SASKATCHEWAN REGISTERED NURSES' ASSOCIATION

RNs WITH ADDITIONAL AUTHORIZED PRACTICE
CLINICAL DECISION TOOL
DECEMBER 1, 2016

COMMUNITY ACQUIRED PNEUMONIA (CAP) PEDIATRIC

DEFINITION

Pneumonia is an infection of the lungs. The condition is associated with fever, respiratory symptoms, and altered findings on physical examination and infiltrates on chest x-ray. Pneumonia may follow an upper respiratory tract infection (URTI) that promotes invasion of the lower respiratory tract with viruses, bacteria, fungi, or parasites.

The highest incidence of community acquired pneumonia (CAP) is in children < 5 years of age.

Patterns of Pneumonia

- Lobar pneumonia: localized to one or more lobes of the lung
- Bronchopneumonia: inflammation around medium-sized airways, which causes patchy consolidation of parts of the lobes
- Interstitial pneumonia: inflammation of lung tissue between air sacs, usually generalized, often viral

IMMEDIATE CONSULTATION REQUIRED IN THE FOLLOWING SITUATIONS

- Decreased mental alertness
- Inspiratory stridor
- Pallor or central cyanosis
- Increased work of breathing
- Nasal flaring
- Retractions/in drawings (substernal, intercostal, sternal notch, supraclavicular)
- Grunting
- Poor feeding and/or need for rehydration
- Toxic appearing child: Toxic appearing infants and children may be pale or cyanotic and are often lethargic or inconsolably irritable.
- Tachypnea or tachycardia with poor capillary refill.
- < 6 months of age
- Immunocompromised status

CAUSES

- In older infants and young children, viruses are the most common cause of CAP. *Streptococcus pneumoniae* (*S. pneumoniae*) is the most common

pathogen in children > 5 years of age. The table below describes the most common causes of pneumonia.

Table 1
Common Causes of Pneumonia According to Age

Age	Bacterial	Viral
0 - < 4 weeks	Group B Streptococcus, gram-negative rods, Mycoplasma, Enterobacteriaceae, *Listeria monocytogenes*	Cytomegalovirus (CMV), herpes virus
4 - 16 weeks	*Chlamydia trachomatis, Haemophilus influenzae, Staphylococcus aureus, Streptococcus pneumoniae, Treponema pallidum, Mycoplasma hominis, Ureaplasma urealyticum,* Enterobacteriaceae, *Listeria monocytogenes*	CMV, Respiratory syncytial virus (RSV)
< 5 years	*Haemophilus influenzae, Mycoplasma pneumoniae, Staphylococcus aureus, Streptococcus pneumoniae, Chlamydophila pneumoniae, Streptococcus pyogenes*	RSV, adenovirus, rhinovirus, Influenze A & B Parainfluenza 1, 2, 3
≥ 5 years	Mycoplasma, *Streptococcus pneumoniae, Chlamydophila pneumoniae*	Influenza virus

Note. Adapted from *First Nations and Inuit health. Pediatric clinical practice guidelines for nurses in primary care. Community-acquired pneumonia, page 10-14,* by Health Canada, 2012, Health Canada.

PREDISPOSING AND RISK FACTORS

- Asthma
- Cystic fibrosis
- Cerebral palsy
- Congenital heart disease

- Bronchopulmonary dysplasia
- Neuromuscular disorders (swallowing disorders that pose a risk for aspiration)
- Gastroesophageal reflux disease (GERD) (recurrent pneumonia may present)
- Tracheoesophageal fistula (recurrent pneumonia may present)
- Immunodeficiency disorders
- Congenital anomalies of the respiratory tract
- Secondhand smoke (especially in children < 1 year of age)
- Infants ≤ 4 months of age

HISTORY

If there is conjunctivitis with eye discharge, consider Chlamydia or adenovirus as causative organisms.

