JOINT COMMITTEE ON VACCINATION AND IMMUNISATION

Minute of the meeting held on 02 October 2024

Held at 10 South Colonnade, Canary Wharf, London, E14 4PU and online by teleconference

Members

Prof Sir Andrew Pollard (Chair)
Prof Wei Shen Lim KBE (Deputy Chair)
Prof Jeremy Brown
Prof Caroline Trotter
Prof Maheshi Ramasamy
Dr Matthijs Backx
Prof Nick Grassly
Prof Ellie Barnes
Prof Simon Kroll
Dr Kevin Brown
Dr Rebecca Cordery
Chris Hughes OBE
Prof Paul Heath
Prof Daniela Ferreira
Dr Jonathan Leach OBE
Rachel Rowson

Co-opted members

Dr Christopher Johnson (Wales)
Dr Louise Herron (Northern Ireland)
Dr Daniel Chandler (Scotland)

Medical Advisor

Prof Thomas Waite OBE (Deputy Chief Medical Officer)
Dr Mary Ramsay CBE

Secretariat

Andrew Earnshaw
Helena Bird
Dr Jenna Gritzfeld
Jonathan Crofts
Dr Rehana Jauhangeer
Jemima D'Arcy
Dr Julie Yates

Presenters/invited experts

Dr Vanessa Saliba (UKHSA)
Dr Sharif Ismail (UKHSA)
Dr Alex Allen (UKHSA)
Prof Matt Keeling (Uni of Warwick)
Marianne Scholes (DHSC)
Prof Nick Andrews (UKHSA)
Prof Nick Davies (LSHTM)
Dr Chu-Chang Ku (LSHTM)
Dr Conall Watson (UKHSA)
Dr Julie Yates (UKHSA)
Dr Colin Campbell (UKHSA)
Simon Hailstone (NHSE)

Invited observers from Devolved Administrations

Sharron Richards (Wales)
Lorraine Walsh (Wales)
Gill Hawkins (Scotland)
Laura Wilson (Scotland)
Martin Coleman (Northern Ireland)

Other invited observers

Simon Cottrell (PH Wales)
Dr Claire Cameron (PH Scotland)
Alex Hawkins-Drew (Guernsey)
Helen Stalker (Isle of Man)
Lucy Jessop (R of Ireland)
Allison Mills (Jersey)
Gary Holden (Ministry of Defence)
Dr Dipti Patel (NaTHNaC)
Helen Beazer (DHSC)
Helen Miscampbell (DHSC)
Dilan Patel (DHSC)
Barnaby Roberts (DHSC)
Hafsah Asghar (DHSC)
Maddy Carey (DHSC)
Thomas Rowland (DHSC)
Dave McGowan (DHSC)
Lukman Sadiq (DHSC)
Anuruddha Jayaratne (DHSC)
Sarah Hicks (DSHC)
Vincent Noone (DHSC)
Dr Helen Campbell (UKHSA)
Dr Suzanna McDonald (UKHSA)
Dr Jamie Lopez-Bernal (UKHSA)
Anna Mensah (UKHSA)
Emily Whamond (DHSC)
Ali Lamont (DHSC)
Dr Benjamin Curtis (Uni Oxford)
Sarah Pais (MHRA)
Dr Julia Stowe (UKHSA)
Louise Letley (UKHSA)
Dr Karen Powell (UKHSA)
Dr Yoon Choi (UKHSA)
Rebecca Symes (UKHSA)
Pinar Erder (UKHSA)
Dr Nicola Hennessy (UKHSA)
David Green (UKHSA)
Greta Hayward (UKHSA)
Susan Fox (UKHSA)
Sarah Beatwell (NHS E)
Colleen Chambers (UKHSA)
Jane Freeguard (NHSE)
Luke Collet-Fenson (UKHSA)
Vicki Davis (DHSC)
Maria Stavridou (UKHSA)
Carla Hobart (UKHSA)
Freddie Drew (NHSE)
Anthony Kessel (NHSE)

VZ Sub-Committee Members
Dr Andrew Farlow
Dr Helen McDonald
Prof Adam Finn
Prof John Edmunds

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 discuss any considerations of the Committee with others outside of the meeting, and any questions received from the media about the meeting discussion should be directed to the Secretariat.

2. The Chair noted apologies from Dr Martin Williams and Prof Maarten Postma.

3. Members were reminded to provide any updated conflicts of interest to the Secretariat.

I. Minute of the last meeting and correspondence from industry

4. The minutes from the JCVI meeting in June 2024 had been provided in the meeting pack and were agreed in the meeting. A minor amendment was noted on point 18

of the minute that this should read '*unencapsulated non-typeable Haemophilus influenzae*'. This would be amended by the Secretariat.

5. The Chair noted that correspondence had been received from MSD about the pneumococcal sub-committee minutes in which MSD offered to share their pneumococcal health economic model. It was planned that the Secretariat would respond to the letter.

6. There had also been correspondence on Respiratory Syncytial Virus (RSV) following the announcement of the maternal vaccination programme because premature infants may remain unprotected due to lower antibody transfer across the placenta for those born under ~30 weeks and because vaccination is not offered until the 28th week gestation. A joint letter had also been sent from British Association of Perinatal Medicine and the Royal College of Paediatric and Child Health addressed to the Chair and the Deputy Chief Medical Officer raising concerns in relation to premature infants. The original JCVI advice on RSV vaccination noted that if a maternal programme was chosen, then there would need to be a further decision on premature infants and this has been discussed further by the RSV sub-committee. A response had been sent to this letter.

7. A letter had been published in Archives of Diseases in Childhood (Charlesworth, 2024) raising issues including the premature infants issue, the Committee were informed that a response has been submitted (Pollard et al. 2024).

II. Matters Arising

Update from DHSC

8. The Committee noted an update from DHSC. The advice for an ongoing routine mpox vaccination programme in high risk GBMSM as advised by the Committee had been accepted. It was expected that submission of the gonococcal advice, and also an update on the adult pneumococcal programme would also follow before the next JCVI meeting.

9. Plans for the appointment of a new Chair to follow the end of Prof Pollard's tenure had been agreed and would proceed. The reappointment of nine JCVI members whose current terms were due to end in the next year had also been agreed.

Research Recommendations

10. An updated version of the Committees research recommendations had been circulated prior to the meeting for members comments. It was commented that this should be a live document, documenting research areas considered important by the Committee. For all clinical studies there is a long lead in time needed for data generation. The National Immunisation Schedule Evaluation Consortium (NISEC) was set up to support clinical studies which may be needed for future JCVI advice.

11. It was commented that research could address barriers for vaccination and ways in which vaccination could be improved. The Committee agreed that the committee

should signal that funding was needed for behavioural research and implementation research through appropriate funding bodies which is not part of NISEC's remit and nor does JCVI have the scientific expertise to advise on methods.

12. It was commented that there had been work under current Health Protection Research Units (HPRUs) especially on attitudinal research. Less research had been done on implementation and delivery models which are often context specific and may be under-researched. Much research had a focus on defining issues rather than evaluating different interventions. The JCVI advocated for more research in this area, including interventional studies to measure what interventions make a difference and cost analyses of such behavioural interventions. It was commented that this could be funded through a number of different HPRUs budgets or through a specific NIHR call.

13. The focus on the JCVI's research recommendations needed to be on programme specific questions which would enable the Committee to make its decisions relating to new or changes to existing vaccination programmes. It was raised that there were still outstanding questions around the onset of myocarditis associated with mRNA-based vaccines, especially as there is ongoing development of such vaccines, including for paediatric indications. There had been very few long-term follow up studies and it had been shown that after 12-18 months there were still MRI changes seen in individuals who had myocarditis. It was however unknown whether these would be of clinical significance in the long term, and therefore a well conducted long-term study was needed. It was also commented that there was uncertainty remaining around the durability of response from mRNA vaccines, however there may be work ongoing within industry to address this.

<u>Mpox</u>

14. The Committee had been made aware of an increase in mpox Clade Ib cases. This had initially centred in the Democratic Republic of Congo (DRC) however had spread to some other countries in the region. WHO had declared this as a public health emergency of international concern. At the time of the meeting no UK cases had been identified to date, however it was noted that there was travel to the affected region, and there had been importations of mpox into the UK in recent years. The Committee had previously given advice on vaccination intervention for the Clade II outbreak in 2022 which was predominantly in gay, bisexual and other men who have sex with men (GBMSM).

15. In August 2024, JCVI was asked for advice from UKHSA on their vaccination options paper, and an update to the Green Book chapter. The update to the Green Book had since been published. The Green Book covered standard pre/post-exposure advice, and outbreak advice. The Chair thanked the Committee for their input. The updated vaccination options paper had been shared in the meeting paper pack.

16. It had been reported that the UK Government had procured more than 150,000 doses of vaccine for use in the UK. Multiple countries and organisations had donated vaccine doses to DRC and other affected countries. The UK were providing

funding to Gavi who were providing vaccine doses to the international Clade Ib response.

17. The Committee discussed the current Green Book advice, which was based in the context of a lack of UK cases, and the number of doses currently available. Further considerations and advice would be made, if needed, based on emerging epidemiology. It was noted that the vaccine had been licensed based on immunogenicity using clade I mpox data, therefore there were not concerns about vaccine effectiveness, however no formal effectiveness studies had been undertaken for clade Ib.

Hepatitis B

18. Currently, monovalent hepatitis B vaccine doses are given during the first year of life as part of the selective programme, given at birth, 4 weeks and 12 months. At the one year appointment, a dried blood spot (DBS) test for hepatitis B surface antigen is scheduled for infants born to hepatitis B infected mothers to ascertain whether they have developed chronic hepatitis B even if they had been vaccinated. A dose of the monovalent hepatitis B vaccine would then be administered for the infected infants.

