

Community – Acquired Pneumonia (CAP): Adult

Respiratory

Clinical Decision Tools for RNs with Additional Authorized Practice [RN(AAP)s]

Effective Date: February 1, 2022

Background

Community-acquired pneumonia (CAP) is an infection of the lower respiratory tract that is acquired outside a hospital and/or long-term care facility (Brashers & Huether, 2019; Winland-Brown & Porter, 2019). The condition is associated with fever, respiratory symptoms, and altered findings on physical examination and infiltrates on chest x-ray. It typically follows an upper respiratory tract infection that promotes invasion of the lower respiratory tract of viruses, bacteria, fungi, or parasites (Brashers & Huether, 2019). Approximately 70-80% of clients who develop CAP are ≥ 60 years of age or have a coexisting medical condition (Winland-Brown & Porter, 2019).

Immediate Consultation Requirements

The RN(AAP) should seek immediate consultation from a physician/NP when any of the following circumstances exist:

- moderate and severe pneumonia as per the CRB-65 tool (confusion, respiratory rate, blood pressure, age) criteria (refer to Making the Diagnosis),
- chronic disease(s),
- malignancies,
- asplenia,
- unable to tolerate oral fluid/food or medication,
- immunocompromised client, and
- clients with some or all of the following regardless of age:
 - altered mental status (new onset disorientation),
 - pulse over 125 beats per minute,
 - respiratory rate over 30 breaths per minute,
 - systolic blood pressure ≤ 90 mm Hg and/or diastolic blood pressure ≤ 60 mm Hg,
 - or temperature $\geq 40^{\circ}\text{C}$ oral or $\leq 35^{\circ}\text{C}$ oral (Anti-infective Review Panel, 2019; Interprofessional Advisory Group [IPAG], personal communication, October 14, 2019).

Causes of CAP

Previously healthy ≤ 65years	Elderly and/or comorbid illness	Immunocompromised clients
<ul style="list-style-type: none"> • <i>Streptococcus pneumoniae</i> (pneumococcal) and <i>Mycoplasma pneumoniae</i> are the most common organisms; • less frequently, <i>Chlamydia pneumoniae</i> and <i>Haemophilus influenzae</i>. 	<ul style="list-style-type: none"> • <i>Haemophilus influenzae</i>; • <i>Klebsiella pneumoniae</i>; • <i>Legionella pneumophila</i>; • <i>Moraxella catarrhalis</i>; • <i>Mycobacterium tuberculosis</i>; • <i>Staphylococcus aureus</i>; and • less frequently, <i>Streptococcus pneumoniae</i>. 	<ul style="list-style-type: none"> • <i>Cytomegalovirus</i> (CMV), • <i>herpes simplex viruses</i> (HSV), and • <i>Pneumocystis carinii</i> (especially those with acquired immunodeficiency syndrome).

(Anti-infective Review Panel, 2019; Winland-Brown & Porter, 2019)

Predisposing and Risk Factors

Predisposing and risk factors for CAP in adults include:

- advanced age,
- compromised immunity,
- diabetes mellitus,
- underlying lung disease (especially chronic obstructive pulmonary disease [COPD]),
- alcoholism,
- altered consciousness,
- chest trauma,
- impaired swallowing,
- smoking,
- endotracheal intubation,
- malnutrition,
- immobilization,
- underlying cardiac or liver disease,
- poor oral hygiene, and
- residence in a long-term care facility (Brashers & Huether, 2019; Nishizawa, 2019).

Health History and Physical Exam

Subjective Findings

The circumstances of the presenting complaint should be determined. These include:

- fever (as high as 40°C oral with peaks in the afternoon or evening);

- chills;
- dyspnea;
- cough (may be productive with a rusty colored sputum);
- pleuritic chest pain (may splint chest wall);
- myalgia;
- nausea, vomiting;
- diarrhea;
- malaise; and
- headache (Brashers & Huether, 2019; Winland-Brown & Porter, 2019).

Generally, pneumonia caused by *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, viruses, and *Pneumocystis carinii* are considered “atypical” pneumonia and have a slower, more insidious onset (Winland-Brown & Porter, 2019). The client may not appear as acutely ill and may have a lower fever, dry cough, and scanty sputum production, and prominence of constitutional symptoms (e.g., pounding headache, coryza, sore throat, myalgia) (Winland-Brown & Porter, 2019).

