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Immunisation Update for Occupational Health

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Public Health England

29th April 2016

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Session Outline

- Epidemiology of vaccine preventable diseases (VPDs) in England
- UK Vaccination policy for Healthcare workers
- Cases of VPDs in healthcare workers and response to incidents in healthcare settings
  - measles
  - pertussis
  - meningococcal disease

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Measles

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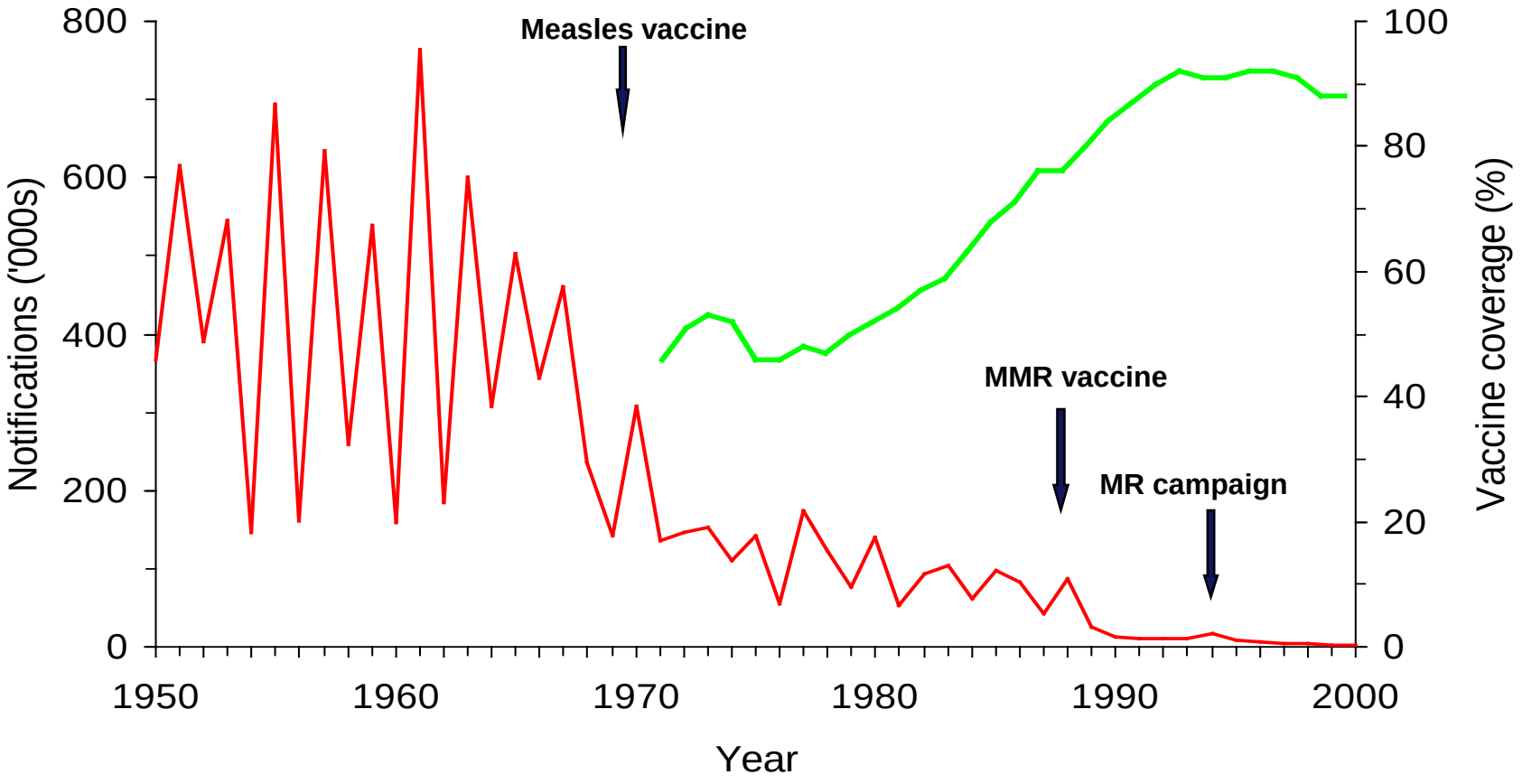
Annual measles notifications & vaccine coverage
England and Wales 1950-2000



Source: Public Health England

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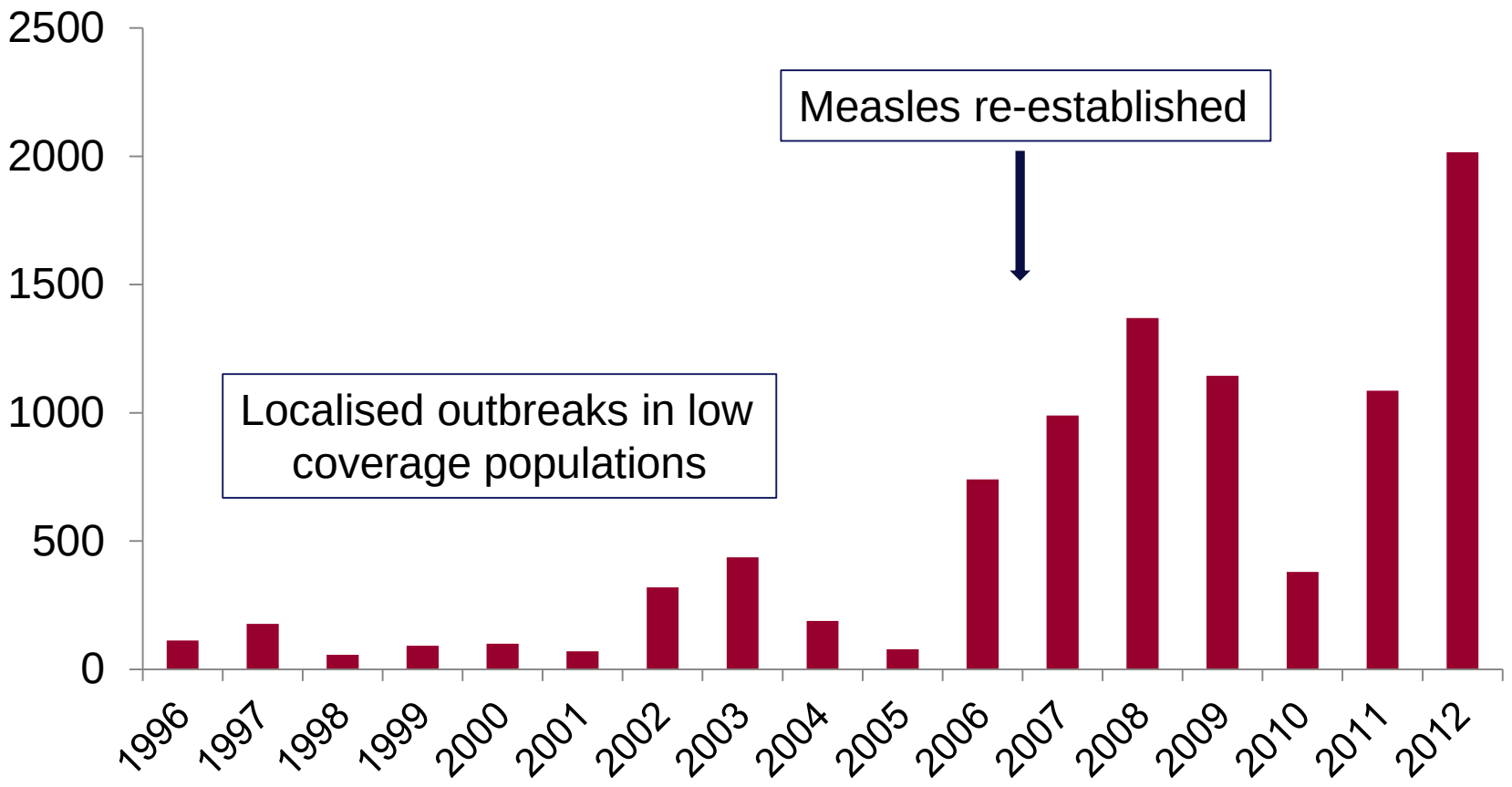
Annual confirmed cases of measles England and Wales 1996 to 2012



