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ERS TASK FORCE REPORT

Guidelines for management of adult community-acquired lower respiratory tract infections

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The following guidelines are based on a systematic analysis of the literative which has been discussed by members of the ESOCAP committee and by external reviewers. The literature review and detailed methods of guideline development will be published in the European Respiratory Review, along with the list of external reviewers

Initial clinical assessment and decision on hospital referral

The management of a community-acquired lower respiratory tract infection (LRTI) should follow a systematic step-by-step process (fig. 1), beginning with a detailed history and clinical examination. Attempts to identify the type of LRTI (pneumonia, acute bronchitis, superinfection of chronic bronchitis, or viral infection) are probably unhelpful outside hospital, since several studies have demonstrated that the sensitivity and specificity of clinical signs and symptoms are low for establishing such a classification. Therefore, the main goal of initial clinical evaluation is to determine whether the patient can be managed at home or whether there is evidence that suggests potential or immediate severity, or that the illness will follow a complicated course (table 1, fig. 2). All these features will guide the decision on hospital referral and admission (fig. 2).

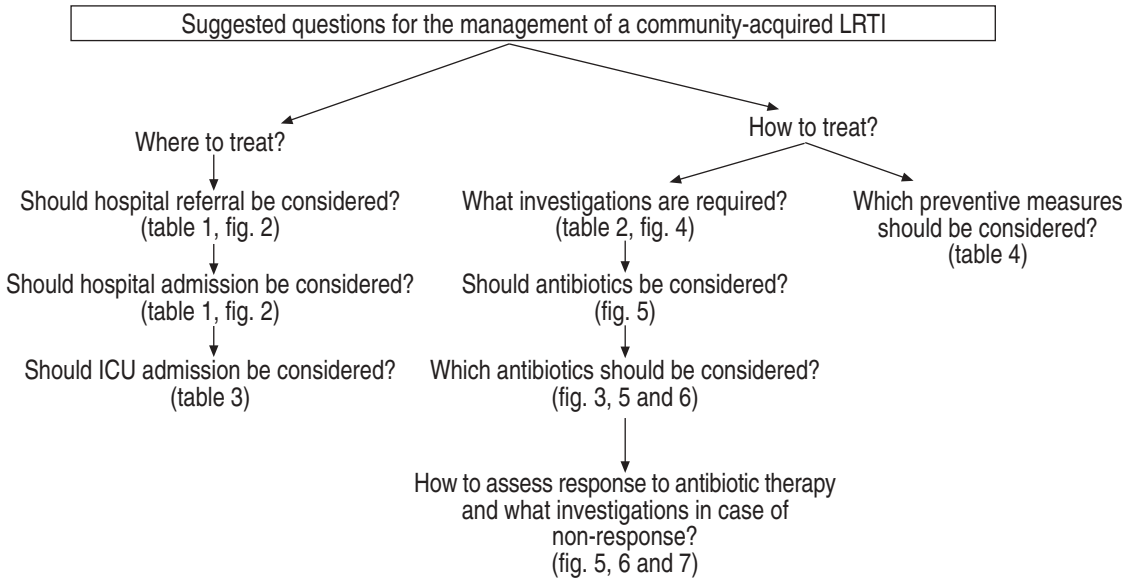

Fig. 1. – Suggested questions to be answered when managing a community-acquired lower respiratory tract infection (LRTI). ICU: intensive care unit.

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Table 1. – Risk factors for pneumonia occurrence, severity and particular micro-organisms in community-acquired lower respiratory tract infections

Risk factor*	Micro-organisms
Age >65 yrs	*Streptococcus pneumoniae*
Institutionalized patients	*S. pneumoniae*, gram-negative enteric bacilli, *Staphylococcus aureus* and anaerobic bacteria in non ambulatory elderly people
Alcoholism	Gram-negative bacilli and *Legionella* sp
Co-morbidity	*S. pneumoniae*, *S. aureus*, *Haemophilus influenzae*, Gram-negative enteric bacilli
COPD, cardiovascular disease, neurological diseases, diabetes mellitus, chronic liver or renal failure, recent viral infection	
Hospital admission	
Within the previous year	*S. pneumoniae*, (especially penicillin-resistant strains in some areas)
Within the previous 2–4 weeks	Gram-negative enetric bacilli
Recent treatment with penicillin or other antibiotics	*S. pneumoniae*, (especially penicillin-resistant strains in some areas), resistant micro-organisms
Aspiration	Gram-negative bacilli, *S. aureus*, anaerobes

*: all these conditions also increase the risk of occurrence and severity of the disease. COPD: chronic obstructive pulmonary disease.

