MANAGEMENT OF COMMUNITY-ACQUIRED PNEUMONIA

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Community acquired pneumonia (CAP)

- Community acquisition pneumonia (CAP) is a common cause of morbidity and mortality in the general population
  - Incidence 2-10 cases per 1,000 inhabitants / year
  - Of these, 20-35 % will require hospitalization
- Despite advances in antimicrobial therapy and knowledge of etiologic agents, pneumonias remain the sixth leading cause of death in the general population
  - CAP mortality 13.7 % (0.1 to 36.5%)
- This wide range is determined by the presentation and severity , aetiology and baseline patient characteristics

Community-acquired pneumonia (CAP)

1. Does the patient has a pneumonia — Diagnosis
2. Where should I treat the patient? — Severity
3. The patient has a pneumonia:
   - Is he immunocompromised?
   - Where was it acquired?

   — Host
4. What treatment should I recommend? — Treatment
   - Antimicrobial
   - Support

Case 1

- 35 years old male
- No comorbidities
- Sudden onset high fever , chills , and cough with greenish expectoration and right pleuritic chest pain. BP 130/60 mm Hg. RR 20 rpm, HR 92 spm, Temperature 38,5ºC
- Crackles in the right lung base

¿What diagnostic test would you order first?

1. It is an upper respiratory tract infection and does not require additional examinations
2. It is a lower respiratory tract infection and does not require additional examinations
3. It could be a pneumonia, therefore I would request a chest radiograph
4. It could be a pneumonia, I would request a CT

¿What diagnostic test would you order first?

1. It is an upper respiratory tract infection and does not require additional examinations
2. It is a lower respiratory tract infection and does not require additional examinations
3. **It could be a pneumonia, therefore I would request a chest radiograph**
4. It could be a pneumonia, I would request a CT

Does the patient has a pneumonia?

- We will decide the use or not of antimicrobial based on this decision
- It is the only respiratory infection in which the delay in treatment is an increase in mortality
  - Before 4 hours of arrival to the emergency room
    - It is associated with a15-17% reduction in mortality
    - It is associated with a shorter stay
    - Independently of the severity

Daniel et al. Thorax 2016. Houck et al. Arch Intern Med 2004.