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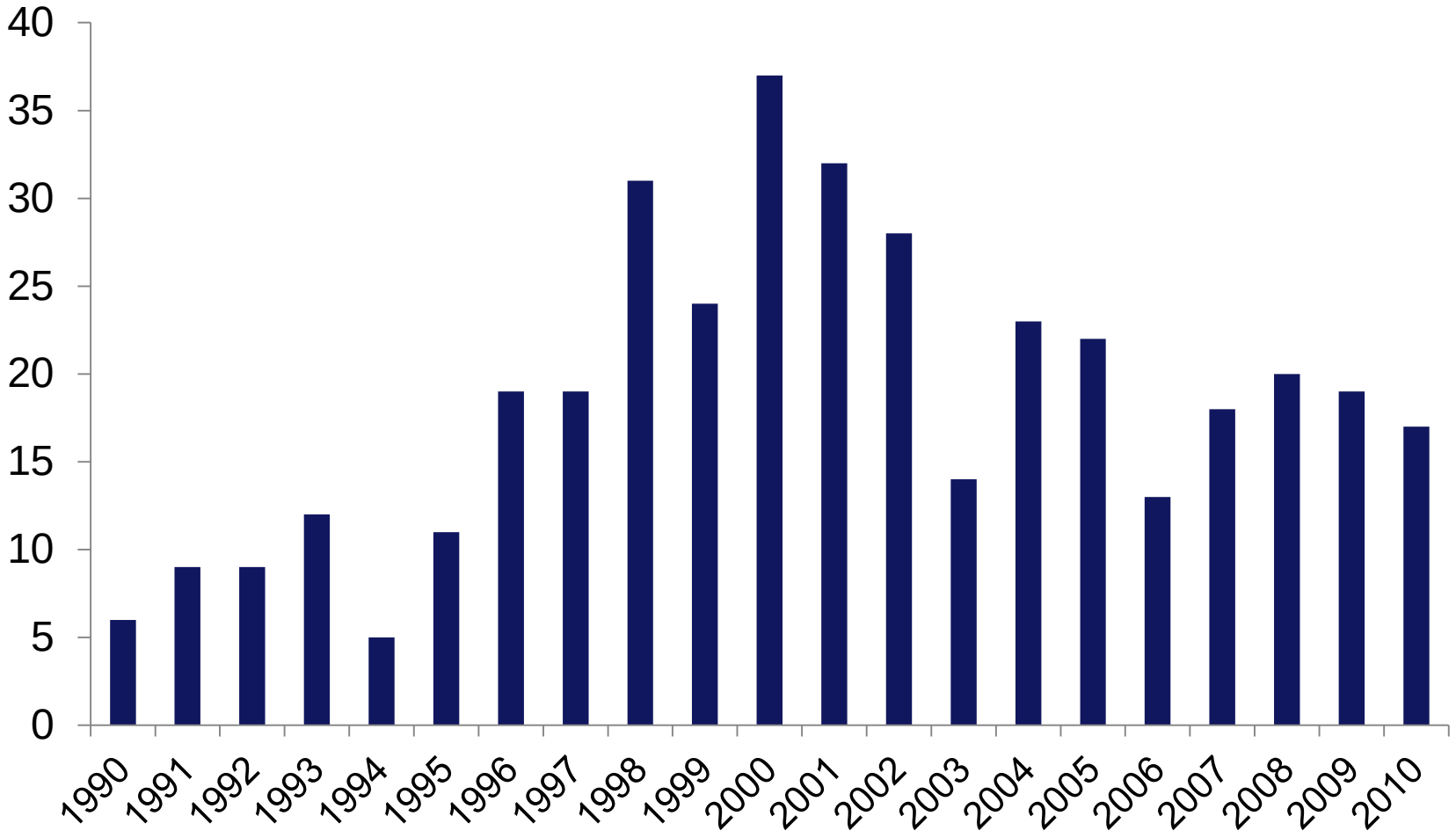
Distribution of confirmed measles cases in England by year of birth, 2013



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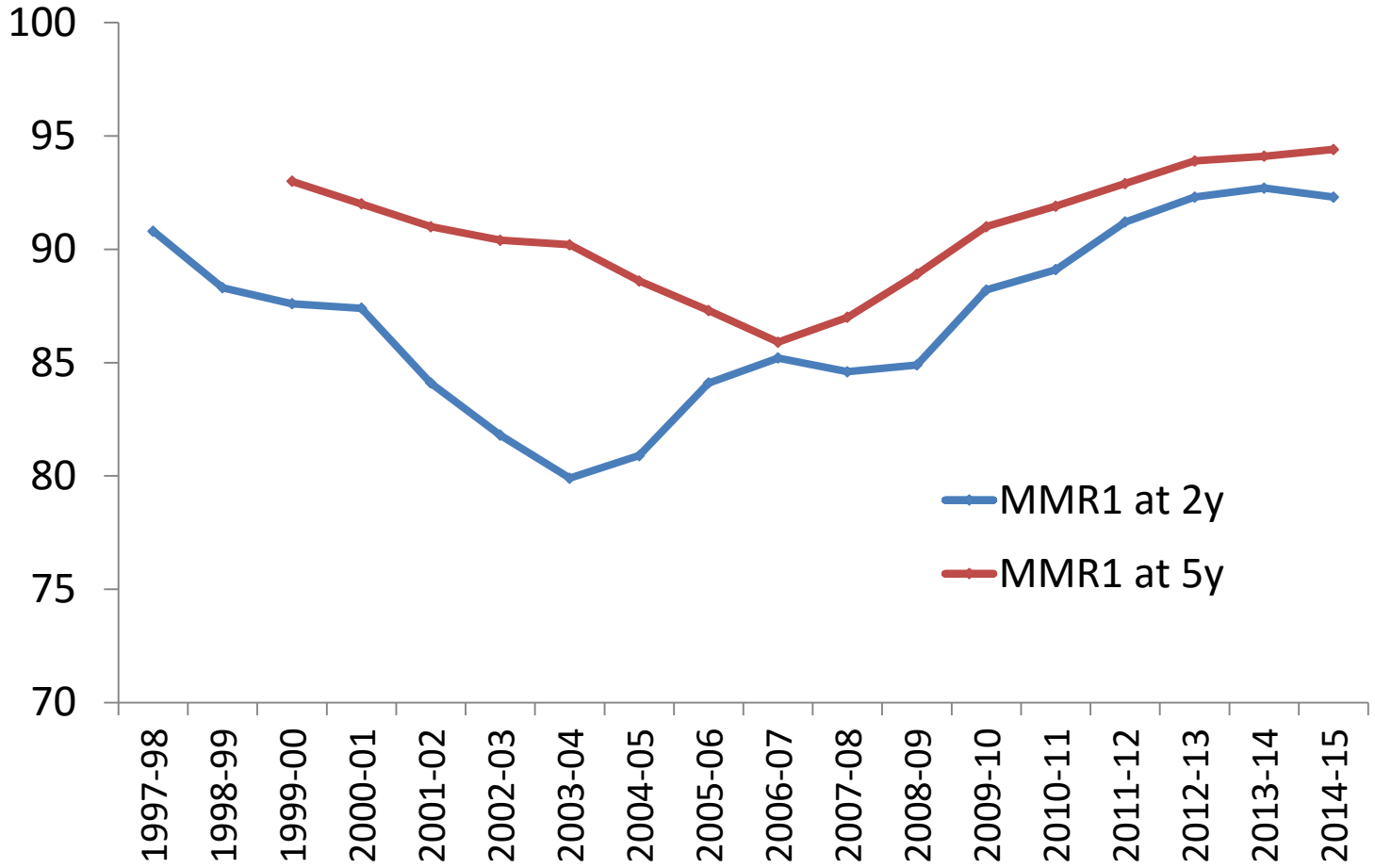
MMR coverage at two and five years of age, England 1997/8-2014/15



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Summary

- Increase in measles observed in 2012 and 2013
  - Peak age group affected now aged 10-14 years
- Coverage of MMR is now at historically high levels, BUT
  - Legacy of older children who were not vaccinated as toddlers
  - These young people are now attending secondary schools
  - No routine opportunity to receive MMR
  - Estimated 330,000 unvaccinated 10-16 years of age
- Potential for school outbreaks in many areas of the country

