



ΕΘΝΙΚΟ & ΚΑΠΟΔΙΣΤΡΙΑΚΟ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ



Α' ΚΛΙΝΙΚΗ ΕΝΤΑΤΙΚΗΣ ΘΕΡΑΠΕΙΑΣ Ε.Κ.Π.Α.
Γ.Ν. Ο ΕΥΑΓΓΕΛΙΣΜΟΣ

1^ο

ΕΚΠΑΙΔΕΥΤΙΚΟ ΣΥΜΠΟΣΙΟ
Α' ΚΛΙΝΙΚΗΣ ΕΝΤΑΤΙΚΗΣ ΘΕΡΑΠΕΙΑΣ
ΙΑΤΡΙΚΗΣ ΣΧΟΛΗΣ ΕΚΠΑ

ΕΠΕΙΓΟΝΤΑ ΣΤΗΝ ΠΝΕΥΜΟΝΟΛΟΓΙΑ

26-27 Μαΐου 2017

Δώμα, Γ.Ν. «Ο Ευαγγελισμός», Αθήνα



ΠΝΕΥΜΟΝΙΑ στο ΤΕΠ

Μαρκοζάννης Ευάγγελος

Επιμ. Α' ΑΠΠ "ΣΩΤΗΡΙΑ"

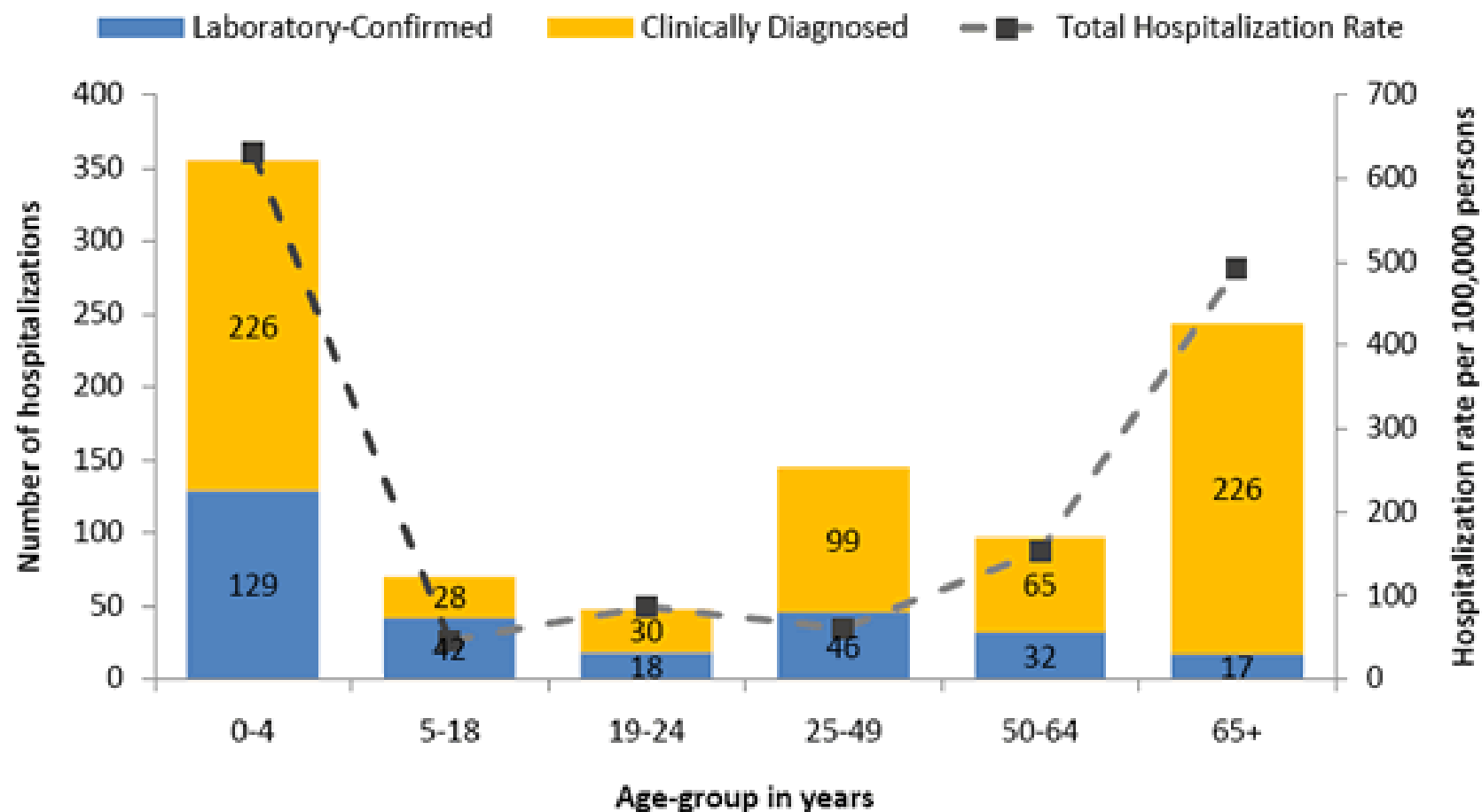
1ο Εκπαιδευτικό Συμπόσιο
με θέμα «**Επείγοντα στην Πνευμονολογία**»
Α' Κλινική Εντατικής Θεραπείας ΕΚΠΑ, Γ.Ν.Α. «Ο Ευαγγελισμός»
26-27 Μαΐου 2017

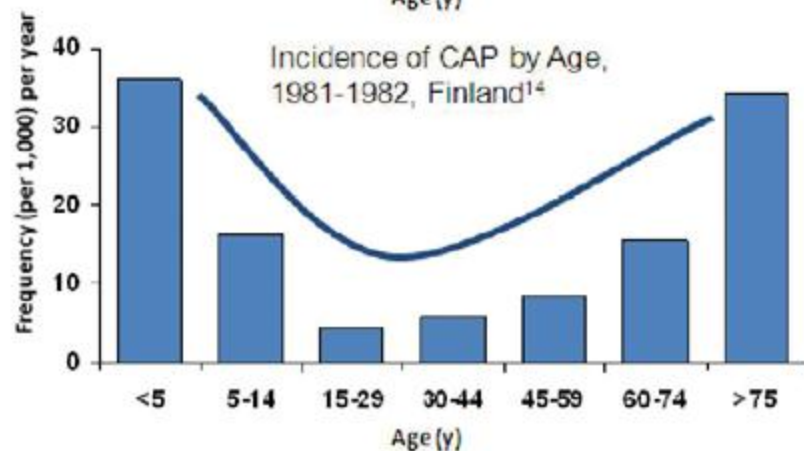
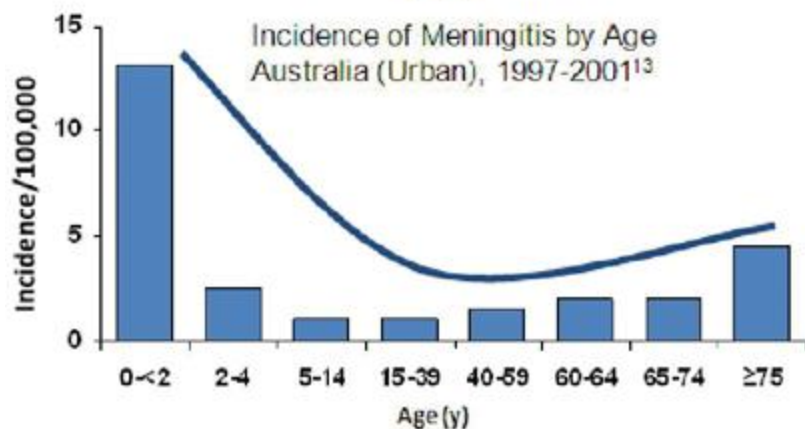
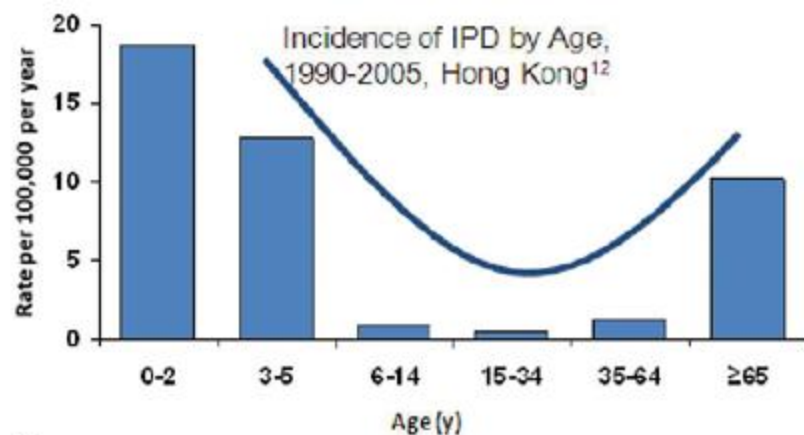
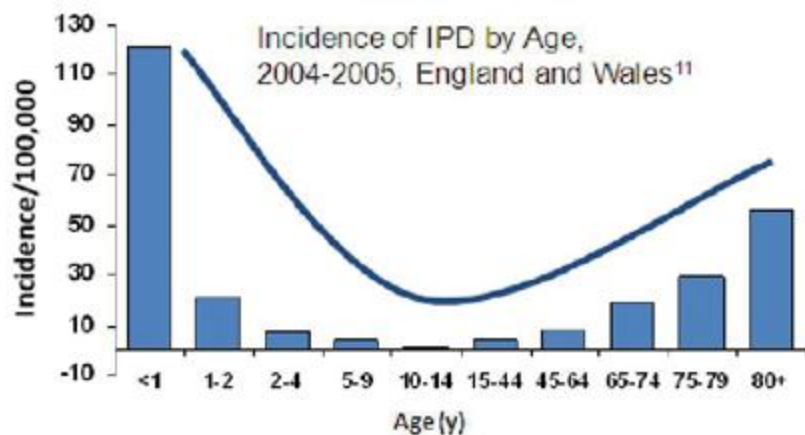


**Δεν υπάρχει σύγκρουση
συμφερόντων με
τις παρακάτω
χορηγούς εταιρείες:**

ASPEN
ASTRAZENECA
BAYER
CHIESI
ELPEN
GLAXOSMITHKLINE
MENARINI HELLAS
NOVARTIS
PFIZER

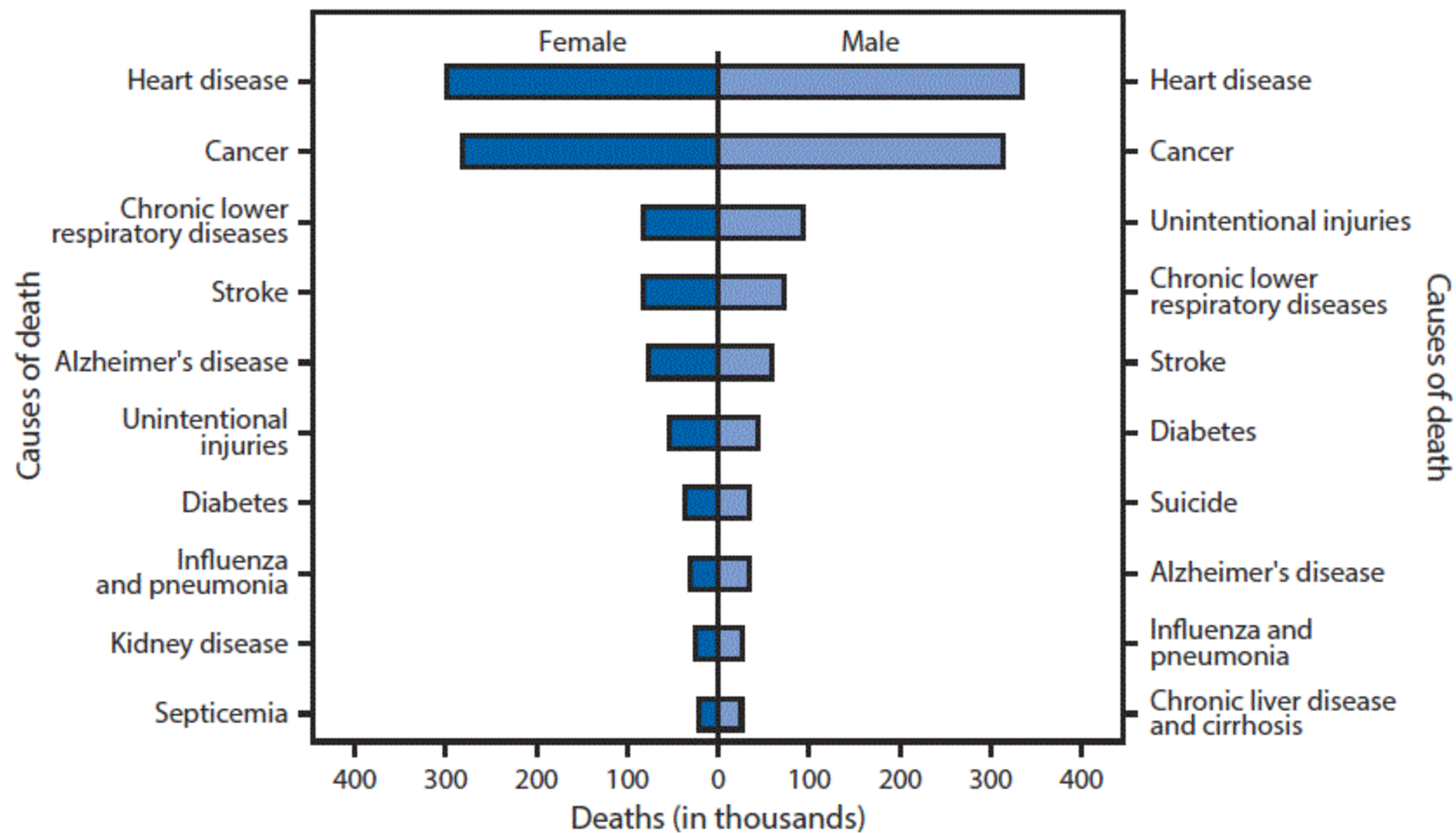
Hospitalizations (n=1057) for Pneumonia and Influenza by Age-Group from September 1, 2009 through April 3, 2010





IPD=Invasive pneumococcal disease. CAP=community-acquired pneumonia.