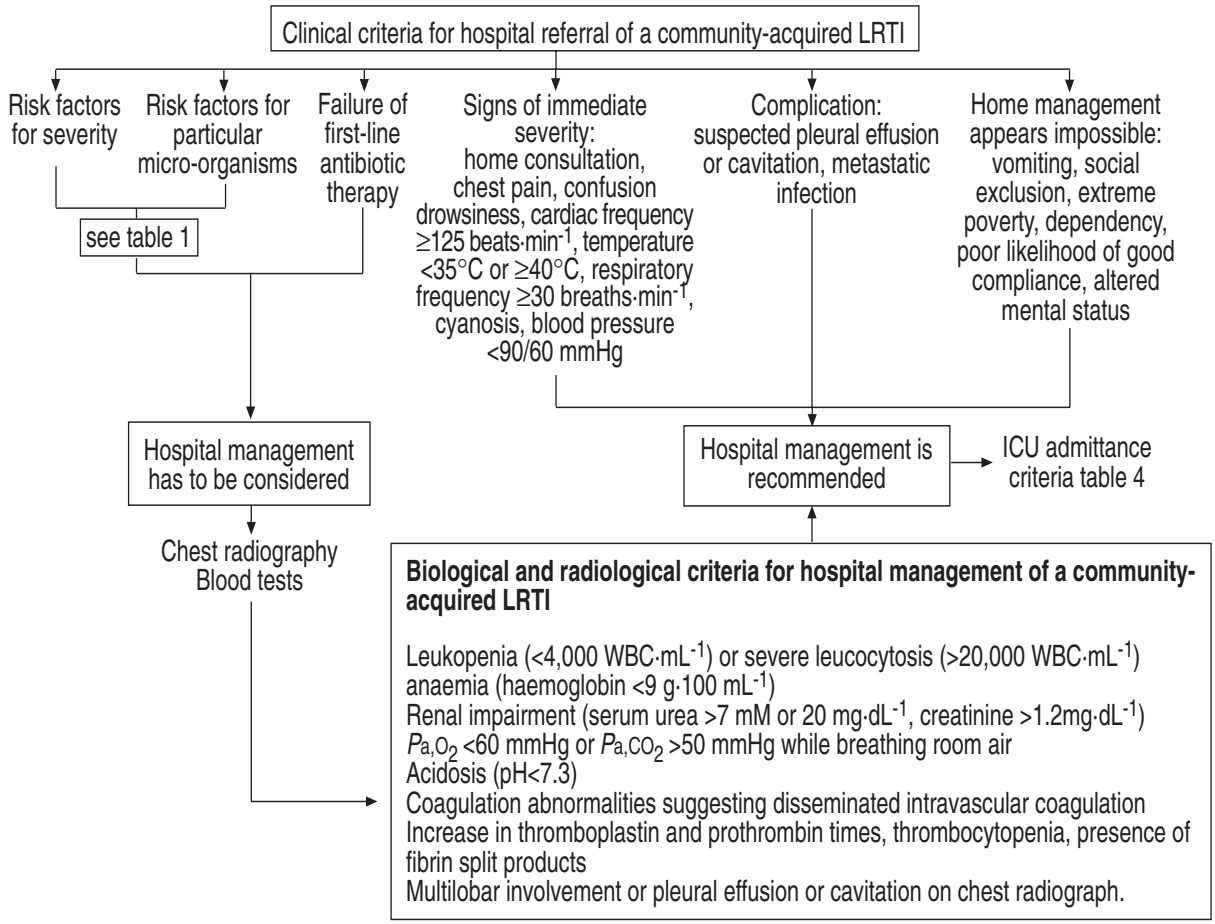

Fig. 2. – Clinical, biological and radiological criteria for hospital referral and hospital admission. Biological and radiological investigations may be performed either in patients referred to the hospital or in outpatients (depending in part on the local health-care system and facilities), according to the criteria listed in table 2. LRTI: lower respiratory tract infection; ICU: intensive care unit; WBC: white blood cells; P_{a,O_2}: arterial oxygen tension; P_{a,CO_2}: arterial carbon dioxide tension.

