HOUSE OF COMMONS

Science and Technology Committee

Oral evidence: Flu vaccination programme, HC 853

Wednesday 7 March 2018

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Watch the meeting

Members present: Norman Lamb (Chair); Bill Grant; Darren Jones; Stephen Metcalfe; Carol Monaghan; Graham Stringer.

Questions 1 - 121

Witnesses

I: Professor Paul Cosford, Director for Health Protection and Medical Director, Public Health England; Professor Stephen Powis, National Medical Director, NHS England; Professor Jonathan Van-Tam, Deputy Chief Medical Officer for England; Professor Andrew Pollard, Chair, Joint Committee on Vaccination and Immunisation; and Dr Sue Crossland, President Elect, Society for Acute Medicine.

Examination of witnesses

Witnesses: Professor Paul Cosford, Professor Stephen Powis, Professor Jonathan Van-Tam, Professor Andrew Pollard and Dr Sue Crossland.

Q1 **Chair:** Welcome, all of you. I am sorry that it is a bit of a squeeze at the table; I hope that you are able to cope. It would be very helpful to us if you could each introduce yourselves, starting from my left.

Professor Van-Tam: Good morning. I am Professor Jonathan Van-Tam, deputy chief medical officer at the Department of Health and Social Care.

Professor Powis: Good morning. I am Professor Stephen Powis, the new national medical director of NHS England.

Professor Cosford: I am Paul Cosford, the medical director for Public Health England.

Professor Pollard: I am Professor Andrew Pollard, chair of the Joint Committee on Vaccination and Immunisation.

Dr Crossland: I am Dr Sue Crossland. I am here representing the Society for Acute Medicine, which is the frontline bit of hospital admissions.

Q2 **Chair:** Can you make sure that you speak up, so that we can hear you clearly? The acoustics are not great in here.

All of you, except for Sue, are involved in the provision and co-ordination of the programme. Could one of you start by explaining how the flu programme is currently organised and the role of the various bodies within that programme?

Professor Cosford: My organisation, Public Health England, is the Government's public health delivery body. We do the monitoring and surveillance of flu activity. We provide technical advice and support to our colleagues in the NHS.

Q3 **Chair:** Is that surveillance of flu activity within this country?

Professor Cosford: Within this country, but we also monitor what is happening internationally and globally. We link with the WHO and colleagues in other countries. We have relationships with colleagues in Australia, France and elsewhere, so we can pick up the phone to understand what is happening there, as well as monitor the formal reports.

We procure the vaccine for children and monitor the supply and procurement of vaccine for the rest of the programme. We act to co-ordinate the health system, in that we run a flu programme board that brings together all the partners to plan the next flu season and to make sure that we have learned the lessons from previous seasons. In doing that co-ordination, we link with colleagues on a week-to-week basis

during the season, to make sure that all are aware of what is happening. I will not speak for Steve, but NHS England delivers the services, of course. DH is the system leader for the whole system. I am sure that Andy will talk more about the JCVI; he is the expert lead on that body. Of course, Sue and her colleagues do the real work of treating people who are suffering from flu, which we are all here to support.

Q4 **Chair:** What is the rationale for the different approach to procurement of the vaccine for children, compared with other groups?

Professor Cosford: The children's programme is delivered in schools and is outside the general practice system. It is central procurement, with each local NHS England team procuring the supply system—the people who will deliver the service locally. There is also central procurement of the particular live attenuated vaccine, which is the nasal spray. That is easier to do in a centrally procured way.

Q5 **Chair:** Is there a case for central procurement in respect of other groups? We will come on to this issue, but, given the variation that exists around the country, one might reach the conclusion that there is a case for a more consistent approach, based on evidence nationally.

Professor Cosford: With recent developments in different aspects of flu vaccines, which I am sure you will want to explore with us, we are all conscious of the need to reduce the amount of variation in the vaccine that is provided for people. Obviously, we are going to look carefully at how to reduce that variation. I would not jump to central procurement as the answer to that. The issue is how we support GPs, who are absolutely critical in providing vaccine to everybody who is eligible, to make sure that they are able to make the right decisions about which vaccines to use for their patients.

Q6 **Chair:** So you think that there is quite an issue with the variation that we notice around the country and that it needs to be addressed in one way or another.

Professor Cosford: To be honest, I do not think that it has been such an issue until recently. Only in the last few months have we had better evidence around different types of vaccine, which suggests that we need to move to a more consistent position. That is what we will look to explore as we learn lessons from this flu season. Obviously, that is one of the things that we are always doing, to identify what issues are arising and how to handle those for the future.

Q7 **Chair:** Sure. Does anybody else want to add anything to what we have heard?

Professor Van-Tam: I would add the fact that, over a couple of decades or more, the influenza vaccines on offer have been essentially similar to one another. It has not mattered which of those influenza vaccines GPs have procured for their patients. However, we entered a new situation in the summer of last year, with the licensing of a new vaccine, containing

adjuvant, for the elderly. That has changed the position and how we think about which vaccines the elderly should receive in the future. You are right to flag up the fact that that is new in the landscape. We have to look carefully at how we do it now and whether that will be the right approach for the future.

Professor Pollard: The Joint Committee on Vaccination and Immunisation advises the Department of Health on new vaccines and monitors what is happening with the vaccine programme. As new data emerge from Public Health England and from surveillance, and as new vaccines become available, as Jonathan has said, we look at the data again and provide new advice to the Department about how those vaccines might be used. Over the last few years, there has been the introduction of a childhood programme. We have the most comprehensive childhood programme in the world. We have also seen the arrival of new vaccines, such as the adjuvanted vaccine for the elderly that Jonathan mentioned. There is a discussion about whether to use the trivalent or the quadrivalent vaccine, which I am sure we will get on to. All of those are things we have been looking at, to provide advice on them.

Q8 **Chair:** You mentioned the data coming back to Public Health England. Does every area have a responsibility to report back to Public Health England on take-up rates and so forth during the programme?

Professor Cosford: Yes. We monitor take-up rates through general practices, hospital uptake rates and the children's programme. We have that on a very regular basis throughout the season.

Q9 **Chair:** Can you provide the Committee with a summary of the data for this season? Is that something that you can do?

Professor Cosford: I can do that. I would be very happy to do it now, if you would like.

Q10 **Chair:** It would be very helpful if you could summarise it quickly and then provide more complete written data.

Professor Cosford: I would be very happy to do so.

Q11 **Chair:** We are interested in variation around the country, so it would be useful if you could provide those data in some detail.

Professor Cosford: We can give you the data on variation in written form. We would be very happy to do that. In essence, the uptake of flu vaccine so far this season—it is unlikely to get much higher than it is now, given where we are—is better than it was last season across all groups. It is on a trend in the right direction. We have hit 72.6% in the over-65s. We aim for 75%, but it is some years since we achieved that, and nowhere else in the world is achieving it at the moment. In healthcare workers, we are up at 67.6%, which is three or four points higher than the figure at this point last year. We are just below 50% in all

the at-risk groups under 65. In pregnancy, it is 48.9% at the moment. In the children's programme, uptake is around 55% to 63% or 64% in the school-based programme and in the low to mid-40s for those aged two and three, where the vaccine is delivered through general practice.

Q12 **Chair:** Do you monitor variation across socioeconomic groups? I know that take-up rate is a big issue in various vaccination programmes. What do we see here?

Professor Cosford: There is definitely variation across socioeconomic groups. I know that the JCVI is looking at that.

Professor Pollard: There are some groups, such as religious groups, that object to the childhood programme. We see variation in different regions of the country that is partly related to that. There is some difference with socioeconomic groups. However, the good thing about vaccination programmes is that, as long as you are delivering them effectively, you can get rid of that inequality—if GPs are providing the vaccine and people are turning up.

Q13 **Chair:** But it requires people to turn up.

Professor Pollard: It does.

Q14 **Chair:** How are decisions made on which flu vaccinations should be offered and to which groups? I guess that this is a question for you, Andrew. What are the main factors that are taken into account?

Professor Pollard: In the decisions about which vaccines to offer to which age group, the main difference is between the live attenuated vaccine for children and the inactivated vaccine for adults. There is a killed vaccine for adults. We use the live attenuated vaccine for children because it works very well in children. The trials show that it works better than inactivated vaccines, because the live vaccine stimulates a better immune response than the inactivated vaccine in children. The problem for adults is that we all have some immunity already. That stops the live vaccine working so well, because it kills some of the vaccine. Therefore, adults have rather poor responses to the live vaccine. That is the main reason for the difference.

We have a long-standing problem that, in older adults, the immune system does not work very well. For a long time, therefore, flu vaccines have had much lower effectiveness in older adults than in younger adults and children. We have been stuck with that position because we have not had alternatives for older adults. The big change that will happen, hopefully, from next season is the new adjuvanted vaccine, which really soups up the elderly immune system and makes a much better immune response. That should be a major change in the flu programme.

Obviously, there is a risk with that, because there is a single supplier of the adjuvanted vaccine at the moment. There may therefore be a need to look at alternatives. Although they are not yet available in the UK, there

are some high-dose vaccines that work a bit better than the current vaccines. We are looking all the time at the new available evidence on trials of vaccines, to see what may be most appropriate for our population. With the ordinary vaccine, we get quite good immune responses in younger adults. Healthcare workers get that vaccine because it works very well in the under-65 age group.

Q15 **Chair:** We have already covered to some extent how well it has worked and what lessons there are to be learned this year. Paul has talked about improvements in rates across the board. Sue, do you have any other comments on how well the programme has worked this year?

Dr Crossland: We have seen a lot more flu this year than last year—probably more than we have seen since the outbreak in 2009. We are getting a mixture of As and Bs. It seems to me that a very large proportion of the people we are seeing this year have been vaccinated. When we do swabs, we always ask people whether they have had their vaccinations. The uptake around where we live is pretty good—probably higher than Paul's figures. It is a fairly well-vaccinated population.

