Introduction

This report presents pertussis vaccine coverage in pregnant women in England for the period January to March 2017, updating previous data reported for October to December 2016 [1].

Following increased pertussis activity in all age groups, including infants under three months of age, and the declaration of a national pertussis outbreak (level 3 incident) in April 2012 [2] pertussis vaccine has been offered to pregnant women since 1 October 2012 [3]. The prenatal pertussis vaccination programme aims to minimise disease, hospitalisation and deaths in young infants, through intra-uterine transfer of maternal antibodies, until they can be actively protected by the routine infant programme with the first dose of pertussis vaccine scheduled at eight weeks of age [4]. In June 2014 the Joint Committee on Vaccination and Immunisation (JCVI) considered available data and based on the high effectiveness and safety of the programme, advised it should continue for a further five years [5]. In February 2016 the JCVI considered new evidence demonstrating that vaccination earlier in pregnancy would increase opportunities during pregnancy for vaccination, without detrimentally affecting the protection afforded to the infant [6, 7]. Based on this, JCVI advised that vaccination should ideally be offered from gestational week 16, although for operational reasons, vaccination should be offered from around 20 weeks, on or after the foetal anomaly scan [8]. This advice was implemented from April 2016.

Reported pertussis incidence persists at raised levels compared to the years preceding the outbreak in 2012. Activity was higher in 2016 than in any year between 2013 and 2015 [9] but fell early in 2017 [10]; this is consistent with pre-existing cyclical trends, with peaks in disease every three or four years. Overall disease levels in 2016 did not reach those seen in 2012. After the introduction of the maternal programme, reported incidence in young infants under three
months of age targeted by the programme fell back to levels observed before the 2012 peak and, whilst increasing in 2016, these young infant cases are still in line with those seen in earlier (pre-2012) peak years.

Methods

General practice (GP) level pertussis vaccine coverage data are automatically uploaded via participating GP IT suppliers to the ImmForm* website on a monthly basis.

ImmForm data are validated and analysed by PHE to check data completeness, identify and query any anomalous data and describe epidemiological trends.

Since April/May 2016 (implementation date varied by GP IT supplier) the following monthly data have been collected:

- **Denominator:** number of women who delivered in the survey month, excluding miscarriages and stillbirths, regardless of gestational age
- **Numerator:** number of women receiving pertussis vaccination between week 16 of pregnancy and delivery

For accurate denominators to be extracted from GP IT systems by the automated survey and precise coverage estimates to be calculated, it is important that the medical records of all women who have given birth have the following fields completed:

- the date of delivery
- the date of receipt of a pertussis-containing vaccine at or after week 16 of pregnancy, regardless of the setting where the vaccine was administered
- where relevant, fields indicating stillbirth or miscarriage

GP data are aggregated by NHS England organisations; data are presented by NHS England Local Team (LT) in this report, and by Clinical Commissioning Group (CCG) and Area Team (AT) in the appendix associated with this report.

Participation and data quality

All four IT suppliers submitted data for each month which represented 89.3% of all English GP practices in January 2017, 90.6% in February 2017 and 97.0% in March 2017. The lower proportion of practices providing data in January and February was due to a technical issue for one IT supplier which was resolved in March.

Results

Pertussis vaccine coverage decreased from 75.3% in January 2017 to 72.6% in March 2017 (72.6%) (see figure 1), a pattern similar to the same time period in previous years. Average coverage for the first three months of 2017 was 73.8%, 13.9% higher than the same period in 2016.

During the first three months of 2017, prenatal pertussis vaccine coverage by NHS England LT ranged from 63.2% (London, March) to 81.0% (South (Wessex), January) (see table 1).

* ImmForm is the system used by Public Health England to record vaccine coverage data for some immunisation programmes and to provide vaccine ordering facilities for the NHS
Figure 1. Monthly pertussis vaccination coverage (%) in pregnant women: England, 2013-2017

Notes:
1. New IT specification implemented in March/April 2016 [10]; coverage reported prior to this date is likely to have been underestimated.
2. Women first offered pertussis vaccine from 20 weeks gestational age in April 2016 would have been expected to deliver in August 2016.

Discussion

The higher levels of prenatal pertussis vaccine coverage recorded from May 2016 through to December 2016 have continued in the first quarter of 2017. Coverage peaked in December 2016 (76.2%) and decreased slightly each following month to 72.6% in March 2017. This pattern is similar to previous years and is thought to be related to the end of the influenza vaccine season. Vaccine coverage remains at the highest level recorded relative to corresponding time points in all previous years.