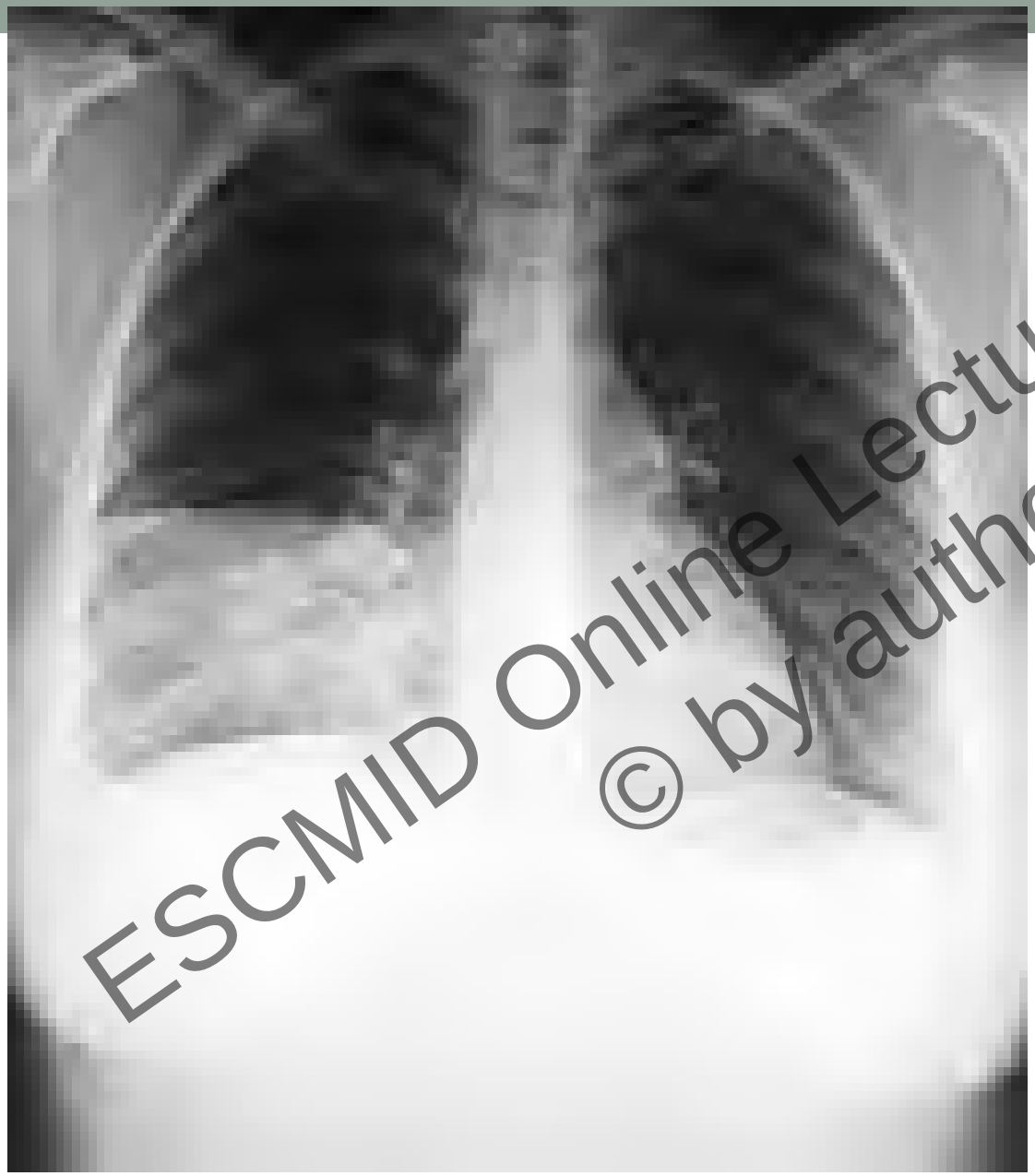
Diagnostic criteria of CAP

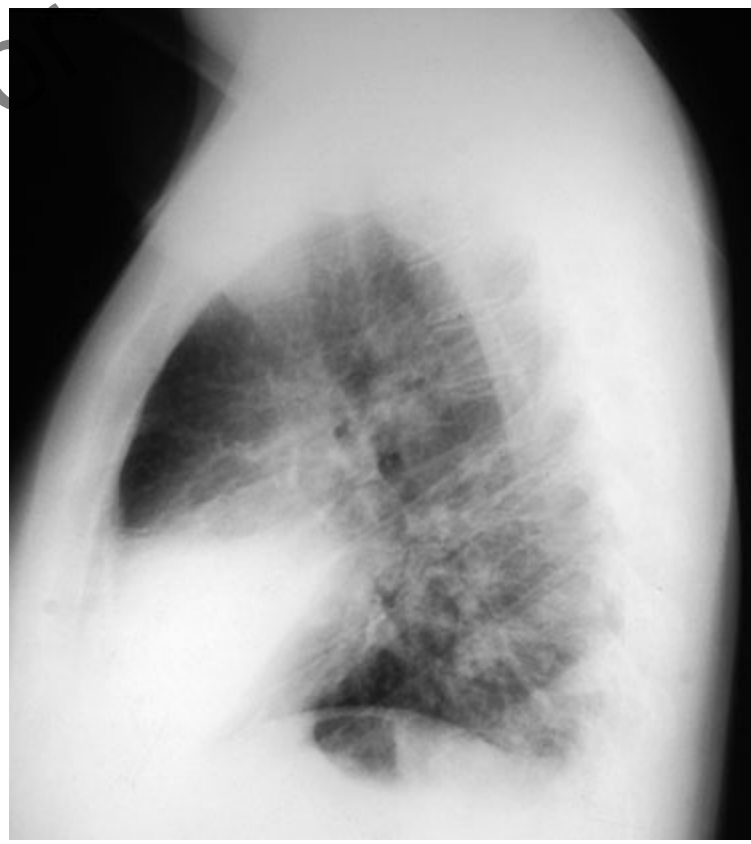
- **Suspected community-acquired pneumonia (CAP)**
  - An acute illness with cough and at least one of new focal chest signs, fever >4 days or dyspnoea/tachypnoea, and without other obvious cause

- **Definite community-acquired pneumonia (CAP)**
  - Suspected pneumonia + **lung shadowing** that is likely to be new.

It is needed to establish the diagnosis of CAP and to differentiate it from other causes of cough and fever, such as acute bronchitis

Woodhead ERS and ESCMID guidelines Clin Microbiol Infect 2011





Imagine that the X Ray is normal

1. It rules out a pneumonia
2. It does not rule out a pneumonia

Imagine that the X Ray is normal

1. It rules out a pneumonia
2. **It does not rule out a pneumonia**

- Radiograph sensitivity is not 100% for the diagnosis of CAP:
  - Deshidration
  - Immunosuppression (especially neutropenia)
  - Elderly
  - Incorrect technique
- If the patient's toxic appearance suggests more than bronchitis and has negative chest radiography findings
  - Treat and repeat the imaging in 24–48 h
- In the elderly, the presence of chest radiograph shadowing accompanied by acute clinical illness (unspecified) without other obvious cause.

Where should I treat this patient with pneumonia?

1. At home
2. In a medical ward
3. In the ICU
4. The site of care is irrelevant in patients with pneumonia
5. I do not know yet

Where should I treat this patient with pneumonia?

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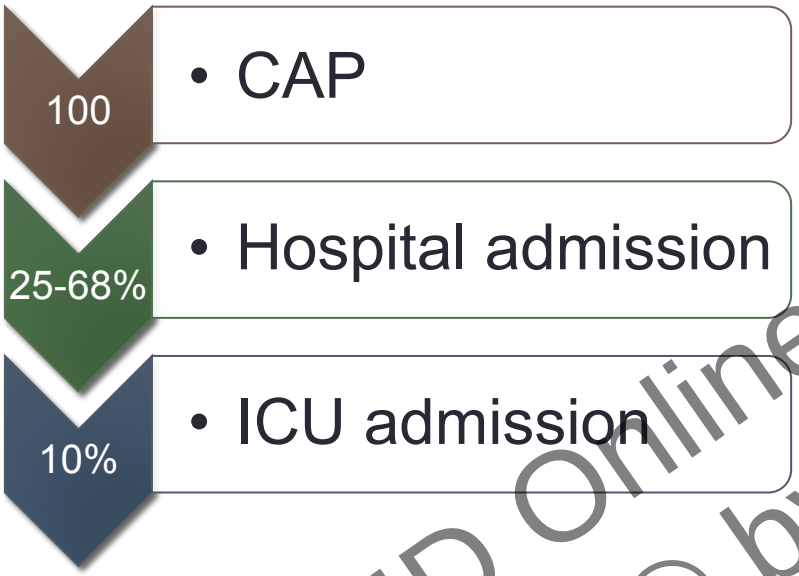
Assessment of severity



The **site of care** of a patient with CAP is probably the **most important decision** the clinician should take in the course of the disease, since an **inadequate indication of outpatient management** could increase the number of **complications and death**

Which of the following symtomps and signs are necessary to evaluate the severity of the pneumonia?

1. Confusion
2. Respiratory rate
3. Blood pressure
4. Age
5. All of them

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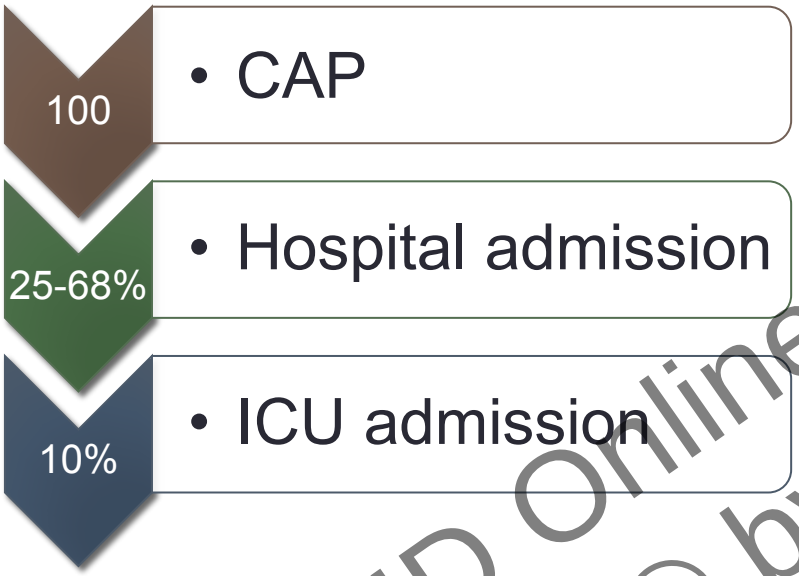
Assessment of severity



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Two prognostic score systems help us with this decision

PSI

CURB65
CRB65

Pneumonia Score Index (PSI)

- PSI is a **two-steps prognostic** score that stratifies patients in 5 mortality risk classes.
- **Validated**: safe and efficacious.
-It identifies patients than can be **safely treated in an outpatient** basis with a clinical anamnesis and physical exploration.

Chart 5 – Classification of patients with community-acquired pneumonia based on risk, according to the Pneumonia Severity Index score.[73]

Score	Points	Mortality, %	Recommended treatment locale
I		0.1	Outpatient clinic
II	≤ 70	0.6	Outpatient clinic
III	71-90	2.8	Outpatient clinic or day hospital
IV	91-130	8.2	Hospitalization
V	> 130	29.2	Hospitalization

