Pertussis 101

Epidemiology
Alexandria Health Department

May 2024

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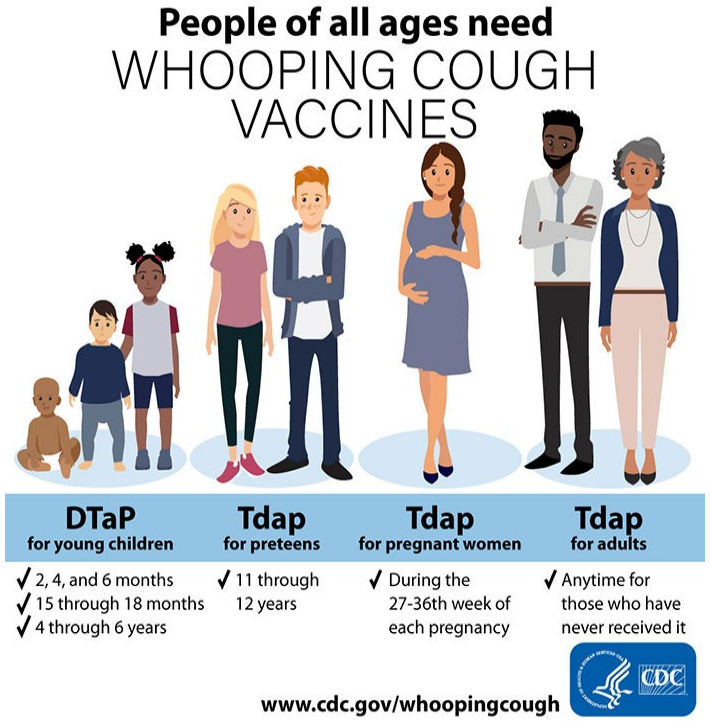
Pathophysiology

- Pertussis (a.k.a. whooping cough):
    - Known for violent uncontrollable coughing. Click here to listen to a cough.
    - Caused by bacterium *Bordetella pertussis*
- Bacteria attach to upper respiratory cilia and release toxins, damaging the cilia and causing airways to swell
- No known animal, insect , or vector source
- Rapidly reportable in Virginia to the Health Department

Vaccines: DTap and Tdap

- Vaccines contain diphtheria, tetanus, and acellular pertussis
  - DTaP and Tdap contain the same pertussis components, but Tdap contains a reduced quantity of some pertussis antigens and diphtheria toxoid.
- Recommended Schedule:
  - DTaP: Given at 2, 4, & 6 months, 15-18 months, and 4-6 years
  - Tdap: Once at 11-18 years (preferably at 11-12 years); once for any adult over 19 years who has never received one.
  - Tdap or Td every 10 years thereafter for tetanus immunity
- Efficacy:
  - DTaP (all 5 doses given on schedule) fully protects 98% of children within a year after the last dose and 71% of children 5 years after the last dose.
  - Tdap fully protects about 73% of adolescents in the first year and 34% of people 4 years after vaccination.



Epidemiology

Infectious period

- Begins at symptom onset
- Untreated: Ends 3 weeks after cough starts
- Treated: Ends 5 days after antibiotics start

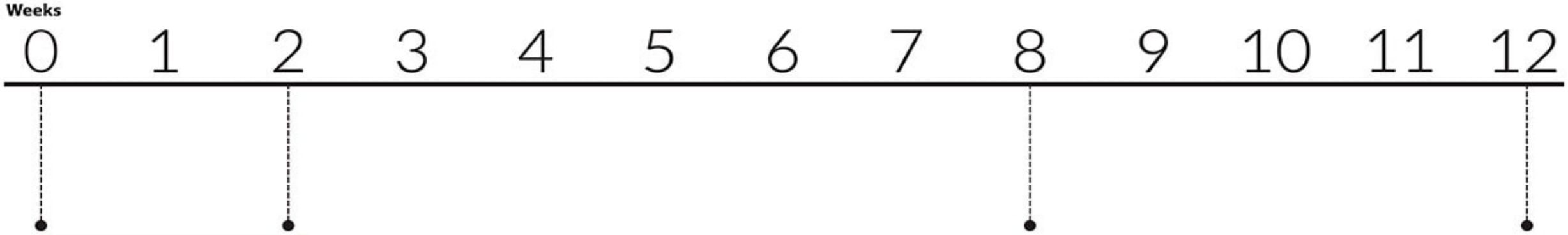
Incubation Period: 4-21 days

- Most commonly 7-10 days

Transmission:

- Occurs during the symptomatic period
- Person-to-person via respiratory droplets or direct contact with secretions

Whooping Cough Disease Progression



Early Symptoms: Stage 1
May last 1 to 2 weeks

- Highly contagious

Symptoms:

- Runny nose
- Low-grade fever
- Mild, occasional cough

Later Symptoms: Stage 2
Last from 1 to 6 weeks; may extend to 10 weeks

Symptoms:

- Fits of numerous, rapid coughs followed by "whoop" sound
- Vomiting and exhaustion after coughing fits (called paroxysms)

Recovery: Stage 3
Last about 2 to 3 weeks; susceptible to other respiratory infections for many months

Recovery is gradual. Coughing lessens but fits of coughing may return.

cdc.gov/whoopingcough

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Test Appropriately

- Testing outside these guidelines is high risk for false-positives
- Serology testing is generally not recommended
- Only test within 3 weeks of symptom onset

Diagnostic Testing for Pertussis

Test	Time frame after symptom onset	Sensitivity (%)	Specificity (%)	Comments
Polymerase chain reaction[8,19,21]	1 to 4 weeks; highest sensitivity by 3 to 4 weeks	77 to 97	88 to 97	Uses a nasopharyngeal Dacron or nylon swab Results in 1 to 2 days
Culture[18,19]	1 to 4 weeks	20 to 80	100	Uses a nasopharyngeal Dacron or nylon swab Requires special transport media and growth conditions Limited yield with antibiotic use and prior immunization Results take seven to 10 days
Serology[19,22]	3 to 12 weeks; highest sensitivity after 6 weeks	65	92	Not useful in patients vaccinated in the previous year or in infants younger than 6 months (presence of maternal antibodies)

Treat Early – For CDC Recs, Click Here

Strongly consider treating prior to test results if:

- High clinical suspicion for pertussis
- High risk for severe or complicated disease (e.g., infants)
- Patient has or will soon have routine contact with someone at high risk of serious disease (e.g., pregnant women)

A reasonable guideline is to treat

- Infants less than 1 year of age within 6 weeks of cough onset
- Pregnant women (especially near term) within 6 weeks of cough onset
- Children/adults more than 1 year of age within 3 weeks of cough onset

Assess for Contacts

Close Contacts:

- Had face-to-face interaction for ≥ 1 hour total/week
- Shared confined space in close proximity for at least 10 hours/week
- Had direct contact with respiratory, oral, or nasal secretions

Give Prophylaxis to Contacts

- All household members
- Persons at high risk for severe pertussis
- Persons who will have close contact with those at high risk for severe pertussis

Recommended Antimicrobial Therapy and Postexposure Prophylaxis for Pertussis in Infants, Children, Adolescents, and Adults[a]

	Primary Agents			Alternative
Age	Azithromycin	Erythromycin	Clarithromycin	TMP-SMZ
< 1 mo	10 mg/kg/day as a single dose daily for 5 days[bc]	40 mg/kg/day in 4 divided doses for 14 days	Not recommended	Contraindicated at younger than 2 mo
1-5 mo	10 mg/kg/day as a single dose daily for 5 days[b]	40 mg/kg/day in 4 divided doses for 14 days	15 mg/kg/day in 2 divided doses for 7 days	2 mo or older: TMz 8 mg/kg/day; SMX 40 mg/kg/day in 2 divided doses for 14 days.
6 mo or older and and children	10 mg/kg as a single dose on day 1 (maximum 500 mg), then 5 mg/kg/day as a single dose on days 2-5 (maximum 250 mg/day)[b,d]	40 mg/kg/day in 4 divided doses for 14 days for 7-14 days (maximum 2 g/day)	15 mg/kg/day in 2 divided doses for 7 days (maximum 1 g/day)	2 mo or older: TMP 8 mg/kg/day; SMX 40 mg/kg/day in 2 divided doses for 14 days.
Adolescents and adults	500 mg in a single dose on day 1 then 250 mg per day on days 2 through 5[b,d]	2 g/day in 4 divided doses for 7-14 days	1 g per day in 2 divided doses for 7 days	TMP 320 mg/day, SMX 1,600 mg/day in 2 divided doses for 14 days

