

## JOINT COMMITTEE ON VACCINATION AND IMMUNISATION

### Minute of the meeting held on 05 June 2019

#### Skipton House, London Road, London

#### Members

Prof Andrew Pollard (Chair)	Prof Adam Finn
Prof Anthony Harnden (Deputy Chair)	Prof Rob Read
Professor Jeremy Brown	Prof Anthony Scott
Alison Lawrence	Dr Maggie Wearmouth
Dr Fiona van der Klis	Dr Peter Elton
Prof Simon Kroll	Dr Martin Williams
Prof Wei Shen Lim	Prof Maarten Postma

#### Medical Advisor

Prof Jonathan Van Tam

#### Co-opted members

Dr Jillian Johnston (NI)	Mrs Anne McGowan (Wales)
Dr Lorna Willocks (Scotland)	Dr Julie Yates (England)

#### Secretariat

Andrew Earnshaw	Chris Lucas
Ruth Parry	Dr Mary Ramsay
Jonathan Crofts	Dr Gayatri Amirthalingam

#### Invited speakers

Dr Gayatri Amirthalingam (PHE)	Dr Mary Ramsay (PHE)
Dr Richard Pebody (PHE)	Louise Letley (PHE)
Prof Liz Miller (PHE)	Prof Nick Andrews (PHE)

#### Invited observers from Devolved Administrations

Dr Syed Ahmed (Scotland)	Dr Stephen Thomas (Wales)
Dr Gillian Armstrong (NI)	

#### Other invited observers

Dr Sandra Anglin (NHS England)	Gary Holden (MoD)
Christine Cook (NHS England)	Joanne Yarwood (PHE)
Dr Linda Diggle (Jersey)	Dr Sema Mandal (PHE)
Dr Jacqui Dunn (IoM)	Julie Nugent (PHE)
Joana Rocha (Guernsey)	Dr Sarah Tarr (PHE)
Nicola Brink (Guernsey)	Dr Jamie Lopez (PHE)
Alex Hawkins-Drew (Guernsey)	David Green (PHE)
Dr Dipti Patel (NaTHNaC)	Rachel Hornigold (PHE)

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Dr Michael Edelstein (PHE)  
Dr Louise Newport (DHSC)  
Sarah Hicks (DHSC)  
Lucy Jessop (Eire)  
Dr Aiqiang Xu (China)  
Dr Fuchang Zhao (China)  
Dr Zijian Feng (China)  
Dr Chao Ma (China)  
Dr Huaqing Wang (China)  
Dr Lawrence Everett (China)  
Prof Xiling Wang (China)

Dr Claire Cameron (HPS)  
Dr Richard Roberts (PHW)  
Anna Clarke (Eire)  
Dr Zhujun Shao (China)  
Dr Shiwen Wang (China)  
Dr Mei Zeng (China)  
Dr Zhijie An (China)  
Dr Ying Qin (China)  
Dr Zhaorui Chang (China)  
Dr Dexin Li (China)  
Prof Hongjie Yu (China)

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## Welcome

1. The Chair welcomed all to the meeting. The Chair reminded members and observers that the papers provided for the meeting included information provided in confidence. Attendees were asked not to circulate the papers more widely or discuss the information provided with others outside of the meeting. Attendees were asked not to discuss any considerations of the Committee with others outside of the meeting. Any requests for information should be directed to the Secretariat.
2. The Chair asked members to provide an update about any declarations of interest.
3. The Chair welcomed representatives from China who would be observing part of the meeting.
4. The Chair noted that this would be the last meeting for Dr Peter Elton and thanked him for his contributions to the Committee.