Fig. 2: Incidence of IPD and Community Acquired Pneumonia (CAP) by age across various regions



6^η αιτία θανάτου

1^η αιτία θανάτου από τα λοιμώδη νοσήματα

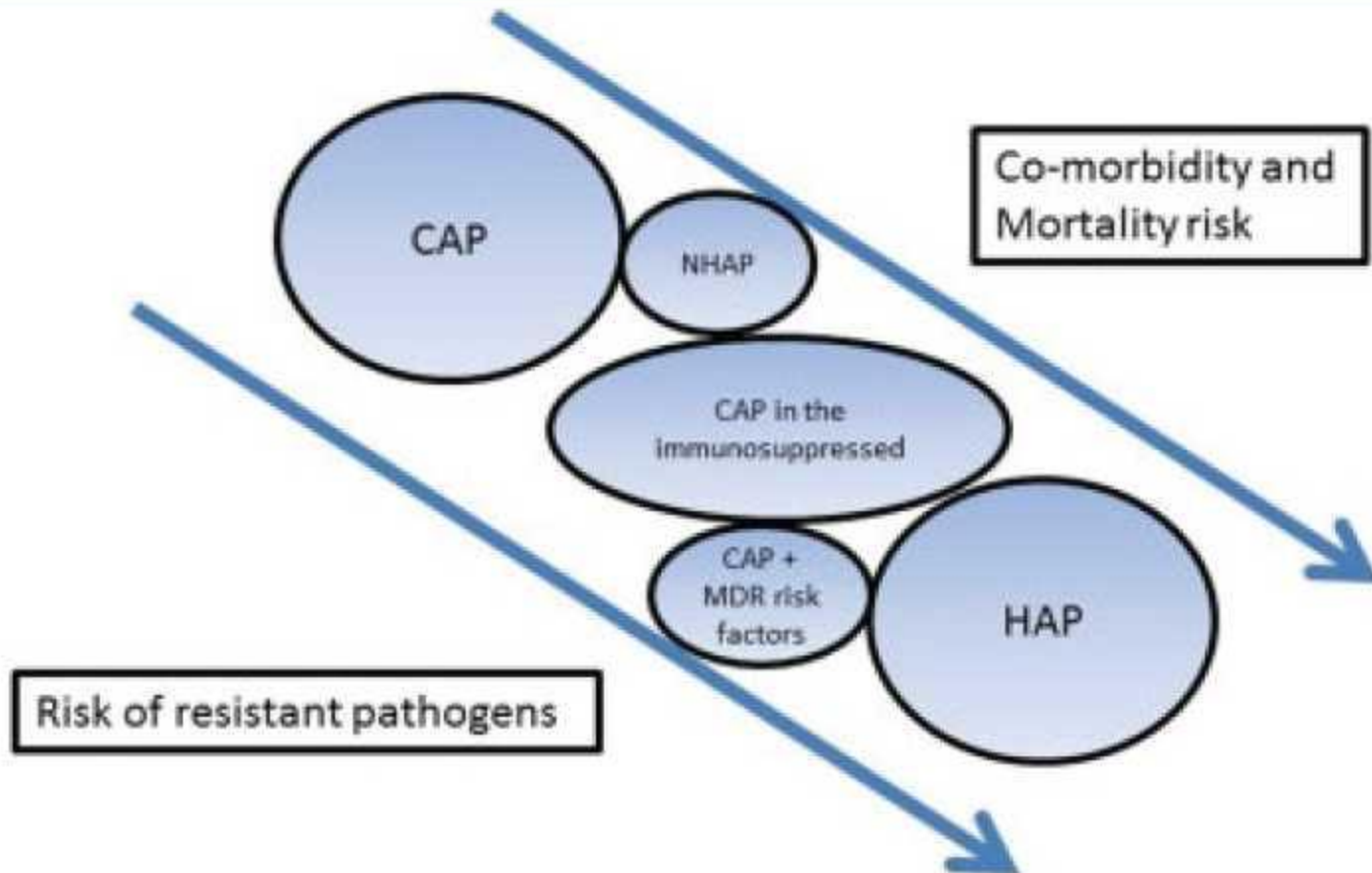
2-24% CAP χρήζει ICU

1% θνητότητα εξωνοσοκομειακά

5-15% σε νοσηλευόμενους

>25% θνητότητα σε ICU

Classification	Criteria
Community-acquired pneumonia	Acute pulmonary infection in a patient who is not hospitalized or residing in a long-term care facility 14 or more days before presentation
Hospital-acquired pneumonia	New infection occurring 48 or more hours after admission
Ventilator-acquired pneumonia	New infection occurring 48 or more hours after endotracheal intubation
Health care-associated pneumonia	Patients hospitalized for 2 or more days within the past 90 d Nursing home/long-term care residents Patients receiving home IV antibiotic therapy Dialysis patients Patients receiving chronic wound care Patients receiving chemotherapy Immunocompromised patients



Community-Acquired Pneumonia (CAP)

Definition

- ◆ Acute infection of pulmonary parenchyma
- ◆ Symptoms of acute infection
 - Respiratory or general
 - May be less prominent in the elderly
- ◆ Acute infiltrate on chest x-ray
- ◆ Clinical findings such as localized rales
- ◆ No hospitalization within previous 14 days
- ◆ Excludes residents in long-term care facilities

Πνευμονία στο ΤΕΠ

- Υποστήριξη (αιμοδυναμική / αναπνευστική)
- Εκτίμηση σοβαρότητας
- Αντιβιοτικά
- Νοσηλεία (?)