19. As previously advised by the Committee, in 2025, an additional hepatitis B containing vaccine will be provided as the hexavalent DTaP/IPV/Hib/HepB and will be routinely administered at 18 months as part of the changes to the childhood schedule. To implement this change for hepatitis B vaccine, UKHSA consulted the Committee on when the DBS testing and hepatitis B vaccine (as part of the hexavalent vaccine) should be undertaken.

20. The Committee agreed that there was no requirement for a monovalent dose at 12 months and DBS testing, as well as a further dose of the hexavalent vaccine at 18 months. The Committee therefore concluded that the monovalent dose given at 12 months appointment should be removed whilst both DBS testing and the hexavalent vaccine dose could be performed at the same time at the 18 months appointment. These changes will be incorporated in Chapter 18 of the Green Book in 2025.

Measles Outbreak

21. UKHSA has been running a national standard measles incident response since January 2024.

22. There have been over 2500 laboratory confirmed measles cases in England in 2024 to date, the highest number recorded since the last measles epidemic in 2012. Initially the outbreak started in Birmingham, but numbers started coming down there in March and since then London has dominated, with smaller outbreaks in the other regions. The majority of the cases have been in unvaccinated children under the age of 10 years reflecting the year-on-year decline in uptake of routine childhood vaccinations observed since 2013. Since schools broke up at the end of July 2024 activity has been on a downward trend and there is now evidence that community

transmission has been interrupted, although small, localised outbreaks continue to be reported.

23. The impact of the regional and national measles catch-up activities between August 2023 and April 2024 has been formally evaluated by UKHSA and published in September (UKHSA 2024). This evaluation was conducted using record level data from the Immunisation Information Service (IIS) and National Vaccine Register (NVR) for the first time. Key findings included:

    - By the end of the campaign period (April 2024) there were increases in the number and percentage vaccinated with measles, mumps and rubella (MMR) vaccine, dose 1 (MMR1) and dose 2 (MMR2) in each of the cohorts assessed, with over 180,000 additional doses of MMR vaccine given during the evaluation period.

    - For MMR1, the largest increase was observed in children aged 15 months to 5 years of age (1.84 percentage point (pp) increase). For MMR2, the largest increase was observed in children aged 3 years and 7 months to 5 years of age (3.59 pp increase).

    - Over 13 percent of previously unvaccinated children under the age of 5 years were vaccinated with MMR1 during the campaign period compared to baseline.

    - There was geographical variation (by NHS commissioning region and integrated care board (ICB)) in the percentage point change in coverage for both doses of MMR across all cohorts.

    - For MMR1, the greatest increases in coverage in children aged under 5 years were observed in London, whilst the smallest increases were observed in the East of England.

    - The largest coverage increases for MMR1 and MMR2 were consistently seen in people from African, Arab, other black, and white Gypsy and Irish Traveller ethnic groups, which are all groups with historically lower MMR coverage The smallest coverage increases for MMR1 and MMR2 were consistently seen in the white British ethnic group.

    - For all cohorts for both MMR1 and MMR2, the greatest percentage change in coverage was observed in the most deprived deciles (decile 1), whilst the smallest percentage change was observed in the least deprived deciles (deciles 9 and 10).

24. The gains observed are in keeping with what has been observed in previous national catch-up campaigns. In order to prevent future surges system-wide partnership working and appropriate, sustained resourcing are needed to reach the 95% WHO target in the routine childhood immunisation programme in all communities.

Pertussis

25. The Committee received an update from UKHSA on pertussis epidemiology (UKHSA, 2024) and the public health response. The Committee noted:
    - Laboratory confirmed cases appeared to have peaked in May 2024 and had been declining since although they remained much higher than in recent years. It was suggested this was linked to the school holidays and reduced mixing. This would continue to be monitored as schools returned this Autumn.

    - Incidence continued to vary significantly by age, with the highest incidence in those under 3 months of age.

    - Despite the reduction in overall case numbers, testing positivity remained high across the testing modalities: around 45% and 70% for serology and oral fluid testing, respectively.

    - Data from the GP in hours syndromic surveillance system also demonstrated a downward trend in GP consultations, noting data were only available up to week 38 so any effects of the return to school would not yet be captured. This trend was noted across age groups and geographies.

    - The downward trend was also noted in Secondary Uses Services (SUS) data on hospital admissions. Initial data continued to suggest that admissions were concentrated in the youngest age group but a lag with receiving data was noted.

    - There had been 10 deaths in infants who had contracted pertussis between January and August 2024.

    - In the first six years of the maternal vaccination programme, vaccine effectiveness against infant death was estimated at around 97%. Taking into account data up until August 2024, vaccine effectiveness against infant death was now estimated at around 91%.

26. Information on the public health response to the increase in cases was noted, including that work was underway to:
    - Understand the potential factors that may be contributing to the resurgence, including genomic analysis. Over 350 isolates had been sequenced from the 2023/24 increase with no single clade identified as driving the resurgence. No tested cases from 2024 had shown macrolide resistance.

    - Review and update the national guidance, including an extension of the occupational vaccination offer to priority group two healthcare workers, with revaccination being offered to priority group one health care workers that had not received a pertussis containing vaccine in the last five years (UKHSA, 2024).

    - Improve uptake of the maternal vaccination programme in partnership with

NHSE. Coverage in the maternal programme was around 60% and had been relatively stable in 2024, with a small uptick seen in June. In the infant immunisation programme, coverage of the primary course of the '6-in-1' vaccine at 12 months of age had been declining over time and was currently around 91%.

- Increase professional engagement and public awareness activities.

27. Work was ongoing to access Clinical Practice Research Datalink (CPRD) data. This would assist in updating vaccine effectiveness analyses for both maternal and infant vaccination.

28. Three ongoing surveillance studies were highlighted: an update of maternal pertussis vaccination in maternity and GP services, an analysis of disease burden in adolescents, and an analysis of deaths in older children, adolescents, and adults.

29. Members asked about the reasons behind the low maternal uptake, such as the failure to offer vaccination or refusal of an offer. This was considered complex, and work was ongoing to investigate different aspects, including maternal perceptions of vaccination and the context in which the offer is made.

30. It was noted that there was significant work ongoing to improve the vaccination record data flow between maternity units and GP services; a new recording service for vaccines was being used by maternity units and it was anticipated that the improved data flow would give a better picture of current vaccination offers.

Pneumococcal Sub-Committee Update

31. The Committee noted that the JCVI pneumococcal sub-committee had met in June to discuss the use of two higher valency pneumococcal vaccines, PCV15 and PCV20, in the infant immunisation programme. Initial modelling had suggested that higher valency vaccines might not provide an advantage over PCV13. The sub-committee would be meeting again later this year.

32. JCVI had previously advised that either PCV20 or PPV23 could be used for the adult and at-risk immunisation programmes. The tender for these programmes had closed recently and the outcome was awaited.

III. COVID-19

33. The Chair noted that the COVID-19 sub-committee met three times in September 2024 to discuss COVID-19 vaccination in 2025 and spring 2026. In today's meeting, the Committee would hear presentations on COVID-19 epidemiology and cost-effectiveness modelling before ratifying advice on COVID-19 vaccination in 2025 and spring 2026.

34. It was highlighted that the JCVI COVID-19 Committee had previously considered a bespoke, non-standard cost-effectiveness assessment, developed by DHSC, in the

formulation of advice for Autumn 2023, Spring 2024, and Autumn 2024. This assessment would also be used in decision-making for the Spring 2025 campaign, when pre-procured vaccine stock will still be available. For advice from Autumn 2025 onwards, standard cost-effectiveness, as detailed in the JCVI Code of Practice, will be used.

Epidemiology

35. The Committee heard a presentation from UKHSA regarding COVID-19 epidemiology (UKHSA, 2024).

36. COVID-19 cases confirmed by laboratory testing and PCR positivity data were presented. Caveats regarding a likely decrease in testing frequency and behaviour since the height of the pandemic were noted. No seasonality in COVID-19 waves was observed, with at least three peaks per year. Recently, these peaks were broader and significantly lower than in previous years, and often lasted more than one month. The baseline for PCR positivity was around 5%.

37. There had been a sustained wave starting in April 2024 with two small peaks in May and mid-July. A small increase in cases had recently been observed.

38. Respiratory DataMart and RCGP positivity data for all respiratory viruses in England from the past year were presented. It was noted that during the last winter season, the peaks in RSV, COVID-19, influenza, and rhinovirus all occurred at different times. It was noted that the peaks of COVID-19 were not as high as for other viruses, but the baseline case rate remained higher than that of other respiratory viruses.

39. COVID-19 hospitalisation rate peaks from SARI-Watch for 2024 were significantly lower than previous years, and these peaks were broader, lasting for longer than previous years. Similar trends were noted in the COVID-19 Intensive Care Unit / High Dependency Unit (ICU/HDU) admission rates, although it was noted that the numbers were so low for ICU/HDU admissions that it was difficult to discerns peaks.

40. A breakdown of circulating variants was presented. KP.3.1.1 made up the majority of sequenced samples and was the dominant circulating variant. The XEC sub-variant, which was a recombinant of KS.1.1 and KP.3, was not yet included in the variant sequencing being undertaken by UKHSA. As the XEC sub-variant was a recombinant of two JN.1 sub-lineages, it was expected that it would have similar characteristics to the JN.1 variant. It was noted that KP.3 was not a sub-lineage of KP.2, but that both KP.3 and KP.2 were sub-variants of JN.1.

41. COVID-19 hospitalisation rates from 2023 to 2024 indicated that dominant variants usually became dominant two months or less after initial detection as a variant of interest. This was typically accompanied with a peak in hospitalisation rates.

42. Members commented that the epidemiological patterns and lack of seasonality made it challenging to predict the optimal timing for vaccination. However, winter vaccination would likely still be beneficial for reducing pressures on healthcare systems.