Q16 **Chair:** I guess that the figures do not necessarily take into account people who have had it done privately, at the chemist's and so forth. Is that right?

Professor Cosford: They take account of the pharmacists. They do not necessarily take account of all those done privately.

Dr Crossland: Last year, we had 33 positive flus in our hospital, which is a fairly small hospital. Our average take a day is probably about 30. This year, we have not seen any let-up yet. I do not know whether Paul has figures on whether flu is peaking at the minute, but we are still seeing the same pressures that we have seen for the last six or eight weeks. We are up to more than 200 positive samples. A lot of them are elderly, vaccinated patients.

Q17 **Chair:** It has gone up from 30 to 200.

Dr Crossland: Yes—from last year to this year. We are also seeing a significant proportion of young people again, as we did in 2009. It is not as bad, but the patients requiring intensive care treatment tend to be younger patients—20, 30 or 40-year-olds, who are normally fit and well. We have seen quite a few transfers out for really strong intensive care support—ECMO in one of the centres of excellence, which is as high as you can go at intensive care level.

Q18 **Chair:** Each year a certain number of people die of flu. Do we have any data on the death rate from flu this season, compared with previous seasons?

Professor Cosford: We do not have those specific data. One of the things that we monitor is the increase in mortality on a week-to-week basis over and above what you would normally expect for this time of

year. We know that there has been a period of four weeks or so during which mortality has been higher than we would have expected.

Q19 **Chair:** By what percentage?

Professor Cosford: There are about 11,300 deaths in week six in an average year. We have probably had about 12,400 or 12,500. It is that sort of element of increase, over a defined period. The interesting thing is that flu this season is not significantly worse than it was last season, or two years before that, in terms of mortality. What we are seeing this season is a very high rate of hospitalisation compared with previous years, so the pressures on NHS colleagues have been very real. If you look at flu circulating in the community, it is a moderate flu season, whereas, if you look at hospitalisations, the figure is very high and has been very high for several weeks. It peaked at the end of January and in early February, but it has been coming down remarkably slowly this season, which is slightly surprising.

Q20 **Chair:** Is that because the strain is more pernicious in some way?

Professor Cosford: There is a mantra in the flu world that it is always difficult to tell exactly what the issues are with flu, because it varies so much. We saw flu A and flu B. Usually, you see flu A first in the season, with flu B coming in a second wave, but we saw them together. Some of us thought that that would probably mean that the reduction would be quite steep, but that has not happened. As we go through all the learning, the monitoring and the surveillance systems for this season, we will look at that very closely, to see what we make of it. The truth is that with flu you have to be prepared for anything that is going to come, because you can never predict it with certainty.

Q21 **Chair:** I am conscious that revised advice has been coming out in the course of this flu season. Is that of any value only in respect of purchasing decisions for the next flu season? Can it do anything to adjust what the system does? I do not know whether I got the tri or the quad, or whatever it is called. I have no idea what I got when I had my injection. If I had the tri, could I go back and have the quad, or can you not do that? Can you not adjust during the season?

Professor Pollard: There is a logistical question, which the others can address. I will comment on the scientific question of the tri versus the quad. The trivalent has two A strains and one B strain. When you add the second B strain, you get a bit of additional benefit, but the difference is not huge, because the one B strain gives you some protection against other B strains. You really need to have both of the As. However, for the Bs, you get so much protection from one B strain that having the other is a fairly marginal additional benefit.

It is true that the extra strain that the quad had was the B-Yamagata, which matched very well to the strain that circulated, so you might think, "If only we had had the quad, we would have been better off." We do not have the end-of-season data to be absolutely sure, but it does not look

like having the quad made a huge difference. It makes a bit of a difference, but not a huge difference. We have been looking at the quadrivalent versus the trivalent over the last few years. We have advised the Department of Health that the quadrivalent is clearly preferable, because there is a small additional health benefit. However, you would not pay much more for it, because that benefit is so small.

Q22 **Chair:** I promise that we will get on to this in more detail. The main question that I was asking was this: when you learn things in the course of a season and put out revised advice, is it of any value only for the subsequent season? Can you do anything to adjust behaviour in the current season?

Professor Pollard: I do not think that it can be adjusted within the season.

Professor Van-Tam: One of the scientific problems that we face is the big lag time between flu vaccine manufacture and the point of use. For the northern hemisphere, our manufacturers begin manufacturing flu vaccine in early March, and possibly in late February—as soon as the World Health Organisation announces which strains should go in. From that point onwards, there is no opportunity to change what is in the vaccine that will be available in October.

By that March decision point on what and how to make the vaccine, the manufacturers need to be ready to start and, therefore, need to know their ordering position. In fact, GPs order vaccine through November, December, January and February for the next October. Recently, we issued advice around the absolute importance of moving to the adjuvanted vaccine for the elderly. We did so to ensure that we did not miss an opportunity for next season. We have very little time to do this in order to catch the manufacturing window. I am pleased to say that those letters went out in time for ordering to be influenced. From October, we should see a much greater use of the adjuvanted vaccine in the elderly.

Professor Cosford: I would like to make a couple of points. One relates to the quadrivalent versus trivalent issue. The children's flu vaccine is quadrivalent and has been for some years. This year, roughly one third of the vaccine ordered by GPs across the country was quadrivalent and two thirds was trivalent. Therefore, a significant proportion of the adult groups received quadrivalent, anyway.

Q23 **Chair:** Could you repeat that? Two thirds of it was quadrivalent.

Professor Cosford: No, two thirds of it was trivalent and one third was quadrivalent. Therefore, a significant proportion received quadrivalent, anyway.

It is too late in any one season to alter the vaccine ordering for that season, but there are a number of other things that we do across the system to respond to pressures. I am sure that at some point in the conversation you will want to hear from Steve about the actions that the

NHS takes on a day-to-day, week-to-week basis to respond to those pressures. Those have been very rigorous actions to make sure that the NHS is coping in response. Equally, we put out new messages when we see the flu developing. We kicked in the "Catch it, bin it, kill it" campaign around January. That was an extra measure to try to prevent the spread of flu and to help us to get through the flu season as quickly as possible. Although the ordering of vaccines cannot be altered for this year, there are a number of things that we do to respond to pressures in the system as we see the flu developing. That is why our day-to-day, week-to-week monitoring of the system is so important.

Q24 **Chair:** I go back to the question of the data that you are willing to supply. Do you get the data back on whether CCGs have been ordering quadrivalent or trivalent?

Professor Cosford: We do not monitor that specifically. The monitoring is at general practice level. However, we have a rough idea of how much quadrivalent there is in the system, compared with how much trivalent there is. That is where the two things—

Q25 **Chair:** It would be appreciated if you could provide as much data as possible on how this variation plays out across the country.

Professor Cosford: Of course.

Chair: Could you also provide data per NHS trust? As I understand it, there is quite a variation from one trust to another. It would be quite useful if you could provide that information.

Q26 **Graham Stringer:** I have a couple of questions, following on from Norman's questions, about points that I did not quite understand. I think that you said that there was more choice this time with regard to the kind of vaccine that is used—trivalent or quadrivalent. Hasn't there always been a choice with regard to the different strains of influenza that you put into the vaccines?

Professor Van-Tam: No. The strains of influenza that go into the vaccine are those chosen by the World Health Organisation for the northern hemisphere. That decision is made in mid-February.

Q27 **Graham Stringer:** Does the World Health Organisation have choice?

Professor Van-Tam: The World Health Organisation calls what is known as a strain selection meeting, where influenza virologists from around the world gather twice a year. The best brains in influenza virology come together and formulate an opinion on what are the best strains to put into the vaccine. We as an individual nation do not have any choice, because the manufacturers are committed to following the World Health Organisation instructions that come out of the strain selection meeting.

Q28 **Graham Stringer:** That is clear. Has that decision been made for next winter?

Professor Van-Tam: The decision for next winter has already been made. Broadly speaking, subject to minor scientific variations that would not be of interest to the Committee, the strains are essentially very similar to the ones that were in last season's vaccine.

It illustrates one of the big problems in the management of influenza. When late February comes, the World Health Organisation says, "This is what we believe should go into the vaccine," and the manufacturers say, "This is what we will start to manufacture for you, ready for use in October." From that moment, we are hostages to virological fortune, if you like, as regards anything that might change between March and October. The volumes required—hundreds of millions of doses for the northern hemisphere alone—make it impossible to make a snap decision in July that something needs to change. We have to live with the decision that our experts hand to us in mid-February.

Q29 **Graham Stringer:** Where we do have a choice is in the groups that are offered the vaccine. Why 65 and not 60?

Professor Pollard: The age groups were chosen for a combination of reasons: where the highest hospitalisation and burden data were—in the over-65s—and logistical and practical reasons. It does not make much difference whether someone is 64 or 65. It is a practical decision, as 65 was the retirement age and the age at which people came in for their vaccinations; other vaccinations are given at the same time. It is a practical issue around that age.

There are cost-effectiveness analyses that look at whether it would be better to choose different ages for some vaccines. The older people are, the higher the hospitalisation rate, so the best use of money might be to focus on the very elderly, if you had vaccines that worked well in that age group. Those are the sorts of things that go into the decision making.

Professor Van-Tam: The age blanket for vaccination begins at 65. However, if you take a population of 63 and 64-year-olds, you may well find that a large proportion of them have a chronic illness of some sort, which will place them in a risk group for vaccination prior to their 65th birthday.

Professor Cosford: It is also the case that we keep the risk groups for the under-65s under review. Last year, we added in morbid obesity, because in previous studies we observed a very significant extra mortality in people with morbid obesity who get flu. In 2010 we added pregnancy, because there was developing evidence around the impact of flu in pregnancy. We keep the risk groups under review, to check who will benefit most from vaccination in the under-65 group.

Q30 **Graham Stringer:** Professor Pollard, you said that there was a small difference between quadrivalent and trivalent. Nick Scriven of the Society for Acute Medicine disagrees. What is the evidence to enable us to decide whether we agree with you or with Nick Scriven?