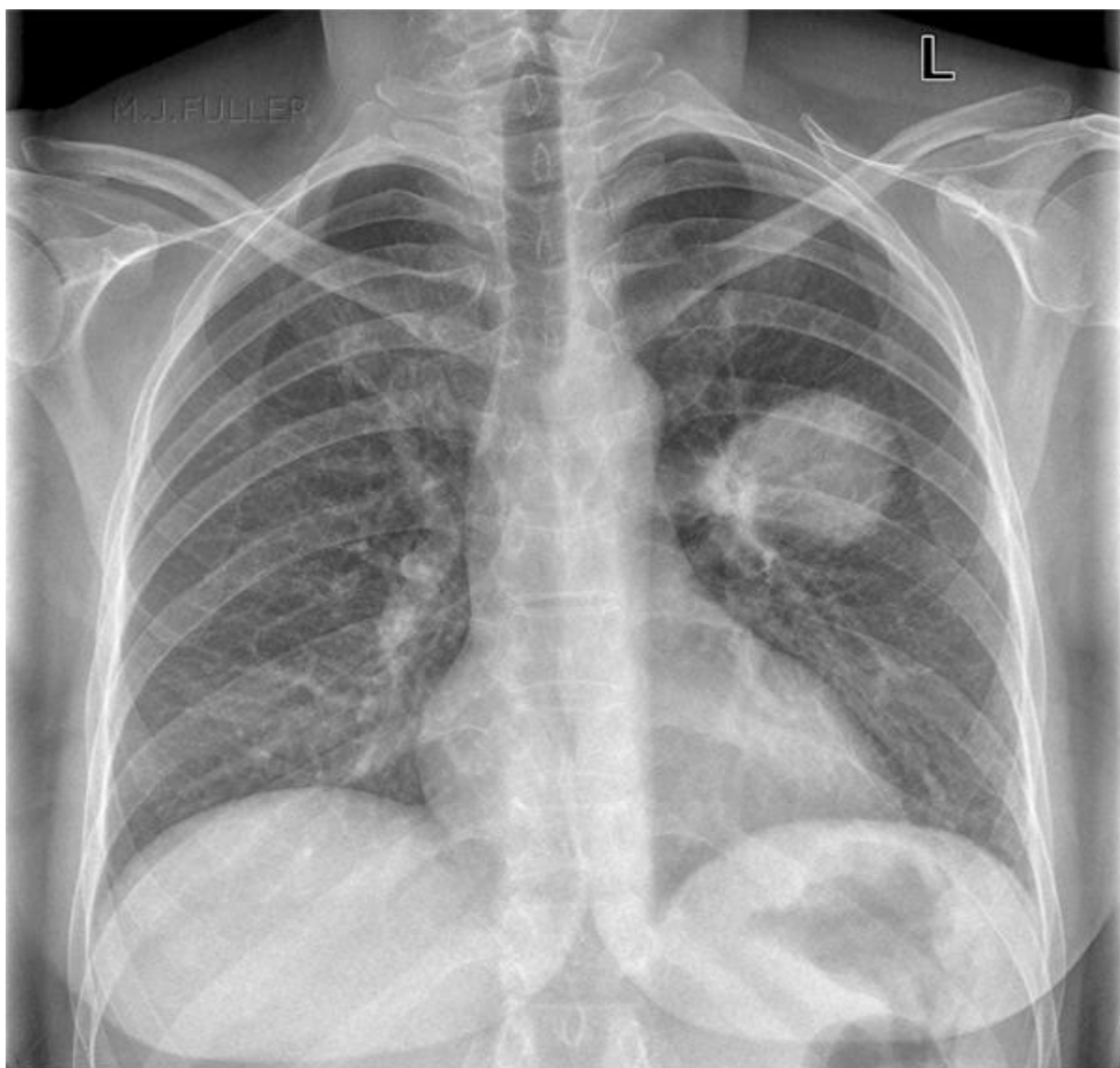
Διαγνωστικά

- Ιστορικό
- Φυσική εξέταση
- Οξυμετρία
- Απεικόνιση

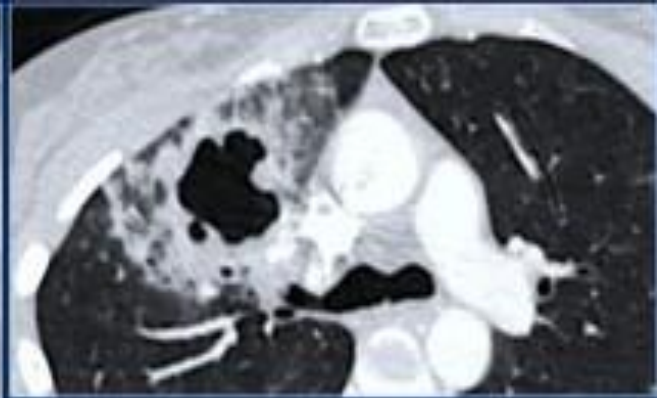




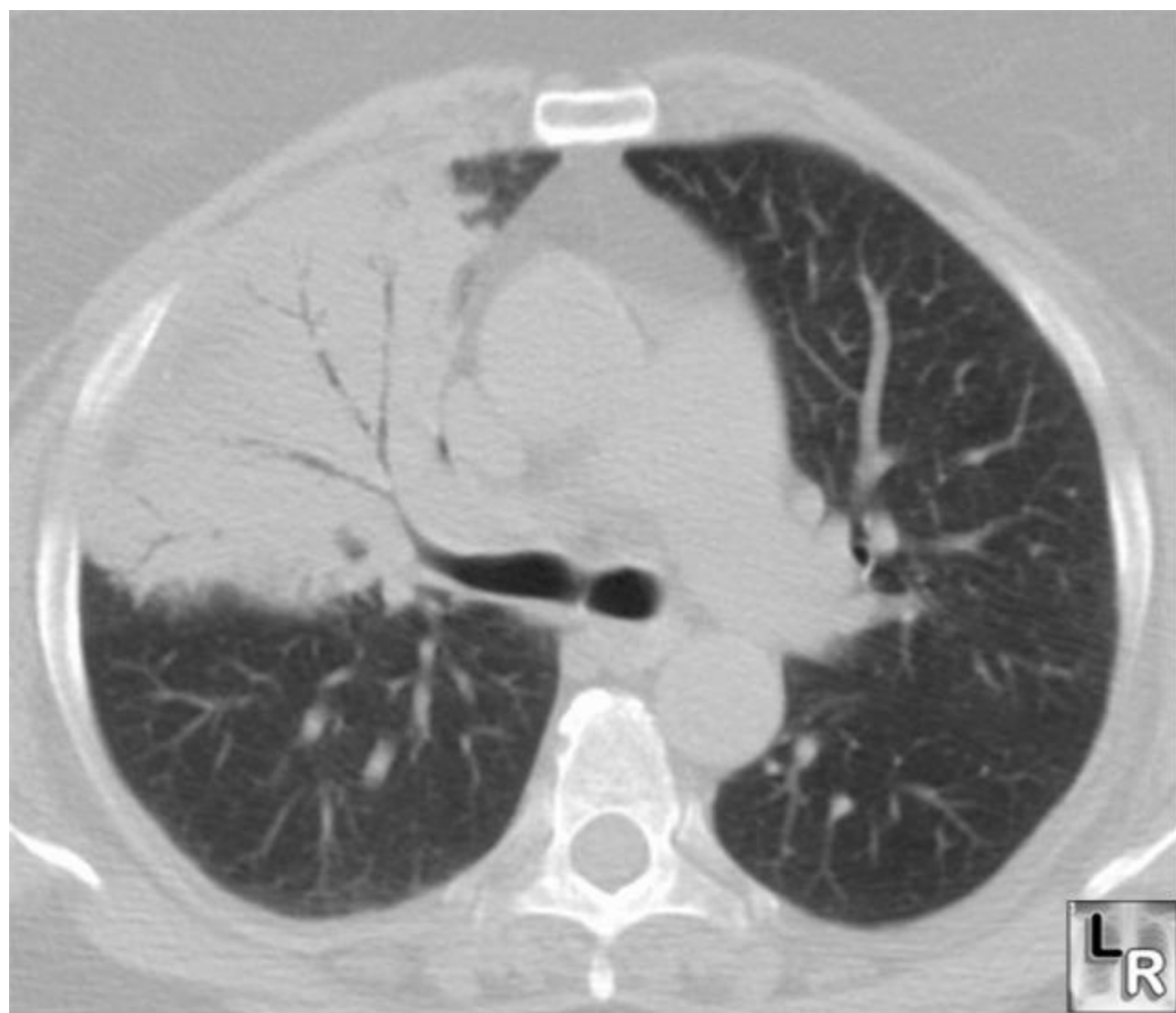


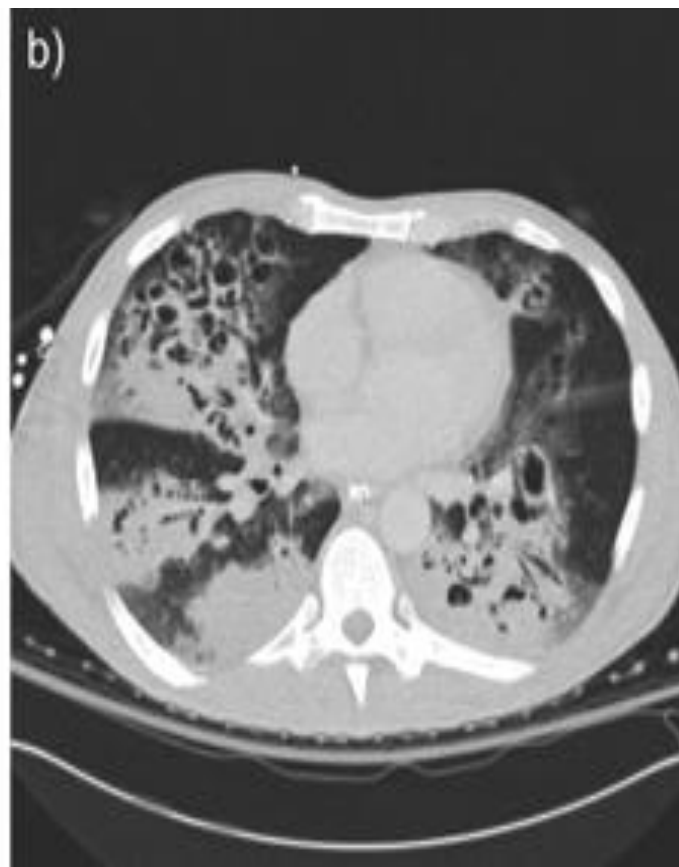


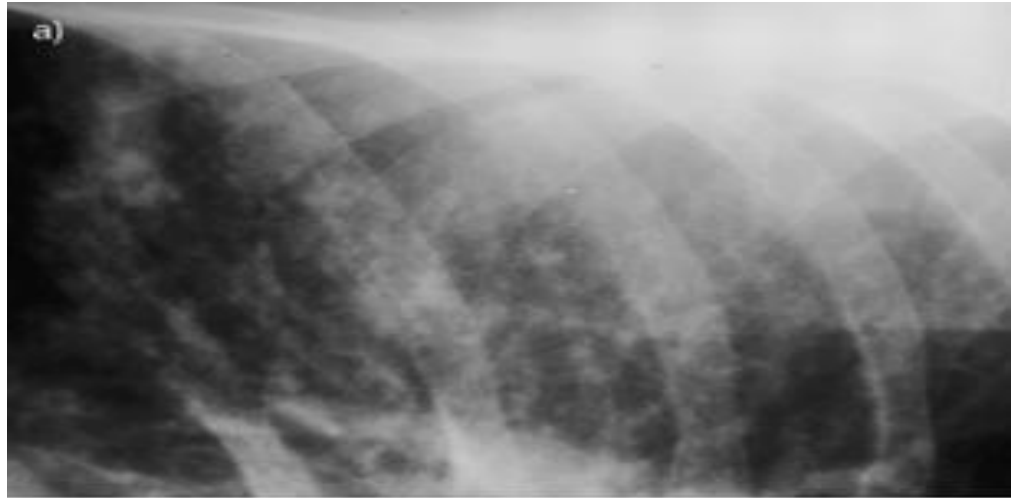




one month follow up









Κάθε πύκνωση δεν είναι πνευμονία

Acute Consolidation	Chronic Consolidation
Pulmonary edema Pneumonia Aspiration Hemorrhage / Contusion Infarction	Neoplasm • post-obstruction • Bronch-alveolar ca • Lymphoma Sarcoidosis Organizing Pneumonia Eosinophilic pneumonia Alveolar proteinosis

Early Chest Computed Tomography Scan to Assist Diagnosis and Guide Treatment Decision for Suspected Community-acquired Pneumonia.

[Claessens YE](#), [Debray MP](#), [Tubach F](#), [Brun AL](#), [Rammaert B](#), [Hausfater P](#), [Naccache JM](#), [Ray P](#), [Choquet C](#), [Carette MF](#), [Mayaud C](#), [Leport C](#), [Duval X](#)

[Am J Respir Crit Care Med](#). 2015 Oct 15;192(8):974-82

Radiologic Probability of CAP in ESCAPED Study Patients with Chest Radiograph and CT Scan Local Interpretation

Parenchymal Infiltrate on Chest Radiograph	Chest CT Scan Probability of CAP		Total
	High or Intermediate*	Low or Ruled Out*	
Yes	132	56	188 (61.1%)
No	40	80	120 (38.9%)
Total	172 (55.8%)	136 (44.2%)	308 (100%) [†]

Ultrasound in the diagnosis and management of pneumonia.

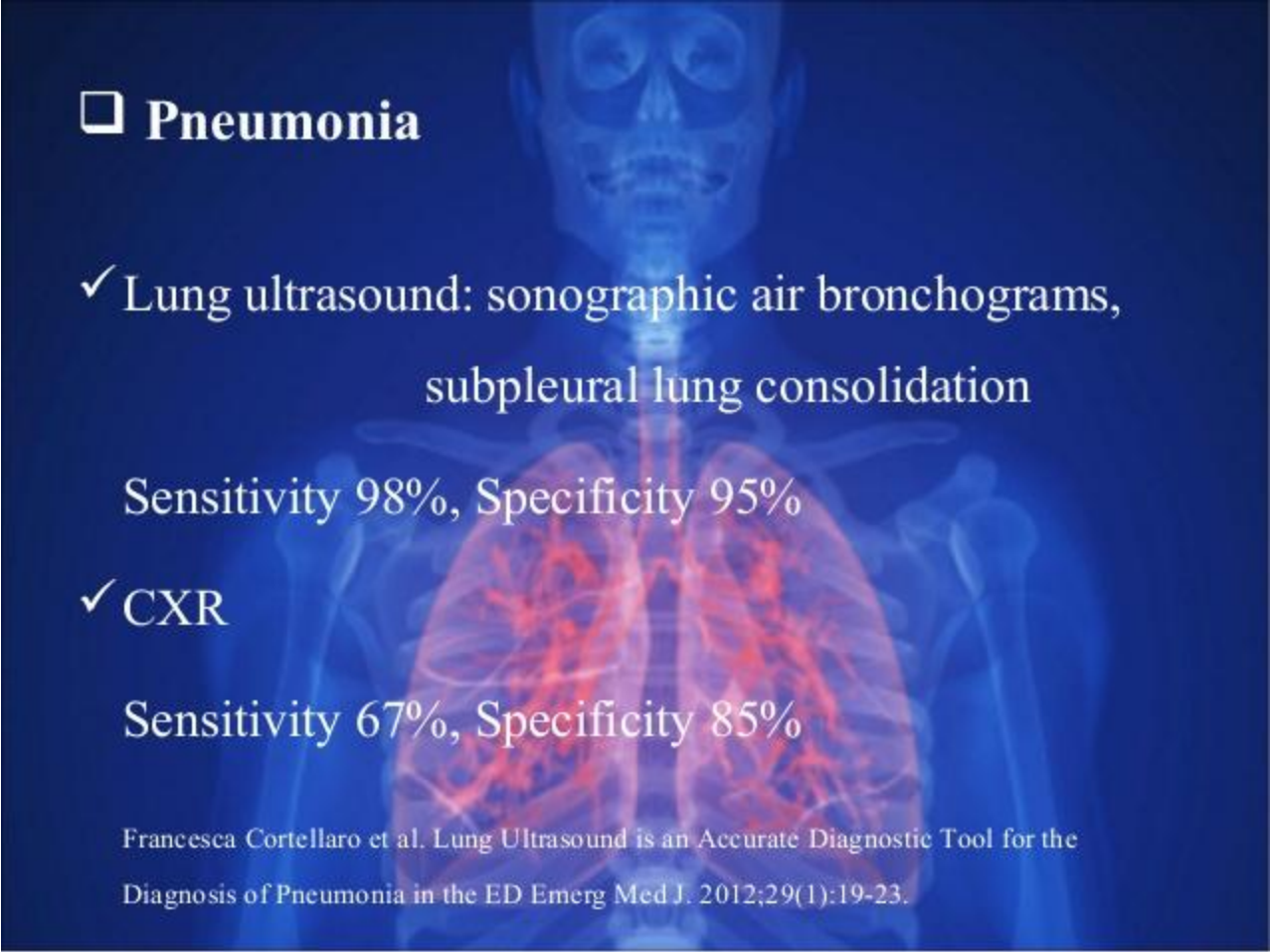
[Schenck EJ](#), [Rajwani K](#)

[Curr Opin Infect Dis.](#) 2016 Apr;29(2):223-8.

Effectiveness of lung ultrasonography for diagnosis of pneumonia in adults: a systematic review and meta-analysis.

[Xia Y](#), [Ying Y](#), [Wang S](#), [Li W](#), [Shen H](#)

[J Thorac Dis.](#) 2016 Oct;8(10):2822-2831.



❑ Pneumonia

- ✓ Lung ultrasound: sonographic air bronchograms,
subpleural lung consolidation

Sensitivity 98%, Specificity 95%

- ✓ CXR

Sensitivity 67%, Specificity 85%

Francesca Cortellaro et al. Lung Ultrasound is an Accurate Diagnostic Tool for the
Diagnosis of Pneumonia in the ED Emerg Med J. 2012;29(1):19-23.