43. It was noted that most testing data for COVID-19 were now being received from hospital settings. As such, the waves observed from these data might appear to be driven more strongly by waning vaccine immunity than real-world COVID-19 positivity, where transmission might be driven by younger individuals who were no longer receiving vaccination or testing for COVID-19.

44. It was questioned whether there was any ongoing work in studying the capacity for mutation of the SARS-CoV-2 Spike protein.

Number Needed to Vaccinate (NNVs)

45. Members noted a presentation from UKHSA on estimating the Number Needed to Vaccinate (NNV) by age and risk groups for COVID-19 hospitalisation, severe hospitalisation, and death in England.

46. To inform modelling and cost-effectiveness analysis, the COVID-19 incidence and uptake data had been shared with the University of Warwick, stratified by age, risk, week and vaccination in the past six months, along with data on mean length of stay. The NNV by age, risk, and period, as well as mean length of stay data had been provided to DHSC.

47. The NNV was calculated using the number of cases by age, risk and week, vaccine uptake, and vaccine effectiveness against hospitalisation, and was based on observed incidence and vaccine use for three periods: September 2022 to March 2023, April to August 2023, September 2023 to March 2024. Outcomes were COVID-19 hospitalisation, severe hospitalisation, and death.

48. The estimated vaccine effectiveness (VE) against hospitalisation was based on UKHSA test negative case-control studies and was estimated to be 50% in the first four weeks post-vaccination, waning to 0% at 28 weeks post-vaccination. It was noted that the VE against death was higher than the 50% in several other studies (Andersson et al., 2024; Liu et al., 2024; Lin et al., 2024; Monge et al., 2024). As such, a sensitivity analysis of 75% VE against death in the 1 to 4 weeks post-vaccination, waning to 20% at 28 weeks, was included.

49. Groups were stratified as no risk, at-risk but not immunosuppressed, or immunosuppressed. Age groups were stratified by 5-year age bands from the age of 15 years. It was highlighted that over the age of 70 years, a significant proportion of individuals were in an at-risk group. Hospitalisation rates and length of stay for COVID-19 both increased with age and risk.

50. To date, additional vaccine doses had been advised where the NNV was less than 2000 to 5000 (depending on the group and the campaign). Using data from autumn 2023/24 in the analysis, the NNVs for preventing hospitalisation in all adults over 65 years of age were below 5000; this matched the JCVI advice to vaccinate all adults over 65 years of age in the Autumn 2023 campaign.

51. When stratified into groups, NNV estimates for preventing hospitalisation were below 4,000 in not at-risk adults aged 80 years and over, and in at-risk but not

immunosuppressed adults aged 60 years and over. For immunosuppressed individuals, NNVs were below 4,000 in almost all age groups.

52. As oxygen/ventilation or ICU admission were now very uncommon for individuals hospitalised with COVID-19, the NNVs against severe hospitalisation were very high and only at-risk adults over 85 years and immunosuppressed adults over 65 years had NNVs under 10,000.

53. For estimates against death, NNVs were below 10,000 in not at-risk adults over 85 years, at-risk but not immunosuppressed adults aged 75 years and over, and immunosuppressed individuals over 45 years of age. The sensitivity analysis carried out using higher VE against mortality significantly lowered the NNVs by approximately three-fold.

54. An additional NNV analysis had been carried out for pregnant individuals following discussion in the COVID-19 sub-committee meeting on September 17th. The same COVID-19 outcomes as the above NNV calculations were used.

55. It was assumed that vaccine was administered late in the second trimester of pregnancy to confer benefits in the third trimester and for infants under 3 months of age. VE was taken as the average in the first three months following vaccination (45%), with a sensitivity analysis for mortality at 70%.

56. Births between August 2022 and February 2024 were used for the infant rates and third trimesters starting from October 2022 to December 2023 were used for pregnancy rates. No ICU admissions or deaths were recorded in pregnant individuals (in any trimester) in the period selected.

57. NNVs against hospitalisation for pregnant individuals were just under 2,000. NNVs against severe hospitalisation were around 300,000 due to the rarity of these cases. It was noted that whilst the NNVs for hospitalisation were similar to adults aged 65 years and over, the length of stay was comparable to women aged 20 to 39 years, implying the severity of the hospitalisations was low.

58. Similar results were observed in infants under the age of three months. The NNVs (i.e., to vaccinate pregnant women) against hospitalisation of infants were under 500, however the NNVs against severe hospitalisation were just over 13,000 and were almost 190,000 for ICU admission.

59. Estimating NNVs against mortality in infants under three months was challenging due to the difficulty in attributing causality to SARS-CoV-2 infection. Mortality data from the ONS and from the National Child Mortality Database were reviewed by UKHSA. NNVs against mortality, using a VE of 45%, were estimated to be between approximately 380,000 and 1.5 million. When VE was 70%, the NNVs decreased to between 243,000 and 975,000.

60. Further analysis into preterm birth in the Omicron period noted a small and non-significant odds ratio of 1.23 for premature birth in pregnant individuals hospitalised with COVID-19. If it were assumed this represented a true risk then using the same

VE assumptions as in other calculations this gave an NNV of 111,000 against the outcome of preterm birth.

61. It was agreed that it was difficult to attribute hospitalisations to COVID-19 in infants. Recent data from the US had found that 30% of infants hospitalised with COVID-19 had concomitant infections (Havers et al., 2024). It was noted that throughout the pandemic, higher hospitalisation rates had been observed in children in the US, as compared with the UK.

62. Further research was needed to determine the significance and causality of a positive SARS-CoV-2 test in pregnant individuals and infants in relation to outcomes such as preterm birth in order to better understand the data available.

University of Warwick Modelling

63. The Committee heard a presentation from the University of Warwick regarding their COVID-19 model and cost-effectiveness analysis (Keeling et al., 2024)*. The model had the same caveats as stated at the COVID-19 sub-committee meeting on September 10th.

64. The model was based on hospitalisation, ICU admission, and mortality data from September 2022 to March 2023, April to September 2023, and October 2023 to March 2024.

65. A simple model was presented which estimated the prevention of hospitalisation from vaccination. This compared the number of hospitalisations in each vaccinated and unvaccinated groups and the length of stay in each group, which were both higher in unvaccinated individuals.

66. It was noted that immunosuppressed individuals made up approximately 1 to 2% of the population.

67. Four different methods for estimating vaccine efficacy were presented:

    - method 1 was the simplest method, which compared risk of severe COVID-19 outcomes in vaccinated and unvaccinated individuals.

    - method 2 incorporated time since vaccination and waning of vaccine protection into the calculation from method 1.

    - method 3a formed vaccine efficacy estimates by considering the raw data in not-at-risk over-65-year-old adults and at-risk adults over 60 years of age separately. Decline in protection was assumed.

    - method 3b followed the same methodology as method 3a but inferred the

* Post-meeting note: The methodology in these minutes was accurate at the time of meeting. The publication referenced above contains changes to the naming of the methods (1 to 4b) detailed in paragraph 67.

decline in protection from maximum likelihood estimates.

- method 4a used the predefined vaccine efficacy from recent Public Health Scotland (PHS, 2024) estimates, including waning of protection.

- method 4b used the predefined vaccine efficacy from recent UKHSA estimates, including waning of protection. These were the same effectiveness estimates used in the DHSC second-opinion modelling.

68. The assumed and estimated declines in vaccine efficacy for methods 3a, 3b, 4a, and 4b were presented for winter and spring, in at-risk and not at-risk populations. The UKHSA vaccine efficacy estimates used in method 4b were lower than the PHS estimates used in method 4a.

69. Health economics results were developed using the PANORAMA study of individuals hospitalised with COVID-19, together with mean length of stay and life expectancy data for each age and risk group. Quality Adjusted Life Year (QALY) losses were estimated with both a single and heterogenous approach for each age and risk group.

70. The willingness to pay figures for an autumn and spring vaccination programme were presented. A combined willingness to pay, for two vaccinations per year, was also presented. Willingness to pay increased with age, although the size of the cohort it would be cost-effective to vaccinate would depend on the price per vaccine dose.

71. Sensitivity analyses in method 3a for not at-risk individuals indicated that:

    a) earlier waves of COVID-19 would not push the willingness to pay below the threshold.

    b) smaller or larger waves of COVID-19 pushed the willingness to pay thresholds into older or younger age groups respectively.

72. It was noted that further adjustments had been made to the model since it was presented to the COVID-19 sub-committee resulting in the willingness to pay being more comparable between the University of Warwick and DHSC models.

<u>DHSC Second Opinion Modelling</u>

73. The DHSC analytical team presented second opinion modelling and cost-effectiveness analysis. For the Spring 2025 campaign, the JCVI would consider the DHSC bespoke, non-standard cost-effectiveness assessment, as pre-procured vaccine stock would still be available. For vaccination programmes from Autumn 2025 onwards, the standard JCVI cost-effectiveness assessment would be used.

74. There were considerable uncertainties around deployment costs for COVID-19 vaccination. As such DHSC asked the Committee to formulate their advice on total willingness to pay, including both deployment costs and vaccine costs. The Committee were also asked to formulate their advice for a range of vaccine prices,

from £0 to a maximum expected price, to mitigate procurement uncertainties.

75. For Spring 2025, the model used the NNV figures supplied by UKHSA, adjusted for COVID-19 rates for the period July 2023 to July 2024. The health states modelled were COVID-19 hospitalisation, severe hospitalisation, prolonged recovery from severe COVID-19, and COVID-19 deaths.

76. A number of wider health benefits were not included in the model, including symptomatic, acute non-hospitalised COVID-19, persistent symptoms in non-hospitalised cases, and elective care benefits for patients awaiting treatment.

77. The parameters used for COVID-19 morbidity QALYs and healthcare costs were the same as used by DHSC in analysis of previous campaigns.

78. The willingness to pay figures for Spring 2025 were presented. In the most plausible scenario, vaccination was cost-effective in all individuals over 75 years of age, assuming the cost of deployment was between £10.04 and £17.23.