Professor Pollard: We have evidence on both effectiveness and cost-effectiveness. JCVI has seen that analysis, which was prepared by colleagues at Public Health England. For me, the interesting thing will be to look at the data that emerge from this season. I do not think that the story will change very much. We already have some preliminary analysis from Public Health England for this season. There is still not a huge difference between trivalent and quadrivalent, but there is a preference. We have expressed a preference for the quadrivalent. However, when you look at cost-effectiveness and ask, "Would you pay more for a quadrivalent?" I think that the answer is, "Not much more." That is from the analysis so far. We need to do re-analysis after we have seen this season, because it has been different. We have had domination by a strain that is not in the trivalent vaccine. However, the previous analyses go back a number of years and do not suggest that there is a huge difference.

Q31 **Graham Stringer:** The difference in cost is about £3 per vaccination, isn't it?

Professor Pollard: I do not know what individual practices are paying for the vaccine, so I cannot answer that. I do not know whether anyone else can.

Professor Powis: It is important to remember that, as Jonathan said, in early February we issued specific advice for next season on the quadrivalent vaccine for at-risk groups. The reason for that was the additional cost-effectiveness data that Andrew has just mentioned, which were prepared by Public Health England. For next season, there is more direct guidance on the use of quadrivalent vaccine in under-65 at-risk groups than there was for this season, so we anticipate that there will be much less variation next year. That was our intention in issuing that guidance.

Q32 **Graham Stringer:** That brings me neatly on to the next question. We have been told that NHS regional teams encourage local commissioning groups to buy the trivalent, rather than the quadrivalent. Is that true? What role do NHS England and Public Health England have in advising on local vaccine purchasing?

Professor Powis: As Paul said earlier, NHS England is responsible for commissioning the seasonal flu immunisation. It does that through section 7A, which is the part of the NHS Act that covers the public health programme commissioning part of NHS England. As we have already said, the procurement is actually done at the level of general practice and pharmacists. It has always been the case that GPs are asked to procure eight, nine or 10 months ahead the vaccines that they believe are most appropriate for their populations of patients. In doing so, they will take into account the guidance that is issued through the annual flu letter, which comes out in March, and the chapter in the green book that refers to influenza. In this season and previous seasons, that guidance has

reflected what Andrew and Paul have said—that there is a marginal benefit between the quadrivalent and the trivalent vaccine.

Q33 **Chair:** Marginal, but clear.

Professor Powis: Yes. The green book—

Professor Pollard: The words that we use are that we "have a preference" for the quadrivalent. However, the data we have looked at have not been strong enough for us to say, "You really ought to have the quadrivalent, because it is so much better." The previous seasons' data did not support a strong recommendation for that.

Professor Powis: Commissioners and NHS England regions, both of which can hold budgets to reimburse general practitioners and pharmacists in their procurement, also have a duty, quite reasonably, to use taxpayers' money efficiently and to consider what they spend on vaccination in the round, against everything else that they commission. In the decisions that they take locally, they will weigh up the evidence that you have heard from JCVI, which is in the green book, and place that in the context of all the commissioning decisions that they make.

However, as I said previously, because of the additional cost-effectiveness analysis that PHE has undertaken and the emergence of the adjuvanted trivalent vaccine in the over-65s, in early February we took the decision, based on advice from Public Health England, that for next season—that is, for the ordering for next season that is occurring now—we would issue specific guidance at a national level. It is the first time that we have done that. We anticipate—and we have evidence that this will be the case—that there will be much less variation in the use of quadrivalent and trivalent in the under-65s and that the vaccine used in the over-65s will be the adjuvanted vaccine. In short, we have acted to ensure that next year procurement mirrors the best possible clinical safety and cost-effectiveness advice that we have been given by PHE and JCVI.

Dr Crossland: I go back to Mr Stringer's question about Nick Scriven. The message that the Society for Acute Medicine was trying to get across was that the frontline is very stretched. Even a marginal benefit from a quadrivalent vaccine might ease some of the pressures that we are seeing day in, day out on the frontline. Clearly, cost has to be taken into account, but—

Q34 **Chair:** He went beyond that. The quote that I have here is, "It is probably about half the cases that are coming into hospital that may have been prevented." That is not marginal.

Professor Pollard: Perhaps I can comment on that. Even in really fantastic flu seasons, where the vaccine matches the strain very well, we are pretty happy if we get a vaccine that is 50% to 60% effective. That means that, even if you had the vaccine that was perfectly matched, half of the cases would still not be prevented in those who are vaccinated.

Q35 **Chair:** He was commenting specifically on the use of the trivalent, rather than the quadrivalent. His assertion was that, had the quadrivalent been used, rather than the trivalent, we would have saved 50% of the admissions. You disagree with that.

Professor Pollard: I do not think that that is right.

Dr Crossland: It probably comes from the fact that we did a small survey on how many Yamagata strains we were seeing. It was a significant proportion of cases. However, I agree that, from an epidemiological and a microbiological point of view, it is difficult to say—

Professor Pollard: It is right to say that a lot of B strains were causing disease. If vaccines were 100% effective, the assertion would have been right, but they are not. That is the problem.

Professor Cosford: My reading of this is that colleagues on the frontline have been flagging up how much pressure they have been under in relation to admissions. Flu, on top of a winter that has been difficult, obviously adds to that. They have seen Yamagata strains that were not in the trivalent but were in the quadrivalent vaccine.

It is a very early estimate, so we cannot be certain that it will be exactly the same when the final season estimate comes out, but the vaccine effectiveness data that we published last week suggest that, against flu B, of all strains, we have had roughly 50% protection; 53% is the point estimate. That suggests that, although the trivalent vaccine did not include the Yamagata strain, it has been offering quite a significant amount of protection against both B-Yamagata and B-Victoria, which was in the vaccine. That is in addition to the third of people or so who have had the quadrivalent vaccine. It is a matter of balancing the importance of the pressures and then looking at things again—these data were published only last week—to check whether that was the case. In retrospect, there has been some cross-reactivity, so it is probably not strictly accurate, but the point that Nick Scriven was making about the pressures hospitals have been under was right, of course.

Q36 **Graham Stringer:** I am not sure whether this was covered by Norman's questions at the beginning. Do we know the numbers of people vaccinated with the trivalent and the quadrivalent vaccine?

Professor Cosford: All we know at national level is roughly the number of orders that have gone out. In the children's programme, it is all quadrivalent vaccine. That is a very large number. We have added a single extra year this season. That is an extra 350,000 children, so there are several million children with quadrivalent vaccine. For all the adults who have been vaccinated, our best estimate is that a third of GPs have ordered quadrivalent rather than trivalent vaccine. I do not have the precise number of people that equates to but, against the background of a programme in which we have vaccinated 1.5 million more people this

season than last season, it will be a significant number. We can give you a better estimate of the numbers, if you would like.

Q37 **Chair:** I have one final question before I bring in Bill. You talked about the tightening of the national guidance, compared with previous years, but presumably discretion still exists at local level. Is that right, in law? Is there a risk that cost pressures in localities may result in decisions that are suboptimal in terms of the evidence?

Professor Powis: Jonathan may be able to comment on this. The evidence that we have seen so far is that, as a result of the advice that we have issued and our work with the companies, which have been co-operating, we seem to be seeing ordering patterns that are appropriate to the guidance issued. Is that correct?

Professor Van-Tam: Yes. In moving now, within fairly rapid timeframes, to ordering of improved and optimised vaccines for next autumn, the Department has been in very close contact with the manufacturers involved. I feel assured enough to assure you that the manufacturers are making it easy, to the extent that that is possible, for general practitioners who may already have ordered trivalent vaccines to switch to quadrivalent. They are also making it easy for general practitioners to switch to the adjuvanted vaccine in the elderly. This year, we have one supplier for the adjuvanted vaccine. We are working on a weekly basis with that company to monitor how ordering is going, to give us quite a degree of assurance that, by and large, the changes that we require are beginning to happen.

Q38 **Bill Grant:** Following modelling work undertaken by Public Health England, the green book advice has been updated to advise that quadrivalent vaccine is more cost-effective than trivalent vaccine. That emanated from work undertaken by Public Health England. Have any other countries recommended that only quadrivalent vaccines be offered to eligible individuals aged under 65? Is that common in other places?

Professor Cosford: I do not have that knowledge with me as we speak.

Professor Pollard: I do not know for certain, but I do not think so.

Q39 **Bill Grant:** But the advice on cost-effectiveness has been changed. One would sense that the quad is better than the tri, but that may be a naive comment. I do not know.

Professor Van-Tam: The general trend across Europe is that manufacturers are switching to offering quadrivalent vaccines. They will become the standard.

Q40 **Bill Grant:** Is that because of a higher volume of sales?

Professor Pollard: I guess that it is competition in the market, really.

Q41 **Bill Grant:** I heard earlier in the conversation that, in the elderly—I may slip into the category of those over 65—the immune system may be less

effective. Do current vaccines appear to work less effectively for over-65s because of the reduced activity of the individual's immune system, or are there other factors at play?

Professor Pollard: The immune system is certainly the major issue. Sixty-five is not such a bad age.

Q42 **Bill Grant:** I am happy to be 65.

Professor Pollard: What is termed immunosenescence really happens over 70 and gets worse as you get older. That is probably the major factor, but there are other issues as well. There are more other illnesses that affect the elderly that may affect the immune response to the vaccine. It is not just the immune system; it is also the other illnesses that people have.

Q43 **Bill Grant:** Other factors come into play as one matures gracefully.

Professor Pollard: Just to add to the complexity of the quad versus tri discussion, there is an important issue to do with the advice on the adjuvanted vaccine. At least at the moment, the adjuvanted vaccine is a trivalent vaccine. However, we will be going from a not very effective vaccine, certainly in the over-70s and over-75s, with the current vaccine, to an adjuvanted trivalent that is much more effective.