Home management

Investigations

Most adults with LRTI in the community can be managed with no investigations. Investigations that are indicated in particular cases are shown in table 2.

Treatment

Therapeutic indications. In many adults with LRTI, the illness is self-limiting and its course will not be modified by antibiotic therapy. In addition, many LRTIs are due to viruses. Thus, such treatment should be considered only in patients with features suggesting the presence or risk factors of bacterial infection that is not self-limiting. These

Table 2. – Investigations in community-acquired lower respiratory tract infections

	Chest radiograph	Microbiological examination of sputum	Blood white cell count, CRP blood cultures, serology, detection of pneumococcal and Legionella antigens	Pulmonary function testing
Patient with no risk factors of severity or of unusual micro-organisms	NR	NR	NR	NR
Risk factors for potential severity (see table 1)	TBC	NR	TBC	NR
Risk factors for unusual micro-organisms (see table 1)	NR	R	NR	NR
Failure of first time empirical therapy	R	R	TBC	TBC
Focal chest signs	R	NR	NR	NR
Wheeze, atopy	NR	NR	NR	R

CRP: C-reactive protein; NR: not recommended; R: recommended; TBC: to be considered.

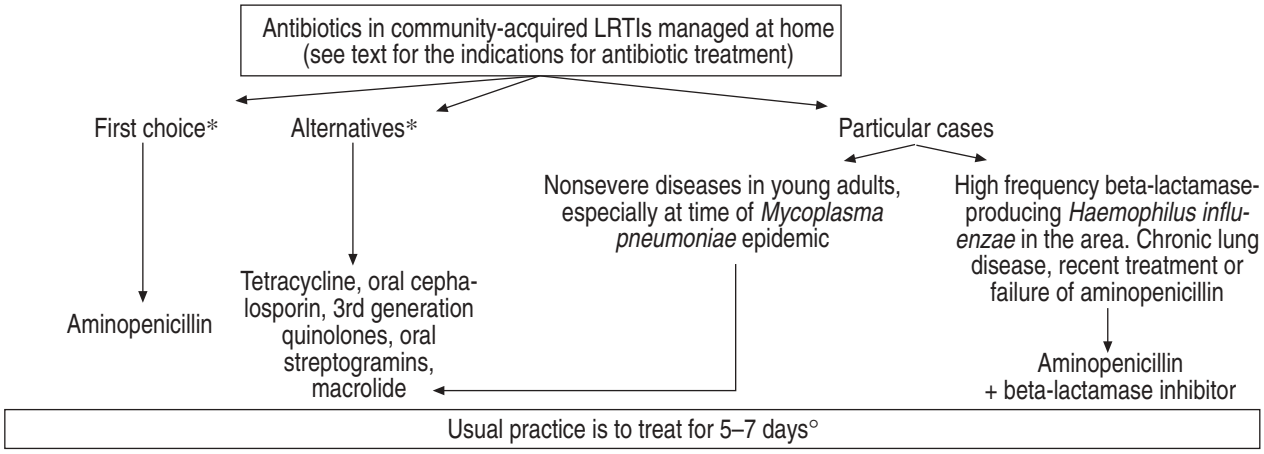

Fig. 3. – Choice of antibiotics and duration of treatment in home-managed community-acquired lower respiratory tract infections (LRTIs). Third generation quinolones. *e.g.*, sparfloxacin, trovafloxacin.*: choice of first line strategy should depend on local resistances of micro-organisms, patient's allergies and costs and side-effect profiles of antibiotics.°: patients should be told to return to the general practitioner if fever does not resolve within 48 h. They should also be told that cough may last longer than the duration of antibiotic treatment.

