

# Guideline for The Diagnosis and Management of Community Acquired Pneumonia: Pediatric

*This guideline was adapted from the Diagnosis and Treatment of Pediatric Pneumonia,<sup>1</sup> and Bugs and Drugs: Antimicrobial Pocket Reference (2001).<sup>2</sup>*

- ◆ The inappropriate choice of antibiotics for the treatment of CAP may lead to increased patient morbidity and mortality

## EXCLUSIONS

- ◆ Neonates (< 1 month)
- ◆ Patients >16 years
- ◆ Immunocompromised patients
- ◆ Hospital acquired pneumonia
- ◆ Aspiration pneumonia

## DEFINITIONS

- ◆ **Pneumonia:** Acute infection of the pulmonary parenchyma
- ◆ **Community Acquired Pneumonia (CAP):** Pneumonia that has been acquired in the community in a patient who:
  - has not been hospitalised within 14 days prior to onset of symptoms
 OR
  - has been hospitalised less than 4 days prior to the onset of symptoms
- ◆ **Bronchopneumonia:** Acute inflammation of the smaller bronchial tubes and peribronchiolar alveoli
- ◆ **Pneumonitis Syndrome:** Infants 1 to 3 months old, who are usually afebrile, and present with characteristic features of cough, tachypnea, and progressive respiratory distress

## ISSUES

- ◆ In children less than 2 years old, the majority of cases of pneumonia are of viral etiology
- ◆ The use of pharyngeal suction for bacterial gram-stain and culture is NOT recommended
- ◆ The overuse of antibiotics for ill-defined respiratory tract infections has led to the emergence of antibiotic resistant organisms

## GOALS

- ◆ To increase awareness of age related causes of CAP
- ◆ To increase the accuracy of clinical diagnosis of CAP
- ◆ To optimize the appropriate use of laboratory and diagnostic imaging services
- ◆ To reduce the inappropriate use of antibiotics in the treatment of CAP in children

## PREVENTION

- ◆ Breast feeding to prevent viral infections
- ◆ Avoidance of environmental tobacco smoke
- ◆ Limit the spread of viral infections (e.g., hand washing)
- ◆ Vaccination
  - Conjugated Haemophilus influenzae type B vaccine is currently recommended for all children
  - Influenza vaccine is recommended annually for high-risk children (see Appendix 1)
  - Pneumococcal polysaccharide vaccine is currently recommended for high-risk children ages 2 and over (see Appendix 2)
  - A conjugated pneumococcal vaccine is available and may be incorporated in the future as a routine vaccination for children starting at 2 months of age

The above recommendations are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.

They should be used as an adjunct to sound clinical decision making.

## ETIOLOGY

### PRACTICE POINT

Age is the best predictor of the microbial etiology of pneumonia

- ◆ Viruses are the most common cause of pneumonia in children ages 1 month to 2 years
- ◆ In school-age children, Streptococcus pneumoniae (S. pneumoniae) and Mycoplasma pneumoniae (M. pneumoniae) are the most common pathogens and empiric therapy must cover both
- ◆ In 40 to 60% of cases, the pathogen can not be identified

## DIAGNOSIS

- ◆ In young children without signs and symptoms of respiratory distress (tachypnea, cough, crackles +/- decreased breath sounds), the diagnosis of pneumonia is unlikely

## Clinical Assessment

### History

- ◆ Fever +/- chills
- ◆ New onset of cough which may or may not be productive
- ◆ Chest pain and/or abdominal pain
- ◆ Difficulty breathing
- ◆ Constitutional symptoms: malaise and lethargy, headache, nausea/vomiting, myalgias

### Identification of Risk Factors and Co-morbidities

- ◆ Recent upper respiratory tract infection (URTI)
- ◆ Exposure to environmental tobacco smoke

- ◆ Daycare centre attendance
- ◆ Underlying disease especially affecting cardiopulmonary or immune systems, or neuromuscular disorders
- ◆ Recent hospitalisation (last 3 months)
- ◆ Malnutrition
- ◆ Lower socio-economic status
- ◆ Prematurity (up until 1 year of age)
- ◆ Cystic fibrosis

### Physical Examination

### PRACTICE POINT

The triad of fever, rigors and pleuritic chest/abdominal pain suggest pneumococcal pneumonia

