I. Welcome and Introductions

1. The Chair welcomed the members to the first meningococcal sub-committee of JCVI. Apologies had been received from Drs Mair Powell and Helen Findlow and Mr Dan Jackson. Members introduced themselves and provided a brief description of their expertise.
2. The sub-committee was reminded that a number of the papers contained unpublished information provided in confidence and they should not be circulated more widely nor should the data be discussed with others outside of the meeting.

3. The Chair took declarations of interest from members and invited contributors (see Annex A).

4. The Chair noted that the terms of reference for the sub-committee had been circulated to members prior to the meeting and formed the basis for the call for evidence. JCVI has asked the sub-committee to consider the following:

**Meningococcal B vaccination**
- To consider the evidence on the impact of meningococcal B disease in terms of:
  - the epidemiology and carriage of different meningococcal serogroup B strains,
  - the costs of treating meningococcal serogroup B disease and the costs of treating the long-term conditions that result from this disease,
  - the quality of life of the affected individual.
- To consider the evidence on the efficacy, including the likely coverage of candidate vaccines based on the prevalence of different strains of meningococcal serogroup B bacteria in the UK and duration of protection.
- To consider the safety of meningococcal B vaccines.
- To consider the evidence on co-administration of meningococcal B vaccines with other vaccines in the routine national immunisation schedule.
- To consider the cost-effectiveness of meningococcal serogroup B vaccination strategies.

**Meningococcal C/ACWY vaccination**
- To consider the current epidemiology of meningococcal serogroups ACWY.
- To consider if the current schedule for meningococcal serogroup C vaccine is appropriate to maintain herd immunity.
- To consider the cost-effectiveness of an additional dose of meningococcal serogroup C vaccine given to children aged three years and four months or soon after (along with current ‘pre-school’ vaccinations).
- To consider if the current schedule should be changed for example by replacing one of the two doses of meningococcal serogroup C vaccine given in infancy with one given at three years four months or soon after (along with current ‘pre-school’ vaccinations).
To consider the cost-effectiveness of an additional dose of meningococcal serogroup C vaccine or meningococcal serogroups ACWY vaccine given to adolescents aged thirteen to eighteen years.

II. Epidemiology of invasive meningococcal disease

5. The sub-committee was provided with information on the epidemiology of invasive meningococcal disease (IMD) in England and Wales, Scotland, and Northern Ireland. A presentation on the epidemiology of IMD in England and Wales was given by the HPA and the sub-committee noted that:
   - overall, IMD in England and Wales has decreased since 1999/00 due to the reduction of serogroup C disease to the lowest level since the introduction of the meningococcal C vaccination programme;
   - over the past four epidemiological years a total of 4,439 cases of IMD have been confirmed with 88% B disease (3,911 cases), 4.2% Y disease (185 cases), 2.1% W135 disease (91 cases), and 2.0% C disease (88 cases);
   - there had been an overall decline in IMD over the past four epidemiological years;
   - the incidence of IMD caused by meningococcal serogroup B is age specific with the highest incidence in infants (with the peak incidence at five months), followed by one- to four-year-olds, with a smaller peak among children aged 15- to 19-years;
   - the decline over the past four years was most marked in children under five years of age; and
   - serogroup B accounts for 94% of IMD in children under five years and 54% of IMD in older people aged over 65 years.

6. The sub-committee also noted that there had been a total of 233 deaths over the past four years, again with a marked decline from serogroup C deaths. The case fatality ratio (CFR) was highest for meningococcal C disease (12.5%) followed by Y disease (9.7%), W135 disease (5.5%) and lowest for B disease (5.0%). It was noted that CFR increases with increasing age, for example, the CFR for serogroup B disease in children under five years was approximately 5% whereas the CFR for people aged over 65 years was approximately 15-20%.

7. The sub-committee was also presented with data showing the clonal complex distribution in meningococcal serogroup B bacteria over time. The sub-committee noted that there was a large degree of genetic diversity with considerable variability over time.