Q44 **Chair:** Is it much more expensive?

Professor Pollard: I do not know what the Department of Health will be paying for it. In fact, GPs will be paying for it, so I cannot answer that.

Professor Van-Tam: It is in the region of a couple of pounds more expensive, on average.

To add to Professor Pollard's comments, the issue between quadrivalent and trivalent in elderly people is almost a red herring, compared with the new factor of the addition of the adjuvant, which is an absolute game changer in terms of how the elderly immune response works in relation to a vaccine.

Q45 **Chair:** So we have the potential to see a significant reduction in deaths from flu among older people.

Professor Van-Tam: Indeed. Professor Pollard can probably comment in more detail, but my understanding is that the modelling data suggest that, as a result of using adjuvanted vaccines, we will see a very significant reduction in the number of elderly consulting and being hospitalised with influenza next winter.

Professor Pollard: That is right. The other thing that is worth mentioning is that our world-leading childhood programme, which protects children, also reduces circulation of flu. One of the most important components of protecting the elderly is having the growing childhood programme. We are only up to eight-year-olds at the moment,

but, over the next few years, we will get the whole of primary school covered.

Q46 **Bill Grant:** This relatively new entrant to the marketplace, adjuvanted trivalent, should improve the outcomes for the over-65s. In your own words, Professor Van-Tam, it is a game changer, although we will have to wait for the results to prove that. Is it proven, or do we need to reflect on the data?

Professor Van-Tam: There are some studies from other countries. Those data have been used to inform how we have modelled how it may work out in the UK. We would expect an improvement of at least 20% in vaccine effectiveness.

Q47 **Bill Grant:** That is significant.

Professor Pollard: It is new in the UK. The vaccine has been around for some years, so it is not a new experiment. We know that it works, and there are trial data that show that it works better. Its availability in the UK is from this year.

Q48 **Bill Grant:** There is a natural follow-on question from that. The vaccine is geared for those aged 65 and over. Is there a reason why it would not dovetail into those who are under 65?

Professor Van-Tam: It is not licensed for under-65s in the UK.

Q49 **Bill Grant:** I will leave it at that.

Professor Van-Tam: We do not have a licence to use it for those under the age of 65 in the UK.

Q50 **Chair:** Because all the testing has been done in relation to over-65s.

Professor Van-Tam: Yes. A licence depends on the trials that you have done.

Q51 **Bill Grant:** It is within the zone of the trial.

Professor Van-Tam: You have to support your licence with data. If you have done the trials in an elderly population, that is where you will get your licence. This product was first licensed in 1997, in Italy, so it has a long history of use in Europe. It is new to us, but it is certainly not new to Europe.

Chair: Why is it new to us, if it has been used elsewhere? That is the obvious question.

Q52 **Bill Grant:** Where has it been?

Professor Van-Tam: I am not an expert in this area, but the take-up of adjuvanted vaccines has been slow across Europe. The evidence has been slow to emerge. Of course, when we get a licence in a given country—in this case, the UK—depends on when the manufacturers decide to file for a licence.

Q53 **Chair:** Doesn't the licence apply to the whole EU, under the EMA?

Professor Van-Tam: It depends. There are many different sorts of approaches to getting a licence. You can go down a centralised route, into Europe. You can also go into individual countries, if you so wish. There are different pathways to a licence at the present time.

Professor Pollard: Almost all new vaccines today would go to the EMA, but a lot of legacy vaccines are licensed locally. We still have a number that are licensed only in individual countries in Europe and are not available elsewhere.

Q54 **Bill Grant:** I am fascinated by the complexities of vaccines: the supply chain, the manufacturer, the particular vaccine that you order, the timing of that order, the supply in, et cetera. There is also demand, which can vary, although we are quite pleased to note that usage has gone up into the high 70s, in some cases. In children, it has gone up into the mid-40s—and rising—which is good. Is a call-off contract set up, or do you have to commit to a certain volume of vaccines, some of which may have to be recycled or destroyed?

Professor Van-Tam: At present, an individual GP practice or, potentially, a GP buying group—a consortium, in other words—will place an order for vaccines. At a certain point in time—usually, towards late spring—that becomes firm and fixed, and the volumes may not then be changed. The GP or the practice then has the financial liability of purchasing the vaccines and claiming the reimbursement from the NHS if they are given to a patient. The reimbursement depends on their being given to the patient, but the forking out of the money is at the point of ordering and is at the GP's risk. From that perspective, it is a delicate and tricky decision for them to understand clearly how many at-risk patients they have and to order the right quantities of vaccine for the next year.

Q55 **Chair:** It sounds like there are some potentially perverse incentives that need to be addressed.

Professor Cosford: Each season, in planning for the future season, we indicate a take-up that we think is a reasonable coverage to order against. That is not where we want to get to ideally, but it is an attempt to balance the use of public money on a very important vaccine programme with ensuring that we do not end up having too much vaccine at the end of the season. We could say, "Buy for 100% of all people with risk factors," but we know that this season we have average uptake of 48%. We know that we will not get to 100%, even though that would be the ideal. Our ambition may be 100%, but last year we asked people to order against a figure of roughly 55%, to try to get the right ambition in the system—to do more—but not to end up with flu vaccine that has to be thrown away and is a waste of taxpayers' money. It is a very difficult balance to get right each year.

Bill Grant: I suspect that there are a lot of factors at play. Thank you very much for that answer.

Q56 **Chair:** Has the adjuvanted trivalent vaccine for the over-65s been in regular use in Italy for some years? Has it been the standard there? Can we see that they have seen reduced numbers of hospital admissions and deaths over a sustained period of time?

Professor Van-Tam: Some of the data that we have used to support a decision to move to the adjuvanted vaccine have come from studies and experiments performed in Italy. Could I answer you honestly and say that I believe that there has been a national programme in Italy for the adjuvanted vaccine? I do not believe so. I am not familiar enough with how the procurement of flu vaccines works in Italy to give you an answer.

Q57 **Stephen Metcalfe:** My question follows on from Bill Grant's points. Just for my own understanding, can I go back over what the current recommendations are and the timing? In November last year, it was recommended that the over-75s receive an adjuvanted trivalent vaccine. In January this year, that was reviewed, and it was recommended that the age limit be brought down to 65. That was communicated to GPs and other purchasers in a letter dated 5 February. The recommendation was that everyone under 65 should receive the quadrivalent. I think that you said that two thirds received it, and a third received the trivalent.

There has been some criticism of that change to the advice, because GPs may have made their purchasing decisions prior to the letter dated 5 February. I think that what I have heard is that, despite that change, the manufacturers are being as flexible as they possibly can in not firming up the orders until the last possible moment. Am I on the right track so far? There is a lot of nodding going on, which is very good.

Perhaps you would argue that the criticism is unfounded, because there is the opportunity to change. My question is therefore simply this: how are you communicating to GPs or purchasers that they have the ability to change their order, as the advice has changed? Professor Pollard said that you are constantly reviewing this. Therefore, the advice will continue to change, potentially, up to the cut-off point, when a new season starts. The issue is communicating these changes in a timely and successful way.

Professor Powis: The changes were communicated directly by the letter of 5 February to GPs and pharmacists, as well as to NHS provider organisations and trusts, so that the procurement of vaccine for healthcare workers also followed guidance. Our regional teams, NHS central and the Department will work closely to ensure that that message has got out. As Jonathan said, the evidence that we have seen so far is that we are not encountering problems of GPs who have placed one order and then need to switch. It has been very helpful that the manufacturers have co-operated and have put their weight behind ensuring that the guidance is followed.

Professor Pollard: As you have heard, timing is a real problem with flu. We have talked about some of the preliminary data for this season. We will not have firm data until the summer, when all of that has been

analysed. We will then review it in JCVI at our meetings in the summer and in the autumn, by which time it is too late to do anything for this autumn. Every year, there is a risk of criticism that we are making decisions or giving advice too late, but the reality of flu is that you get the information after the season has already gone and that the new vaccines become available at different times.

Professor Van-Tam: I would add to that response by saying that the NHS letter in December pointed to a recommendation for the 65 to 74-year-olds, as well as the 75-plus group. In fairness, however, it said that the priority was over-75s, which is scientifically clear. When it became apparent that there was clearly going to be enough supply of the adjuvanted vaccine and that we were not seeing the pull-through we had hoped for from the wording of that letter, it was important to reinforce it in February with the further advice.

Q58 **Stephen Metcalfe:** So you see no particular issue with the GPs and purchasers getting the correct quantities of the correct vaccine to deliver the best programme that they can.

Professor Van-Tam: It is clearly more challenging for them to do this than if they had had the rather simple situation of being able to order before Christmas, as usual. However, if we had not acted in that way, we would not have an adjuvanted vaccine programme for our elderly until 2019. I think that that would have been the wrong decision for public health.

Q59 **Stephen Metcalfe:** Would it be useful to shift forward the usual date for ordering from before Christmas into February, as a rule of thumb, so that there is time for advice to be confirmed in advance of the new season?

Professor Van-Tam: That is a good idea, but it fails to take into account the fact that we work with international vaccine manufacturers. A given manufacturing plant in France, for example, may say, "I have a manufacturing capacity for 100 million doses of influenza vaccine." That will be allotted to the various different customers across the northern hemisphere. The UK needs to place its orders so that it is within that international supply mix at the right time. Clearly, there are some risks in there being no UK order until very close to the deadline.

Q60 **Stephen Metcalfe:** That begs the question, could you do a two-stage order? Could you say, "We will have our 20 million vaccines"—or however many it is; I am sorry, but I cannot recall the figure—"but we are not quite sure how we want to divide those up in terms of strains, et cetera"?

Professor Van-Tam: No, we cannot do that on strains.

Professor Powis: It is also important to understand that, before we issued the guidance in early February, we went through the loop of checking with the supply chain, through colleagues at the Department, that the manufacturers could deliver what we were asking. Obviously,

there would be no point issuing more direct guidance if the supply chain could not fulfil those orders.