National MMR catch up programme targeting unvaccinated and partially vaccinated children aged 10-16 years

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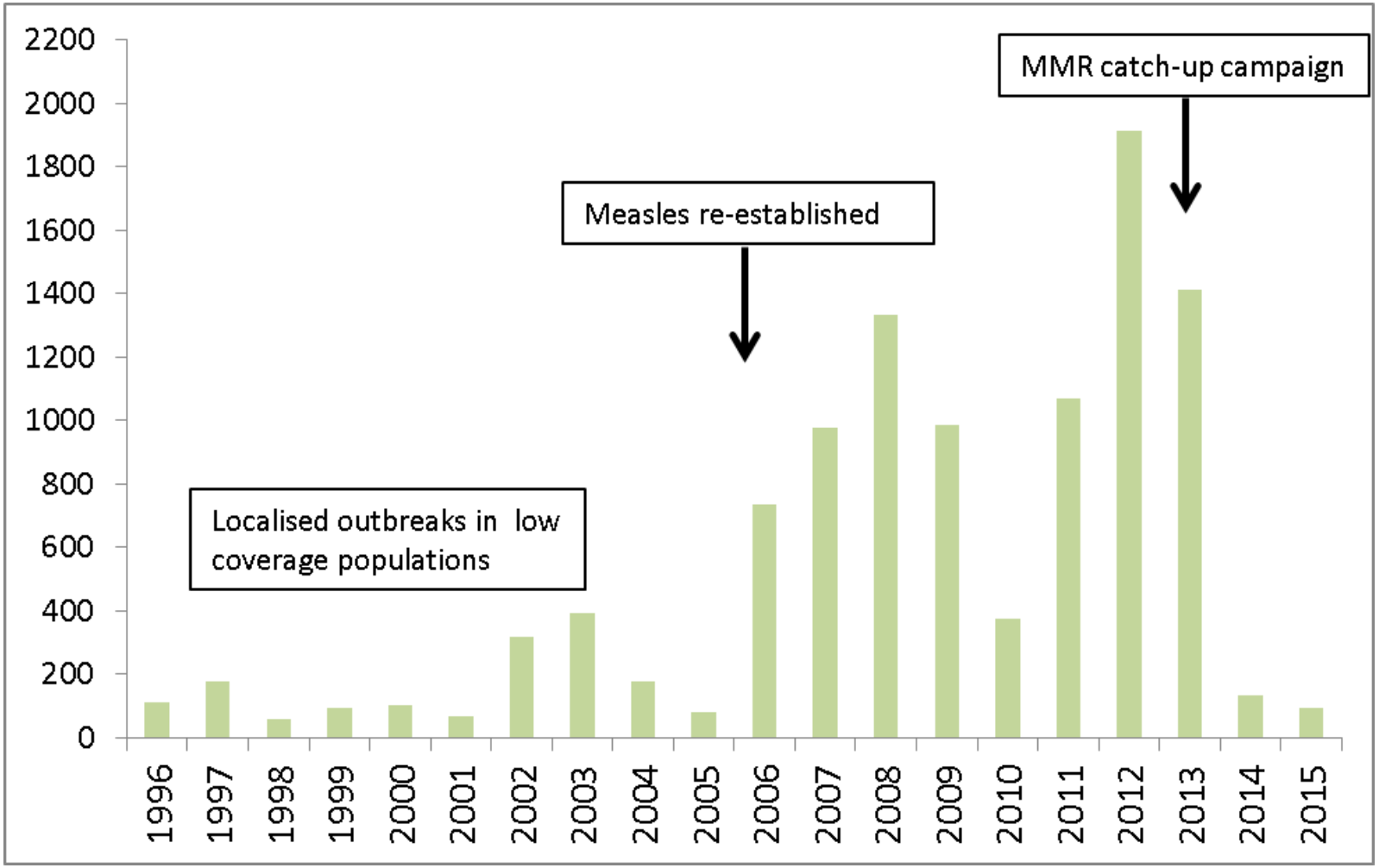
Annual confirmed cases of measles England and Wales 1996 to 2015



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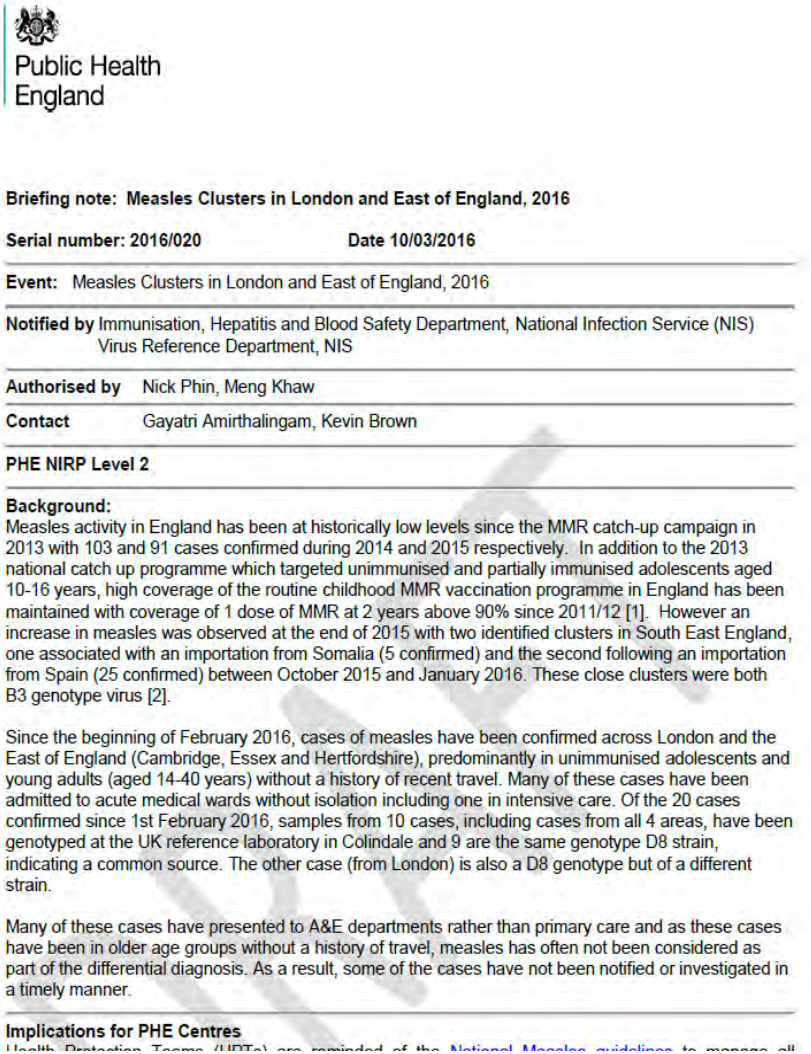
Measles cases in 2016

- Increase in confirmed measles cases in London /East of England
- Predominantly unimmunised adolescents / young adults
- Largely attending walk in centres, A&E depts
- Delays in diagnosis and lack of infection control
- Significant resources for contact tracing in hospital settings including healthcare staff



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Briefing note: Measles Clusters in London and East of England, 2016

Serial number: 2016/020 **Date 10/03/2016**

Event: Measles Clusters in London and East of England, 2016

Notified by Immunisation, Hepatitis and Blood Safety Department, National Infection Service (NIS) Virus Reference Department, NIS

