

Bacterial Respiratory Tract Infections



Streptococcus pneumoniae

Gram-positive encapsulated diplococcus causing community-acquired pneumonia, meningitis, and otitis media. Over 100 serotypes; 23 cause 90% of severe infections.



Bordetella pertussis

Gram-negative coccobacillus causing whooping cough. Highly contagious, vaccine-preventable respiratory illness with highest incidence in young infants.

B. pertussis Pathogenesis

Pertussis toxin: AB toxin causing lymphocytosis

Adenylate cyclase toxin: Impairs immune response

Tracheal cytotoxin: Damages respiratory epithelium(cilia)

Filamentous hemagglutinin: Enables attachment

S. pneumoniae Virulence

Polysaccharide capsule: Inhibits phagocytosis

IgA protease: Evades immune system

Pneumolysin: Lyses host immune cells

Autolysin: Releases internal components

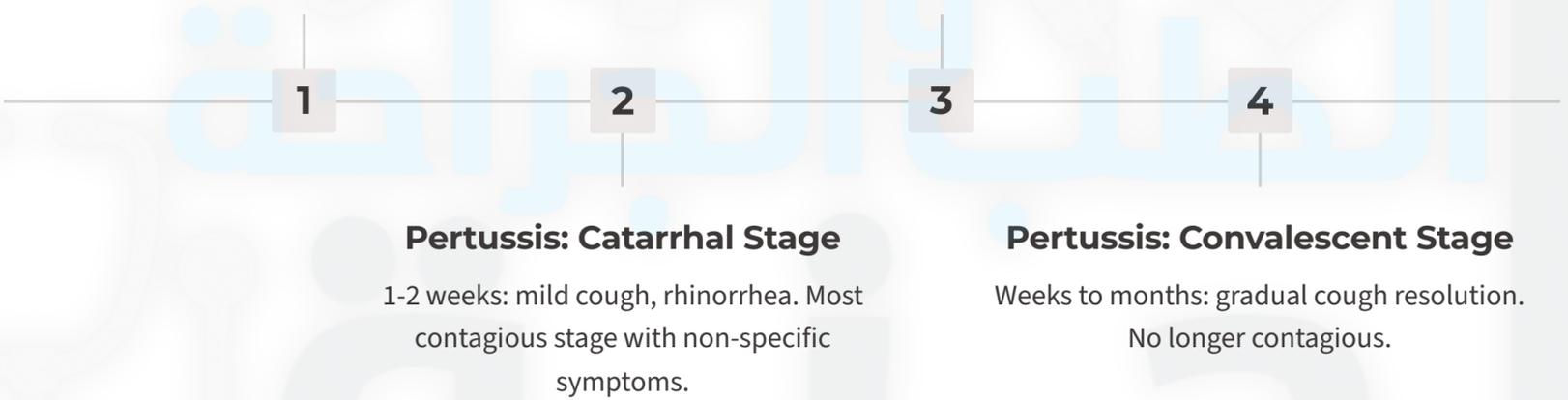
Clinical Presentations

Pneumococcal Pneumonia

High fever (39.5°C), pleuritic pain, rusty sputum. Lobar consolidation on X-ray. 15% mortality in hospitalized patients.

Pertussis: Paroxysmal Stage

2-6 weeks: severe coughing spells with inspiratory whoop, post-tussive vomiting. Infants may have apnea and cyanosis.



Treatment Approaches

Pertussis

Macrolide antibiotic (e.g., azithromycin) is the treatment of choice for pertussis.

Most effective when started during catarrhal stage

Pneumococcal Pneumonia

Outpatient (Healthy)	Amoxicillin or doxycycline
Outpatient (Comorbid)	Fluoroquinolone or beta-lactam + macrolide

Prevention Strategies

Pneumococcal Vaccines

PPSV23: 23 serotypes, weaker response, not for infants

PCV13: 13 serotypes, stronger T-cell response, effective in infants

Pertussis Vaccine (DTaP)

Acellular pertussis vaccine is the best prevention. Recommended for babies, children, teens, and adults.

Hygiene Measures

Cover coughs/sneezes, wash hands frequently for 20 seconds, use tissues properly to prevent transmission.

Risk Factors

Young/elderly, immunosuppressed, asplenia, chronic diseases, viral infections, loss of consciousness

Key Diagnostics

Chest X-ray for pneumonia; culture, PCR, serology for pertussis; lymphocytosis distinguishes pertussis

Complications

Meningitis, sepsis (pneumococcal); rib fractures, apnea, seizures, respiratory failure (pertussis)