assumption of 50% of cases showing clinical symptoms, this corresponds to a case fatality of less than 0.02%. These results are also consistent with analyses from the UK. In England and Wales there has been no detected effect on all-cause mortality at a population level during the epidemic to date [11]. However, it needs to be remembered that this is mortality additional to any underlying mortality that can also rise in the winter due to other viruses, cold weather, etc.

Persons affected – Risk groups

A consistent finding is that people with severe disease and dying directly or indirectly from infection with the pandemic strain are especially concentrated in certain risk groups. The proportions vary from setting to setting [2]. Considering deaths in the UK 70–80% were persons in the risk groups (people with certain chronic diseases plus pregnant women) [12]. These percentages are lower when considering patients in intensive care and lower still in lower levels of hospital care, though here there is variability that comes from the criteria used for hospitalisation. Considering hospitalised cases in Ireland, 49% of hospitalised cases belonged to a risk group and 58% of those in ICU were risk groups patients [13]. In the Netherlands, so far, 62% of hospitalised cases, 66% of ICU cases and 80% of deaths were in people belonging to a pandemic risk group [14].

Quantitative assessment for young children

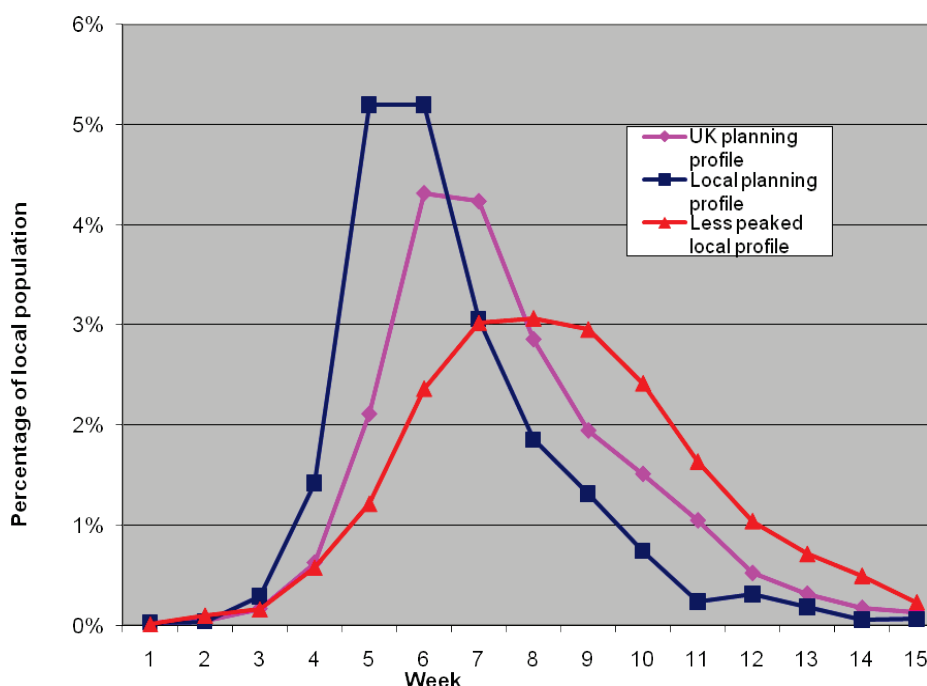
Clinical attack rates can be up to twice as high for the age group < 16 years compared with the elderly group, due to a combination of lower levels of prior immunity and higher contact rates in the young [7,10–12]. In England and in the Netherlands, around 20% of patients admitted to hospital were < 5 years old; this percentage has remained stable for several months. In several countries in the Northern and Southern Hemispheres, the rate of hospital admission in the < 5 years age group is at least 2–3 times higher than in the 5+ years age groups when comparing rates per 100 000 population. In UK, numbers of up to 4.5 times higher have been observed for the < 5 year group than of the 5+ year group.

Shape of the pandemic wave

For planning purposes, a local pandemic wave may last around 15 weeks from start to finish, but at a national level this may be longer – how much longer will depend on size, geography and travel patterns in specific countries. For planning purposes, it can be assumed that about 20% of all cases will occur in each of the two weeks either side

of the peak. It also needs to be remembered that local peaks can be considerably higher than national peaks. Of course, they can also be lower but that is not relevant to planning assumptions. For an illustration, see Figure 1.

Figure 1: Indicative profile of an epidemic curve showing a 20% clinical attack rate in terms of the proportion of the population becoming ill each week. The shape and the duration of the curve is not a forecast of how the epidemic curve will look like. The figure highlights the importance on epidemics on local level vs. national level.



Source: Courtesy of UK Department of Health.

Summary of impact (a reasonable worst case over the full course of the first year of the pandemic)

Clinical attack rates:	up to 20%²
Mortality rates:	up to 3 per 10⁵ of population
Hospitalisation rates:	up to 100 per 10⁵ of population
Absenteeism	No different from a severe normal winter

These are not predictions. These estimates are for planning purposes and represent the reasonable worst case for a country or region where there has been no prior wave. Countries and regions where there has been a sizable first wave would expect a lesser epidemic both in terms of any future waves, and indeed over the entire pandemic, due to the less vigorous dynamics [7].

It is also important to note that clinical attack rates are expected to be up to twice the population average (quoted above) in children and young adults, with considerably lower rates in older people [9]. However, with the exception of children aged < 5 years – who may have relatively high rates of hospitalisation (see above) – mortality and hospitalisation are expected to be more uniformly distributed with age, with the age differences in the risk of becoming infected largely cancelling out the age differences in the probability of becoming seriously ill or dying, if infected.

² An “expected” clinical attack rate is expected to be 5–20%. The number 20% indicates thus, as earlier mentioned, the reasonable worst case scenario.

Applicability to countries outside EU/EEA area

Pandemic planners in countries outside the EU/EEA could consider using the suggested values in this paper. A word of caution is that the values apply to countries that have not yet experienced the first wave of the outbreak. The suggested values are also based on the assumption that the pandemic will develop as in the Southern Hemisphere, with additional consideration of data from the UK, the Netherlands, Norway and Ireland. Several of the parameters could be directly applicable, but hospitalisation rates are expected to vary due to differences in the criteria for hospitalisation (and hospital capacity) and variation in which population groups are most affected within a country. It is also important to consider country differences in demographic characteristics and health seeking behaviour.

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