Authorised by Nick Phin, Meng Khaw

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PHE NIRP Level 2

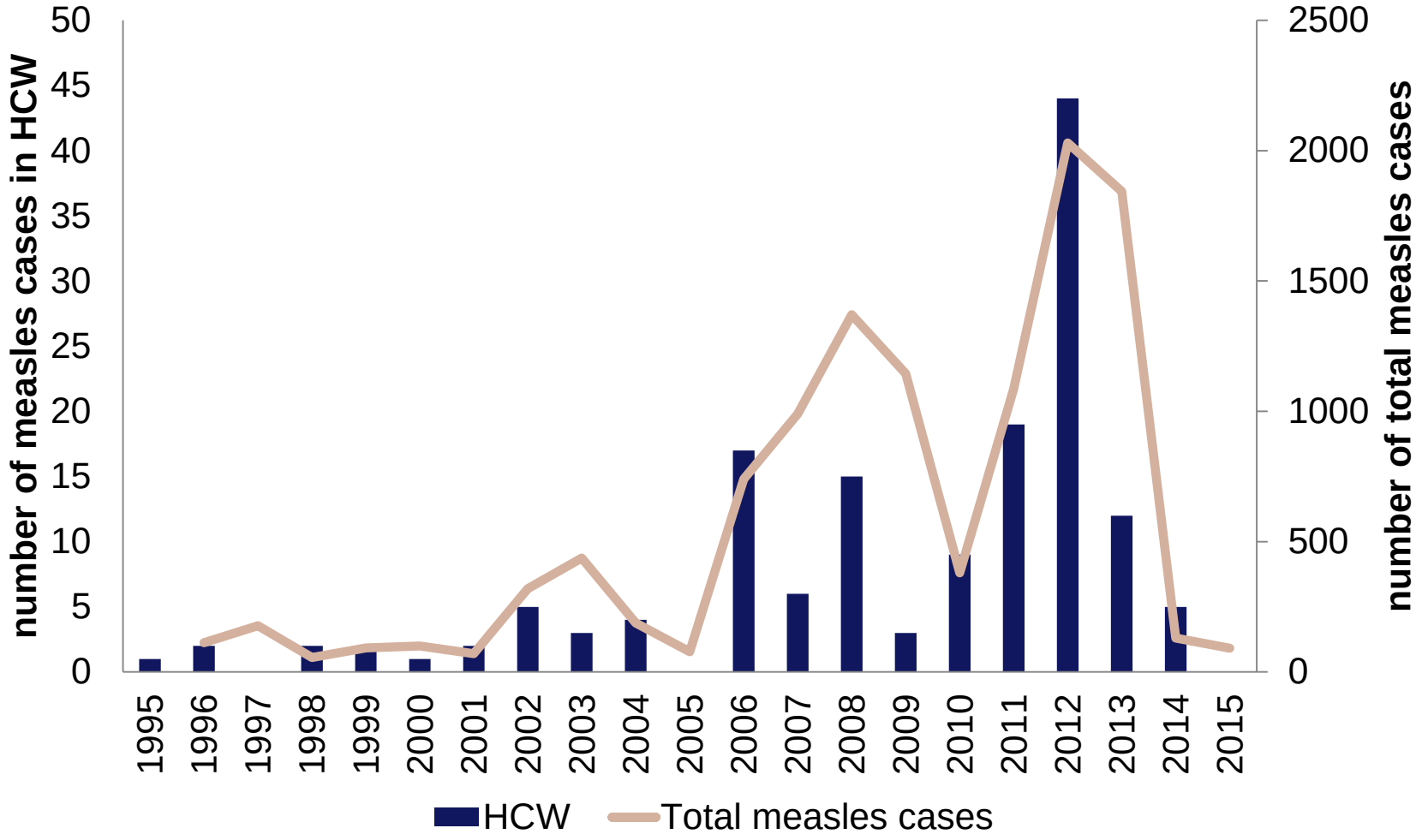
Background:
Measles activity in England has been at historically low levels since the MMR catch-up campaign in 2013 with 103 and 91 cases confirmed during 2014 and 2015 respectively. In addition to the 2013 national catch up programme which targeted unimmunised and partially immunised adolescents aged 10-16 years, high coverage of the routine childhood MMR vaccination programme in England has been maintained with coverage of 1 dose of MMR at 2 years above 90% since 2011/12 [1]. However an increase in measles was observed at the end of 2015 with two identified clusters in South East England, one associated with an importation from Somalia (5 confirmed) and the second following an importation from Spain (25 confirmed) between October 2015 and January 2016. These close clusters were both B3 genotype virus [2].

Since the beginning of February 2016, cases of measles have been confirmed across London and the East of England (Cambridge, Essex and Hertfordshire), predominantly in unimmunised adolescents and young adults (aged 14-40 years) without a history of recent travel. Many of these cases have been admitted to acute medical wards without isolation including one in intensive care. Of the 20 cases confirmed since 1st February 2016, samples from 10 cases, including cases from all 4 areas, have been genotyped at the UK reference laboratory in Colindale and 9 are the same genotype D8 strain, indicating a common source. The other case (from London) is also a D8 genotype but of a different strain.

Many of these cases have presented to A&E departments rather than primary care and as these cases have been in older age groups without a history of travel, measles has often not been considered as part of the differential diagnosis. As a result, some of the cases have not been notified or investigated in a timely manner.

Implications for PHE Centres

Confirmed measles in health care workers, 1995-2015 England and Wales



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Cases of confirmed measles in health care professionals in England and Wales by year of onset and year of birth,1995-2015

	1995-1997	1998-2000	2001-2003	2004-2006	2007-2009	2010-2012	2013-2015	Total
1950-1959	1	0	0	2	0	2	1	6
1960-1964	0	0	0	0	2	5	0	7
1965-1969	1	2	0	5	2	11	2	23
1970-1974	1	2	1	2	6	11	2	25
1975-1979	0	1	5	11	8	24	2	51
1980-1984	0	0	1	2	4	9	6	22
1985-	0	0	0	0	2	10	4	16
Total*	3	5	7	22	24	72	17	150

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Cases in health care workers 2001-2015

Medical staff		**42**
• Medical student	2	
• HO/SHO/SpR	18	(surgery , paediatrics , medical , A&E)
• Consultant	5	(radiology, gynae, gastro,anaesthetics)
• GP	11	
• Other(not specified)	6	
Nursing staff		**30**
• Student nurse	1	
• Qualified nurse	29	(SCBU, A&E, psychiatry, practice, ITU)
Other staff		**56**
• Ambulance crew	12	
• Pharmacist	6	
• Physiotherapist	3	
• GP receptionist	13	
• other support staff	22	(care assistant, dentist, social worker, radiographer, security, laboratory, etc)

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What can we do to reduce risk for health care workers?

Post exposure

- Healthy adults can receive MMR within three days of exposure
- Evidence for protection not good, none if given late
- Vulnerable patients can receive HNIG within five days – may modify severe infection

Many cases are not recognised until late

- Opportunity to identify those at risk missed

Measles is highly infectious

- Transmission has occurred after cases have left the room
- Unable to reliably define those at risk

Contact tracing and prophylaxis is an expensive and time consuming exercise

- Probably limited public health benefit

Service Implications of staff exclusion

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Pre-exposure policy

- To ensure all healthcare workers are immune to measles and rubella
- Satisfactory evidence of protection would include

  - having received two doses of MMR, or
  - positive antibody tests for measles and rubella

- Serological testing is not required post vaccination

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Serological testing

Measles tests were not designed to measure protection

- Diagnosis of acute infection (high levels IgG or seroconversion from paired samples)
- Low sensitivity (particularly for lower levels seen in vaccinated individuals, better for older individuals with natural immunity)
- Specificity generally high

Serological testing

Assume 95% of adults are truly immune

If you test 1000 health care workers

950 are truly immune

50 are truly susceptible

	Test positive	Test negative /
True immune	855	95
Not immune	3	47

Assume specificity of 94% and sensitvity of 90%

The proportion of test positives that are truly immune (PPV) is 855/858 (99.7%)

The proportion of test negatives that are truly susceptible (NPV) is 47/142 (33.1%)

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Pertussis

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Whooping Cough

- *B. pertussis* exclusively human pathogen
  - Transmission via close direct contact
- Clinical presentation varies with age
  - Unimmunised infants at highest risk of complications and deaths
  - Atypical / mild infection in older vaccinated individuals
- Aim of Immunisation Programme
  - To prevent serious disease and death from pertussis in young infants
  - Need to understand source of transmission for infants
- Infection / vaccination do not offer lifelong protection