Objective Findings

The signs and symptoms of CAP may include:

- fever (flushed, diaphoretic appearance if fever is high);
- tachycardia;
- increased respiratory rate (> 20 breaths/minute);
- productive cough;
- nasal congestion;
- decreased oxygen saturation (< 90% indicates need for supplemental oxygen and referral to a physician/NP);
- tactile fremitus (vibrations with spoken word "99");
- decreased breath sounds/air entry (over area of atelectasis or consolidation);
- crackles (rales, rhonchi, crepitation) over affected lobes or scattered with bronchopneumonia and interstitial pneumonia;
- bronchial breath sounds (louder than normal, short inspiration with long, higher pitched expirations over consolidation);
- wheezes;
- bronchophony, egophony, and whispered pectoriloquy (suggestive of consolidation);
- dullness to percussion in lobar pneumonia;
- decreased unilateral chest excursion over area of lobar pneumonia;
- findings suggestive of pleural effusion include dullness to percussion, pleural friction rub, and distant breath sounds;
- right or left upper quadrant pain, secondary to effusion/pneumonitis; and/or
- signs of dehydration (secondary to increased fluid needs from fever/tachypnea and decreased oral intake) (Brashers & Huether, 2019; Winland-Brown & Porter, 2019).

Differential Diagnosis

The following should be considered as part of the differential diagnosis:

- acute bronchitis,
- influenzae,
- tuberculosis (TB) (pulmonary),
- COPD,
- lung cancer,
- aspiration pneumonia,
- lung abscess,
- pleural effusion,
- severe acute respiratory syndrome,
- occupational or environmental hazard exposure, or
- atelectasis (Kaysin & Viera, 2016; Winland-Brown & Porter, 2019).

Making the Diagnosis

A client with CAP typically appears acutely ill, has a fever and a cough that may be productive. Frequently the client is splinting one side of their chest due to the discomfort from coughing. Other signs and symptoms are listed in the *Subjective* and *Objective Findings*. Illness severity using the CRB-65 criteria can be used to help determine disease severity (Anti-infective Review Panel, 2019). Criteria scores, such as CRB-65, should always be supplemented with determination of subjective factors (e.g., reliability to take oral medication, availability of outpatient support).

CRB-65 Criteria

- C (confusion - new onset disorientation),
- R (respiratory rate > 30 breaths per minute),
- B (low blood pressure < 90 systolic and/or < 60 diastolic), and
- > 65 years of age (Anti-infective Review Panel, 2019).

Clients score one point for each criterion.

Mild CAP

- Score is 0-1. Treatment at home may be appropriate depending on support available and clinical judgment of the provider and consultation (Anti-infective Review Panel, 2019).

Moderate CAP

- Score is 2. Same day assessment and support is available and can be managed in the community in consultation with a physician/NP.

Severe CAP

- Score is ≥ 3 . Should be admitted to hospital urgently.

Investigations and Diagnostic Tests

Winland-Brown and Porter (2019) suggest that the most helpful tests used in the initial diagnosis of CAP include chest x-ray, leukocyte count, and Gram stain of sputum specimens. The RN(AAP) should initiate treatment while waiting for test results.

A chest x-ray is important for three reasons: 1) it may help distinguish whether the pneumonia is bacterial or viral in nature (lobular infiltrates strongly suggest a bacterial infection), 2) it will rule out a pleural effusion, and 3) cavities can be seen on x-rays in clients with pneumonia caused by anaerobes such as *Mycobacterium tuberculosis* (Winland-Brown & Porter, 2019). The leukocyte count may help differentiate between viral and bacterial pneumonia (total WBC counts of > 15,000 cells/ μ L suggest a bacterial infection) but is not a reliable indicator of the cause of pneumonia (Winland-Brown & Porter, 2019). A sputum Gram stain can help guide treatment, but accurate specimen collection is not likely unless the client has a productive, vigorous cough (Winland-Brown & Porter, 2019).

Management and Interventions

Goals of Treatment

The primary goals of immediate treatment are to relieve symptoms, determine the level of treatment required, prevent complications, provide antimicrobial therapy as appropriate, and prevent further respiratory compromise (Winland-Brown & Porter, 2019).

Non-Pharmacological Interventions

The RN(AAP) should recommend, as appropriate, the following non-pharmacological options:

- increased rest,
- adequate fluid intake of 3 litres in a 24-hour period,
- position of comfort (such as upright) to facilitate breathing, and
- humidified air to relieve irritated nares and pharynx (Winland-Brown & Porter, 2019).