- ◆ Temperature  $\geq 38.5^{\circ}\text{C}$
  - ◆ Tachypnea\*:
    - $\leq 11$  months  $> 50$  breaths per minute
    - $> 11$  months to 5 years  $> 40$  breaths per minute
    - 5 to 16 years  $> 28$  breaths per minute
- \*Note: Must be counted for a full minute*
- ◆ Signs of accessory muscle use:
    - Tracheal tug
    - Intercostal/subcostal indrawing
  - ◆ Signs of consolidation include:
    - Palpation
      - Diminished chest expansion
      - Increased tactile vocal fremitus
    - Percussion
      - Localized dullness
    - Auscultation
      - Diminished air entry
      - Localized crackles
      - Bronchial breath sounds
      - Pleural rub
      - Whispering pectoriloquy (over 10 years old)

## Investigations

### PRACTICE POINT

Only in those children with respiratory distress should the clinical diagnosis of pneumonia be confirmed by chest x-ray

- ◆ Chest x-ray is considered the gold standard for the diagnosis of pneumonia
- ◆ Pulse oximetry is recommended in any child with signs of tachypnea or clinical hypoxemia
- ◆ CBC with differential and blood cultures are recommended in patients with suspected bacterial pneumonia
- ◆ Gram-stain and culture of sputum from older children and adolescents may be useful
- ◆ In children over 2 years of age, Mycoplasma IgM may be considered
- ◆ Cold agglutinins are of limited value in the diagnosis of *M. pneumoniae*
- ◆ RSV testing is not routinely recommended

## MANAGEMENT

- ◆ Antibiotics are **NOT** indicated for viral pneumonia, bronchiolitis or for prevention of bacterial pneumonia

### General

- ◆ Ensure adequate hydration
- ◆ Adequate analgesics/antipyretics for pain and fever
- ◆ Cough suppressants are not routinely recommended
- ◆ Oxygen therapy is indicated for hypoxemia
- ◆ Patients with pleural effusions complicating pneumonia should be referred
- ◆ Pleural empyema should be drained
- ◆ Chest physiotherapy is controversial

### Table 1: Factors to help in the decision of hospitalising the patient<sup>3-5</sup>

- Toxic appearance
- Age < 6 months
- Severe respiratory distress and oxygen requirement
- Dehydration/vomiting
- No response to oral antibiotics
- Immunocompromised
- Non compliant patient/parent

### Antibiotic Management (See Tables 2 and 3)

- ◆ If antibiotic therapy is required, the choice of antibiotics is based on the age of the patient, clinical presentation and the local resistance patterns of predominant bacterial pathogens
- ◆ Oral antibiotic therapy provides adequate coverage for most patients with pneumonia treated as out-patients
- ◆ Parenteral therapy is typically reserved for neonates and patients with pneumonia severe enough to warrant admission to hospital

## FOLLOW-UP

- ◆ In patients with uncomplicated pneumonia, repeat chest radiographs are unwarranted. However, in patients with pleural effusions, pneumatoceles or pulmonary abscess, a repeat chest radiograph should be done to ensure resolution.