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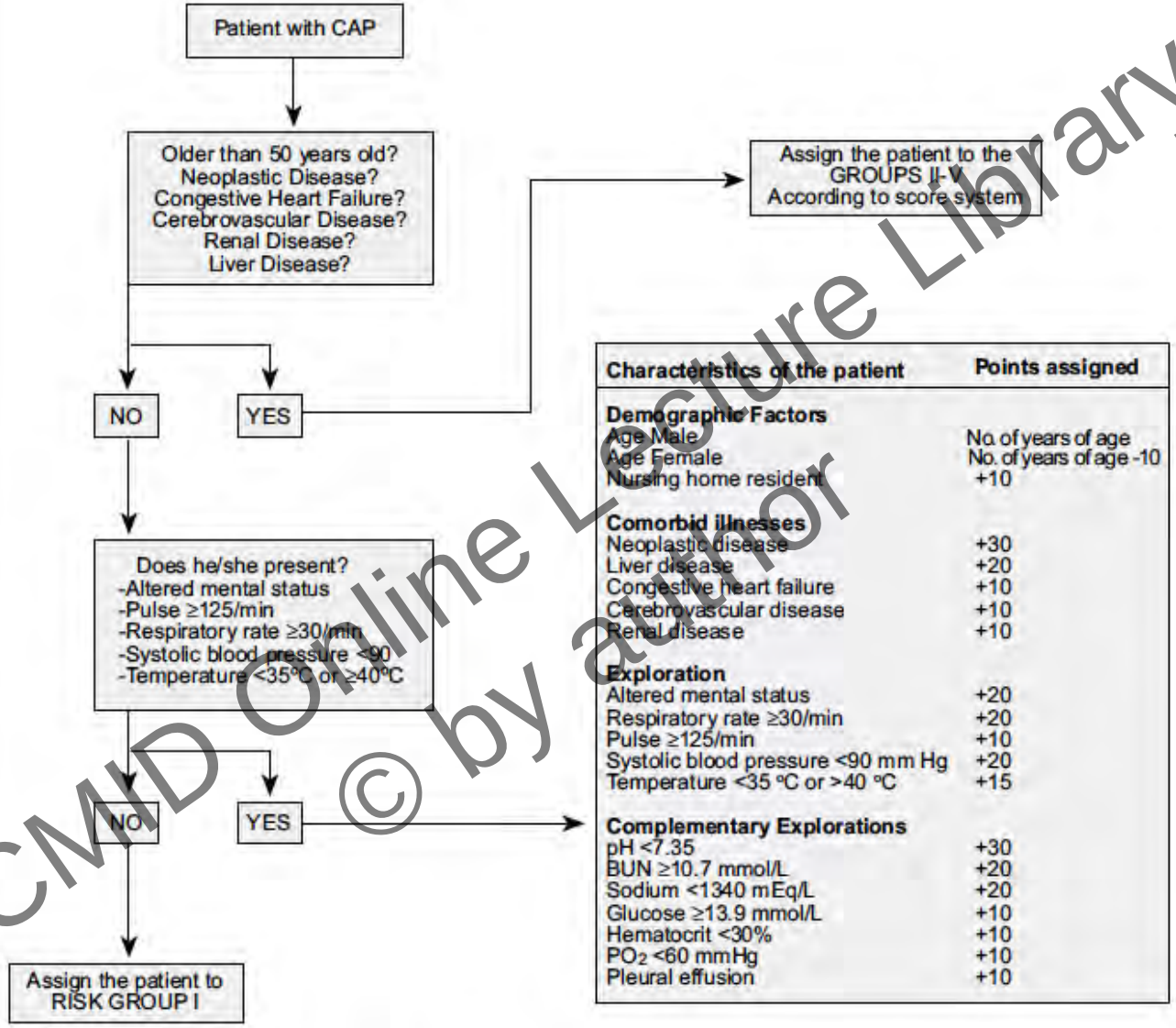


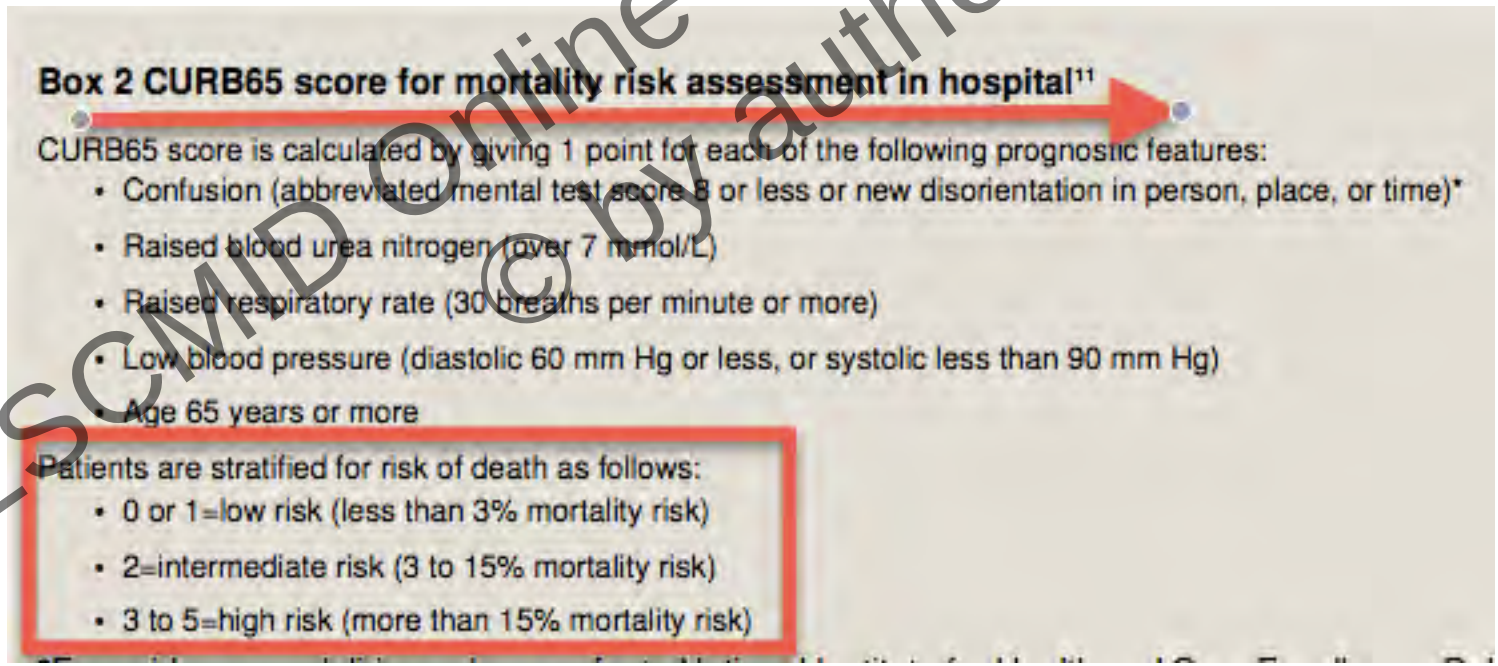
Characteristics of the patient	Points assigned
Demographic Factors	
Age Male	No. of years of age
Age Female	No. of years of age -10
Nursing home resident	+10
Comorbid illnesses	
Neoplastic disease	+30
Liver disease	+20
Congestive heart failure	+10
Cerebrovascular disease	+10
Renal disease	+10
Exploration	
Altered mental status	+20
Respiratory rate ≥30/min	+20
Pulse ≥125/min	+10
Systolic blood pressure <90 mm Hg	+20
Temperature <35 °C or >40 °C	+15
Complementary Explorations	
pH <7.35	+30
BUN ≥10.7 mmol/L	+20
Sodium <1340 mEq/L	+20
Glucose ≥13.9 mmol/L	+10
Hematocrit <30%	+10
PO_2 <60 mmHg	+10
Pleural effusion	+10

RISK	GROUP	BASED ON	MORTALITY	TREATMENT
Low	I	Algorithm	0.1%	Outpatient (B-II)
Low	II	≤70 points	0.6%	Outpatient (B-II)
Low	III	71-90 points	2.8%	Individualized (C-III)
Moderate	IV	91-130 points	8.2%	Hospital (A-II)
High	V	>130 points	29.2%	Hospital / ICU (A-II)

CURB65

Simpler severity of illness score that assigns one point to each of the following:

C= confusion
R=Respiratory rate ≥30 rpm
U= Blood urea nitrogen (over 7 mmol/L)
B= Sistolic blood pressure <90 mmHg or diastolic BP ≤60 mmHg.
65=Age ≥65 years old.