...“συνήθης” έλεγχος

- Λευκά
- Νεφρική λειτουργία
- Ηπατική βιοχημεία
- Έλεγχος πήξης
- Γαλακτικό
- LDH (PJP)
- Παρακέντηση Υπεζωκοτικής Συλλογής

Αιτιολογικός παράγοντας

- Κλινικά (?) .. πτωχή προγνωστική αξία
“τυπική” - “άτυπη”
- Ακτινολογικά (?)

Αιτιολογικός παράγοντας

Πτύελα / Βρογχικές εκκρίσεις
Gram χρώση – κ/α

..σε σοβαρή πνευμονία

+ legionella σε θετικό αντιγόνο ούρων

BTS : μέσης (κ/ες) /υψηλής βαρύτητας (Gram)

Αιτιολογικός παράγοντας

Αιμοκαλλιέργειες (?)

..σε σοβαρή πνευμονία

- i. Υψηλότερο ποσοστό βακτηριαιμίας*
- ii. Μικρότερο ποσοστό ψευδώς θετικών*

Πριν την έναρξη αντιβίωσης

BTS : μέσης /υψηλής βαρύτητας

Αιτιολογικός παράγοντας

- PCR (επίχρισμα, πτύελα, βρογχ. εκκρίσεις)

- Άτυπα
- Ιούς
- Βακτήρια

➤ Ανιχνεύει και μη ζώντα

- Δεν επηρεάζεται από προηγούμενη αντιβιοτική αγωγή
- Μεγαλύτερη ευαισθησία από κ/ες και ορολογικό έλεγχο

Αιτιολογικός παράγοντας

CRP / PCT

- CRP ασθενής συσχέτιση με σοβαρότητα νόσου
 - Αποτελεσματική στην παρακολούθηση
- PCT βακτηριακή λοίμωξη ή φλεγμ. κυτταροκίνες
 - Σημασία για απόσυρση αγωγής

Αιτιολογικός παράγοντας

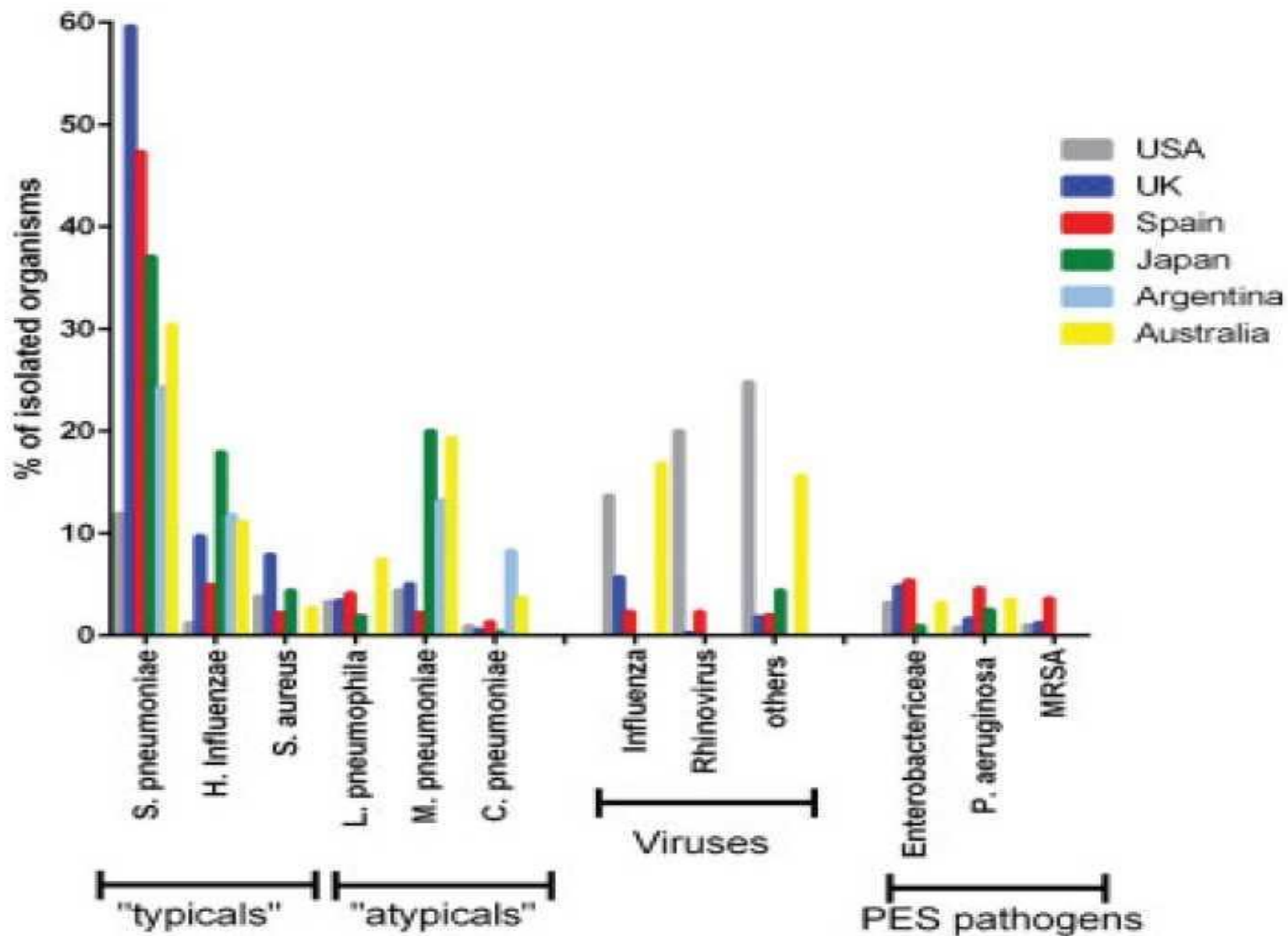
Αντιγόνα ούρων

- Πνευμονιοκόκκου σε μέτρια / σοβαρή CAP
- Λεγιονέλλας σε βαριά, σε παράγοντες κινδύνου και σε έξαρση της νόσου
(NICE: και σε μέσης βαρύτητας)

Μικροβιολογική διερεύνηση ασθενούς με **σοβαρή πνευμονία από την κοινότητα**, που εισάγεται στο νοσοκομείο.

1. Σε όλους τους ασθενείς πρέπει να λαμβάνονται **δύο ζεύγη καλλιεργειών αίματος** πριν από τη χορήγηση αντιβιοτικών.
2. Πτύελα ή δείγμα από το κατώτερο αναπνευστικό για **χρώσεις Gram, Ziehl-Neelsen και καλλιέργειες**.
3. Καλλιέργειες πτυέλων (συναξιολογούνται με τα ευρήματα από τη χρώση Gram). Προσοχή: Το δείγμα θεωρείται αξιόπιστο όταν ο αριθμός των πυοσφαιρίων είναι >25 και ο αριθμός των επιθηλιακών κυττάρων <10 κύτταρα ανά οπτικό πεδίο.
4. Βιοχημικός και μικροβιολογικός έλεγχος **πλευριτικού υγρού** (εάν υπάρχει).
5. **Αντιγόνο ούρων** για *Legionella* sp. (ομάδα 1) και *S. pneumoniae*.
6. Τους χειμερινούς μήνες, **σε περιόδους έξαρσης ή επιδημίας γρίπης**, ταχεία ανίχνευση αντιγόνου του ιού της γρίπης από ρινοφαρυγγικό έκκριμα και ενίοτε δείγματα πτυέλων για άμεσο ανοσοφθορισμό για ιούς της γρίπης και αναπνευστικό συγκυτιακό ιό (RSV).
7. **Ορολογικός έλεγχος για άτυπα παθογόνα (*M. pneumoniae*, *C. pneumoniae*, *Legionella* sp.) δεν συνιστάται** σε βάση ρουτίνας γιατί προσφέρει περισσότερο στην επιδημιολογική διερεύνηση και λιγότερο στην κατευθυνόμενη αντιμετώπιση.

Επιπροσθέτως εάν είναι διαθέσιμα: Ειδικές καλλιέργειες πτυέλων ή PCR για *Mycoplasma pneumoniae*, *Chlamydomphila pneumoniae* και *Legionella* sp





Risk factors for community-acquired pneumonia in adults in Europe: a literature review

Antoni Torres,¹ Willy E Peetermans,² Giovanni Viegi,^{3,4} Francesco Blasi⁵

Table 4 Bundles for lifestyle interventions to reduce the risk of CAP in adults

Risk factor	Evidence	Recommendation
Smoking	Risk of CAP increased in current and former smokers (9 studies) ^{19-23, 38, 42, 46, 47}	Smoking cessation
Alcohol consumption	Risk of CAP increased with high consumption or history of alcohol abuse (4 studies) ^{21, 23, 38, 47}	Reduce alcohol consumption
Nutritional status	Being underweight was generally associated with an increased risk of CAP (4 studies) ^{23, 38, 44, 47}	Dietary advice to ensure good nutritional status
Contact with children	Regular contact with children increased the risk of CAP (3 studies) ^{23, 38, 44}	Avoid contacts with children with lower respiratory tract infections
Dental hygiene	Risk of CAP decreased in individuals with a recent (within past year) dental visit (2 studies) ^{23, 38}	Ensure regular dental visits
Vaccination against influenza and <i>Streptococcus pneumoniae</i>	Current guidelines ^{88, 89}	Ensure compliance with guidelines

CAP, community-acquired pneumonia.

TABLE 1: PATHOGEN BASED ON SPECIFIC RISK FACTORS⁷

Risk Factor	Pathogen
Alcoholism	Typical CAP organisms PLUS oral anaerobes, <i>Klebsiella pneumoniae</i>
COPD/smoking	<i>Haemophilus influenzae</i> , <i>Pseudomonas aeruginosa</i> , Typical CAP organisms
Lung abscess	Community-acquired MRSA, oral anaerobes, fungal pneumonia, <i>M. tuberculosis</i> , atypical mycobacteria
HIV/AIDS	<i>M. tuberculosis</i> , <i>Pneumocystis jirovecii</i> , <i>Cryptococcus</i> , Histoplasmosis, <i>Aspergillus</i> , atypical mycobacteria, <i>Haemophilus influenzae</i> , <i>Pseudomonas aeruginosa</i>
Influenza	Influenza, <i>S pneumoniae</i> , <i>Staphylococcus aureus</i> , <i>Haemophilus influenzae</i>
Cough >2 weeks with a whoop	<i>Bordetella pertussis</i> (whooping cough)

AIDS = acquired immune deficiency syndrome; CAP = community-acquired pneumonia;

COPD = chronic obstructive pulmonary disease; MRSA = methicillin-resistant *Staphylococcus aureus*.

The big decision: hospital or home?

- 25 φορές πιο ακριβά
- Δεν υπάρχουν guidelines εισαγωγής
- Απομόνωση(?)..ιογενείς, TB, ουδετεροπενία



2015 - Annotated BTS Guideline for the management of CAP in adults (2009) Summary of recommendations

Introduction to the annotated edition

The BTS guideline for CAP in adults was published in 2009 ⁽¹⁾. NICE published guideline 191 on Pneumonia in December 2014 ⁽²⁾. Recognising differences in the scopes of the two guidelines, this annotated edition of the BTS guideline indicates where recommendations remain valid, and where overlaps exist.

The NICE guideline 191 has 27 recommendations, of which 3 relate to hospital acquired pneumonia and one to lower respiratory tract infections including CAP. The remaining 23 relate specifically to CAP. The BTS guideline has 137 recommendations all relating to CAP. The guidelines were compared by a small working group under the auspices of the BTS Standards of Care Committee.

Of the 24 NICE Guideline recommendations relating to CAP, 4 covered subjects not included in the BTS guideline (NICE recommendations 1.1.1, 1.2.12, 1.2.21, 1.2.22).

Of the 137 BTS recommendations, 101 were not within the scope of the NICE guideline, 31 overlapped but with no major differences and 5 overlapped with some differences. Each BTS recommendation is annotated with one of the following symbols to indicate the current status:

Green circle ● (101): Not included in NICE guideline 191 – recommendation remains valid.

Blue square ■ (31): Overlap between the BTS and NICE recommendations but no major difference exists – recommendation remains valid.

Orange triangle ▲ (5): Overlap between BTS and NICE recommendations, some difference exists and is highlighted in the annotated guideline (BTS recommendation numbers 27, 28, 59, 60, 106).

