THE ROYAL SOCIETY

The Academy of Medical Sciences

Summary of oral evidence: Dr John Edmunds, Health Protection Agency.

24 May 2006

Dr Edmunds is the Head of the Modelling and Economics Unit at the HPA and is the lead on Pandemic Influenza Modelling.

Members of the working group present were: Sir John Skehel, Professor Glynis Breakwell, Professor Neil Ferguson, Dr John McCauley, Professor Andrew McMichael, Professor Karl Nicholson and Professor Robin Weiss.

Key points

Research at the HPA

The main focus of the Modelling and Economics Unit at the HPA is to evaluate the different control programmes that are being planned for use during a pandemic influenza outbreak. This includes travel restrictions and vaccine and antiviral strategies. Dr Edmunds and his unit are now involved in the contingency planning for an influenza pandemic, but they were not involved in the original plans.

Dr Edmunds and his group are working on the development of models to use on emerging data that would become available during a pandemic. The surveillance systems would give a partial, and perhaps contradictory, view of the epidemic progress due to incomplete reporting and delays (both clinical and reporting delays). The group are working on models to incorporate this disparate information to give an overall view of the epidemic progress and predict what will happen during a pandemic to advise the Department of Health on antiviral use and distribution, hospitalisations etc.

Antivirals

Dr Edmunds' unit was not involved in the decision to purchase Tamiflu stocks for 25% of the UK population. Neither are they involved in the ongoing discussions on who constitutes an 'essential worker'.

Department of Health

Dr Edmunds was asked about how well he thought scientific advice is integrated into policy making for pandemic influenza in the UK. Dr Edmunds sits on the DH Pandemic Influenza Scientific Advisory Group and the modelling subgroup. His group and Professor Neil Ferguson's group are the two groups that input information to the discussions. In Dr Edmunds view, the system works well but neither group are looking at the implementation of the models, the DH have taken that on. There sometimes appears to be a delay at the level above the Scientific Advisory Group at the DH. Many of the original planning assumptions did not necessarily taking the modelling into account.

Social science research

Dr Edmunds was asked about the types of sociological research that feed into the modelling studies he carries out. Most of the models that have been carried out do not assume that people will change their behaviour in the event of a pandemic, although they were fitted to data from previous pandemics, when individuals might have changed from their normal behaviour, and this behavioural modification should therefore already be taken into account. However, human behaviour patterns have changed since previous pandemics.

Dr Edmunds and his group have just completed a large comparative study on the contact patterns of individuals in different countries, which aims to document patterns of mixing within and between households and workplaces, across age groups etc. They have carried out this survey in collaboration with others, and it has been funded by the EU. In addition, they have been involved in a collaborative study (co-ordinated by sociology researchers in Erasmus University, Rotterdam) of risk perception and precautionary behaviour in response to a perceived threat of an influenza pandemic. The research was carried out on individuals in eight countries, including three SARS-affected countries (China, Hong Kong and Singapore). The survey asked individuals where they felt they were most at risk of contracting influenza during a pandemic, for example on public transport, in restaurants/cafes or theatres. In total, over 3400 individuals in participated (approximately 400 per country). They are currently analysing the results to determine the overall attitudes of individuals, but some trends that have emerged are that people responded that they would avoid public transport and restaurants but would not avoid going to a doctor's surgery during a pandemic.

Dr Edmunds and his group do not have formal input into decisions made by the Cabinet Office but the Cabinet ask questions on an occasional basis and may ask for advice on certain issues.

Modelling

Dr Edmunds was asked about any weaknesses he could identify in the modelling studies that are currently carried out. His view is that basing all modelling on previous experience of flu pandemics in 1957 and 1918 is limiting and the situation could be very different from those two examples.

One unexplained feature of pandemics is the number of waves of influenza infection that can occur. Two waves of a pandemic could be explained by seasonal factors affecting transmission, but there were three waves of influenza in 1918 which suggests that other factors (such as strain evolution) must have played some role. The current contingency planning in the event of a new influenza pandemic focuses on developing a flu vaccine during or after the first wave of the pandemic, for use during the second wave. The problem with this plan is that there may be only one wave of influenza, as there was in 1957 and (in most countries) in 1968/1969.

The second option is to vaccinate the population now with a pre-pandemic vaccine. Dr Edmunds and his group are looking at the potential impact of using a poorly-matched pre-pandemic vaccine and they predict that this could reduce the number of deaths caused by flu. They have made simple assumptions in their models, which are based on previous pandemics and have assumed that there would be a certain effective level of protection from the vaccine. The policy advice is clear from the research the HPA have carried out and it recommends that the Government invest in a pre-pandemic vaccine. They have also looked at a situation where a pre-pandemic vaccine is in limited supply and have found that children should be vaccinated in preference to older individuals. This information has been provided to the DH but it is very difficult to weigh up the expense of the vaccine against need. There is also an issue with the administration of vaccine and logistical problems with the requirement for a 'two-dose' policy.

The issue of the vaccine potentially being poorly matched to the strain of flu that could emerge during a pandemic was discussed. It was pointed out that some years the seasonal flu vaccine can be poorly matched, which causes a rise in cases of flu. This shows that the vaccine has to be up to date to offer protection.

Dr Edmunds and his group have also looked at the effect of school closures on the spread of disease historically. The winter period of school closures (over Christmas) appears to have a large impact on effective contact patterns amongst children. There does not appear to be an effect on others outside this group.

While Dr Edmunds and his group have been able to answer many questions, there are still many that remain unanswered such as questions about social distance and the effectiveness of masks for offering protection against infection. It is unclear whether large events such as football matches should be cancelled or whether people should use public transport during a pandemic.

Dr Edmunds expressed his view that individuals would be more likely to catch flu from their home or work than on public transport, as there is a lack of evidence for increased transmission in areas of high population densities (where public transport use is more widespread). The risk of transmission depends, on the number and type of human contacts people have, and again, there is a lack of evidence of a difference in urban and rural contact patterns and the trends in disease spread that emerge.

The influence of the media in affecting peoples' behaviour was discussed. It was pointed out that the media also played a part in the 1918 pandemic and a study of Canadian newspapers during that period showed that 25% of all column inches were devoted to influenza, even though there was a war going on at the time. People did avoid public transport during the 1918 pandemic, which was demonstrated by the reduction in ticket sales on the New York subway for example, but this appears to have had little epidemiological impact.