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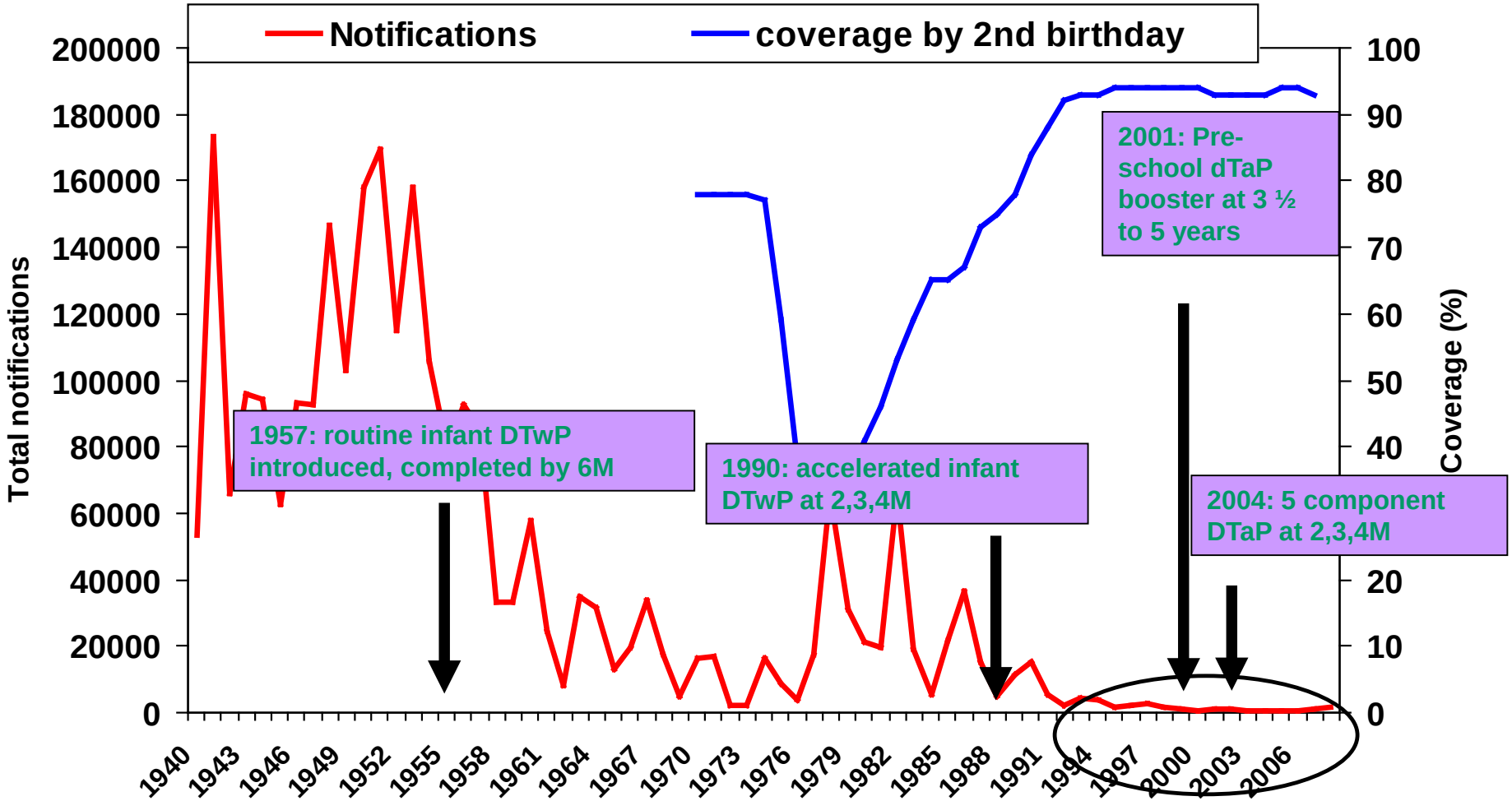
Pertussis Immunisation Programme in England



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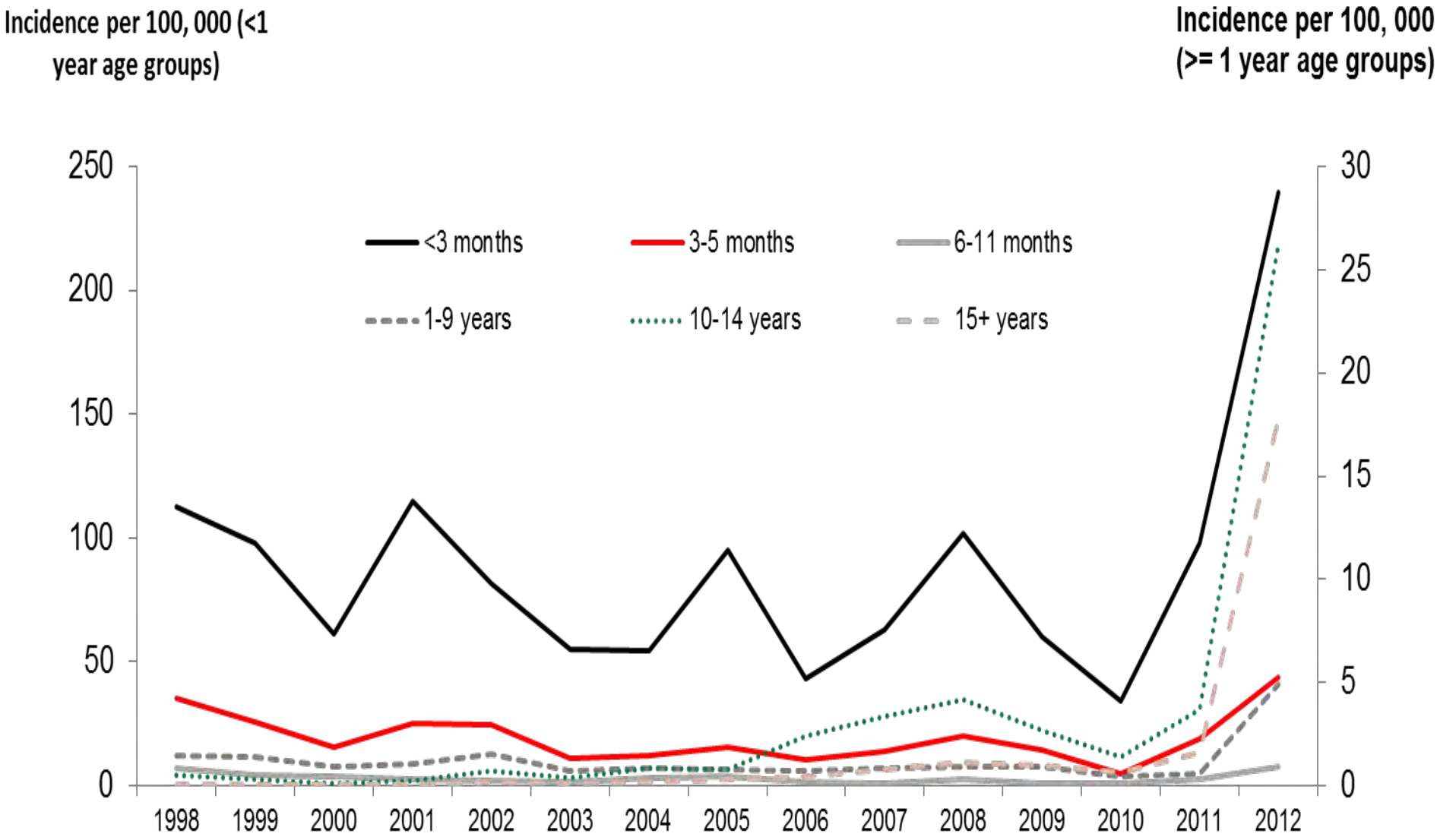
Annual age specific pertussis incidence rates, England, 1998-2012