8. Questions were raised about the level of under ascertainment due to unconfirmed disease given that data were derived from laboratory confirmed disease. It was noted that ascertainment was probably higher now than in the
past and that only four per cent of the samples received for meningococcal PCR are confirmed as meningococcal disease suggesting that clinicians were not reluctant to send samples of suspected meningococcal disease. It was also noted that any potential under ascertainment needed to be and had been factored into the cost effective modelling for meningococcal B vaccines by Christensen et. al.

9. Scotland also presented data that showed there were no significant differences between Scotland and the rest of the UK with respect to IMD and in the phenotype and genotype distribution of serogroup B disease. Scotland noted that it was difficult for it to determine if there had been a decline in IMD over the past four years. Data provided from Northern Ireland were also similar to GB data.

10. It was noted that clonal complexes within serogroup B bacteria are not shared with serogroup C and Y organisms. It was also noted that clonal complex ST23 dominates serogroup Y disease.

III. Meningococcal B candidate vaccines
11. The sub-committee was provided with data from Novartis and Pfizer on their candidate meningococcal serogroup B vaccines. Data provided included evidence on safety, immunogenicity, potential strain coverage, co-administration and duration of protection.

**Novartis vaccine**
12. The sub-committee noted that the candidate vaccine from Novartis contains three surface proteins; Neisserial adhesin A (NadA), factor H binding protein (fHBP) and Neisserial heparin binding antigen (NHBA) and outer membrane vesicles (OMV) from the New Zealand epidemic strain NZ98/254 containing the PorA P1.4.\(^1\)\(^2\)

13. The sub-committee considered data from published clinical trials\(^1\)\(^2\). From the data provided, it was noted that the vaccine was immunogenic and that if a bacterial strain expressed a vaccine antigen then, in general, bactericidal activity was observed. Conversely, if it is not expressed then no activity is observed\(^1\).

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14. The subcommittee noted that the MATS assay was developed by Novartis to assess potential coverage of the Novartis vaccine since conventional assays are impractical due to the high number of strains that need to be assessed. The assay compares reference strains and provides a relative potency (RP) for the test strain. The RP depends upon both the quantity of antigen expressed and extent of immunological cross-reactivity with the vaccine antigen. Strains are diverse in RP values which reflect the variations in antigen expression and/or cross-reactivity of the antigens. The cut-off for the MATS assay, the positive bactericidal threshold (PBT) for the three protein antigens, predicts serum bactericidal antibody (SBA) activity. It was noted that the MATS assay had been conducted with pooled sera from toddlers; the sub-committee noted that it would be preferable to see data on individual infant sera but that this may not be practicable.

**ACTION:** Secretariat to contact Novartis to ascertain whether data on individual infant sera are being generated.

15. The sub-committee noted that the HPA Meningococcal Reference Unit had also validated the MATS assay and determined the potential coverage of the Novartis vaccine based on 535 invasive meningococcal serogroup B isolates from the 2007-08 epidemiological year. Of those available, seven were non-typeable by MATS. Five hundred and twenty eight isolates were analysed to estimate the strain coverage and proportion of strains with RP above the PBT for any of the vaccine antigens were determined. Strains with PorA P1.4 (20%) were considered to be covered by the vaccine. These data suggest that 73% (95% CI: 60-90%) of meningococcal serogroup B strains may be covered by the Novartis vaccine.

16. The sub-committee noted that the Novartis vaccine appears immunogenic. With respect to concomitant administration with other childhood vaccines, it would like to see data on GMC particularly for the pneumococcal serotypes used in the current UK immunisation schedule. In addition, data were only available for immunogenicity from two months of age. However, since meningococcal serogroup B disease peaked in infants at five months, the sub-committee noted that it may be desirable to vaccinate children at 0, 1 or 0, 2 months of age.