### I. Minute of the February 2019 meeting

5. The Minutes of the February 2019 meeting were agreed.

### II. Matters arising

6. Regarding the Cost-effectiveness Methodology for Immunisation Programmes and Procurement (CEMIPP) consultation, DHSC advised that the Government response to the consultation was under consideration.
7. On yellow fever vaccination it was noted that the MHRA had started a review of global safety data and UK safety data. The first meeting had been held and subsequent meetings would follow.
8. On the Committee's research recommendations, volunteers were requested to assist the Deputy Chair in updating the recommendations. A revised version would be published in due course. It was noted that areas of

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parameter uncertainty in modelling should be considered for the recommendations.

### **III. Coverage and attitudinal research**

9. The Committee noted the latest coverage data from across the UK. All four countries reported on a small decline in uptake of infant vaccines over the preceding few quarters. The uptake of maternal vaccines was reported to be good in all countries. Shingles vaccine uptake continued to be low with between 40 and 50% of those eligible receiving the vaccine.
10. The potential reasons for the small decline in coverage was likely to vary across the country, but changes in the delivery of primary care, the variable availability of call/recall systems and recruitment issues were all cited as possible contributory factors.

#### Attitudinal research

11. The Committee noted a presentation from PHE on the annual surveys of attitudes to immunisation amongst parents of infants and young people and their parents. The methodology was highlighted and the results for 2018 summarised.
12. It was noted that there was a high level of confidence in the immunisation programmes amongst parents of infants and young people and their parents. A high percentage agreed that immunisations were a lower risk of harm than the disease they were designed to prevent, and few indicated they had any concerns about any immunisation (9% of parents in 2018 compared with 33% in 2002).
13. In 2019 respondents indicated a continuing high level of trust in healthcare professionals as a source of information on immunisation, whereas social media was the least trusted of possible sources of information.
14. Young people were most likely to go to school staff or family if they wanted to find out more information about immunisation, compared with a low proportion indicating that they would use the internet.
15. The Committee was pleased to note the continued high level of confidence in the UK childhood and adolescent vaccination programmes. The recent small but sustained reduction in coverage was most likely to be associated with access related issues and operational capacity within primary care.

### **IV. Pneumococcal update**

16. The Committee considered an update on the pneumococcal programme and the Chair provided background on the programme and deliberations regarding the Committee's advice on a 1+1 childhood pneumococcal conjugate vaccination schedule using PCV13.

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17. The Committee noted that in 2006 the PCV7 vaccine had been introduced as a 2+1 schedule, following evaluation by the National Vaccine Evaluation Consortium (NVEC) and showed equivalent protection to the 3+1 licensed schedule. The programme had moved to the use of PCV13 vaccine in 2010. Overall, the UK was considered to have good control of PCV13 vaccine-type disease.
18. In October 2017 after consideration of evidence on pneumococcal epidemiology, immunogenicity of a 1+1 schedule compared with a 2+1 schedule, pneumococcal carriage data and modelling of alternate schedules, the Committee had advised a move to a 1+1 schedule in the UK.
19. Following this there was a period of stakeholder consultation, and the Committee considered responses in February and June 2018, and confirmed their advice for a 1+1 schedule in the UK in June 2018. The change was confirmed by both the Minister for Public Health and Primary Care and Secretary of State for Health in April 2019.
20. PHE indicated that the manuscript for the PHE model had been accepted by PLOS Medicine for publication.
21. PHE had continued to review and evaluate the likely impact of the switch to 1+1 and provided the Committee with a presentation on the latest findings. The Committee noted that:
  - the modelling undertaken by PHE was based on the transmission model used to assess the impact of introduction of PCV7 and the switch to PCV13; several papers had been published on the model;
  - the model predicted transmission of pneumococci in the nasopharynx, stratified by age and serotype;
  - the key model parameters (force of infection, case carrier ratio and competition parameters by age and serotype grouping) were obtained by fitting a static model to data from the longitudinal pre-PCV carriage study and a dynamic model to post PCV IPD data;
  - the model predictions on co-carriage episodes in the pre-PCV7 era were close to those obtained when the pre-PCV7 carriage samples were retested using a DNA micro-array method which was not available at the time the pre-PCV7 carriage study was conducted.
  - in a sensitivity analysis in the latest update, on the advice of the JCVI sub-committee, serotype 3 had been removed from the model;
  - the model had predicted the behaviour of vaccine-type (VT) and non-vaccine-type (NVT) well, up to 2013/14;
  - to examine the rise of NVT disease after 2013/14, the model was used