CAP Guideline Working Group members 2014/5

Dr Wei Shen Lim, Chair, BTS CAP Guideline group 2009; consultant respiratory physician,
Nottingham

Dr David Smith, Chair, BTS Standards of Care Committee; consultant respiratory physician, Bristol

Dr Matt Wise, Member, BTS Lung Infection Advisory; consultant respiratory physician, Cardiff

Sally Welham, Deputy Chief Executive, British Thoracic Society

January 2015

The full copy of the annotated BTS guidelines for community acquired pneumonia in adults is available here:

<https://www.brit-thoracic.org.uk/guidelines-and-quality-standards/community-acquired-pneumonia-in-adults-guideline/annotated-bts-guideline-for-the-management-of-cap-in-adults-2014/>



AUDIT, RESEARCH AND GUIDELINE UPDATE

British Thoracic Society community acquired pneumonia guideline and the NICE pneumonia guideline: how they fit together

W S Lim,¹ D L Smith,² M P Wise,³ S A Welham,⁴ on behalf of the British Thoracic Society

¹Department of Respiratory Medicine, Nottingham City Hospital, Nottingham, UK
²Southmead Hospital, North Bristol Lung Centre, Bristol, UK
³Department of Adult Critical Care, University Hospital of Wales, Cardiff, UK
⁴British Thoracic Society, London, UK

Correspondence to
 Dr W S Lim, Nottingham City Hospital, David Evans Building, Hucknall Road, Nottingham, Notts NG5 1PB, UK;
 weishen.lim@nuth.nhs.uk

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ABSTRACT

The British Thoracic Society (BTS) guideline for the management of adults with community acquired pneumonia (CAP) published in 2009 was compared with the 2014 National Institute for Health and Care Excellence (NICE) Pneumonia Guideline. Of the 36 BTS recommendations that overlapped with NICE recommendations, no major differences were found in 31, including those covering key aspects of CAP management: timeliness of diagnosis and treatment, severity assessment and empirical antibiotic choice. Of the five BTS recommendations where major differences with NICE were identified, one related to antibiotic duration in low and moderate severity CAP, two to the timing of review of patients and two to legionella urinary antigen testing.

BACKGROUND

The British Thoracic Society (BTS) guideline for the management of adults with community acquired pneumonia (CAP) was published in 2009.¹ In December 2014, the National Institute for Health and Care Excellence (NICE) Pneumonia Guideline (CG191) was released.² In this overview, the key differences between these guidelines are highlighted and plans for future guidance in this topic area are discussed.

METHOD

Following the release of the NICE Pneumonia Guideline, a small working group was convened under the auspices of the BTS Standards of Care Committee to review the BTS CAP Guideline recommendations taking into account NICE guidance. Each BTS recommendation was mapped to the relevant NICE Guideline recommendation(s), where applicable. Clinical judgement was applied to determine if any 'major differences' existed; in this context, the term 'major difference' is applied to denote a difference in the details of a recommendation that might mean a change in clinical practice, it does not describe the magnitude of any potential impact on clinical practice.

All BTS recommendations were annotated according to the following three levels: (1) Not included in NICE Guideline—BTS recommendation remains valid, (2) Overlap between NICE and BTS recommendations but no major difference exists—BTS recommendation remains valid and (3) Overlap

between NICE and BTS recommendations, some difference exists.

Due to differences in the methods used to grade the levels of evidence in each guideline, it was not possible to compare the strength of recommendations between guidelines.

RESULTS

The NICE Guideline contains 27 recommendations, of which 3 relate to hospital acquired pneumonia, one to lower respiratory tract infections including CAP and 23 specifically to CAP. The BTS Guideline contains 137 recommendations, all relating specifically to CAP. Of these 137 recommendations, 36 overlapped with NICE Guideline recommendations. Major differences with the NICE Guideline were considered to exist for only five BTS recommendations (see table 1).

In particular, no major differences were noted in the recommendations pertaining to the key aspects of the management of CAP: severity assessment, antibiotic choice and timeliness of treatment. Both guidelines recommend the use of:

- A. clinical judgement in conjunction with the CURB-65 score (CRB65 score for primary care) to assess illness severity;
- B. a single antibiotic as initial empirical therapy in patients with low severity CAP;
- C. dual combination antibiotics comprising amoxicillin and a macrolide for patients with moderate severity CAP; and
- D. dual combination antibiotics comprising a β -lactamase stable β -lactam (such as co-amoxiclav) and a macrolide for patients with high severity CAP.

In addition, both guidelines recommend that processes are put in place to allow the radiological diagnosis and treatment of patients with CAP within 4 h of presentation to hospital.

DISCUSSION

The larger number of recommendations in the BTS Guideline compared with the NICE Pneumonia Guideline is partly due to differences in the scope of these two guidelines. Some of the areas covered in the BTS Guideline that were not evaluated for the NICE Guideline include the management of specific pathogens commonly associated with CAP failure to improve and complications related to CAP.

Where the two guidelines overlap, there is considerable harmony. No major differences are

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1 point given for each of:

- Confusion
- Urea (>7 mmol/L)
- Respiratory rate ($\geq 30/\text{min}$)
- BP (SBP <90 mmHg or DBP ≤ 60 mmHg)
- Age (≥ 65 years)



Risk class	Mortality (%)	Recommended site of care
0	0.7	Outpatient
1	2.1	Outpatient
2	9.2	Short hospital stay / supervised outpatient
3	14.5	Hospital, assess for ICU
4	40	Hospital, assess for ICU
5	57	Hospital, assess for ICU

PSI

PNEUMONIA SEVERITY INDEX

FINE MJ ET AL: A PREDICTION RULE TO IDENTIFY LOW-RISK PATIENTS WITH COMMUNITY ACQUIRED PNEUMONIA. NEJM 1997;336:243

Demographics	Co-morbidities	Physical exam / vital signs	Laboratory / imaging
▪ Age (1 point per year) - Male Yr - Female Yr -10 ▪ Nursing home residency +10	▪ Neoplasia +30 ▪ Liver disease +20 ▪ CHF +10 ▪ Cerebrovascular disease +10 ▪ Renal disease +10	▪ Mental confusion +20 ▪ Respiratory rate +20 ▪ SBP +20 ▪ Temperature +15 ▪ Tachycardia +15	▪ Arterial pH +30 ▪ BUN +20 ▪ Sodium +20 ▪ Glucose +10 ▪ Hematocrit +10 ▪ Pleural effusion +10 ▪ Oxygenation +10

↓

Risk class (Points)	Mortality (%)	Recommended site of care
I (<50)	0.1	Outpatient
II (51–70)	0.6	Outpatient
III (71–90)	2.8	Outpatient or brief inpatient
IV (91–130)	8.2	Inpatient
V (>130)	29.2	Inpatient

as a site-of-care tool. BUN, blood urea nitrogen; CHF, chronic heart failure; SBP, systolic blood pressure.

Table 2 Advantages and Limitations of Pneumonia-Specific Scores

Severity Score	Advantages	Limitations
PSI	Well validated Improves outcome Good performance in low mortality risk patients	Complex to calculate Overemphasis of age and comorbidities Excludes risk factors such as COPD and diabetes Performs less well for need for ICU/ventilatory or vasopressor support Limited use outside hospital setting
CURB-65	Well validated Simple to calculate	Underestimates severity in young patients Does not take into account comorbidities Performs less well for need for ICU/ventilatory or vasopressor support Limited use outside hospital setting
CRB-65	Suitable for community setting	As for CURB-65
IDSA/ATS 2007	Good performance for predicting ICU admission Minor criteria may be useful to identify high-risk patients	Need for ICU is not the most accurate measure of severity due to intercenter variability
SMART-COP	Good accuracy for prediction of need for ventilatory or vasopressor support	Complex to calculate May underestimate severity in young and previously fit patients
PIRO-CAP	Risk stratification in high-risk patients	Not widely validated

Major criteria (2)

Invasive mechanical ventilation

Requiring vasopressors due to septic shock

Minor criteria (9)

Respiratory rate $\geq 30/\text{min}$

$\text{PaO}_2/\text{FiO}_2$ ratio ≤ 250

Multilobar pneumonia in chest X-ray

Decreased level of consciousness/disorientation

BUN ≥ 20 mg/dL

WBC $< 4,000/\text{mm}^3$

Platelet $< 100,000/\text{mm}^3$

Core temperature $< 36^\circ\text{C}$

Hypotension requiring aggressive fluid therapy

Criteria for admission to intensive care unit

One major or more

Three minor or more

Γενικά μέτρα

- Ξεκούραση
 - Υγρά
 - Όχι κάπνισμα
 - Sat O₂ : 94-98%
-
- ΕΓΚΑΙΡΗ έναρξη αγωγής
 - ΕΓΚΑΙΡΗ αιμοδυναμική υποστήριξη
 - ΕΓΚΑΙΡΗ αναπνευστική υποστήριξη

Timing of antibiotic administration and outcomes for Medicare patients hospitalized with community-acquired pneumonia.

[Houck PM](#)¹, [Bratzler DW](#), [Nsa W](#), [Ma A](#), [Bartlett JG](#).

[Arch Intern Med](#). 2004 Mar 22;164(6):637-44.

Table 5. Antibiotic Administration Within 4 Hours of Arrival and Patient Outcomes Stratified by Risk Classes*

Outcome Measures	All Patients, % (95% CI)	Antibiotic Within 4 h, % (95% CI)	Antibiotic After 4 h, % (95% CI)	Unadjusted†		Adjusted‡	
				OR (95% CI)	P Value	AOR (95% CI)	P Value
All patients							
30-d mortality	12.0 (11.5-12.6)	11.6 (10.9-12.3)	12.7 (11.8-13.6)	0.90 (0.81-1.00)	.045	0.85 (0.76-0.95)	.005
In-hospital mortality	7.0 (6.6-7.5)	6.8 (6.3-7.3)	7.4 (6.7-8.1)	0.91 (0.80-1.04)	.17	0.85 (0.74-0.98)	.03
Length of stay >5 d	43.3 (42.5-44.1)	42.1 (41.0-43.2)	45.1 (43.8-46.5)	0.88 (0.82-0.95)	<.001	0.90 (0.83-0.96)	.003
30-d readmission	13.4 (12.8-14.0)	13.1 (12.4-13.9)	13.9 (12.9-14.9)	0.93 (0.84-1.04)	.20	0.95 (0.85-1.06)	.34
PSI risk classes II and III							
30-d mortality	2.6 (2.1-3.1)	2.1 (1.5-2.7)	3.4 (2.6-4.4)	0.60 (0.40-0.89)	.01	0.62 (0.42-0.93)	.02
In-hospital mortality	1.1 (0.8-1.4)	0.9 (0.6-1.4)	1.2 (0.7-1.9)	0.78 (0.42-1.43)	.42	0.77 (0.42-1.44)	.42
Length of stay >5 d	32.8 (31.3-34.3)	31.2 (29.4-33.1)	35.3 (32.9-37.7)	0.83 (0.73-0.95)	.008	0.86 (0.75-0.99)	.03
30-d readmission	10.0 (9.1-11.0)	9.4 (8.3-10.6)	10.9 (9.4-12.6)	0.85 (0.69-1.05)	.12	0.87 (0.70-1.07)	.19
PSI risk classes IV and V							
30-d mortality	15.9 (15.2-16.6)	15.5 (14.6-16.4)	16.5 (15.4-17.7)	0.92 (0.83-1.03)	.16	0.87 (0.78-0.98)	.03
In-hospital mortality	9.5 (8.9-10.0)	9.2 (8.4-9.9)	9.9 (9.0-10.9)	0.92 (0.80-1.05)	.21	0.86 (0.74-1.00)	.04
Length of stay >5 d	47.6 (46.6-48.6)	46.5 (45.3-47.8)	49.2 (47.6-50.8)	0.90 (0.83-0.98)	.01	0.92 (0.84-1.00)	.04
30-d readmission	14.9 (14.2-15.7)	14.7 (13.8-15.7)	15.2 (14.0-16.5)	0.96 (0.85-1.09)	.53	0.99 (0.88-1.12)	.89

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio; PSI, Pneumonia Severity Index.

*Patients without prehospital antibiotic treatment.

†Univariate analysis comparing the antibiotic timing subgroups "within 4 h" vs "after 4 h."

‡Multivariate analysis comparing the antibiotic timing subgroups "within 4 h" vs "after 4 h" using logistic regression. The logistic regression model included the timing of initial antibiotic, PSI, admission to the intensive care unit, census regions of hospitalization, race/ethnicity, and other processes of care (oxygenation assessment, blood culture within 24 hours, and initial antibiotic consistent with current guidelines).

Triage / Initial Assessment suggestive of CAP

Result of CXR reviewed by clinician

No consolidation

Reassess

Consolidation

Does the patient meet criteria for CAP?