**ACTION:** Secretariat to ask Novartis if it can provide immunogenicity data on other infant vaccines given concomitantly with the candidate meningococcal B vaccine and immunogenicity data on infants vaccinated at 0, 1 and 0, 2 months of age.

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17. The sub-committee noted that the antibody levels did not remain high after each dose of vaccine. It noted the explanation given that the vaccine was inducing immune memory although the antibody levels after the toddler booster dose were similar to those seen after the primary course. However, toddlers receiving a single dose at 12 months of age had lower serum bactericidal antibody geometric mean titers (with fewer achieving a greater than four fold increase in SBA) compared with toddlers who had been given three doses in infancy and a fourth dose at 12 months of age. This may suggest the induction of immune memory by the infant doses. Data from a Phase III trial in which some individuals were boosted as toddlers and some were naïve may be available soon. These data would be important for the sub-committee to see to help assess the duration of protection.

18. The sub-committee reviewed the data on safety of the Novartis vaccine. An increased frequency of fever is observed in infants who received the vaccine concomitantly with other childhood vaccines. It was noted from data when the meningococcal serogroup B vaccine had been given alone, that the level of fever was similar to that seen with the current infant immunisations. When given concomitantly, the rate of fever was additive, implying that the vaccine is not more reactogenic than other vaccines. It was noted that in vaccine trials, parents appeared to be not overly concerned with the level of fever. The sub-committee noted that it would like to see data on the effect of giving paracetamol after vaccination and the effect on both fever and immunogenicity of the vaccines, noting that previous studies demonstrated reduced immunogenicity when prophylactic paracetamol was used in infants.4

19. The sub-committee noted the data provided on serious adverse events and that it would like to see further information.

**ACTION:** Secretariat to ask Novartis if it can provide further safety data on its candidate meningococcal B vaccine.

**Pfizer vaccine**

20. The sub-committee noted the data provided by Pfizer whose candidate vaccine is derived from sub-families A and B of the factor H binding protein (fHBP). The data showed that the vaccine produced good immunogenicity in adolescents and children; no infant data were provided. The committee noted that a flow

cytometry assay had been developed by Pfizer to determine the threshold of expression of vaccine antigens that correlated with potential coverage of the Pfizer vaccine.

21. The sub-committee noted that too little clinical trial and safety data had been provided on the Pfizer vaccine to assess the vaccine fully.

**ACTION:** Secretariat to ask Pfizer if it can provide further data on the immunogenicity, safety and potential coverage of its candidate meningococcal B vaccine.

**Novartis and Pfizer vaccines**

22. The sub-committee noted that both the meningococcal B candidate vaccines were not specific to serogroup B strains since other neisserial species and meningococcal serogroups also express some of the antigens in the candidate vaccines. It was noted that for the Novartis vaccine, on a panel of 167 non-serogroup B strains from England & Wales and Germany, around 65% (95%CI: 50-81%) of strains expressed at least one vaccine antigen or porA 1.4. The sub-committee noted that such vaccines could open up an ecological niche for replacement with other pathogenic and non-pathogenic neisseria, the implications of which were unknown. It would be important to have data on the effect of the vaccines on the carriage of both pathogenic and non-pathogenic neisseria in order to assess any potential effect.

23. The sub-committee noted that an ‘infant only’ approach to any meningococcal B vaccination programme would have very little impact on carriage. The sub-committee was concerned that the population group that carry pathogenic meningococcal serogroup B bacteria are not fully understood, although are thought to be adolescents. It was noted that a carriage study in England of 3,000 university-students immunised with a serogroup B vaccine was currently ongoing and data would be available at the end of 2011. Limitations to this study were noted with respect to the timing of vaccination, since the vaccination of students who are already at university will likely miss the period when acquisition of meningococcal B is most likely to occur.

