



Public Health
England

Dublin: National Immunisation Conference

Pertussis vaccination in pregnancy

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What is pertussis (whooping cough)?

- *Bordetella pertussis* - Gram negative bacilli
- Exclusively human pathogen
- Transmitted through close direct contact
- Initial catarrhal stage followed by cough stage
- Can infect others up to 21 days after symptom onset
- **Infection / vaccination do not confer lifelong protection**

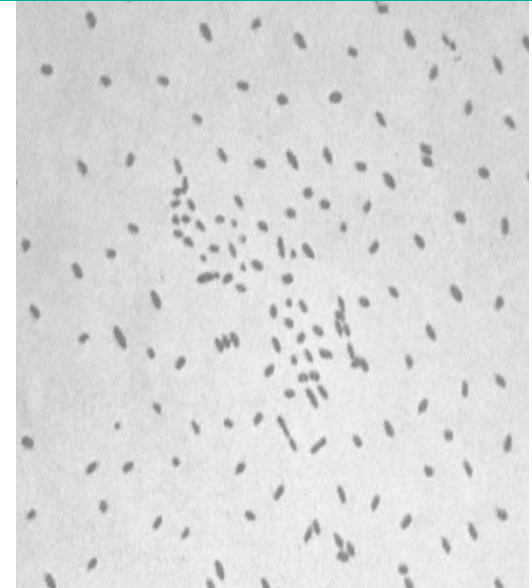


Photo courtesy of CDC



Complications in infants and young children

- Infants in particular, and young children, are most at risk of severe disease and complications such as:
 - Pneumonia
 - Temporary pauses in breathing as a result of severe difficulty with breathing
 - Weight loss due to excessive vomiting
 - Seizures or brain damage
 - Encephalitis (acute inflammation of the brain)
 - In severe cases pertussis can be fatal in infants

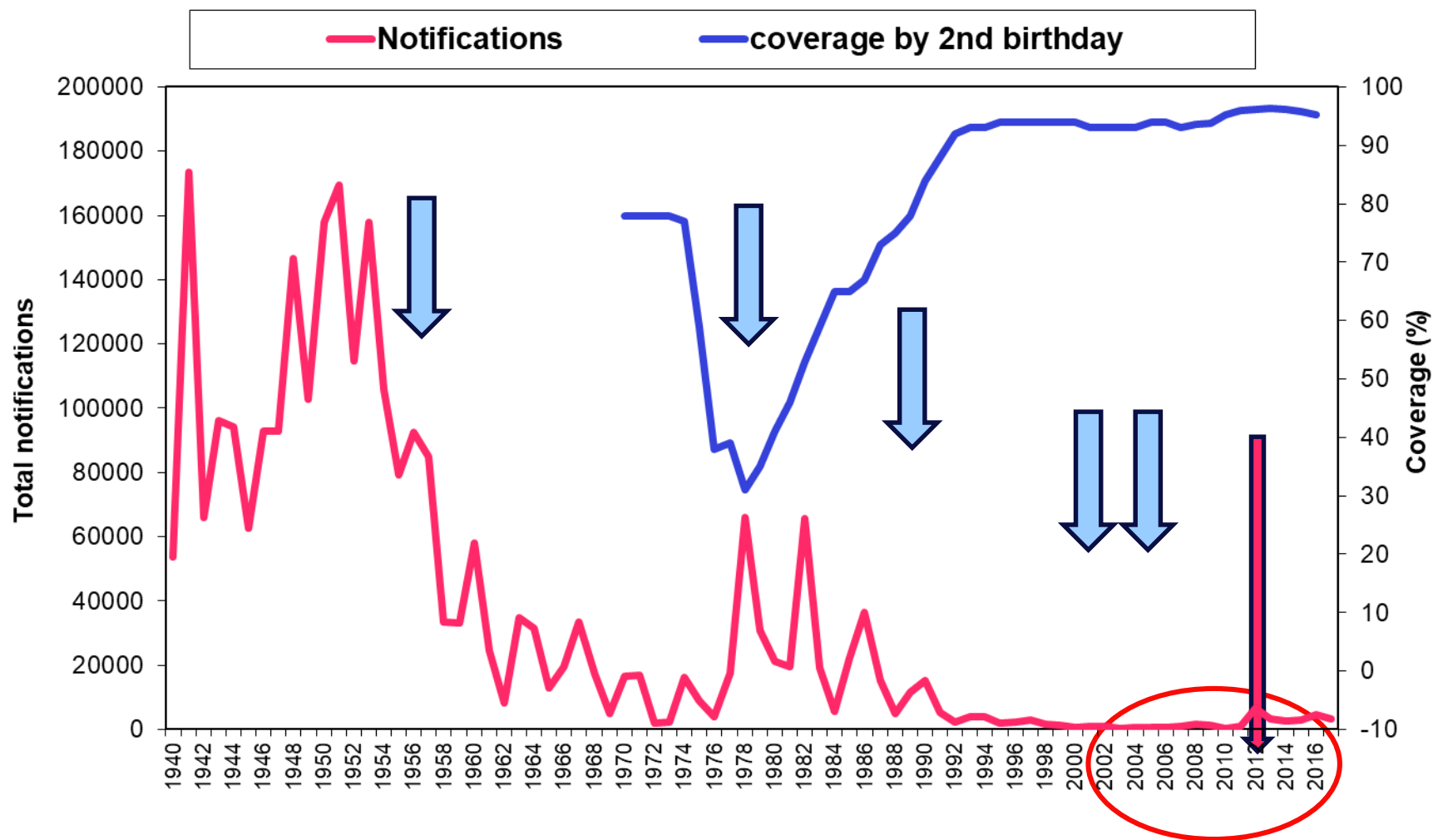


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What does pertussis look like?