### PRACTICE POINT

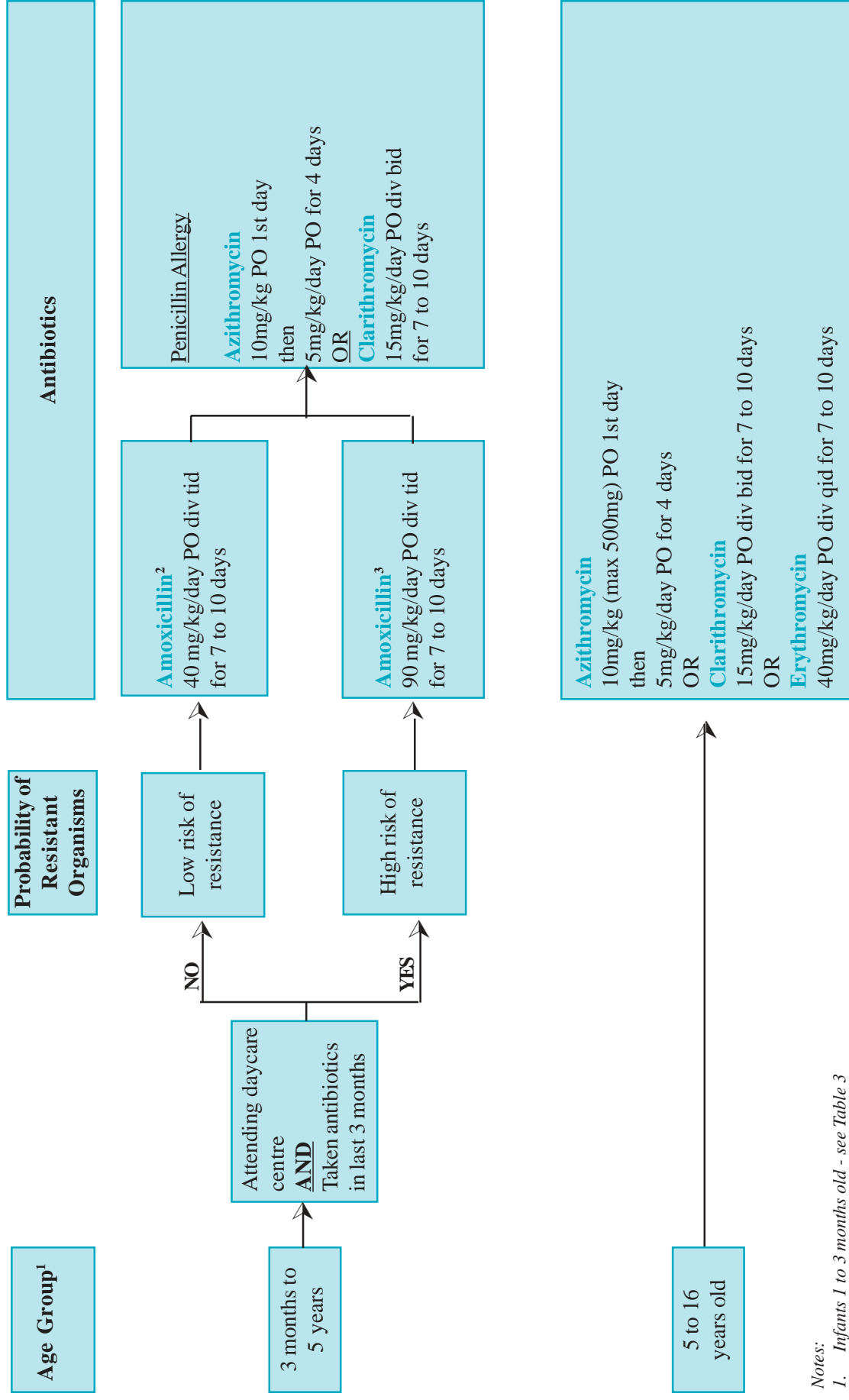
In a patient with recurrent pneumonia or atelectasis in the same area of the lung consider:

- Aspiration of a foreign body
- Congenital malformation
- Asthma

In a patient with atelectasis in a different area of the lung consider:

- Cystic fibrosis
- Immunosuppression
- Aspiration

**Table 2: Out-Patient Antibiotic Therapy for Suspected Bacterial Pneumonia**



Notes:

1. Infants 1 to 3 months old - see Table 3
2. Amoxicillin retains best coverage of all oral beta-lactam agents against *S. pneumoniae* (including penicillin-intermediate strains)
3. Those not responding to high dose antibiotic therapy within 48 hours - consider high level resistant organism and refer patient

