Indian Academy of Pediatrics (IAP)

STANDARD TREATMENT GUIDELINES 2022

Pertussis in Children

Lead Author
Jayant G Joshi

Co-Authors
Arun Manglik, Durgappa H

Under the Auspices of the IAP Action Plan 2022

Remesh Kumar R
IAP President 2022

Upendra Kinjawadekar
IAP President-Elect 2022

Piyush Gupta
IAP President 2021

Vineet Saxena
IAP HSG 2022–2023

IAP Standard Treatment Guidelines Committee

Chairperson

Remesh Kumar R

IAP Coordinator

Vineet Saxena

National Coordinators

SS Kamath, Vinod H Ratageri

Member Secretaries

Krishna Mohan R, Vishnu Mohan PT

Members

Santanu Deb, Surender Singh Bisht, Prashant Kariya, Narmada Ashok

Pertussis in Children

113

Introduction

- ☑ Pertussis is a highly contagious acute infection of the respiratory tract. It predominantly afflicts infants and young children. Although adolescents and adults are the major source of infection, manifestations are less severe in them.
- ☑ Pertussis, also commonly called as "whooping cough", is caused by *Bordetella pertussis*, fastidious gram negative coccobacilli, which can only colonize ciliated epithelium. It affects only human beings with no known animal/environmental sources.
- ☑ *Bordetella* like illness can also be caused by other species, *Bordetella parapertussis*, *Bordetella bronchiseptica* and *Bordetella holmesii*. *B. parapertussis* causes milder pertussis like illness in humans and other two species are known to occur in immunocompromised patients.

Epidemiology

- ☑ In 2008, World Health Organization (WHO) estimated that 16 million cases of pertussis and 195,000 childhood deaths occurred globally and 95% of them were reported from developing countries. Chanales et al., (WHO 2010) estimated that nearly 300,000 deaths worldwide are caused by pertussis each year.
- ☑ In 2018, WHO estimated that there were 151,074 cases of pertussis worldwide.
- ☑ Though pertussis is underdiagnosed, it is a formidable disease and major public health problem causing significant morbidity and mortality especially in infants and young children.

Pathogenesis

Pertussis is a toxin-mediated disease. Organisms get colonized in respiratory ciliary epithelium and toxins released cause ciliary paralysis and induce inflammation that interferes with adequate clearance of pulmonary secretions. *B. pertussis* expresses *pertussis toxin (PT),* the major virulence protein, which is known to have several biological activities, histamine sensitivity, insulin secretion, and leukocyte dysfunction. Tracheal cytotoxin is responsible for local epithelial damage and inhibits clearance of organisms. Both, cellular and immune responses follow infection as well as immunization. Vaccines generate antibodies to PT, which neutralize toxins and antibodies to Prn enhances opsonophagocytosis.

Clinical Features

Classic pertussis is common in children and usually experience first symptom 7–10 days after infection (range 5–21 days). Typically, pertussis presents in three phases.

1. *Catarrhal phase (1–2 weeks):* In this phase children have nonspecific prodromal features such as coryza, mild dry cough ,low grade fever, conjunctival congestion, and lacrimation.
2. *Paroxysmal phase (4–6 weeks):* As the catarrhal phase wanes, children start getting dry irritative hacky, inexorable paroxysmal cough with post-tussive vomiting and typical inspiratory whoop lasting for few seconds to minutes.
3. *Convalescent phase:* Symptoms subside slowly over a period of 1–2 weeks.

Case Definition

A suspected case of pertussis is defined as following.

A patient with a cough lasting for 2 weeks or more, with at least one of the following:

- ☑ Paroxysms of coughing.
- ☑ Inspiratory whooping.
- ☑ Post-tussive vomiting.
- ☑ Apneic spells and cyanosis with cough of any duration, in infants, without any obvious systemic cause.
- ☑ High index of suspicion for cough of any duration in unvaccinated children.

Complications of Pertussis

More common in unimmunized children.

- ☑ Pneumonia
- ☑ Failure to thrive due to post-tussive vomiting
- ☑ Secondary bacterial infections
- ☑ Rectal prolapse
- ☑ Subconjunctival hemorrhage
- ☑ Seizures and encephalopathy
- ☑ Cerebral hypoxia
- ☑ Pulmonary hypertension
- ☑ Young infants may present with apnea, cyanosis, and respiratory compromise.