Professor Cosford: I was going to make a similar point. As you would expect in a complex set of situations and a complex environment where there are different organisations with different responsibilities, at the end of each season we meet and go through all the things that have happened during the year to see whether we can make improvements for next season. The issue of communication and timing of ordering, and the issues that have arisen from that, will be one of the areas we will look at in a lot of detail. If there are ways in which we can simplify that for GPs and others for next season, we will certainly aim to do so.

Professor Powis: We feel that we are in a very good position for next season. We should not underemphasise that we think that we have issued advice in good time. That will have significant benefit for next season.

Professor Cosford: That is right. It is easy to get into all the things that we could perhaps do slightly better, but we have a fantastic children's flu programme, we are moving all our over-65s to the adjuvanted vaccine, which will be the best possible thing for them, and we are moving all under-65s at risk to quadrivalent vaccine, which is the best available evidence that we have for now. By international comparisons, we have really good coverage across all those groups. I think that it is a really positive story, but we will try to do it better, of course.

Q61 **Chair:** Before I bring in Darren, I have a question about practices that had ordered before the advice changed. Helen Stokes-Lampard, the chair of the Royal College of GPs, has said that they will look to NHS England for reimbursement of the costs of ordering, in effect, the wrong vaccine, to match the current guidance. Is there a risk that, if they are not reimbursed for the wasted cost, patients in some practices will get a suboptimal vaccine because of what has already been ordered?

Professor Powis: I will make two points on that. First, as we said previously, we have not seen evidence that that risk has materialised. Secondly, when we issued guidance, we said that we would work with GPs who found themselves in that situation around reimbursement.

Q62 **Chair:** Does "work with" mean "provide the financial reimbursement"?

Professor Powis: It means that we will work with them and work out how reimbursement might occur. I do not have any evidence that we have had to do that in practice. I could seek that evidence for you, but I have not been made aware of it at the moment.

Professor Van-Tam: The Department has sought phone calls with all of the major vaccine manufacturers for 2018-19 and sought assurances from them that there will not be any difficulty in relinquishing a TIV—trivalent— order in order to switch to QIV. We have been assured on that point that the manufacturers support public health policy in the UK.

Q63 **Chair:** So, by working with the manufacturer, we should be able to avoid any problems.

Professor Powis: The problem would occur only if the manufacturer held the purchaser to their original order. I have got assurance from the manufacturers that they will not do that, so the situation should not arise. We covered it off in the guidance that we issued.

Q64 **Darren Jones:** I should declare an interest. I got a free flu vaccination from Kellaway pharmacy in my constituency, in return for posing for their publications while having a shot. I am happy to promote that.

Professor Powis: Did that increase the vaccination rates in the constituency?

Q65 **Darren Jones:** I like to think that it did so significantly.

I get a lot of casework from constituents who, in other areas, rightly identify that national guidelines are not followed by local clinical commissioning groups. We have touched on this issue a little already. I wonder whether you are able to track variation—or, should I say, deviation from your guidelines—at local level. If so, how prevalent is that?

Professor Cosford: We monitor uptake by locality, so that we can see the variations in uptake. We do not know exactly which GPs have given the quadrivalent and which have given the trivalent vaccine this season because that is commercial information that they hold with the manufacturers. As I said, we have the overall ballpark figure. We monitor by local area, by trust and by school. We have all that information, so we can see that. I am not sure whether your question was about monitoring of vaccine uptake, monitoring of flu activity or monitoring of guidance being followed.

Q66 **Darren Jones:** It was about monitoring of localities deviating from your guidelines.

Professor Powis: Previously the guidance was in the green book and the annual flu letter. As we have already covered, that guidance did not indicate a strong preference for one or the other. Now that we have issued more direct guidance for next season, the question will be what will happen next season. As we have already said, the indications from the manufacturers and from what we are hearing back are that the guidance is now being followed. The proof of the pudding, I imagine, will be when we get to next season.

Q67 **Darren Jones:** Are you saying that previously guidelines have not been followed?

Professor Powis: What is different this year is that we issued a letter in February that was more directive, if you want, in guidance. It has added to the guidance in the green book, which was modified.

Professor Cosford: I am struggling slightly to understand which piece of guidance you mean.

Professor Pollard: The previous guidance indicated a preference for the quadrivalent, but it was a marginal difference.

Q68 **Darren Jones:** I understand all that. I will re-ask the question to make sure I have got this right. You have the national guidelines that you put together as a group. The guidelines go to clinical commissioning groups. They sometimes offer guidance to GPs about what steps to take in terms of purchasing and then the GPs themselves do the purchasing. My question is: do you know if there is any deviation at a local level from the guidelines that you produce nationally on what actions GPs should be taking?

Professor Cosford: Do you mean in what clinical commissioning groups say the GPs should do? Is it the difference between national and clinical commissioning?

Q69 **Darren Jones:** Basically, are your guidelines being followed?

Professor Powis: I think the answer for this season, where the guidance would have been issued in the flu letter last spring and would have pointed to the information in the green book, as Professor Pollard has said, is that there was a preference expressed for the quadrivalent vaccine, but not a strong preference in the sense that other things should be taken into account.

My interpretation—and correct me if I am wrong—is that the guidance was not definitively pushing people towards one or the other. For next season, the letter that we issued on 5 February, which contained the latest guidance, is much more directional in terms of pushing people towards the quadrivalent vaccine for the under-65 at-risk groups and the adjuvanted trivalent for the over-65s. As the Chair said earlier, we cannot absolutely instruct the procurement, but we can issue strong guidance. The evidence so far is that that guidance is being followed, but we will have to see how that plays out during the ordering season.

Q70 **Darren Jones:** So there was flexibility for local decision making and that has become a bit more restrictive.

Professor Powis: The previous guidance would have allowed more flexibility, which is why we saw some of the comments and decisions by commissioning groups, which have to take commissioning in the round. This year we have tightened the guidance. Why have we done that? First, because of the evidence base. The cost-effectiveness analysis that Public Health England published last year, which was published after the ordering for the current season, would not have been relevant for this winter. Secondly, because of the licensing of the adjuvanted trivalent vaccine in the over-65s. That is an important bit of the guidance that we issued in February, because, as Jonathan said, the potential for benefit is very substantial. Thirdly, because we are aware of the possibility of

variation in guidance and, as the choice of vaccines becomes more complex, our view, based on advice from PHE, was that it would be preferable to issue stronger, more directed guidance, which is why I said earlier that we are probably in the best of all possible positions for next year, in that we should absolutely see less variation in ordering between trivalent and quadrivalent. I would expect practices to be ordering quadrivalent as per the guidance for the at-risk under-65s and to be ordering and using adjuvanted trivalent in the over-65s. I think that is a very strong position to be in.

Professor Van-Tam: On the specific point about the letter and the advice to CCGs, the accompanying material to the February letter says to CCGs, "If you have already issued influenza vaccine purchasing advice which is contrary to the recommendations in this letter, you are to rescind it and replace." It specifically asks them to do that. One hopes they have done it.

Professor Cosford: There are joint local teams that deal with screening and immunisation programmes that cover the margins of the boundaries between Public Health England and NHS England. The people who run those programmes and who are employed in overseeing them are incredibly committed to the cause of doing everything they can in respect of flu. If they saw any guidance being given locally that was contrary to the guidance that Stephen and colleagues have delivered through NHS England, we would know about it straightaway, and I am sure you would know about it, too. It is most unlikely that would happen and, if it happened, we would not know about it. It is belt and braces, but the world of flu is full of very committed people who understand the benefits to be gained from getting this programme as good as possible.

Q71 **Darren Jones:** Sure, that is without question. There had been evidence previously where different clinical commissioning groups had said to buy the cheaper version.

Professor Cosford: And I think that relates to the period when the guidance was not clear in the way that it is now.

Darren Jones: So we will see.

Professor Cosford: The evidence was not so clear that this was an absolute must-do. Having done the extra cost-effectiveness analysis on the under-65s and the adjuvant, we have said the evidence is absolutely clear for next season. We will be keeping a close eye on it.

Q72 **Darren Jones:** So we will see less deviation in the next cycle.

Professor Cosford: Yes.

Professor Powis: It is also important to acknowledge that some GPs will have had to switch orders and that is an additional administrative task they will have had to have gone through. On behalf of NHS England, I should thank general practitioners and pharmacists for working with us to

comply with the guidance that we issued in February. It is important to say that.

Q73 **Darren Jones:** When it comes to the ordering, is it down to individual GP groups or their practice managers? Who brings in all this guidance and advice and makes the final decision on what to order?

Professor Powis: At the end of the day, it is the practice and the way it organises itself with the practice manager and the groups of GPs.

Q74 **Darren Jones:** My concern here is that you have all the evidence and the national guidelines, which are not necessarily mandated to be followed, which flow down to a clinical commissioning group, which has enormous financial pressures on it. This gets funnelled down to a GP practice, which has enormous resource pressures. In my view, this would probably lead to wanting to do what the guidance says, because when you are running a GP practice you do not have a huge amount of time to get into the detail of this. Would it not be easier to do all this centrally?

Professor Powis: Yes, and I think Paul alluded to that earlier. The system has been in place for many years and it has its advantages. GPs know their population of patients. As Paul has said, it is a very successful vaccination programme internationally. I would not want us to have the message that it is not working—because it is working. Having said that, we are absolutely committed to ensuring that patients get the best possible vaccines. Going forward, if, for any reason, we see evidence of variation, even though I have said we are not expecting it, clearly we would review that and take that into account in terms of the procurement that is used nationally for the adult programme.