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to look at potential scenarios and the best fit was found where the case-carrier ratio of NVT serotypes had increased compared with the pre-PCV era;

- this was supported by data from a PHE carriage study which indicated that the overall case-carrier ratio of NVTs had increased in 2015/16 compared with 2012/13;
- the model assumptions were that under a 1+1 schedule, removal of a priming dose reduced protection against carriage, and IPD, in children under a year but efficacy post-booster was the same as under a 2+1 schedule;
- this was based on the Goldblatt *et al* study, looking at immediate IgG responses post-booster;
- there were now additional data from follow up of the 1+1 and 2+1 trial cohorts, including carriage data observed at the time of booster and six months later, (the study was not powered to look at a carriage end-point) and serological follow up from 15-21 months of age;
- when comparing IgG declines over time between 1+1 and 2+1 schedules, there were some serotypes which showed faster waning with the 1+1 schedule compared with the 2+1 schedule;
- carriage data at booster, or sixth months later showed no difference of carriage between the 1+1 and 2+1 cohorts, with the expected serotypes having persisted (19A, 19F, 3);
- observed boosts in IgG titre levels between the post-booster and 6-month follow up could indicate carriage exposure to those serotypes, with the largest boosts for serotypes 19A, 19F and 3 which were known to be circulating in the UK;
- waning of IgG antibody levels post-booster would not necessarily translate to a reduction in carriage protection post-booster;
- epidemiological evidence indicated protection against IPD persisted for many years post-booster, despite rapid waning of IgG levels post-booster;
- it was noted that although PPV23 vaccine produced IgG antibodies, vaccination had no impact on carriage
- however, to explore the potential impact of these findings, PHE modelled faster waning of protection post-booster under a 1+1 schedule, using 'extreme' assumptions of duration of protection against carriage of 3 years for 1+1 and four years for a scenario where the 1st dose provides no protection against carriage or IPD compared with 5 years for the 2+1 schedule;

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- the model estimated that under these two extreme 1+1 waning scenarios any additional increase in IPD cases over the first 5 years would be small compared with the base case assumption of equal persistence of protection post-booster with a 1+1 and 2+1 schedule;
- in summary, under what were considered 'extreme' assumptions of more rapid waning of protection post-booster with the 1+1 than the 2+1 schedule there was predicted to be little impact on additional IPD cases in the first five years of the programme.

22. The Committee noted that using a direct calculation method for additional vaccine type cases in infants, the results indicated:

- there had continued to be a decline in VT IPD in the UK (excluding serotype 3);
- the expected number of cases with a 1+1 compared with a 2+1 schedule had been calculated using the recent VT IPD incidence, vaccine coverage and one and two dose effectiveness data, in those aged 4-14 months;
- using epidemiological data from year 2017/18, which most closely reflected recent changes, the calculation estimated only an additional 1.3 cases per year, in those aged 4-14 months, compared with the number of cases predicted if continuing with a 2+1 schedule; and
- with the continued decrease in VT serotypes, it was expected this additional number of cases would continue to decline with a switch to 1+1.

23. In discussion it was noted that there were ongoing studies from other countries on the impact of a 1+1 schedule powered to have a carriage endpoint.

24. Members queried whether the duration of protection estimates used in the waning analyses were appropriate. PHE noted that there was uncertainty around duration across different serotypes, but the analysis was based on an average across various durations, which indicated that 3 years duration was logically consistent.

