

2022

EXPLORING PERTUSSIS: WHOOPIING COUGH IN AUSTRALIA WEBINAR

This webinar will start at 6pm AEST

PRESENTED BY

Angela Newbound

6PM – 7PM AEST

Wednesday 14 September

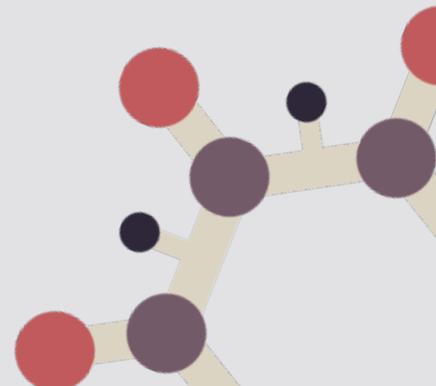


IMMUNISATION
COALITION



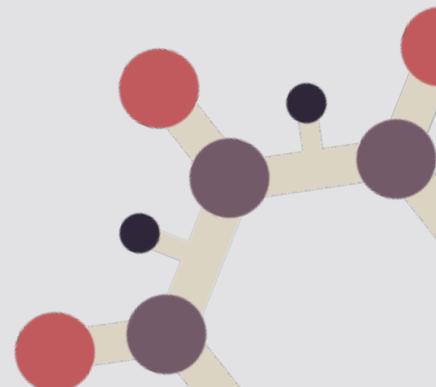
Exploring Pertussis: Whooping Cough in Australia

Angela Newbound
Immunisation Education Consultant



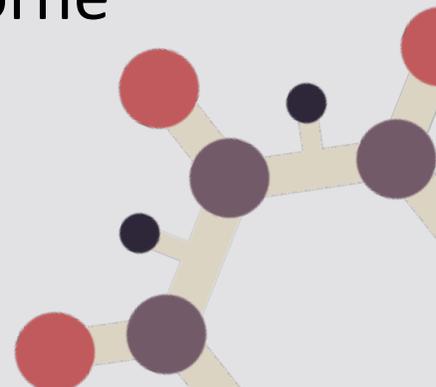
Overview

1. Overview of pertussis disease across age groups
2. Pertussis vaccines and effectiveness
3. Vaccination target groups and coverage rates
4. Priority groups for General Practice involvement
5. Key take home messages

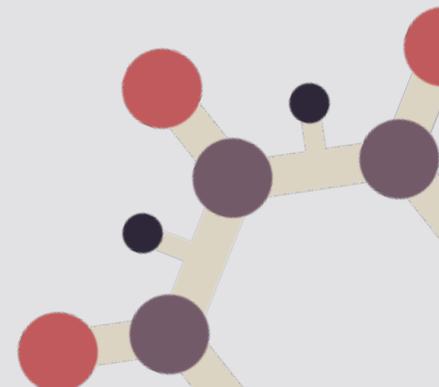
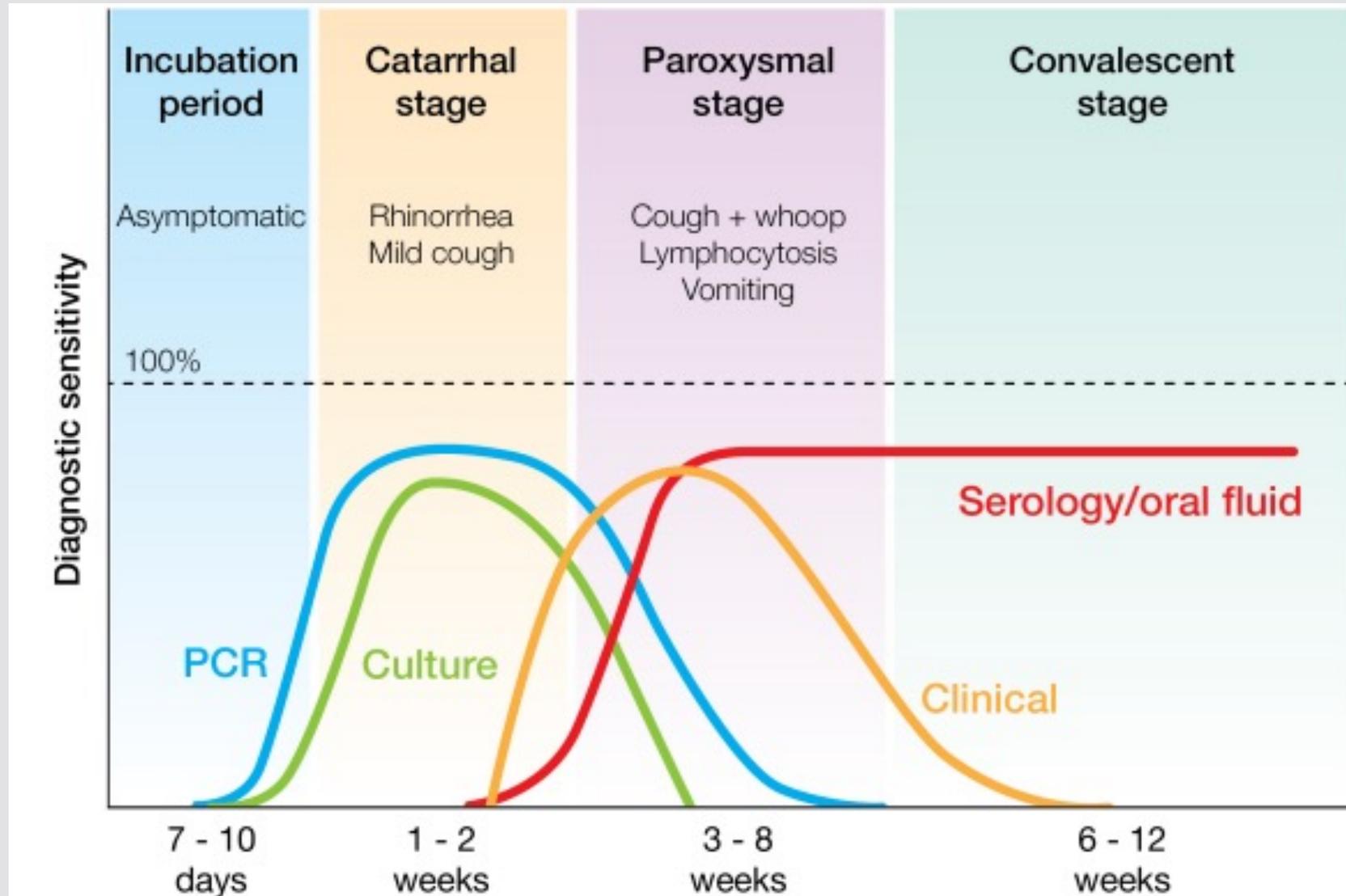


POLL 1

- ❁ What is the mode of transmission of pertussis?
 - ❁ A) Pertussis is mainly transmitted by large droplet infection or direct contact with discharges from respiratory mucous membranes of infectious people.
 - ❁ B) Can be transmitted indirectly via contaminated objects, however this occurs rarely.
 - ❁ C) There is some experimental evidence which supports airborne transmission over distances greater than one metre.
 - ❁ D) All of the above



Clinical Course of Pertussis



Overview

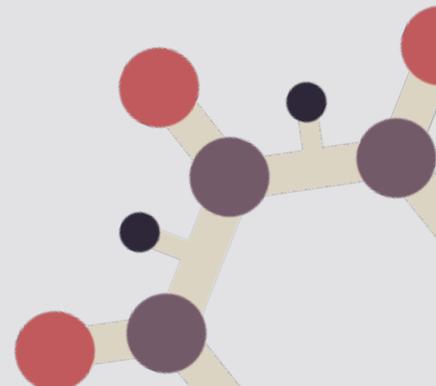
Overview of pertussis disease across age groups

