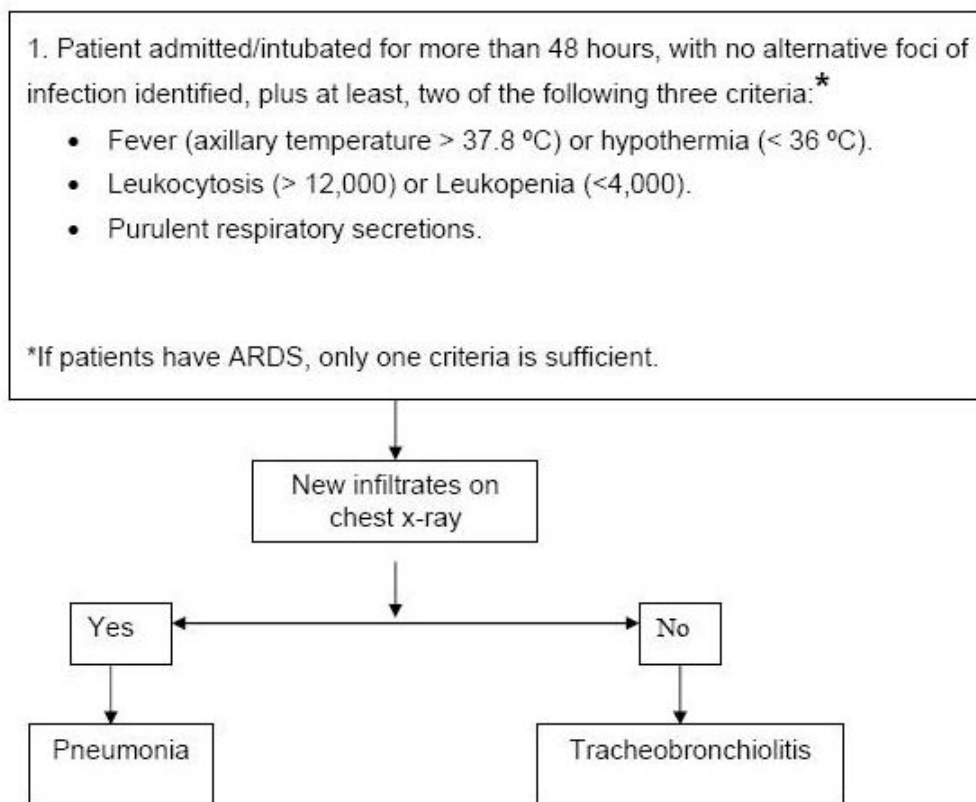


**Figure 1: Clinical Suspicion of Hospital-Acquired Pneumonia**



**Table 1. Clinical Pulmonary Infection Score(CPIS)**

Score	Day 0	Day 3	Score
	Temperature, °C ³38.5° - 38.9° = 1 point ³39.0° - 36.0° = 2 points	Temperature, °C 38.5° - 38.9° = 1 point 39.0° - 36.0° = 2 points	
	Blood leucocytes, mm-3 <4.000 or >11.000 = 1 point 50% band forms = add 1 point	Blood leucocytes, mm-3 <4.000 or >11.000=1 point 50% band forms = add 1 point	

	<p>Tracheal secretions</p> <p>Presence of non-purulent tracheal secretions = 1 point</p> <p>Presence of purulent tracheal secretions = 2 points</p>	<p>Tracheal secretions</p> <p>Presence of non-purulent tracheal secretions = 1 point</p> <p>Presence of purulent tracheal secretions = 2 points</p>	
	<p>Oxygenation: PaO<sub>2</sub>/FIO<sub>2</sub></p> <p>&gt;240 or ARDS = 0 point</p> <p>≤ 240 and no ARDS = 2 points</p>	<p>Oxygenation: PaO<sub>2</sub>/FIO<sub>2</sub></p> <p>&gt;240 or ARDS = 0 point</p> <p>≤ 240 and no ARDS = 2 points</p>	
	<p>Pulmonary radiography</p> <p>No infiltrate = 0 point</p> <p>Diffuse or patchy infiltrate = 1 point</p> <p>Localized infiltrate= 2 points</p>	<p>Pulmonary radiography</p> <p>No infiltrate = 0 point</p> <p>Diffuse or patchy infiltrate = 1 point</p> <p>Localized infiltrate= 2 points</p>	
	<p>Microbiological Data</p> <p>Pathogenic bacterial cultured in rare or high quantity or no growth = 0 point</p> <p>Pathogenic bacterial cultured in moderate or heavy quantity = 1 point</p> <p><b>Same pathogenic bacterial seen on Gram stain = add 1 point</b></p>	<p>Microbiological Data</p> <p>Pathogenic bacterial cultured in rare or high quantity or no growth = 0 point</p> <p>Pathogenic bacterial cultured in moderate or heavy quantity = 1 point</p> <p><b>Same pathogenic bacterial seen on Gram stain = add 1 point</b></p>	