SMX indicates sulfamethoxazole; TMP, trimethoprim

[a]Centers for Disease Control and Prevention. Recommended antimicrobial agents for the treatment and postexposure prophylaxis of pertussis: 2005 CDC guidelines. *MMWR Recomm Rep. 2005;54(RR-14):1-16*

[b]Azithromycin should be used with caution in people with prolonged QR interval and certain proarrhythmic conditions.

[c]Preferred macrolide for this age because of risk of idiopathic hypertrophic pyloric stenosis associated with erythromycin.

[d]A 3-day course of azithromycin for PEP or treatment has not been validated and is not recommended.

Infection Control

- Follow Droplet Precautions and Standard Precautions
- Keep personal protective equipment (PPE) on hand for patients and staff
- Medical staff exposed to Pertussis in the absence of appropriate PPE will be evaluated by health department for PEP

Infection Control (cont.)

- Know your clinic procedure
  1. Source control: Put a surgical mask on the patient when they enter the facility.
  2. Quick to the room: Room the patient ASAP and instruct on respiratory hygiene/cough etiquette.
  3. Stay Put: Limit patient transport outside the room/space unless medically necessary.
  4. Use PPE appropriately (for all staff).
     a) Perform hand hygiene
     b) Put on surgical mask prior to entering
     c) Remove mask prior to exiting
     d) Perform hand hygiene
  5. If you believe staff have been exposed to pertussis at work, inform your clinic manager/IP. AHD evaluates the need for prophylaxis.

Be Prepared

Educate all staff: Nurses, NPs, PAs, Medical Assistants following the checklist:

Whooping Cough Checklist – Is your clinic ready?	
☐	All staff have received training about pertussis, including: ☐ When to test ☐ How to test: collecting NP swab video ☐ Antibiotics for cases and close contacts ☐ How to contact the health department to report suspect and clinical cases
☐	All staff are up to date on their Tdap vaccine.
☐	Order pertussis test kits from commercial labs: ☐ LABCORP code: 180224 ☐ QUEST code: 11365 ☐ Public Health testing for uninsured/underinsured patients: email alex_epi@vdh.virginia.gov to request kits dropped off to your office.
☐	Inventory your pertussis testing supplies and walk through testing and shipping processes
☐	Inventory your Personal Protective Equipment for standard precautions PLUS droplet precautions

A Note to Remember:

Exclude positive/clinically diagnosed case from school/work

- Until 5 days of appropriate antibiotic treatment
- Or 21 days after cough onset if no treatment
- Recommended by the health department to decrease transmission and protect high risk members of our community

Thank You!

Contact:
Alex_Epi@vdh.virginia.gov
Provider line: 703-746-4951

References and Resources:

Alexandria HD website: Information for Healthcare Providers | City of Alexandria, VA (alexandriava.gov)

Pertussis

Disease specifics: Pertussis: Disease Specifics for Clinicians | CDC

Signs and Symptoms: Signs and Symptoms of Whooping Cough (Pertussis) | CDC

Testing guidelines: Specimen Collection and Diagnostic Testing | CDC

Testing instructional video: https://www.youtube.com/watch?v=zqX56LGItgQ

Treatment guidelines: https://www.cdc.gov/pertussis/clinical/treatment.html

Postexposure Antimicrobial Prophylaxis Recommendations: Pertussis and Postexposure Antimicrobial Prophylaxis (PEP) | CDC

Infection Control: Pertussis | Epidemiology and Control of Selected Infections | Infection Control | CDC