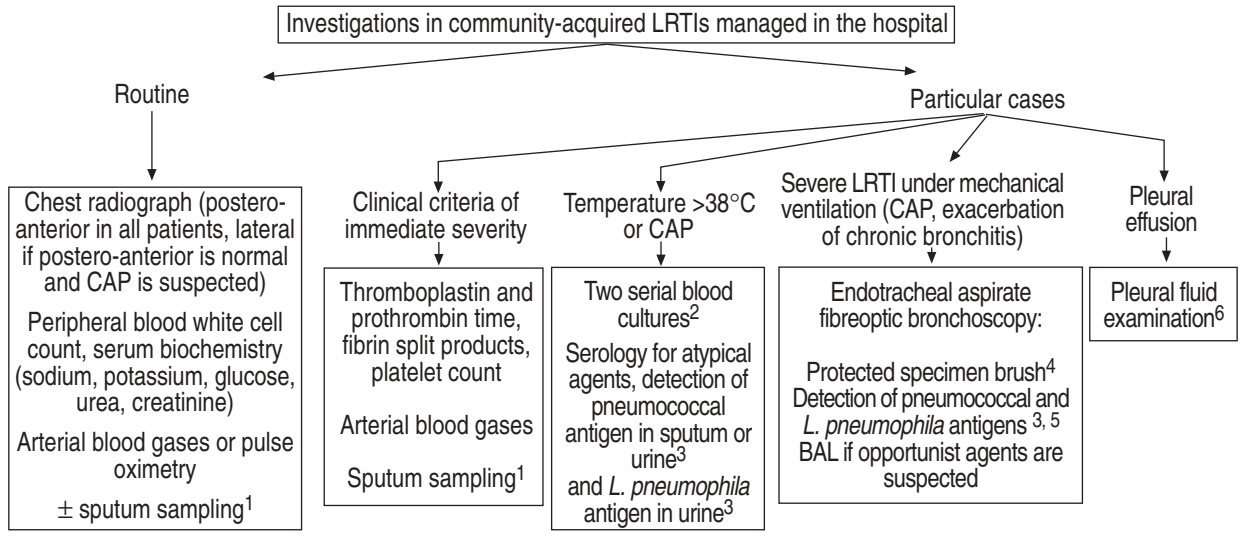

Fig. 4. – Investigations in community-acquired lower respiratory tract infection (LRTIs) managed in the hospital. [1]: sputum sampling should be performed after mouth-washing. Results of Gram-stain should be considered only when there are >25 polymorphonuclear cells and <10 squamous epithelial cells per high power field. Results of culture should be considered only when there is a pure culture of a single microbial agent or when a micro-organism is present in an amount greater than 10^7 cells·mL^{-1}. [2]: cost-effective only in patients with underlying risks (table 1). [3]: if available. [4]: for Gram-stain and quantitative culture. [5]: *Legionella pneumophila* antigen detection is indicated only in patients with pneumonia. [6]: pleural fluid examination: biochemistry (pH, proteins, glucose, and lacticdehydrogenase if available), microbiology (Gram-stain, culture, pneumococcal antigen detection if available). CAP: community-acquired pneumonia; BAL: bronchoalveolar lavage.

features include suspected pneumonia, and superinfection of chronic bronchitis in the presence of increased dyspnoea, sputum volume and sputum purulence.

Choice of antibiotics. Antibiotic therapy should always be active against *Streptococcus pneumoniae*, which is the most frequently encountered pathogen. Other frequent micro-organisms are *Mycoplasma pneumoniae*, *Moraxella catarrhalis* and *Haemophilus influenzae*, whereas *Staphylococcus aureus*, *Legionella pneumophila* and Gram-negative enteric bacilli, are very rare. The role of *Chlamydia pneumoniae* remains to be determined. Based on these data, recommended antibiotics are shown in figure 3.

Duration of antibiotic therapy. The recommended duration of antibiotic therapy is 5–7 days.

Hospital management

Investigations

In hospitalized patients, investigations are needed to ensure that treatment is adequate, and to look for additional criteria of severity (fig. 4).

Criteria for admission to the intensive care unit

Persistence or worsening of at least one of the conditions shown in table 3 justifies consideration of admission of the patient to an intensive care unit.

Treatment and assessment of response

The initial decision to give antibiotics and their choice depends on the clinical situation and on results of chest radiography and microbiological investigations (figs. 5 and 6). This decision and choice may be modified according to risk factors of particular micro-organisms (table 1) and have to be reconsidered after the results of microbiological examinations.

Pneumonia. Antibiotics are recommended in all patients with pneumonia. The most frequent pathogens are *S. pneumoniae*, *H. influenzae*, anaerobes, *L. pneumophila*, Gram-negative enteric bacilli, *S. aureus*, *C. pneumoniae* and *M. pneumoniae*. In patients admitted to the intensive care unit *S. pneumoniae* and *L. pneumophila* are the leading causes of severe pneumonia. The clinical presentation cannot accurately predict the microbiological aetiology.

