Children's Hospital and Health System, Inc.
Patient Care Treatment Guideline
Urgent Care (UC)

SUBJECT: Pertussis & Parapertussis

The most up-to-date recommendations by the CDC can be found at the below link:
http://www.cdc.gov/pertussis/index.html

Purpose: To evaluate and initiate treatment of pertussis and parapertussis

Definitions:

PERTUSSIS, commonly known as whooping cough, is a very contagious disease found only in humans. It is transmitted most commonly via respiratory routes. The bacterium attaches to the cilia of the upper respiratory system and releases toxins which paralyze the cilia and cause inflammation; thus interfering with the ability to clear airway secretions. Pertussis is known for bursts (paroxysms) of uncontrollable, worsening, violent coughing which often makes it hard to breathe. At the end of paroxysmal coughing, one with pertussis will often need to take a deep breath which may be accompanied with a high-pitched "whooping" sound. Pertussis is transmitted by close contact via large respiratory droplets produced by coughing or sneezing. The typical incubation period is 7 to 10 days, with a range of 5 to 21 days. Those aged > 1 year are contagious for 3 weeks after the cough begins, those < 1 year are contagious for 6 weeks after the onset of cough. The duration of classic pertussis is 6 to 10 weeks. Pertussis cases occur year round with a peak in late summer-autumn; occurring endemically with 3-to-5 year cycle of increased disease.

Pertussis can affect people of all ages, but can be very serious, even deadly, for babies less than one year old. Approximately 2/3 of infants with pertussis will require hospitalization; of these, 61% will experience apnea, 23% pneumonia and 1% death. The most common complication, and cause of most pertussis-related deaths, is secondary bacterial pneumonia. Many babies who get pertussis are infected by older siblings, parents or caregivers who might not even know they have the disease. Pertussis is highly communicable with secondary attack rates of 80% among susceptible household contacts. Pertussis is generally treated with antibiotics to prevent those infected from spreading the disease. Vaccination offers the best protection against the disease, although neither natural infection nor immunization provides lifelong immunity.

PARAPERTUSSIS, similar to pertussis, is a bacterial illness that may cause prolonged cough, paroxysmal cough, whoop, and vomiting, but is typically milder and shorter in duration (2 weeks versus 6 weeks). Infants < 6 months may experience a more severe course compared with older persons. Rarely, death can occur in infants with underlying health problems or infants with a pertussis coinfection (positive for parapertussis AND pertussis).

Effective: 02/2020
Approved UC Clinical Practice Council and Medical Director 1/2020
Next review: 02/2023

Etiology:

- **PERTUSSIS** caused by *Bordetella pertussis (B. pertussis),* gram negative bacteria
- **PARAPERTUSSIS** caused by *Bordetella parapertussis (B. parapertussis),* gram negative bacteria

Differential Diagnosis for PERTUSSIS and PARAPERTUSSIS:

- Mycoplasma pneumoniae
- Chlamydia trachomatis
- Chlamydia pneumoniae
- Bordetella bronchiseptica (cause of kennel cough)
- Respiratory tract viruses; specifically, RSV and Adenovirus
- Reactive airway disease/asthma
- Allergic or infectious sinusitis
- Gastroesophageal reflux
- Aspiration pneumonia

Guideline

Subjective Data/History for PERTUSSIS and PARAPERTUSSIS

Summary of Clinical Features of Pertussis and Parapertussis

Stage	Length (Total 0-12 weeks)	Clinical Features
Stage 1: Catarrhal *Highly contagious*	• 7-10 days • Range 4-21 days	Insidious onset of: • Coryza (runny nose) • Sneezing • Fever – absent or minimal • Mild, occasional cough (which gradually becomes more severe) • Apnea - *young infant (<6 months) often have atypical presentation*
Stage 2: Paroxysmal *Traditional symptoms*	• 1-6 weeks • May persist for up to 10 weeks	• Paroxysms of numerous, rapid coughs due to difficulty expelling thick mucus from the tracheobronchial tree • Long inspiratory effort accompanied by a high-pitched "whoop" at the end of the paroxysms • Cyanosis during attack • Vomiting and Exhaustion Paroxysmal attacks: • Occur more frequently at night • Increase in frequency during the first 1-2 weeks, remain at the same frequency for 2-3 weeks, and then gradually decrease