**Table 3: In-Patient Antibiotic Therapy for Suspected Bacterial Pneumonia**

Age Group	Patients in Hospital	Critically Ill Patients
1 to 3 months Pneumonitis syndrome	<p><b>Azithromycin</b><sup>1</sup> 10mg/kg PO 1st day then 5mg/kg/day PO for 4 days</p> <p><b>OR</b></p> <p><b>Clarithromycin</b><sup>1</sup> 15mg/kg/day PO div bid for 10 to 14 days</p> <p><b>OR</b></p> <p><b>Erythromycin</b> 40mg/kg/day PO div qid for 10 to 14 days</p>	<p><b>Azithromycin</b><sup>1</sup> 10mg/kg IV (max 500mg) 1st day then 5-10 mg/kg/day IV for 4 days</p> <p><b>OR</b></p> <p><b>Erythromycin</b> 40mg/kg/day IV div Q6h for 10 to 14 days<sup>2</sup></p>
1 to 3 months Bacterial pneumonia (rare) In these children consider referral	<p><b>Cefuroxime</b><sup>3</sup> 150mg/kg/day IV div Q8h for 10 to 14 days<sup>2</sup></p>	<p><b>Cefuroxime</b><sup>3</sup> 150mg/kg/day IV div Q8h for 10 to 14 days<sup>2</sup></p> <p><b>OR</b></p> <p><b>[Cefotaxime</b> 200mg/kg/day IV div Q8h <b>PLUS</b></p> <p><b>Cloxacillin</b> 150-200 mg/kg/day IV div Q6h for 10 to 14 days<sup>2</sup>]</p>
3 months to 5 years	<p><b>Cefuroxime</b><sup>3</sup> 150 mg/kg/day IV div Q8h for 10 to 14 days<sup>2</sup></p>	<p><b>[Cefuroxime</b><sup>3</sup> 150 mg/kg/day IV div Q8h<sup>2</sup> <b>PLUS</b></p> <p><b>Erythromycin</b> 40mg/kg/day IV/PO div Q6h for 10 to 14 days<sup>2</sup>]</p> <p><b>OR</b></p> <p><b>[Cefotaxime</b> 200mg/kg/day IV div Q8h <b>PLUS</b></p> <p><b>Cloxacillin</b> 150-200 mg/kg/day IV div Q6h for 10 to 14 days<sup>2</sup>]</p>
5 to 16 years	<p><b>[Cefuroxime</b><sup>3</sup> 150mg/kg/day IV div q8h <b>PLUS</b></p> <p><b>Erythromycin</b> 40mg/kg/day IV/PO div Q6h for 10 to 14 days<sup>2</sup>]</p>	<p><b>[Cefuroxime</b><sup>3</sup> 150mg/kg/day IV div q8h <b>PLUS</b></p> <p><b>Erythromycin</b> 40mg/kg/day IV/PO div Q6h for 10 to 14 days<sup>2</sup>]</p>

*Notes:*

1. Azithromycin or clarithromycin are alternatives to erythromycin. See above for dosages
2. Duration is total length of therapy- IV plus PO. Consider switch to oral therapy when child is: afebrile, clinically improving, has no complications (e.g., empyema), tolerating oral intake, not experiencing diarrhea.
3. Cefuroxime – maximum pediatric dose = 1.5g/dose

*For true anaphylaxis to beta-lactams, consult infectious diseases specialist*

## BACKGROUND

### Epidemiology

In North America, the annual incidence of pneumonia per 1000 children ranges from 30 to 45 among those less than 5 years old, 16 to 20 among those 5 to 9 years old and 6 to 12 among older children and adolescents.<sup>6-9</sup>

Several risk factors increase the incidence or severity of pneumonia in children: prematurity, cystic fibrosis, malnutrition, low socio-economic status, passive exposure to smoke and attendance at day care centres.<sup>10</sup> Underlying disease, especially those that affect cardiopulmonary, immune or nervous systems also increase the risk of severe pneumonia.

### Etiology

In most studies the specific cause of pneumonia could not be identified in 40 to 60% of cases.<sup>1</sup> Viral agents cause the majority of paediatric pneumonia. Approximately 50% of documented viral pneumonias in children are caused by respiratory syncytial virus (RSV), about 25% are caused by parainfluenza and a smaller number result from influenza A and B or adenovirus. With the exception of adenovirus, these organisms are seen almost exclusively during the winter months.

The best predictor of the cause of paediatric pneumonia is age.<sup>1</sup> In the neonatal period *Streptococcus agalactiae* (Group B), *E. coli* and *Listeria monocytogenes* are the most common pathogens causing neonatal pneumonia.

Infants 1 to 3 months of age may present with pneumonitis syndrome. This is characterized by cough, tachypnea, progressive respiratory distress and radiologic evidence of bilateral diffuse pulmonary infiltrates with air trapping.<sup>1</sup> Most are afebrile. The most common pathogen causing this syndrome is *Chlamydia trachomatis*.