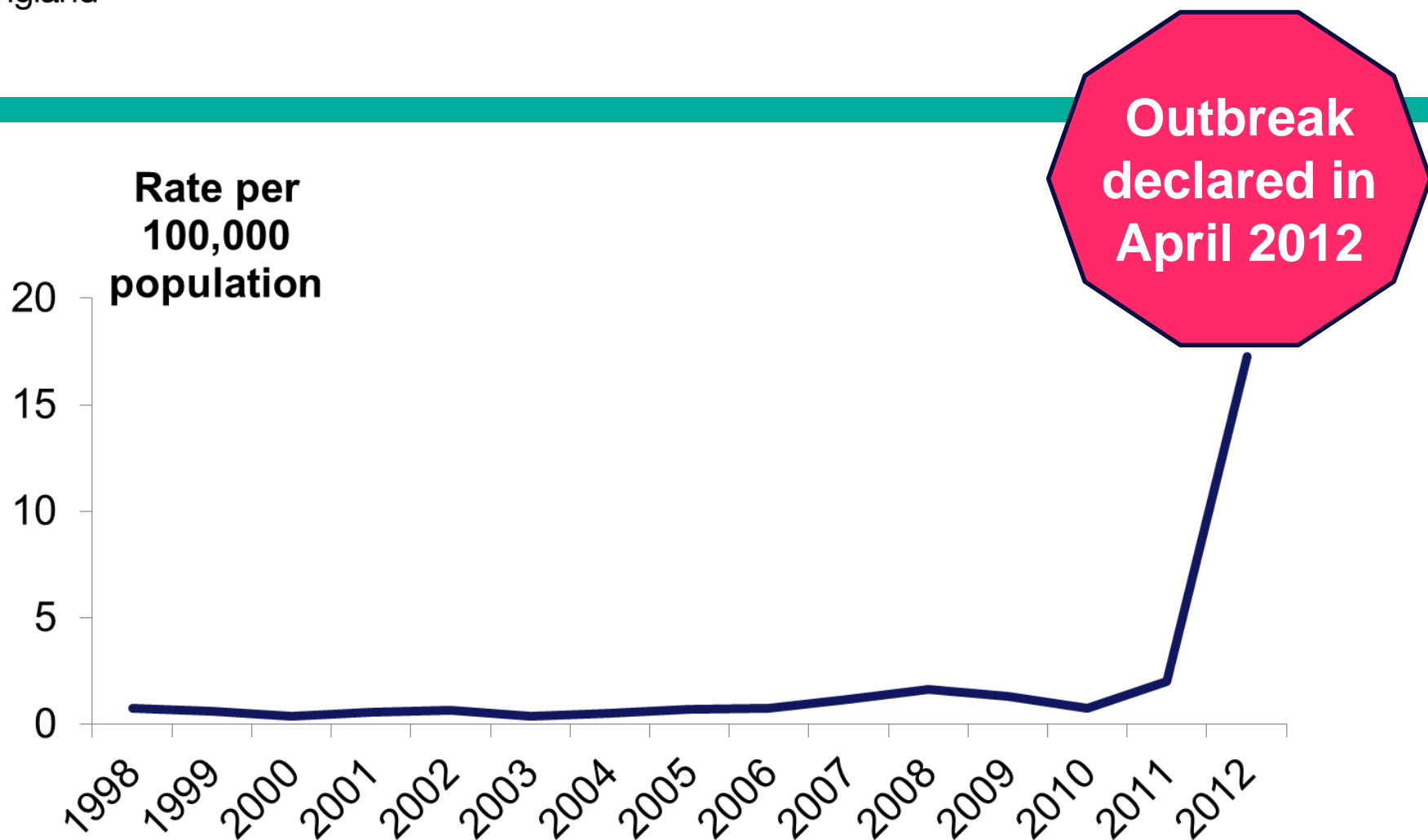
Pertussis notifications and vaccine coverage 1940-2017 (England and Wales)