Stage	Length (Total 0-12 weeks)	Clinical Features
		Paroxysmal attacks continued: • Infants < 6 months may not have enough strength to have a whooping sound *Often appear well in-between coughing fits.*
Stage 3: Convalescent	• 7-10 days • Range of 4-21 days	• Gradual recovery • Less persistent, paroxysmal cough disappears in 2-3 weeks *Paroxysms often recur with subsequent respiratory infections for many months after the onset of pertussis.*

Objective Data/Physical Exam for PERTUSSIS and PARAPERTUSSIS

Suspect pertussis and/or parapertussis in the following patients:

- **Infants < 6 months**:
  - Cough that is not improving (of any duration)
  - Gagging or gasping
  - Pneumonia
  - Apnea, seizures, cyanosis, vomiting, or poor weight gain
  - Leukocytosis with lymphocytosis
    (WBC count ≥20,000 cells/mL with ≥50 percent lymphocytes)
- **Children/Adults > 6 months**:
  - Paroxysmal nonproductive cough of ≥7 days duration
  - A cough illness with whoop, apnea, posttussive vomiting, subconjunctival hemorrhage, or sleep disturbance
  - Cyanosis
  - Sweating episodes between paroxysms

Diagnostic Studies: Per Wisconsin Division of Public Health (WDPH), only symptomatic persons should have specimens collected for pertussis testing. Note: All tests sent for pertussis automatically include testing for parapertussis at CW. CW turn-around-time for pertussis testing is 24 hours.

PERTUSSIS

- PCR (polymerase chain reaction) via nasopharyngeal specimen (NP swab)
  - PCR provides timely results with improved sensitivity over culture
  - Optimal sensitivity during the first 3 weeks of cough or up to 4 weeks of cough in infants or unvaccinated persons
  - Typically negative after 21 days from onset of cough, or 5-7 days of appropriate antibiotic therapy

PARAPERTUSSIS

- PCR (polymerase chain reaction) via nasopharyngeal specimen (NP swab)
  - PCR provides timely results with improved sensitivity over culture

Both Pertussis (whooping cough) and Parapertussis is nationally-notifiable and cases will be reported to the appropriate health department (done by CW lab and Infection Preventionist).

Treatment – (See Appendix A: Pertussis & Parapertussis Treatment Algorithm; Appendix B: Recommended Antimicrobial Therapy and Postexposure Prophylaxis for Pertussis and Parapertussis in Infants, Children, Adolescents, and Adults)

PERTUSSIS

*Per the CDC, clinicians should strongly consider **treating prior to test results** if clinical history is strongly suggestive or patient is at risk for severe or complicated disease (i.e. infants).*

- Treatment is recommended for individuals who have a positive *Pertussis* PCR within three weeks of cough onset (individuals >1 year) or within six weeks of cough onset (individuals <1 year/pregnant women)
  - **If < 4 months and either suspect Pertussis or have a confirmed positive Pertussis PCR:** Consult with CW Infectious Disease for possible CBC, admission and close monitoring as this population is known to develop complications and deteriorate rapidly; consider transfer to CW EDTC for stabilization PRN

PARAPERTUSSIS

- All persons, particularly infants, with positive *Parapertussis* PCR should promptly receive treatment with an appropriate antibiotic to help prevent the spread to young infants. The medication dosing and dose schedule is the same as for pertussis infection.

Postexposure Prophylaxis (PEP) for PERTUSSIS

Per Wisconsin Division of Public Health (WDPH):

- If the person meets the definition as a **close contact AND is in the high-risk category** then initiate PEP with appropriate antibiotics if last exposure to the pertussis patient was within 21 days.
  - If pertussis symptoms are present or develop, the individual should be managed as having a suspected case of pertussis (see Appendix A: Pertussis & Parapertussis Treatment Algorithm)

- If the person meets the definition as a **close contact but is NOT in the high-risk category** then monitor this person(s) for 21 days from last exposure.
    - If pertussis symptoms are present or develop, the individual should be managed as having a suspected case of pertussis (see Appendix A: Pertussis & Parapertussis Treatment Algorithm)

- **Close contacts are defined as:**
    - Direct face-to-face contact for a period of time (duration not defined)
    - Shared confined space in close proximity for a prolonged period of time (≥1 hour)
    - Direct contact with respiratory, oral, or nasal secretions
    - Contact in a setting with known pertussis transmission (i.e. ≥2 or more cases in same classroom or sports team)
    - Household contacts (including roommates in dormitories)

- **"High-risk" categories are defined as:**
    - Infants aged < 1 year
    - Pregnant women in their third trimester
    - Individuals with pre-existing health conditions that may be exacerbated by pertussis infections (for example, but not limited to, immunocompromised persons, patients with moderate to severe medically treated asthma)
    - Persons who will have contact with anyone in the above 3 groups
    - Household contacts

Note: UC providers should not prescribe PEP for non-UC patients. UC providers should recommend non-UC patients needing PEP call their primary care provider. When possible, please confirm positive pertussis or parapertussis results.