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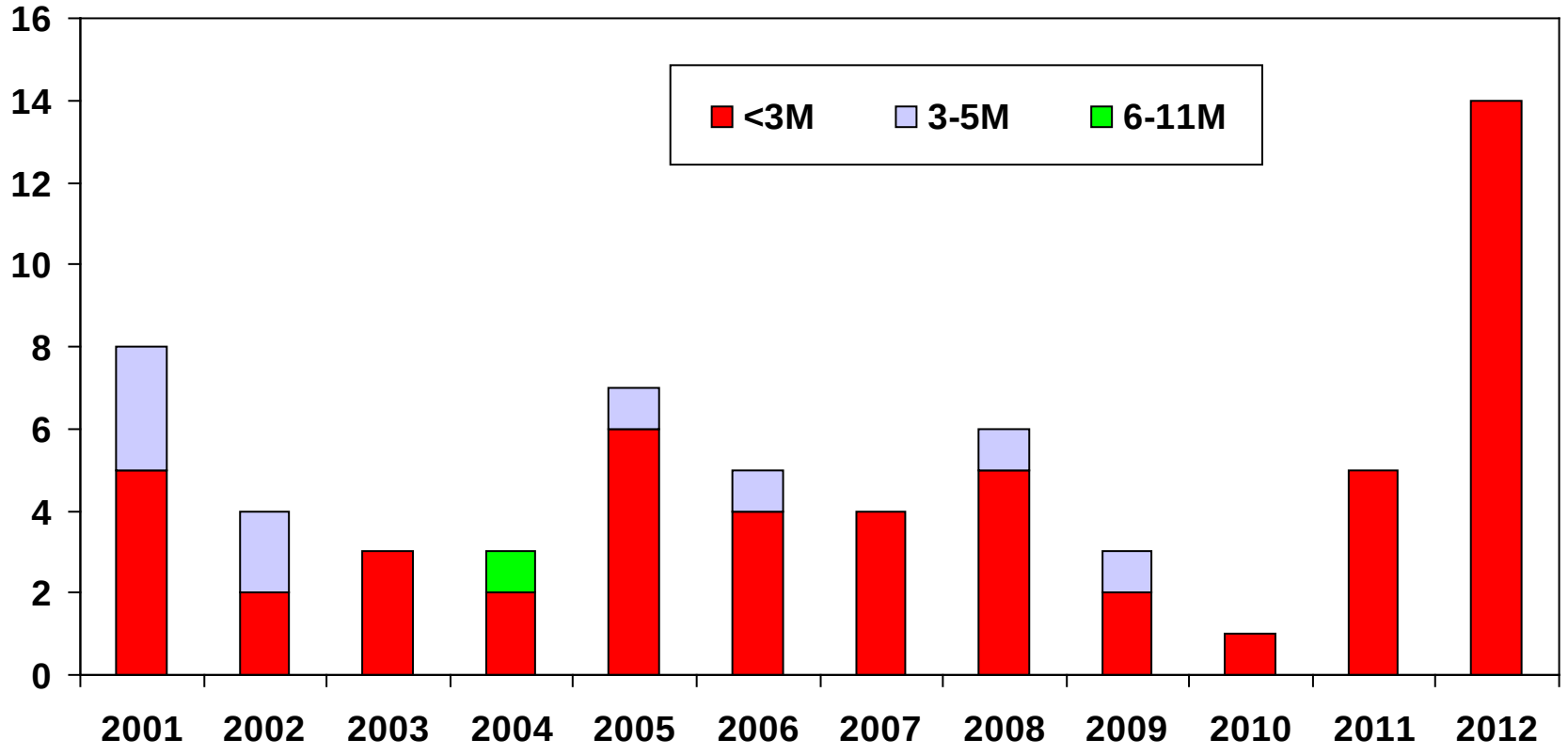
Number of deaths from whooping cough in infants, England, 2001-2012



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

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Reason for pertussis resurgences?

Investigated by WHO Strategic Advisory Group of Experts (SAGE)

- review of epidemiology in 19 countries
- results of baboon challenge studies
- mathematical models that simulate pertussis transmission

Data supported a ‘true’ resurgence in 5 of 19 countries

- Australia, Chile, Portugal, USA and UK

SAGE conclusion: Weekly Epidemiological Record: July 2014

“*The shorter duration of protection and likely reduced impact on infection and transmission conferred by aP vaccines play a critical role in the resurgence of pertussis*”

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WHO position on HCW vaccination

- HCWs are at increased risk of pertussis and transmission in healthcare settings pose substantial risk of infection for infants
- Vaccination of HCWs recommended in many countries (either all or those with regular contact with pregnant women /infants)
- Vaccination of HCWs considered only partially effective in preventing nosocomial spread of infection

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Vaccination of Healthcare workers

- Increased risk of pertussis and risk of transmission to vulnerable groups
- Number of incidents associated with healthcare settings in 2011

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Vaccination of Healthcare Workers

BUT

- Likely to contribute a small part in improving overall control
- High coverage difficult to achieve
- Maternal programme introduced in October 2012
- Need for boosters
- Global pertussis vaccine supply shortages

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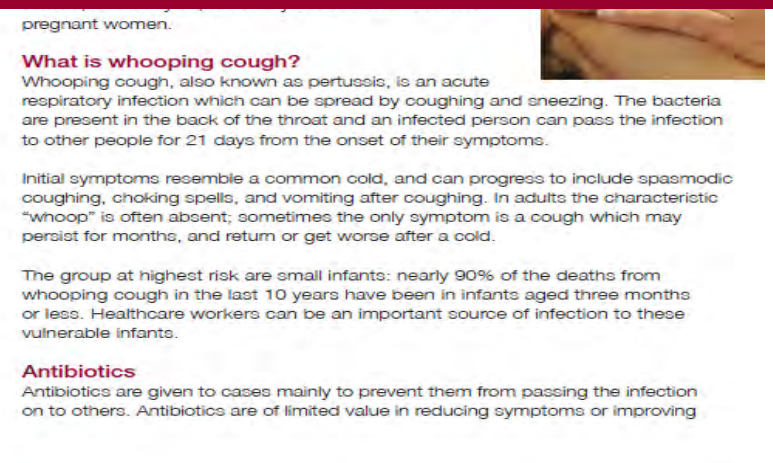
Public health management of pertussis in healthcare settings (2012)

- Developed by expert group
- Definitions of significant exposure in a healthcare setting
- Definitions of priority groups for post exposure propphylaxis
- Focus for chemoprophylaxis and post exposure vaccination in settings involving pregnant women and young infants
- wider vaccination where evidence of nosocomial transmission in a high risk setting e.g. maternity unit



pregnant women.

What is whooping cough?

Whooping cough, also known as pertussis, is an acute respiratory infection which can be spread by coughing and sneezing. The bacteria are present in the back of the throat and an infected person can pass the infection to other people for 21 days from the onset of their symptoms.

Initial symptoms resemble a common cold, and can progress to include spasmodic coughing, choking spells, and vomiting after coughing. In adults the characteristic "whoop" is often absent; sometimes the only symptom is a cough which may persist for months, and return or get worse after a cold.

The group at highest risk are small infants: nearly 90% of the deaths from whooping cough in the last 10 years have been in infants aged three months or less. Healthcare workers can be an important source of infection to these vulnerable infants.

Antibiotics

Antibiotics are given to cases mainly to prevent them from passing the infection on to others. Antibiotics are of limited value in reducing symptoms or improving

