Pertussis Vaccination Programme for Pregnant Women: vaccine coverage estimates in England, April to September 2016

Pertussis vaccine coverage in pregnant women averaged 70% across May to September 2016, 14% higher than the same period in 2015. This increase is thought to be associated with changes to the data extraction criteria from April 2016 and suggests coverage estimates prior to this may have been underestimated. In addition, the extended eligibility criteria for the vaccine, available to women from 16 weeks of pregnancy since April 2016 (previously available from 28 weeks), would have started to impact coverage from September 2016, and this may have also contributed to the increase.

Introduction

This report presents pertussis vaccine coverage in pregnant women in England for the period April to September 2016, updating previous data reported for January to March 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]. Overall pertussis activity persists at raised levels compared to the years preceding the outbreak in 2012 and in 2016 to date has increased to reach higher levels than those observed between 2013-2015. After the introduction of the maternal programme, however, 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, cases are still in line with those seen in earlier peak years.

Between 1 October 2012 and 31 May 2016, 16 deaths have been reported in young babies with confirmed pertussis. Fourteen of these 16 babies were born to mothers who had not been vaccinated against pertussis and both of the babies whose mothers had been vaccinated were delivered too close to vaccination to confer optimal passive protection in the infant [4].

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 [5]. 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 [6]. 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 [7,8]. Based on this, they 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 [9]. This advice was implemented from April 2016.
Further information on the history and epidemiology of the disease, recommendations on supply, storage and use of the vaccine, as well as guidance on contraindications, precautions and adverse reactions can be found in the “Immunisation against infectious disease” book (the green book), chapter 24 [9].

Additional background information for the programme can be found on the PHE website and on the vaccine coverage collection in the April 2014 to March 2015 annual report [10].

**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.

During April and May 2016 a new specification was implemented by IT suppliers to capture vaccinations given to women earlier in pregnancy, according to the new advice [9].

Since April/May 2016 (implementation date varied by 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 (previously only those delivering at more than 28 weeks gestational age were included, stillbirths were not previously excluded);
- **Numerator**: number of women receiving pertussis vaccination between week 16 of pregnancy and delivery (previously only those receiving pertussis vaccination between week 28 of pregnancy and delivery were included)

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 in this report, and by Clinical Commissioning Group (CCG) and Area Team (AT) in the Appendix to this report.

**Participation and data quality**

All four IT suppliers submitted data for the period April 2016 to September 2016. A number of changes have been implemented relating to the way data are extracted which may have affected data quality and are described further in the discussion.

**Results**

Between April and September 2016, data were provided for 94.8% of GP practices on average, ranging from 93.0% (August 2016) to 96.0% (May 2016).

*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*
Pertussis vaccine coverage in pregnant women increased from 64.6% in April 2016 to an average of 70.0% between May to September 2016 (figure 1). Coverage between May and September in 2016 was 14% higher than that observed for the same period in 2015.

Based on previously published monthly coverage estimates [11] annual coverage (March to April), was calculated to be 58.2% in 2015/16, compared to 56.8% in 2014/15.

Between April and September 2016, prenatal pertussis vaccine coverage by NHS England LT ranged from 57.1% (London, April) to 77.7% (South (Wessex), September) (table 1).

**Figure 1. Monthly pertussis vaccination coverage (%) in pregnant women: England, 2013-2016**

Discussion

Prenatal pertussis vaccine coverage increased during the first quarter of 2016, and unlike previous years, increased further during the summer months, appearing to stabilise at around 70%, the highest coverage recorded since the programme started.

A number of changes relating to the way data are extracted from GP systems (affecting numerator and/or denominator), are thought to have contributed to the increase in coverage observed since April 2016:

- All GP IT suppliers implemented a correction to the way data were extracted in Spring 2016 to reduce denominator inflation (double-counting) due to erroneous data duplication practices (where practices erroneously record multiple delivery dates for a woman which fall in different months, as described in the 2014/15 annual report [10]).
- Stillbirths have now been excluded. Assuming women previously received vaccination across the 28-32 week recommended period, those who had a stillbirth just after 28 weeks would have been less likely to be vaccinated than women delivering later in pregnancy. However, stillbirths comprised less than 0.5% of total births in 2015 [12]. Additionally, since 1 April 2016, vaccination can now take place from as early as week 16 of pregnancy, although the recommended optimal period is between weeks 20 and 32, but up to term (rather than ideally between weeks 28-32). There is therefore now a longer period available for vaccination, including a greater opportunity

for signposting and reminders for pregnant women about vaccination. Women who were eligible to receive vaccine from as early as 20 weeks would be expected to be included in the data from September 2016 for women delivering around the time of their due date, but could be seen as early as May for women delivering earlier than their due date, or for women who were erroneously vaccinated earlier than previously advised. Women with estimated due dates in July and August would have been between 20 and 27 weeks pregnant on 1 April 2016 so may have had an opportunity to receive vaccination from this time.

The national coverage estimates are now closer to coverage estimates extracted from the Clinical Research Practice Datalink (CPRD) for the purpose of on-going estimation of vaccine effectiveness [13], 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 [14]. In addition the monthly variation in coverage between the four main GP IT suppliers has narrowed from up to 29% between lowest and highest reported coverage between April 2013 - March 2016, to up to 12% since April 2016. National coverage using GP data extracted via ImmForm had previously been thought to be underestimating coverage [13], and the current alignment with CPRD data as well as the decreased variation in reported coverage between GP IT suppliers support the idea that the higher national coverage observed in recent months may be more accurately reflecting true coverage.

Pertussis activity has been high in 2016 and 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 [9]. Considerable variation in coverage between ATs has previously been reported, and continues to be seen between LTs with at least a 14% difference observed between the highest and lowest each month April to August 2016. 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 live births [12], indicates that in 2015 these data represented about 66% of the population of pregnant women.

Second, the survey does not cover all GP practices in England and, although data for 95% of GP practices were on average provided, 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.

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 improved 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 to September 2016

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<tbody>
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<td>London</td>
<td>57.1</td>
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<td>59.4</td>
<td>61.3</td>
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<td>Midlands and East (Central Midlands)</td>
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<tr>
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<td>North (Lancashire and Greater Manchester)</td>
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<td>South (South Central)</td>
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N.B. Data extraction date: 12 October 2016 (Apr-Aug), 3 November 2016 (Sep)
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).