In children between ages 3 months to 2 years, the most common pathogens causing pneumonia are viral. As age increases the incidence of pneumonia decreases. Bacterial pathogens include *Streptococcus pneumoniae* (*S. pneumoniae*), non typeable *Haemophilus influenzae* (*H. influenzae*), *Moraxella catarrhalis* (*M. catarrhalis*) and pathogens such as *Mycoplasma*

*pneumoniae* (*M. pneumoniae*) and *Chlamydia pneumoniae* (*C. pneumoniae*).

*C. pneumoniae* is an increasingly recognized pathogen in paediatric CAP. The incidence of this infection varies from 1 to 15%. In a recent study of 260 healthy children with CAP, *C. pneumoniae* was detected in 28% of patients and *M. pneumoniae* was detected in 27%. The symptoms associated with *C. pneumoniae* infection are indistinguishable from those seen with *M. pneumoniae*, and the choice of antibiotics is the same.

## DIAGNOSIS

### Clinical Assessment

Most of the difficulty is in differentiating between viral and bacterial infections.<sup>11</sup> The absence of the symptom cluster of respiratory distress, tachypnea, cough, crackles, and decreased breath sounds accurately excludes the presence of pneumonia. The presence of tracheal tug or subcostal, or intercostal retractions indicates greater severity.<sup>1</sup> Radiographic confirmation is necessary because there is frequent disagreement between pneumonia diagnosed by clinical examination and that diagnosed by chest radiography.<sup>12</sup> Radiographic confirmation is considered to be the gold standard.<sup>12</sup>

Cyanosis is a late and severe sign of hypoxia.<sup>13</sup> Any child with respiratory distress, significant tachypnea or pallor should be assessed with oximetry. Children with lethargy, poor peripheral perfusion or mottling should be considered to have a life threatening infection.

Two classic presentations have been described for pneumonia:

- Typical pneumonia: fever, chills, pleuritic chest pain and a productive cough
- Atypical pneumonia: gradual onset over several days to weeks, dominated by symptoms of headache and malaise, non-productive cough and low grade fever.

Unfortunately, the overlap of microbial agents responsible for these presentations thwarts identification

of the causal pathogens on the basis of clinical presentation.<sup>14</sup>

## INVESTIGATION

### Laboratory Tests

Laboratory tests are preferred to identify the causal agent. Unfortunately there are no gold standards.<sup>1</sup> The inclusion of these tests in the various settings are based on their availability and feasibility rather than on evidence that they will effect a change in management or follow-up.

Complete blood cell (CBC) and differential should be considered in patients with suspected pneumonia.<sup>3,15</sup> In cases of bacterial pneumonia, the WBC count is usually increased with a predominance of polymorphonuclear cells.<sup>5</sup> Leukocytosis can occur with infection due to adenovirus and influenza virus or with mycoplasma infection. Leukopenia can also be seen in viral infections. However, its presence in bacterial infection suggests severe or overwhelming infection.<sup>15</sup>

Blood cultures should be performed in patients with suspected bacterial pneumonia. Blood cultures do appear to have low sensitivity but are still worthwhile to identify the causative pathogens and corresponding susceptibilities to antimicrobial agents. Results will be positive in 10 to 30% of patients with pneumonia.<sup>16</sup>

Bacterial cultures of samples from the nasopharynx and throat have no predictive value.<sup>1</sup> However, gram-stain and culture of sputum from older children and adolescents may be useful. Detection of mycoplasma IgM by ELISA is a sensitive technique and should be considered for children aged 2 years and over.

### Chest Radiography

PA and lateral x-rays of the chest should be performed only in children who show signs and symptoms of respiratory distress: tachypnea, cough, crackles +/- decreased breath sounds. Bronchiolitis and asthma may cause hyperinflation and atelectasis and must be distinguished from pneumonia.<sup>1</sup> Two main patterns of pneumonia are recognized: interstitial and acinar.<sup>1</sup> However, these patterns cannot be used to

identify the cause. Peribronchial thickening, diffuse interstitial infiltrates and hyperinflation tend to be seen with viral infections.<sup>12</sup> Acinar infiltrates which can be sub-segmental, segmented, or lobar, especially if associated with pneumatoceles and/or pulmonary abscesses, strongly suggest bacterial pneumonia.