79. The model used for Spring 2025 was adapted for Autumn 2025 and Spring 2026. Levels of observed hospitalisations and deaths were based on data from Autumn 2023 and Spring 2023 vaccination campaigns, similar to the modelling by the University of Warwick. VE against hospitalisation was assumed to be 50% in weeks 1 – 4 post-vaccination and VE against mortality was assumed to be 75% in weeks 1 – 4 post-vaccination, as presented by UKHSA earlier. Health economic parameters were now taken from the PANORAMA study, as detailed in the University of Warwick's modelling methodology.

80. The willingness to pay outputs of methods 4a and 4b of the University of Warwick model and DHSC model for Autumn 2025 and Spring 2026 were compared. The willingness to pay was broadly similar, which provided reassurance on the robustness of the modelling undertaken by the University of Warwick. The differences which could be observed between the DHSC and University of Warwick models were due to different assumptions on vaccine effectiveness.

81. A simple cost-effectiveness model had been designed for pregnant individuals. It used the NNV calculations developed by UKHSA and modelled the health benefits of vaccination to the mother and infant. The model followed a similar structure as the model developed by DHSC for Autumn 2025 and Spring 2026, but with different parameters.

    a) The assumptions in the model were presented, including averted hospitalisations, severe/ICU admissions, deaths, and vaccine uptake.

    b) The COVID-19 health states modelled to be impacted by vaccination were: infant ward hospitalisation, infant severe hospitalisation excluding ICU, infant ICU admission, infant COVID-19 death, pre-term births, the pregnant person's COVID-19 hospitalisation, and the pregnant person's severe (including ICU) hospitalisation.

c) The health economic inputs for the models were presented.

82. Results for the simple pregnancy model were presented including and excluding pre-term births due to the uncertainty in the data for these events:

    a) Willingness to pay for infants and mothers, excluding NNV for pre-term births, was £10.07. Healthcare savings from averted infant hospitalisations were the primary contributor to health benefits.

    b) Willingness to pay for infants and mothers, including NNV for pre-term births, was £13.19. The QALY impact was the main driver behind the increase in willingness to pay when pre-term births were included.

83. A number of sensitivity analyses were carried out assuming higher VE against infant mortality and using a lower discount rate for QALYs, but these did not raise the willingness to pay by more than £0.80. Stillbirths were not factored in, but it was calculated that they would need to be at least 5.4 times higher than the current modelled averted neonatal deaths for the total willingness to pay to exceed the exemplary cost per administered dose.

84. The health economics parameters were considered a limitation because they were not COVID-19 specific. Parameters for preterm births were particularly uncertain.

85. It was concluded that there was significant uncertainty in the overall willingness to pay for estimates of vaccination people who are pregnant. In particular, it was noted that the analyses were very sensitive to changes in assumptions around neonatal deaths which were highly uncertain.

86. It was agreed that the data gaps needed to be identified and addressed to allow for more certainty in the analyses. Neonatal deaths would likely be very rare events so would be more challenging to accurately study. A future study might be considered in preterm births associated with COVID-19. However, it was also noted that it would be key to distinguish ‘for’ versus ‘with’ COVID-19 in future research, as well as identifying co-infections in hospitalised infants, as this was a significant contributor to willingness to pay. It was noted that current data were likely to be overestimating COVID-19 hospitalisation due to not distinguishing co-infections.

<u>COVID-19 vaccination in Spring 2025</u>

87. The Committee agreed with the suggestion of the COVID-19 sub-committee that, in line with previous spring campaigns and the non-standard cost-effectiveness analysis carried out by DHSC, the following groups should be eligible for COVID-19 vaccination in Spring 2025:

    a) Adults aged 75 years and over

    b) Residents in care homes for older adults

    c) Individuals aged 6 months and over who are immunosuppressed

COVID-19 vaccination in Autumn 2025 and Spring 2026

88. The Committee agreed that method 4b in the University of Warwick cost-effectiveness analysis was the most appropriate method to consider in JCVI decision-making, as it used UKHSA VE estimates in its methodology. The Committee had based decisions on COVID-19 vaccination on UKHSA VE estimates throughout the pandemic; these were also based on the largest population size compared with other VE estimates.

89. It was noted that age-based vaccination programmes were easier to implement and generally achieved higher uptake than risk-based programmes. This was for several reasons, including a lack of data on risk groups in medical records, a lack of awareness in individuals as to whether they belong to a risk group, and ease of communication of age-based programmes.

90. It was recognised that the cost-effective cohorts could change depending on the price at which vaccines were procured. The JCVI were giving advice using an example vaccine cost, which was not based on prior knowledge of vaccine list price. It was considered unlikely that the eligible cohorts would change more than one five-year age band either way.

91. Using an exemplary cost per administered dose (i.e., administration cost per dose plus vaccine cost per dose), the Committee advised that adults aged 75 years and over should be offered COVID-19 vaccination.

92. The Committee agreed that due to the lack of seasonality observed in COVID-19 epidemiology, the same cohorts should be offered vaccination in Autumn 2025 and Spring 2026.

93. It was acknowledged that the COVID-19 risk groups were currently very broad and heterogeneous. A stratification of risk groups to determine individuals who were at high-risk compared to low-risk or severe COVID-19 outcomes, was considered necessary, however the data to carry out this analysis were insufficient.

Pregnancy

94. The uncertainties in the pregnancy modelling carried out by the DHSC were noted, particularly regarding the available epidemiological data, the inclusion of preterm births, and QALYs. Whilst there was considerable uncertainty in the data, it was highlighted that the model's estimate of willingness to pay was around £13 per dose. It was considered very unlikely that vaccines could be sustainably purchased and deployed at a total cost below £13 per dose. Further, there was significant uncertainty around this estimate and the possibility it was over-estimated due to being unable to reliably remove adverse events 'with' but not 'due' to COVID-19.

95. Internationally, Germany had stopped offering COVID-19 vaccination during pregnancy beyond the primary three 'antigenic contacts', in 2023. WHO SAGE were expected to publish an updated roadmap on COVID-19 next year, in which vaccination in pregnant women would be addressed.

96. Members agreed that any improvement in data quality was unlikely to have a substantial impact on improving the cost-effectiveness of a programme due to the extremely low mortality rates in the pregnant and neonatal populations, most of which might be attributed to an alternative cause, which could further reduce cost-effectiveness of COVID-19 vaccination. Whilst there was still uncertainty around preterm births due to COVID-19, collection of this data could take a considerable time. Extending the offer of vaccination in pregnancy despite a lack of cost-effectiveness was not considered appropriate for this length of time.

97. The Committee did not advise that pregnant individuals be eligible for COVID-19 vaccination in Autumn 2025 and Spring 2026.

98. The Committee was very supportive of the ongoing efforts to increase uptake of maternal vaccinations in general.

<u>People experiencing homelessness</u>

99. The COVID-19 sub-committee had discussed COVID-19 vaccination in people experiencing homelessness, defined as rough sleepers and hostel users. The sub-committee proposed that people experiencing homelessness should be considered for COVID-19 vaccination in line with other risk groups, as they were likely to have undiagnosed comorbidities.

100. As the Committee's advice for 2025 and Spring 2026 did not include separate advice for clinical risk groups, there was no separate advice for COVID-19 vaccination on the national programme for people experiencing homelessness. People experiencing homelessness would be eligible for COVID-19 vaccination on the national programme based on their age or if they were immunosuppressed.

<u>People who are immunosuppressed</u>

101. The willingness to pay figures for people who are immunosuppressed did not reach the exemplary cost per administered dose at all ages because of the small population size.

102. It was noted that the immunosuppressed group were highly heterogenous in terms of their risk of severe outcomes of COVID-19. This group made up less than 1% of the population.

103. Members agreed that all individuals aged 6 months and over who are immunosuppressed should be offered vaccination in Autumn 2025 and Spring 2026. It was also agreed that more granular data were needed on COVID-19 risk in people who are immunosuppressed, particularly children, so vaccination could be targeted at those with the highest risk of severe hospitalisation and mortality from COVID-19.

<u>People in care homes for the elderly</u>

104. The Committee discussed vaccination of individuals living in care homes for the elderly. It was agreed that all residents in care homes for the elderly should be

vaccinated regardless of age, as most were likely to fall into the eligible age band, and it was considered operationally complex to apply an age threshold in this setting. Furthermore, it was reasonable to assume that all individuals who were living in a care home for the elderly would be at higher risk of severe complications from COVID-19.

Vaccine contingency stock

105. The Committee discussed the clinical need for a vaccine contingency stock in the scenario where a variant of concern had partially escaped existing vaccine immunity.

106. The JCVI agreed with the position of the COVID-19 sub-committee that a vaccine contingency stock matched to a previous variant (as compared to a new variant of concern) was unlikely to be clinically useful when compared with a new variant vaccine, which should be pushed for as quickly as possible. This is because if a new COVID-19 variant of concern were to emerge which escaped from current widespread immunity (from vaccination and infection) resulting in higher hospitalisation/death rates then it is unlikely that vaccines matched to a previous variant of the virus would be effective. Furthermore, such a scenario is not considered likely, making holding a vaccine contingency stock less likely to be clinically necessary.

Vaccine type

107. It was noted that it was challenging to match vaccines to variants due to their rapid emergence and unpredictability. A preference for the latest updated variant-matched vaccine was not ‘at any price’, and that cost-effectiveness analysis would be applied to this decision by policymakers.

108. The merits of using different variant-matched vaccines in subsequent campaigns was discussed, as previous evidence had indicated that this could provide better immune responses.

109. The Committee agreed that, when possible, the latest updated vaccine should be used, provided this did not delay deployment.

110. The Committee discussed the inclusion of more than one vaccine platform in the programme, for example mRNA and protein-based vaccines. The Committee agreed that a programme comprising varied vaccine products would be more resilient, would enable the measurement of important real-world data on relative vaccine effectiveness against hospitalisation and mortality to inform future vaccine policy, and would provide an alternative for individuals in whom a particular vaccine product was considered clinically unsuitable, for example as a result of anaphylaxis following vaccination.