25. The Committee noted that the model predicted a continued decline to very low levels of IPD cases with both the 1+1 and 2+1 schedules. It was noted that if the average duration of protection was much less than the estimates put in the base case, this might prevent elimination of VT pneumococcal with either a 1+1 or 2+1 programme, however the model was consistent with the current situation.

26. The Committee agreed that the evidence presented, while of interest, provided no rationale for any change to their advice on use of a 1+1

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schedule in the UK. This advice continued to be based on the scientific evidence, rather than cost.

27. The Committee asked PHE to continue to monitor the situation and present to JCVI regularly on pneumococcal epidemiology and carriage data and asked that consideration be given to publication of the updated analysis.

## **V. Review of the maternal pertussis programme**

28. The Chair reminded the Committee that in 2012 there had been an increase in pertussis disease in the population, including disease and deaths in infants too young for vaccination. The Committee had advised that an emergency maternal pertussis immunisation programme should be put in place.
29. A rise in pertussis activity had been observed in a number of countries, with the switch from use of whole-cell to acellular pertussis vaccines thought to be an important contributory factor due to shorter duration of protection from disease and lower efficacy against infection of acellular pertussis vaccines. It was considered important to note that in the UK there would be an increasing number of children who had been primed and boosted with acellular vaccines, and modelling predictions had suggested that levels of pertussis activity would remain higher going forward, when compared with pre-2012 levels.
30. Public Health England provided a presentation on the programme and the impact and cost-effectiveness of continuing the programme, and noted that:
- a number of countries worldwide had now started maternal pertussis vaccination programmes, in response to a resurgence of disease and the ongoing public health threat from pertussis disease;
  - the highest rates of disease were seen in young unimmunised infants, under the age of three months;
  - the aim of maternal vaccination was to boost immunity at a point in pregnancy that would optimise the transplacental transfer of maternal antibodies, and passively protect infants in the first few months of life;
  - an additional benefit of maternal immunisation was that mothers had been shown as an important source of infection for young infants, and vaccination was expected to reduce the risk of exposure;
  - with growing evidence on the safety and effectiveness of maternal immunisation, WHO in 2015 concluded that maternal immunisation was likely to be the most cost-effective supplemental strategy to protect young infants;

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- rates of pertussis disease in England were highest in those less than three months of age;
- in 2012 there was a dramatic rise in rates of disease in the population, particularly in young infants
- this group are the most at risk of severe complications and death;
- 14 infants died in 2012, all of whom were too young for vaccination;
- any strategy to combat the resurgence of disease therefore needed to protect infants from birth, and this was the main driver for going with a maternal programme;
- the maternal programme was introduced on the advice of the Committee in October 2012, using a five-component pertussis vaccine for women ideally between 28-32 weeks pregnancy; and
- in April 2016, based on advice of the Committee. the window of vaccination was extended down to 16 weeks (optimal period from 20-32 weeks).

31. On coverage, impact and effectiveness, the Committee noted that:

- the latest evaluation on vaccine coverage indicated that coverage using routine data sources was around 60% in the first few years of the programme, with slightly higher levels in the winter months;
- from April 2016 there appeared to be a rise in coverage to around 70%, but this rise was likely to be associated with a change in data extraction, and routine collections in earlier years were probably underreporting coverage;
- extending the window of opportunity for vaccination had also had a positive impact on coverage;
- a number of evaluations had been undertaken to assess the effectiveness of the programme, the first set of studies were based on the first year of data, using two different approaches, both approaches consistently showed high levels of protection for infants whose mothers were vaccinated at least one week prior to delivery (91-93%);
- an updated review, three years after the start of the programme, showed that effectiveness remained high at around 91%;
- at six years the effectiveness data remained at similarly high levels;
- infants born to vaccinated mothers also had a lower risk of hospitalisation, shorter durations of stay and a lower risk of intensive care admission;