Half of patients with bacterial pneumonia will present with a lobar or segmental consolidation which commonly contains air bronchogram. Acinar infiltrates are less frequently seen in viral disease and in *M. pneumoniae*.<sup>12,17</sup> Round pneumonia is seen in the early stages of pneumococcal pneumonia.<sup>12,17</sup> *M. pneumoniae* infection is typically associated with radiologic evidence of diffuse infiltration out of proportion with the clinical findings.<sup>1</sup> Chlamydial pneumoniae may be indistinguishable from *M. pneumoniae*.<sup>1</sup> *M. pneumoniae* can have a different pattern: the most frequent is bronchopneumonia infiltrates mainly in the lower lobes. Others include bilateral reticulonodular interstitial infiltrates and less commonly segmental/sub-segmental consolidation.

In patients with uncomplicated pneumonia repeat chest radiographs are unwarranted. However, in patients with round pneumonia, pleural effusion, pneumatocele or pulmonary abscess, or suspected congenital anomaly or sequestration, a repeat chest radiograph should be considered to ensure resolution within 14 to 21 days.<sup>1</sup> Patients with a complicated course or persistent clinical abnormalities should have a repeat chest radiograph after 2 to 3 weeks.

The presence of a foreign body, congenital malformation or asthma should be considered in patients with recurrent pneumonia or atelectasis in the same area of the lung. Recurrences in different areas may suggest aspiration, immunodeficiency or cystic fibrosis.<sup>6</sup>

### HIV Infection

Although this guideline focuses primarily on otherwise healthy children the first overt sign of HIV infection may be an opportunistic infection such as *Pneumocystis carinii* pneumonia in a previously healthy child. In this AIDs era, the possibility of unusual pathogens must always be considered.<sup>1</sup>

## MANAGEMENT

The two most important issues that arise in the management of paediatric pneumonia are:

- The difficulty of distinguishing patients with bacterial pneumonia from those with non-bacterial pneumonia

and

- The dearth of randomised controlled trials related to antibiotic choices.

In the majority of cases of mild to moderate forms of paediatric bacterial pneumonia, oral antimicrobial therapy is adequate. Intravenous antibiotics are usually reserved for neonates and patients with severe pneumonia who warrant hospitalisation.

Table 1 lists some of the factors that help in considering hospitalisation of children with CAP. The ultimate decision to admit a patient must be based on the overall clinical picture.

Given the rise in incidence of organisms resistant to antibiotics,<sup>18</sup> the prescription of antibiotics for non-bacterial infections should be actively discouraged. The choice of empirical antibiotics for CAP in children is based on several factors, including the age of the patient, the clinical presentation and the local resistance patterns of predominant bacterial pathogens.<sup>19-21</sup>

Table 2 summarizes the empirical antimicrobial agents for outpatient management.<sup>1,3,5</sup> In children ranging from 3 months to 5 years most bacterial pneumonias are caused by *S. pneumoniae* and occasionally by non-typeable *H. influenzae*, *M. catarrhalis* and *S. pyogenes*. Amoxicillin is the drug of choice. Children who are at low risk of penicillin intermediate and high level resistant *S. pneumoniae*, (i.e., those who have not been exposed to antibiotics in the last three months and those not attending day care centres), amoxicillin 40mg/kg/day divided in three doses for 7 to 10 days is appropriate. Those children who are at high risk of intermediate and high level resistant *S. pneumoniae*, (i.e., those who have received antibiotics during the last three months and those attending day care centres), the amoxicillin dose should be increased to 90mg/kg/day in three divided doses to provide coverage for penicillin intermediate *S. pneumoniae*. In those children who are allergic to

penicillin/amoxicillin, newer generation macrolides such as clarithromycin or azithromycin are appropriate.

The organisms most responsible for community acquired pneumonia in children aged 6 to 16 years are the atypical pathogens such as *Mycoplasma pneumoniae* and *Chlamydia pneumoniae*.<sup>22,23</sup> Erythromycin or newer generation macrolides such as clarithromycin or azithromycin are recommended for initial empirical therapy.<sup>1</sup> Newer macrolides have fewer gastrointestinal side effects than erythromycin but are substantially more expensive.

Table 3 provides recommendations for empiric antimicrobial therapy of CAP in hospitalised children.