Primary vaccines at 8, 12 and 16 weeks, booster at 3 years 4 months

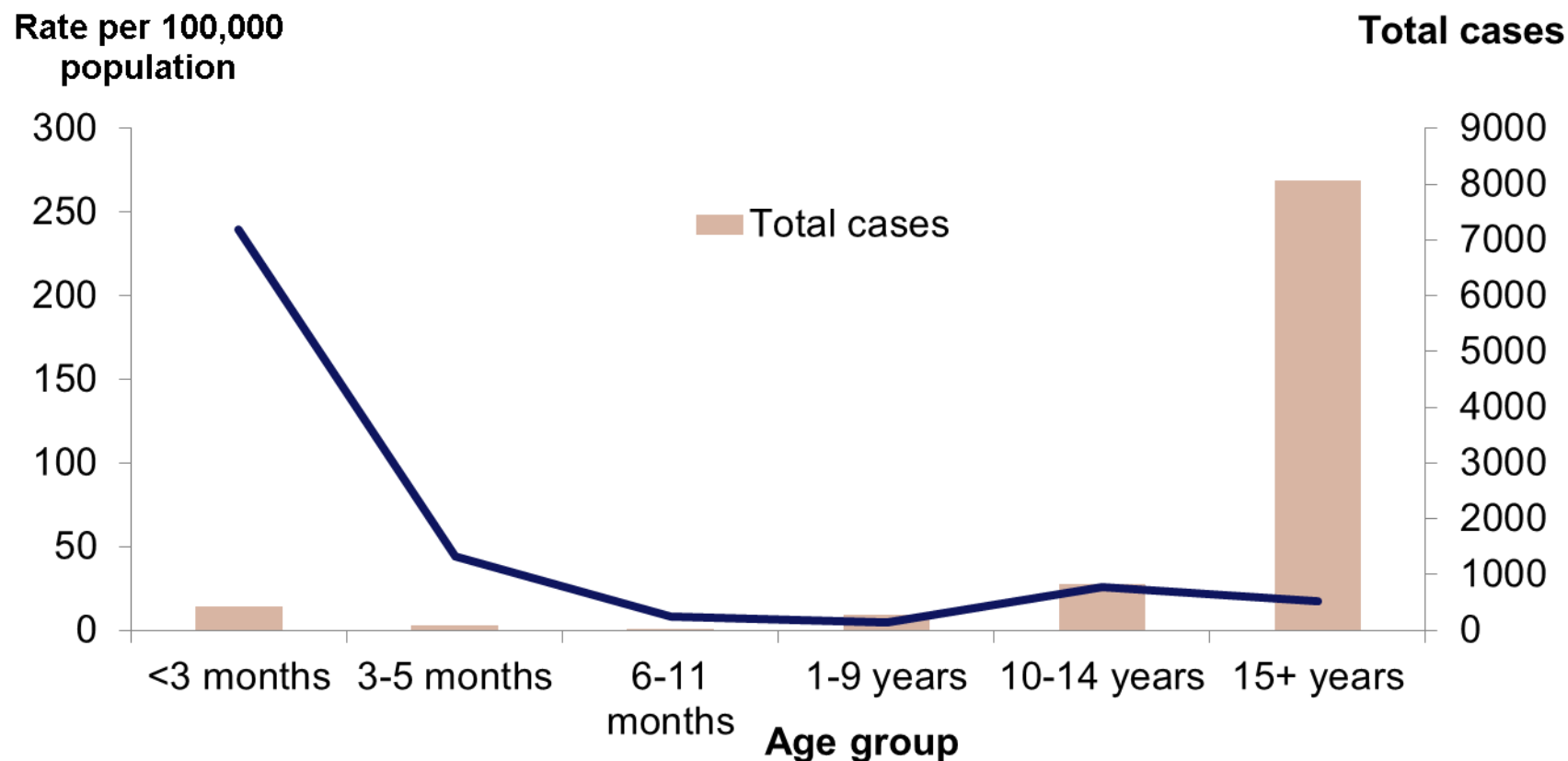


Incidence of laboratory confirmed pertussis cases at all ages, England & Wales





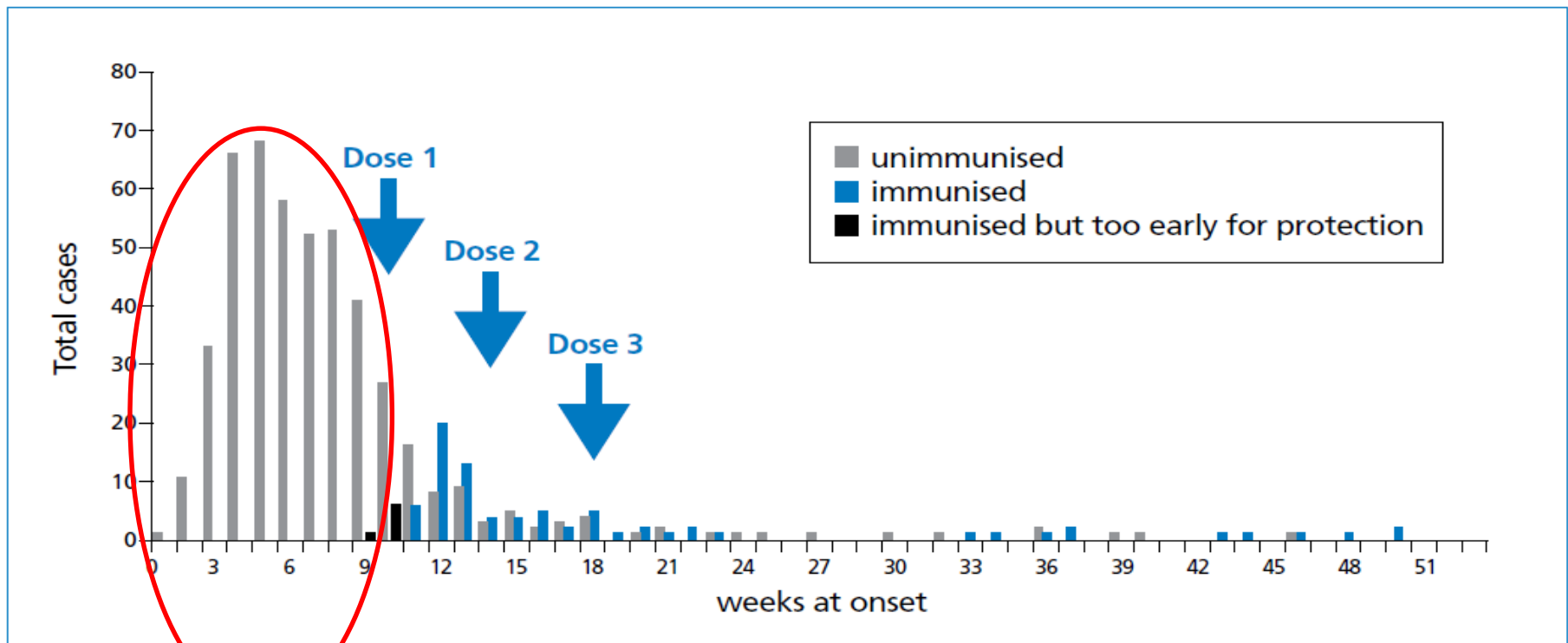
Age distribution of laboratory confirmed pertussis cases and rate per 100,000 England and Wales 2012





Onset age of laboratory confirmed pertussis cases in infants

14 infant deaths



Confirmed cases in infants aged under one year, by week of age at onset (2011- August 2012). Protection is assumed to accrue within the two weeks following immunisation.