24. It was noted that carriage in older children may be beneficial since disease was relatively low in older children who have higher carriage prevalence; thus, carriage may be helping to prevent disease. However not all individuals who carry the bacteria would be protected by carriage. It was also noted that any approach to only provide individual protection (i.e. just vaccinating infants) without decreasing carriage, was unlikely to be cost-effective.

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IV. Meningococcal B cost-effectiveness modelling

25. The committee was presented with cost effectiveness models of meningococcal B disease from Christensen et. al. and also from Novartis.

26. Christensen et. al. had constructed both a cohort model (to look at direct protection) and a transmission dynamic model (to look at the effects of herd immunity) recognising that data at present were only available on immunogenicity: this was taken as a correlate of direct protection; no data were available on the effect of the vaccines on carriage.

27. On key epidemiological assumptions the authors noted that:
   - the number of meningococcal serogroup B cases have declined in recent years from a peak in 2000/01 – this is natural variation in the number of cases over time. There are relatively low levels of IMD in the population. However, the incidence could rise again in the future. The models capture these issues;
   - most disease occurs in very young children – there is a small secondary peak in teenagers, however, for meningococcal serogroup B this is not as prominent as it was for meningococcal serogroup C disease before the vaccine was introduced;
   - estimates of the incidence of disease and case fatality ratio were taken from a number of national routine datasets in the UK including laboratory confirmed cases, hospital admissions, notifications of the disease and death registrations;
   - since laboratory confirmed cases underestimate the true number of cases occurring, given that some will be diagnosed on clinical grounds alone, the base case model used hospital admissions, which provide a higher estimate of disease incidence. However, hospital admission reporting may not capture all cases as some may die before admission to hospital. Therefore, the incidence from the hospital data were inflated to allow for this by using death registration data.

28. Taking the key epidemiological assumptions into consideration, the authors noted that three scenarios for incidence and case fatality were considered, a low, medium and high incidence based upon hospital and death registration data from either recent or an average from a nine year dataset.

29. The authors noted that the following vaccine assumptions for the Novartis vaccine were used for the base case:
   - an ‘effective’ vaccine efficacy of 75% (i.e. 75% efficacy covering 100% meningococcal strains);
• an average duration of protection from early routine infant vaccination of 18 months following the primary course and 36 months following a booster dose; and
• protection starting one month following the second dose.

Vaccine strategies modelled included routine infant vaccination with or without a catch-up programme.

• The economic model perspective taken was that of the National Health Service and Personal and Social Services. Costs and benefits were discounted back to 2008.

30. It was noted that taking into account direct protection only, all scenarios from the model came much higher than the £30,000/QALY threshold and thus could not be considered cost effective at an assumed vaccine price of £40 per dose.

31. The sub-committee was also presented with the results from the dynamic transmission model, which models carriers in the population. Carriage prevalence estimates were obtained from a recent systematic review of carriage prevalence by age.6 This model allows herd immunity to be considered.

32. The sub-committee noted that assuming a reasonable vaccine efficacy against carriage then the model predicts that implementing a catch-up vaccination, in addition to routine immunisation, may significantly reduce the annual number of cases of disease, at least in the short term.

33. The sub-committee noted that assuming a vaccine efficacy against carriage of 60% then the model predicts that greater longer-term reductions in disease may be made by implementing routine infant and adolescent immunisation programmes. However, the model assumes no replacement effects, and no adverse effects of the potential loss of natural boosting. Therefore, the results may be optimistic.

34. The sub-committee noted that under most scenarios considered, including those with herd immunity, new meningococcal vaccines are unlikely to be considered cost-effective if the vaccine were to cost £40 per dose or more.

35. The sub-committee welcomed the model, which it considered to be well constructed. It noted that there were areas of the model that could be further refined including updating inputs to economic parameters. In addition, the committee noted that a significant impact could be made if infants were

vaccinated earlier than modelled since disease in infants peaks at five months, iterating their earlier call for additional data on immunogenicity and safety of giving doses at 0, 1 or 0, 2 months. The committee also noted that retrieval costs for specialised paediatric intensive care units should be included in the model.