Total Day #0 = \_\_\_\_\_

Total Day #3 = \_\_\_\_\_

**Table 2.**

<p>A. <b>SIRS:</b> 2 or more of the following variables:</p> <ol style="list-style-type: none"><li>1. Fever <math>&gt;38^{\circ}\text{C}</math> or <math>&lt; 36^{\circ}\text{C}</math></li><li>2. Heart rate <math>&gt;90</math> beats per minute</li><li>3. Respiratory rate <math>&gt;20</math> breaths per minute or <math>\text{PaCO}_2 &lt;32</math> mm Hg</li><li>4. Abnormal white blood cell count (<math>&gt;12,000/\text{mm}^3</math> or <math>&lt;4,000/\text{mm}^3</math> or <math>&gt;10\%</math> bands)</li></ol> <p>B. <b>Bacteremia:</b> bacteria within the blood stream (does not always lead to SIRS or sepsis)</p> <p>C. <b>Sepsis:</b> SIRS plus a documented or presumed infection.</p> <p>D. Severe sepsis: aforementioned sepsis criteria with associated organ dysfunction, hypoperfusion or hypotension.</p> <p>E. Sepsis induced hypotension: presence of a systolic BP <math>&lt;90</math> mmHg or a reduction of <math>&gt; 40</math> mmHg from baseline in the absence of other causes of hypotension."</p> <p>F. Septic shock: Persistent hypotension and perfusion abnormalities despite adequate fluid resuscitation.</p> <p>G. Multiorgan dysfunction syndrome: state of physiological derangements in which organ function is not capable of maintaining homeostasis.</p>
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### Day 0

If a patient meet three out of the four criteria below(the new onset of fever ( $>38.3$ ) leukocytosis ( $>12,000 \text{ mm}^3$ ) leukopenia( $<4000/\text{mm}^3$ ) purulent respiratory secretions)

- Cultures of the lower respiratory secretions are immediately taken
- Gram stain is performed (usually takes less than 24 hours to process)

If CPIS(Day 0) score  $> 6$

Following tests are performed

- Initiate broad spectrum of antibiotics treatment
- Cultures of the lower respiratory secretions are immediately taken

- Obtain blood cultures
  - CBC, electrolytes, hepatic and renal functions
  - Arterial blood gases
  - C-reactive protein(CRP) and procalcitonin

- Obtain Pleural fluid cultures

If patient hospital stay  $\leq 5$  days

- A urinary antigen for *Streptococcus pneumoniae* is performed

Else

- *Legionella* urinary antigen is performed

If presence of SIRS(Table 2) , and gram stain shows predominant bacterium or intracellular bacteria.

- Administer broad spectrum bacteria (figure 2)

If CPIS(Day 0)  $< 6$

If Systemic Inflammatory Response Syndrome(SIRS)is not present && (Gram stain of respiratory system negative || Intracellular Organism  $< 2\%$ )