Postexposure Prophylaxis (PEP) for PARAPERTUSSIS

WDPH RECOMMENDS PEP treatment as follows
- Infant < 6 months in household, treat ALL household members
- All infants < 6 months
- If any of the above described contacts are symptomatic, TEST FIRST, then treat due to risk of co-infection with Pertussis

Note: UC providers should not prescribe PEP for non-UC patients. UC providers should recommend non-UC patients needing PEP call their primary care provider. When possible, please confirm positive pertussis or parapertussis results.

Education of Patient/Family for PERTUSSIS and PARAPERTUSSIS

- Pertussis is treated with antibiotics to prevent the spread of the disease
- Parental reassurance that patient will continue to cough; treatment does not shorten the duration of illness

- Do not use cough medications (See UC Guideline: Pharmacologic Agents in the Treatment of Cough and Cold Symptoms in Children)
- Avoid irritants for cough
- Clean, cool mist vaporizer will help loosen mucus
- Encourage fluids

Period of Communicability for PERTUSSIS and PARAPERTUSSIS

Treated with appropriate antibiotic therapy?	Age of patient	Start of Infectious Period	End of Infectious Period
YES	All ages	7 days before cough onset	After 5th day of treatment
NO	≥ 1 year	7 days before cough onset	21 days after cough onset
NO	< 1 year	7 days before cough onset	42 days after cough onset

Day 0 = day of cough onset

Note: Data suggests for both PERTUSSIS and PARAPERTUSSIS, if treatment is started within the first 2 weeks of cough illness, the overall duration of cough may be shorter

Return to school/daycare/work for PERTUSSIS

- Infected children should be excluded from school/daycare/work and isolated at home until they have completed 5 days of effective antimicrobial therapy, or if they are not treated, 21 days if > 1 year old or 42 days if < 1 year old, after the onset of cough.

Return to school/daycare/work for PARAPERTUSSIS

- No exclusion from school/daycare/work unless contact with infants < 6 months. If contact with infants less than 6 months, must be excluded until received 5 days of appropriate antibiotic treatment or 21 days have passed since cough onset.

Prevention for PERTUSSIS and PARAPERTUSSIS

- Routine Vaccination with DTaP and Tdap
  - Does not provide lifelong immunity for pertussis
  - Still recommended for people with natural disease
  - Does not protect against parapertussis
  - Vaccine efficacy: 80-85%
- Appropriate and timely PEP
- Good personal hygiene

Follow-up

- As needed

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This guideline is designed to serve as a reference for clinical practice and does not represent an exclusive course of treatment nor does it serve as a standard of medical care. Providers should apply their professional judgment to the management of individual patient conditions and circumstances. Children's Hospital and Health System (CHHS) does not make any representation with respect to any sort of industry recognized standard of care for the particular subject matter of this clinical guideline. Additionally, CHHS form documents are subject to change, revision, alteration, and/or revocation without notice.

