Declaration of Interest

• These are my views – not those of JCVI

• Watch out for:
  – Corporate slides
Quadrivalent meningococcal ACWY conjugate vaccine.
The role of adolescents

Men C conjugate vaccine
Laboratory confirmed cases of meningococcal serogroup W disease in England, 2005/06-2014/15
Emergence of MenW in England

- Associated with emergence of clone W 2a:1.5,2 = **ST-11 clonal complex**
- Similar to that causing disease in South America
- Associated with increase in disease incidence and high case fatality ratios in recent years
  - As group C, in UK and Europe in late 1990s
  - As group W, Hajj-associated outbreak early 2000s
  - As group W, African epidemics 2002-2004
  - As group W, in S. America and S. Africa
Outbreak progression

Original UK strain

2013-strain

- 2009/10 (n=5)
- 2010/11 (n=13)
- 2011/12 (n=22)
- 2012/13 (n=38)
- 2013/14 (n=76)
- 2014/15 (n=144)

Bar chart showing:
- 2009/10 (n=5)
- 2010/11 (n=13)
- 2011/12 (n=22)
- 2012/13 (n=38)
- 2013/14 (n=76)
- 2014/15 (n=144)
New Meningococcal W strain in 15 teenagers

Group W cases in 15 to 19 year-olds; July 2015 and January 2016

- 7 presented with D&V (2 rash);
- 5 died
- 3 septicaemia – 1 died
- 2 septic arthritis
- 2 pneumonia
- 1 meningitis (rash)

Atypical presentations more common with Men W

Euro Surveill. 2016;21(12)
Serogroup W cases by age group
England, 2010/11 to 2014/15
Strategy to control MenW disease

- Wide age range affected
  - Incidence highest in infants and adolescents
  - High number of cases in older adults
- Vaccinating children in Chile, only impacted on vaccinated age group

- Only feasible strategy is to target carriers with conjugate ACWY vaccine
  - plan to immunise adolescents
Herd Immunity
Herd Immunity
Herd Immunity

Indirect protection

Direct protection
Meningococcal carriage by age

Infants  4.5%
19-year olds  23.7%
50-year olds  7.8%
Men ACYW conjugate vaccine

Polysaccharide capsule  Tetanus or CRM197
Men ACYW conjugate vaccine

Polysaccharide capsule    Tetanus or CRM197

A   A
C   C
W   W
Y   Y

C
W
Y
Conjugate ACWY vaccines induce very high serum bactericidal antibody titres after a single dose in adolescents.

Capsular group-specific SBA GMTs, pre- and post-quadrivalent conjugate
UK carriage study 15 to 17 year olds, before and after the introduction of serogroup C conjugate vaccine

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>B</td>
<td>4.11</td>
<td>4.14</td>
<td>1.01</td>
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<tr>
<td>C</td>
<td>0.45</td>
<td>0.15</td>
<td>0.34</td>
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<tr>
<td>Y</td>
<td>0.97</td>
<td>1.05</td>
<td>1.09</td>
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<tr>
<td>W</td>
<td>1.12</td>
<td>1.42</td>
<td>1.27</td>
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<tr>
<td>NG/OTHER</td>
<td>10.05</td>
<td>11.22</td>
<td>1.12</td>
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<tr>
<td>TOTAL</td>
<td>16.7</td>
<td>17.98</td>
<td>1.08</td>
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JCVI recommendations: February 2015

• Rapid increase in W cases, known virulence and international experience
  – JCVI; “a public health emergency”

• Optimal strategy difficult to decide based on wide age distribution

• Replace adolescent MenC doses with quadrivalent conjugate (ACWY)
  • Vaccination for school years 10-13 should have rapid impact on carriage and therefore have impact on disease in all age groups
    – Speed of effect will depend on speed of catch-up campaign
Changing the Meningococcal vaccine schedule – 2014-2017

<table>
<thead>
<tr>
<th></th>
<th>2 months</th>
<th>3 months</th>
<th>4 months</th>
<th>12 months</th>
<th>3.5 yrs</th>
<th>14 yrs</th>
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<tr>
<td>Men C</td>
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Serum bactericidal antibody killing of UK MenW cc11 strains by serum from infants immunised with Bexsero®

<table>
<thead>
<tr>
<th>Lab number</th>
<th>Site</th>
<th>Type</th>
<th>Pre-</th>
<th>Pool1</th>
<th>Pool2</th>
<th>Pool3</th>
<th>Pool4 Post 4th</th>
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<tbody>
<tr>
<td>M11-240736</td>
<td>Blood</td>
<td>W:NT.P1.5,2 cc11</td>
<td>&lt;2</td>
<td>&gt;64</td>
<td>&gt;64</td>
<td>&gt;64</td>
<td>&gt;128</td>
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<tr>
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<td>Blood</td>
<td>W:NTP1.5,2 cc11</td>
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This work suggests that children immunised with Bexsero may have some protection against the emerging strain of MenW (~70% Men W cases)
How will we implement the teenage MenACWY immunisation programme?
1. Urgent catch-up programme; August 2015  
   aged 17-18 years
2. First time university entrants; August 2015  
   up to 25 years
3. Routine cohort; September 2015  
   aged 13-15 years
4. Second catch-up cohort; January 2016  
   aged 15-16 years
## UK meningococcal ACWY conjugate vaccine programme – planned roll-out

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<th>2014/15 year - age</th>
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<td>Y7 - 11/12</td>
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<tr>
<td>01/09/2001-31/08/2002</td>
<td>Y8 - 12/13</td>
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<td>Y10 - 14/15</td>
<td>Y10 MenC</td>
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**Key:**
- Routine schedule MenC
- Routine schedule ACWY
- School based catch-up ACWY
- Primary care catch-up cohorts
- Delivery mechanism to be decided
- Completed
# UK meningococcal ACWY conjugate vaccine programme – planned roll-out

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**Routine schedule**
- MenC

**Routine schedule ACWY**
- School based catch
- Primary care catch

**Primary care catch-up cohorts**
- Delivery mechanism to be decided
- Completed

- 84%
- 77%
- 71%
- 38%
How will we monitor the vaccine programmes?
Monitoring meningococcal infection

- Notifications from clinicians and laboratories
- All cases followed up via local health protection unit – was child vaccinated?
- Samples to PHE meningococcal reference unit (MRU)
  - serogrouping, sero-sub typing
  - whole genome sequencing
Confirmed serogroup W cases to 31 December, last 5 epi years by age group, England

Direct protection

Indirect protection
Conclusions

Programs targeting young children give direct protection but time limited (antibody persistence poor).

Programs targeting adolescents/carriers can induce herd protection (antibody persistence good).

Serogroup W cases in the elderly, will they be covered by herd protection through immunising adolescents?