- Viral infection has a gradual onset
- Bacterial infection has a rapid onset
- Fever and/or chills (none or low grade with viral, high in bacterial)
- Rapid breathing is a sensitive but nonspecific finding in bacterial pneumonia
- Difficult breathing or shortness of breath is common and can lead to difficult feeding in infants
- A cough is often seen in bacterial pneumonia. *Bordetella pertussis* (*B. pertussis*) pneumonia often presents after a catarrhal phase with a paroxysmal cough and post-tussive vomiting.
  - In children, there is often no history of sputum production
- Pleuritic chest pain (older children may complain of this symptom)
- Abdominal pain and/or vomiting: lower lobe pneumonia can present with abdominal pain
- Irritability, lethargy, and/or malaise
- Poor feeding or apnea in young infants
- Birth history, including maternal infections (e.g., *Chlamydia trachomatis* can be transmitted to an infant through a mother's genital tract at delivery)
- Immunization status: in a fully immunized child, *Haemophilus influenzae* type B, *B. pertussis,* and *S. pneumoniae* infections are less common.
- Recent history of URTI can predispose to bacterial pneumonia.
- A history of repeated bacterial infections suggests immunodeficiency or cystic fibrosis which are risk factors for bacterial pneumonia.

- Exposure to contacts with pertussis, tuberculosis (TB), or history of recent travel:
  - Be aware of TB infection rate in the community

PHYSICAL FINDINGS

- Ill appearance
  - General examination can range from a mildly ill-appearing child to toxic in appearance
  - Infants may have a paucity of exam findings disproportionate to their appearance and tachypnea
  - Clients can be dehydrated or in shock
- Fever
  - Most children with bacterial pneumonia present with a fever
  - Clients with atypical bacterial pneumonia and pertussis are sometimes afebrile
- Tachypnea or increased work of breathing, nasal flaring, grunting and/or retractions/in drawings (substernal, intercostal, sternal notch, supraclavicular)
- Decreased oxygen saturation, therefore oxygen saturation should be obtained by pulse oximetry in all children in whom pneumonia is being considered as a possible diagnosis
- Localized rales, rhonchi, decreased breath sounds or wheezing:
  - These are all significant clinical findings of pneumonia
  - With increasing consolidation, dullness to percussion and decreased breath sounds may be noted

DIFFERENTIAL DIAGNOSIS

- Bronchiolitis
- Bronchitis
- Asthma
- Pulmonary trauma
- Atelectasis
- Pneumothorax
- Croup
- Foreign body aspiration (especially in young children)
- Toxin inhalation (e.g., insecticides)
- Chronic or congenital pulmonary/cardiac disease

- GERD

COMPLICATIONS

- Pleural effusion
- Empyema
- Pneumatoceles (form with empyema and usually resolve over time)
- Necrotizing pneumonia
- Pneumothorax
- Lung abscesses (aspiration common underlying factor)
- Hyponatremia (with severe pneumonia)
- Respiratory failure and cardiovascular collapse
- Bacteremia/sepsis
- Pericarditis

INVESTIGATIONS AND DIAGNOSTIC TESTS

CAP may be determined by clinical findings alone. A chest x-ray should be considered for all pediatric clients in whom CAP is a possible diagnosis and particularly considered in the following:

- Severe disease syndrome (toxic appearing child)
- Further assessment when clinical findings are not conclusive
- Exclusion of pneumonia in young children with fever > 39°C oral or older children with cough and fever > 38.5°C oral
- Exclusion of other causes of respiratory distress, especially in the presence of cardiac or pulmonary conditions

The need for a chest x-ray will be determined in consultation with a physician/RN(NP).

MAKING THE DIAGNOSIS

In consultation with a physician/RN(NP), a diagnosis of pneumonia is made based on the presence of one or more factors listed under History and Physical Findings.

No single sign can definitively rule in or rule out pneumonia in infants.

Severe pneumonia requires immediate consultation and hospitalization. It is characterized by:

- < 1 month of age

- Toxic appearance
- Severe respiratory distress
- Oxygen requirement
- Dehydration, vomiting
- No response to oral antibiotics within 24-48 hours

Mild to Moderate pneumonia is characterized by:

- ≥ 1 year of age
- May have fever but is not dehydrated and is eating and drinking appropriate for age. Medication for fever helps manage temperature.
- Not in respiratory distress
- Can ingest oral medication and is not vomiting

MANAGEMENT AND INTERVENTIONS

Management depends upon the cause, severity of the disease, and the age of the child.

