

# Chronic Bronchitis: Clearing the Cough



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Acute exacerbation of chronic bronchitis (AECB) is the most frequent cause of consultations and hospitalizations among patients who have chronic obstructive pulmonary disease (COPD). The Canadian guidelines for managing and treating AECB were published in 2003.<sup>1</sup>

AECB should be distinguished from acute bronchitis, as the clinical management of the two diseases is very different. The term “acute bronchitis” designates an acute respiratory infection (less than three weeks), with a cough (productive or not) being the main manifestation.<sup>2</sup> Generally, the patient does not present fever, tachypnea or tachycardia. A lung auscultation reveals none of the characteristic signs of pneumonia. Acute bronchitis generally overcomes adults that are normally in good health and is an infection of viral origin, the flu virus being the major cause.

## Defining AECB

Patients afflicted with COPD present a progressive deterioration of gas exchange over the years. That deterioration is irreversible (or only partially reversible) and is accompanied by chronic inflammation. Approximately 85% of COPDs are cases of chronic bronchitis, which is defined by the presence of a regular productive cough with episodes lasting longer than three months and recurring for at least two consecutive years.<sup>3</sup>

Spirometry (the determination of forced expiratory volume in one second) is the best test for confirming the diagnosis and evaluating the

Table 1

### Clinical definition of AECB

#### Major criteria

- Increased secretions
- Increased dyspnea
- Change in appearance of secretions

#### Minor criteria

- Wheezing
- Throat pain
- Runny nose, nasal congestion

#### AECB

- At least two major criteria
- OR**
- One major criteria with at least one minor criteria

AECB: Acute exacerbation of chronic bronchitis

severity. COPD treatments vary according to the severity of the disease; for more information, interested readers may consult the guidelines of the Canadian Thoracic Society, published in 2004.<sup>3</sup>

AECB represents a significant cause of morbidity and mortality for patients with COPD. AECB is defined by an acute and sustained deterioration of the patient's lung condition beyond daily fluctuations and requires a change or addition of medication. The main clinical criteria of AECB are increasing quantities of secretions, a change in the colour or other aspect of the secretions and increasing dyspnea (Table 1).<sup>4</sup> Patients may also present with wheezing, throat pain or congestion and a runny nose with

Table 2

### Acute bronchitis and acute exacerbations of chronic bronchitis— Canadian guidelines 2003

<b>Viral bronchitis</b> No co-morbidity	• Viral	• No antibiotics
<b>Chronic mild bronchitis</b> FEV <sub>1</sub> > 60% < 60 years < 4 exacerbations/year	• <i>H. influenzae</i> • <i>M. catarrhalis</i> • <i>S. pneumoniae</i>	• Amoxicillin • Macrolide • Doxycycline • Cephalosporins (2 <sup>nd</sup> , 3 <sup>rd</sup> generation)
<b>Chronic moderate bronchitis</b> FEV <sub>1</sub> 59%-40% Diabetes, chronic renal failure, chronic heart failure At least 4 exacerbations/year	• Same as above and enterobacteriaceae	• Respiratory fluoroquinolone amox/clavulanate macrolide
<b>Chronic severe bronchitis</b> FEV <sub>1</sub> < 40%	• Same as above and more resistant pathogens (pseudomonas, enterobacteriaceae)	• Treat for more resistant pathogens (pseudomonas, enterobacteriaceae)

FEV<sub>1</sub>: Forced expiratory volume in one second

clear mucus. The frequency of AECB episodes generally increases with the severity of the COPD and contributes to the deterioration of the respiratory condition in the long term.

The principle risk factors of COPD patients for developing an episode of AECB are active smoking, non-compliance with the basic treatment and the severity of the underlying disease.

### What is the etiology of AECB?

AECB can be precipitated by an infection or by an exposure to allergens, dust or pollutants. Bacterial etiologies account for about 50% of the causes of AECB and viruses represent about 30%.<sup>4</sup>



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The bacterial etiologies of community-acquired AECBs and pneumonias are not the same. It is important for practitioners to know those differences, as this determines the choice of the empirical antibiotic treatment (Table 2). Though *Streptococcus pneumoniae* is the most frequent etiologic agent of community-acquired pneumonias, it only accounts for about 13% of bacteria responsible for AECBs. For patients with COPD, haemophilus influenzae is the the most common bacterial cause of AECB. Among viruses, the influenza virus represents the most frequent viral cause of AECB.