In older children and adolescents and adults, pertussis presentations may vary from classic presentation/mild/no cough.

Investigations

- ☑ Posterior nasopharyngeal secretion culture is the gold standard and yield is maximum during catarrhal phase.
- ☑ Polymerase chain reaction (PCR) detects deoxyribonucleic acid (DNA) sequence of bacteria and sensitivity decreases after 4 weeks of onset of disease.
- ☑ Serology useful for diagnosis during convalescent phase.

Treatment

- ☑ *Acute phase:* General supportive measures include:
- ☑ Adequate hydration
- ☑ *Control of secretions:* Avoid excessive suctioning
- ☑ Maintenance of airway
- ☑ *Antibiotics:* Macrolides eradicate *B. pertussis* within 5 days from nasopharynx, when started early in the course of the disease.
- ☑ *Erythromycin:* 40–50 mg/kg QID for 14 days
- ☑ *Azithromycin:* 10 mg/kg OD for 5 days
- ☑ *Clarithromycin:* 15 mg/kg BD for 7 days
- ☑ *Alternate agents:* Cotrimoxazole who are intolerant to macrolides.
- ☑ Erythromycin and clarithromycin are not recommended in infants <1 months.
- ☑ Trimethoprim-sulfamethoxazole (TMP-SMX) contraindicated in infants <2 months due to risk of kernicterus.

Antimicrobial therapy administered during catarrhal phase may ameliorate the disease. The antibiotic therapy may shorten the duration of symptoms and decrease transmission to the susceptible contacts. However, once the paroxysmal stage is established, antibiotics have no effects on the course of the disease but limit the spread of infection to others.

Hospitalization may be indicated in young infants (<4 months age) who have significant morbidity with respiratory compromise in form of persistent hypoxia or frequent episodes of apnea with altered sensorium or seizures.

Prevention

- ☑ Vaccination is the most successful strategy in preventing pertussis. Age appropriate vaccination schedule comprising of the primary and booster vaccinations should be followed scrupulously.
- ☑ Advisory Committee on Immunization Practices (ACIP) recommends single dose of tetanus, diphtheria, and pertussis (Tdap) in place of Td for adults aged 65 years who have close contact with infants <12 months.
- ☑ ACIP also recommended that all pregnant women receive a dose of Tdap with every pregnancy preferably between 27 and 36 weeks of gestation.
- ☑ All household contacts <21 days high risk of disease should have preventive prophylaxis treatment.

Key Messages

- ☑ Pertussis is a major public health problem with significant morbidity and mortality especially in infants and young children.
- ☑ Catarrhal phase is the most infectious stage and antimicrobial therapy administration is critical during this phase.
- ☑ Inexorable paroxysmal cough followed by post-tussive vomiting is the diagnostic hall mark of pertussis.
- ☑ Infants <3 months do not have classic presentation and catarrhal phase may last for few days or may go unnoticed.
- ☑ As the paroxysmal phase wanes the episodes of cough and severity will slowly decrease.
- ☑ Vaccination is the most cost effective strategy for the prevention of pertussis in children.

Further Reading

- ☑ CDC. Updated recommendations for use of tetanus toxoid reduced diphtheria toxoid and acellular pertussis (Tdap) vaccine from the advisory committee on immunization practices, 2010. MMWR. 2011;60(1):13-5.
- ☑ Cornia P, Lipsky B. (2022). Pertussis infection: Epidemiology, microbiology, and pathogenesis. [online] Available from https://www.uptodate.com/contents/pertussis-infection-epidemiology-microbiology-and-pathogenesis/print [Last accessed October, 2022].
- ☑ Jackson DW, Rohani P. Perplexities of pertussis: Recent global epidemiological trends and their potential causes. Epidemiol infect. 2014;142(4):672-84.
- ☑ Wood N, McIntyre P. Pertussis review of epidemiology, diagnosis, management and prevention. Pediatr respir rev. 2008;9(3):201-11.
- ☑ Yeh S, Mink CM. (2022). Pertussis infection in infants and children: Clinical features and diagnosis. [online] Available from https://www.uptodate.com/contents/pertussis-infection-in-infants-and-children-clinical-features-and-diagnosis [Last accessed October, 2022].
- ☑ Zouari A, Smaoui H, Kechrid A. The diagnosis of pertussis: which method to choose? Crit Rev Microbiol. 2012;38(2):111-21.