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- in England, the latest analysis using the first six years of the programme showed vaccine effectiveness against hospitalisation and death was remarkably high;
- protection from the maternal programme remained consistently high irrespective of the timing of vaccination during pregnancy, up to one week prior to delivery;
- although numbers in the analysis were small, there was evidence of residual effectiveness from vaccination in a previous pregnancy (median interval between pregnancies was 2.5 years);
- rates of disease in young infants were now the lowest since 1998, whereas rates in older individuals had remained higher than pre-2012 levels;
- in the 5-9 year old cohort, rates were higher in the last peak in 2016, than those seen in 2012; these were the first cohorts coming through who had been primed and boosted with acellular pertussis vaccines;
- in 2019 there had been primary school pertussis outbreaks, which had not previously been observed;
- since extending the window of opportunity for vaccination, pre-term infants seem to be benefitting from the change;
- in 2012 there were 14 deaths, there had been 20 deaths since 2012; 18 were in infants born to mothers who did not receive vaccine in pregnancy; and two were born to mothers who received vaccine late in pregnancy (4-7 days prior to delivery); and
- in 2017 there were no deaths from pertussis, the first time since 1993.

32. On safety the Committee noted that:

- there was a growing body of evidence on safety, with 16 published studies, looking at over 150,000 vaccinated pregnancies;
- overall the findings were consistent and reassuring, although there had been some mixed findings from a few studies with respect to two outcomes, post-partum haemorrhage and chorioamnionitis;
- of the three studies looking at post-partum haemorrhage, one indicated an increased risk, but this was not replicated in the other two studies;
- of the six published studies which looked at chorioamnionitis, three found an association, all retrospective observational studies from the US, using the ICD-10 code for chorioamnionitis;
- in one study, they did a sub-analysis for how reliable an ICD10-code was for chorioamnionitis, by looking at medical notes, and found that

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the positive predictive value was only around 50%;

- when this was taken into account in the analysis, the indication was no longer significant;
- the second study, while finding an association with chorioamnionitis, did not find any signals for outcomes associated with chorioamnionitis;
- the group concluded that given the low positive predictive value for chorioamnionitis from ICD-10 codes, and the lack of association with any of the associated neonatal outcomes, it was likely there was residual confounding, and concluded that the vaccine was safe;
- the third study did a secondary analysis looking at women who had also received influenza vaccine, (suggesting that this was a more homogeneous group with regards to health-seeking behaviour), and found that the association was weaker; this group concluded that residual confounding was responsible for the signal; and
- in light of the available published data, PHE and MHRA and LSHTM, had initiated a study using CPRD data linked to hospital admissions to further evaluate the safety of the maternal programme.

33. On blunting the Committee noted that:

- infants born to vaccinated mothers had been shown to have lower pertussis responses to the primary schedule than infants born to unvaccinated mothers;
- ten studies had shown the effect, although the clinical significance of this was largely unknown given the lack of a correlate of protection for pertussis;
- however, looking at responses following the booster dose, the blunting disappeared, and there also seemed to be an enhancement of the tetanus response, and a decline in response to diphtheria and CRM conjugated vaccines;
- an RCT in the UK had observed blunting, as described in other studies, and that the blunting did not differ between maternal vaccine products;
- the blunting post-primary had resolved by 13 months;
- PHE data indicated that there was no clinical impact on protection; and
- sufficient vaccine should soon be available to allow implementation of the Committee's advice on healthcare worker vaccination in those with close contact to infants less than three months of age.