Pharmacological Interventions

The pharmacological interventions recommended for the treatment of CAP are in accordance with the *RxFiles Drug Comparison Charts* (RxFiles Academic Detailing Program, 2021) and the *Anti-infective Guidelines for Community-acquired Infections* (Anti-infective Review Panel, 2019).

Analgesics and Antipyretics

	Drug	Dose	Route	Frequency	Duration
Adult					
	Acetaminophen	500-1000 mg (maximum dose of 4 g/day)	p.o.	q4-6h prn	5-7 days
AND/ OR	Ibuprofen	400-600 mg (maximum dose of 3200 mg/day)	p.o.	q6-8h prn	5-7 days

Oral Antibiotics

If an antibiotic has been used in the past three months, consider choosing one from a different class. Consider local resistance patterns when choosing antibiotic therapy. There are concerns with resistance to macrolides as monotherapy due to an increase in resistance of *Streptococcus pneumoniae*.

	Drug	Dose	Route	Frequency	Duration
Adult (First line without penicillin allergy)					
	Doxycycline	100 mg	p.o.	200 mg on day 1 and then 100 mg b.i.d.	3-7 days
OR	Amoxicillin	1 g	p.o.	q8h	3-7 days
Adult (First line with penicillin allergy)					
	Doxycycline	100 mg	p.o.	200 mg on day 1 and then 100 mg b.i.d.	3-7 days
OR	Clarithromycin	500 mg	p.o.	q12h	5-7 days
OR	Clarithromycin XL	1 g	p.o.	once daily	5-7 days
OR	Azithromycin	500 mg day one and then 250 mg day 2 to 5.	p.o.	once daily	5 days
OR	Azithromycin	500 mg	p.o.	once daily	3 days

Client and Caregiver Education

The RN(AAP) provides client and caregiver education as follows:

- Explain the nature, course, and expected outcomes of the illness.
- Counsel about appropriate use of medications, such as purpose, dose, frequency, and side effects.
- Encourage adequate fluids to prevent dehydration.
- Encourage adequate rest.
- Recommend influenza vaccination on an annual basis.
- Recommend pneumococcal vaccine to clients over the age of 65 years and those with comorbid conditions (e.g., COPD, diabetes) regardless of age (Ramirez, 2019; Winland-Brown & Porter, 2019).

Monitoring and Follow-Up

The RN(AAP) should instruct the client to return for reassessment within 24 hours or sooner if symptoms worsen or shortness of breath develops. The client should be reassessed after the course of antibiotics is completed.

Complications

The following complications may occur:

- respiratory failure from hypoxia;
- sepsis (bacteremia);
- metastatic infection such as meningitis, endocarditis, pericarditis, or empyema;
- renal failure; or
- cardiac failure (Ramirez, 2019).

Referral

Refer to a physician/NP if client presentation is consistent with those identified in the *Immediate Consultation Requirements* section or if there is a failure to respond to the prescribed treatment within 24-48 hours (IPAG, personal communication, October 14, 2019; Winland-Brown & Porter, 2019).

References

- Anti-Infective Review Panel. (2019). *Anti-infective guidelines for community-acquired infections*. MUMS Guideline Clearinghouse.
- Brashers, V., & Huether, S. (2019). Alterations of pulmonary function. In K. McCance & S. Huether (Eds.), *Pathophysiology: The biologic basis for disease in adults and children* (8th ed., pp. 1163-1201). Elsevier.
- Kaysin, A., & Viera, A. (2016). *Community-acquired pneumonia in adults: Diagnosis and management*. <https://www.aafp.org/afp/2016/1101/p698.pdf>
- Nishizawa, T., Niikura, Y., Akasaka, K., Watanabe, M., Kurai, D., Amano, M., Ishii, H., Matsushima, H., Yamashita, N., & Takizawa, H. (2019). Pilot study for risk assessment of aspiration pneumonia based on oral bacteria levels and serum biomarkers. *BMC Infectious Diseases*, 19(1), 761. <https://doi.org/10.1186/s12879-019-4327-2>
- Ramierz, J. A. (2019, June 25). *Overview of community-acquired pneumonia in adults*. <http://www.uptodate.com>
- RxFiles Academic Detailing Program. (2021). *RxFiles: Drug comparison charts*. (13th ed.). Saskatoon Health Region.
- Winland-Brown, J. E., & Porter, B. O. (2019). Infectious respiratory disorders. In L. Dunphy, J. Winland-Brown, B. Porter, & D. Thomas (Eds.), *Primary care: The art and science of advanced practice nursing – an interprofessional approach* (5th ed., pp.371-396). F. A. Davis.

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