☼ Infants, children

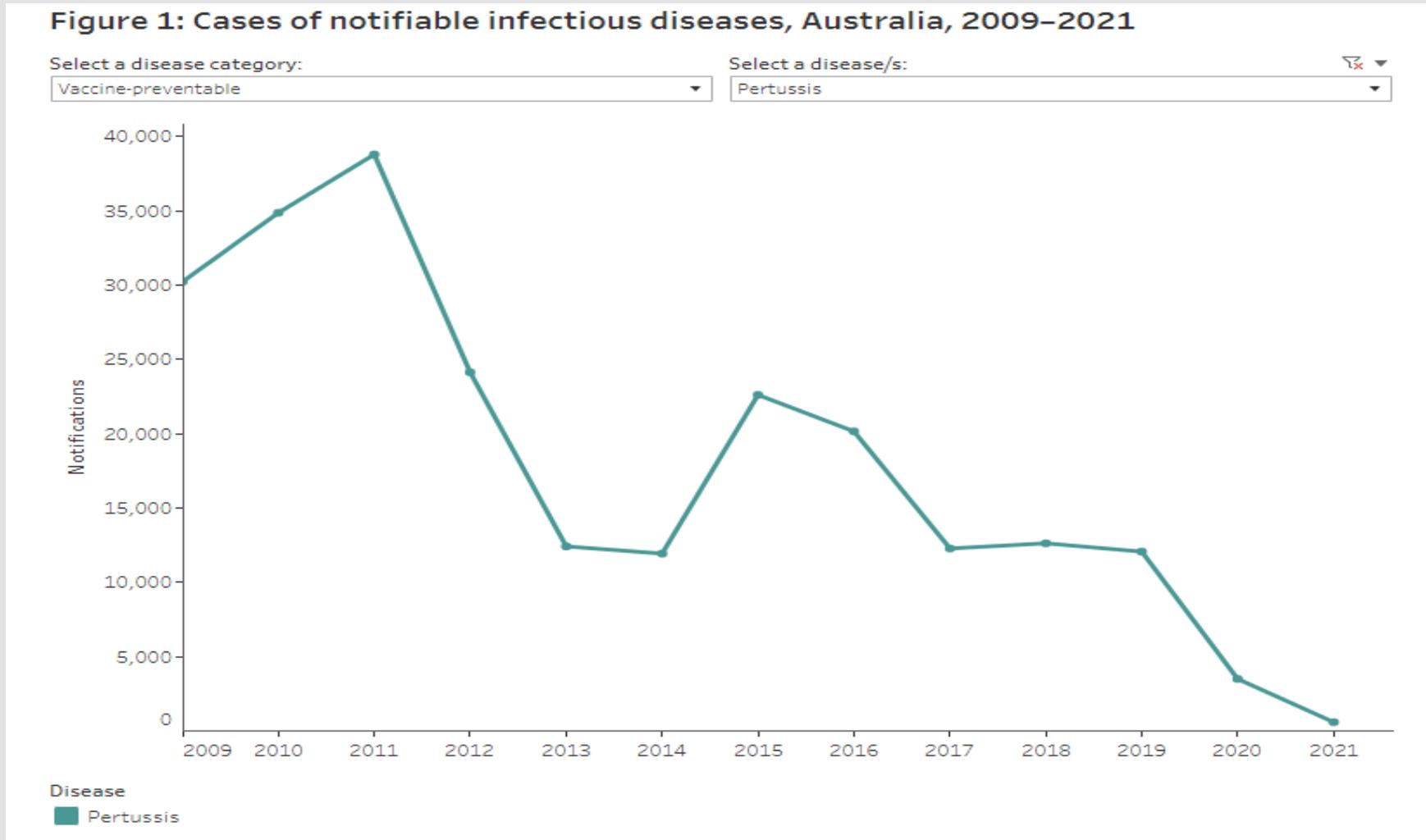
☼ Adolescents

☼ Adults including pregnant women

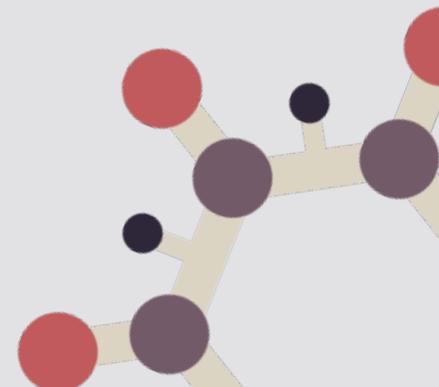
☼ Older persons



Pertussis notifications 2009 - 2021

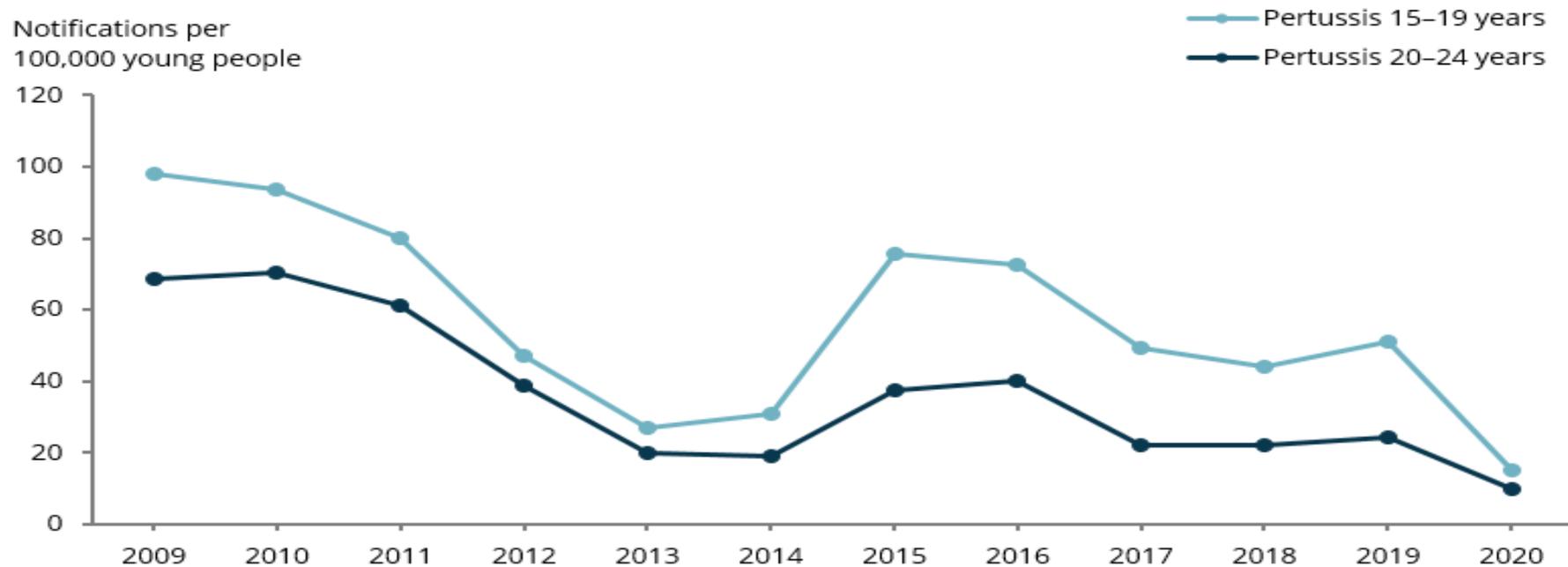


Source: <https://www.aihw.gov.au/reports/australias-health/infectious-and-communicable-diseases>



Pertussis in adolescents and young adults

Figure 2: Rate of notifications for pertussis (whooping cough) among young people aged 15–19 and 20–24, 2009–2020

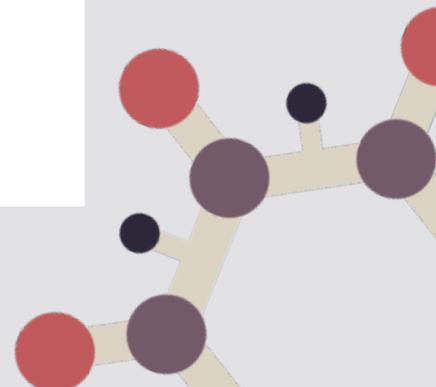


Note: All NNDSS data were extracted January 2021, see [Technical notes](#).

Chart: AIHW.

Source: DoH 2020a.

Source: <https://www.aihw.gov.au/reports/children-youth/infectious-diseases>



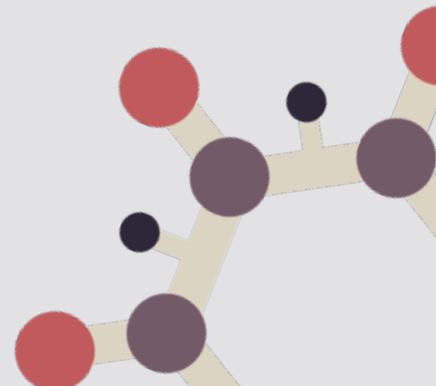
Vaccine effectiveness in children

- ✿ Pertussis-containing vaccines protect against severe and typical pertussis. They provide substantially less protection against milder coughing illness. DTPa vaccines with 3 or more antigens have vaccine efficacy of:
 - ✿ 71–78% for preventing milder symptoms of pertussis (≥ 7 days of paroxysmal cough and laboratory confirmation)
 - ✿ 84% for preventing typical disease (≥ 21 days of paroxysmal cough and laboratory confirmation)
- ✿ The 1st dose of the childhood schedule significantly reduces the incidence of severe pertussis disease in young infants. Protection increases further with the doses given at 4 and 6 months of age, as measured by hospitalisation rates and mortality.



Vaccine effectiveness in adolescents and adults

- ✿ Pertussis-containing vaccines with reduced antigen content (dTpa) are immunogenic, including in older people.
- ✿ A randomised trial in adults reported a point estimate of 92% efficacy against culture-positive or nucleic acid test-positive disease within 2.5 years of vaccination with a 3-component monovalent pertussis vaccine.

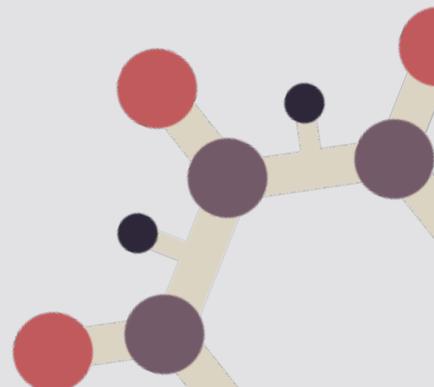


Vaccine effectiveness in pregnant women

- ✿ Vaccinating pregnant women with dTpa can reduce the risk of pertussis in them and their young infants. This is a result of direct passive protection by transplacental transfer of high levels of pertussis antibodies from the mother to the fetus during pregnancy.
- ✿ In a landmark study, vaccination of mothers at least 7 days before delivery reduced pertussis disease by 91% in infants <3 months of age.

However, it is not known:

- ✿ what exact level of pertussis antibody the pregnant woman needs to have to provide this level of protection to her infant
- ✿ how waning pertussis immunity in the mother affects this protection



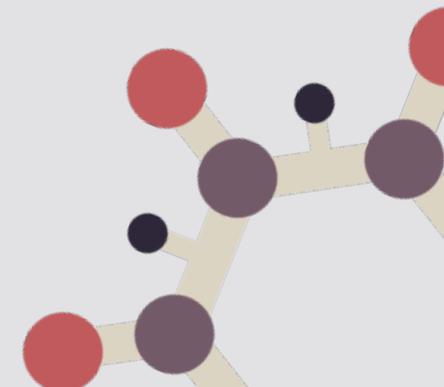
Vaccine Recommendations

❁ A. Infants and children

❁ Infants and children are recommended to receive pertussis-containing vaccine in a 5-dose schedule

❁ Infants and children aged <10 years who have missed a dose of pertussis-containing vaccine are recommended to catch up

Target is 95%



POLL 2

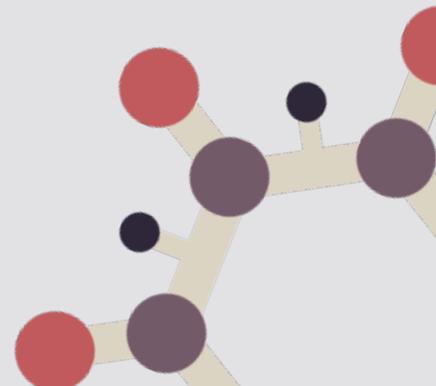
🌟 In June 2022, the DTPa vaccination coverage, according to AIR data for all children at 5 years of age is:

🌟 A) 92.58%

🌟 B) 90.78%

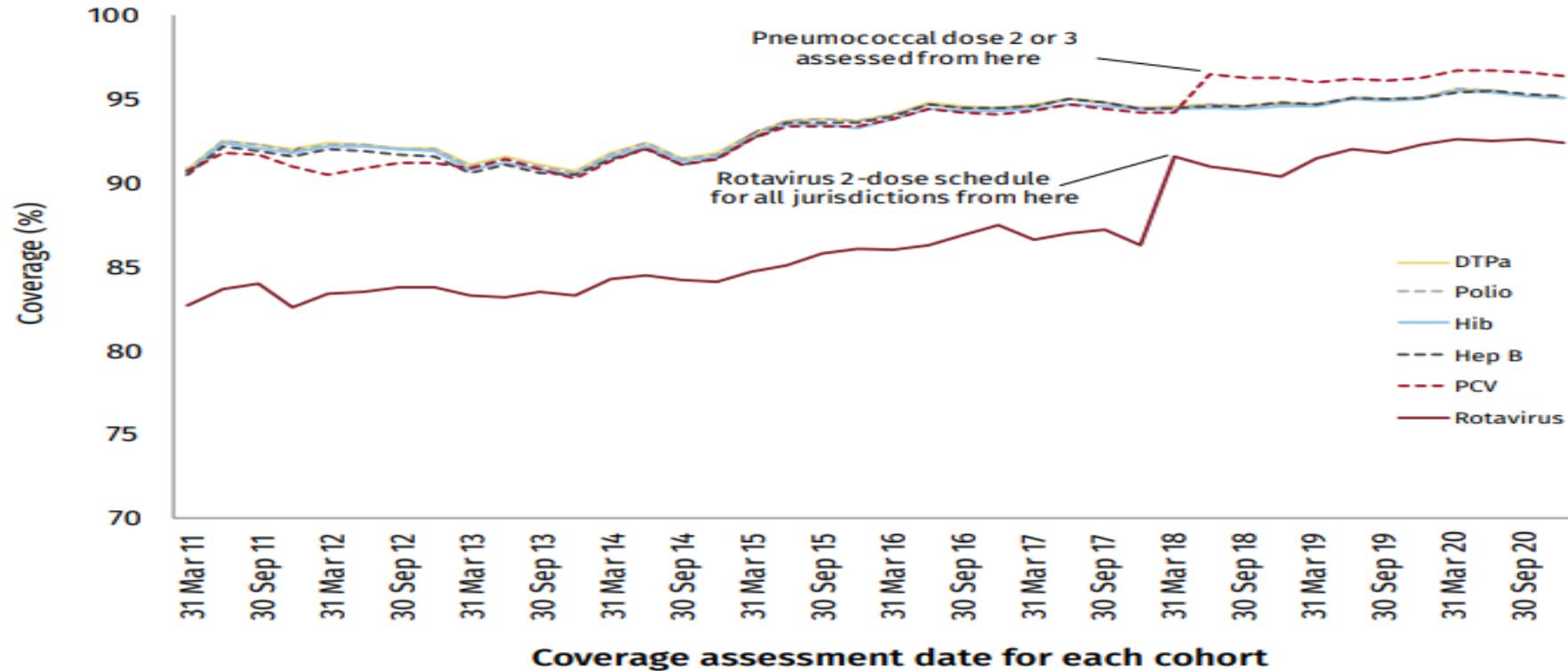
🌟 C) 91.25%

🌟 D) 94.54%

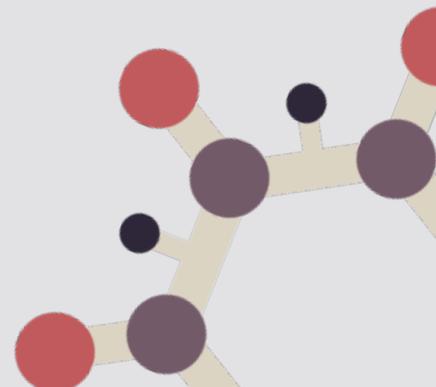


DTPa coverage at 12 months of age

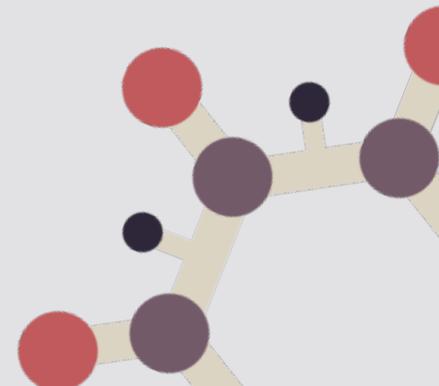
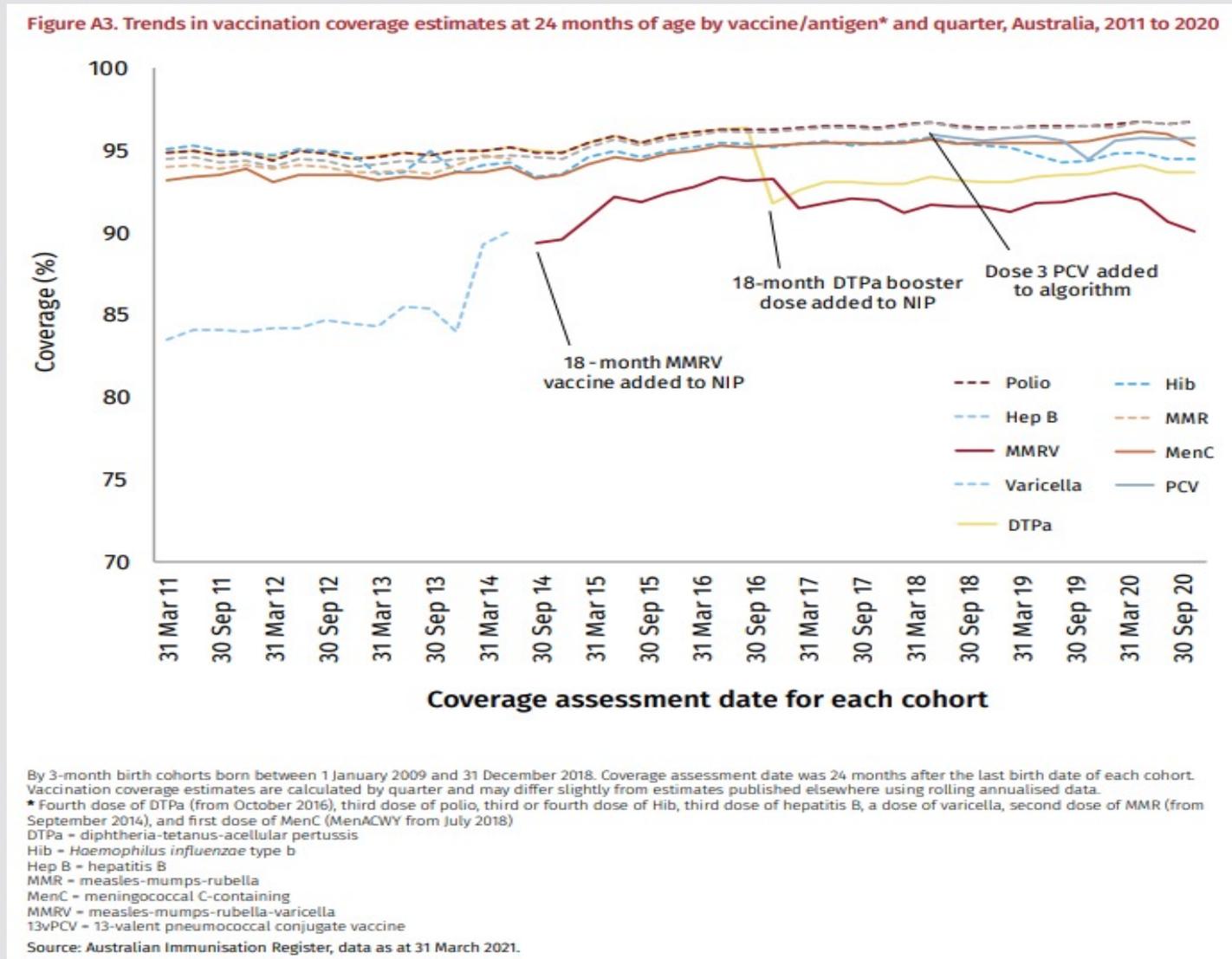
Figure A2. Trends in vaccination coverage estimates at 12 months of age, by vaccine/antigen* and quarter, Australia, 2011 to 2020



By 3-month birth cohorts born between 1 January 2010 and 31 December 2019. Coverage assessment date was 12 months after the last birth date of each cohort. Vaccination coverage estimates are calculated by quarter and may differ slightly from estimates published elsewhere using rolling annualised data.
 * Third dose of DTPa vaccine, polio vaccine and 13vPCV, second or third dose of Hib and rotavirus vaccines, and third dose of hepatitis B vaccine.
 DTPa = diphtheria-tetanus-acellular pertussis
 Hib = *Haemophilus influenzae* type b
 Hep B = hepatitis B
 13vPCV = 13-valent pneumococcal conjugate vaccine
 Source: Australian Immunisation Register, data as at 31 March 2021.