Box 2 CURB65 score for mortality risk assessment in hospital[11]

CURB65 score is calculated by giving 1 point for each of the following prognostic features:

- Confusion (abbreviated mental test score 8 or less or new disorientation in person, place, or time)*
- Raised blood urea nitrogen (over 7 mmol/L)
- Raised respiratory rate (30 breaths per minute or more)
- Low blood pressure (diastolic 60 mm Hg or less, or systolic less than 90 mm Hg)
- Age 65 years or more

Patients are stratified for risk of death as follows:

- 0 or 1=low risk (less than 3% mortality risk)
- 2=intermediate risk (3 to 15% mortality risk)
- 3 to 5=high risk (more than 15% mortality risk)

Eccles Nice CAP guidelines. BMJ 2014

CRB65

Box 1 CRB65 score for mortality risk assessment in primary care[11]

CRB65 score is calculated by giving 1 point for each of the following prognostic features:

- Confusion (abbreviated mental test score 8 or less or new disorientation in person, place, or time)*
- Raised respiratory rate (30 breaths per minute or more)
- Low blood pressure (diastolic 60 mm Hg or less, or systolic less than 90 mm Hg)
- Age 65 years or more

Patients are stratified for risk of death as follows:

- 0=low risk (less than 1% mortality risk)
- 1 or 2=intermediate risk (1 to 10% mortality risk)
- 3 or 4=high risk (more than 10% mortality risk)

*For guidance on delirium, please refer to National Institute for Health and Care Excellence. De

Eccles Nice CAP guidelines. BMJ 2014

Imagine now this patient with this data

- 32 years old
- No significant co-morbidities
- HR 105 spm
- RR 40 rpm
- BP 100/60 mm Hg.
- Normal blood test
- Sat O_2 90%
- Lobar infiltrate

Where would you treat him?

1. At home, CURB 65=1
2. At home, PSI class II
3. The patient is hypoxemic, therefore he should be treated at the hospital

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How can I decide where to treat a patient with CAP?

Site of care election is a 3 steps process:

1. **. PSI-CURB-CRB65**
2. **Consider situations that may compromise outpatient therapy**
   - Impossible oral intake
   - Lack of psyco-social support
   - Empyema, lung abscess, metastatic infection
   - High risk pathogens (*S. aureus,* anaerobes, GNB)
   - Severity
3. **Common sense. Clinical judgement**

Severity criteria

- **RR >30 rpm** at admission
- PaO_2/FiO_2 <250 mm Hg
- Need for **mechanical ventilation**
- **Bilateral.**
- Involvement > 2 lobes.
- Infiltrate **increase > 50%** without clinical response to treatment
- Systolic BP < 90 mm Hg or diastolic BP < 60 mm Hg.
- Need for vasopressor treatment during > 4 hours (**septic shock**).
- **Serum creatinine > 2 mg/dL** or increase > 2 mg/dL, hemodialysis.

Mandell A IDSA. CID 2007, Eccles Nice BMJ 2014, Woodhead ERJ-ESCMID Clin Microbiol Infect 2011, Pachon SAEI Enf Infec Microbiol Clin 2009

Consider my first patient (without respiratory failure)

Would you offer microbiological tests?

1. Yes, blood cultures
2. Yes, pneumococcus urinary antigen test
3. Yes influenza RT-PCR in nasopharyngeal swabs
4. All are true
5. All are incorrect

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Etiologic diagnosis.

When and what?

Clues

In patients **not requiring hospital admission** microbiological tests are not needed, except for **epidemiological reasons** or if an **uncommon etiology** is suspected, as in most cases the empirical antibiotic therapy is effective.

In patients that require hospital admission, diagnostic tests will be performed within the first 4 hours.

Etiological diagnosis. Clinical indications

Table 5. Clinical indications for more extensive diagnostic testing.

Indication	Blood culture	Sputum culture	*Legionella* UAT	Pneumococcal UAT	Other
Intensive care unit admission	X	X	X	X	X[a]
Failure of outpatient antibiotic therapy		X	X	X	
Cavitary infiltrates	X	X			X[b]
Leukopenia	X			X	
Active alcohol abuse	X	X	X	X	
Chronic severe liver disease	X			X	
Severe obstructive/structural lung disease		X			
Asplenia (anatomic or functional)	X			X	
Recent travel (within past 2 weeks)			X		X[c]
Positive *Legionella* UAT result		X[d]	NA		
Positive pneumococcal UAT result	X	X		NA	
Pleural effusion	X	X	X	X	X[e]

IDSA/ATS 2007 Guidelines

What is your treatment recommendation in a patient with CAP?

1. Start antimicrobial therapy as soon as the patient is diagnosed
2. Wait until the patient has fever, then take blood cultures and start antimicrobial therapy
3. It is night, so start antibiotics in the morning
4. It will depend on the severity of the CAP

What is your treatment recommendation in a patient with CAP?

1. **Start antimicrobial therapy as soon as the patient is diagnosed**
2. Wait until the patient has fever, take blood cultures and start antiviral therapy
3. It is night, so start antibiotics in the morning
4. It will depend on the severity of the CAP

When should antimicrobial therapy be administered in patients with CAP?