Yes

Treat according to clinical judgement and CURB65 severity score

No

Consider other diagnoses

CURB65 severity score:

1 point for each feature present:

- **C**onfusion
- **U**rea > 7 mmol/l
- **R**espiratory rate $\geq 30/\text{min}$
- **B**lood pressure (SBP < 90 or DBP $\leq 60\text{mmHg}$)
- **A**ge ≥ 65 years

0-1

Low severity
(risk of death <3%)

2

Moderate severity
(risk of death 9%)

3-5

High severity
(risk of death 15–40%)

Other reasons for admission (unstable co-morbidity, social)

No

Yes

Home

Antibiotics
as per table
5

Hospital

Antibiotics
as per table
5

Hospital

Supportive care
Microbiological
investigations
as per table 4
Antibiotics given
as per table 5

Hospital

Supportive care
Microbiological
investigations as
per table 4
Antibiotics given
as per table 5
Urgent senior
review
Decision re
transfer to critical
care unit
(especially if
CURB65 = 4 or 5)

Aim by 4 hours: diagnosis made and management including antibiotics started

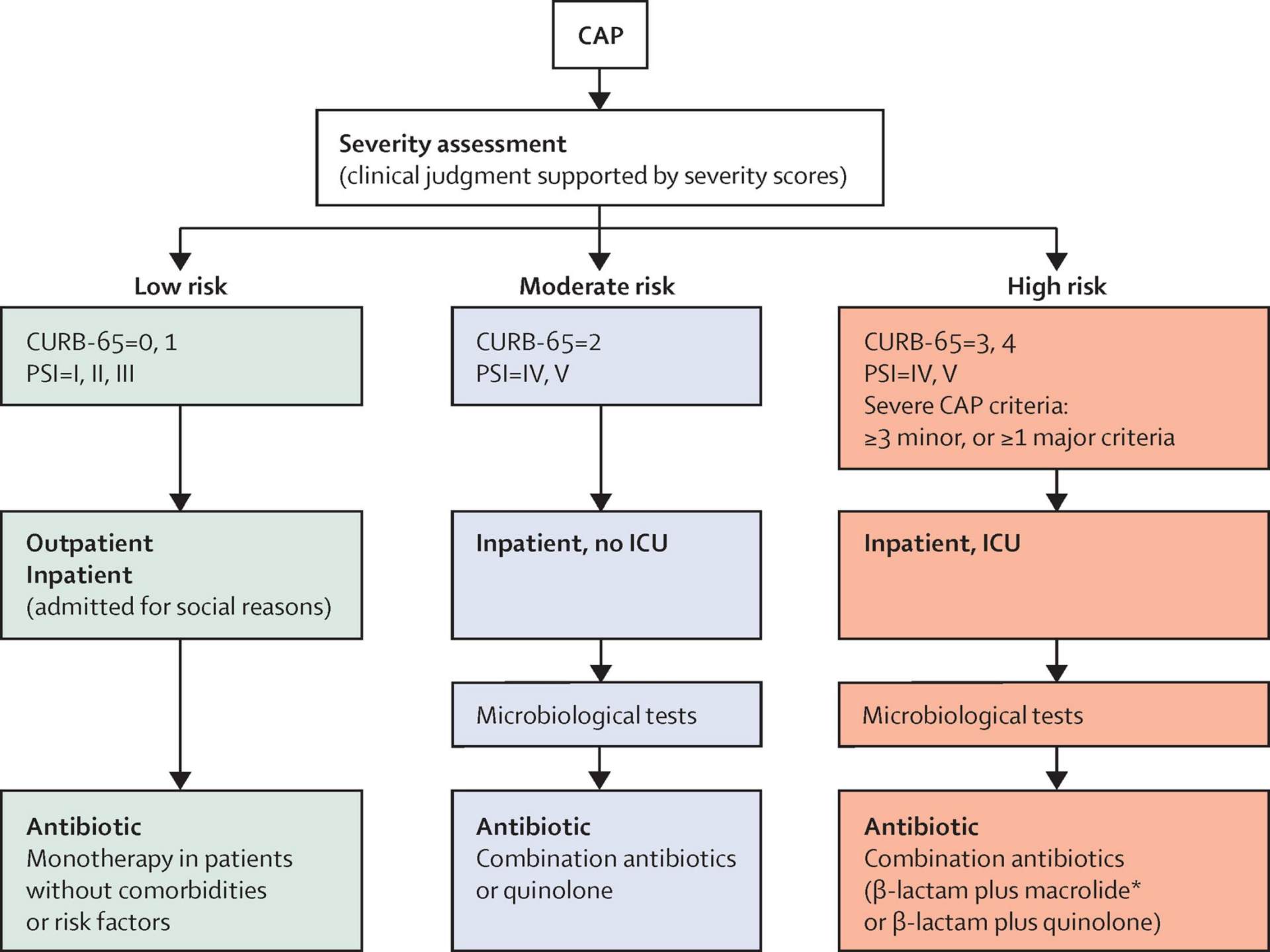


Table 4. Common Antibiotic Regimens For Outpatient Treatment Of Community-Acquired Pneumonia^{51,52}

Antibiotic	Adult Dosage	Comments/Caveats
Outpatient Treatment, No Comorbidities		
Macrolides		
Azithromycin	500 mg PO, then 250 mg PO daily x 4 days	Macrolides are first-line therapy
	Extended-release 2 g x1 dose	
Clarithromycin	500 mg PO twice daily 1 g extended-release daily x 7 days	
Doxycycline	100 mg PO twice daily x 7-10 days	
Outpatient Treatment, Patient With Comorbidities or Recent Antibiotics		
Fluoroquinolone		
Moxifloxacin	400 mg PO daily x 7-10 days	If recent antibiotics, choose alternate therapy from prior
Levofloxacin	750 mg PO daily x 5 days	
Beta-lactam		
Amoxicillin	1 g PO 3 times daily x 7 days	
Amoxicillin-clavulanate	1000/62.5 mg PO 2 tabs twice daily x 7 days	
Cefpodoxime	200 mg PO twice daily x 7 days	
Cefprozil	500 mg PO twice daily x 7 days	
Cefdinir	300 mg PO twice daily x 7 days	
PLUS		
Macrolide		
Azithromycin	500 mg PO, then 250 mg PO daily x 4 days	
	Extended-release 2 g x1 dose	
Clarithromycin	500 mg PO twice daily Extended-release 1 g daily x 7 days	
OR		
Doxycycline	100 mg PO twice daily x 7-10 days	

Abbreviations: g, gram; mg, milligram; PO, by mouth; q, every.

Recommendations for Inpatient Empirical Antibiotic Therapy for CAP

Patients	Recommendation
Non-ICU	Respiratory fluoroquinolone or β -lactam plus macrolide
ICU	β -lactam plus either azithromycin or respiratory fluoroquinolone
ICU or non-ICU with special indications	Instead of standard recommendation, substitute β -lactam plus one of the following: • Ciprofloxacin or levofloxacin • Aminoglycoside and azithromycin • Aminoglycoside and fluoroquinolone
• CA-MRSA concern	In addition to the standard recommendation, add vancomycin or linezolid

Table 1

Risk Factors for MDR Pathogens

Antimicrobial therapy in preceding 90 days

Current hospitalization of five or more days

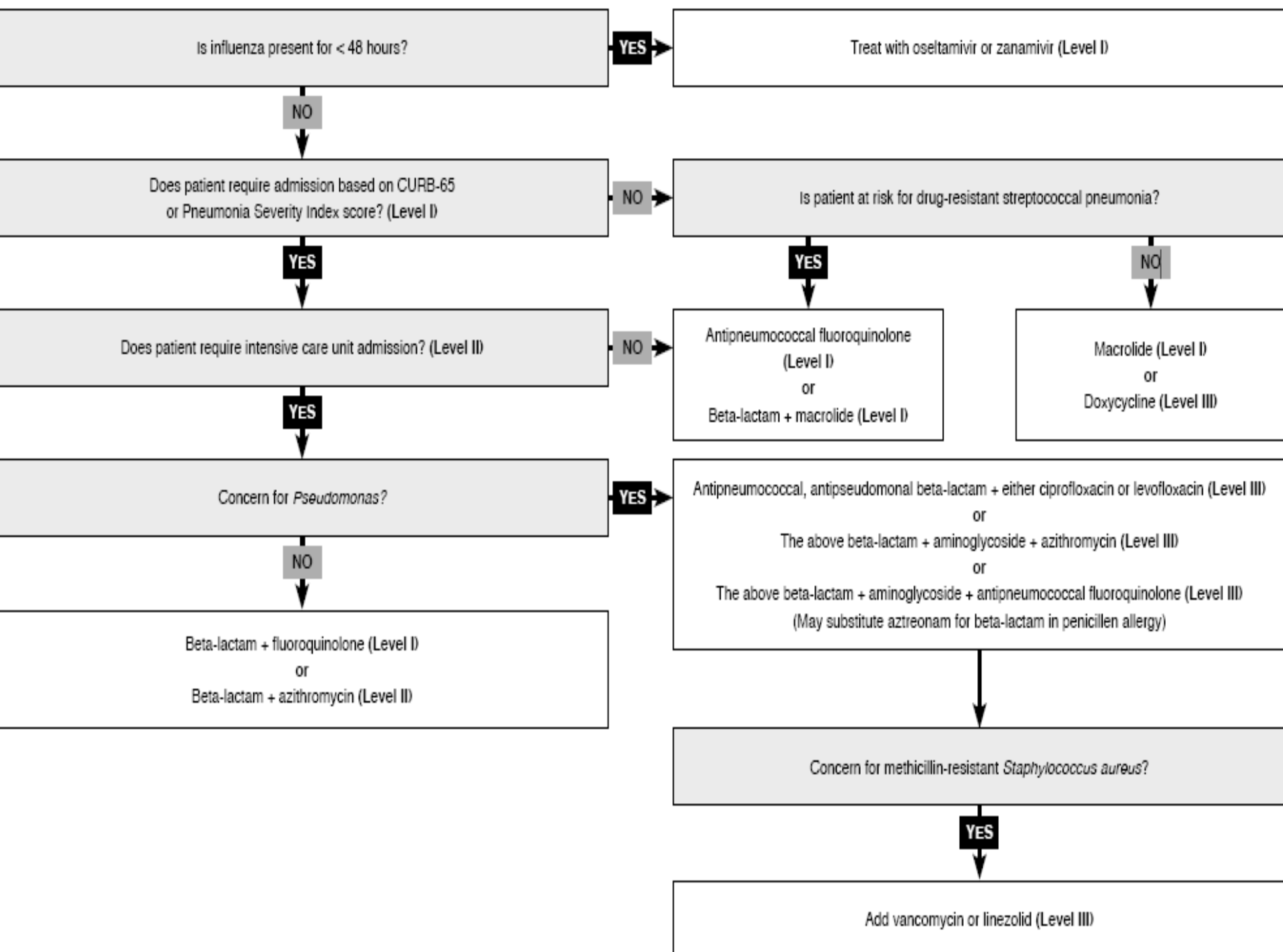
High frequency of antibiotic resistance in the community or hospital unit

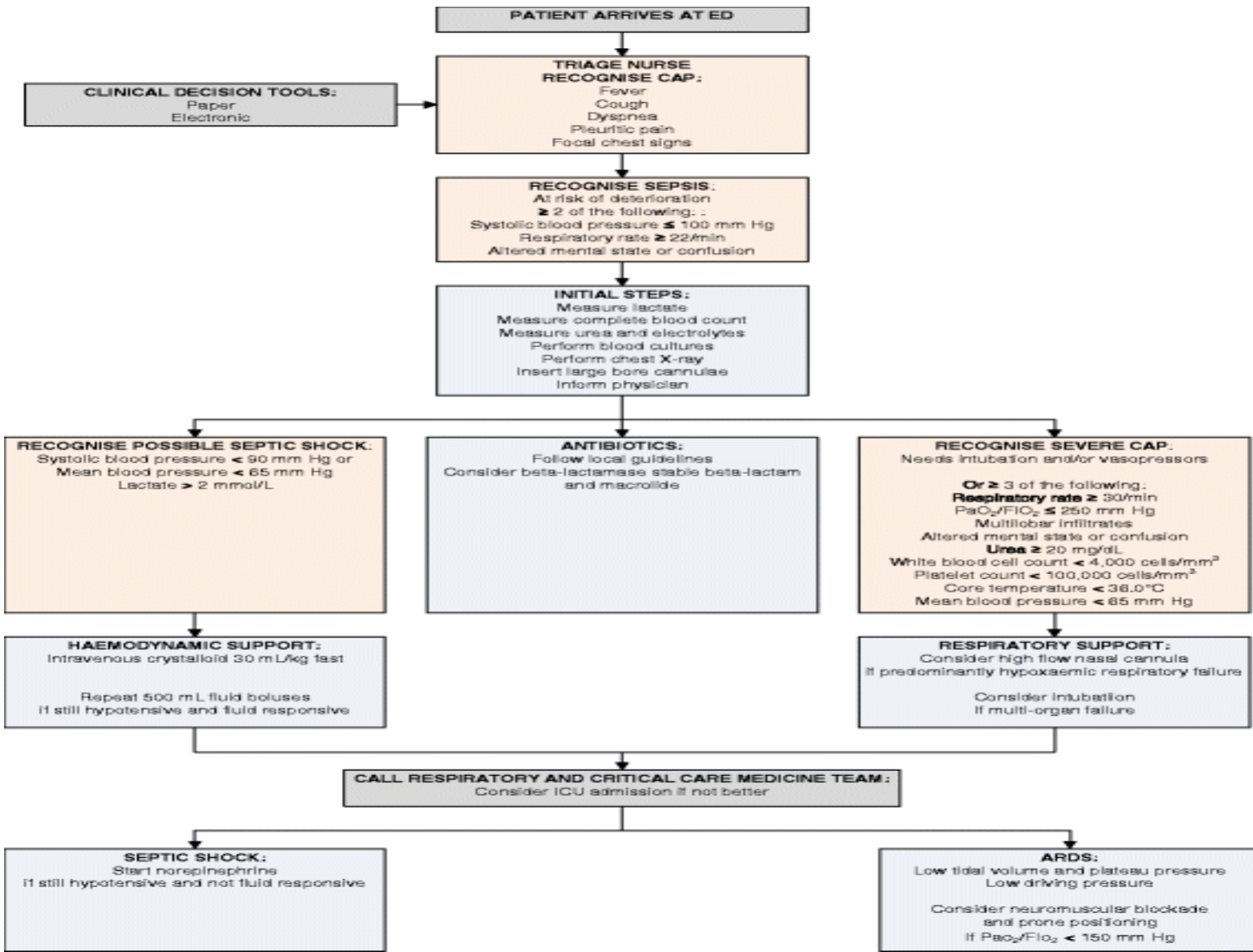
Presence of risk factors for HCAP:

- Hospitalized for two days or more in the preceding 90 days
- Residing in a nursing home or extended-care facility
- Receiving home infusion therapy
- Receiving chronic dialysis in the preceding 30 days
- Receiving home wound care
- Living with a family member who has an MDR pathogen

Immunosuppressive disease and/or therapy

*MDR: multidrug resistant; HCAP: health care-associated pneumonia.
Source: Reference 2.*





Κορτικοειδή (severe CAP / septic shock)

Μειώνουν χρόνο για κλινική σταθερότητα
θεραπευτική αποτυχία
θνητότητα
ARDS
παραμονή στη ΜΕΘ και στο νοσοκομείο

Review Criteria for Healthcare Associated Pneumonia (HCAP):

1. Hospitalization in acute care facility for 2+ days within 90 days of infection;
2. Resides in nursing home or long-term care facility;
3. Received home IV medications or home wound care within 30 days;
4. Chronic dialysis within 30 days;
5. Immunosuppressive disease or therapy

Table 6. Common Antibiotic Regimens For Treatment Of Healthcare-Associated Pneumonia^{51,52}

Antibiotic	Adult Dosage	Comments/Caveats
Antipseudomonal beta-lactam		
Cefepime	1-2 g IV q8-12 hours	• In severe penicillin allergy, use aztreonam 2 g IV q6-8 hours in and fluoroquinolone
Ceftazidime	2 g IV q8 hours	
Imipenem	500 mg q6 hours or 1 g q8 hours	
Meropenem	1 g q8 hours	
Piperacillin-tazobactam	4.5 g q6 hours	
PLUS		• To cover <i>Legionella pneumophila</i>, use the fluoroquinolone-containing regimen or add a macrolide to the aminoglycoside regimen
Antipseudomonal fluoroquinolone		
Ciprofloxacin	400 mg q8 hours	
Levofloxacin	750 mg q24 hours	
OR		
Aminoglycoside		
Gentamicin	3 mg/kg load, then 2 mg/kg IV q8 hours	
Tobramycin	3 mg/kg load, then 2 mg/kg IV q8 hours	
Amikacin	8-12 mg/kg load, then 8 mg/kg IV q8 hours	
PLUS		
MRSA coverage		
Vancomycin	15 mg/kg q12 hours	
Linezolid	600 mg q12 hours	

Abbreviations: g, gram; IV, intravenous; kg, kilogram; mg, milligram; PO, by mouth; q, every.

Empiric antibiotic therapy^{1 2 3} for HAP, HCAP, or VAP based on Multi-drug resistant (MDR) risk factors (Adapted from the 2005 ATS/IDSA Guidelines).		
Risk factors⁴	Potential pathogens	Empiric antibiotic
Early onset (<5 days) AND No MDR risk factors.	<i>Strep pneumonia</i> <i>Haemophilus influenza</i> MSSA Enteric gram-negative bacilli <i>E. coli</i> <i>K. pneumonia</i> <i>Enterobacter species</i> <i>Proteus species</i> <i>Serratia marcescens</i>	<u>Monotherapy:</u>^{5 6} Ceftriaxone OR Levo- ⁷ , moxi-, or ciprofloxacin ^{8 9} OR Ampicillin/sulbactam OR Ertapenem
Late onset (5 or more days) OR Presence of MDR risk factors.	Above pathogens PLUS MDR pathogens: <i>P. aeruginosa</i> <i>K. pneumonia</i> (ESBL) ¹⁰ <i>Acinetobacter species</i> ¹¹	<u>Combination therapy:</u>¹² AP cephalosporin (cefepime, ¹³ ceftazidime ¹⁴) OR AP carbapenem (imipenem ¹⁵ or meropenem ¹⁶) OR AP β -lactam/ β -lactamase inhibitor (piperacillin-tazobactam ¹⁷) PLUS AP FQ (ciprofloxacin or levofloxacin) ¹⁸ OR AG (amikacin, ¹⁹ gentamicin, ²⁰ or tobramycin ²¹) ²²
	MRSA	PLUS Vancomycin ²³ or Linezolid ^{24 25}
	<i>Legionella pneumophila</i>	PLUS See footnote ²⁶
MDR= multidrug-resistant HAP= Hospital-acquired pneumonia, VAP= ventilator-associated pneumonia, HCAP= healthcare-associated pneumonia AP= anti-pseudomonal, FQ= fluoroquinolone, AG = aminoglycoside, ESBL = extended spectrum beta-lactamase, MRSA = Methicillin-resistant <i>Staph aureus</i> , MSSA = Methicillin-Sensitive <i>Staph aureus</i>		

[Thorax](#). 2010 Apr;65(4):354-9

Nursing home-acquired pneumonia: a 10 year single-centre experience.

[Polverino E](#), [Dambrava P](#), [Cillóniz C](#), [Balasso V](#), [Marcos MA](#), [Esquinas C](#), [Mensa J](#), [Ewig S](#), [Torres A](#).

Community-acquired pneumonia and nursing home-acquired pneumonia in the very elderly patients

[Takaya Maruyama](#), [Esteban C. Gabazza](#), [John Morser](#), [Takehiro Takagi](#), [Corina D'Alessandro-Gabazza](#), [Shizu Hirohata](#), [Sei Nakayama](#)

A New Strategy for Healthcare-Associated Pneumonia: A 2-Year Prospective Multicenter Cohort Study Using Risk Factors for Multidrug-Resistant Pathogens to Select Initial Empiric Therapy

Takaya Maruyama Takao Fujisawa Masataka Okuno Hirokazu Toyoshima
Kiyoyuki Tsutsui Hikaru Maeda Hisamichi Yuda Masamichi Yoshida
Hiroyasu Kobayashi Osamu Taguchi

[Clin Infect Dis \(2013\) 57 \(10\): 1373-1383.](#)

Epidemiology and Predictors of Multidrug-Resistant Community-Acquired and Health Care-Associated Pneumonia

Alan E. Gross,^{a,b,c,d} Trevor C. Van Schooneveld,^{d,e} Keith M. Olsen,^c Mark E. Rupp,^{d,e} Thu Hong Bui,^e Elsie Forsung,^e Andre C. Kalil^{d,e}

University of Illinois at Chicago, College of Pharmacy, Chicago, Illinois, USA^a; University of Illinois Hospital and Health Sciences System, Chicago, Illinois, USA^b; University of Nebraska Medical Center, College of Pharmacy, Omaha, Nebraska, USA^c; University of Nebraska Medical Center, College of Medicine, Omaha, Nebraska, USA^d; The Nebraska Medical Center, Department of Infection Control and Epidemiology, Omaha, Nebraska, USA^e

***Antimicrob. Agents Chemother.* 2014, 58(9):5262.**

CAP patients, respectively. The presence of an MDRO was not associated with HCAP classification (odds ratio [OR] = 1.95; 95% confidence interval [95% CI], 0.66 to 5.80; $P = 0.23$) or with most of its individual components (hemodialysis, home infusion, home wound care, and ≥ 48 -h hospitalization in the last 90 days). Independent predictors of MDRO included the following: *Pseudomonas aeruginosa* colonization/infection in the previous year (OR = 7.43; 95% CI, 2.24 to 24.61; $P < 0.001$), antimicrobial use in the previous 90 days (OR = 2.90; 95% CI, 1.13 to 7.45; $P = 0.027$), admission from a nursing home (OR = 4.19; 95% CI, 1.55 to 11.31; $P = 0.005$), and duration of hospitalization in the previous 90 or 180 days ($P = 0.013$ and $P = 0.002$, respectively). MDROs were uncommon in HCAP and CAP. HCAP did not predict MDRO isolation. Local etiology of community onset pneumonia and specific MDRO risk factors should be integrated into therapeutic decisions to prevent empirical overprescribing of antibiotics for methicillin-resistant *Staphylococcus aureus* (MRSA) and *P. aeruginosa*.

Healthcare-Associated Pneumonia Does Not Accurately Identify Potentially Resistant Pathogens: A Systematic Review and Meta-Analysis

James D. Chalmers Catriona Rother Waleed Salih Santiago Ewig

[Clin Infect Dis \(2014\) 58 \(3\): 330-339](#)

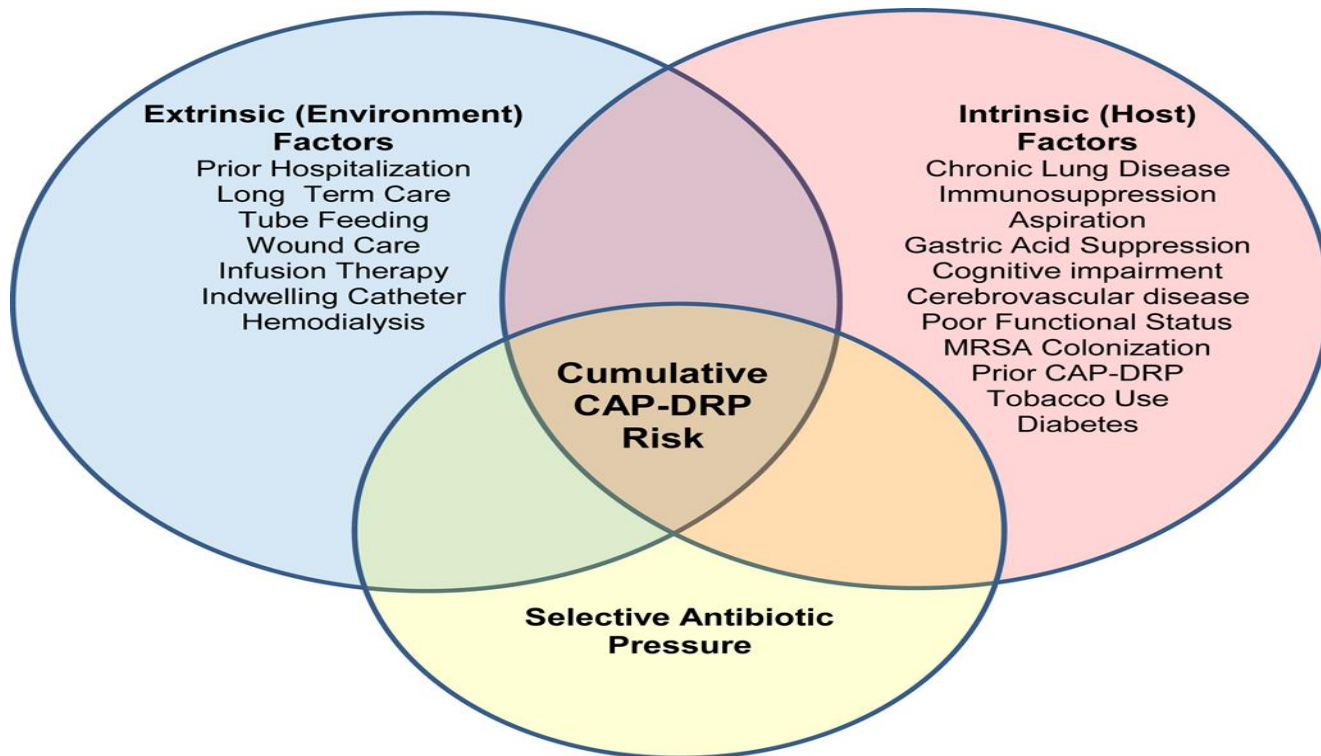
Conclusions. The HCAP concept is based on predominantly low-quality evidence and does not accurately identify resistant pathogens. Mortality in HCAP does not appear to be due to a higher frequency of resistant pathogens.