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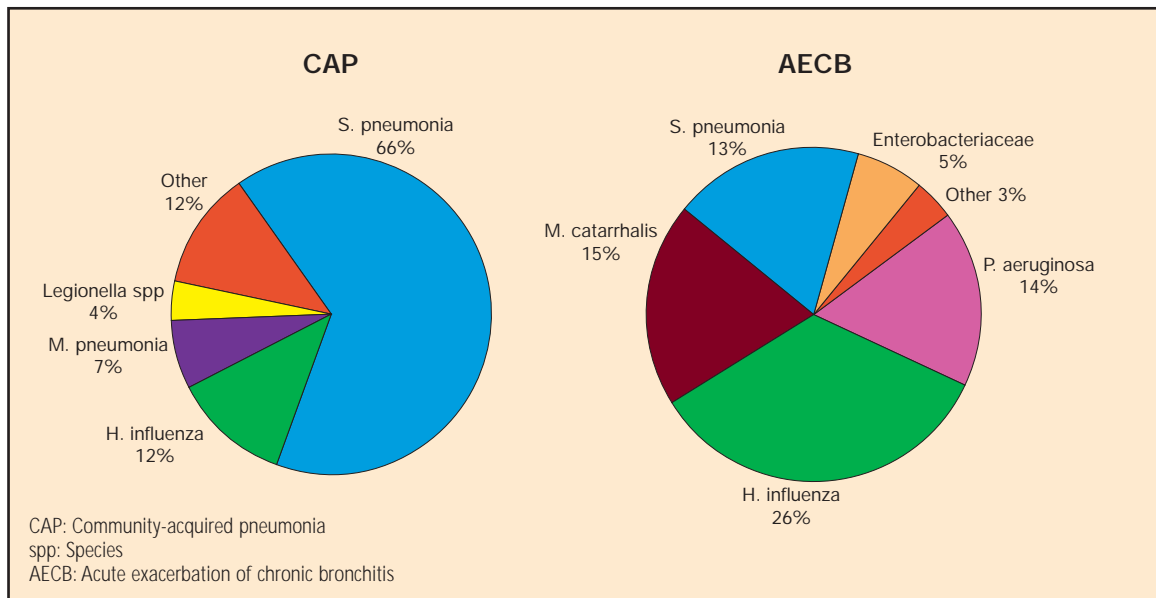


Figure 1. Bacterial etiology of CAP vs. acute exacerbations of chronic bronchitis.

## How is AECB diagnosed?

There is no specific test that can diagnose AECB. The diagnosis is based exclusively on clinical criteria (Table 1). There is no pathognomonic sign at the exam. Fever is unusual and lung X-rays are not very useful, though they should be done to rule out pneumonia. A sputum culture is useful for obtaining a microbiologic diagnosis and for determining the sensitivity to antibiotics of the respiratory pathogen isolates. However, it is important to keep in mind that the lower respiratory tracts of patients with COPD are chronically colonized by bacteria. Even though the negative predictive value approximates 90%, the positive predictive value only reaches about 35%. Hence, it is not always easy to distinguish a colonizer from the etiologic agent on the basis of the culture. Moreover, a positive culture for bacteria does not exclude the possibility that an AECB is caused by a virus.

## How can it be treated?

The etiologic identification of AECB and the rapid initiation of the specific and appropriate treatment allows the decrease of the severity

and duration of the episode.<sup>4</sup> The usefulness of an antibiotic treatment depends on the ability to correctly identify a bacterial episode. To that effect, the Anthonisen criteria helps identify those patients most susceptible of having an AECB with a bacterial etiology (Table 1).

The patients who benefit the most from an antibiotic treatment are those who present at least two of the main criteria mentioned above. The number of AECB episodes in the last year can also be a useful prognostic factor for determining whether or not the etiology is bacterial. The inappropriate use of antibiotics for treating AECB has significant financial and medical consequences.<sup>5</sup>

The goal of an antibiotic treatment is not to eradicate the bacteria but, rather, to reduce the bacterial load, thereby decreasing inflammation. An adequate treatment accelerates the disappearance of symptoms, prevents secondary complications and prolongs the intervals between exacerbations. The choice of the empirical antibiotic treatment should be dictated by a stratification of the patient's risk factors and by pathogenic agents likely to be found (Figure 1).<sup>3</sup>

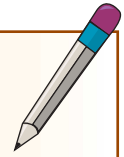
Recent exposure to antibiotics (within the last three months) should also be taken into

consideration when choosing a treatment. Generally, patients should not be administered antibiotics that are of the same type as the one recently received. For patients with severe COPD who have had exposure to antibiotics, Gram-negative bacilli and, in particular, *Pseudomonas aeruginosa*, must be considered.

National surveillance systems are in place that monitor the evolution of the resistance of the most common respiratory pathogens. For example, the current rate of resistance to penicillin per production of  $\beta$ -lactamase with *Haemophilus influenzae* is situated between 20% to 25%.<sup>6</sup> On the other hand, the resistance of *H. influenzae* strains to respiratory quinolones is < 1%. In the early 1990s, the rate of non-susceptibility (intermediary or resistant strains) to penicillin among *Streptococcus pneumoniae* strains in Canada increased significantly, reaching 24% in 2002.<sup>7</sup> Since then, the rate of non-susceptibility to penicillin by *S. pneumoniae* is slightly on the decrease with figures situated around 15%.<sup>8</sup> However, these resistant strains are increasingly accompanied by a resistance to macrolides, tetracyclines and trimethoprim-sulfamethoxazole. The resistance of *S. pneumoniae* to quinolones has also increased over the past years; however, it remains relatively low (1% to 2%).<sup>8</sup>

Resistance to antibiotics of respiratory pathogens should be taken into consideration when selecting an empirical treatment for AECB patients, particularly if these present a moderate to severe underlying lung disease with co-morbidity factors.

## Take-home message



- Acute bronchitis with patients who present no co-morbidity factors should not be treated with antibiotics.
- Patients with chronic bronchitis are chronically colonized by bacteria at the respiratory tracts. However, only 50% of exacerbations are caused by bacterial infections.
- Only patients presenting at least two of the main criteria should be treated with antibiotics.
- Prior antibiotic treatments may promote resistance. An initial treatment must assume the probability of infection by the resistant germ.
- The spirometry test is the most useful test for diagnosing COPD. It also allows evaluation of the severity of the disease.

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