

Indian Academy of Pediatrics (IAP)



STANDARD TREATMENT GUIDELINES 2022



**Under the Auspices of the
IAP Action Plan 2022**

Remesh Kumar R
IAP President 2022

Uendra Kinjawadekar
IAP President-Elect 2022

Piyush Gupta
IAP President 2021

Vineet Saxena
IAP HSG 2022–2023

Community- Acquired Pneumonia

Lead Author
TU Sukumaran

Co-Authors
**Rashmi Ranjan Das,
Sagar Warankar**



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Vineet Saxena

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Community-Acquired Pneumonia

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Definition

Acute infection of lung parenchyma in previously healthy child, acquired outside of the hospital settings, and not hospitalized within 14 days prior to onset of symptoms. This excludes children with immunodeficiency, severe malnutrition, and postmeasles state.

TABLE 1: Etiological types and characteristic differentiating features.

<i>Viral pneumonia</i>	<i>Streptococcal pneumonia</i>	<i>Staphylococcal pneumonia</i>	<i>Atypical pneumonia</i>
<ul style="list-style-type: none">☑ Follows short upper respiratory tract infection (URTI)☑ Gradual onset cough☑ Less toxic look☑ Wheeze may be associated (bronchiolitis like features)☑ Usually, bilateral affecting all lobes☑ Lasts 3–5 days and resolves spontaneously	<ul style="list-style-type: none">☑ More toxic☑ Rapid progression☑ Lobar pneumonia☑ Gastrointestinal manifestations (lower lobe pneumonia)	<ul style="list-style-type: none">☑ Empyema☑ Cellulitis/abscess☑ Necrotizing pneumonia☑ Pneumatocele formation	<ul style="list-style-type: none">☑ More like viral pneumonia☑ Wheezing☑ May not be sick (walking pneumonia)☑ Diffuse lung involvement

Etiological Types

TABLE 2: Revised World Health Organization (WHO) classification (2014) in children aged 2–59 months.

Classification	Clinical findings
No pneumonia	Cough and cold
Pneumonia	Fast breathing: $\geq 50/\text{min}$ (2 months to 1 year) $\geq 40/\text{min}$ (>1–5 years) $\geq 30/\text{min}$ (>5 years) <i>and/or</i> Chest indrawing
Severe/very severe pneumonia	General danger signs <input checked="" type="checkbox"/> Not able to drink/feed <input checked="" type="checkbox"/> Persistent vomiting <input checked="" type="checkbox"/> Convulsions, cyanosis <input checked="" type="checkbox"/> Lethargy/Unconscious <input checked="" type="checkbox"/> Stridor in a calm child <input checked="" type="checkbox"/> Severe malnutrition

Persistent single cardinal clinical sign which is very sensitive and specific to diagnose pneumonia is rapid breathing or tachypnea. Auscultatory features are not sensitive.

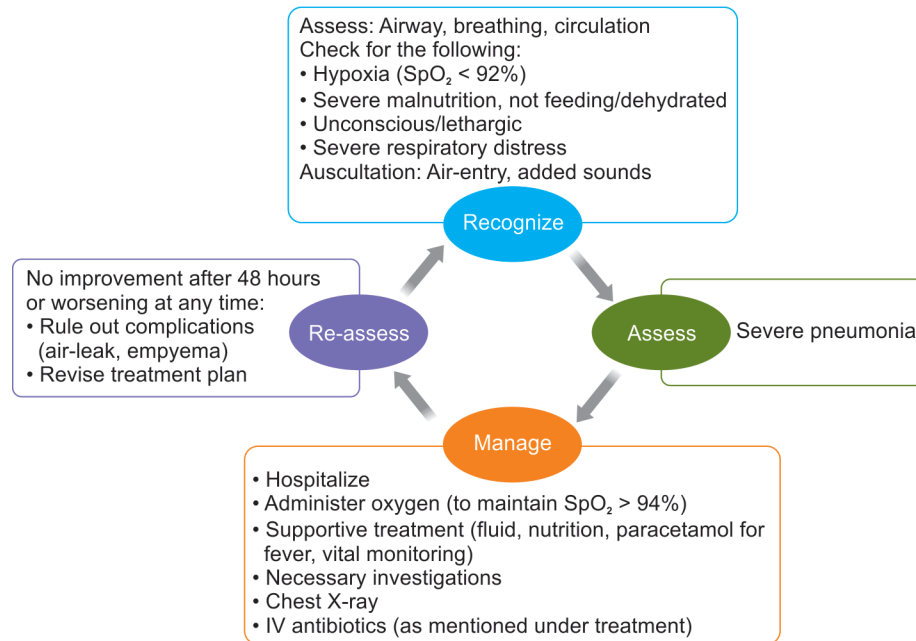


Fig. 1: Triaging of a pneumonia case (2–59 months) in the emergency. (IV: intravenous; SpO_2 : oxygen saturation)