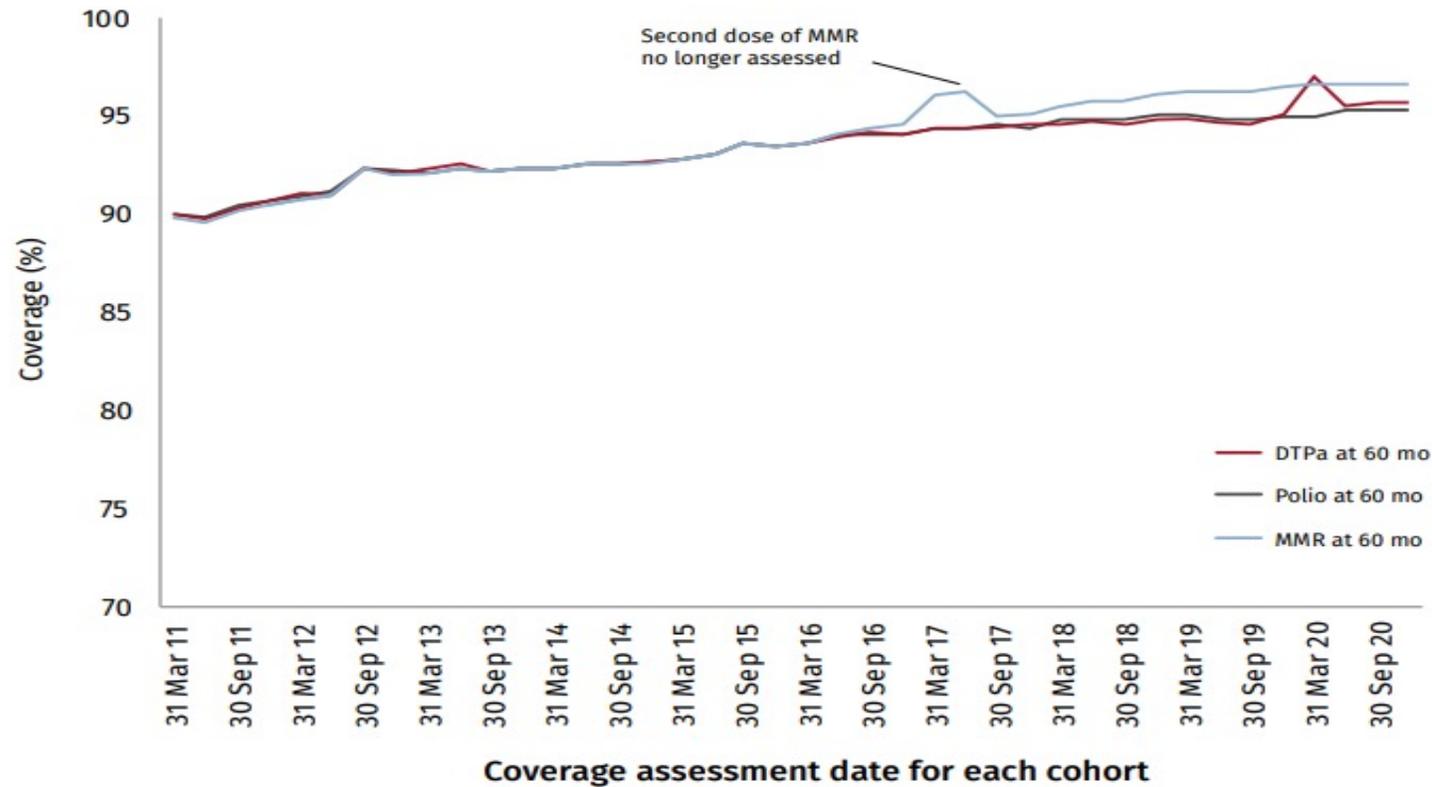


DTPa coverage at 24 months of age



DTPa coverage at 60 months of age

Figure A4. Trends in vaccination coverage estimates at 60 months of age by vaccine/antigen* and quarter, Australia, 2011 to 2020



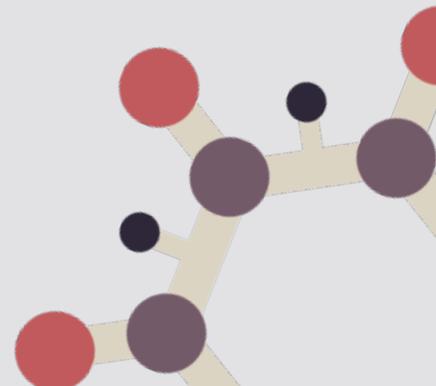
By 3-month birth cohorts born between 1 January 2006 and 31 December 2015. Coverage assessment date was 60 months after the last birth date of each cohort. Vaccination coverage estimates are calculated by quarter and may differ slightly from estimates published elsewhere using rolling annualised data.

* Fourth or fifth dose of DTPa and fourth dose of polio, second dose of MMR (up until June 2017)

DTPa - diphtheria-tetanus-acellular pertussis

MMR - measles-mumps-rubella

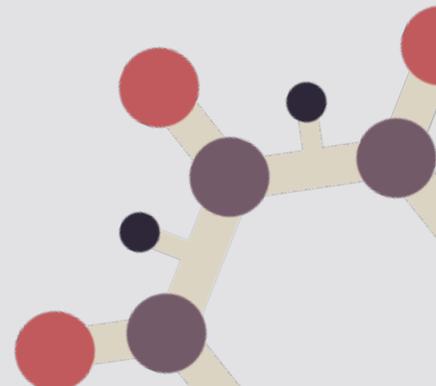
Source: Australian Immunisation Register, data as at 31 March 2021.



Vaccine Recommendations

❁ B. Adolescents

❁ Optimal age for a booster dose of pertussis-containing vaccine for adolescents is 11–13 years

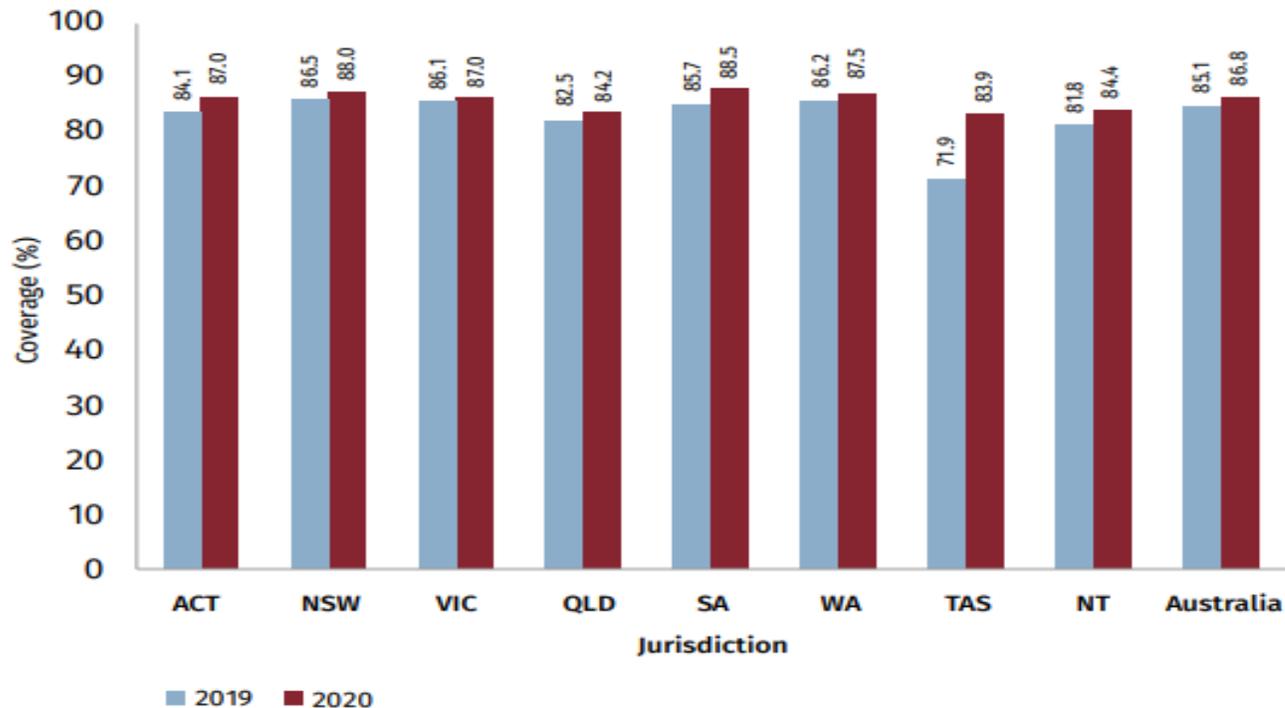


Adolescent coverage rates 2019 and 2020

Diphtheria-tetanus-acellular pertussis (dTpa) booster vaccine coverage

Figure 15 shows coverage, by 15 years of age, of the adolescent booster dose of dTpa vaccine in 2019 and 2020, by jurisdiction. Nationally, dTpa coverage was 1.7 percentage higher in 2020 than 2019 (86.8% versus 85.1%). Coverage in all jurisdictions was higher in 2020 than 2019, with the largest increase in Tasmania (from 71.9% to 83.9%). Coverage in 2020 ranged from 84.2% in Queensland to 88.5% in South Australia.

Figure 15. Coverage (%) of the adolescent booster dose of diphtheria-tetanus-acellular pertussis (dTpa) vaccine by 15 years of age,* by jurisdiction, Australia, 2019 and 2020



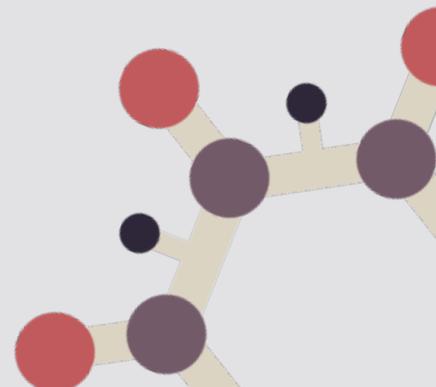
* dTpa vaccinations received before 15th birthday in cohort born 1 January – 31 December 2004 for 2019 coverage estimates and cohort born 1 January – 31 December 2005 for 2020 coverage estimates
ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia
dTpa = diphtheria, tetanus, pertussis (acellular) – adolescent/adult formulation
Source: Australian Immunisation Register, data as at 31 March 2020 (for 2019 data) and as at 31 March 2021 (for 2020 data).

Vaccine Recommendations

C. Adults

- ✿ Adults who want to reduce their likelihood of becoming ill with pertussis are recommended to receive pertussis-containing vaccine
- ✿ Adults who need a tetanus-containing vaccine are recommended to receive dTpa vaccine rather than dT vaccine

<20% ??

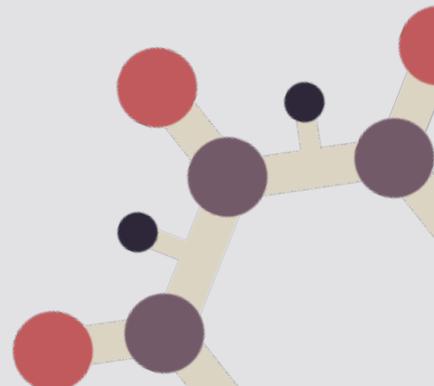


Vaccine Recommendations

❁ D. Older Persons

❁ Adults aged ≥ 65 years are recommended to receive pertussis-containing vaccine if their last dose was more than 10 years ago

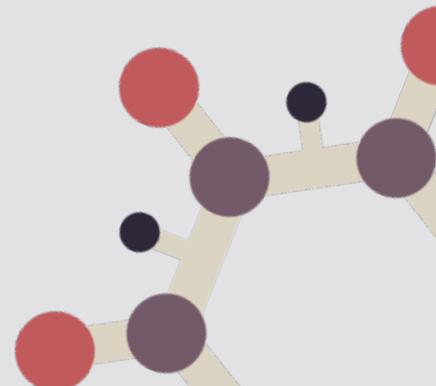
<20% ??