Professor Cosford: I think that is right. To take the point you have already made, GPs do a brilliant job in getting high rates of vaccination. Part of that of course is due to the fact they are also within the system of procuring the vaccine. We are looking to make sure that we can provide every possible support to help them to know which are the best vaccines for their population, and to know that without having to go through very detailed processes of understanding the detail of the evidence, which is best looked at at a national level. We would have to think carefully about any changes in the system of procurement, because the last thing we want to do is to remove the incentives that get our programmes to the best possible level. If we were to change the procurement system, we would have to be very cautious about making sure that was done with the complete engagement and support of GPs and that the systems to value their input were absolutely there.

Q75 **Darren Jones:** Dr Crossland, do you agree? These chaps represent the national guidelines groups. What is your view on everything I have just said?

Dr Crossland: Are you asking about going to a central system?

Q76 **Darren Jones:** From a frontline perspective, would that be better or not?

Dr Crossland: GPs are pretty well placed to do it. I have a slight conflict of interest because my husband is a GP, but I think they are very happy to do it. They spend a lot of time going out and catching people who have not come in to flu clinics, and I think that would be very difficult to do at a central level. We know that GPs who go on home visits to patients who have not turned up to the flu clinics will often take the jabs out and catch bits of the population. That would not happen in a national centralised programme.

Q77 **Darren Jones:** I do not mean to interrupt. My question was not so much about the delivery of the vaccinations but the purchasing and distribution of them to GPs, who would then deliver them. Would GPs prefer the decisions around purchasing and payment to be done centrally?

Dr Crossland: I do not speak for them, so it would be difficult to say. I suspect they are probably reasonably happy, but you would have to ask them.

Q78 **Chair:** Quickly following up on Darren's points about financial pressures and so forth, the *Pulse* article in February 2017 said, "A CCG in the Midlands has highlighted a conflict of interest facing GP practices with regards to ordering flu vaccine, concluding that practices should order a majority at a price that will disadvantage them financially. Although the arguably more effective flu vaccine—quadrivalent—is cheaper to practices due to a large, 50%, discount offered by one manufacturer, the cost to the NHS to reimburse practices is higher."

Is this conflict of interest on price a lesson that needs to be learned for this season? I appreciate and very much welcome the clearer steer nationally, but you do not want to have decisions influenced by price, do you? You want the best evidence to lead to procurement decisions.

Professor Cosford: That is partly behind the discussions that we have had nationally about giving a clear direction. We were clear that the decisions about quadrivalent and adjuvanted vaccines needed to be taken across the board for all patients and we did not want those decisions influenced by those sorts of issues. Simply publishing the evidence in the green book has not been sufficient to counter that. I do not want to say more than, as we have said, that we are looking at all the issues that arise during the season to see what lessons we can learn for the future.

As Dr Crossland has said, we must not lose the huge commitment of GPs to get people vaccinated, whatever we do. Although there may be some issues there that we need to look at, we must not lose that centrality of the GPs.

Chair: I think everybody agrees with that—that is clear.

Q79 **Graham Stringer:** This has been fascinating. Where is the science at? Where is the research—or is there research—that means that we could expect a universal vaccine in the near future?

Professor Pollard: There is a lot of work going on among academic groups both in Europe and the US looking at different types of approaches for universal flu vaccines. Some of them are more promising than others, but at the moment none of them is close to having a product. There is lots of really interesting science, but it is a long way from a product. I do not think we will see that certainly in the next five years. Jonathan works in this area as well.

Q80 **Graham Stringer:** It would not be ridiculous to say that it is possibly or probably within 10 years.

Professor Pollard: Possibly. I think it would be great if we could get there. Some of the science is fantastic, but whether that can be turned into a product that would work for everyone, I do not know.

Professor Van-Tam: I think that is right; I completely agree with Professor Pollard. Another issue is the transformation of the science into a product. There are many scientific questions remaining, for example, whether universal really means universal in terms of the very wide coverage of influenza viruses. Also, how long would a universal influenza vaccine last for? Would it still need to be given annually or once every two years or once every five years? That is also not known. Certain of the immunological approaches mean that some of the vaccines may prevent severe illness but may not prevent infection, and that would need to be looked at carefully in the round in terms of what the supposed universal influenza vaccine actually did. There are a number of these big, key scientific questions, but I do not think there is enough clarity in the answers to give us an adequate steer at this stage as to how close we are to a real live product that we could employ usefully in clinical practice.

Professor Pollard: At this point we do not have anything in late-phase trials. There is so much work to do to get to a point where you would even be able to apply for a licence. That is why there is certainly nothing on the horizon in the next five years.

Q81 **Graham Stringer:** I have a completely different question. Speaking for myself, what I have heard this morning has been a much more positive story than I expected it to be, but, with the benefit of hindsight, is there anything that you would have done differently or that should have been done differently in the recommendations for this flu season?

Professor Pollard: That is a good question. As we have described, we look at evidence on the flu programme every year and the availability of new vaccines, and we have been able to react to new evidence as quickly as is possible, so I do not think we could have done anything different for this year. We have not had any new data.

Q82 **Chair:** Presumably, the clearer national guidance is one of the learning points. As Graham says, with the benefit of hindsight, we would have done that last year, would we not?

Professor Powis: Yes, but the two components that drove us to deliver that guidance were: first, the licensing of the adjuvanted trivalent vaccine, and that was not licensed in time for the current season; and secondly, the cost-effectiveness analysis that Public Health England undertook. The analysis for the quadrivalent vaccine was not available until after the ordering had been undertaken for this season. The one bit of evidence and the key change in the market occurred in time for the next season but did not occur in time for the current winter.

Professor Cosford: I think that is fair.

Professor Pollard: We are unbelievably on top of it with our system here compared with most countries, in that we are able to make quick responses to the new evidence that is emerging and make changes within a year. It is astonishing.

Q83 **Chair:** Is it your claim that the UK is a global leader in this?

Professor Pollard: In our vaccine decision making and our ability to respond, we are.

Q84 **Graham Stringer:** Within the UK, are there differences in the policies of the home countries of England, Scotland, Wales and Northern Ireland?

Professor Pollard: They all follow the same advice from JCVI. The roll-out of programmes is a bit different. For example, Scotland and Northern Ireland have already fully rolled out their childhood programme, whereas in England and Wales we are still trying to get to all primary school children up to eight-year-olds. They are already up to 11-year-olds. There are some differences in speed of roll-out, but what is delivered in the programme is the same.

Q85 **Graham Stringer:** So there is no fundamental difference.

Professor Cosford: There is no fundamental difference. The issue about the roll-out of the children's programme is a practical one. To vaccinate every child in every primary school in the country in a roughly two-month period is a huge logistical undertaking that has required us to phase it in to get it right.

Q86 **Graham Stringer:** The US Centers for Disease Control and Prevention has stopped recommending nasal vaccines because it does not believe them to be effective. That is not the case in this country, is it? The science is the science, so why is there a difference?

Professor Pollard: That decision was made several years ago, and it related particularly to the H1N1 strain, which was the pandemic strain from 2009. Within the live attenuated vaccine, it was not performing as well anyway, and that was true everywhere. That is to do with having a live vaccine that contains four different strains that compete with each other. There are some tweaks needed by the manufacturer to get optimal immune responses to all four strains. That has been worked on, and, in fact, that vaccine changed this year to try to address that.

The specific issue about the decision in the US was because of a study by the Centers for Disease Control and Prevention in Atlanta, which found that the vaccine had not worked that season. It was exactly the same vaccine we used here. In other American studies, in Canada, Finland and the UK, there was very good effectiveness of the vaccine. Other countries did not make that decision based on one study, for which we do not have a full explanation, which showed it was not working. All other studies and our own data showed very good effectiveness. Just in February, after reviewing the latest UK data, the American Advisory Committee on Immunization Practices has changed that decision and gone back to recommending that the vaccine should be used.

Q87 **Graham Stringer:** A question occurs to me that lies beneath that about the difference in the studies. Is everybody completely satisfied with the quality control and the products that come from the manufacturers? Do you get dud batches of vaccine, and, if you do, how do you detect them?

Professor Powis: The quality control is very good for influenza vaccines. Work is done at various WHO laboratories to look at the products as they are being developed each year to make sure they are effective. Here in the UK we also have our own body—the National Institute for Biological Standards and Control—that looks at some of the vaccines and shares that responsibility with other control agencies around Europe, depending on which vaccine it is. We have very good monitoring systems in Europe to look at quality.

We also have data provided by immunising small numbers of adults each year—particularly with the inactivated vaccines—to check that the vaccines are able to provide good immune responses. That monitoring works very well. Linked to your question is one perhaps about how you can have studies with different outcomes. In this particular case, we do not know the answer, because there is not yet a full explanation as to why one CDC study gives a different result from all the others. It highlights the difficulty that, to do studies in populations that are being immunised for flu, you have to collect a lot of data and you have to make sure that you have not introduced bias in the way that you have collected the data that might favour or disfavour a vaccine. It is incredibly difficult to do that. We are lucky in that we have amazing systems in the UK through different types of studies done with GPs, through GP databases and hospital surveillance. We have different ways of looking at the data to make sure that we have got it right. Public Health England has a whole team that works on this each year.

Professor Cosford: That year we had very good evidence that the children's programme in the UK had demonstrated good effectiveness. To have taken a policy decision with DH colleagues to cease the children's programme on the basis of having good evidence of effectiveness here, but one concern in the US that led it to stop the programme, was a step further than certainly I was willing to advise. I know that was the case with colleagues, particularly given JCVI support for ongoing use.

Professor Powis: We continued to review all the global data on the vaccine, and there was no reason to make a change in the UK.

Q88 **Graham Stringer:** Could the nasal vaccination programme be used effectively for other groups apart from children?

Professor Pollard: The evidence that we have at the moment is that the vaccine works best in children because they have not met flu as many times as we have. Adults have met flu for many years—usually at least 18—by the time they are adults. That means we already have quite a lot of immunity to flu. The specific characteristics of live vaccines mean that that pre-existing immunity stops the vaccine working so well. You can use it in adults but you do not get very good immune responses. It is perfectly safe but it does not work very well.