Source: Pneumonia in Children (PIC) Module of IAP Respiratory Chapter, 2021.

- ✓ Community-acquired pneumonia (CAP) is a clinical diagnosis and no investigations are required in outpatient department (OPD) setting.
- ✓ Investigations required in hospitalized children—complete blood count (CBC), blood culture, chest X-ray, inflammatory markers [C-reactive protein (CRP) and procalcitonin], and molecular methods [multiplex reverse transcription–polymerase chain reaction (RT-PCR) and BioFire).
- ✓ A combination of CRP, procalcitonin, and CBC—better understanding the response to the treatment.
- ✓ Isotype enzyme-linked immunosorbent assay (ELISA) for antibody detection against *Mycoplasma*—better than cold agglutinins.
- ✓ Pulse oximetry is helpful in assessing the severity and monitoring response to treatment in hospitalized children or those with severe disease.

TABLE 3: Indications for admission or referral.

Age < 3 months	Oxygen saturation (SpO ₂) < 92%	Marked tachypnea (e.g., 20 breath/min above the cutoff for that age)
Severe malnutrition, not feeding/dehydrated	Intermittent apnea and grunting	Failure of outpatient department (OPD) treatment

TABLE 4: Outpatient treatment (oral therapy).

Age	First line	Second line	If <i>Staphylococcus aureus</i> suspected
<3 months	Always admit and treat in the hospital		
3 months to 5 years	Amoxicillin (80 mg/kg/d), BD for 5 days (in India, 40–50 mg/kg/d is sufficient as penicillin-resistant pneumococci prevalence is <10%)	Co-amoxiclav (dose schedule same as that of amoxicillin) Or Cefpodoxime (10 mg/kg/d), BD for 5 days Or Cefuroxime (30 mg/kg/d), BD for 5 days	Co-amoxiclav (dose schedule same as that of Amoxicillin) Or Cefuroxime (30 mg/kg/d), BD for 5 days Or Linezolid* (10 mg/kg/d), TID for 5 days
>5 years	Same as above	Co-amoxiclav or cefpodoxime (as above) Or Azithromycin (10 mg/kg/d), OD for 5 days (empty stomach)	Same as above

*Linezolid is a reserve drug for tuberculosis (TB), so the National Tuberculosis Elimination Programme (NTEP) has advised to use it with caution.

TABLE 5: Inpatient treatment (parenteral therapy).

Age	First line	Second line	If <i>Staphylococcus aureus</i> suspected
<3 months	Cefotaxime ± gentamicin (5–7 mg/kg/d, OD) Or Amikacin (15 mg/kg/d, OD) Or Ceftriaxone (75–100 mg/kg/d), BD	Piperacillin-tazobactam ± gentamicin or amikacin Or Cefoperazone-sulbactam ± gentamicin or amikacin	Ceftriaxone + cloxacillin (50–100 mg/kg/d, QID) Or Cefuroxime/or co-amoxiclav* + gentamicin or amikacin <i>Second line</i> Ceftriaxone + vancomycin (40–60 mg/kg/d, QID) or linezolid** (same as oral dose)
3 months to 5 years	Ampicillin (100 mg/kg/d, TID or QID)***	Co-amoxiclav* Or Cefotaxime Or Ceftriaxone	Ceftriaxone + Cloxacillin Or Cefuroxime or Co-amoxiclav or cefazolin (50 mg/kg/d, BD or TID) <i>Second line</i> Ceftriaxone + vancomycin or clindamycin (20 mg/kg/d, TID or QID) or linezolid** (same as oral dose)
>5 years	Ampicillin (dose same as above)	Co-amoxiclav* Or Cefotaxime (150 mg/kg/d, TID) Or Ceftriaxone Or Azithromycin	Same as above

*Co-amoxiclav injectable dose: 100 mg/kg/d, TID.