## REFERENCES

1. Jadavi T, Law B, Lebel M, et al. A practical guide for the diagnosis and treatment of pediatric pneumonia. *CMAJ*, 1997; 156 (5): S703-S711.
2. Blondel-Hill E, Fryters S. Bugs and Drugs:2001 Antimicrobial Pocket Reference, 2001. Capital Health Authority, Edmonton.
3. Wald F. Recurrent pneumonia in children. *Adv Pediatric Infect Dis*, 1990; 5:183-203.
4. Wang F, Long S. Persistent and recurrent pneumonia. In: Long S, Pickering L, Prober C, (editors). Principles and practice of pediatric Infectious diseases. New York: Churchill Livingstone; 1997: 263-269.
5. Klein J. Bacterial pneumonias. In: Textbook of pediatric infectious diseases. 3<sup>rd</sup> ed. Philadelphia: WB Saunders; 1992: 299-314.
6. Alexander E, Foy H, Kenny G, et al. Pneumonia due to *Mycoplasma pneumoniae*. *NEJM*, 1966; 275:131- 6
7. Foy H, Cooney M, Maletzky A, et al. Incidence and etiology of pneumonia, croup and bronchiolitis in preschool children belonging to a prepaid medical care group over a four year period. *Am J Epidemiology*, 1973; 97: 80-92.
8. Murphy T, Henderson F, Clyde W, et al. Pneumonia: an 11 year study in pediatric practice. *Am J Epidemiology*, 1981; 113: 12-21.
9. Wright A, Taussig L, Ray C, et al. The Tuscon childrens respiratory study: II. Lower respiratory tract illnesses in the first year of life. *American Journal Epidemiology*, 1989; 129: 1232-1246.
10. Wang E, Law B, Stephens D, et al. Pediatric investigators collaborative network on infections in Canada (PICNIC) study of morbidity and risk factors with RSV disease. *J Pediatrics*, 1995; 126: 212-219.



- 11 Rice R, Loda F. A roentgenographic analysis of respiratory syncytial virus pneumonia in infants. *Radiology*, 1966; 87: 1021-1027.
- 12 Redd S, Patrick E, Vreuls R, et al. Comparison of the clinical and radiographic diagnosis of pediatric pneumonia. *Trans R Soc Trop Med Hyg*, 1994; 88: 307-310.
- 13 Simpson H, Flenley D. Arterial blood-gas tensions and pH in acute lower respiratory tract infections in infancy and childhood. *Lancet*, 1967; 1: 7-12.
- 14 Margolis P, Ferkol T, Marsocci S, et al. Accuracy of the clinical examination in detecting hypoxemia in infants with respiratory distress. *J Pediatrics*, 1994; 124: 552-560.
- 15 Austrian R, Gold J. Pneumococcal bacteremia with special reference to bacteremic pneumococcal pneumonia. *Ann Intern Med*, 1964; 60: 759-776.
- 16 Donowitz G, Mandell G. Acute pneumonia. In: Mandell G, Douglas R, Bennet J (editors), *Principles and practice of infectious diseases*. New York: Churchill Livingstone, 1990: 540-554.
- 17 Korppi M, Kiekara O, Heiskanen-Kosmo, et al. Comparison of radiological findings and microbial aetiology of childhood pneumonia. *Acta Paediatrica*, 1993; 82: 360-363.
- 18 Murray B. New aspects of antimicrobial resistance and the resulting therapeutic dilemmas. *Journal Infectious Diseases*, 1991; 163: 1185-1194.
- 19 Knothe H. Antibiotic usage for initial empirical treatment of infections in hospitalised patients in West Germany. *Infection*, 1991; 19: 127-130.
- 20 Simon C. Progress of antibiotic therapy in pediatrics. *Infection*, 1991; 19: 61-64.
- 21 Dagan R. Antibiotic treatment of pediatric community acquired lower respiratory tract infections: challenges and possible solutions. *Respiration*, 1993; 60: 38-44.
- 22 Block S, Hedrick J, Hammerschlag M, et al. *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* in pediatric community acquired pneumonia: comparative efficacy and safety of clarithromycin vs. erythromycin ethylsuccinate. *Pediatric Infectious Disease Journal*, 1995; 14: 471-477.
- 23 Hammerschlag M. Atypical pneumonias in children. *Adv Pediatric Infectious Diseases*, 1995; 10: 1-39.
- 24 Canada Communicable Diseases Report 2000; 26(ACS02): 1-15
- 25 Canada Immunization Guide - Health Canada, 5th Edition, 1998
- 26 Communication from Disease Control and Prevention - Alberta Health, October 1998.