UK Maternal Programme rationale

- Only potential way to protect infants from birth
 - Boost immunity in pregnant women
 - Optimise transplacental transfer of maternal Abs
 - Passive protection in infant until first dose of vaccine at 2 months
- Additionally these women are then unlikely to be a source of infection for their babies





Pertussis vaccination in pregnancy

UK Maternal Programme introduced as outbreak response measure

Introduced in October 2012

- Offer a single dose of Repevax®(dTaP/IPV) ideally between 28-32 weeks pregnancy
- Offer in every pregnancy

From July 2014, vaccine changed to Boostrix-IPV® (dTaP/IPV)

From April 2016, guidance updated to advise women can be vaccinated from 16 weeks, ideally between 20-32 weeks (usually after 20 week scan)



ews > Pregnant women to be offered pertussis vaccine

Pregnant women to be offered pertussis vaccine

Mark Gould

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Friday, 28 September 2012

From today all pregnant women will be offered the whooping cough vaccine amid concerns about a serious increase in prevalence of the disease which has resulted in nine infant deaths this year.

Both the Royal College of General Practitioners (RCGP) and the Health Protection Agency (HPA) have welcomed the move which was announced by the Chief Medical Officer for England, Dame Sally Davies, today.

The HPA says it received reports of 1,230 cases of whooping cough in August 2012, bringing the total number of cases so far this year to 4,791, according to figures today.

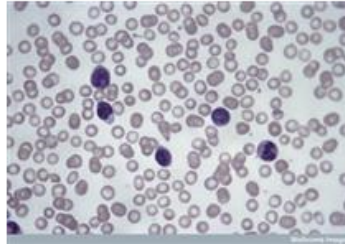
It says the total number of cases so far in 2012 (up to end of August) is now more than four times the annual total number of cases reported in 2011 (1,118) and in 2008 (908) – the last 'peak' current outbreak.

In August there were a further three pertussis-related deaths in infants aged three months and the total number of deaths in this age group so far this year to nine.

Dr Maureen Baker, the RCGP's Health Protection Lead said the college welcomed the move, "in light of the recent deaths of babies".

"Whooping cough is a highly infectious bacterial disease which spreads when a person with the coughs and sheds the bacteria which is then inhaled by another person.

"The vaccine will be offered to pregnant women from week 28 of their pregnancy during routine appointments with a GP, midwife or nurse.



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Pregnant women to be given whooping cough vaccine to protect unborn child

Pregnant women are to be given the whooping cough vaccine for the first time following the biggest outbreak of the disease for 20 years and the deaths of ten babies.



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28 September 2012 Last updated at 02:53

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Fergus Walsh

Medical correspondent
More from Fergus



Whooping cough vaccine a 'no-brainer' during pregnancy

COMMENTS (46)



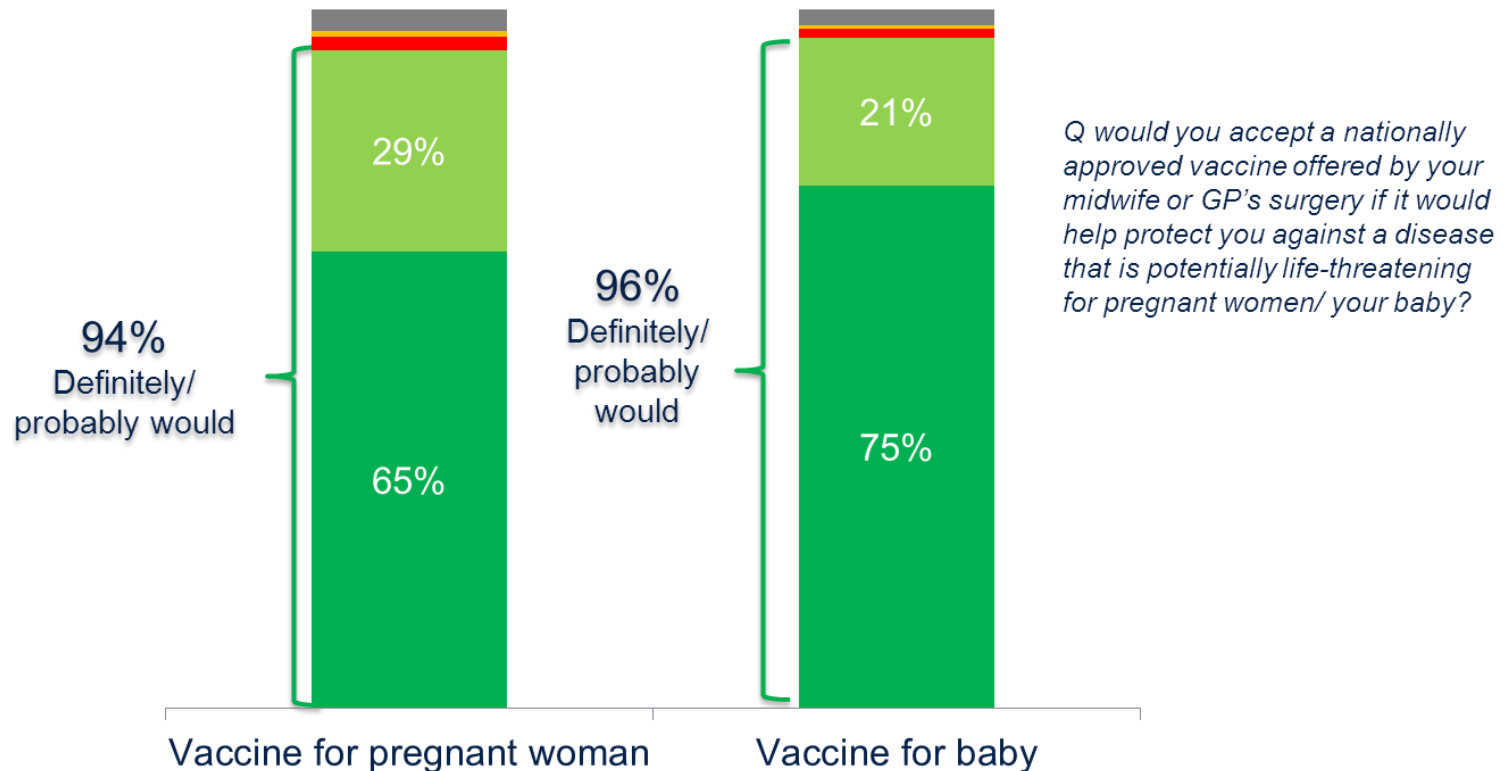
Zoe was just four weeks old when she got whooping cough, and had to spend