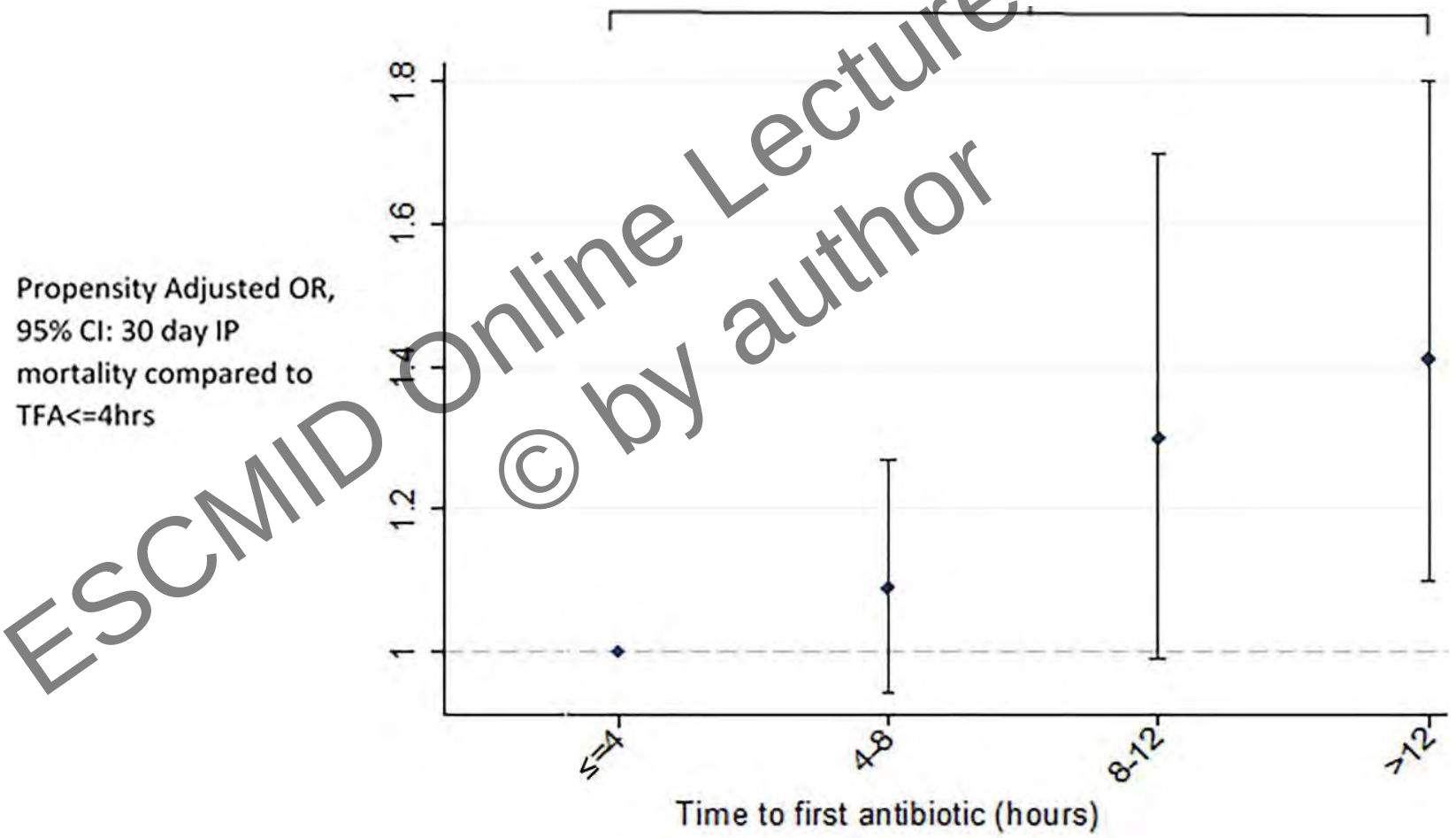
It is the only respiratory tract infection that a delay in the onset of antibiotic therapy determines an increase in mortality

If treatment is started **BEFORE 4 hours** following diagnosis:

- Reduce mortality 15-17%.
- Shorter hospital stay.
- Independient of severity.

Daniel Thorax 2016, Houck et al. Arch Intern Med 2004.

Time to first antibiotic and 30 days mortality



Daniel Thorax 2016

What antimicrobial empirical therapy would you recommend?

- 1. A macrolide
- 2. Amoxicillin
- 3. Amoxicillin-clavulanate
- 4. Meropenem
- 5. Levofloxacin

What antimicrobial empirical therapy would you recommend?

- 1. A macrolide
- 2. **Amoxicillin**
- 3. Amoxicillin-clavulanate
- 4. Meropenem
- 5. Levofloxacin

Antimicrobial therapy in CAP

Antimicrobial therapy

Consider the most frequent etiologies

- Clinical findings and epidemiological data.
- Antimicrobial resistance.
  - Prevalent pathogens.
  - *Streptococcus pneumoniae*
- PK/PD.

Consider the host

Consider the severity

Etiology of CAP requiring hospital admission

TABLE 2. Characteristics of 4558 patients with community-acquired pneumonia divided by study period

Variable	1995–99 (*n* = 1121)	2000–04 (*n* = 1064)	2005–09 (*n* = 1634)	2010–14 (*n* = 739)
Aetiology, (%)				
Streptococcus pneumoniae	23.5	29.5	44.5	31.8
Pneumococcal bacteraemia	10.1	8.6	10.9	8.3
Legionella pneumophila	6.6	7.7	3.9	2.4
Haemophilus influenzae	6.2	6.6	3.8	4.7
Aspiration pneumonia	7.0	6.6	8.1	7.2
Atypical agents	5.6	4.8	2.9	3.8
Gram-negative bacilli[b]	1.3	1.5	1.7	2.7
Virus	1.3	1.1	4.5	6.1
Mixed pathogens	3.5	2.4	5.0	5.5
Unknown aetiology	49.3	43.0	31.9	39.8
Treatment, (%)				

The most frequent etiology is *Streptococcus pneumoniae*

Viasus Clin Microbiol Infect 2016

Table 2. Pathogen Detection in Patients With Community-Acquired Pneumonia Using Molecular Methods (n = 323)

Pathogen	N (%)
Bacteria	
Any bacteria	262 (81.1)
With $\geq 10^5$ CFU/mL cutoff where quantified	231 (71.5)
Haemophilus influenzae	130 (40.2)
Streptococcus pneumoniae	115 (35.6)
Moraxella catarrhalis	44 (13.6)
Escherichia coli	37 (11.5)
Staphylococcus aureus	33 (10.2)
Klebsiella pneumoniae	13 (4.0)
Pseudomonas aeruginosa	9 (2.8)
Mycoplasma pneumoniae	6 (1.9)
Acinetobacter baumannii	3 (0.9)
Legionella pneumophila	3 (0.9)
Non-*pneumophila Legionella* spp.	3 (0.9)
Chlamydophila psittaci	2 (0.6)
Chlamydophila pneumoniae	0 (0)
Virus	
Any virus	98 (30.3)
Rhinovirus	41 (12.7)
Influenza	23 (7.1)
A	16 (5.0)
B	7 (2.2)
Parainfluenza virus	11 (3.4)
PIV-1	3 (0.9)
PIV-2	6 (1.9)
PIV-3	2 (0.6)
Coronavirus	9 (2.8)
HCoV-OC43	6 (1.9)
HCoV-NL63	2 (0.6)
HCoV-229E	1 (0.3)
HCoV-HKU1	0 (0)
Adenovirus	7 (2.2)
Respiratory syncytial virus	4 (1.2)
Human metapneumovirus	3 (0.9)
Any pathogen[a]	280 (86.7)
With $>10^5$ CFU/mL cutoff for bacteria where quantified	263 (81.1)

- *S. pneumoniae* - *H. influenzae* most common
- Only sputum (96%)
- Few atypical etiologies
- Less expectoration
- Increase diagnosis 39 to 87%

