



## Mecanisms & microorganisms

<b>Pathophysiology</b>	<ul style="list-style-type: none"> <li>Aspiration pneumonia (AP) refers to the bacterial proliferation and invasion of the pulmonary parenchyma following the typically silent inhalation of oropharyngeal secretions colonized by pathogenic bacteria.</li> </ul>
<b>Micro-organisms</b>	<ul style="list-style-type: none"> <li>The main microorganisms responsible for aspiration pneumonia are : <ul style="list-style-type: none"> <li>- <i>Streptococcus pneumoniae</i>,</li> <li>- <i>Staphylococcus aureus</i>,</li> <li>- Rarely: <i>Pseudomonas aeruginosa</i> and anaerobic bacteria</li> <li>- <i>Haemophilus influenzae</i>,</li> <li>- Enterobacterales,</li> </ul> </li> </ul>
<b>Main risk factors</b>	<ul style="list-style-type: none"> <li>Swallowing disorders</li> <li>Impaired consciousness</li> <li>Gastroesophageal reflux disease (GERD) and factors promoting GERD (nasogastric tube, hiatal hernia, obesity, etc.)</li> <li>Abnormal pharyngeal reflexes</li> <li>Medications: psychotropics, analgesics</li> </ul>

## Diagnostic and management

### Diagnostic

The diagnosis of aspiration pneumonia (AP) combines:

<b>Pneumonia</b>	<ul style="list-style-type: none"> <li>Signs of acute lower respiratory tract infection</li> <li>Infiltrate on imaging</li> </ul>
<b>AND presumed aspiration</b>	<ul style="list-style-type: none"> <li>Swallowing disorder or witnessed aspiration</li> <li>Clinico-radiological involvement in dependent lung zones in the presence of aspiration risk factors</li> </ul>

Severity criteria	
Major criteria	Critères mineurs
<ul style="list-style-type: none"> <li>Septic shock</li> <li>Respiratory failure requiring mechanical ventilation</li> </ul>	<ul style="list-style-type: none"> <li>Respiratory rate <math>\geq 30</math> breath/min</li> <li>PaO<sub>2</sub>/FiO<sub>2</sub> ratio <math>\leq 250</math></li> <li>Multilobar infiltrates (<math>\geq 2</math> lobes)</li> <li>Blood urea nitrogen <math>\geq 7,14</math> mmol/L</li> <li>Leukopenia (white blood cell count <math>&lt; 4000/\text{mm}^3</math>)</li> <li>Thrombocytopenia (<math>&lt; 100\,000/\text{mm}^3</math>)</li> <li>Hypothermia (core temperature <math>&lt; 36^\circ\text{C}</math>)</li> <li>Hypotension requiring fluid resuscitation</li> </ul>

### Additional investigations

<b>Imaging</b>	<ul style="list-style-type: none"> <li><b>Essential for the diagnosis of IP</b> <ul style="list-style-type: none"> <li>First-line: non-contrast <b>chest CT scan</b></li> <li>Second-line: lung ultrasound or chest X-ray</li> </ul> </li> </ul>
<b>Laboratory tests</b>	<ul style="list-style-type: none"> <li><b>No biological test is recommended as first-line for the diagnosis of IP</b> (e.g., CBE, CRP, procalcitonin, Legionella urinary antigen, pneumococcal urinary antigen)</li> <li>A sputum cytobacteriological examination (CBE) can be performed prior to initiating antibiotic therapy active against <i>Pseudomonas aeruginosa</i></li> <li>During seasonal viral epidemics (e.g., influenza), virological testing may be considered</li> </ul>



## Risk Factors for Infection Potentially Involving *Pseudomonas aeruginosa* or MRSA\* and Justifying Antibiotic Therapy Modification in IP with Severity Criteria