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Meningococcal update

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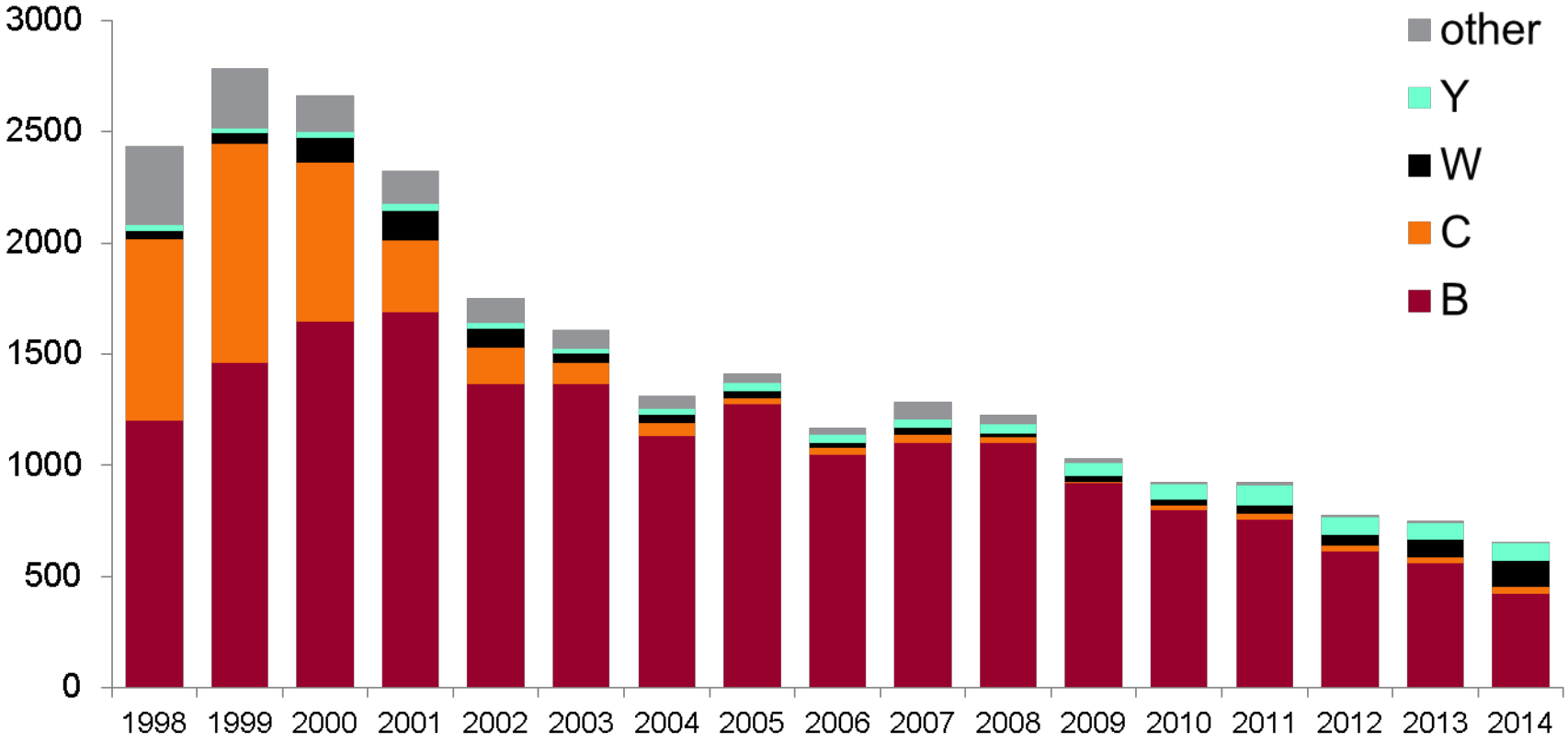
Laboratory confirmed cases invasive meningococcal disease

England and Wales



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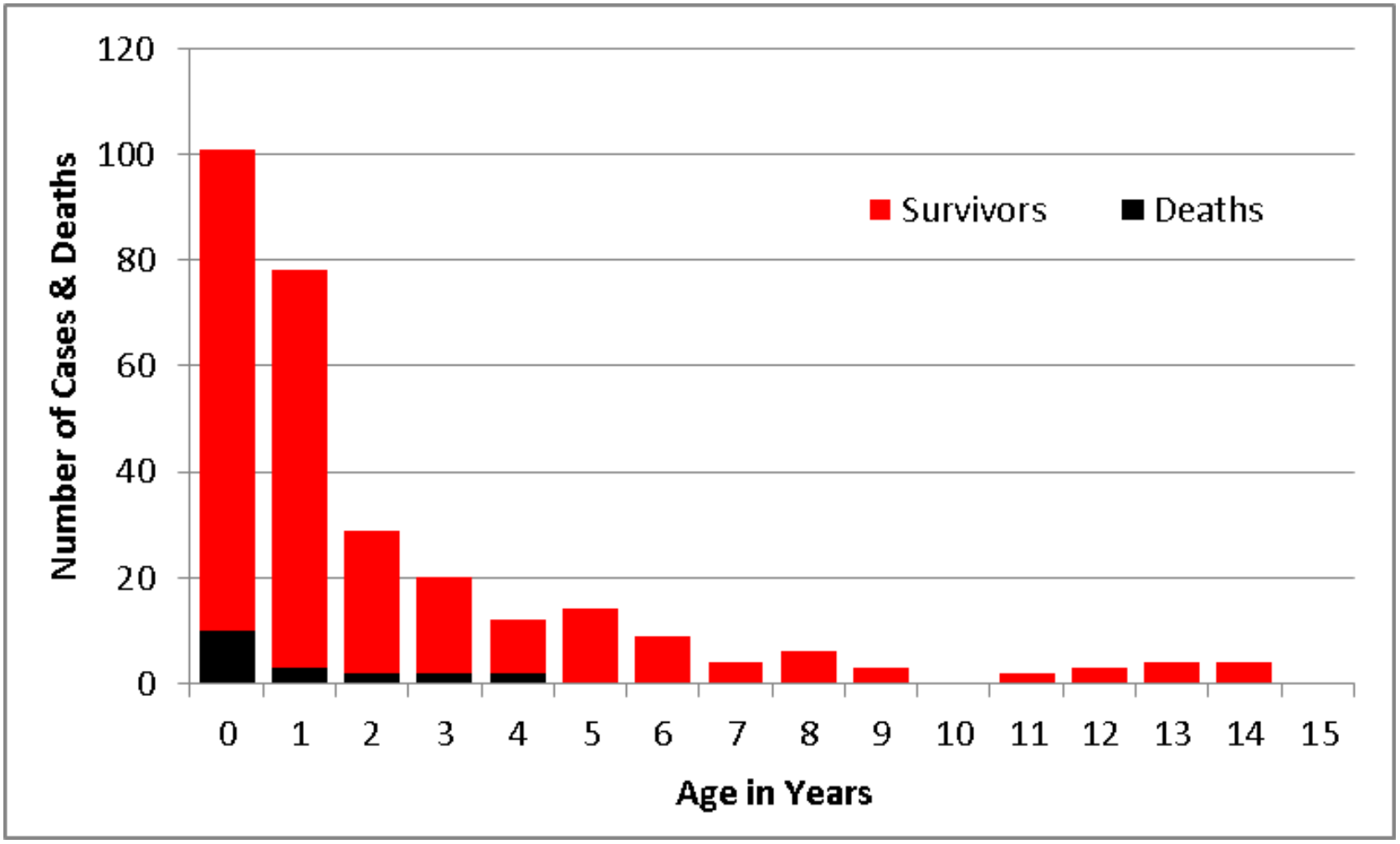
MenB cases/deaths, England 2014/15



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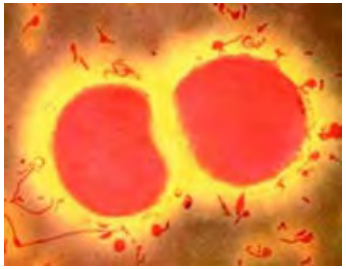
Vaccines against MenB

- MenC and MenACWY conjugate vaccines target the polysaccharide capsules – no cross-protection



- MenB polysaccharide is a polysialic acid - identical to that found on surface of human foetal neuronal cells.
- Consequently;

  (i) Poorly immunogenic.

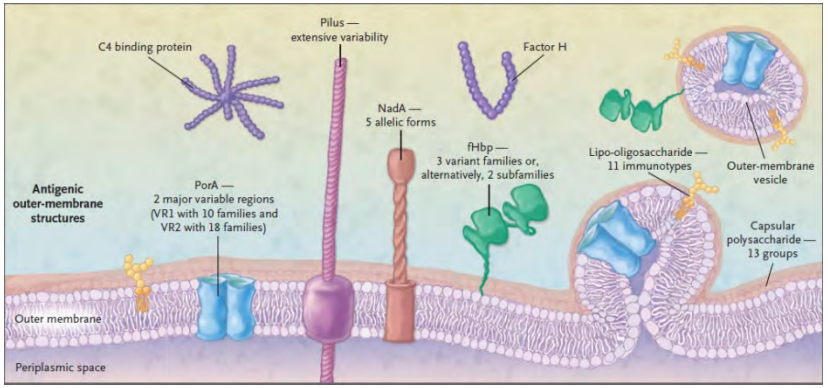
  (ii) Potential to induce an autoimmune response

- Use subcapsular antigens, which:

  (i) are Surface-exposed

  (ii) are Conserved

  (iii) induce Bactericidal activity



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UK MenB programme

Negotiations to procure at cost-effective price were concluded in late March 2015

MenB vaccine given with routine immunisation appointments from 1st September 2015

Routine cohort: infants born on or after the **1 July 2015**

Schedule: 2, 4 and 12 months (2+1)