Gadsby Clin Infect Dis 2016

CAP. Less frequent etiologies risk factors

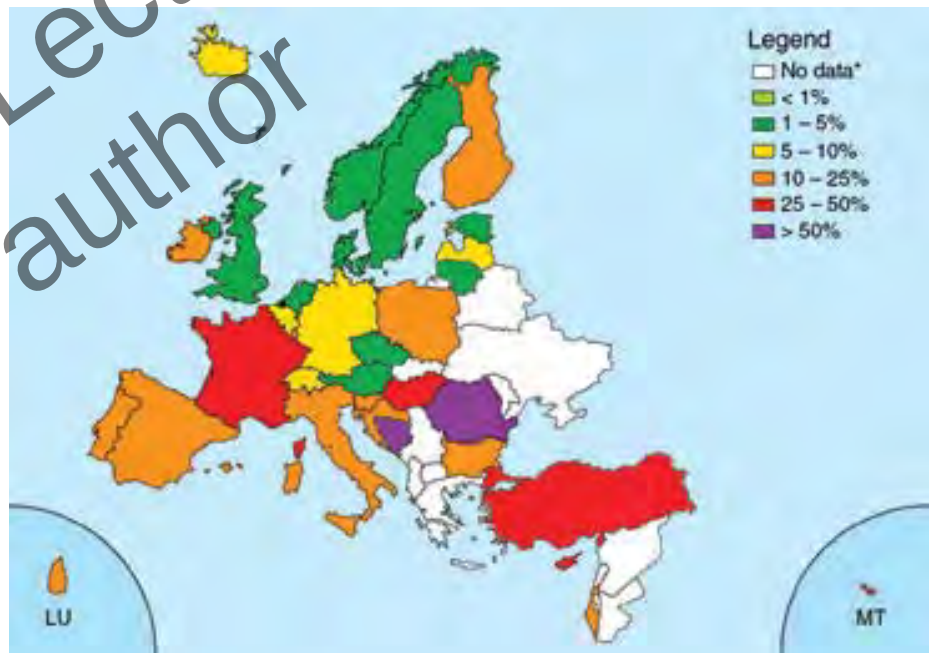
MICROORGANISM	Advanced age	C.O.P.D. /smoking	D.M.	Alcoholism	I.D.	Previous virosis
S. aureus	Yes	Yes/	Yes		Yes	Yes
Streptococcus spp.	Yes	Yes/	Yes			Yes
C. pseudodiphteriticum	Yes	Yes/	Yes		Yes	
L. monocytogenes	Yes				Yes	
M. catarrhalis	Yes	Yes/			Yes	
Klebsiella spp.		Yes/Yes	Yes	Yes	Yes	
E. coli		Yes/	Yes	Yes		
Acinetobacter spp.	Yes	Yes/Yes	Yes	Yes		
P. aeruginosa		Yes/				

C.O.L.D.: chronic obstructive lung disease
D.M.: diabetes mellitus
I.D.: immunodeficiencies

Streptococcus pneumoniae

- Penicillin resistance of invasive *S. pneumoniae* strains changed from 18.6% in the first period to 8.2% in the last period
- Amoxicillin is the most active oral betalactam
- Susceptibility to cephalosporins and quinolones did not show major changes

Streptococcus pneumoniae: proportion of invasive isolates non-susceptible to penicillin (PNSP) in 2008.



Viasus Clin Microbiol Infect 2016

Would you consider the use of a macrolide as monotherapy?

- 1. Yes
- 2. No
- 3. It depends on the local epidemiology

Would you consider the use of a macrolide as monotherapy?

- 1. Yes
- 2. No
- 3. **It depends on the local epidemiology**

Macrolides

Mechanisms of resistance.

- Target-site modification: the most common, encoded by **ermB**.
  - **High level of resistance** (MIC>128)
  - Europe
  - MLSB phenotype (macrolide, lincosamide, steptogramin)
- Efflux of the drug out of the cell: encoded by **mef(A)**
  - **Low level of resistance** (MIC 1-64)
  - North America
  - M phenotype, remains susceptible to clindamycin
- Macrolide resistance among pneumococci, including M phenotype, is a **cause of failure** of outpatient pneumonia therapy
  - Breakthrough bacteremia 24% of pneumococcal bacteremia treated with macrolides

Johnston NJ. Antimicrob Agents Chemother 1998, Farrell DJ Antimicrob Agents Chemother 2003; Lonks Clin Infect Dis 2002, Daneman Clin Infect Dis 2006.

Streptococcus pnemoniae susceptibility

Antibiotic	MIC (μg/ml)		CLSI susceptibility[b] (% of isolates)			PK/PD	
	50%	90%	Susceptible	Intermediate	Resistant	Susceptibility (% of isolates)	Breakpoint (μg/ml)
Penicillin (O)	≤0.015	0.5	77.1	22.0	0.9	NA	
Penicillin (P)	≤0.015	0.5	99.8	0.2	0.0	NA	
Ampicillin	≤0.015	2	NA	NA	NA	93.4	≤2
Amoxicillin-clavulanate	≤0.015	1	94.8	4.0	1.2	94.8	≤2
Amoxicillin-clavulanate[c]			NA	NA	NA	98.8	≤4
Cefuroxime (P)	≤0.015	1	83.8	10.7	5.5	99.3	≤4
Cefuroxime (O)	≤0.015	1	94.5	4.3	1.3	94.5	≤1
Cefaclor	0.125	16	79.1	2.0	19.0	75.9	≤0.5
Cefditoren	≤0.015	0.125	NA	NA	NA	94.9	≤0.12
Cefotaxime	≤0.015	0.25	99.6	0.2	0.2	99.6	≤2
Erythromycin	≤0.015	≥128	78.9	0.0	21.1	78.9	≤0.25
Clarithromycin	≤0.015	≥128	78.2	0.9	20.9	78.2	≤0.25
Azithromycin	≤0.015	≥128	77.6	1.6	20.8	74.3	≤0.12
Ciprofloxacin	0.25	0.5	NA	NA	2.2[d]	97.0	≤1
Levofloxacin	0.125	0.25	97.6	1.9	0.5	97.7	≤2

Macrolides in monotherapy are not recommended in CAP, except in nonsevere cases with atipical etiology suspicion

Pérez-Trallero Antimicrob Agents Chemother 2010

CASE 2. 42 years old male

- Male, 42 years old. Heavy smoker
- Symptoms and signs: same as in Case 1

The treatment and site of care of this patient would be:

1. At home, and amoxicillin
2. At home and a macrolide
3. At home and a quinolone
4. At home and amoxicillin-clavulanate

CASE 2

- Male, 42 years old. Heavy smoker
- Symptoms and signs: same as in Case 1
- PSI risk-class I CRB 65 0

OUTPATIENT

S. pneumoniae

Haemophilus influenzae, Moraxella catarrhalis

Amoxicillin-clavulanate (875-125 mg/8h vo)

Case 3. 56 years old female

- Hypertension
- Four day ago: fever with chills, productive cough, pleuritic chest pain
  Today: dyspnea and confusion
- 39,9ºC, poorly perfused, stuporous , BP 80/40 mm Hg , HR 100 spm, RR 50 rpm, Sat O_2 85%. Hypoventilation and bilateral crackles. Abdomen and limbs normal

- Laboratory tests: leucocytes 43000/µl, (86% PMN), HB 9.4 g/l, platelets 555000/µl. Na 129 meq/l, pH 7.30, creatinine 2.2 mg/dl, glucose 110 mg/dl

Case 3

The site of care and the treatment this patient would be:

1. A medical ward and meropenem
2. The ICU and ceftriaxone and azitromicin
3. A medical ward and ceftriaxone
4. The ICU and a macrolide
5. The ICU and levofloxacin