Recommended antibiotics are shown in figure 6. The duration of treatment should be: 7–10 days in classical bacterial infection or uncomplicated community-acquired pneumonia (CAP); 10–14 days in suspected or proven *M. pneumoniae* or *C. pneumoniae* infection; and 21 days in suspected or proven *L. pneumophila* or *S. aureus* infection or severe CAP. The route of administration should be switched from *i.v.* to oral when fever has resolved and clinical condition is stable.

Assessment of response and investigations in nonresponding patients. The main criterion of response to antibiotic therapy is body temperature; fever should resolve within 2–3 days after initiation of antibiotic treatment. Progression of pulmonary infiltrates is also predictive of poor outcome in severe CAP.

In nonresponding patients, investigations, as shown in figure 7, should be considered.

Exacerbation of chronic bronchitis. Indications for antibiotics. When the exacerbation is due to a bacterial infection, the most frequent pathogens are *H. influenzae*, *S. pneumoniae* and *M. catarrhalis*. Gram-negative bacilli, *S. aureus*, *C. pneumoniae* and *M. pneumoniae* are less frequently involved. Antibiotics are recommended in all patients with severe chronic obstructive pulmonary disease (COPD) exacerbations, and in nonsevere exacerbations when there is increased purulence of sputum and increased sputum volume and increased dyspnoea; valuable alternative regimens are described in figure 5.

Duration of antibiotic treatment. Antibiotics (except clarithromycin and azithromycin) should be administered for at least 7 days. Treatment should last 21 days when infection with *L. pneumophila* is suspected.

Assessment of response and investigations in nonresponding patients. Symptoms of exacerbation should resolve

Table 3. – Intensive care unit (ICU) admission

ICU admision is highly recommended in the case of existence or persistence of at least one of the following:
Severe respiratory failure
Respiratory frequency >30 breaths·min^{-1}
$P_{a,O_2}/F_{I,O_2}$ <250 mmHg (<200 mmHg if COPD)
Need of mechanical ventilation
Radiographic spread of pneumonia (increase in size of opacity by 50% or greater within 48 h of admission)
Severe haemodynamic instability:
Systolic blood pressure <90 mmHg or diastolic <60 mmHg
Need of vasoactive drugs for more than 4 h
Urine output <20 mL·h^{-1} (in absence of hypovolaemia)
Metabolic or haematologic criteria
Severe acidosis (pH <7.30)
Severe disseminated intravascular coagulation
Acute renal failure requiring dialysis
Other severe organ failures

P_{a,O_2}: arterial oxygen tension; F_{I,O_2}: inspiratory oxygen fraction; COPD: chronic obstructive pulmonary disease. 1 mmHg = 0.133 kPa.