POLL 3

❁ The ideal optimal time for pertussis vaccination in pregnancy is:

- ❁ A) Anytime after 14 weeks
- ❁ B) Between 10 and 40 weeks
- ❁ C) Between 20 and 32 weeks
- ❁ D) Anytime after 30 weeks



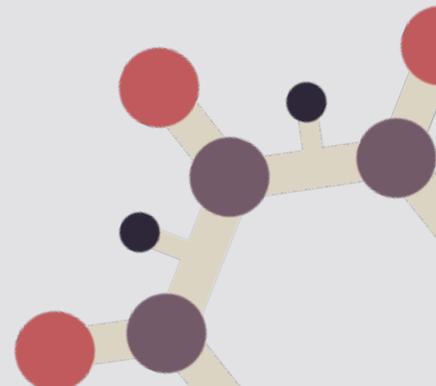
Vaccine Recommendations

❁ E. Women who are pregnant or breastfeeding

❁ Pregnant women are recommended to receive a single dose of pertussis-containing vaccine in each pregnancy

❁ Women who recently gave birth and did not receive pertussis-containing vaccine during pregnancy are recommended to receive the vaccine as soon as possible

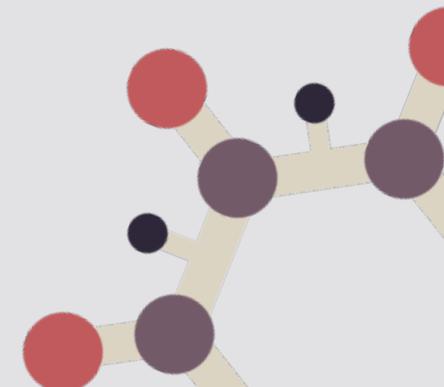
85%



Vaccine Recommendations

❁ Adult household contacts and carers of infants

❁ Adult household contacts and carers of infants aged <6 months are recommended to receive pertussis-containing vaccine at least 2 weeks before they have close contact with the infant



Vaccine Recommendations

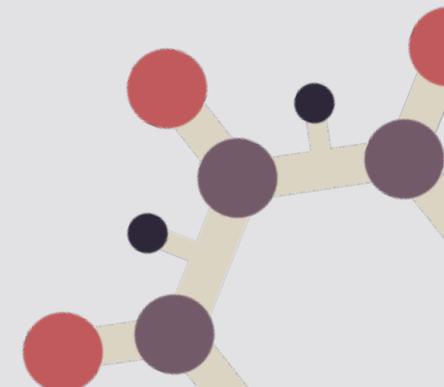
❁ F. Healthcare workers

❁ Healthcare workers are recommended to receive pertussis-containing vaccine every 10 years

❁ G. Early childhood educators and carers

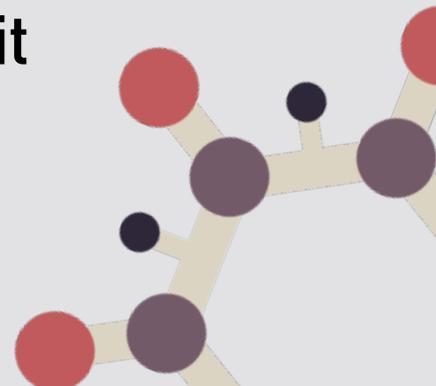
❁ Early childhood educators and carers are recommended to receive pertussis-containing vaccine every 10 years

<50%



Adolescent Pertussis Vaccination

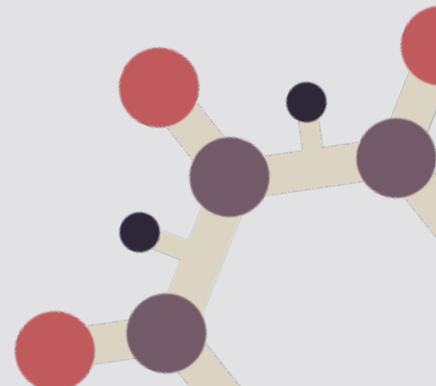
- ✿ Vaccination is recommended for all adolescents aged 12–13 years
- ✿ Offered in year 7 or 8, depending on your state or territory
- ✿ Can be offered in General Practice (free NIP vaccine)
- ✿ Includes refugees and humanitarian entrants
- ✿ Receipt of family assistance payments such as Family Tax Benefit (Part A) require adolescents to be vaccinated as per the NIP



Adolescent Pertussis Vaccination



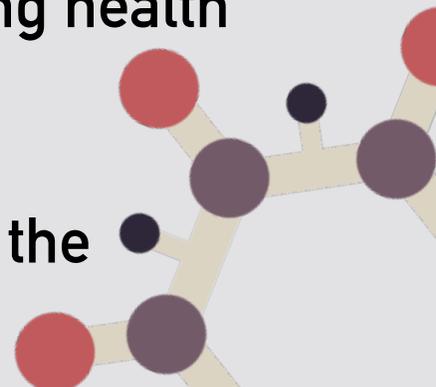
- ✿ Students may miss school immunisation visits for a variety of reasons
- ✿ All providers have the responsibility to ensure they receive a catch-up vaccine
- ✿ Be opportunistic
- ✿ Check the AIR at each encounter



World Health Organisation

Global Vaccine Action Plan 2011-2020

- ✿ The vision of the Decade of Vaccines (2011–2020) is a world in which all individuals and communities enjoy lives free from vaccine-preventable diseases
- ✿ The benefits of immunization are equitably extended to all people
- ✿ Strong immunization systems are an integral part of a well-functioning health system
- ✿ The goal of vaccination is not only to prevent disease but to influence the trajectory of intrinsic capacity



Healthy Ageing

is the process of developing and maintaining the functional ability that enables well-being in older age



Adult Pertussis Vaccination

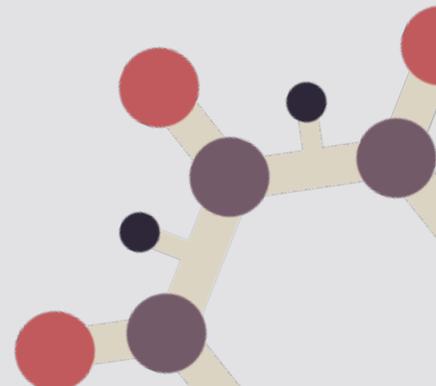
Why vaccinate adults?

- Pertussis is not just a childhood disease

- Reservoir and waning immunity

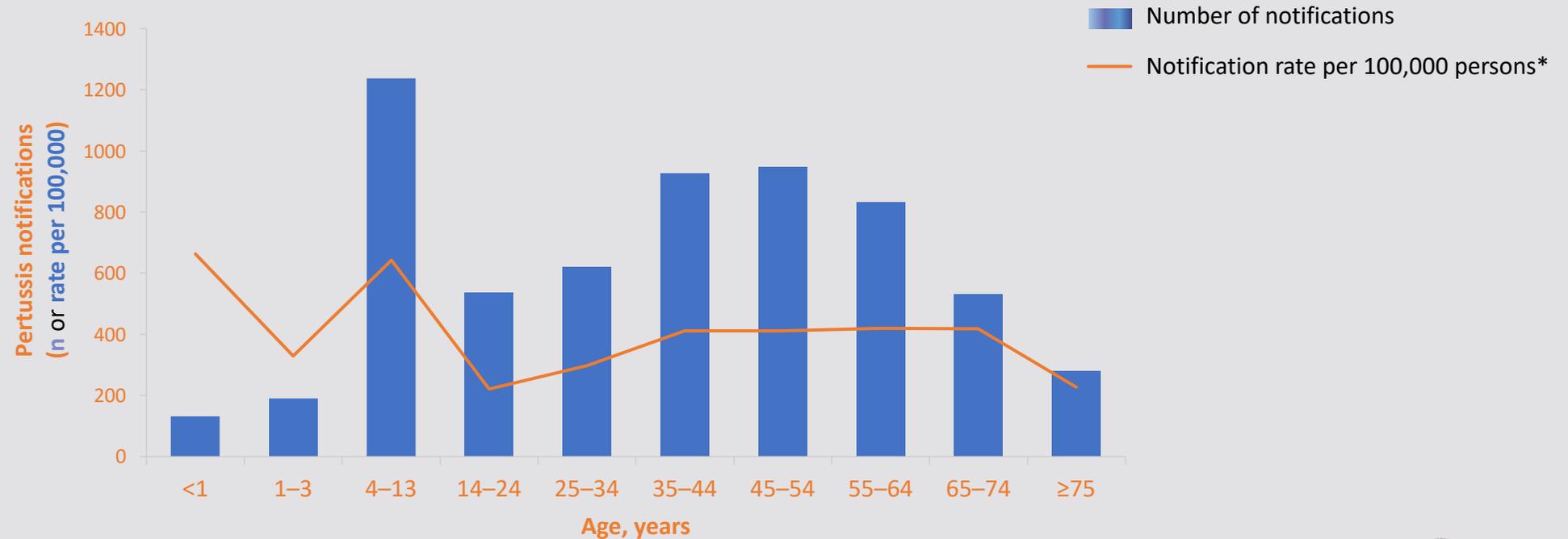
- Immunosenescence

- Co-morbidities

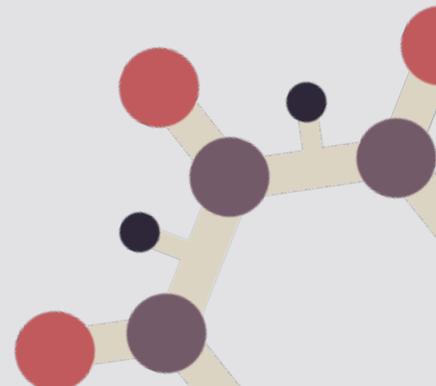


Pertussis is not just a childhood disease

Pertussis notifications during an epidemic in South Australia, Jul 2008–Dec 2009 (N=6230)