36. The sub-committee noted that the cost-effectiveness model submitted by Novartis was well constructed and that the economic assumptions were reasonable. However, no results were presented as the authors had noted they were awaiting further data.

37. The sub-committee was provided with a presentation from Dr Russell Viner on the outcomes of serogroup B meningococcal disease in adolescents and children (MOSAIC) study that had been funded by the Meningitis Trust. This study was a retrospective study from five representative areas of England that took cases of meningococcal disease (three years post disease) and compared them to age and sex matched controls from the same GP practices. Cases were recruited through hospitals and identified through the MRU database held by the HPA. Individuals were included as cases if they were survivors of meningococcal serogroup B disease as confirmed by a positive culture or PCR and had the disease between July 2004 to Dec 2006.

38. Analysis showed that there were no differences in sex or ethnicity between the groups. Based on discharge letters, meningococcal septicaemia accounted for around two thirds of the disease and the remaining third was mixed (meningitis and septicaemia) disease and meningococcal meningitis.

39. The data presented showed that meningococcal serogroup B disease made significant impacts in hearing loss, reduction in IQ and other neuropsychological outcomes such as visual memory, working memory, executive function and attention.

40. In addition, questionnaires were also conducted on mental health, social and educational function, physical limitation and sequelae, quality of life (EQ5D), physical disability and symptoms, and economic and health service assessment.

41. It was noted that the level of QALY loss measured by the EQ5D was quite small. The sub-committee noted that the EQ5D method is too insensitive to the subtle changes measured in other parts of the MOSAIC study. For example, it is difficult to capture QALY loss for losing cognitive/audiology functions. Further, since the study design only permits assessment three years post disease, the QALY loss measured during and directly after an invasive meningococcal infection could not be measured nor the long-term QALY loss after three years. The sub-committee noted that it would be important to capture these data.
42. The sub-committee had also been provided with data from the Meningitis Research Foundation, which had costed a severe case of meningococcal septicaemia and meningococcal meningitis. The sub-committee noted that only a small proportion of cases would be as severe as the cases included in the studies but that these data could be usefully included in the model to ensure that the costs were properly represented at the high end of the spectrum.

**ACTION:** Dr Trotter agreed to update the cost-effective model and Dr Viner agreed to provide data, when completed, to help populate the quality of life data and health care costs for the cost-effective model.

V. **Meningococcal C epidemiology, current effectiveness of the Men C vaccination programme, and potential changes to the programme including other serogroups A, W135 and Y**

43. The sub-committee was provided with a paper from the HPA on the epidemiology of invasive meningococcal disease in England and Wales covering serogroups A, C, W135 and Y. In addition to the information considered under agenda item II, the sub-committee noted that:

- there had been a decline in serogroup W135 IMD following outbreaks originating from people travelling back from the Hajj;
- there has been an increase in serogroup Y in the last two years. In epidemiological year 2009/10, the majority of Y cases were in people aged 45 years and over with a small number (14 cases) among individuals aged 15-19 year-olds in 09/10; and
- serogroup C IMD continues to be at very low levels. The majority of meningococcal serogroup C cases that do arise are in adults or are recent entrants to UK. The HPA has recorded four cases in children that had received a booster dose of Menitorix (Hib/MenC) and this possible signal for vaccine failures would continue to be monitored.

44. The sub-committee noted that the majority of IMD cases caused by serogroup Y disease were in people aged 45 years and over with underlying health conditions. It noted that the level of Y disease was still relatively low.

45. Scotland also presented data that showed that unlike England and Wales, it had not seen an increase in IMD caused by serogroup Y. Further, IMD caused by serogroup W135 was also very low. It was noted that data from Northern Ireland were similar to Scotland’s data and that cases of IMD caused by serogroups C, Y and W135 were all very low.