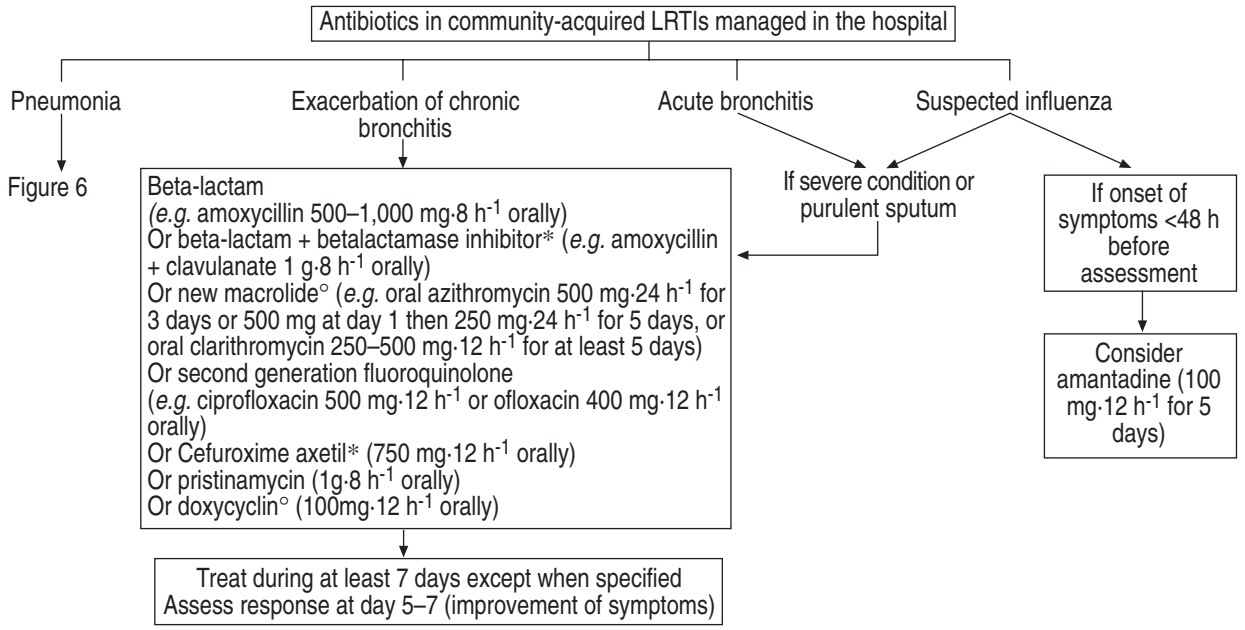

Fig. 5. – Choice of antibiotics, duration of treatment and assessment of response in community-acquired lower respiratory tract infection (LRTI) managed in the hospital (except community acquired pneumonia; see figure 6). *: only in areas where the frequency of betalactamase-producing *Haemophilus influenzae* is low; °: in areas with low rates of resistant *Streptococcus pneumoniae.*

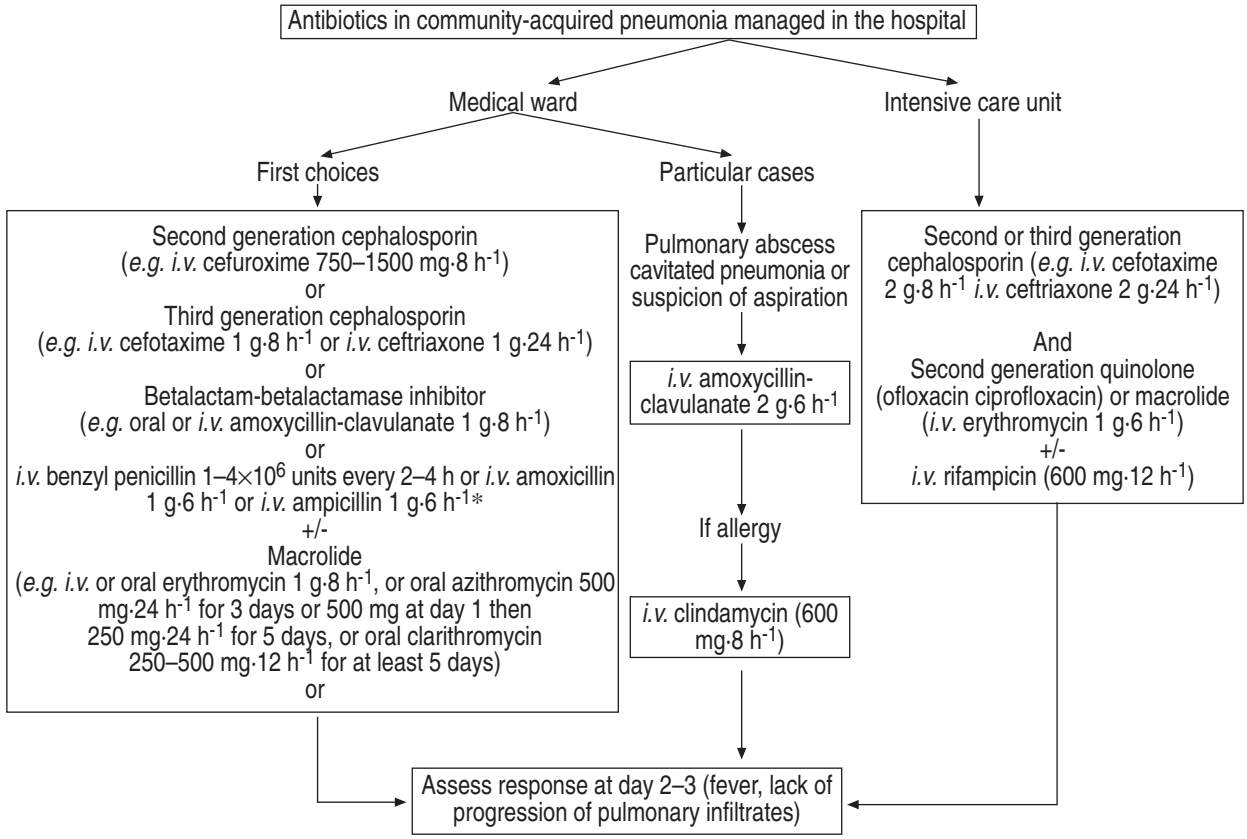

Fig. 6. – Choice of antibiotics and assessment of response in community-acquired pneumonia managed in the hospital. *: only in areas where the frequency of betalactamase-producing *Haemophilus influenzae* is low.