## **THE ALBERTA CLINICAL PRACTICE GUIDELINES PROGRAM**

The Alberta Clinical Practice Guidelines Program promotes appropriate, effective and quality medical care in Alberta by supporting the use of clinical practice guidelines. The program is administered by the Alberta Medical Association under the direction of a multi-stakeholder steering committee.

### **Alberta Clinical Practice Guidelines Steering Committee**

Alberta Health and Wellness  
 Alberta Medical Association  
 College of Family Physicians of Canada,  
 Alberta Chapter  
 College of Physicians and Surgeons of Alberta  
 Physicians at Large  
 Public Representative  
 Regional Health Authorities  
 University of Alberta  
 University of Calgary  
 Alberta Association of Registered Nurses  
 Alberta College of Pharmacists

### **TO PROVIDE FEEDBACK**

The Alberta CPG Working Group for Antibiotics is a multi-disciplinary team composed of family physicians, infectious diseases specialists, pediatricians, hospital and community pharmacists, a microbiologist, epidemiologist and consumers. The team encourages your feedback. If you have difficulty applying this guideline, if you find the recommendations problematic, or if you need more information on this guideline, please contact:

The Alberta Clinical Practice Guidelines Program:  
 12230 - 106 Avenue NW  
 Edmonton AB T5N 3Z1  
 Phone: (780) 482-2626  
 or toll free 1-800-272-9680  
 Fax: (780) 482-5445  
 Email: [cpg@albertadoctors.org](mailto:cpg@albertadoctors.org)  
 Website: <http://www.albertadoctors.org>

# APPENDIX 1

## INFLUENZA VACCINE<sup>24</sup>

### **Vaccine should be given annually to:**

#### **High Risk:**

- Adults and children with chronic cardiac or pulmonary disorders (bronchopulmonary dysplasia, cystic fibrosis, asthma)
- Adults and children with chronic conditions: diabetes and other metabolic diseases, cancer, immunodeficiency (including HIV), immunosuppression (including renal transplants), renal disease, anemia, hemoglobinopathy
- Residents of nursing homes or long term care facilities
- People  $\geq 65$  years of age
- Children and adolescents treated with long term ASA
- People at high risk of influenza complications traveling to foreign destinations where influenza is likely to be circulating

#### **People capable of transmitting influenza to those at high risk:**

- Health care workers and other personnel who have continuous, direct care contact with people in high risk groups (above)
- Household contacts (including children) of people at high risk who cannot be immunized or are immunosuppressed or elderly/frail

#### **Others:**

- People who provide essential community services and other adults who wish to reduce their chances of acquiring infection and consequently missing work
- Pregnant women in high risk groups (vaccine is considered safe for pregnant women, regardless of stage of pregnancy)

*Protection begins 2 weeks post vaccination and lasts up to 6 months (may be less in the elderly).*

## APPENDIX 2

# PNEUMOCOCCAL POLYSACCHARIDE VACCINE\*<sup>25,26</sup>

### Strongly Recommended - High Risk\*\*:

- Asplenia (traumatic/surgical/congenital)
- Splenic dysfunction
- Sickle-cell disease

*NB: Where possible give vaccine 10 to 14 days prior to splenectomy or at beginning of chemotherapy for Hodgkin's disease.*

*\*\* Vaccine failures may occur in this group - advise counseling (re: fulminant pneumococcal sepsis and need to seek early medical advise with fever).*

### Recommended:

- All persons  $\geq 65$  years old
- All residents of long term care facilities
- Patients with chronic cardiovascular/pulmonary disease, cirrhosis, alcoholism, chronic renal disease, diabetes mellitus, HIV infection, and other conditions associated with immunosuppression, chronic cerebrospinal fluid leak.

*NB: Vaccine may be administered simultaneously with influenza vaccine (separate injection site).*

### Not Recommended:

- Children  $< 2$  years of age
- Asthma (as the single underlying condition)
- Otitis media (as the single underlying condition)

\* *Pneumococcal conjugated vaccine may be incorporated as routine immunization starting at 2 months old.*