Factors that could have contributed to the overall increase in coverage observed since April 2016 were described in the April to September 2016 report [11]. Women who received vaccine from as early as 20 weeks were likely to be included in the data from August 2016 onwards for women delivering around the time of their due date. The longer period available for vaccination, including a greater opportunity for signposting and reminders, could be contributing to an increase in coverage.

For the last six months national coverage estimates have been close to coverage estimates extracted from the Clinical Research Practice Datalink (CPRD) for the purpose of on-going estimation of vaccine effectiveness [12], which averaged 74% in the first half of 2016. The CPRD is a sentinel primary care network that includes 510 English general practices, representing approximately 6% of the UK population [13].
Pertussis activity was high in 2016 and although this has fallen in early 2017 unprotected young infants continue to be at risk of infection. GPs, practice nurses, obstetricians and midwives should continue to encourage pregnant women to receive the pertussis vaccine, ideally between weeks 20 and 32 of their pregnancy (but up to term) to further reduce the incidence of pertussis in young infants [8]. Considerable variation in coverage between ATs has previously been reported, and continues to be seen between LTs with at least a 16.0% difference observed between the highest and lowest in January to March 2017. Identifying examples of good practice in areas achieving consistently high coverage for pertussis vaccination during pregnancy and applying them to low coverage areas may help address this gap.

There are limitations to the data presented in this report. First, completeness of data is reliant on the recording of delivery dates in the mothers' medical records and comparison of this data with national data on maternities [14], indicates that in 2015 these data represented about 67% of the population of pregnant women.

Second, the survey does not cover all GP practices in England and, although data for 92.3% of GP practices were provided in January to March, there may be differential completeness of the recording of delivery dates among GPs. Coverage may be overestimated if women who have received the vaccine are more likely to have their delivery date recorded. Furthermore, women not registered with a GP (and therefore less likely to be having regular contact with the health service prior to delivery) will not be captured by this reporting system. Following the change in recommendation for eligibility of the vaccine around the time of the 20 week scan more vaccines may be delivered in maternity settings which while potentially increasing vaccine coverage, may present further challenges in the recording of these data on GP systems.

London LT, which has consistently recorded lowest vaccination coverage since the start of the automated GP data extraction in April 2014, started offering vaccination in maternity services towards the end of 2016. Although October 2016 to March 2017 data suggest that London coverage is following similar trends to national coverage, vaccines delivered in a maternity setting may not be recorded in primary care data and vaccine coverage in London may therefore be underestimated. Work is ongoing to increase data completeness for pertussis vaccines delivered in settings other than general practice.

Continued support in the delivery of this important programme has been sought from service providers (GP practices and maternity units), Screening and Immunisation Teams and Health Protection Teams and the continued high coverage reported here suggests the delivery of this programme is becoming better embedded. Screening and Immunisation Teams should continue to update service providers on the current epidemiology of the disease, the recent changes to and effectiveness of the vaccination programme and the need to maintain and improve coverage achieved thus far. If coverage, and ultimately the impact of the programme itself, is to be accurately monitored, it is essential that GPs and practice nurses continue to ensure that vaccination and date of delivery are recorded in the patient’s GP record. In areas that have commissioned maternity units to offer pertussis vaccines in pregnancy, it is important that providers ensure doses of vaccines given to individual women are also communicated to the woman’s GP. Maternity units not offering pertussis vaccines to pregnant women should continue to discuss its importance, making use of available resources [15] and sign-post the woman to her GP to receive the vaccine.
Table 1. Monthly pertussis vaccination coverage (%) in pregnant women by NHS England Local Team: England, April 2016 to March 2017