111. It was noted that only the Pfizer-BioNTech COVID-19 mRNA (Comirnaty) vaccine had been used in the paediatric population in the UK, due to lower rates of reported myocarditis. There was no updated comparison of the magnitude of myocarditis risk

between the Pfizer-BioNTech and Moderna COVID-19 vaccines in children.

112. The Committee agreed to continue advising the use of the Pfizer-BioNTech COVID-19 mRNA (Comirnaty) vaccine, with the vaccine dose appropriate to the child's age.

IV. Shingles

113. The Committee noted an update from the varicella/zoster sub-committee Chair on the previous considerations around the shingles vaccination programme.

Update to UKHSA guidelines on post-exposure prophylaxis for varicella or shingles

114. The Committee were informed by UKHSA of an update to the UKHSA guidelines on post exposure prophylaxis for varicella or shingles (UKHSA, 2024). This guidance had been updated following the withdrawal of varicella-zoster immunoglobulin (VZIG), it was now recommended that all neonates exposed to intrauterine infection should be given an intravenous immunoglobulin product, preferably varicella-zoster specific, and antiviral medication. Varitect CP had been obtained for this use.

Previous advice on the Shingrix® programme

115. The Committee were reminded that the JCVI had previously recommended changing the shingles vaccination programme from Zostavax® (live attenuated zoster vaccine, ZVL given as one dose) at 70 years of age to Shingrix® (recombinant zoster vaccine, RZV given as two doses) at 60 years of age. This programme had started in September 2023 and individuals turning 65 years and 70 years were eligible for vaccination. This would then eventually move to vaccinating individuals turning 60 and 65 years of age. There were still outstanding considerations relating to the oldest cohorts who had never been offered vaccination previously, and revaccination of those who had previously received Zostavax®.

116. Since the introduction of the zoster vaccination programme it was estimated that there had been 40,500 fewer zoster GP consultations in the first five years since the introduction of ZVL, the equivalent to 55% vaccine effectiveness. However, there had been a year on year decline in vaccine uptake in the routine 70 year old cohort.

117. Studies have shown RZV having a higher vaccine efficacy than ZVL. Immunogenicity studies showed that RZV had good vaccine effectiveness in immunosuppressed cohorts and subsequently the JCVI advised its use in those who were contraindicated for ZVL. Following review of cost-effectiveness of RZV in the immunocompetent the Committee recommended that it should be offered routinely at 60 years of age, with catch up for 60- to 70-year-olds.

118. The United States Advisory Committee on Immunisation Practices (ACIP) recommended RZV in those age over 50 years, including those who had already received ZVL (Dooling et al. 2018). Real world data (Izurieta et al. 2021, Sun et al. 2021) indicated that real world effectiveness was lower than estimated in clinical trials.

Technology evaluation of recombinant zoster vaccine for preventing herpes zoster in people aged 80 and above

119. The Committee noted a modelling presentation from London School of Hygiene and Tropical Medicine. Analysis had been undertaken to evaluate RZV vaccination in individuals aged 80 years and above, with one or two doses, for those who either were never offered vaccination, or those who did not take up vaccination when offered. The analysis also looked at the cost-effectiveness of re-vaccination of individuals aged 80+ years who previously received ZVL.

120. This modelling analysis had been compared with the previous modelling used to inform the initial RZV recommendations. Estimates for disease incidence and hospitalisation lined up with the previous estimates however the proportion of cases which went on to develop post-herpetic neuralgia (PHN) was lower, although it was noted that this did not have a significant impact on results. Real world RZV vaccine effectiveness data had been fitted to long term clinical trial data to map the rate of waning over ten years. Efficacy estimates were also used to model relative protection from a single dose of RZV if already vaccinated with ZVL. Age-specific efficacy estimates were also included in the analysis. Vaccine uptake was based on real world ZVL data from the past five years, and it was assumed that this would be the same for RZV.

121. Health costs and Quality Adjusted Life Years (QALYs) estimates had been extracted from the literature. Estimated QALY losses were the same as used for the previous modelling analysis, health costs had been inflated to account for the time since the publication of the studies. QALY loss estimates from EQ5D scores were relative to perfect health and assumed a return to this state. It was noted that assuming changes relative to perfect health rather than the population norm was considered to be more accurate and consistent with previous modelling work. Overall, the net effect of changes to the modelling since the previous considerations were that the programme was likely to be slightly less cost-effective than found in the previous analysis.

122. A static cohort model had been used to model cases of shingles and the resulting QALY losses and health costs. This was used to calculate the cost-effective threshold price per dose of RZV vaccine.

123. The Committee noted the results of the threshold price calculations for both unvaccinated and previously ZVL vaccinated cohorts by age group. The willingness to pay was calculated based on one and two doses based on whether the median value was cost-effective at £20,000/QALY, and 90% probability of being cost-effective at £30,000/QALY. The routine programme (vaccinating with two doses at 60 years of age) was assumed to be cost-effective and therefore was used as the benchmark for determining cost-effectiveness.

124. The results showed that as age increases (80 to 99 years of age), the willingness to pay per dose (based on two doses of RZV) in Zostavax® naïve individuals falls below the assumed cost-effectiveness threshold. A single dose of RZV offers better cost-effectiveness, particularly for those in their 80s which was significantly above the

assumed cost-effectiveness. This increase in cost-effectiveness was due to the efficiency of only offering a single dose. The decrease in cost-effectiveness observed for increasing age was due to the shorter life expectancy remaining and therefore the less time to acquire shingles. The cohort size of the oldest age groups was smaller and therefore when considering the programme as a whole does not decrease the overall threshold price significantly.

125. A similar analysis was also undertaken for those who had been previously vaccinated with ZVL, this was considered to be cost-effective for individuals in their 80s, but less cost-effective for those in their 90s. It was noted that there would be relatively few individuals in the oldest group so the difference on overall cost-effectiveness would be small.

126. Threshold prices were calculated based on two methods of delivery including with a call-in programme, likely to result in a higher rate of uptake, and a programme without call-in which would result in lower rate of uptake. Due to the efficiency of a proposed one dose programme, introduction of additional older age groups (80 to 100 years of age) then the overall threshold price would increase even without using a call-in delivery method. A programme which called 80-year-olds in for vaccination was considered to improve overall programme cost-effectiveness however did not make a notable difference to the overall threshold price.

127. An increased number of doses administered would lead to more cases prevented and corresponding proportion of QALYs saved with a higher amount of medical costs saved.

128. It was concluded that in all scenarios modelled, adding a single dose of RZV in those over 80 years of age to the programme would be cost-effective. It was also noted that a single dose would make the programme as a whole more cost-effective due to the efficiency of using only one dose.

Discussion

129. It was commented that there was not good evidence on vaccine efficacy in the oldest age group over 95 years, and therefore it was difficult to estimate long term effectiveness of a single dose in this age group. Data on vaccine effectiveness for a single dose (Izurieta et al.) looked at the population as a whole. A single dose was shown to have ~57% vaccine effectiveness over two years, and it was difficult to assume that waning would follow the same pattern as two doses. Very low single dose vaccine effectiveness in individuals over the age of 90 years could be an issue, and it was unknown what the incremental difference in vaccine effectiveness between one and two doses would be in this group. It was noted that in the oldest individuals, protection in the longer term (~20 years) would be less relevant.

130. In the effectiveness studies used for this analysis, there was a larger reduction seen in vaccine effectiveness in 65- to 79-year-olds compared with 80 years old and over for one dose than seen for two doses.

131. Members noted recent data on the reduction of incidence of dementia linked with shingles vaccination, however it was agreed that due to the uncertainty around this potential effect these data could not be taken into consideration at this time.

132. The current programme was noted to have had notable positive effect on eligible cohorts. Although disease increases in severity in the oldest age groups, the QALYs to be gained in the oldest age groups are fewer than in younger eligible cohorts as there is less time to reactivate their latent herpes zoster. These older age groups would also include individuals who had previously been vaccinated with Zostavax®.

133. It was agreed that based on the modelling data, giving one dose of Shingrix® to unprotected individuals over 80 years was readily justifiable. The Committee also discussed the potential to offer two doses to all cohorts, including those eligible in the current programme, and all those aged 80 years and over. It was agreed that this would lead to the best outcome epidemiologically.

134. The cost-effectiveness of offering two doses in these cohorts may be below the reasonable threshold price. However due to there being a small number of people in the oldest age cohort it may not impact much on the overall cost of the programme. This analysis had originally been carried out, however it was considered that the threshold prices would be too low to be feasible. Averaging over the whole older adult cohort (80 to 99 years modelled) could be below the cost-effective threshold for two doses, and a lower threshold price than used for the current routine programme. It was not known whether it would be possible to acquire vaccine for a two-dose programme at a cost-effective price.

135. It was also raised that a programme where some cohorts are offered two doses of vaccine, and others offered one dose might be operationally complex, and it may be difficult to communicate the reasonings behind this. It was noted however that any programme offered to a group who are not currently eligible for vaccination would be a step forward. Delivering vaccination to the oldest cohorts may also be more complex with a greater proportion of individuals being housebound.

136. It was considered that a view may be needed from DHSC on whether this difference in cost-effectiveness thresholds for different cohorts could be taken into account during the tender process.

137. The Committee discussed the incidence of PHN in the modelling as it was noted to be different in this modelling than the previous modelling analysis. Although the previous value is likely to be closer to the natural history of the disease, the estimates used in this model were likely to be accurate in terms of the economic assumptions of medical treatment.

138. In terms of revaccinating those who had received Zostavax®, it was considered that due to the assumed faster rate of waning of protection, and the proportion of individuals who would have received their vaccine at a younger age when first becoming eligible, it would be programmatically simpler to offer revaccination to the whole cohort at a specific age such as 80 years. The proportion of individuals who would have been vaccinated recently would be relatively small.