34. On modelling the Committee noted that:

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- a retrospective and prospective analysis on the cost-effectiveness of the maternal programme had been undertaken;
  - for the retrospective study the maternal programme was compared with five different scenarios;
  - vaccine effectiveness was taken from PHE estimates (89%);
  - QALY loss and illness were from published studies;
  - NHS reference costs were used;
  - results were presented using 3.5% and 1.5% discounting;
  - exploratory sensitivity analyses were undertaken to consider the QALY losses in parents from infant deaths;
  - the results from the retrospective study, which was considered conservative, indicated that the emergency maternal programme was highly likely to have been cost-effective;
  - the prospective study considered whether the maternal programme should stop or continue;
  - parameterisation was the same as for the retrospective study;
  - deterministic sensitivity analyses had been undertaken;
  - probabilistic uncertainty analyses had been undertaken;
  - the findings were most sensitive to infant inpatient numbers, the number of infant deaths and the discount rate;
  - under the base case scenario, continuing the maternal programme was highly likely to be cost-effective; and
  - the probability of the programme being cost-effective was over 95%.
35. The Committee agreed that the maternal programme had been highly successful and there had been a substantial impact on disease. Members questioned whether there were any data on repeat vaccinations from multiple pregnancies and local reactions. PHE indicated they were not aware of any specific data on this. Comments were made regarding the availability of monovalent pertussis vaccines, and it was noted that there were no such vaccines marketed in the UK. JCVI asked to see the results of the UK safety study once completed. The Committee were reassured that evidence indicated that blunting of infant immune responses was not having any clinical impact.
36. The Committee commented that the impact and cost-effectiveness

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analyses were likely to be conservative, and it was noted that the modellers had wanted to consider all possible options. The incidence modelled was considered low, and comments were made that pertussis activity could be even higher going forward, as the total number of cohorts which had been primed and boosted with acellular vaccines in childhood increased. The Committee agreed that the modelling indicated the maternal programme was highly likely to be cost-effective.

37. The Committee advised that the emergency maternal programme should continue as a routine programme.

## **VI. Influenza**

38. The Committee received an overview of the 2018/19 flu season from PHE and noted that:

- influenza A(H1N1)pdm09 was the dominant subtype in circulation followed by A(H3N2) with virtually no influenza B;
- peak activity was lower for influenza like illness (ILI) consultations compared with the previous season;
- however, secondary care had been busy, with disease affecting mostly adults and the elderly, and close to the peak levels seen last year;
- no excess in all-cause mortality had been observed over the season and there were fewer estimated flu attributable deaths compared with recent seasons;
- in comparison some European countries experienced some excess all-cause mortality;
- there had been a good match with the vaccine strain for A(H1N1)pdm09 and most A(H3N2) strains were characterised as belonging to the vaccine like 3C2a subclade;
- towards the end of the season, however, a small number of A(H3N2) subclade 3C3a strains were detected, which would be the subclade of next season's A(H3N2) vaccine;
- overall, vaccine uptake levels had been similar to the previous season for eligible groups;
- for health care workers, uptake was above the 70% mark for the first time;
- in the elderly the phased delivery of the adjuvanted vaccine meant initially a slower rate of uptake, but the final level achieved was 72%, similar to coverage in 2017/18;
- in the childhood programme, school year five had been added in

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England;