<table>
<thead>
<tr>
<th>Local Team</th>
<th>Apr-16</th>
<th>May-16</th>
<th>Jun-16</th>
<th>Jul-16</th>
<th>Aug-16</th>
<th>Sep-16</th>
<th>Oct-16</th>
<th>11/16</th>
<th>Dec-16</th>
<th>Jan-17</th>
<th>Feb-17</th>
<th>Mar-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>57.1</td>
<td>60.7</td>
<td>59.4</td>
<td>61.3</td>
<td>59.7</td>
<td>61.0</td>
<td>63.1</td>
<td>*</td>
<td>66.4</td>
<td>65.0</td>
<td>63.4</td>
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</tr>
<tr>
<td>Midlands and East (Central Midlands)</td>
<td>60.2</td>
<td>70.8</td>
<td>70.7</td>
<td>72.7</td>
<td>71.6</td>
<td>73.3</td>
<td>76.3</td>
<td>*</td>
<td>77.7</td>
<td>76.2</td>
<td>75.2</td>
<td>75.5</td>
</tr>
<tr>
<td>Midlands and East (East)</td>
<td>60.3</td>
<td>72.0</td>
<td>71.4</td>
<td>72.5</td>
<td>71.2</td>
<td>74.4</td>
<td>76.6</td>
<td>*</td>
<td>77.2</td>
<td>79.0</td>
<td>77.4</td>
<td>74.5</td>
</tr>
<tr>
<td>Midlands and East (North Midlands)</td>
<td>69.4</td>
<td>73.5</td>
<td>74.2</td>
<td>74.7</td>
<td>73.4</td>
<td>74.4</td>
<td>76.4</td>
<td>*</td>
<td>78.2</td>
<td>77.4</td>
<td>74.5</td>
<td>72.7</td>
</tr>
<tr>
<td>Midlands and East (West Midlands)</td>
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<td>69.1</td>
<td>71.4</td>
<td>70.2</td>
<td>70.6</td>
<td>72.9</td>
<td>74.5</td>
<td>*</td>
<td>75.3</td>
<td>75.6</td>
<td>71.7</td>
<td>72.4</td>
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<tr>
<td>North (Cheshire and Merseyside)</td>
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<td>72.2</td>
<td>72.8</td>
<td>71.0</td>
<td>75.5</td>
<td>72.2</td>
<td>75.9</td>
<td>*</td>
<td>77.7</td>
<td>78.6</td>
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<td>74.1</td>
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<tr>
<td>North (Cumbria and North East)</td>
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<td>74.0</td>
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<td>76.6</td>
<td>79.6</td>
<td>*</td>
<td>81.0</td>
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<td>65.9</td>
<td>67.4</td>
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<td>71.8</td>
<td>70.5</td>
<td>73.4</td>
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<td>78.6</td>
<td>77.4</td>
<td>76.5</td>
<td>73.9</td>
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<tr>
<td>South (South East)</td>
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<td>72.7</td>
<td>71.8</td>
<td>72.9</td>
<td>73.4</td>
<td>74.2</td>
<td>76.9</td>
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<td>78.0</td>
<td>78.1</td>
<td>75.4</td>
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<tr>
<td>South (South West)</td>
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<td>69.5</td>
<td>68.7</td>
<td>69.8</td>
<td>71.7</td>
<td>74.9</td>
<td>*</td>
<td>76.5</td>
<td>78.1</td>
<td>72.1</td>
<td>71.9</td>
</tr>
<tr>
<td>South (Wessex)</td>
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<td>74.9</td>
<td>75.8</td>
<td>74.1</td>
<td>77.7</td>
<td>79.4</td>
<td>*</td>
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<td>81.0</td>
<td>77.5</td>
<td>77.4</td>
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<td>ENGLAND</td>
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<td>70.0</td>
<td>70.1</td>
<td>71.4</td>
<td>73.8</td>
<td>*</td>
<td>76.2</td>
<td>75.3</td>
<td>73.5</td>
<td>72.6</td>
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<tr>
<td>Monthly reported denominator</td>
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<td>35,501</td>
<td>34,864</td>
<td>35,021</td>
<td>33,880</td>
<td>34,514</td>
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<td>*</td>
<td>31,310</td>
<td>31,068</td>
<td>28,317</td>
<td>33,983</td>
</tr>
</tbody>
</table>

*N. B. Data extraction dates: 12 October 2016 (Apr-Aug), 3 November 2016 (Sep), 13 February 2016 (Oct-Dec), 5 May 2017 (Jan-Feb), 10 May 2017 (Mar).

References


2. A level 3 incident is the third of five levels of alert under the HPA's Incident Reporting and Information System (IERP) according to which public health threats are classified and information flow to the relevant outbreak control team is coordinated. A level 3 incident is defined as one where the public health impact is significant across regional boundaries or nationally. An IERP level 3 incident was declared in April 2012 in response to the ongoing increased pertussis activity. HPR, 2012. 6(15).


5. Joint Committee on Vaccination and Immunisation minutes. 2014; Available from: https://www.gov.uk/government/groups/joint-committee-on-vaccination-and-immunisation#minutes