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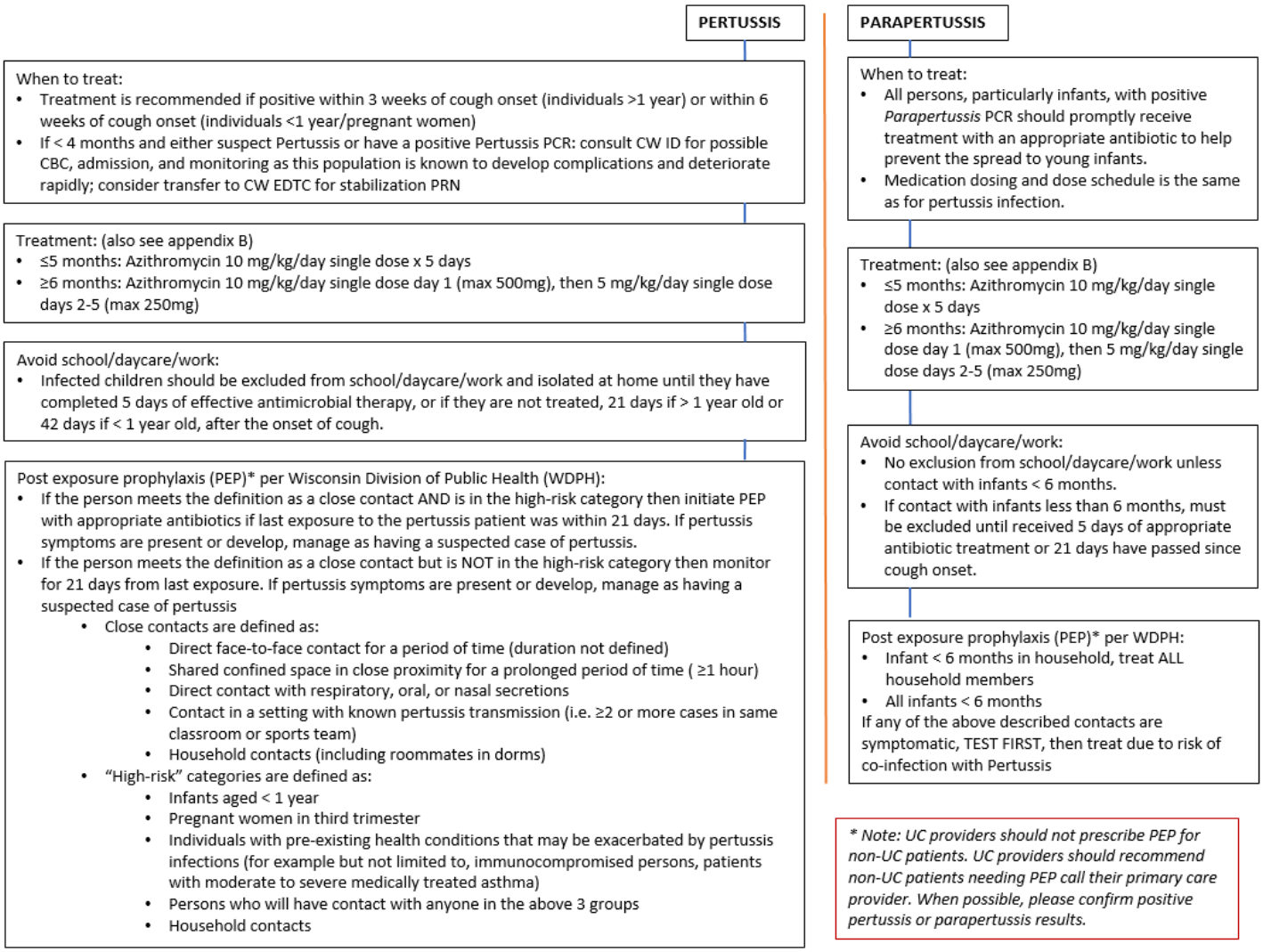
Treatment information also provided by Lori Loof, Injection Preventionist, Children's Wisconsin (personal communication, January 2020).

Appendix A: Pertussis & Parapertussis Treatment Algorithm



Appendix B: Recommended Antimicrobial Therapy and Postexposure Prophylaxis for Pertussis in Infants, Children, Adolescents, and Adults (Redbook & UpToDate)

	Recommended Drugs			
Age	Azithromycin	Erythromycin	Clarithromycin	TMP-SMX
<1 month	**Recommended first line:** 10mg/kg/day as a single daily dose for 5 days	Not preferred; erythromycin is associated with infantile hypertrophic pyloric stenosis; use if azithromycin is unavailable; 40 mg/kg per day in four divided doses for 14 days	Not recommended	Contraindicated at younger than 2 months of age
1-5 months	See above	See above	15mg/kg/day in 2 divided doses for 7 days	2 mo of age or older: TMP, 8mg/kg/day; SMX 40mg/kg/day in 2 doses for 14 days
Infants ≥ 6 months	**Recommended first line:** 10mg/kg as a single dose on day 1 (max 500mg), then 5mg/kg/day as a single dose on days 2-5 (max 250mg/day)	40 mg/kg/day in 4 divided doses for 7–14 days (maximum 1–2 g/day)	15 mg/kg/day in 2 divided doses for 7 days (maximum 1 g/day)	See above
Adolescents & Adults	**Recommended first line:** 500 mg as a single dose on day 1, then 250 mg as a single dose on days 2 through 5	2 g/day in 4 divided doses for 7–14 days	1 g/day in 2 divided doses for 7 days	TMP, 320 mg/day; SMX, 1600 mg/day in 2 divided doses for 14 days