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Laboratory confirmed cases of pertussis (England): annual report for 2018

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In England, there were 2947 laboratory confirmed cases of pertussis (culture, PCR, serology or oral fluid) reported to the Public Health England pertussis enhanced surveillance programme in 2018. Pertussis is a cyclical disease, with increases occurring every 3-4 years, with pertussis activity usually peaking each year in quarter three. The 2947 confirmed cases in England in 2018 were 32% lower than the 4341 reported in 2017 (Figure 1). Almost a third (31%; 907/2947) of all confirmed cases in England in 2018 were reported in the third quarter (July to September) (table1).

A national outbreak of pertussis [1] was declared by the HPA in April 2012 and, as a response to the ongoing outbreak, the Department of Health (DH) introduced a temporary immunisation programme for pregnant women from October 2012 [2]. In June 2014 the Joint Committee on Vaccination and Immunisation (JCVI) advised that the programme should continue for a further five years [3] based on UK evidence of impact, high effectiveness and safety and continuing high levels of disease [4,5,6,7]. From 1 April 2016 the recommended gestational age for vaccination was revised to between 20-32 weeks but can be given as early as 16 weeks [3].

The national incidence for all age groups, based on laboratory confirmations in England and 2017 population estimates [10], was 5 per 100,000 in 2018 compared to 8/100,00 in the previous year and 11/100,000 in 2016; it reached 18/100,000 in 2012 (epidemic peak year). Prior to the major peak in 2012, incidence ranged between 0.4/100,000 to 2/100,000 (figure 2).

Laboratory confirmed pertussis cases in infants aged under one year, were 46% lower in 2018 (92 cases) than in 2017 (169 cases). This compares with 508 confirmed cases reported in 2012. The 92 infant cases in 2018 were the lowest number of confirmed cases reported since 2010.

There has been a decline in pertussis incidence in infants under 3 months of age since the introduction of the maternal vaccination programme, from 234/100,000 in 2012 to 93/100,000 in 2016 and 30/100,000 in 2018 (figure 2). The number of confirmed cases in infants <3 months was 49 in 2018, the lowest number of confirmed cases since the introduction of enhanced surveillance in 1994. Cases in this age group were 57% lower in 2018 compared to 2017 (115 cases). Incidence does however remain highest in infants under 3 months who are at most risk of severe disease and too young to be fully vaccinated.

Cases in older infants have also remained low since the 2012 epidemic peak when there were 74 cases (43/100,000) in infants aged 3-5 months. There were 26 cases (16/100,000) in this age group in 2018 compared to 37 (23/100,000) in 2017. In the 2016 cyclical peak, confirmed cases aged 6-11 months were higher (34 cases, 10/100,000) than in any year since the introduction of enhanced surveillance. In both 2017 and 2018, the incidence in this age group was 5/100,000 with 17 cases reported each year. These low numbers are consistent with protection from primary vaccination offered at 2, 3 and 4 months of age.

In all children aged 1 year and older numbers of confirmed cases were lower in 2018 than in 2017 (30% lower in 5-9 year olds and 22% lower in 10-14 year olds). The only exception was those aged 1-4 years where cases in 2018 (86 cases) were 15% higher than those confirmed in 2017 (75 cases). Ascertainment in those aged 5 to <17 years has improved with availability of oral fluid testing since 2013. From 1 May 2018, the availability of oral fluid testing was extended to all children aged 2 to <17 years which may underpin the increase observed in the 1-4 year age group in 2018.

Whilst most (79%; 2342/2947) (table 2) laboratory confirmed cases in England in 2018 occurred in individuals aged 15 years and older, total numbers in 2018 (2342 cases) were 34% lower than in 2017 (3530 cases).

In England, 14 deaths were reported in infants with confirmed pertussis in the 2012 epidemic peak year. Following the introduction of pertussis vaccination in pregnancy there have been 19 further deaths in babies with confirmed pertussis including one death reported in 2018. All the deaths in 2012 and those that have occurred following the introduction of the maternal programme were too young to be fully protected by infant vaccination. Only two of the infants born after the introduction of the maternal programme had a mother who had been vaccinated during pregnancy. In both cases the vaccination was too close to delivery to confer optimal passive protection in the infant.

The most recent PHE figures report that the proportion of mothers due to give birth between January 2018 and December 2018 who had been immunised with a pertussis containing vaccine in pregnancy in England ranged from a monthly average of 67.6% (July) to 72.9% (January, December) [8], lower than in 2017 but continuing at the higher levels seen since April 2016 when changes to the way coverage data are extracted from GP systems and extended gestational eligibility criteria for the vaccine came into effect [9,3]. This drop could represent a genuine decrease, or reflects an increase in vaccines administered in maternity settings, which is poorly recorded in primary care records.

The surveillance data in young infants following the introduction of a programme to immunise pregnant women demonstrate that, despite high levels of circulating pertussis, a relatively low incidence has been maintained in infants being targeted by the programme, even during the expected seasonal increases. It is important to be aware, however, that raised levels of pertussis persist in all age groups other than infants. Women should, therefore, continue to be encouraged to be immunised against pertussis at the optimal time during pregnancy in order to protect their babies from birth. It is important that information on vaccines administered in pregnancy is transferred to primary care and that records held in primary care are updated accordingly. The advice to offer vaccination earlier in pregnancy should lead to more opportunities for pregnant women to be vaccinated and to have their vaccine status checked.