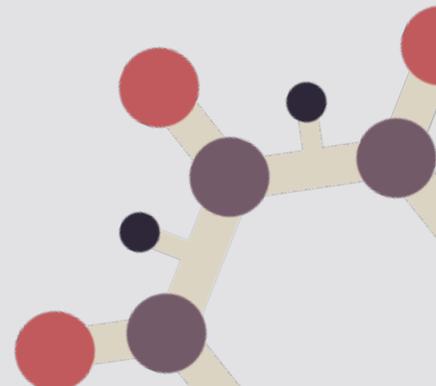
Of these 6,230 pertussis notifications, 66% were in adults aged ≥ 25 years



Reservoir and waning immunity

• Epidemiology

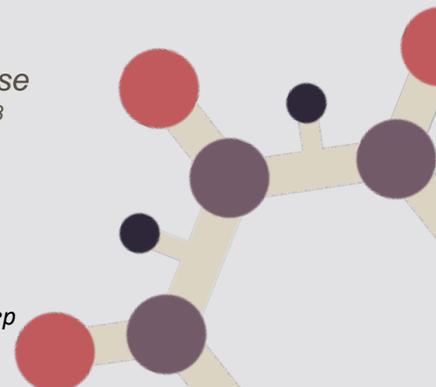
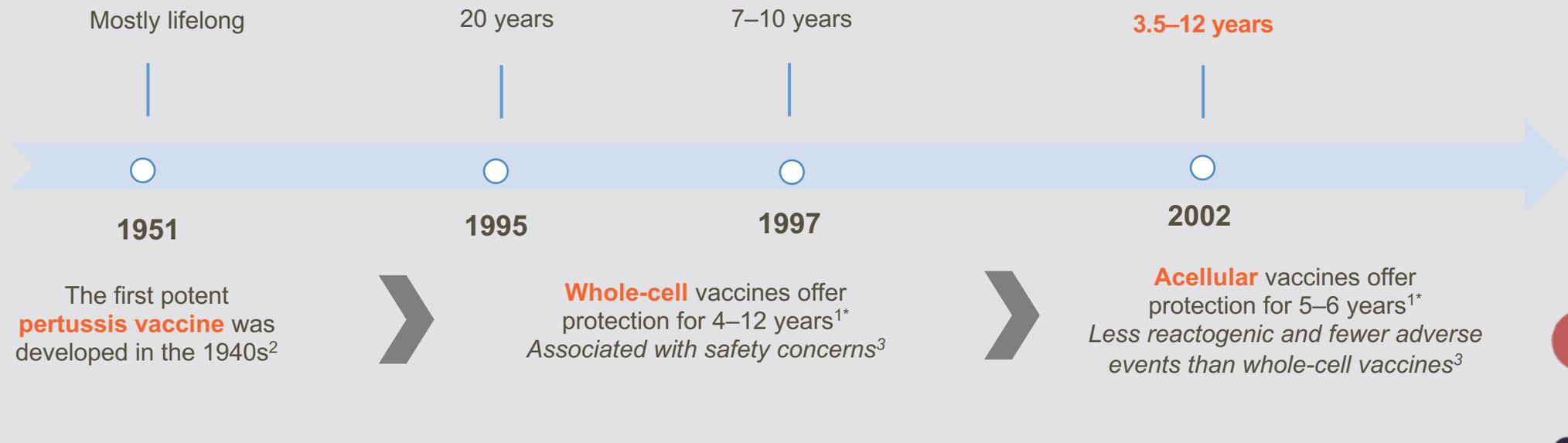
• Waning immunity



Pertussis vaccination does not confer lifelong immunity

Waning immunity plays a role in disease transmission

Our understanding of the duration of **naturally induced protection** has evolved since the 1950s¹

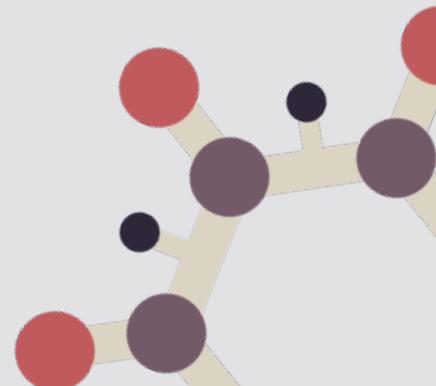


• 1. Wendelboe AM *et al.* *Pediatr Infect Dis J* 2005;24:S58–S61; 2. Shapiro-Shapin CG. *Emerg Infect Dis* 2010;16:1273–1278; 3. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 1997;46:1–25

Immunosenescence

- ✿ Increase in exhausted memory T cells
- ✿ Decrease in naïve T cells
- ✿ Decrease CD8 cell population
- ✿ CD8/CD4 ratio < 1
- ✿ Decreased telomerase
- ✿ Telomere shortening

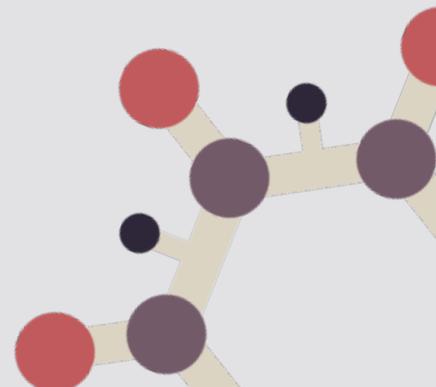
- ✿ ... Decreased response to all vaccines



Immunosenescence

So, as we age

- ✿ Substantial impact of immune-senescence and frailty on impact of disease and ongoing disability.
- ✿ For influenza, pneumonia, pertussis and shingles, vaccines exist but are not perfect and differential access and differential uptake seen across countries
- ✿ In Australia
 - ✿ 75-80% of elderly regularly get influenza vaccine
 - ✿ Half this have had pneumococcal vaccines
 - ✿ Unknown coverage for pertussis
 - ✿ Possibly 60% coverage for shingles vaccine



The burden of pertussis in adults is underestimated

Pertussis in adults is often missed, misdiagnosed or unreported



Misconceptions

- Pertussis is still perceived by some as a childhood disease¹



Atypical symptoms

- Adults may present with mild or atypical symptoms¹⁻³
- Distinct catarrhal, paroxysmal and convalescent stages often shortened or absent⁴
- Cough may manifest without classical symptoms such as whooping or vomiting⁵



Late diagnosis

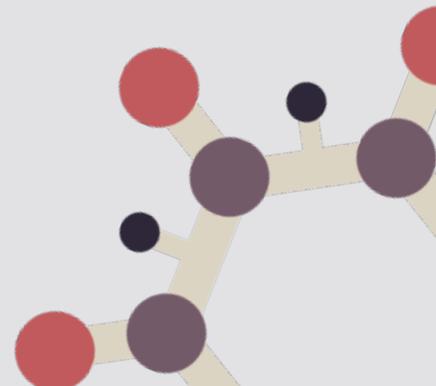
- Adults often present for diagnosis late, by which time detection of the pathogen is difficult^{1,3}



Surveillance

- Monitoring systems vary and pertussis is not a statutory notifiable disease in every country¹

• 1. Tan T *et al. Pediatr Infect Dis J* 2005;24:S10–S18; 2. World Health Organization (WHO). *Wkly Epidemiol Rec* 2010;85:385–400; 3. Centers for Disease Control and Prevention (CDC). In: *The Pink Book: Epidemiology and Prevention of Vaccine-Preventable Diseases*, Hamborsky J *et al* (Eds). 13th edn. Washington, DC: Public Health Foundation, 2015. pp. 261–278; 4. Hong JY. *Korean J Pediatr* 2010;53:629–633; 5. Riffelmann M *et al. Dtsch Arztebl Int.* 2008;105:623–628



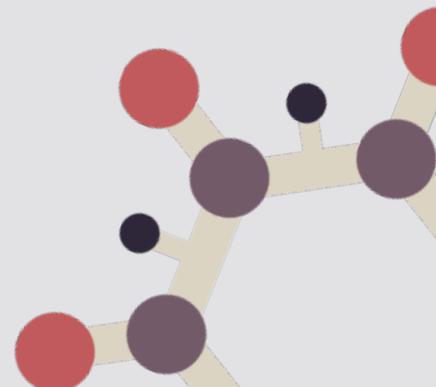
POLL 4

✿ According to the Pertussis (whooping cough) – CDNA National Guidelines for Public Health Units, which test, would be preferred for diagnosis of pertussis in an adult who presents with a 5-day history of coughing and post-tussive vomiting?

✿ A) Serology

✿ B) Nucleic acid testing (NAT) - also known by the proprietary name of PCR

✿ C) Culture



Diagnostic Challenges

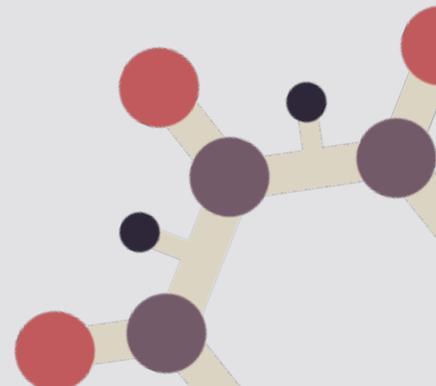
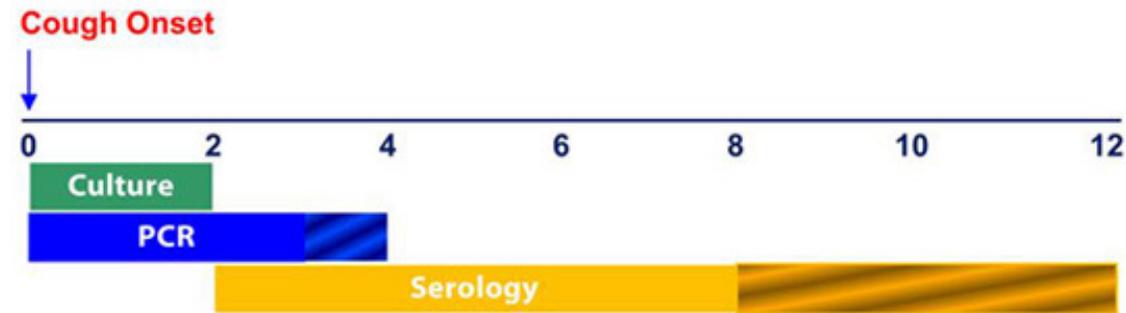
- ✿ NAT / PCR: Greatest sensitivity in first three weeks of illness, after which bacterial load in the pharynx decreases and more false positives occur