Evaluation of pertussis vaccination in pregnancy



Most mothers would accept vaccines in pregnancy

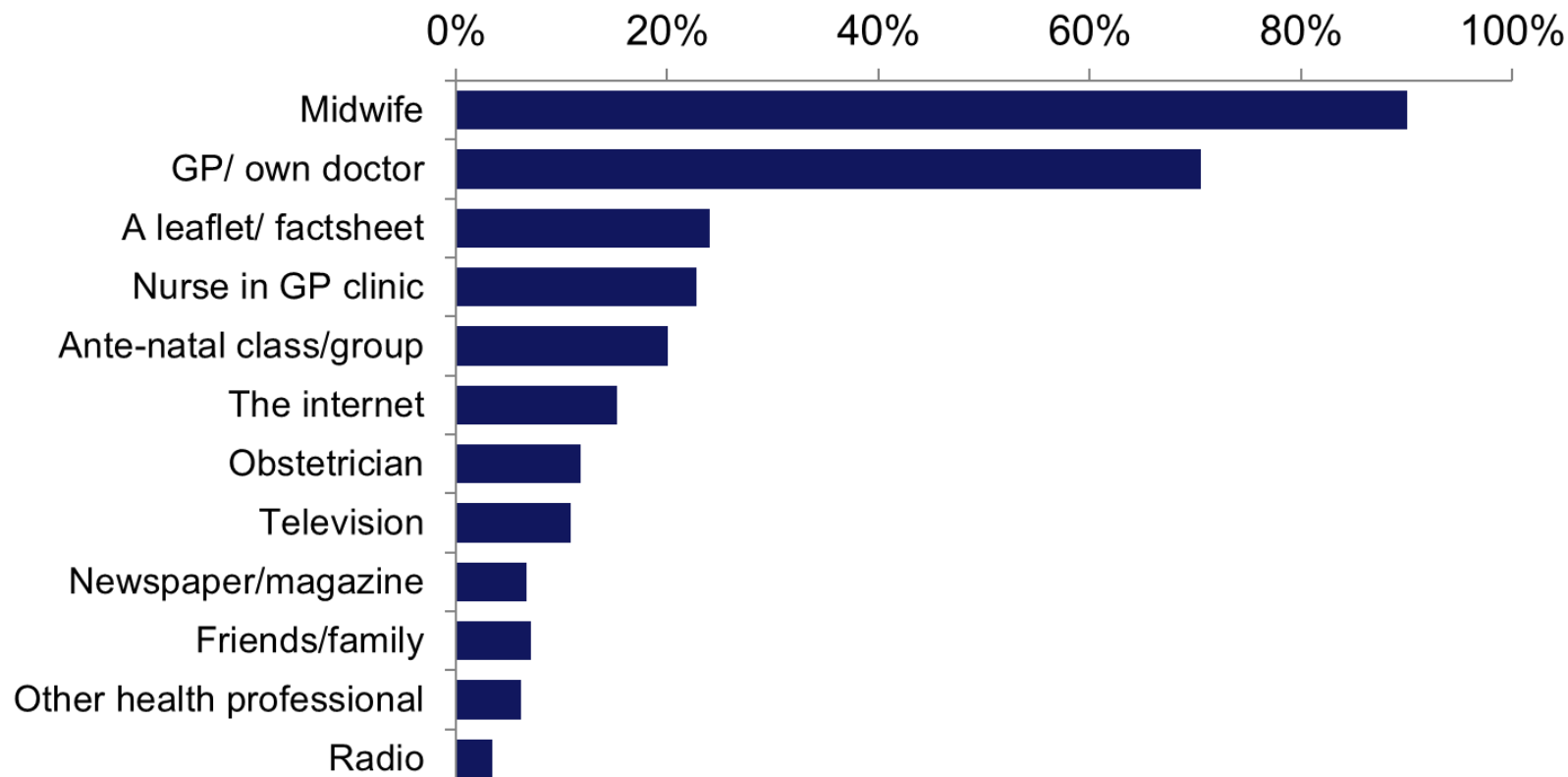


Base: All respondents (1,892)