**Linezolid is a reserve drug for tuberculosis (TB), so the National Tuberculosis Elimination Programme (NTEP) has advised to use it with caution.

***Ampicillin dose in severe infection: 200 mg/kg/d, TID or QID.

TABLE 6: Oral therapy in hospitalized children.

Etiological agents	Parenteral therapy	Oral therapy	Total duration
Bacteria other than <i>Staphylococcus aureus</i>	β-lactam antibiotics	Amoxicillin OR cefpodoxime OR cefdinir (14 mg/kg/d, BD)	7–10 days
Methicillin-susceptible <i>Staphylococcus aureus</i> (MSSA)	β-lactam antibiotics	Cephalexin (50 mg/kg/d, BD or TID) Or Co-amoxiclav	7–10 days
Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	β-lactam antibiotics + vancomycin/ clindamycin	Linezolid* Or Clindamycin	14 days (if no complications) Or 4–6 weeks (if complications)

*Linezolid is a reserve drug for tuberculosis (TB), so the National Tuberculosis Elimination Programme (NTEP) has advised to use it with caution.

Macrolides in CAP (used in following situations):

- ☑ In a child immunized against *Hemophilus influenzae* type b (Hib)/pneumococcal conjugate vaccine (PCV): If no response to first-line antibiotics or suppurative complications of CAP are absent.
- ☑ Persistence of the following: Low-grade fever, cough, few clinical signs, and chest X-ray showing bilateral perihilar streaky infiltrates.
- ☑ Extrapulmonary manifestations not suggestive of *Staphylococcus aureus* or no response to antistaphylococcal antibiotics.

- ☑ Only symptomatic and supportive treatment
- ☑ Oseltamivir can be given if H1N1 infection is suspected but that should be initiated within 3 days of symptoms. The details of dose schedule are provided in **Table 7** [recommended by the American Academy of Pediatrics (AAP) and Centers for Disease Control and Prevention (CDC)].

TABLE 7: Indication and dose schedule.

Indications	Dose schedule
Treatment	<p><i>Infants (<1 year old):</i> 3 mg/kg/dose twice daily</p> <p><i>Children (≥1 year old):</i></p> <ul style="list-style-type: none"> ≤15 kg: 30 mg twice daily >15–23 kg: 45 mg twice daily >23–40 kg: 60 mg twice daily >40 kg: 75 mg twice daily
Prophylaxis (7 days)	<p>Not indicated in infants <3 months of age (limited data)</p> <p><i>Infants ≥3 months and <1 year of age:</i> 3 mg/kg/dose once daily</p> <p><i>Children (≥1 year old):</i> The doses mentioned above under different weight band should be given as once daily dosing</p>

Further Reading

- ☑ Bradley JS, Byington CL, Shah SS, Alverson B, Carter ER, Harrison C, et al. Executive summary: the management of community-acquired pneumonia in infants and children older than 3 months of age: clinical practice guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America. *Clin Infect Dis*. 2011;53:617-30.
- ☑ Harris M, Clark J, Coote N, Fletcher P, Harnden A, McKean M, et al. British Thoracic Society guidelines for the management of community acquired pneumonia in children: update 2011. *Thorax*. 2011;66 Suppl 2:ii1-23.
- ☑ Kabra SK, Lodha R, Pandey RM. Antibiotics for community-acquired pneumonia in children. *Cochrane Database Syst Rev*. 2013;6:CD004874.
- ☑ Rudan I, O'Brien KL, Nair H, Liu L, Theodoratou E, Qazi S, et al. Epidemiology and etiology of childhood pneumonia in 2010: estimates of incidence, severe morbidity, mortality, underlying risk factors and causative pathogens for 192 countries. *J Glob Health*. 2013;3:010401.
- ☑ World Health Organization. Integrated Management of Childhood Illness (IMCI) (revised). Geneva: World Health Organization/The United Nation Children's Fund (UNICEF); 2014.
- ☑ World Health Organization (WHO). Antibiotic Dosing for Children: Expert Recommendations for Children Ages 2 months to 12 years. [online] Available from https://www.who.int/selection_medicines/committees/expert/21/applications/s6_ab_paed_dosing_rev.pdf. [Last accessed January, 2022].