 - ✿ Poor sensitivity after 5 days of antibiotics

- ✿ Culture: Gold standard and good specificity in first 2 weeks after cough onset. After this lots of false negatives on NP swab

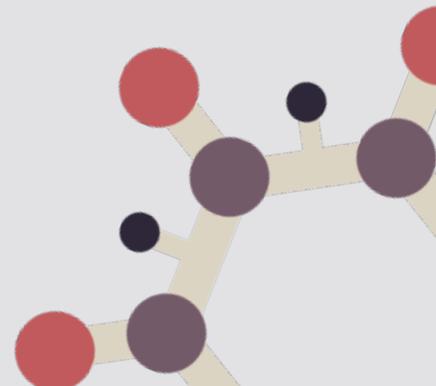
- ✿ Serology: Best 2-8 weeks post cough. Can be used up to 12 weeks and some tests can be single specimens

Optimal Timing for Diagnostic Testing (weeks)



Hodder S et al Antibody Responses to *Bordetella pertussis* Antigens and Clinical Correlations in Elderly Community Residents *Clin Infect Dis*, 2000 Vol 31, (1) 7–14

- ✿ A serological study to determine the frequency of *Bordetella pertussis* infection in 100 adults aged ≥ 65 years carried out over a 3-year period
- ✿ With the use of more specific criteria that indicate definite *B. pertussis* infection (≥ 2 -fold increase in titer to PT) and probable *B. pertussis* infection (≥ 2 -fold increase in titer to PT or ≥ 2 -fold increase to fimbriae-2), the rates were 3.3 and 8.0 per 100 person-years, respectively. Fifty percent of individuals with definite *B. pertussis* infections had time-associated symptomatology.
- ✿ Symptomatic pertussis occurs in elderly individuals, therefore, consider immunising the elderly with acellular pertussis vaccines.



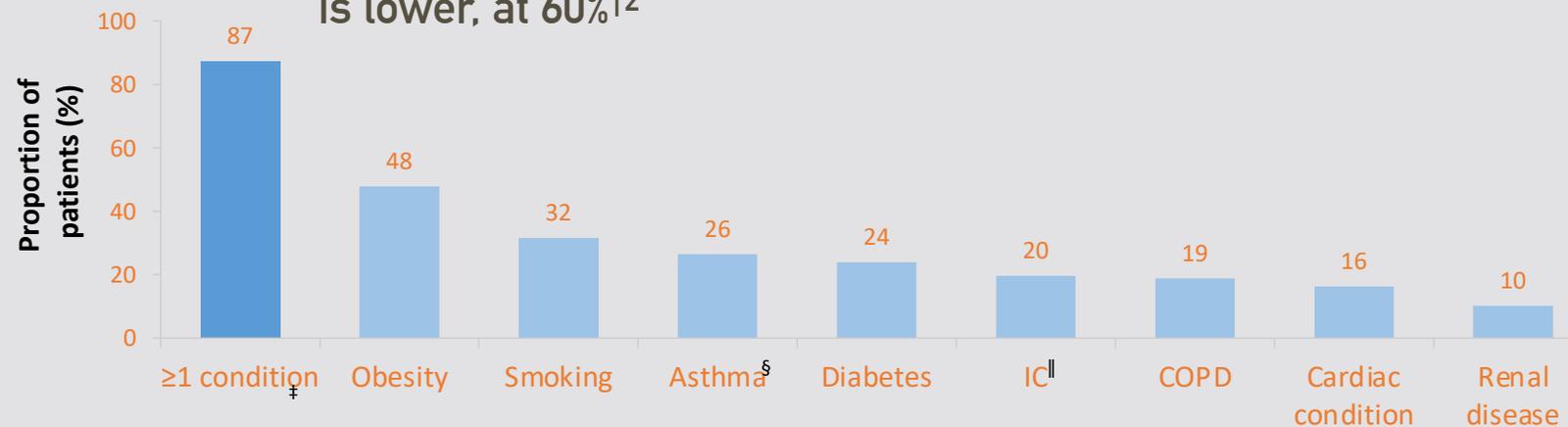
A US study suggested that adults with underlying conditions were at increased risk of severe pertussis

87%

of adults hospitalised with pertussis had underlying conditions¹

according to Enhanced Pertussis Surveillance data and inpatient medical records from seven US states,* 2011–2015 (N=117)

By comparison, the rate of chronic diseases in the general US adult population is lower, at 60%^{†2}

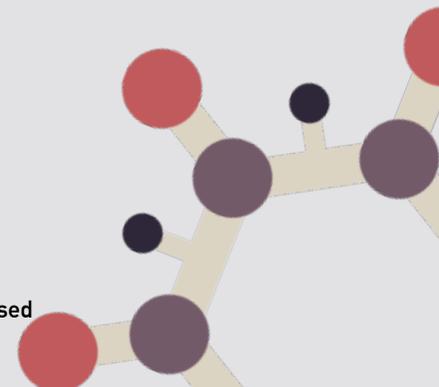


All reported pertussis deaths¹ in adults from 1990–2004 in the USA occurred in patients with underlying medical conditions³

• Figure independently created for GSK from the original data

*Colorado, Connecticut, Georgia, Minnesota, New Mexico, New York and Oregon; [†]Range of conditions included in chronic diseases² was not defined, and may not be fully consistent with those included for underlying conditions; [‡]Includes other conditions not shown; [§]Asthma or reactive airway disease; ^{||}Immunocompromising condition or immunosuppressive medication use; ¹5 deaths
COPD, chronic obstructive pulmonary disease, IC, immunocompromising condition

• 1. Mbayei SA et al. Clin Infect Dis 2018;doi:10.1093/cid/ciy889; 2. Centers for Disease Control and Prevention (CDC), 2018. About chronic diseases. <https://www.cdc.gov/chronicdisease/about/index.htm> (accessed January 2019); 3. Kretsinger K et al. MMWR Recomm Rep 2006;55:1–37



Immunocompromised adults may be at increased risk of severe complications of pertussis

20% of adults hospitalised with pertussis had a potentially immunocompromising condition or immunosuppressive medication use¹ according to Enhanced Pertussis Surveillance data and inpatient medical records from seven US states,* 2011–2015 (N=117)

The estimated rate of immunosuppression in the general US adult population was lower, at 3%^{†2}

In four case reports, immunocompromised patients had pertussis with severe/fatal complications:



≥21 yrs



- Age 62 years, Spain³
- Immunosuppressive therapy following renal transplantation
- Paroxysmal cough, apnoea, hypoxia, laryngeal spasms
- Required ICU treatment



- Age 63 years, Norway⁴
- Multiple myeloma
- *B. pertussis* bacteraemia
- Hospitalised with bronchopneumonia



- Age 31 years, USA⁵
- Wegener's granulomatosis + immunosuppressive medications
- *B. pertussis* bacteraemia
- Severe respiratory acidosis
- Died in hospital



- Age 82 years, USA⁶
- Multiple myeloma + immunosuppressive medications
- *B. pertussis* bacteraemia
- Laboured breathing requiring mechanical ventilation
- Died in hospital

*Colorado, Connecticut, Georgia, Minnesota, New Mexico, New York and Oregon; [†]Self-reported immunosuppression due to medications or medical conditions in US adults aged ≥18 years, 2013. ICU, intensive care unit

1. Mbayei SA *et al. Clin Infect Dis* 2018;doi:10.1093/cid/ciy889; 2. Harpaz R *et al. JAMA* 2016;316:2547–2548; 3. Garbiras M *et al. Transplant Infect Dis* 2016;18:280–283; 4. Trøseid M *et al. J Infect* 2006;52:e11–e13; 5. Janda WM *et al. J Clin Microbiol* 1994;32:2851–2853; 6. Centers for Disease Control and Prevention (CDC) *MMWR Morb Mortal Wkly Rep* 2004;53:131–132

High BMI and medication/supplement use may increase the risk of pertussis

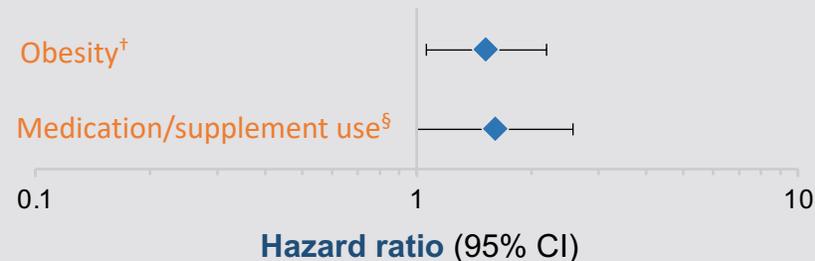
48% of adults hospitalised with pertussis were obese¹

according to Enhanced Pertussis Surveillance data and inpatient medical records from seven US states, * 2011–2015 (N=117)

The rate of obesity[†] in the general US adult population[‡] was lower, at 38%²

Obesity or medication/supplement increased the risk of pertussis by more than 50%
in a population-based prospective cohort study, NSW, Australia (N=263,094; notifications=205)³

Risk of pertussis notification

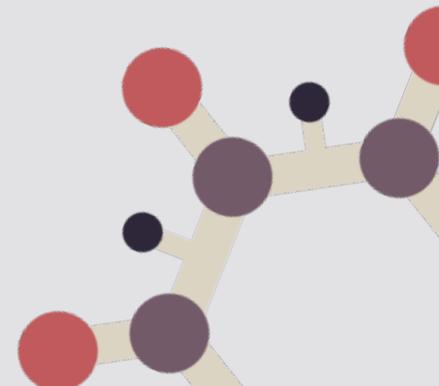


≥21 yrs



≥45 yrs

- Figure independently created for GSK from the original data
- *Colorado, Connecticut, Georgia, Minnesota, New Mexico, New York and Oregon; [†]Body mass index ≥ 30 kg/m²; [‡]Adults aged ≥ 20 years during 2013–2014; [§]Includes prescribed and over-the-counter formulations CI, confidence interval; NSW, New South Wales
- 1. Mbayei SA *et al. Clin Infect Dis* 2018;doi:10.1093/cid/ciy889; 2. National Center for Health Statistics, 2017. Report 2017-1232: Health, United States, 2016; <https://www.ncbi.nlm.nih.gov/books/NBK453378/> (accessed January 2019); 3. Liu BC *et al. Clin Infect Dis* 2012;55:1450–1456