- uptake had increased slightly in both preschool and school aged children, and the total number of children vaccinated also increased compared with the 17/18 season;
  - overall vaccine effectiveness (VE) for the programme was estimated to be 44.4% (95% CI: 26.8-57.7); 45.7 % (29.0- 60.1) and 35.1% (-3.7-59.3) for all flu, A(H1N1) and A(H3N2) respectively;
  - stratifying by age groups gave encouraging results for the adjuvanted vaccine in those aged 65 years and older with an overall effectiveness of 62% (3.4, 85.0), against all flu;
  - VE estimates for the egg based quadrivalent vaccine in at risk groups aged 18-64 years were positive but non-significant for both influenza A subtypes for H1N1pdm09 at 33.2 (-11.4-59.9%), and lower for AH3N2 at 6.2 (-110.7, 58.2);
  - in children aged 2 to 17 years old, VE for LAIV against all flu and AH1N1 were positive, at 48.6 (-4.4, 74.7) and 49.9 (-14.3, 78.0) respectively, but VE for A(H3N2) was lower and non-significant at 27.1 (-130.5, 77);
  - VE estimates against flu confirmed hospitalisation in the elderly for the adjuvanted vaccine against all flu, AH1N1 and A H3N2 were all positive and significant; and
  - while the majority of those over 65 years old received aTIV a small number received standard dose quadrivalent vaccine.
39. The Committee noted that the US had experienced a late season increase in A(H3N2) subclade 3C3a, which was not contained in the 2018/19 vaccine. VE results from the US showed positive mid-season VE estimates for both A(H1N1)pdm09 and A(H3N2) however the VE estimate for A(H3N2) dropped off by the end of season.
40. The Committee noted that egg adaptation was likely to be a factor influencing the poor VE against A(H3N2) in those aged 2 to 64 for the egg-based vaccines (QIV and LAIV) in the UK.
41. Looking ahead for the 2019/20 season the Committee noted that the cell-based quadrivalent vaccine (QIVc) would be available for use in both the elderly and at risk under 65-year olds and the adjuvanted for the over 65-year olds. In addition, the high dose trivalent vaccine (TIV HD), which JCVI had advised as equally suitable to use in the elderly, was now available but was unlikely to be used as the NHS had decided not to reimburse GPs' and pharmacies' costs for this vaccine.
42. Regarding TIV HD the Committee noted that the manufacturer had submitted additional data including a meta-analysis of pooled relative VE

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for TIV HD compared with standard dose trivalent vaccine across nine influenza seasons. Results showed positive significant relative vaccine effectiveness (RVE) for a range of primary and secondary care outcomes. Further data supplied also indicated a superior RVE for TIV HD compared with TIV against respiratory and circulatory outcomes.

43. The Committee agreed that the data presented required a more thorough review and that other manufacturers should also be afforded the opportunity to present their latest data. Therefore, a flu subcommittee would be convened before the October meeting, in order for advice to be taken into account in time for ordering for the 20/21 season.

## **VII. Update from the Influenza Sub-committee**

44. The Committee noted that an Influenza Sub-committee had met on 3 June to consider vaccines available for use in an influenza pandemic, and modelling of the impact of vaccination in different groups in different pandemic scenarios.
45. The 2009 Hine report had recommended that in order to help ministers make decisions about the level of vaccine coverage needed in future pandemics, the JCVI should consider and advise on appropriate vaccination strategies during the planning stage, taking into account behavioural and economic analyses. This advice would allow ministers to see the full range of options when next deciding on levels.
46. It was noted that the Sub-committee had reviewed vaccines which were available or were in development, and these findings were discussed by the Committee.
47. The Sub-committee would be convened again later in the year, to allow consideration of additional modelling, including scenarios directed by the Sub-committee.

## **VIII. Horizon Scanning**

48. The Committee noted the latest results from the annual horizon scanning exercise. The Committee expressed their thanks for the submissions made by industry. The results were considered commercially confidential.

## **IX. Childhood vaccination schedule**

49. The Committee noted that in the longer-term, changes might be required in the childhood vaccination schedule, due to changes in the vaccines available. Issues around the future availability of vaccines were considered commercially confidential.
50. The Committee noted a series of options for alternate schedules and were asked to consider these further following the meeting. Members suggested

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that an additional day be added to the October or February meeting to facilitate a comprehensive discussion of future options.