46. The sub-committee considered a number of papers on:
• the current meningococcal serogroup C programme;\(^7\)
• the duration of immunity offered by different meningococcal serogroup C vaccination programmes;\(^8\)
• the lessons from the UK meningococcal serogroup C carriage study; and
• the estimates of the age specific susceptibility to serogroup C meningococcal infection in the pre- and post-vaccination era.

47. The sub-committee noted that in children under six years of age who were vaccinated with the meningococcal serogroup C vaccine, antibody wanes rapidly such that only ten per cent have protective antibody when they reach early adolescence. If children are immunised when they are over six years of age then around fifty per cent had protective levels of antibody in early adolescence.


48. It was noted by the sub-committee that antibody wanes rapidly even after a booster dose at 12 months of age. Data also showed that boosting younger children after the age of 6 years produced high levels of antibody for at least one year however, there are no longer term data after boosting in this age group. In contrast, it was noted that boosting in early adolescence generated persistent antibody responses.

49. Given the data provided, the sub-committee concluded that the current meningococcal serogroup C vaccination programme is relying on herd protection, most likely due to the initial catch-up programme of older children, and that individual protection in vaccinated infants does not last long.

50. The sub-committee recognised that it would be extremely difficult to predict precisely when the protection provided by herd immunity would wane. The possibility of using surveillance to detect an increase in disease that could act as a signal to initiate a booster vaccination programme was discussed. However, such a strategy would lead to individuals being seriously affected by meningococcal serogroup C disease as the signal and would not be acceptable. Therefore, the sub-committee agreed that a change should be made to the meningococcal serogroup C vaccination programme to enable current levels of herd protection to be maintained and also to provide a degree of individual protection to older children.

51. The sub-committee advised that the best time to provide a dose of meningococcal C vaccine would be in early adolescence since this is likely to provide much longer lasting antibody levels. It noted that data were likely to be available soon on the persistence of antibody eight years post a booster dose of meningococcal serogroup C vaccine given to a group of 13- to 15-year-old children. The sub-committee agreed that these data were important for determining when a booster dose should be given.

52. The sub-committee discussed the data on the epidemiology of other meningococcal serogroups and whether consideration should be given to introducing a quadrivalent meningococcal serogroup A,C,W135 and Y vaccine.

53. The sub-committee noted that:
   - meningococcal serogroup A, W135 and Y disease were all low with the majority of Y disease in older people that could not be protected by an adolescent programme;
   - the immunogenicity of the meningococcal C component in the currently licensed MenACWY CRM197-conjugated vaccine was lower compared with responses for the other serogroups. Boosting in early adolescence with MenACWY vaccines may not provide long-lasting protection and that
boosting again may be required.\textsuperscript{9,10} However, the sub-committee recognised that these data were from unprimed teenagers using the quadrivalent diphtheria-conjugated meningococcal ACWY vaccine and that there are a lack of comparative data for the meningococcal serogroup C component of the ACWY vaccine on boosting teenagers who were vaccinated in early childhood; and

- vaccinating against other serogroups, which were not causing disease in adolescents, and for which data were not clear on the role that carriage had on providing protection, could potentially cause an increase in disease for example in older age groups if it disturbed current levels of carriage.

54. The sub-committee concluded that a booster dose of a meningococcal serogroup C vaccine should be considered in early adolescence and that the current epidemiology did not support the use of ACWY vaccine, for all the reasons given in paragraph 54.

55. The sub-committee considered a cost-effective analysis from Novartis. It noted that the model had concluded that a cost-effective strategy could be to withdraw a dose of meningococcal C given to infants and replace it with a dose of ACWY vaccine in adolescents. In reviewing the model structure, the sub-committee noted that it needed to model multiple strains through all ages. The model provided to the committee had looked at meningococcal C disease in infants only and then ACWY in adolescents and thus was not appropriate.