139. Longer term, there may need to be consideration of revaccination of Shingrix® cohorts where, in this case one vaccine may be adequate to boost protection. This would become more important as the current eligible cohort progresses to vaccinating individuals at 60 years old. Further research was needed on the duration of protection offered from one dose, and the potential incremental gain from additional doses.

140. In the original analysis, incremental benefits of using a two-dose schedule over a one-dose schedule in 60-year-olds was not carried out, however a second dose would be less favourable than the first dose if the assumption is that the vaccine effectiveness from a single dose is over 50%. Due to allowing flexibility in the delivery of the programme, there was not a consistent dose interval in vaccinated cohorts which made real world studies looking at one dose effectiveness more difficult.

141. Due to concern over the effectiveness of a one dose programme in the oldest cohorts, the Committee agreed there was a preference for a two dose programme if possible, until further data become available about the effectiveness and duration of protection from one dose. Further discussions were needed around whether a two-dose programme would be feasible.

V. RSV

Programme to protect neonates and infants

142. The Committee noted that with the RSV maternal immunisation programme in place there was a need to consider infants born prematurely. Maternal vaccination was available to women from week 28 gestational age, however, infants born at <32 weeks gestation may have limited or no passive protection from maternal antibody which meant there was an inequity in protection. JCVI had previously indicated that this would need to be looked at if the policy outcome was for a maternal programme. This issue had been discussed at the 8 June 2024 RSV sub-committee where UKHSA presented an analysis of the risk factors in infants for hospitalisation due to RSV. Since then, UKHSA had taken forward this work to provide an economic analysis of the cost effectiveness of offering a long-acting monoclonal product to protect those born prematurely.

143. The Committee noted that data from the manufacturer on maternal antibody transfer post vaccination showed quite rapid development of protection following vaccination from 14 days onwards before birth. Even in those born less than 14 days post vaccination, RSV neutralising antibody titres were quite high compared with placebo serum levels, with protection for 90 days. This informed the view that those born <32 weeks premature might be the group that needed additional protection.

144. Approximately 1.3% (~8800) of the annual birth cohort were born <32 weeks gestation, classed as very/extremely premature. The cohort currently eligible for palivizumab was approximately 4000 children and most of these were drawn from the very/extremely premature group but with additional risk factors including chronic lung disease and chronic heart disease. Therefore, a potential programme for all

very/extremely premature babies would cover most of the palivizumab eligible group. A seasonal with catch up programme would most likely be the best approach to take rather than a seasonal or year-round programme.

145. An overview of the UKHSA analysis was presented comparing hospital admissions among premature infants with term infants and all infants. Hospital admissions including critical care were used as this was where most of the benefits of vaccination were seen and was a good proxy for morbidity and mortality.

146. Births between 1 January 2022 and 30 December 2023 were linked to the maternity services data set (MSDS) to obtain gestational ages at birth. The births were then linked to hospital episode statistics (HES) data for bronchiolitis with an RSV infection and also unspecified bronchiolitis. Admissions were classified as day admission (discharged on the same day), hospitalisation (if overnight stay involved) and paediatric intensive care (PICU) admission. Multiple admissions for the same infant were counted. NHS average cost estimates for 2021/22 were used. The primary analysis centred on bronchiolitis with RSV as the wider bronchiolitis definition might include other undiagnosed viruses such as human metapneumovirus (hMPV) or rhinovirus. Limitations were that the risk of hospitalisation was not adjusted for other risk or demographic factors and palivizumab status was unknown. Linkage required the use of NHS numbers meaning the overall cohort was smaller than that estimated by ONS but the gestational age ratios were consistent to those of the ONS.

147. The analysis was in two parts:

- a clinical-epidemiological comparison of admission risks in preterm infants vs term infants, and
- An economic assessment comparison of the relative costs in the two groups to inform an estimate of the willingness to pay for a passive immunisation programme using a long-acting monoclonal antibody for very/extremely preterm neonates.

148. From the HES data 975,980 births were identified and 94% of these were linked to the MSDS to obtain gestational age at birth. For RSV bronchiolitis the risk ratios for those born very/extremely preterm compared with term births for day care admission, hospital admission and PICU admission were 1.95 (95% CI: 1.6-2.38), 3.37 (95% CI: 3.14-3.61) and 10.84 (95% CI: 9.46-12.42), respectively. A cross reference comparison with a rapid assessment of the literature showed a similar risk gradient with increasing prematurity and estimated risks consistent with the UKHSA findings. It was noted that the literature showed that risk of admission at 6-11 months of age for those who were born very/extremely preterm remained high compared with all infants at 6-11 months of age.

149. The cost effectiveness analysis to give an estimate of the willingness to pay for a nirsevimab immunisation programme for those born very/extremely preterm compared the ratio of costs per child in this group with that for the whole birth cohort. These cost ratios were then applied to the LSHTM model estimates of willingness to pay for a nirsevimab programme (seasonal with catch up or year-round). The ratio

of the cost per cohort member was estimated to be six times more for a very/extremely preterm baby compared with that in the whole birth cohort group. It was noted that the original modelling by LSHTM for a nirsevimab programme was incremental on the existing palivizumab programme, however, for the tender the additional cost savings of replacing palivizumab were factored into the estimate of the willingness to pay for nirsevimab.

150. As noted, a seasonal with catch up programme for very/extremely premature infants would also result in effectively replacing the current palivizumab programme. The cost effectiveness analysis was further adjusted to account for the latest scientific evidence that indicated that RSV disease was not deferred until later age in those infants receiving nirsevimab as had been previously assumed in the original modelling work by LSHTM.

151. The Committee noted that the estimate of the willingness to pay for nirsevimab for a seasonal with catch up programme was comparable to the prices listed in some countries where it was being used in programmes for all infants. The Committee noted that the willingness to pay substantially increased if replacement of the palivizumab programme was factored into the cost effectiveness.

152. The Committee noted that factoring palivizumab replacement made a huge difference because of the savings on the cost of palivizumab and delivery of this which required monthly doses to be administered. If there was a policy to immunise the very/extremely premature infants the vast majority of palivizumab eligible infants would be drawn from this and then there would be the additional extension to include all the other very/extremely premature infants. The Committee noted that it seemed a novel approach factoring in the savings from the removal of a programme into the overall cost of a new programme. It was noted that the savings from replacing the palivizumab programme had been factored into the tender for nirsevimab for a universal programme but the savings per child were much smaller because of the overall size of the cohort. The Committee agreed that this approach needed to be sense checked with DHSC. It was noted that this was a replacement at the population level rather than at the individual level.

153. The analysis suggested that there seemed a realistic cost-effective price range for a programme for very/extremely premature infants and that there was also an equity argument which DHSC would need to consider. The Committee supported the idea of this being taken forward to discuss how one might approach procurement of a monoclonal antibody for a programme for very/extremely premature infants. It was noted that this would not be in time for 2024/25 but ideally could be in place for 2025/26 and subsequent years, on the assumption that the maternal programme would continue. It was noted that the palivizumab programme would continue for 2024/25.

154. The Committee noted there was uncertainty as to whether the manufacturer was willing to supply the currently licensed product nirsevimab for a programme for very/extreme premature infants since it had not been possible to obtain nirsevimab to replace palivizumab as previously advised by the Committee. With the Committee's support for a programme and the evidence discussed, there was now

the opportunity for officials to engage with the manufacturer on this issue. It was noted that another long-acting monoclonal product was expected to enter the market, pending licensure, in 2025 which could improve the opportunity to secure a supply of a suitable product.

Programme to protect adults

155. The Committee noted that in June 2023 it had advised that, subject to licensure, any of GSK, Pfizer, and Moderna older adult RSV vaccines would be suitable for a national programme. The programme was currently using the Pfizer vaccine which had won the tender. Emerging data on duration of protection from the manufacturers since then continued to support the suitability and comparability of the GSK and Pfizer products, however, this was less clear for the Moderna product.

156. A summary of the data on cumulative VE for two RSV seasons for the different trial endpoints were presented for the three products. The Committee had also been provided confidential access to unpublished season 3 data by GSK which could not be discussed at the meeting. UKHSA had fitted the waning of VE for the three products using the data provided by the companies underpinning their Kaplan-Meier curves. Fitting of the VE data was based on the same fitting process used in the LSHTM model. Trial endpoints used were LRTD for GSK, LRTI 2+ or 3+ signs/symptoms for Pfizer and LRTI 2+ or 3+ signs/symptoms for Moderna. The Committee noted the important caveat that the data presented were from different studies, different populations, and different end points in terms of case definitions. Overall, the evidence indicated much better persistence of VE over two seasons for the Pfizer and GSK products with less certainty on the durability of protection for the Moderna product which was currently unlicensed in the UK.

157. The Committee agreed that based on the existing data from the clinical trials that there was greater certainty with respect to the durability and efficacy of protection of the two products from Pfizer and GSK than there was for the Moderna product at this time. JCVI was mindful that there were no head-to-head studies of the three products and that it would like to see more data from the real world with which to further evaluate each product in comparison with the data emerging on the other vaccines before making any potential changes to the current programme.

158. The Committee noted that there had been a lot of correspondence received by the secretariat on the issue of why those aged 80 years old and above were not eligible for RSV vaccination. The trial data from the manufacturers reviewed by the Committee in 2023 had contained small numbers of participants in those ≥ 80 years old and it was not possible to be confident about the protection in this age group. The JCVI RSV statement had said that advice for the programme would be guided by emerging evidence on duration of protection and disease incidence. An extension to the initial programme would be considered when there was more certainty about protection in the very elderly and the real-world impact of the programme in the 75- to 80-year-olds.

159. Another issue that needed future consideration by JCVI was individuals less than 75 years old in clinical risk groups, including the immunocompromised and those

with COPD. Real world data were emerging that could potentially be reviewed by the February meeting.