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<b>Prof Andrew Pollard (Chair)</b>
<p>Professor Pollard receives no personal payments from the manufacturers of vaccines</p> <p>He is Director of the Oxford Vaccine Group in the Department of Paediatrics, University of Oxford and has current research funding from the Bill and Melinda Gates Foundation, the National Institute for Health Research, the European Commission, Medical Research Council, Wellcome Trust, Innovate UK, Meningitis Research Foundation, and the Global Alliance for Vaccines and Immunisation. He chairs the scientific advisory group on vaccines for the European Medicines Agency and is a member of WHO's SAGE.</p> <p>Other investigators in the Department conduct research funded by vaccine manufacturers and the Department has received unrestricted educational grant funding for a three-day course on paediatric infectious disease from Gilead, MSD, GSK and Astra Zeneca.</p>
<b>Prof Anthony Harnden (Deputy Chair)</b>
<p>Professor Harnden has no registered conflicts of interest.</p>
<b>Dr Peter Elton</b>
<p>Dr Peter Elton has no registered conflicts of interest</p>
<b>Prof Adam Finn</b>
<p>Professor Adam Finn receives no personal payments from the manufacturers of vaccines.</p> <p>Professor Finn undertakes unpaid advisory work for Astellas on a klebsiella-pseudomonas vaccine.</p> <p>Professor Finn's Department receives funding for consultancy work from VBI vaccines on a developmental Hep B vaccine, and Bionet on a developmental pertussis toxin vaccine.</p> <p>The University of Bristol conducts research funded by GSK on meningococcal carriage, by Pfizer on pneumococcal carriage and transmission.</p>
<b>Prof Matt Keeling</b>
<p>Professor Matt Keeling has no registered conflicts of interest.</p>
<b>Prof Wei Shen Lim</b>
<p>Professor Wei Shen Lim's Department has funding from Pfizer for work indirectly related to pneumococcal vaccines.</p>
<b>Prof Jeremy Brown</b>



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Professor Brown has received payment for consultancy work from ImmunoBio on a novel pneumococcal vaccine.

Professor Brown's Department has undertaken work for Novartis on the effects of monoclonal antibodies on vaccine responses.

**Dr Martin Williams**

Professor Martin Williams has no registered conflicts of interest.

Professor Williams holds a contract for work with Public Health England.

**Dr Fiona Van der Klis**

Dr Fiona van der Klis has no registered conflicts of interest

**Ms Alison Lawrence**

Ms Alison Lawrence has no registered conflicts of interest

**Prof Maarten Postma**

Professor Postma has received honoraria from SPMSD (health economics) MSD (health economics) and is an advisor to companies on Rotateq and Rotarix vaccines.

Professor Postma works for the University of Groningen which receives grants from SPMSD and GSK for work related to influenza vaccines.

Professor Postma attends advisory boards unrelated to vaccines or vaccine industry

Professor Postma organized a conference which was financially supported by Pfizer relating to Health Economics.

Professor Postma works for the University of Groningen which has an external PhD student who is employee at Sanofi Pasteur working on a thesis on high dose influenza vaccine.

**Prof Robert Read**

Professor Read receives no payments from the manufacturers of vaccines.

The University of Southampton receives CASE studentship awards from Novartis and GSK.

**Prof Anthony Scott**

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Professor Scott receives no payments from the manufacturers of vaccines.

Professor Scott is Director of the Health Protection Research Unit at the London School of Hygiene and Tropical Medicine. He receives research funding from the National Institute for Health Research, the Medical Research Council, the Wellcome Trust and Gavi, The Vaccine Alliance, and the Bill & Melinda Gates Foundation.

**Dr Maggie Wearmouth**

Dr Wearmouth has no registered conflicts of interest

**Professor Simon Kroll**

Professor Kroll received research funding from Meningitis Now, to investigate carriage of meningococci and non-pathogenic Neisseria in infants. The funding period ended in 2018.

He is the Honorary Medical Director of Meningitis Now

**Dr Jillian Johnston (co-opted member)**

Dr Jillian Johnston has no registered conflicts of interest

**Mrs Anne McGowan (co-opted member)**

Mrs McGowan receives no payments from the manufacturers of vaccines

Mrs McGowan's employer Public Health Wales develop educational materials with funding from Pfizer, Sanofi Pasteur MSD, Novartis, Astra Zeneca and Wyeth.

**Dr Lorna Willocks (co-opted member)**

Dr Lorna Willocks has no registered conflicts of interest

**Ms Julie Yates (co-opted member)**

Ms Julie Yates has no registered conflicts of interest