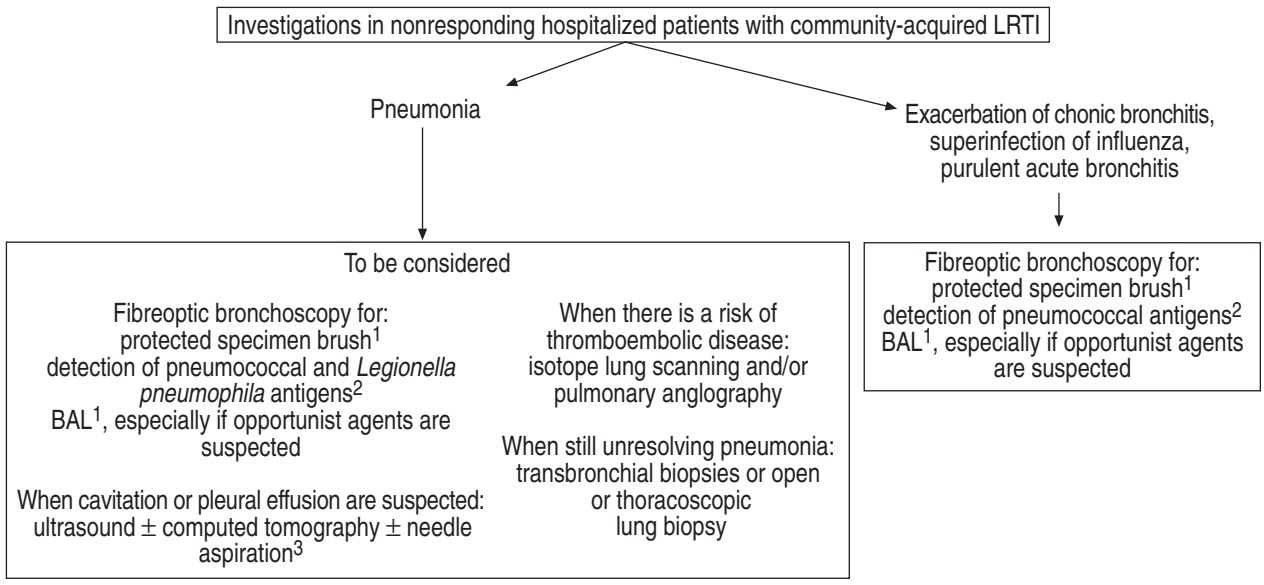

Fig. 7. – Investigations in nonresponding patients hospitalized for community-acquired lower respiratory tract infection (LRTI). [1]: for Gram-stain and quantitative culture; [2]: if available; [3]: pleural fluid examination: biochemistry (pH, proteins, glucose, and lactic dehydrogenase, if available), microbiology (Gram-stain, culture, pneumococcal antigen detection, if available). BAL: bronchoalveolar lavage.

Table 4. – Prevention of community-acquired lower respiratory tract infections

Preventive measure	Indication
Pneumococcal vaccine	Age >65 yrs
	Cardiovascular diseases, pulmonary diseases, diabetes mellitus, alcoholism, liver cirrhosis
	Cerebrospinal fluid leaks, immunodepression (HIV infection, chronic renal failure, organ transplant recipients, haematologic and lymphatic malignancies, asplenia, sickle cell disease)
Influenza vaccine	Age >65 yrs
	Chronic diseases
	Medical and nursing home employees
Oral immunization	None
Prophylactic antibiotics	None
Treatment of URTIs	None
early antibiotic therapy	In selected patients only
Tonsillectomy, surgery for recurrent sinusitis	

HIV: human immunodeficiency virus; URTI: upper respiratory tract infections.

within 5–7 days after initiation of antibiotics. In nonresponding patients, bronchoscopy with protected specimen brush for Gram stain and quantitative culture should be considered.

Acute bronchitis or influenza. Hospitalized patients are those with an unstable underlying condition which puts them at risk of severity. Indications of antibiotics and amantadine are shown in figure 5.

Prevention

Table 4 summarizes the indications for preventive measures, based on their proven efficacy.