Case 3

The site of care and the treatment this patient would be:

1. A medical ward and meropenem
2. **The ICU and ceftriaxone and azitromicin**
3. A medical ward and ceftriaxone
4. The ICU and a macrolide
5. The ICU and levofloxacin

Combination therapy in patients with CAP

Table 1 Multivariate analyses of the association between antibiotic therapy and clinical outcomes

Outcome measures	Total (n=5240)	β-lactam therapy (n=2001)	β-lactam/ macrolide combination therapy (n=3239)	Adjusted OR (95% CI)	p Value
30 day IP death rate	1281 (24.4)	536 (26.8)	745 (23.0)	0.72 (0.60 to 0.85)*	<0.001
ICU admission	419 (8)	136 (6.8)	282 (8.7)	0.94 (0.72 to 1.22)†	0.635
Need for MV	151 (2.9)	58 (2.9)	93 (2.9)	0.99 (0.71 to 1.38)†	0.508
Need for INS	130 (2.5)	42 (2.1)	88 (2.7)	0.87 (0.55 to 1.38)†	0.544
30-day IP death rate stratified by pneumonia severity					
Low severity (CURB65=0–1)	201/2247 (8.9)	95/908 (10.5)	106/1339 (7.9)	0.80 (0.56 to 1.16)‡	0.238
Moderate severity (CURB65=2)	370/1480 (25)	171/561 (30.5)	199/919 (21.7)	0.54 (0.41 to 0.72)‡	<0.001
High severity (CURB65≥3)	710/1513 (46.9)	270/532 (50.8)	440/981 (44.9)	0.76 (0.60 to 0.96)‡	0.025

N=5240

Combination therapy reduce mortality in moderate-severe cases

Rodrigo Thorax 2013

Combination therapy in CAP

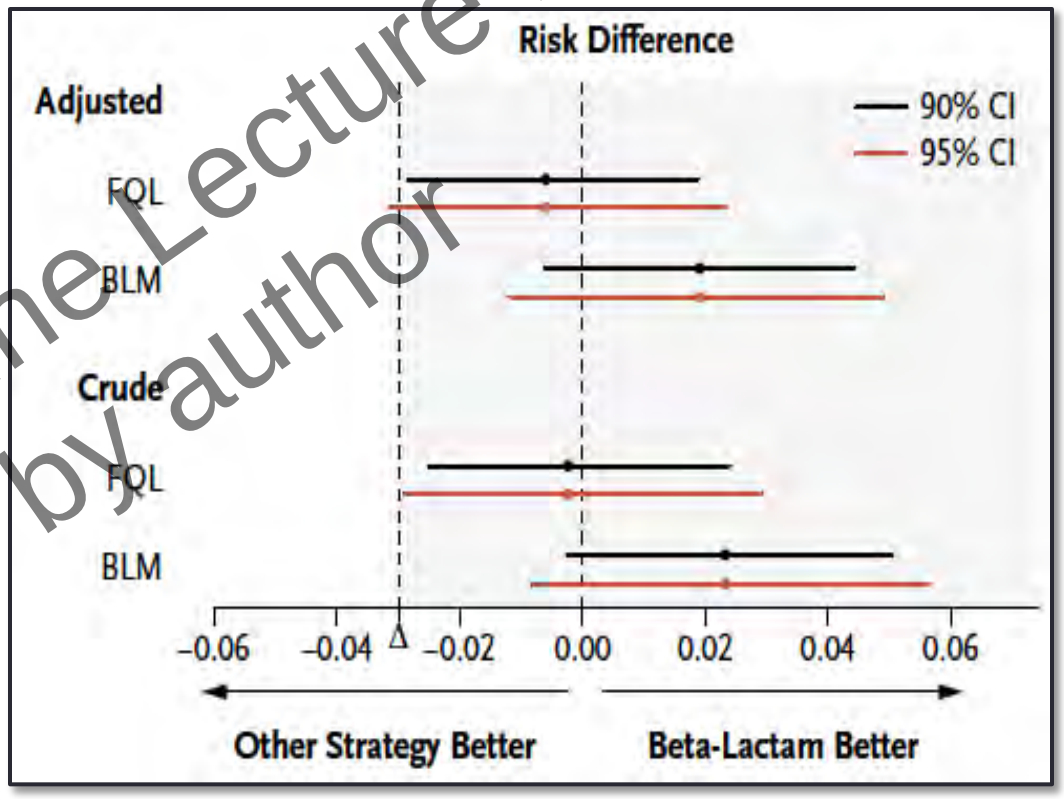
- The combination / **macrolide or betalactam** / **quinolone -betalactam** :
  - Increase spectrum for atypical organisms
  - Possible synergistic effect on pneumococcus :
    - Improves the prognosis of pneumococcal bacteremia *
    - Improves prognosis of severe pneumonia (patients in ICU) **

Combination therapy is recommended in **moderate-severe CAP,** in cases without microbiological diagnosis and not clear typical-atypical manifestations, and in bacteremic pneumococcal CAP.

*Baddour Am J Respir Crit Care Med 2004 **Lerroy Chest 2001, Rodrigo Chest 2013

In hospitalized patients with non severe CAP. Is combination therapy necessary?

In non-ICU hospitalized patients, a **betalactam** monotherapy had the same 90 days mortality than a **quinolone monotherapy** or **betalactam-macrolide combination.**



Postma *et al*. NEJM 2015

CASE 3

- CURB65 4. PSI: class V (196 points)

S. pneumoniae, Legionella pneumophila
H. influenzae, Staphylococcus spp.
Enterobacteriaceae

Ceftriaxone or cefotaxime
Plus
a macrolide or quinolone

It is February and case 3 comes to our clinic

- Would you change your recommendations?

1. Yes
2. No

It is February and case 3 comes to our clinic

- Would you change your recommendations?

1. **Yes**
2. No

Influenza virus therapy

- During influeza season, influenza is one of **the most common** etiologies of pneumonia (35% of the cases)
- Treatment with **oseltamivir** is highly **effective** (reduction of mortality) in patients with influenza pneumonia
- The benefit is higher if started **within the first 48 hours**
- Coinfection (bacterial-virus) is not uncommon

It is recommended to add **antiviral therapy**, at least in patients with **severe CAP** or with **comorbidities** during influeza season.

Skarbinski Clin Infect Dis 2011; http://www.cdc.gov/flu/professionals/antivirals/index.htm, Gutierrez-Pizarraya J Infect 2012

CASE 3. February

- CURB65 4. PSI: class V (196 points)

S. pneumoniae, Legionella pneumophila
H. influenzae, Staphylococcus spp.
Enterobacteriaceae
Influenza

Ceftriaxone or cefotaxime
plus
Macrolide or quinolone
plus
Oseltamivir

Non antimicrobial therapy

- Early resuscitation
- Pulse oximetry monitoring If $sat0_2 < 92\ \%$
- Oxygen therapy : if $sat0_2 < 92\ \%$ or tachypnea
- ICU admission in case of respiratory failure , septic shock or multiple organ failure
- In case of complicated pleural effusion tube placement for drainage
- Prophylaxis of deep vein thrombosis in all patients with reduced mobility
- Early mobilization in the first 24 hours (at least 20 minutes a day)
- Proper nutrition
- Analgesia and antipirexia
- Adequate hydration

How long would you treat a patient with CAP?