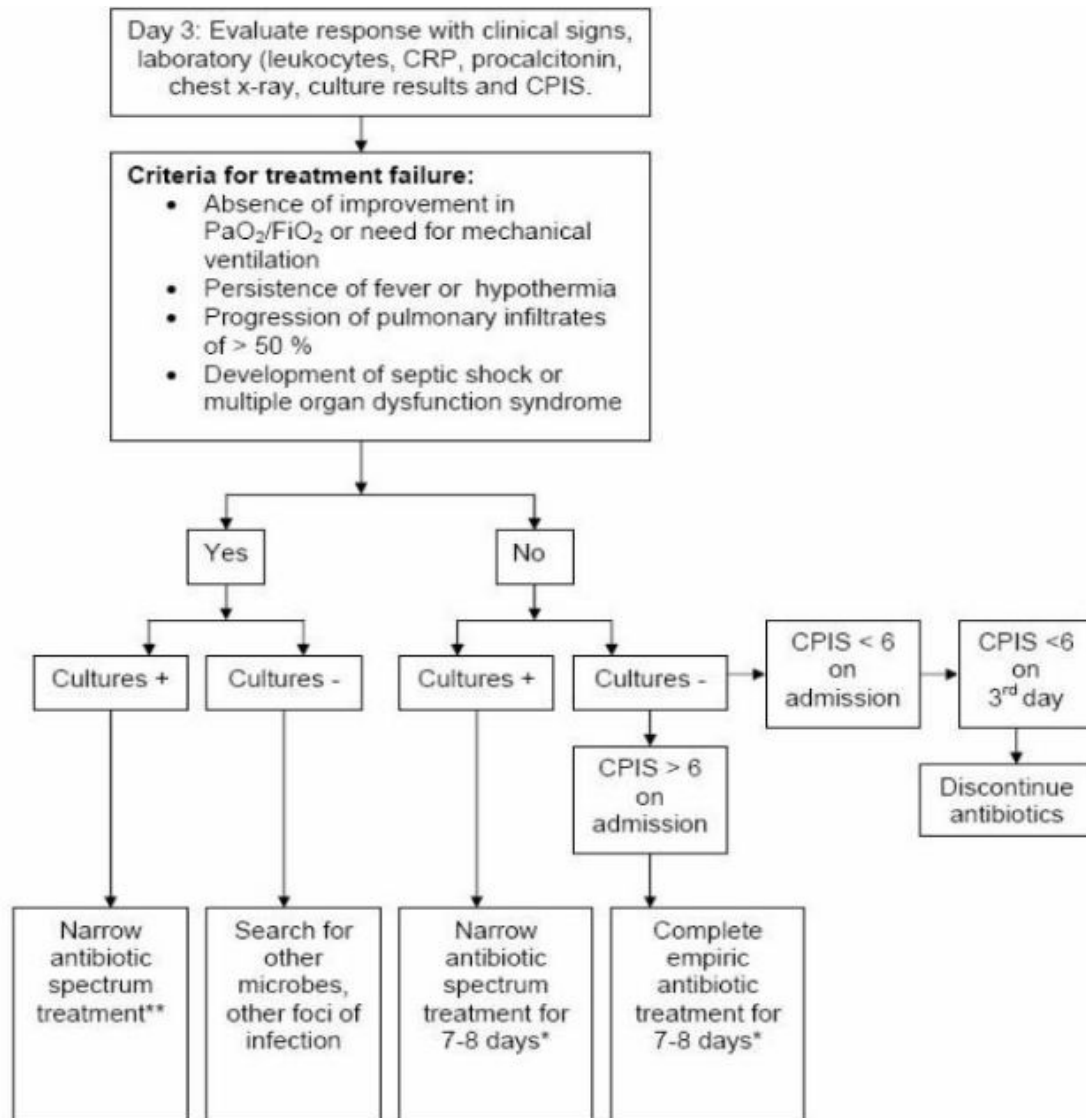
- Pneumonia is not likely; symptoms normally caused by noninfectious causes
- Patients receive no antibiotics treatment but will be strictly monitored (for how long?)
- Antibiotics can be added if deterioration is observed.

If gram stain is hard to interpret

- Monotherapy is administered : quinolone and carbapenem.

### Day 3 Reevaluation

\*Meeting one criterion would be count as failure.



## Antibiotics Selections

Risk factors for Multi-Resistant Microorganisms
■ Antibiotic treatment within the last 90 days (> 5 days)
■ Current hospital admission or within the last 90 days (> 5 days)
■ Immunosuppressive disease and/or treatment
■ Chronic dialysis within the last 30 days
■ Epidemic outbreak in the unit by multiresistant organism

If CPIS>5 || risk factors for MRMO || Mechanical Ventilation > 5 days

- a combination of an anti-pseudomonal beta-lactam antibiotic with the addition of a quinolone or an aminoglycoside

If previous infection of MRSA || Mechanical Ventilation > 5 days

- Empiric therapy for MRSA
- Linezolid sometimes is preferred to vancomycin

If No risk factors of MRMO || Mechanical Ventilation < 5 days

- Ceftriaxone or Levofloxacin

## Dosing

Antibiotic	Doses	Interval of administration	Infusion time
Ceftriaxone	1 g	12 hours	1 / 2 - 1 hour†
Levofloxacin	750 mg	12 hours*	1 / 2 hour
Ceftazidime	2 g	8 hours	2 - 3 hours†
Cefepime	2 g	8 hours	2 - 3 hours†
Imipenem	0.5 g	6 hours	1 hour†
Meropenem	0.5 – 1 g	6 hours	2 - 3 hours†
Piperacillin/Tazobactam	4 / 0.5 g	6 hours	2 - 3 hours†
Ciprofloxacin	400 mg	8 hours	1 / 2 hour
Amikacin	15 mg / Kg	24 hours **	1 / 2 - 1 hour
Vancomycin	1 g	8-12 hours***	1- 3 hours*
Linezolid	600 mg	12 hours	1 hour

\*Administer this dose for 3 days and after continue with 500 mg / 24 hours

\*\*Adjust the dosage according to PK / PD parameters

\*\*\*Initiate this dose with 24 hours, measure trough blood levels prior to the following dosage and adjust the levels according to values.

†For beta-lactam agents and vancomycin, continuous infusion should be considered.

## References

<http://www.antimicrobe.org/e47.asp>

[http://www.antimicrobe.org/h04c.files/history/e47\\_link.asp](http://www.antimicrobe.org/h04c.files/history/e47_link.asp)

[https://academic.oup.com/cid/article/51/Supplement\\_1/S81/421244](https://academic.oup.com/cid/article/51/Supplement_1/S81/421244)