Scwharz KL et al

Effectiveness of pertussis vaccination and duration of immunity

[CMAJ](#). 2016 Nov 1; 188(16): E399–E406. doi: [10.1503/cmaj.160193](https://doi.org/10.1503/cmaj.160193)

Adjusted vaccine effectiveness:

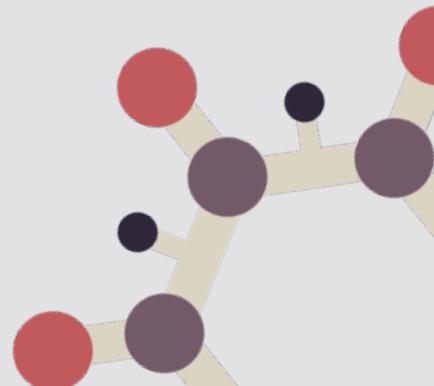
- ✿ 80% (95% confidence interval [CI] 71% to 86%) at 15–364 days,
 - ✿ 84% (95% CI 77% to 89%) at 1–3 years,
 - ✿ 62% (95% CI 42% to 75%) at 4–7 years and
 - ✿ 41% (95% CI 0% to 66%) at 8 or more years since last vaccination.
-
- ✿ Waning immunity with the acellular vaccine, with an adjusted OR for pertussis infection of 1.27 (95% CI 1.20 to 1.34) per year since last vaccination.
 - ✿ Acellular, versus whole-cell, vaccine priming was associated with an increased odds of pertussis (adjusted OR 2.15, 95% CI 1.30 to 3.57).



So:

- **minimal protective antibodies**
- **lots of disease, much of it unrecognized**
- **mortality exists**
- **vaccine needed**

But neither vaccine nor disease are protective for over a decade (if that) so need recurrent vaccination



Strategies to increase vaccination rates in older people

MICHAEL WOODWARD AM, MB BS, MD, FRACP

JOHN C.B. LITT MB BS, DRACOG, MSc(Epid), FRACGP, FAFPHM, PhD

PAUL VAN BUYNDER MB BS, MPH, FAFPHM

TABLE 2. COMMON MISCONCEPTIONS ABOUT PERTUSSIS VACCINATION AND SUGGESTED GP RESPONSES

Misconception	Suggested GP response*
I wasn't aware that I need pertussis vaccination	<ul style="list-style-type: none"> Older people have the highest rates of pertussis Pertussis can be severe in older people, leading to a three-month-long cough and complications such as cracked ribs, hospitalisation and even death
I was vaccinated against pertussis as a child, I don't need another vaccination	<ul style="list-style-type: none"> Pertussis vaccine provides good protection, but this protection starts to decrease after about three years Older people are not protected by childhood pertussis vaccination and need a booster dose
Pertussis vaccination won't stop me getting whooping cough	<ul style="list-style-type: none"> Although pertussis vaccination does not protect for life, it is very effective for at least three to possibly 10 years
I was diagnosed with pertussis 10 years ago, I don't need the vaccine	<ul style="list-style-type: none"> Immunity from natural pertussis infection lasts up to 20 years in some people but for as little as four years in others, so a booster should be considered
I am concerned about the adverse effects of pertussis vaccination	<ul style="list-style-type: none"> Adult pertussis vaccines contain less antigen than the childhood vaccines so cause fewer adverse reactions Local reactions and mild fever or an unwell feeling may occur but severe adverse effects are rare

* Healthcare providers remain the most trusted advisors and influencers of vaccination decisions. A recommendation from the practice nurse or GP frequently counters myths and misperceptions about both the disease and the vaccine to protect against the disease.

5. TIPS FOR GPs TALKING WITH OLDER PATIENTS ABOUT PERTUSSIS VACCINATION

What is the risk of getting pertussis?

The risk of getting pertussis is high. Protection provided by childhood vaccination wanes within a decade of the final dose, and protection after infection lasts only four to 20 years. Most older people are thus not immune to pertussis; they are at greater risk of disease than younger age groups.

How serious is pertussis?

Older adults usually develop an annoying and chronic cough that can last up to three months. One in five people who have a cough for more than two weeks are likely to have pertussis. Some older people with pertussis require hospitalisation and a small number die of the disease.

How effective is pertussis vaccine?

The vaccine has good effectiveness (about 84%).

How long does protection last?

Pertussis vaccine protects for three to possibly 10 years.

What are possible adverse effects of the vaccine and how common are they?

Adult pertussis vaccines contain lower amounts of antigens than paediatric vaccines. Possible side effects include local site reactions and mild systemic effects, which are self-limiting. Severe adverse effects are rare.

What is the risk of an allergic reaction?

The risk of an allergic reaction is very low, quoted as less than one in a million doses.



What is the risk of getting pertussis from the vaccine?

The pertussis vaccine consists of *Bordetella pertussis* antigens, not live organisms. It cannot cause pertussis.

Importance and challenges of vaccination in older people

PAUL VAN BUYNDER MB BS, MPH, FAFPHM
MICHAEL WOODWARD AM, MB BS, MD, FRACP

YOU.

Doctors, Specialists



Nurses, Midwives,
Aboriginal Health
Practitioners



Pharmacists





- Pertussis occurs in **all age groups**¹
- Pertussis is **under-reported**, with cases in adults frequently missed or misdiagnosed²



• Adults with underlying conditions can be at increased risk from pertussis:³⁻⁷

	Asthma	COPD	Obesity	IC*	Age ≥50	Smoking
Risk of pertussis	!	!	!			
Worse pertussis symptoms or hospitalisation [†]	!	!	!	!	!	!



• For those with pre-existing asthma or COPD, pertussis can **worsen symptoms** of the underlying condition and significantly **increase healthcare costs**^{4,8,9}

**Adults with underlying conditions are at higher risk for serious problems with pertussis
Booster vaccination with Tdap vaccine may help these populations to stay healthy¹⁰**

*Potentially immunocompromising condition or immunosuppressive medication use; †Pertussis-related hospitalisation
COPD, chronic obstructive pulmonary disease; IC, immunocompromised; Tdap, tetanus, diphtheria, acellular pertussis vaccine

1. Clarke MF *et al. Epidemiol Infect* 2013;141:463-471; 2. Tan T *et al. Pediatr Infect Dis J* 2005;24:S10-S18; 3. Mbayei SA *et al. Clin Infect Dis* 2018;doi:10.1093/cid/ciy889; 4. Buck PO *et al. Epidemiol Infect* 2017;145:2109-2121; 5. Liu BC *et al. Clin Infect Dis* 2012;55:1450-1456; 6. De Serres G *et al. J Infect Dis* 2000;182:174-179; 7. Karki S *et al. Vaccine* 2015;33:5647-5653; 8. Bonhoeffer J *et al. Infection* 2005;33:13-17; 9. Harju TH *et al. Thorax* 2006;61:579-584; 10. CDC, 2016. Vaccination of adults with lung disease including asthma. <https://www.cdc.gov/vaccines/adults/rec-vac/health-conditions/lung-disease.html> (accessed January 2019)

Summary

Pertussis in high-risk populations



- Pertussis occurs in **all age groups**¹
- Pertussis is **under-reported**, with cases in adults frequently missed or misdiagnosed²



- Adults with underlying conditions can be at increased risk from pertussis:³⁻⁷

	Asthma	COPD	Obesity	IC*	Age ≥50	Smoking
Risk of pertussis	!	!	!			
Worse pertussis symptoms or hospitalisation[†]	!	!	!	!	!	!

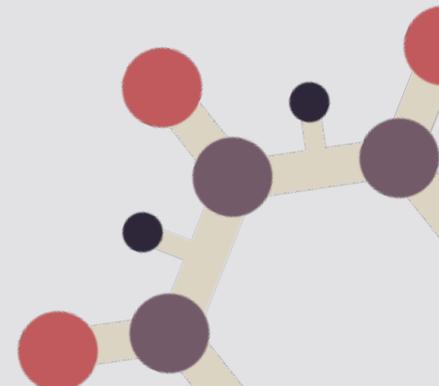


- For those with pre-existing asthma or COPD, pertussis can **worsen symptoms** of the underlying condition and significantly **increase healthcare costs**^{4,8,9}

**Adults with underlying conditions are at higher risk for serious problems with pertussis
Booster vaccination with dTpa vaccine may help these populations to stay healthy¹⁰**

• *Potentially immunocompromising condition or immunosuppressive medication use; [†]Pertussis-related hospitalisation. COPD, chronic obstructive pulmonary disease; IC, immunocompromised; Tdap, tetanus, diphtheria, acellular pertussis vaccine

• 1. Clarke MF et al. Epidemiol Infect 2013;141:463–471; 2. Tan T et al. Pediatr Infect Dis J 2005;24:S10–S18; 3. Mbayei SA et al. Clin Infect Dis 2018;doi:10.1093/cid/ciy889; 4. Buck PO et al. Epidemiol Infect 2017;145:2109–2121; 5. Liu BC et al. Clin Infect Dis 2012;55:1450–1456; 6. De Serres G et al. J Infect Dis 2000;182:174–179; 7. Karki S et al. Vaccine 2015;33:5647–5653; 8. Bonhoeffer J et al. Infection 2005;33:13–17; 9. Harju TH et al. Thorax 2006;61:579–584; 10. CDC, 2016. Vaccination of adults with lung disease including asthma. <https://www.cdc.gov/vaccines/adults/rec-vac/health-conditions/lung-disease.html> (accessed January 2019)



References

1. <https://ranzcog.edu.au/news/updated-advice-on-pertussis-immunisation-in-pregna>
2. Van Buynder PG, Van Buynder JL, Menton L, Thompson G, Sun J. Antigen specific vaccine hesitancy in pregnancy. *Vaccine* 2019; 37(21):2814-2820.
3. Ridda I, Yin K, King C, MacIntyre CR, McIntyre P. The importance of pertussis in older adults: A growing case for reviewing vaccination strategy in the elderly. *Vaccine*,2012; 30 (48) 6745-6752
4. Chiappini, E., Stival, A., Galli, L. *et al.* Pertussis re-emergence in the post-vaccination era. *BMC Infect Dis* 13, 151 (2013). <https://doi.org/10.1186/1471-2334-13-151>