Campbell et al (2014) British Journal of Midwifery

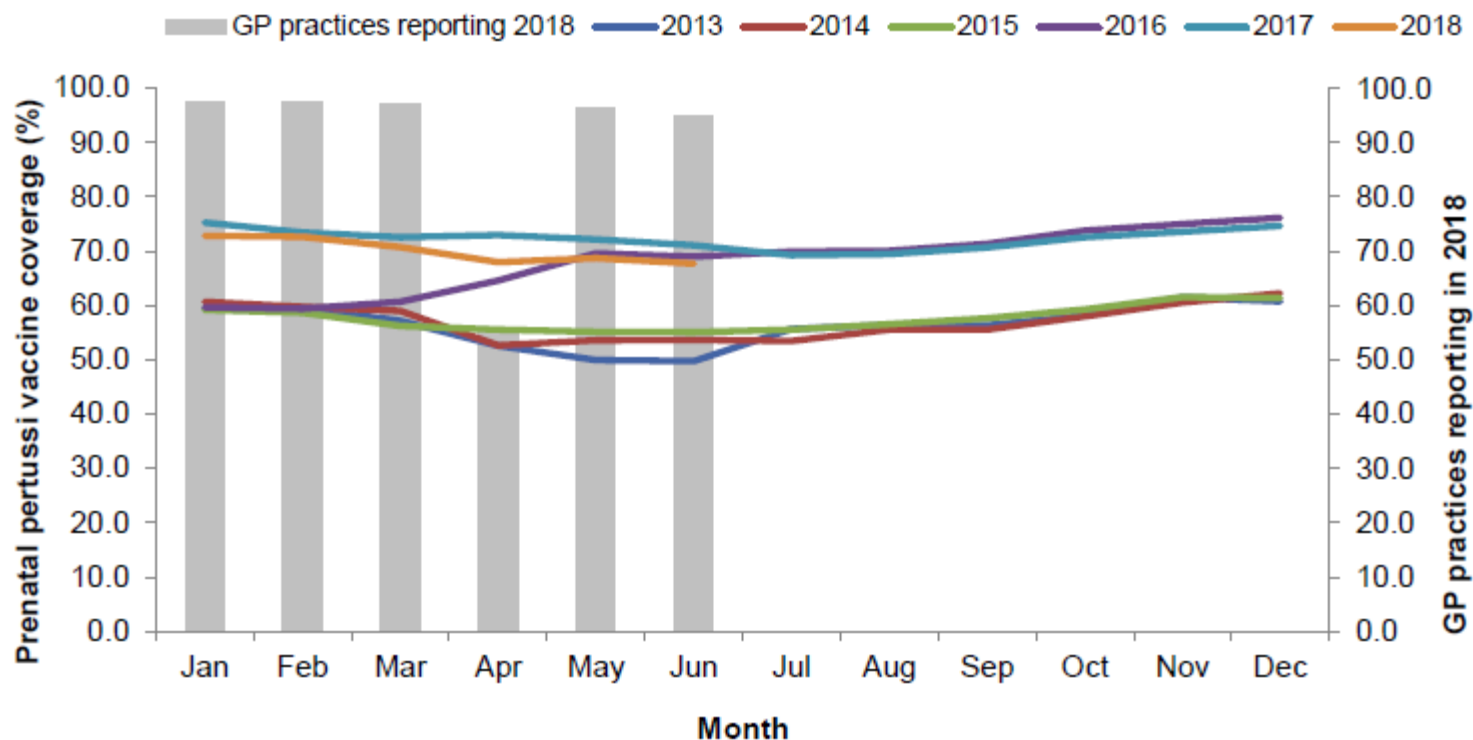


Women's ideal source of information if being offered a vaccine in pregnancy



Q. Ideally, where would you like to get information from if you are being offered a vaccine in pregnancy?

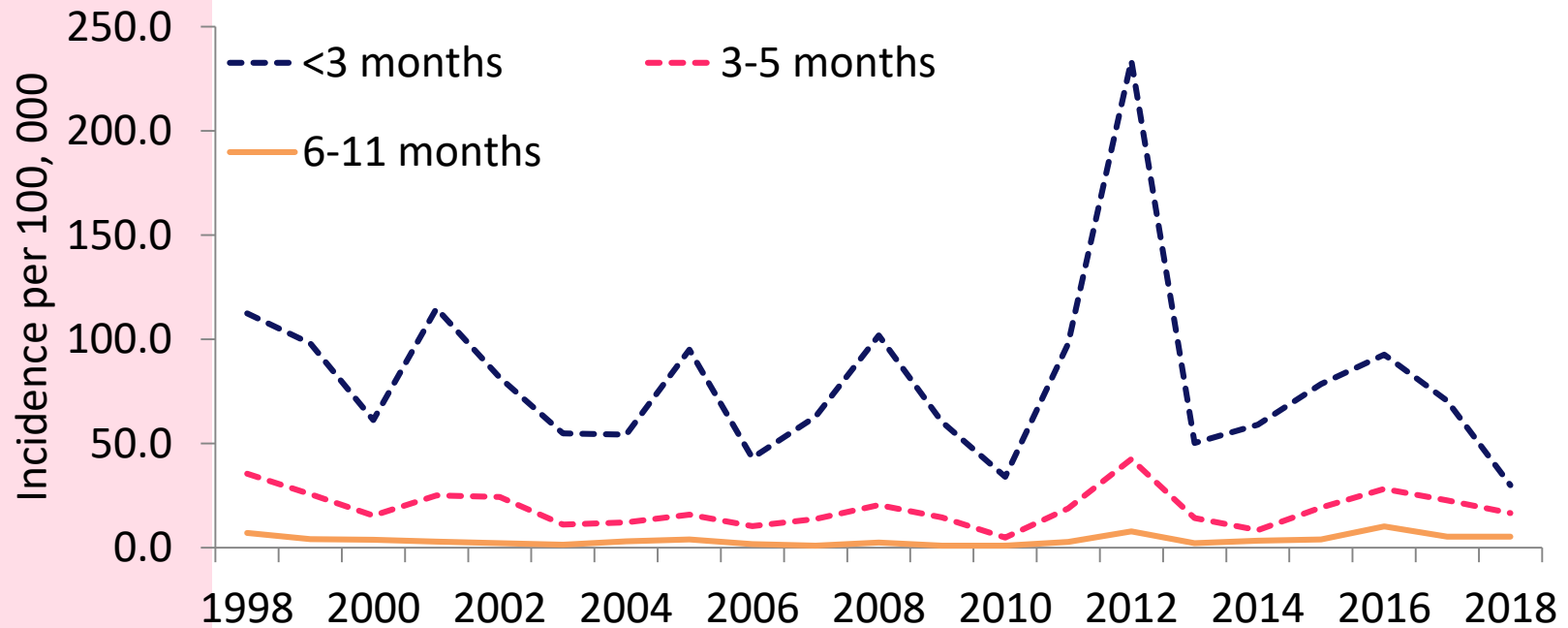