160. The Committee agreed that it would need to formally review in detail the evidence for a potential extension to the programme for the very elderly and risk groups which would be undertaken by the RSV sub-committee. Another issue concerned the duration of protection and when revaccination might be required which would be kept under review. The Committee noted that the issue of whether to vaccinate in every pregnancy (as currently advised) should also be reviewed as the duration of protection was good for two seasons in older adults and potentially longer or more robust in younger pregnant individuals.

VI. Coverage

Working group on declining coverage

161. The Committee heard an update on all 4 nations regarding the progress made by the working group in 2023 to 2024. Following a decline in vaccine coverage in the routine childhood programmes in UK over the last decade, JCVI had asked for a working group to be set up in 2023 so that all four nations: England, Scotland, Wales and Northern Ireland could work effectively and collaboratively to determine the causes. The meetings had covered data, attitudinal work, delivery models, maternal programmes and system leadership and coordination. Future meetings would cover more vaccination related topics including inequalities.

162. These meetings had led to two more collaborative subgroups being formed to progress actions on data and attitudinal work as a priority. There was a consensus that there needed to be an agreement on the core elements of roles and competency frameworks. This needed to align across borders, UK wide training pathways and ongoing development programmes for clinical public health specialists in immunisation. There were potential opportunities to develop peer networking and to link with Faculty of Public Health. The membership of the working group was queried regarding obstetrics, immunisation nurses and midwives. The presence of immunisation nurses and midwives was acknowledged, and in these meetings, delivery models, attitudes and maternal programmes were reviewed.

Coverage across UK nations

163. Vaccination coverage had decreased in 2023-2024 for all fourteen routine vaccines. No vaccines met the 95% target and MMR1 remained below this target. The quarterly cover of vaccination evaluated rapidly (COVER) data at 1 year old and 2 years old was presented to the Committee which noted the declining trend in all four nations. For coverage at 2 years old, it was noted that there was a slight increase in uptake in the last quarter which will be monitored

closely. The coverage showed that Northern Ireland uptake was decreasing at a faster rate than other UK nations.

164. Coverage at 5 years old showed similar pattern of decline which had accelerated after 2020. After reviewing the datasets for data quality, a correction had been made to the data for Wales which indicated a slightly better trend (2%) in uptake at 5 years old than previously calculated. The Wales datasets were not live and merging of regional data had led to duplication algorithm issues where the latest record for a child vaccination was not included especially if there has been relocation from one area to another. It was noted that for Scotland, a change in service delivery away from GP practices had a positive impact for MMR, but this change had been influenced by the COVID-19 pandemic. For Northern Ireland, there was a difference in uptake reporting. For the MMR catch up campaign data, following a review, it was noted that over 30% of children's records had disparities due to timeliness as the child health information services (CHIS) was paper based.

165. The Committee queried whether the data issue noted in Wales had been observed in other nations. Northern Ireland stressed that data were part of multifactorial issues including access issues since the COVID-19 pandemic.

Data uncertainty in CHIS and COVER

166. It had been noted that the observed decline in reported coverage for children and adults might have been influenced by factors other than vaccination uptake and ascertainment. MMR coverage of 1st dose at 5 years old had consistently declined since 2016/2017. Work had been undertaken by NHSE London Region and UKHSA to look at the denominator (population proportion) in terms of definition and measurement.

167. NHSE London identified that 24% of 5 to 11 years old recorded on CHIS who had not received an MMR dose had no GP or school information recorded. GP registration and school census points indicate a child is currently engaged in the system and that they have interacted with local services. This group represents 6% of all 5-11 years population and this result was believed to be unlikely to be solely due to gaps in the school census related to independent or home schooling due to its size.

168. Work was ongoing to improve CHIS data quality in London, in particular contact information for unregistered children and those with no private address listed. Many of these families could not be reached due to missing contact information and it was not known whether they remained in London.

169. UKHSA's Immunisation information system (IIS) database holds information on COVID-19, influenza and MMR coverage. Analysis of the difference between IIS denominator and Office for National Statistics (ONS) population estimates showed that the overall population size is greater in IIS than ONS estimates, and that specific patterns in the difference between these two information sources.

The difference between the IIS and ONS estimates varied by age and patient sex. This variance in denominator population is present in both IIS and CHIS (especially in recent years in CHIS) and indicates there appears to support the possibility of there being a systematic issue with data quality used in CHIS for children's vaccination uptake.

170. The COVER denominator for 5-year-olds when compared with ONS population estimates showed that from 2018 onward, the difference became consistently greater than 30 000 suggesting the COVER denominator may be inflated. It was observed that this could be due to change in methodology by ONS. A similar observation was made for MMR1 coverage at 5 years and from 2018 a decline in coverage had been seen. A more detailed analysis was required for to better understand the denominator populations and their effect on coverage.

171. The potential impact of change of denominator on coverage was examined; cohorts had changed in size over a year. It was noted that if only half of this added cohort (1-2 years) were unvaccinated or recorded as unvaccinated then this would lead to a 1% drop in coverage. A formal investigation would be required so that the root cause(s) could be determined and would possibly lead to more effective and accurate capture of coverage data. Where a London postcode area seems to have a disproportionately large number of children mapped, a more detailed review is being undertaken by CHIS to identify if any require vaccination and if they remain in borough.

172. This data has limitations with little historic data preserved for use in retrospective analysis. There are challenges to working with CHIS as it is a live system. Other sources of non-live data (including Hospital Episode Statistics) could be investigated to monitor this difference of population size difference between IIS and ONS so that the most vulnerable children could be identified. Dormant accounts could potentially be partitioned using new methodologies in CHIS systems which are being explored by NHSE London. The use of the consistent approaches to data linkages would be crucial in order to avoid data duplication. The Committee agreed that a better understanding of this issue would be critical for making informed decisions regarding improving coverage.

VII. AOB

173. The Committee were made aware of the ongoing Marburg virus outbreak. This was currently concentrated in Rwanda but there was some spread to neighbouring countries. The majority of deaths so far had been in healthcare workers and there was some concern about getting transmission under control before further spread. There were four vaccines, including two based on a vesicular stomatitis virus platform and two adenovirus vector vaccines (one from Sabin and one from Oxford University). WHO had prioritised the Sabin vaccine to be used to test for efficacy in

outbreaks. This update was shared for awareness and was not likely to require Committee discussion.

174. It was planned that there would be meetings of the horizon scanning, meningococcal, and pneumococcal sub-committees before the end of 2024.

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Committee Declarations of Interest

Professor Sir Andrew Pollard (Chair)

Prof Sir Andrew Pollard leads:

- Non-commercial grants from:
    - Wellcome and Bill & Melinda Gates Foundation on typhoid and paratyphoid vaccines (Tybar-CV, Bharat Biotech, 2013-current);
    - Medical Research Council (MRC) on paratyphoid vaccine (with University of Maryland; from 2018-current);

- European Commission (EC) grants:
    - Preparing for RSV Immunisation and Surveillance in Europe (PROMISE) on RSV biomarkers (Current)
    - Horizon 2020 (DIAMONDS) on fever in children and pneumonia (current)
    - EC (Innovac4) to develop a Clostridioides difficile challenge model (2021-current)

- Grants from Innovate UK to develop plague, Q fever vaccines (2016-current) and Chikungunya/Mayaro Virus vaccines (2023- current).
- Grants from Coalition for Epidemic Preparedness Innovations (CEPI) on COVID19 vaccines (2020-2023)
- Grant from Bill & Melinda Gates Foundation on evaluating infant schedules (2019 – current)

Prof Sir Andrew Pollard's institution, the University of Oxford, has received grants from:

- AstraZeneca for the development of a COVID-19 vaccine since 2020.
- National Institute for Health and Care Research (NIHR) and UK Research and Innovation (UKRI) for work on their COVID-19 vaccine (2020 – 2024)
- The Serum Institute of India for work on a new bivalent typhoid-paratyphoid vaccine
- Sanofi, GSK, and Astrazeneca, provided unrestricted educational grants to the University of Oxford for a three-day course on infection in children, in June 2024

The University of Oxford has also been supported in-kind through the provision of materials by Moderna for preclinical research on plague and chikungunya vaccines.

The University of Oxford has made a strategic partnership with Coalition for Epidemic Preparedness Innovations (CEPI) in 2023 for the development of vaccines against future outbreaks and pandemics, Prof Pollard has a role in co-ordination however is not receiving any research funding under this agreement.

As JCVI Chair, Professor Sir Andrew Pollard has an observational role on the UKHSA Moderna Strategic Partnership Research and Development Steering Group. JCVI has independent status in this group and Prof Pollard only provides advice on general matters, agnostic to company.