<i>P. aeruginosa</i>	<ul style="list-style-type: none"> <li>Documented history of respiratory tract colonization or infection with <i>P. aeruginosa</i> within the past year</li> <li>Parenteral antibiotic therapy within the last 3 months</li> <li>Severe chronic obstructive pulmonary disease (COPD)</li> <li>Bronchiectasis</li> <li>Tracheostomy</li> </ul>
MRSA	<ul style="list-style-type: none"> <li>History of MRSA colonization</li> </ul>

\*MRSA : MRSA (Methicillin-Resistant *Staphylococcus aureus*)

## Treatment

- Dosage adjustments of certain antibiotics may be required based on renal function
- Recommended duration of antibiotic therapy is **5 days if favorable clinical response is observed by day 3**
- Antibiotic choice depends on severity and patient-specific factors

IP Without Severity Criteria	
Patient Condition	Recommended Antibiotic Regimen
No allergy to $\beta$ -lactams	Amoxicillin-clavulanic acid orally 1 g three times daily
Penicillin allergy without contraindication to cephalosporins or inability to use oral route	Ceftriaxone subcutaneous 1 g daily
Allergy to all $\beta$ -lactams	Cotrimoxazole (sulfamethoxazole 800 mg / trimethoprim 160 mg) three times daily

IP With Severity Criteria	
Risk Factor	Same treatment as IP without severity criteria
No risk factors for <i>P. aeruginosa</i> or MRSA infection	Piperacillin (4 g) / tazobactam (500 mg) 3 to 4 times daily
Risk factor for <i>P. aeruginosa</i> infection	Pipéracilline (4g) /tazobactam (500mg) x 3 à 4 / jour
Risk factor for MRSA infection	Addition of linezolid 600 mg twice daily

IP With Severity Criteria and Unknown Mechanism
Treat according to protocols for severe community-acquired pneumonia

In Case of Recurrence or Relapse After Clinical Cure Criteria Are Met
<ul style="list-style-type: none"> <li>Repeat the same treatment regimen</li> </ul>

In Case of Failure of First-Line Treatment
<ul style="list-style-type: none"> <li>Piperacillin (4 g) / tazobactam (500 mg) 3 to 4 times daily</li> <li>Infectious disease specialist consultation recommended</li> </ul>



## Criteria for Favorable Clinical Evolution

Achievement of all clinical cure criteria at 72 hours allows discontinuation of antibiotic therapy after 5 days of treatment.

### Clinical Cure Criteria

- Temperature  $\leq 37.8^{\circ}\text{C}$
- Systolic blood pressure  $\geq 90$  mmHg
- Heart rate  $\leq 100$  beats per minute
- Respiratory rate  $\leq 24$  breaths per minute
- $\text{SpO}_2 \geq 90\%$  or  $\text{PaO}_2 \geq 60$  mmHg on room air

## Prevention

### Management of Pulmonary Aspiration

- Clinical monitoring only
- Preventive antibiotic therapy is not recommended

### Pharmacological Prevention

- In patients with prior stroke on antihypertensive treatment: preferential use of angiotensin-converting enzyme (ACE) inhibitors rather than other antihypertensive agents
- Reassess the need to continue medications that may promote interstitial pneumonia, including:
  - Psychotropic drugs
  - Anticholinergics
  - Proton pump inhibitors

### Non-Pharmacological Prevention

- Postural advice:
  - Positioning  $> 30^{\circ}$ , especially in patients on enteral nutrition or with attention disorders
  - Specific swallowing maneuver: chin tuck toward sternum
  - Elevation of patients to upright position and early rehabilitation
  - Mobilization
  - Meals taken in seated position
  - Verticalization
  - Early rehabilitation
- Swallowing assessment before initiating oral intake
- Adapt food volume and texture to swallowing disorders: meal fractionation, texture modification
- Regular oral hygiene (e.g., tooth brushing)

### Measures Not Recommended

- Use of scopolamine
- Use of straws
- Routine use of chlorhexidine mouthwash