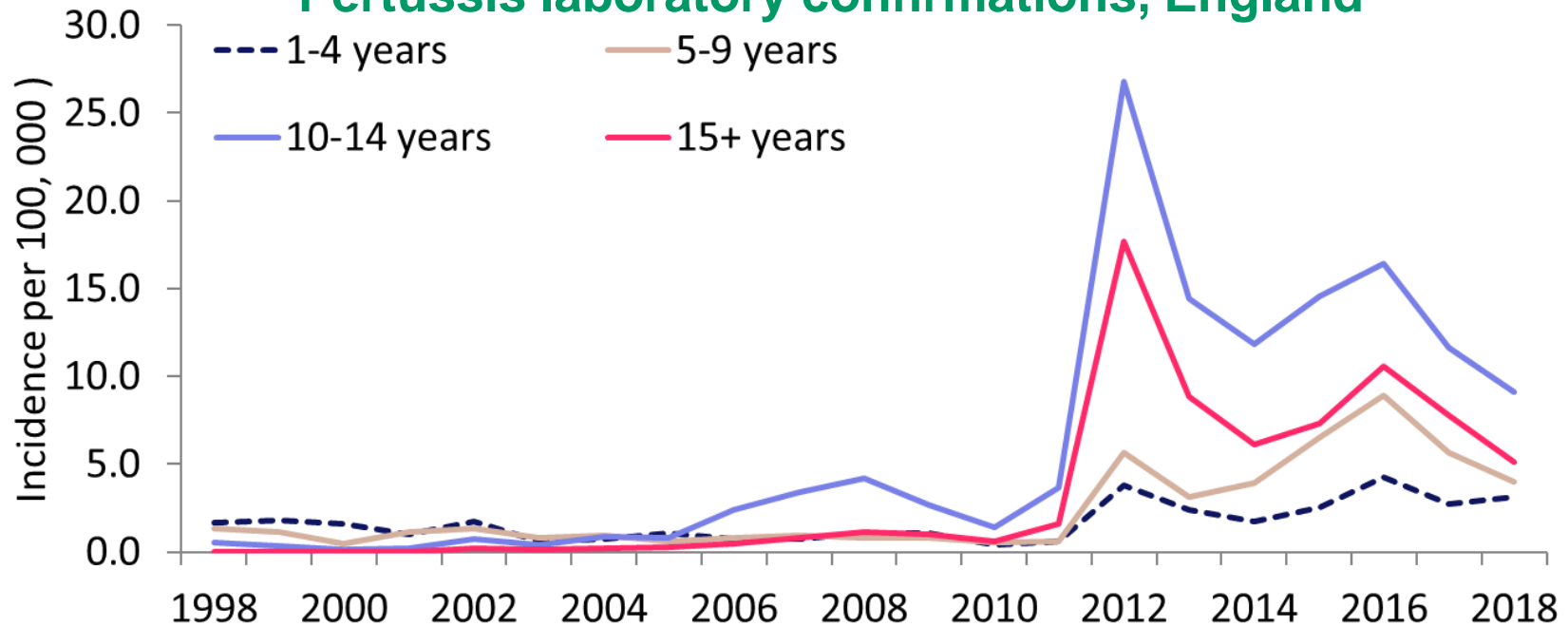
Monthly pertussis vaccination coverage (%) in pregnant women: England, 2013-2018



Footnotes:

1. New IT specification implemented in March/April 2016 [11]; 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.
3. Data from one of the largest IT suppliers were missing in April 2017