Goals of Treatment

- Relieve symptoms
- Early identification of respiratory compromise
- Prevent complications
- Antimicrobial therapy as appropriate
- Improve or prevent respiratory distress

Appropriate Consultation

Consult a physician/RN(NP) if any of the following apply:

- Moderate to severe respiratory distress
- < 6 months of age
- Immunosuppression
- Underlying cardiac or lung disease
- Failure to respond to oral antibiotics within 24-48 hours
- Inability to tolerate oral antibiotics

Further management and transport of severely ill children will be determined through this consultation.

Non-Pharmacological Interventions

- Adequate fluid intake: 6-8 glasses of fluid per day

Pharmacological Interventions

Mild to Moderately Ill Children

- Antipyretic and analgesic for fever:
  - Infants and children < 12 years of age:
    - Acetaminophen (Tylenol) 10-15 mg/kg orally or rectally q4-6h prn. Do not exceed 5 doses (2.6 g) in 24 hours.
    - Children > 12 years of age: refer to adult dosing
      Or
    - Ibuprofen (Motrin) 5-10 mg/kg orally q6-8h prn. Maximum dose is 40 mg/kg/day.

Antimicrobial therapy:

- Review antibiotics prescribed for any type of infection in the previous 3 months; if a particular antibiotic has been used, consider selecting an alternative class of antibiotic agent.
- Choice of and route for antibiotic therapy is based on age and the most likely infective organism.
- Therapy for children 1-3 months of age is determined by a physician and usually in an acute care setting.

3 months - 5 years of age

Treat mild to moderately ill child as follows:

First Line:

- Amoxicillin (Amoxil) 80 mg/kg/day orally divided q8h for 7-10 days
- Amoxicillin/clavulanate 80 mg/kg/day orally divided q12h for 7-10 days

For beta-lactam allergy:

- Erythromycin 40 mg/kg/day orally divided q12h, q8h or q6h for 7-10 days
- Clarithromycin 15 mg/kg/day orally divided q12h for 7-10 days
- Azithromycin 10 mg/kg orally the first day, then 5 mg/kg/day orally for 4 days

5 - 18 years of age

First Line:

- Erythromycin 40 mg/kg/day orally divided q12h, q8h or q6h for 7-10 days (maximum dose 4 g/day)
  Or (in an older child)
- Erythromycin 250 mg orally q6h for 10 days (or erythromycin 333 mg orally q8h for 10 days)
  Or
- Azithromycin 10 mg/kg orally on day 1 (maximum dose 500 mg/first day dose), then 5 mg/kg orally once daily for 4 days (maximum dose 250 mg/day)

For macrolide allergy (only in children > 8 years of age):

- Doxycycline 4 mg/kg/day orally divided q12h (maximum dose 200 mg/day)

Client and Caregiver Education

- Explain the nature, course, and expected outcomes of the illness.
- Warn parents or caregivers that symptoms may worsen and of the need for close monitoring for signs of respiratory distress.
- Advise parents or caregivers the signs of respiratory distress.
- Recommend that the child be given adequate fluids to prevent dehydration.
- Ensure the child gets rest.
- Care for the child in a propped-up position.
- Counsel client/caregiver about appropriate use of medications (dose, frequency, side effects, etc.).
- Return to the clinic if any concerns.
- Recommend routine immunizations.

Monitoring and Follow-Up

- Follow-up in 24-48 hours (sooner if symptoms worsen)
- Child awaiting transport to hospital: monitor ABCs, pulse oximetry and hydration

Referral

- Consultation will take place as indicated. Refer to "Immediate Consultation Required in the Following Situations" section. Further referral will be determined through consultation with a physician/RN(NP).

- Further referral for care may be indicated by caregiver fatigue and ability to provide care to the child.

DOCUMENTATION

- As per employer policy

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