Q89 **Graham Stringer:** The green book reports that nasal live attenuated vaccine can provide broader protection against antigenic drift. Can you explain what that involves?

Professor Pollard: The flu virus changes a bit each year. This is a big challenge for the flu programme, because, as you have heard, the strains are selected at the beginning of the year, and we do not have any idea what is going to turn up when the flu season starts. Any slight drift from the last season is a real problem in making sure, with the inactivated vaccine, that you have the right match.

The live vaccine is the whole virus and not just some components of it. The type of immune response you get to a live virus is quite different from just the proteins or the dead virus that are in the inactivated vaccine. As a result, it gives you broader protection than you would have had if you had just used the inactivated vaccine in children. It is not quite at the level of the universal vaccine that we were talking about, but it gives you good background immunity and makes children a bit more like young adults. We have already had lots of exposure to flu, so we have quite a bit of background immunity. I am assuming we are all young adults here.

Q90 **Carol Monaghan:** Professor Pollard, I was conned into having a flu vaccine a few months ago here in Parliament because I was told I was getting a nasal spray. You can imagine my surprise when it was not. I was looking over the target groups and the different take-up targets for the different eligible groups. Is there a basis for these particular targets? Are these targets a reflection on what is considered achievable, or is there some clinical reason behind them?

Professor Pollard: I will answer part of the question and pass over to colleagues for who sets the targets. We look at the analysis of impact and of cost-effectiveness with the flu programme. For example, with the childhood programme, we know from the predictive modelling data that we would have a huge impact on children and the elderly just by vaccinating 30% of children. If you vaccinate 30% of children, you massively reduce the circulation of flu in the whole population. That is not

a target, but it is saying that, if you can do at least 30%, it is really worth having a childhood programme. As you have heard, in the youngest children we are at 40% to 50%, and in some primary schools we are at even 70% or 80%. We are exceeding the minimum that is required from the science. There is a separate question around targets, which the other witnesses can deal with.

Professor Cosford: Of course children are super-spreaders of flu, and we see from the analysis that the flu programme in children is having an impact on admissions to hospital and GP consultations of adults in their families and their communities. It is a really important programme. It is not our target. We set it as an ambition or a figure each year to procure against and for the service to aim to get to. That is a balance between where they are now regarding their current uptake and where we think it is reasonable to get to. They order against that so that, in any season, we do not have the terrible position where we run out of vaccine and people are asking for it, or at the end of the season we end up with large volumes of vaccines that have not been used and that therefore have to be destroyed, which is a waste of public money. They are not the evidence-based decisions on "this is where we will get the greatest benefit" target. This is a practical programme delivery issue for us on a year-to-year basis.

Q91 **Carol Monaghan:** I was surprised by the range for the schoolchildren target—40% to 65%. That is a bit of a broad range.

Professor Cosford: That was the subject of a lot of discussion, as you might imagine, for exactly that reason. Again, it was looking at where different parts of the programme were in terms of the children's delivery. This season, the uptake in two-year-olds and three-year-olds vaccinated in general practice, for instance, is up to between 40% and 45%. It reflects the variability of achievement so far in some parts of the country. The schools programme as a whole varies by the school year, but in England it is now around 60%, so we are achieving.

Q92 **Chair:** And it is pretty consistent across the country.

Professor Cosford: There is variability and, again, we can give you data on that.

Q93 **Chair:** Again, if you could provide us with the data, that would be useful.

Professor Cosford: Some places are getting over 75% and some places are getting lower. Those places with religious issues around flu vaccination in some of our inner cities are more problematic, but even that is not universal. There are places where that is a demographic issue, but they are still getting very good uptake.

Q94 **Chair:** To a degree, I guess it comes down to the quality of local leadership.

Professor Cosford: There is a whole range of different factors. Quality of local leadership is one, but the sense of trust in a vaccine in a particular community—or otherwise—and a sense of whether religious objections are reasonably overcome by certain arguments or not, are other factors.

Professor Pollard: In the schools programme, it is very encouraging that it has been going up year on year. Remember that in primary schools we did not have any programme of vaccines going into the schools. All the schools programmes were in secondary schools. For the staff this has been a completely new experience over the last few years, so it is very encouraging that things are improving.

Professor Cosford: The reception year figure is a nice figure and shows a nearly 30 percentage point increase in uptake by moving that into the schools programme. They are up at 63% this season so far and last season they were down at about 30% or 35%.

Q95 **Carol Monaghan:** Could I push a little further on this? The uptake in England across all the groups has remained below target and you have explained some of the reasons, but does a societal change have to take place, or are there people like me who just do not want to get a jag? If that is the case, could there be an option for the nasal spray, albeit on the understanding it is not as effective?

Professor Cosford: Others will know this better than I, but the nasal spray is not licensed for use in adults—that is my understanding—so that is difficult.

Professor Van-Tam: Even in the US, the top age for the licence of the nasal spray is 49 years.

Carol Monaghan: I would have managed that.

Professor Powis: I do not think he was implying you would not.

Professor Cosford: My wife does not think I have reached adulthood yet, but there we are.

On the issue of societal change, the WHO set 75% for the flu programme. We hit 72.6% this year. In one year in the last 15 we have hit 75%. It is one of those interesting things where, almost whatever we do, however hard we work, we still hit somewhere between 70% and 75%. I think that reflects societal views about vaccination. There are some in society who simply do not think it has the value that we all understand and are absolutely committed to. That is an important wider debate.

Professor Pollard: The flu programme has a particular problem in that there has been a lot of media reporting over the years about it not working, and that makes people unwilling to participate in it. A problem with the flu vaccine is that in some years it will not work because the strain will not match, and in some years it will work because the strain

matches very well. There is a problem about communication with flu programmes.

Chair: But the overall message is that it is incredibly effective and people ought to be participating.

Q96 **Carol Monaghan:** Has any specific action been taken to improve the uptake?

Professor Cosford: There is a whole range of evidence-based actions. Many of the activities go back to the previous conversation about general practice, and the way that general practitioners act to put on special clinics on Saturday mornings to get to their specific at-risk groups, or use asthma and antenatal clinics, or whatever, to encourage vaccination. All that is working very hard, and of course there are incentive schemes in the system as well to help improve uptake.

Q97 **Carol Monaghan:** I think the specific data for particular areas that have previously been asked for would be interesting, to consider why some areas have been more successful.

Professor Cosford: Yes.

Q98 **Carol Monaghan:** Dr Crossland, have you been flu-vaccinated this year?

Dr Crossland: Yes, I was flu champion for our hospital.

Q99 **Carol Monaghan:** So you have and you did not complain in the way I did, clearly. Can I ask a final question of the entire panel? Do you think there should be mandatory flu vaccination for healthcare workers?

Professor Powis: I would make a few points. First, a lot of effort, including through an incentive scheme we have for trusts, has gone in over recent years to improve the rate of vaccination in frontline clinical staff or healthcare workers. This year, as Paul said earlier, the figure is approaching 70%. It was just over 67% at the end of January, with another month to go. I think I am right in saying that this year will be the highest rate ever. The first thing to say is that this is a success story in terms of those rates going up. Again, I should thank the trusts and others for all the efforts they have undertaken. Having recently come from an acute trust, I know the efforts that have been undertaken to ensure that staff have the opportunity to be vaccinated.

The second point I would make is that it is a professional duty and obligation for healthcare workers to be vaccinated, or rather, to protect themselves and their patients against common diseases. That is expressed in a variety of different ways, in professional regulations, for instance in GMC good medical practice. In most—perhaps all—professional groups there is guidance that, in my view, places a duty on healthcare workers to be vaccinated.

The third point to make is that to switch to a mandated programme would not necessarily be a simple thing to do operationally. There are

things that would need to be taken into account in terms of staff who could not or would not be vaccinated, and the approach you would take to those staff. It is not necessarily an easy operational thing to implement.

Q100 **Chair:** Is that under consideration?

Professor Powis: We are always considering how we can improve the vaccination rates of healthcare workers. The aim is to get to 75%. This year we will be close to 70%, so we are not far off.

Q101 **Carol Monaghan:** But that is not mandatory.

Professor Powis: That is not mandatory. The fourth thing I would say is that we still see a lot of variability—back to your point—among NHS trusts and providers. Some trusts are achieving over 95% vaccination of frontline staff and there are still trusts that are down at 30% or 40%. Clearly, there is more that can be learned from those organisations that are over 90% and in the high 80s that can be applied to those organisations that are in the 40s.

The same factors in terms of variability that Paul has alluded to in the general population will also apply to healthcare workers, although with the added responsibility—the professional duty—to protect themselves and their patients. There is still more we can do. We can make it easy for staff to be vaccinated and put in various local incentive schemes, et cetera, to get those organisations that are below 50% nearer to the higher-performing trusts. There is more that we could do before we would have to get to a mandated system. There are things we would have to consider in terms of how that would work practically.

Back to my original point, we have been making good progress year on year. It will be a subject for conversation for next year, to put in place more things that allow us to get even further above 70%.

Q102 **Bill Grant:** When I use the term "healthcare workers," I tend to focus on the NHS, but should that be extended to nursing homes and private sector care providers who are dealing primarily, but not exclusively, with the elderly in their own homes? Are there methodologies to encourage rather than mandate these people?

Professor Powis: We have put some incentives in this year. I think it is fair to say that it is harder to monitor some of those groups. I understand that we will be getting some data back towards the end of the season that would allow us to do some further analysis that will play into what we do next year. Is that correct, Paul?

Q103 **Chair:** What is your assessment of the levels of uptake in the social care system?

Professor Cosford: We do not have a routine information-collection system because of the complexity of care homes. The ad hoc surveys

that we do suggest there is huge variability, with the best at around 25% uptake.

Q104 **Chair:** One imagines that there is as good a reason for the uptake to be as good in a care home or in domiciliary care as it is in a hospital.