Catch-up cohort: infants born from **1 May to 30 June 2015**
Schedule: 3, 4 and 12 months (2+1)
Schedule: 4 and 12 months (1+1)

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Health Protection Report

weekly report

Infection report

Volume 10 Number 8 Published on: 26 February 2016

Provisional vaccine coverage estimates for the new meningococcal B (MenB) immunisation programme for England, January 2016

Catch-up cohort 1 (born May 2015)		Catch-up cohort 2 (born June 2015)			Routine cohort (born July 2015)		
Participating GPs (%)	Dose 1 coverage (%)	Participating GPs (%)	Dose 1 coverage (%)	Dose 2 coverage (%)	Participating GPs (%)	Dose 1 coverage (%)	Dose 2 coverage (%)
82.8	76.6	84.4	88.8	75.2	96.0	94.0	84.8

https://www.gov.uk/government/publications/meningococcal-b-immunisation-programme-vaccine-coverage-estimates

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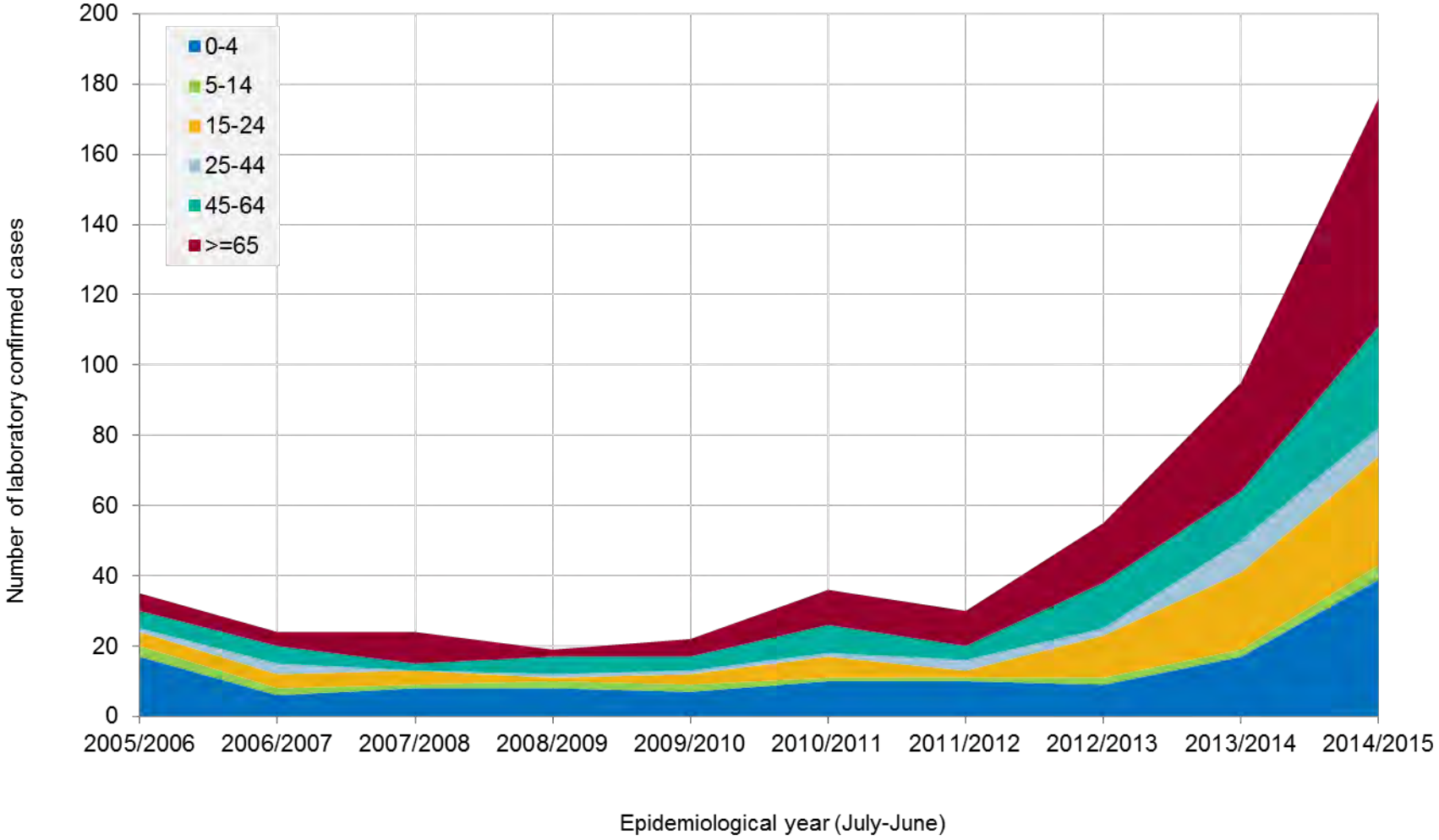
Laboratory confirmed cases of meningococcal group W (MenW) disease in England, 2005/06-2014/15



Date source: PHE Meningococcal Reference Unit. Surveillance by PHE Immunisation Department – Last Update August 2015
Please see link for more information and data https://www.gov.uk/government/collections/meningococcal-disease-guidance-data-and-analysis

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JCVI recommendations: February 2015

- In view of rapid increase in cases, known virulence of clonal complex 11 and international experience
  - JCVI considered situation a public health emergency
- Optimal strategy difficult to decide based on wide age distribution
- Option to replace MenC doses with quadrivalent conjugate (ACWY) warrant urgent consideration
  - Infants at highest risk but current MenC – single dose of quadrivalent not sufficient
  - Toddler dose is given as Hib-MenC – still need the Hib booster
  - Teenagers are at high risk AND known to have high carriage rates
- 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

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ACWY programme – planned roll-out

Birth cohort	2014/15 year - age	Academic year				
		2014/15	2015/16	2016/17	2017/18	2018/19
01/09/2003-31/08/2004	Y6 – 10/11				Y9 ACWY	
01/09/2002-31/08/2003	Y7 - 11/12			Y9 ACWY		
01/09/2001-31/08/2002	Y8 - 12/13		Y9 ACWY			
01/09/2000-31/08/2001	Y9 - 13/14		Y10 ACWY			
01/09/1999-31/08/2000	Y10 - 14/15	Y10 MenC		Y12 ACWY		
01/09/1998-31/08/1999	Y11 - 15/16			Y13 ACWY		
01/09/1997-31/08/1998	Y12 - 16/17		Y13 ACWY			
01/09/1996-31/08/1997	Y13 – 17/18	Y13 ACWY				

Key

- Routine schedule MenC
- Routine schedule ACWY
- School based catch-up ACWY
- Primary care catch-up cohorts
- Delivery mechanism to be decided
- Completed

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Meningococcal vaccines for healthcare professionals

- Risk of exposure to meningococcal disease is generally low

EXCEPT

- For laboratory workers in specialist centres / reference laboratories

Guidance for public health management of meningococcal disease

- Aim of chemoprophylaxis is to reduce risk of invasive disease by eradicating carriage in close contacts at highest risk
- After a single cases, risk of linked cases outside the household is low
- In health care setting prophylaxis indicated for those with transient close contact i.e. directly exposed to respiratory droplets
- Vaccination offered to those with close prolonged contact to reduce risk of late cases (A,C, W, Y)– combination of genetic susceptibility in family, increased exposure and environmental factors
- Men B vaccine not indicated for household contacts after single case
- Vaccine not indicated for those receiving chemoprophylaxis for transient contact e.g. healthcare workers

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Prophylaxis in healthcare settings

- Healthcare workers in contact with meningococcal disease are at increased risk of disease in the 10 day period after exposure
- BUT ABSOLUTE RISK IS VERY LOW
- Higher risk in those heavily exposed to nasopharyngeal secretions of cases around time of admission to hospital
- Once case started antibiotic treatment, carriage rates decline rapidly
- Where there is a risk of being exposed to secretions on face /eyes, staff should wear masks

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Summary

- National vaccine recommendations are under constant review including vaccination of healthcare workers
- Importance of OH vaccine policy
  - Avoid cases in health care workers and reducing nosocomial transmission especially to high risk patients
  - Avoid need to contact trace staff (resource intensive)
- Cases of measles in HCWs in England have declined in recent years but continue to occur

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Acknowledgements

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