56. Data were provided from the National Vaccine Evaluation Consortium that demonstrated that a single dose of meningococcal C vaccine in infants could provide protection for up to 12 months before the booster dose was administered. It was noted that it would be preferable to use a tetanus-toxoid conjugated meningococcal serogroup C vaccine as this would likely provide better protection when boosted with a tetanus toxoid-conjugated Hib/MenC vaccine given at 12 months. The sub-committee noted that an adolescent dose of meningococcal serogroup C vaccine could be relatively cost neutral if the vaccination programme was changed – removing one dose of meningococcal serogroup C vaccine in infants and using it for an adolescent booster given at the same time as the school-leaving boosters given at 13-18 years.

57. The sub-committee noted that any advice needed to take into account a recent JCVI request ‘that further consideration should be given to the use of combination vaccines that contained hepatitis B antigen but only alongside other potential changes to the schedule’. It was also recognised that an adolescent sub-committee of the JCVI would also be meeting in autumn 2011 and that the

advice from that sub-committee would also have to be considered in parallel. The sub-committee asked that a working paper be prepared for the June JCVI meeting looking at potential changes to the immunisation programme.

**ACTION:** HPA to prepare a paper on the potential changes to the immunisation programme taking into account changes to meningococcal serogroup C vaccination regimen and the use of combination vaccines that contained hepatitis B antigen.

**VI. Additional information**

58. The sub-committee considered a submission from Meningitis UK on attitudinal research. The research showed that many parents thought that their children were vaccinated against all causes of meningitis. The sub-committee welcomed the research and noted the common misperception and the importance of communicating the message to parents to remain vigilant to meningococcal disease.

59. The sub-committee also noted concerns raised by the Meningitis Trust regarding proposed charges for diagnostic meningococcal PCR testing by the HPA Meningococcal Reference Unit and the adverse effect this would have on the diagnostic service provided by the Unit. It was noted that at a time when considerations were being made about changes to the meningococcal vaccination programmes, there was a need for good surveillance.

**ACTION:** Chairs of JCVI and the meningococcal sub-committee to write to HPA to express concerns about the proposed charges for meningococcal diagnostic PCR.

**VII. AOB**

60. The sub-committee agreed that it should meet again in November to discuss further data on meningococcal serogroup C vaccination and in February to discuss meningococcal serogroup B vaccination, subject to progress and completion of necessary work.

61. The Chair thanked members and invited contributors for attending and closed the meeting.
Annex A

Declarations of interest
The following members have declared interests in companies that manufacture meningococcal vaccines (GSK, Novartis, Baxter and Pfizer)

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<tr>
<th>Member</th>
<th>Interests</th>
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<td>Andrew Pollard</td>
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<tr>
<td>David Goldblattt</td>
<td>Personal specific – Novartis</td>
<td>The member was able to participate in discussions when invited by the chair but not in decisions</td>
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<td>Personal non-specific – Pfizer</td>
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<td>Non-personal non-specific Novartis</td>
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<tr>
<td>Mary Ramsay</td>
<td>Non-personal specific – GSK, Baxter and Pfizer</td>
<td>The member was able to participate in the discussion but not decisions</td>
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<td>Non-personal, non-specific – Baxter and Pfizer (formally Wyeth)</td>
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<td>Mike Levin</td>
<td>Non-personal, non-specific – Novartis</td>
<td>The member was able to participate in the discussion and in the decisions</td>
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<tr>
<td>Anne McGowan</td>
<td>Non-personal non-specific – GSK and Pfizer</td>
<td>The member was able to participate in the discussion and in the decisions</td>
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<tr>
<td>Dan Jackson</td>
<td>Non-personal non-specific – Novartis</td>
<td>The member was able to participate in the discussion and in the decisions</td>
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The following invited contributor declared interests in companies that manufacture meningococcal vaccines (GSK, Novartis, Baxter and Pfizer)

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<th>Invited Contributor</th>
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