Professor Cosford: Uptake among residents in care homes tends to be very high, but the uptake among the staff tends to be less so.

Q105 **Chair:** But the case for staff to have the jab in a care home is just as strong as in a hospital.

***Professor Cosford*:** The case is a very strong one.

Professor Pollard: It is stronger.

Q106 **Chair:** Because it is a concentration of the most at risk.

Professor Pollard: Exactly, and there is a closed environment where all the transmission of flu occurs.

Q107 **Chair:** This is an area where there is scope for enormous improvement. If we are at 25% at best at the moment, we should be getting it up to 70%.

Professor Cosford: Those with the higher rates—and although I use the word "higher" in this context, it is still low—are those with permanent staff. Those care homes with lots of bank staff, locum staff or turnover staff have even lower rates than that. We do not have a routine data collection system for that.

Q108 **Chair:** Does the CQC monitor care homes to check whether they are getting there? It ought to be a quality measure. Does it do that?

Professor Powis: I cannot answer that off the top of my head.

Professor Cosford: My belief is that, where the CQC has a role in relation to a care home, vaccination rates among staff is one of the issues they would look at. We will have to take that away.

Chair: You can come back to us, because clearly it is one lever that can be used to drive up rates. Carol, have you finished?

Q109 **Carol Monaghan:** Could the others give me a yes or no on mandatory vaccines, without a long answer?

Dr Crossland: The issue of mandatory vaccines is difficult. If we got to a stage where the vaccine was universal and effective every year, that would make for a much easier case. For example, we already vaccinate for hepatitis in healthcare workers, and they are not allowed to practise on the frontline without it. When you can still get flu despite having a vaccine, it is much more difficult to mandate it. From a duty point of view, I absolutely agree with the sentiment down the table that it is our duty to get vaccinated. Whether it could be mandated is more difficult.

Professor Pollard: In most settings where you see low uptake rates, a lot of it is to do with communication and access. I have worked in hospitals here and in north America. In a north American setting, where in some hospitals it is as close as you can get to it being mandated, it is all to do with having the vaccination team with a cart going to the ward and making sure that the nurses and doctors get vaccinated. If you sit in a clinic room waiting for them to come to you, which some hospitals still do, they do not come because they have busy jobs. Access is probably the main thing and that can drive things up a bit.

Another strategy I have seen used, which I really like—I am a paediatrician—is on children's wards, where parents are told in the leaflets they get when their child is admitted, "Ask your nurse or doctor whether they have been vaccinated," and parents will put the healthcare workers under a lot of pressure.

Carol Monaghan: Chair, this panel are clearly politicians because I do not think they are quite committing, are they?

Professor Cosford: Can I give an opinion?

Q110 **Chair:** Are you about to give it a pull?

Professor Cosford: I will give you a stronger view than my colleagues. It is perfectly reasonable that we have different views. I think the position should be that all healthcare workers are vaccinated unless there are contraindications.

Q111 **Chair:** Do you mean all health and care workers?

Professor Cosford: Yes.

Q112 **Chair:** Given the concentration of at-risk people in care homes, presumably—

Professor Cosford: Sure. I am thinking about NHS healthcare workers.

Q113 **Chair:** NHS and social care.

Professor Cosford: I am sure all social care workers should as well, unless they have contraindications. It protects them, it reduces sickness absence, so it helps the NHS to operate through the winter, but, importantly, because 30% to 50% of cases of flu, as we understand it, are subclinical, there is a risk, even when you are not showing clinical symptoms of flu, of passing that on to patients. Therefore, from where I sit, it is a patient protection issue. That does not necessarily argue for mandation, which is the interesting bit. There is a responsibility on trusts to do all they can to get the rates as high as possible, and there is a responsibility on healthcare workers. It is a dual responsibility. At the moment, we have 21 trusts across the country with over 80% uptake, whereas there are still some trusts at 30% to 40% uptake, and that needs to be addressed through operational management routes. I do not like this being deemed as solely an issue of professional responsibility. It

is an issue of professional responsibility, but, as Andy says, when it is made easy, people will take it up.

I disagree with patients challenging their healthcare workers. Patients in at-risk groups do not have that sort of relationship with their medical or healthcare staff. You need them on your side, and challenging them as to whether they are practising properly is not part of the relationship. It may be different in paediatrics where you are protecting your child—I think that is a different relationship—but for the majority of patients I do not think that is right.

If you go for mandation, you have to have a sanction. I cannot work out what an acceptable or reasonable sanction would be. People talk about face masks, and I know there are examples in the States where that happens. Equally, as a patient, I would never want to be dealing with staff wearing face masks unless it was in circumstances where that was absolutely necessary. That does not feel right to me. A mechanism that works in exposure prone procedures and the hep B vaccine is where people are moved off to work on something else. However, I do not know one part of a hospital where people are not vulnerable to the impact of flu. I think we are doing brilliantly well, but we should do better. I cannot quite work out what mandation means in practice here. If I could, I think I would—

Q114 **Chair:** You would be in favour of it.

Professor Cosford: I would want to have a clear discussion with professional leaders about it, because, equally, we have a long tradition in this country of vaccination without mandation, and we get very high rates as a result. The psychological and cultural aspects of a move to mandation are important. We could end up with some groups of people being even more suspicious of vaccination than they are already, which could be counterproductive. It is a complicated area. It is a brilliant issue to discuss and we must get to a better place on it.

Q115 **Stephen Metcalfe:** I struggle a little with the mandating of vaccines and always prefer the carrot to the stick. You have talked about access and communication. Have you any evidence upon which to base that view and why it is that healthcare workers seem to have a lower uptake than some other groups? Perhaps you should find out if there is some other underlying reason for the resistance.

Professor Cosford: My synopsis is that there is only a very small group that actively would refuse if it was made easy. The reason I say that is because there are significant numbers of trusts that get the rates really high by way of the current processes. It is about making it as easy as possible for people to get a vaccine and the communication behind it.

Professor Pollard: To come back to Paul's point about people challenging the staff, it is not a frivolous comment because we should be in a position in our society and in our hospitals where it should look odd if

staff are not vaccinated. We should be saying, "How could you not be vaccinated?" and we are not there yet. I think the patients are part of that as well. It is not just the staff.

Professor Powis: I believe there is an evidence base. There are some published studies available that show when you take a multifaceted-type approach towards healthcare staff in terms of availability and easy access, and where you use opt-out policies rather than mandation, you can see an increase.

Q116 **Stephen Metcalfe:** Good luck with that. Professor Pollard, right back at the beginning of this session you talked about high-dose vaccines. Could you expand on what that means? Might we be looking to do more of this in the future? What is the science around this?

Professor Pollard: At the moment, we do not have high-dose vaccines available in the UK, so it is not an option. High dose just means there is more protein in it. They are protein vaccines with an extra dose to make them high dose. High-dose vaccines have been in trials, and there is evidence that in the elderly you get more protection if you just give more of the vaccine. Now that those products are becoming available, that is something that will need to be looked at.

Q117 **Stephen Metcalfe:** Does that mean conducting trials or collecting data here in the UK?

Professor Pollard: No, it is the vaccine being available in the UK. The data are now available, and one thing we will need to do is look at those data.

Q118 **Stephen Metcalfe:** Who would ultimately make that decision?

Professor Pollard: As to the decision on its use, JCVI would give advice to the Department of Health, and the Department of Health would act on that as appropriate.

Professor Van-Tam: In the UK, the licence for a high-dose vaccine would be given by the MHRA.

Q119 **Stephen Metcalfe:** Would the vaccine have to go through a process with the MHRA?

Professor Van-Tam: Yes, the manufacturers would have to submit a data dossier to the MHRA for consideration of a UK licence. My best understanding is that it is possible that we will have a licensed high-dose vaccine by the end of this year.

Q120 **Stephen Metcalfe:** Thank you. That is very useful. Finally, I want to ask a question about Brexit—we have not mentioned the B word yet. The UK is currently a member of a number of networks for communicating and co-ordinating on cross-border health threats. Do you see any threat or change to that because of Brexit? If so, what can be done to minimise that?

Professor Cosford: Is that a question specifically in relation to flu? Perhaps I should not even say that.

Q121 **Stephen Metcalfe:** It relates to flu, but obviously we have roles in other areas as well.

Professor Cosford: From where I sit, as responsible for the health protection system in the UK, I will give you a very general response. Of course, there is a set of issues that we are aiming to negotiate on. We also have contingency plans if the important relationships that we have with some European institutions are not as strong as they are now in some years' time. However, as a professional leading in this area, whatever the organisational issues are, when there is an infectious disease issue going on, whether it is flu or something else, we have strong relationships with our colleagues across Europe and worldwide, and I will pick up the phone to them whatever the organisational arrangements are. We will maintain those contacts and ways of working with colleagues across Europe in an appropriate way. Of course, there may be some issues about the institutional relationships that we will have to work through. The negotiations on that are not part of what I am involved in.

Professor Van-Tam: For influenza, I would say that the WHO global network of virus information sharing that leads to the formulation of vaccine decisions is deeply embedded in the entire global system. It takes no account of EU or any other international borders. People co-operate at that level. I cannot see that being in any way impacted by whether the UK is in or out of the European Union, and to what degree.

Professor Pollard: Could I make two comments, one of which is positive? From a World Health Organisation perspective, we completely fit in with what is going on in policy decisions. I am involved in policy decisions at the WTO. Many people from the academic world in the UK are on all those committees and that is not going to change. That is really important for flu.

The one worry I have is around the European Medicines Agency. Our regulator's role in that agency has been incredibly important. I do not know what that is going to look like after Brexit, but if we were isolated from European regulation, and the huge resource there is across Europe to support the licensure of vaccines—not just for flu but across all of them—and we had to do it all ourselves, I think that would be a real problem for the UK.

Chair: We have come to the end. It has been quite a long session and we are very grateful to you for your patience with us. It has been absolutely fascinating and very useful from our point of view. Thank you all very much indeed for attending.