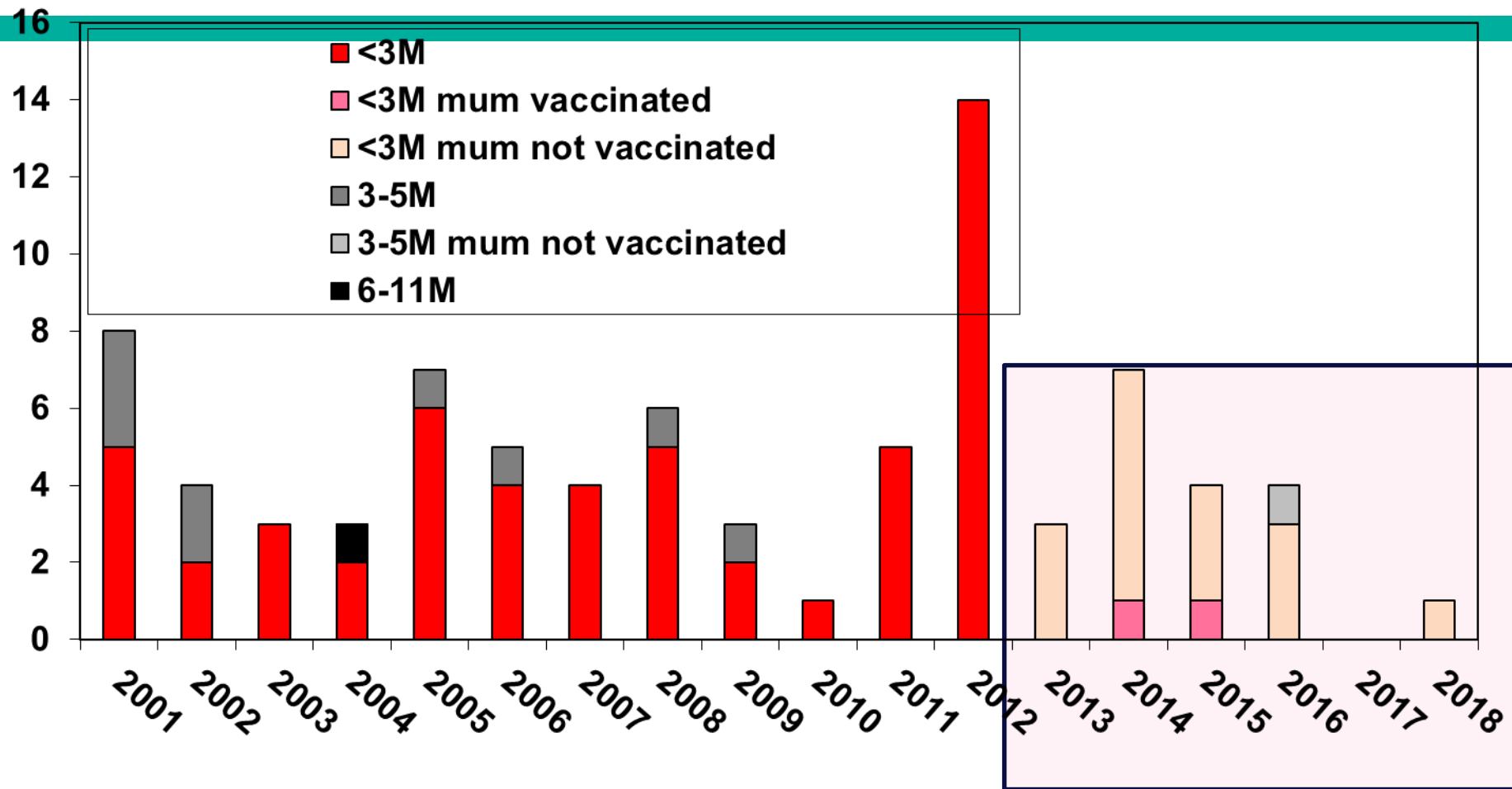
Pertussis laboratory confirmations, England





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Reconciled deaths from pertussis in infants, England 2001-2018



Sources: lab confirmed cases, certified deaths, Hospital episode statistics, GP registration details, HPZone



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Pertussis maternal vaccine effectiveness in prevention of infant disease: England

(1) Amirthalingam G et al. Lancet 2014 (2) Dabrera G et al. CID 2014
(3) Amirthalingam G et al CID 2016 (4) Unpublished PHE data to Sept 2017 (5)
Bellido-Blasco et al Eurosurveillance 2017

Analysis <2M age	Cases vaccinated / total	Matched / control coverage	Adjusted VE (95% CI)
Screening method (1)	11/81 (15%)	61%	90% (82% to 95%)
Case-control study (2)	10/58 (17%)	39/55 (71%)	93% (81% to 97%)
Screening Method (3)	35/243 (14.4%)	64.8%	91% (88% to 94%)
Case-control study (5)	5/22 (23%)	41/66 (62%)	91% (57 to 98%)



Investigating impact on infant immune response - Blunting

- Consistent reporting of interference in the infant's primary pertussis response following maternal immunisation – immunogenicity studies.
- The clinical significance of these findings remains unclear as no agreed correlate of protection for pertussis
- Specific pertussis antigens affected differs between studies.
- From studies in England and the US there is no evidence that babies born to vaccinated mothers are more at risk of disease after their infant vaccinations than babies born to unvaccinated women.

From Campbell et al JMM 2018 - Hardy-Fairbanks 2013; Hoang 2016; Ladhani 2015; Maertens 2016; Munoz 2014



Studies on safety

- 16 studies, covering over 150,000 vaccinated pregnancies,
- assessing the safety of Tdap and Tdap/IPV vaccines with either 3- or 5- pertussis components.
- largely retrospective observational studies from Europe and North America investigated a range of maternal, fetal and infant outcomes.
- The findings were generally consistent with reassuring evidence of similar risks of maternal, fetal and infant outcomes (e.g. pre-eclampsia, preterm delivery, still birth or congenital anomalies) in vaccinated & unvaccinated pregnancies.
- Chorioamnionitis in mother (3 of 6 studies suggested small signif risk) but not in associated infant conditions (1) transient tachypnea of the newborn; (2) neonatal sepsis; (3) neonatal pneumonia; (4) respiratory distress syndrome; (5) newborn convulsions.

Campbell et al JMM 2018 - Donegan 2014; Hoang 2016; Kharbanda 2014; Kharbanda 2016; Maertens 2016; Morgan 2015; Munoz 2014; Shakib 2013; Walls 2016; Zheteyeva 2012



Changing model of delivery and training for health professionals are key challenges

- Antenatal care in England shared between maternity services (midwives) and general practice and care pathways vary across the country. Timely vaccination relies on good communication.
- Increasingly model of delivery in England moving to maternity settings
- In the UK, programme introduced rapidly as outbreak response measure with limited opportunity for health professional training



Conclusions

- Despite success of childhood immunisation programmes, pertussis remains a global public health concern
- Additional strategies required to optimise control and protect infants at highest risk of severe disease
- Immunising pregnant women has been shown to be a safe and highly effective strategy in protecting young infants in the first months of life, in high income settings
- Challenges remain in achieving high coverage in target group – delivery through maternity services
- And there are some outstanding questions
 - (1) optimal timing as demonstrated by clinical protection
 - (2) longer term impact of approach – including blunting
 - (3) optimal infant/ booster schedule



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through the PHE pertussis enhanced
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Thank you for your attention.