Prof Sir Andrew Pollard has undertaken private consultancy work for Shionogi for their unlicensed

COVID-19 vaccine and is a contributor to intellectual property licensed by Oxford University Innovation to AstraZeneca.
Professor Wei Shen Lim KBE (Deputy Chair)
Prof Wei Shen Lim KBE has no registered conflicts of interest. Prof Wei Shen Lim's institution, Nottingham University Hospitals, has received: - unrestricted investigator-initiated research funding from Pfizer for a multi-centre study in pneumonia (non-vaccine related) in which Prof Lim is the Chief Investigator. - funding from the National Institute for Health and Social Research (NIHR) for clinical trials in the fields of TB and pneumonia (non-vaccine related). Prof Lim is the lead of the Acute Infection Sub-theme, NIHR Nottingham Biomedical Research Centre (BRC). Prof Lim is also lead of the Acute Respiratory Infection, NIHR Respiratory Translational Research Collaboration (TRC).
Dr Matthijs Backx
Dr Matthijs Backx has no registered conflicts of interest.
Professor Eleanor Barnes
Prof Eleanor Barnes receives consultancy fees from AstraZeneca for assessing vaccine responsiveness in immune vulnerable people using NHS data, as a member of the REVIVE group (March 2023 – ongoing). Prof Barnes has carried out consultancy work for Barinthus Biotherapeutics for designing and presenting a poster on an HBV vaccine that was developed in lab and licensed to Barinthus Biotherapeutics at the EASL congress in June 2023. Prof Barnes holds patents in HBV and HCV vaccine antigens, and runs clinical vaccine studies that receive funding from industry in COVID vaccines (March 2023 - March 2024) Prof Barnes' research laboratory has received a research grant from Barinthus Biotherapeutics in June 2023 for T cell analysis of an HBV vaccine. She is the laboratory lead for a vaccine study into COVID-19 monoclonal antibodies in immunosuppressed patients (Rapid Protect) which is funded by AstraZeneca. The fees support lab members to perform experiments (March 2023 – ongoing). Prof Barnes is the laboratory lead for a vaccine study on COVID-19 monoclonal antibodies in immunosuppressed patients, which is funded by Neovacc. The funding supports lab members to perform experiments. (January 2024 – present).
Professor Jeremy Brown
Prof Jeremy Brown's research group has received funding from an Australian biotech company GPN Vaccines to assess immunological responses in a rabbit model to their pneumococcal pre-clinical vaccine product. This product is undergoing phase 1 trials at present. Prof Brown has undertaken consultancy work for GPN Vaccine on their product Gamma PN. The consultancy fee for service assessment of immunological responses was paid towards a research project rather than personally to Prof Brown.

Dr Kevin Brown
Dr Kevin Brown has no registered conflicts of interest. Dr Brown retired from UK Health Security Agency (UKHSA) at the end of March 2023. Dr Brown provides advice/consultancy services to WHO (Global and European region) specifically on measles, rubella and more occasionally on polio.
Dr Rebecca Cordery
Dr Rebecca Cordery has no registered conflicts of interest. Dr Cordery works for UK Health Security Agency (UKHSA) and was employed by NHS England as the National Specialty Adviser for flu and immunisation until October 2023.
Professor Daniela Ferreira
Prof Daniela Ferreira institutions, the University of Oxford and Liverpool School of Tropical Medicine, received the following grants: • three research grants from Pfizer for research into pneumococcal and RSV vaccines (December 2018 – October 2024). • a research grant from MSD for research into pneumococcal vaccines (March 2022 – June 2024). • a research grant from Sanofi for research into RSV (August 2021 – March 2024).
Professor Nicholas Grassly
Prof Nicholas Grassly has no registered conflicts of interest. Prof Grassly has an advisory role for Wellcome Trust on their investment in Shigella vaccine development by Institut Pasteur, France. Prof Grassly's institution has collaborated with University of Oxford, with funding from AstraZeneca, to analyse immune correlate of protection data from the phase 3 trial of ChAdOx1 ncov-19 vaccine (COV002) manufactured by AstraZeneca. Prof Grassly's institution collaborates with Bharat Biotech to analyse data on immune correlates of protection induced by Covaxin in their phase 3 trial.
Professor Paul Heath
Prof Paul Heath has no registered conflicts of interest. Professor Paul Heath's institution, St George's University of London, has received research grants from the following organisations: • Moderna for COVID -19 vaccine and influenza vaccine trials (ongoing) • Pfizer for GBS vaccine trials (ongoing) • Merck for RSV monoclonal antibody trials (ongoing) • Sanofi for RSV monoclonal antibody trials (ongoing)

- Minervax for GBS vaccine trials (ongoing)
- GSK for meningococcal B vaccine trials (ongoing)

Other information

Until January 2024, Professor Paul Heath was a member of the British Society of Blood and Marrow Transplantation and Cellular therapy (BSBMTCT) Vaccination committee and of the Children's Cancer and Leukaemia Group (CCLG) vaccination committee. Professor Heath was also the Chair for the European Society for Paediatric Infection Diseases (ESPID) Research Committee.

Professor Paul Heath is a member of WHO Technical Advisory Group on GBS Vaccine Development. He is the Chair for St Georges University of London Research Ethics Committee and the coordinator for the United Kingdom Paediatric Vaccine Group (UKPVG). He is the Lead for the NIHR South London Children's Specialty Research Group. Prof Heath is the co-chair of the UK Infectious Diseases Vaccine Research Forum, a member of the RCOG Green Top Guideline on prevention of GBS, a member of the National Institute for Health and Care Excellence (NICE) Bacterial meningitis & meningococcal disease Guideline Development Group.

His institution carries out publicly funded (National Institute for Health and Care Research /Department of Health and Social Care) trials on vaccines through the National Immunisation Schedule Evaluation Committee (NISEC2). His institution also carries out activities funded by the Gates Foundation related to GBS vaccines.

Mr Christopher Hughes OBE

Mr Christopher Hughes has no registered conflicts of interest.

Professor Simon Kroll

Professor Simon Kroll has no registered conflicts of interest.

Other information

Professor Kroll is an emeritus Professor of Paediatrics and Molecular Infectious Diseases at Imperial College London. Other members of Imperial College provide advice to the Pharmaceutical Industry but he does not, nor is he indirectly involved in furnishing advice.

Professor Kroll is also honorary Medical Director and a Trustee of Meningitis Now, a registered UK medical charity which supports the use of vaccines to prevent meningitis, and which has from time to time received unrestricted funding from different pharmaceutical companies to support the Trust's charitable activities.

Dr Andrew Jonathan Leach OBE

Dr Andrew Jonathan Leach has no registered conflicts of interest.

Dr Leach receives his salary from Davenal House Surgery, which has included advising on and delivering vaccination to our registered patient population (2009 – ongoing).

Dr Leach is the NHS Herefordshire and Worcestershire Integrated Care Board Clinical Lead for

vaccination, for which he is remunerated (2021 – ongoing). The role includes advising on vaccination and responding to rises in infectious disease such as measles and pertussis.

Dr Leach undertakes expert witness work primarily on military cases (2010 – ongoing). He is instructed by the Government Legal Dept or by firms of solicitors.

Dr Leach sits on panels for the Medical Practitioner Tribunal Service of the General Medical Council regarding fitness to practise of doctors (2023 – ongoing).

Dr Leach is the Associate Medical Director for Military and Veterans Health for NHS England, he is involved with national policy work, including the design and delivery of modes of care for the military community (2017 – ongoing).

During the recent COVID 19 pandemic, Dr Leach was NHS England Medical Director for COVID 19 vaccination and therefore represented the organization at a wide range of meetings and fora.

Dr Leach is a Governing Body Member of Primary Care Commissioning (PCC) on a pro bono basis (2015 – ongoing). He is a Provost of Midland Faculty of the Royal College of General Practitioners (RCGP), from 2024 – ongoing.

Professor Maheshi Ramasamy

Prof Maheshi Ramasamy has worked as a principal investigator on clinical trials sponsored or funded by industry but has not received any direct payment for this work.

Prof Ramasamy has contributed to an intellectual property project between AstraZeneca and Oxford University on ChADOx1-nCov19 (2022 – ongoing).

Prof Ramasamy is involved in the following studies as:

- co-applicant for a Horizon 2020 grant with GSK Vaccines Institutes for Global Health to conduct a phase 1 study of a novel iNTS-GMMS vaccine (2019 – present).
- principal investigator for a phase 2 study of the BPZE1 intranasal pertussis vaccine funded by ILIAD (2022 – present).
- chief investigator on a pneumococcal/RSV CHIM study funded by Pfizer under a collaboration agreement (2023 – present).
- chair of the Data and Safety Monitoring Committee for a phase 4 study of the V118_24 flu vaccine, funded by Seqirus (2023 – present).

Prof Ramasamy is the co-chair of the National Immunisation Schedule Evaluation Consortium which conducts research on new and improved vaccines for use in the UK schedule. These trials are funded by NIHR but may involve discussions with vaccine manufacturers related to IMP supply for trial use.

Professor Maarten Postma

Professor Maarten Postma holds 100% of the shares in Pharmacoeconomics Advice Groningen (PAG BV) which works on cost-effectiveness of most currently relevant vaccines. A spin-off company supports specific initiatives in the University (including payment and support of staff and acquisition of resources). He has carried out consultancy work with Seqirus, Sanofi, Moderna, GSK and Novavax on influenza, RSV, COVID and shingles vaccines. Professor Postma holds 25% shares in Health-eCore who work on cost-effectiveness of most currently relevant vaccines.
Ms Rachel Rowson
Ms Rachel Rowson does not have any registered conflicts of interest.
Prof Caroline Trotter
Prof Caroline Trotter has no registered conflicts of interest. <u>Other information</u> Prof Trotter is a member of the World Health Organisation's Technical Taskforce for Defeating Meningitis by 2030. Prof Trotter is the Chair of the Meningitis Research Foundation Scientific Advisory Panel. MRF is a charity that receives sponsorship from pharmaceutical companies. She is also director of the Vaccine Impact Modelling Consortium (VIMC) at Imperial College, funded by Gavi, the Bill & Melinda Gates Foundation and Wellcome Trust. VIMC is an international community of modellers providing high-quality estimates of the public health impact of vaccination, to inform and improve decision making.
Dr Martin Williams
Dr Martin Williams has no registered conflicts of interest.
Dr Louise Herron (co-opted member)
Dr Louise Herron has no registered conflicts of interest.
Dr Christopher Johnson (co-opted member)
Dr Christopher Johnson has no registered conflicts of interest. Dr Christopher Johnson's organisation, Public Health Wales (PHW) receive sponsorship towards the costs of the Welsh Immunisation Conference that they host. This sponsorship from a number of pharmaceutical companies to cover the cost of venue and hosting (AstraZeneca, GSK, MSD, Pfizer, Sanofi, Seqirus). Sponsors do not have any say over agenda or presentation content.
Dr Daniel Chandler (co-opted member)
Dr Daniel Chandler has no registered conflicts of interest.