Figure 1. Total number of laboratory confirmed pertussis cases per evaluation quarter in England: 2009 to 2018

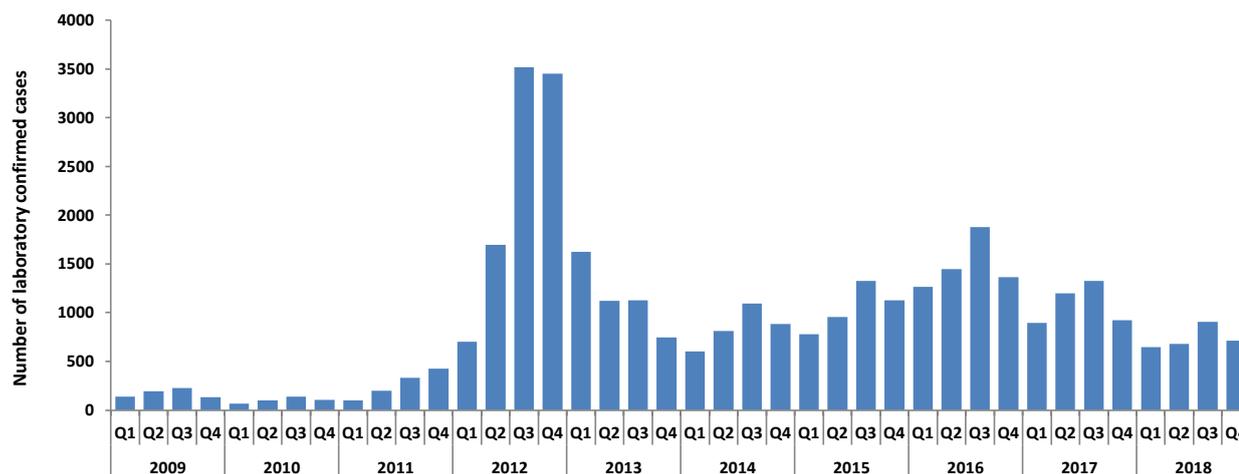


Table 1. Laboratory confirmed cases of pertussis by quarter and test method* in England: 2018

Quarter	Culture	PCR	Serology	Oral fluid only	Total
Jan - Mar	10	22	587	28	647
Apr - Jun	12	34	594	39	679
Jul - Sep	18	51	787	51	907
Oct - Dec	6	29	642	37	714
Total	46	136	2610	155	2947

* Culture confirmed cases may additionally have tested positive by any other method, PCR confirmed cases may have additionally tested positive by serology or OF and serology confirmed cases may also have been confirmed by OF. Cases are only represented once in the table. Submission of all presumptive *B. pertussis* isolates is encouraged for confirmation of identity and to allow further characterisation for epidemiological purposes.

Figure 2. Incidence of laboratory confirmed pertussis cases by age group in England: 1998-2018

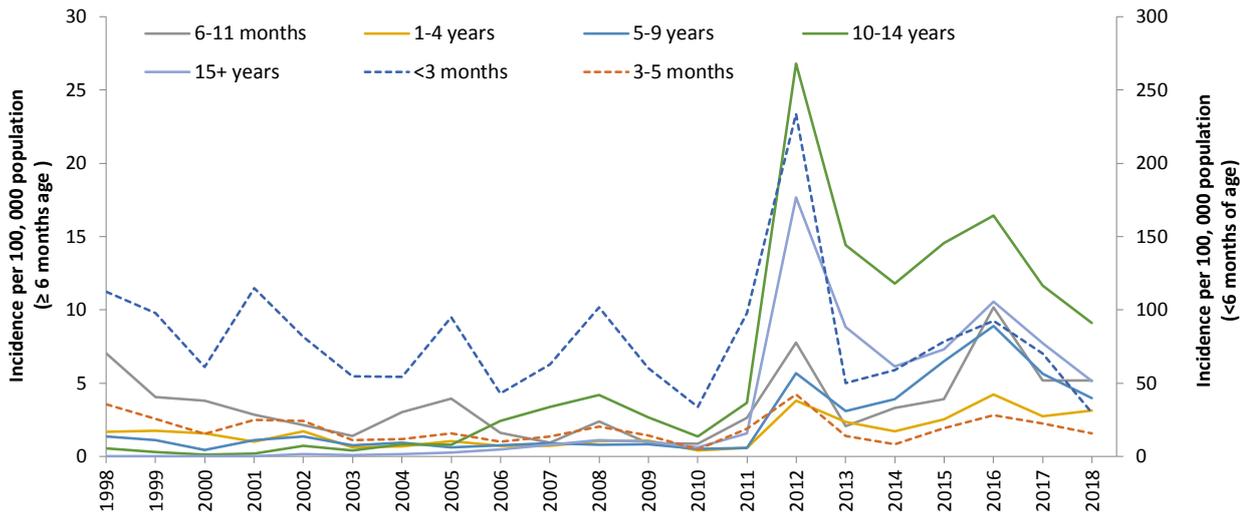


Table 2. Age distribution of laboratory confirmed cases of pertussis by test method* in England: 2018

Age group	Culture	PCR	Serology	Oral fluid only	Total
<3 months	15	34	0	0	49
3-5 months	4	21	1	0	26
6-11 months	5	9	3	0	17
1-4 years	5	23	40	18	86
5-9 years	2	7	81	49	139
10-14 years	3	2	216	67	288
15+ years	12	40	2269	21	2342
Total	46	136	2610	155	2947

* Culture confirmed cases may additionally have tested positive by any other method, PCR confirmed cases may have additionally tested positive by serology or OF and serology confirmed cases may also have been confirmed by OF. Cases are only represented once in the table. Submission of all presumptive *B. pertussis* isolates is encouraged for confirmation of identity and to allow further characterisation for epidemiological purposes.

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