Predicting risk of drug-resistant organisms in pneumonia: Moving beyond the HCAP model

Brandon J. Webb, Kristin Dascomb, Edward Stenehjem, Nathan Dean

Respiratory Medicine

Volume 109, Issue 1, Pages 1-10 (January 2015)



HCAP is present: Residing in a nursing home, recent hospitalization, hemodialysis, home infusion therapy



Assess severity of illness
(Need for mechanical ventilation, ICU admittance)
AND
Presence of risk factors for MDR pathogens
(recent antibiotics, recent hospitalization, poor functional status, immunosuppression)



Severe pneumonia

No

Yes



Group 1 (0-1 risks)

Treat for common CAP
pathogens (consider oral rx)
Quinolone or
Beta-lactam/macrolide.

Group 2 (≥ 2 risks)

Treat for MDR pathogens
with HAP therapy.

Group 3 (0 risks)

Treat for severe
pneumonia in hospital.
Beta-lactam PLUS
macrolide or quinolone.

Group 4 (≥ 1 risks)

Treat for MDR
pathogens with HAP
recommendations.
Use 3 drugs.

ASPIRATION PNEUMONIA & ASPIRATION PNEUMONITIS

Tahseen J. Siddiqui, M.D

ASPIRATION PNEUMONITIS AND ASPIRATION PNEUMONIA

PAUL E. MARIK, M.B., B.CH, N Engl J Med, Vol. 344, No. 9 • March 1, 2001 • www.nejm.org •

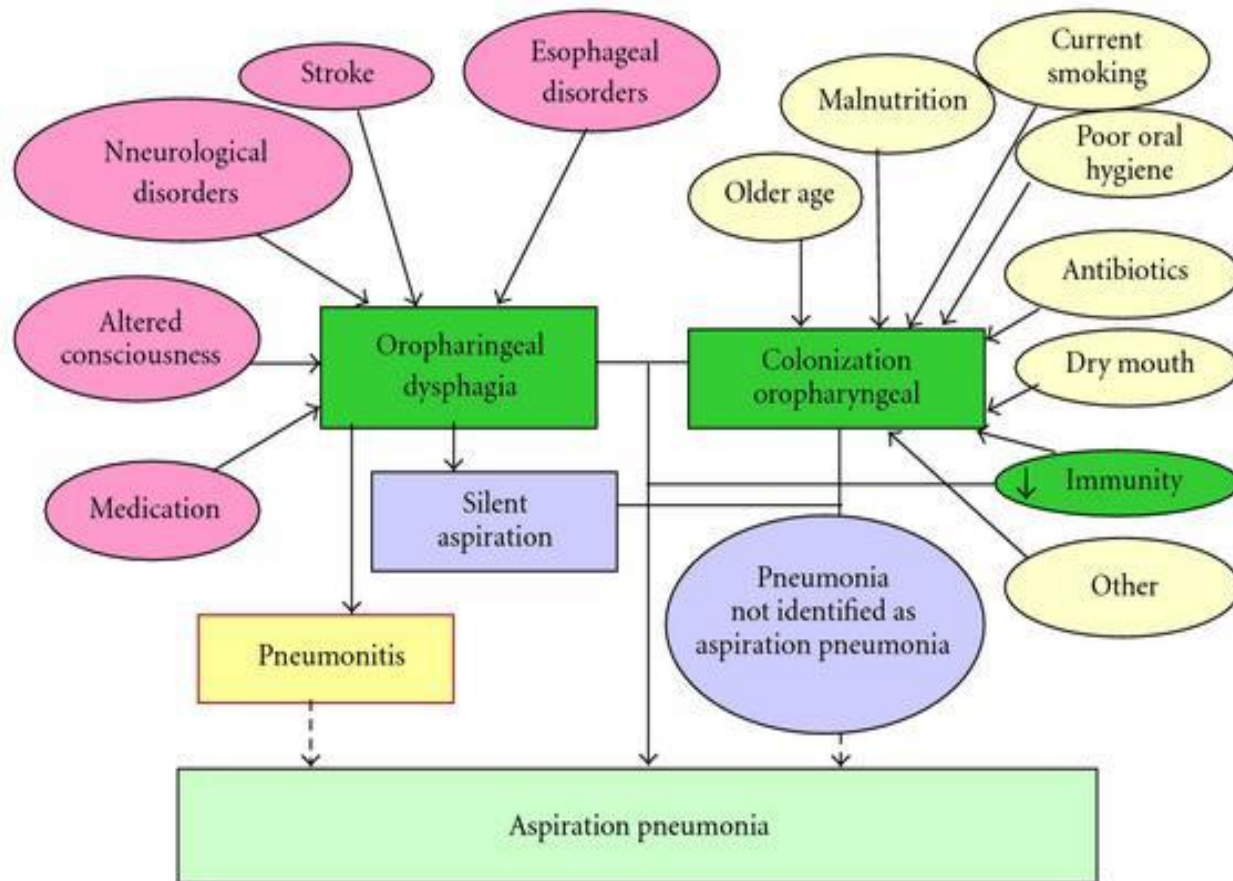
671

“Σύνδρομα” εισρόφησης

- Χημική πνευμονίτιδα (Mendelson syndr.)
- Πνευμονία
- Ξένου σώματος
- Λιποειδική πνευμονία

σημασία...

- Εισροφηθέν υλικό
- Ποσότητα
- Κατάσταση ασθενούς



Aspiration pneumonia/pneumonitis statistics
(overall incidence is hard to ascertain):

- 5-15% of CAP
- 18% of pneumonias in nursing home residents
- Aspiration pneumonitis occurs in approximately 10% of patients who are hospitalized after a drug overdose.
- Aspiration pneumonitis is a complication of general anesthesia, occurring in approximately 1 of 3,000 operations in which anesthesia is administered and accounting for 10-30 % of all deaths associated with anesthesia.

Aspiration Pneumonitis (Treatment)

- Uncomplicated cases: supportive measures such as airway clearance, oxygen supplementation, and positive pressure ventilation.
- **Antibiotics do not seem to alter the clinical outcome, including radiographic resolution, duration of hospitalization, or death rate, nor do they influence the subsequent development of infection.**

Αντιβίωση σε πνευμονίτιδα ?

- Όχι πριν τις 48 h
- Σε υποψία αποικισμού του γαστρικού περιεχομένου
όπως σε απόφραξη του λεπτού εντέρου ή σε λήψη αντιόξινων, PPIs κλπ

Treatment

- Treat hypoxemia/provide oxygen
- Empiric antibiotic selection depends on setting/patient characteristics
 - ▣ No clear guidelines on which regimen is best
- CA:
 - Respiratory FQ + clindamycin, metronidazole
 - OR**
 - β -lactam/ β -lactamase inhibitor

Aspiration pneumonia

- **Aspiration pneumonia empiric therapy**
- The causative organisms in aspiration pneumonia have been noted to be similar to those of CAP or HCAP
- Patients with severe periodontal disease, putrid sputum, or a history of alcoholism with suspected aspiration pneumonia may be at greater risk of anaerobic infection.
- One of the following antibiotic regimens is suggested for such patients:
 - **Piperacillin-tazobactam**
 - **Imipenem**
 - **Clindamycin or metronidazole plus a respiratory fluoroquinolone plus ceftriaxone**

Αγωγή

- Χωρίς προδιαθεσικούς (για αναερόβια) / Μη τοξικός

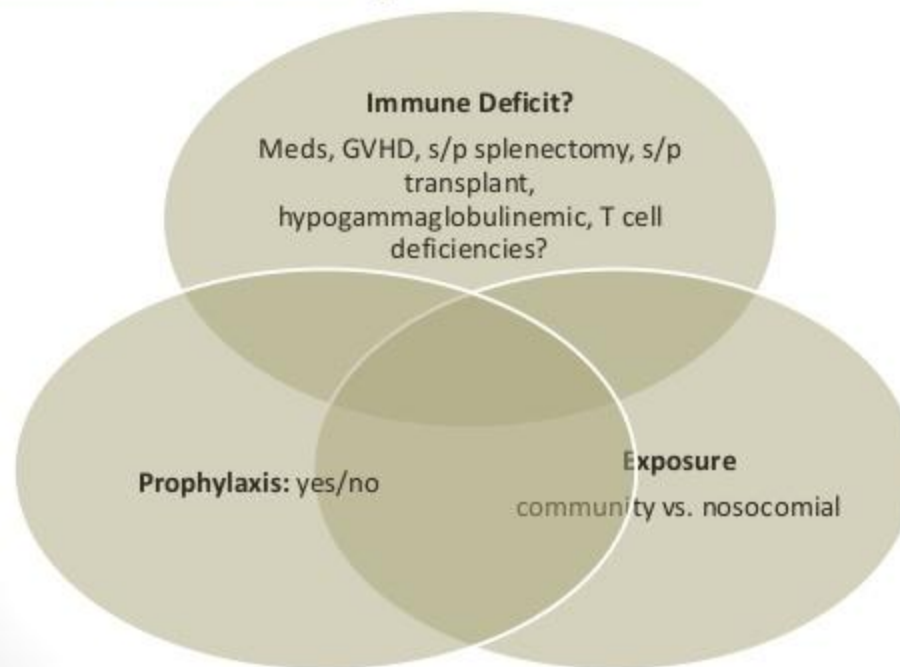
κεφαλοσπορίνη 3^{ης} γενιάς + μακρολίδη
ή φλουροκινολόνη

- Σοβαρή πνευμονία / τοξικός

Pip/Taz ή imipenem/cilastatin + Βανκομυκίνη +/- κλινδαμυκίνη

Τα κορτικοειδή δεν έχουν θέση παρά μόνο στην αντιμετώπιση καταστάσεων όπως βρογχόσπασμος, σηπτικό shock, ARDS

Infections in the Immunocompromised



Major immunocompromised host groups

- HIV/AIDS
- Solid organ and hematopoietic cell transplants
- Malignancy on chemotherapy or radiation therapy
- Primary immunodeficiencies and autoimmune diseases
- Acquired immunodeficiencies: asplenia, long-term steroid use

Underlying Immune Defects Determines Risk of Infection

Humoral

- **Encapsulated bacteria**
 - *S. Pneumo*
 - *H. Influenza*
 - *N. meningitidis*
 - *Capnocytophaga canimorsus*
 - *Bordetella holmesii*
- **Parasites**
 - Giardia
 - Cryptosporidia
- Salmonella
- Campylobacter

Cell-mediated

- **Intracellular pathogens**
 - Mycobacteria
 - *Legionella*
 - *Listeria*
- Nocardia
- Strongyloides
- **Fungi**
 - Histoplasma
 - Cryptococcus
 - Candida
 - Molds: Aspergillus, Mucor
 - Pneumocystis
- **Viruses**
 - Herpes viruses: CMV, EBV, HSV, VZV, HHV6

Levels of Immunosuppression & Risk of Infections

High level

- Primary combined immunodeficiency
- Receiving cancer chemotherapy
- **Within 2 months after solid organ transplantation**
- HIV with CD4 <200
- **Daily corticosteroid therapy with dose $\geq 20\text{mg}$ or prednisone or equivalent for ≥ 14 days**
- Receiving certain **biologic immune modulators**- tumor necrosis factor-alpha (TNF- α) blocker or rituximab

Low level

- Asymptomatic HIV with CD4 ≥ 200
- Lower daily dose of systemic corticosteroids
- Methotrexate $\leq 0.4\text{mg/kg/week}$; azathioprine $\leq 3\text{mg/kg/day}$, or 6-mercaptopurine $\leq 1.5\text{mg/kg/day}$

Rubin et al, CID 2013: 1-57.

Complications

- Superinfection
- drug toxicity
- empyema
- sepsis
- pneumothorax
- acute respiratory distress syndrome (ARDS)

Emergency Department Care

- Initial stabilization and resuscitation of the patient as needed according to "ABCs":

- Circulation: crystalloid intravascular resuscitation with or without vasopressor support
- Airway/Breathing: positive pressure ventilatory support or endotracheal intubation with mechanical ventilation

- Diagnostic measures including:

- Basic bloodwork
- Sputum Gram stain and cultures
- Serologies including serum and urine antigen
- Imaging including radiography and CT
- Blood cultures

- Empiric antimicrobial therapy based on most likely pathogens

- In the case of PCP pneumonia, recommendations are for adjuvant corticosteroid therapy when a room air arterial blood gas pO₂ is <70, or if the A-a gradient is >35.



ευχαριστώ