1. 10 days always
2. 5 days always
3. 5 days in a non-severe CAP
4. 10 days in severe CAP
5. 3 and 4 are correct

How long would you treat a patient with CAP?

1. 10 days always
2. 5 days always
3. 5 days in a non-severe CAP
4. 10 days in severe CAP
5. **3 and 4 are correct**

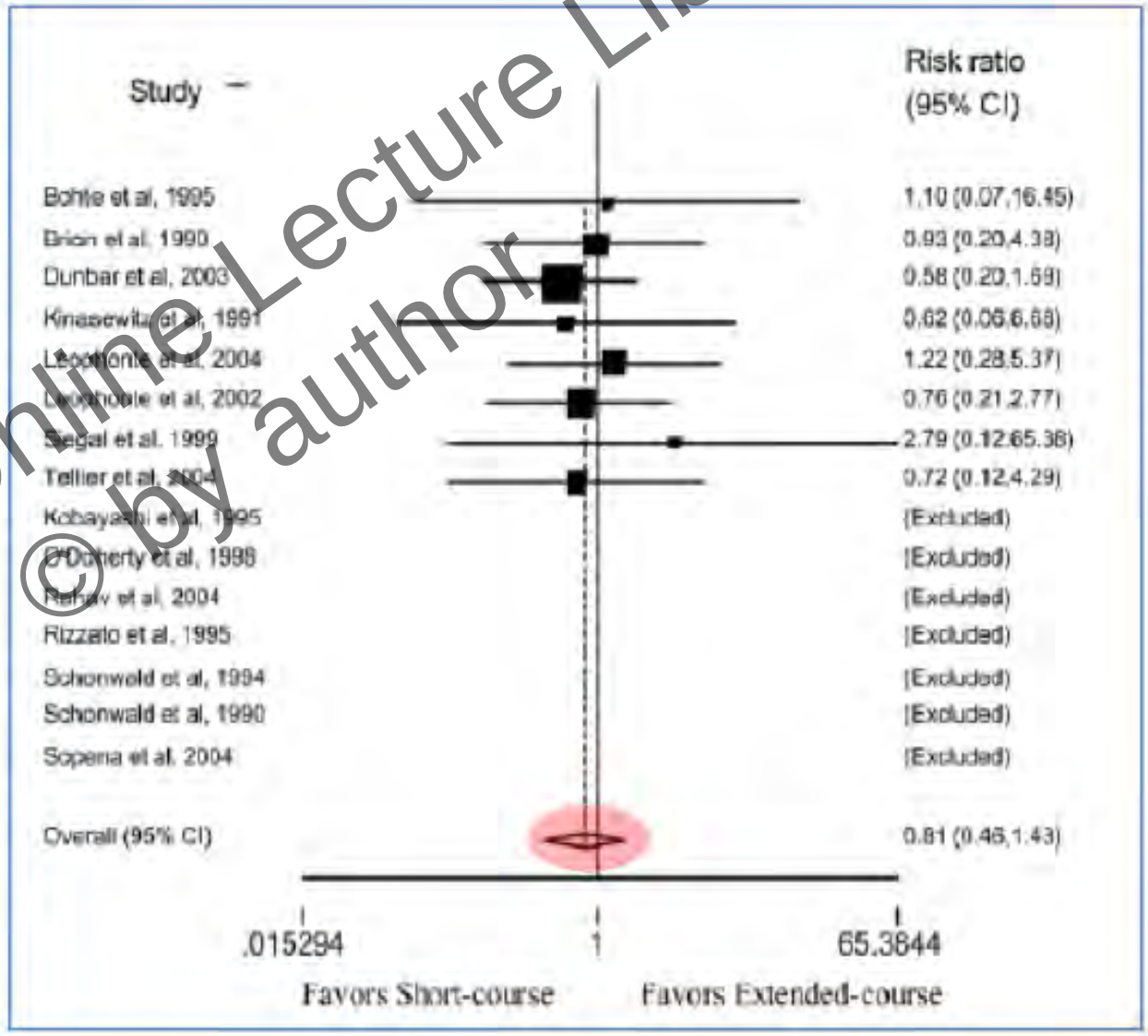
How long would you treat him?

Li, Am J Med 2007;120(9):783-90

Meta-analysis.

Short (3-7 days) vs. Prolonged (10-14 d)

No differences in clinical, microbiological cure and survival



Duration of treatment.

- Low severity community acquired pneumonia:
  - Offer **a five day course** of a single antibiotic to patients
  - Consider **extending the course** of the antibiotic for longer than five days as a possible management strategy for patients whose **symptoms do not improve as expected after three days**

Eccles BMJ 2014

Duration of treatment

- Moderate and high severity community acquired pneumonia:
  - Consider a **seven to 10 day** course of antibiotic therapy for patients with moderate or high severity community acquired

Eccles BMJ 2014

Clues for CAP follow up

CAP with outpatient treatment

Patients should be reevaluated 48-72 hours after the diagnosis

Explain that they should seek further medical advice if:

- Symptoms do not begin to improve within three days or earlier if their symptoms are worsening
- Oral intake compromised
- Dyspnea
- Confusion

CAP treated at the hospital

Most patients are clinically stable by day 3-5

Response to treatment is mainly based on clinical variables:

- Temperature, respiratory rate, blood pressure

When should I repeat the X radiograph?

When should I repeat the X radiograph?

- **In case of favorable response, it is not necessary to repeat the radiography after 72 hours** of treatment
- If favorable response, a progression of the infiltrates has not any impact on the outcome
- In general, a radiography will be performed **at the end of treatment** and **one month after the initiation of therapy** (if previous uncomplete resolution)

- **In case of non favorable response**
  - Resolution of the infiltrate may be slower in severe CAP, in this situation, the control will be repeated periodically until resolution is complete
  - The patient should be sent to his referral hospital to be evaluated the same day
  - Reevaluated clinically
  - New radiological techniques (chest radiography and/or CT)
  - Fiberbronchoscopy and/or transthoracic pulmonary aspiration

Some ideas to take home

1. Patients with **CRB65≥ 1** should be evaluted at the **hospital** and all patients with **severity criteria should be admitted**

2. In general, only patients requiring **admission**, those with **unfavorable response** and those with suspicion of **unusual etiologies** require **microbiological tests**

3. **Antibiotic treatment is urgent**, so it should be started within the first **4 hours of diagnosis** in non-critically ill patients and within the **first hour** in critically ill patients

4. The choice of antibiotic treatment will be based on the expected etiology, clinical features, patients characteristics and severity

5. During influenza epidemic period, **oseltamivir** should be considered as empiric treatment of CAP

6. **48-72 hours** after initiation of antibiotic treatment the patient should be evaluated medically

Some changes to make

1. **Complementary studies** (except thorax radiography) are **NOT** needed in non-severe CAP

2. **Macrolides monotherapy should NOT** be used as treatment of CAP, with the exception of nonsevere cases sugestive of atypical etiology

3. **Not all CAP requiring hospital admission need combination therapy.** Only severe cases and/or doubts of typical/atypical etiology

4. In case of favorable response, CAP does not need more than **5 days** of treatment