ΜΕΤΑΠΤΥΧΙΑΚΟ ΛΟΙΜΩΞΙΟΛΟΓΙΑΣ
ΔΙΑΛΕΞΕΙΣ ΜΑΘΗΜΑΤΩΝ Α΄ ΕΞΑΜΗΝΟΥ
ΔΕΥΤΕΡΑ 07.11.2022

Πνευμονία συνδεόμενη με υπηρεσίες υγείας

ΠΑΡΑΜΥΘΙΩΤΟΥ ΕΛΙΣΣΑΒΕΤ

ΠΑΘΟΛΟΓΟΣ,ΕΝΤΑΤΙΚΟΛΟΓΟΣ,ΛΟΙΜΩΞΙΟΛΟΓΟΣ

Β ΠΑΝΕΠΙΣΤΗΜΙΑΚΗ ΚΛΙΝΙΚΗ ΕΝΤΑΤΙΚΗΣ ΘΕΡΑΠΕΙΑΣ

ΠΑΝΕΠΙΣΤΗΜΙΑΚΟ ΓΕΝΙΚΟ ΝΟΣΟΚΟΜΕΙΟ ΑΤΤΙΚΟΝ

- Πνευμονία: ορισμός
- Πνευμονία: παθοφυσιολογία
- Πνευμονία: «κατηγορίες»
- HCAP (health – care associated pneumonia)
- HAP (hospital – associated pneumonia)
- Συμπεράσματα

- **Πνευμονία: ορισμός**
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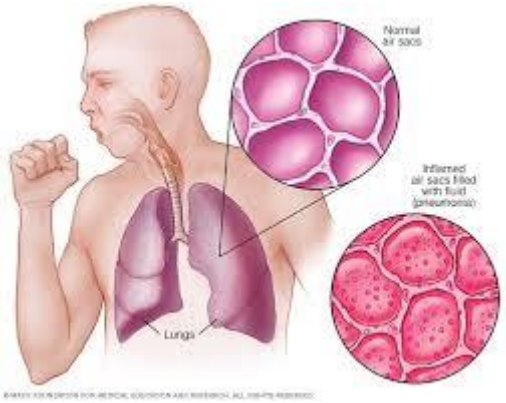
ΠΝΕΥΜΟΝΙΑ

- As "new lung infiltrates plus clinical evidence that the infiltrate is of an infectious origin, which include the new onset of fever, purulent sputum, leukocytosis, and decline in oxygenation."

Pneumonia Essentials 2010 3rd Edition

Burke A. Cunha



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ΠΑΘΟΦΥΣΙΟΛΟΓΙΑ ΠΝΕΥΜΟΝΙΑΣ

- **Υποκείμενοι μηχανισμοί :**

- **ΕΙΣΠΝΟΗ παθογόνων**
- **ΕΙΣΡΟΦΗΣΗ παθογόνων**
- **ΑΙΜΑΤΟΓΕΝΗΣ ΔΙΑΣΠΟΡΑ**

ΠΑΘΟΦΥΣΙΟΛΟΓΙΑ ΠΝΕΥΜΟΝΙΑΣ

- **ΕΙΣΠΝΟΗ ΠΑΘΟΓΟΝΩΝ**:

- Είτε οι μικροοργανισμοί παρακάμπτουν τους φυσιολογικούς μηχανισμούς άμυνας – πνευμονία κοινότητας -

- Είτε ο ασθενής εισπνέει *gram - αρνητικούς* μικροοργανισμούς οι οποίοι αποικίζουν το ανώτερο αναπνευστικό σύστημα ή το μηχάνημα υποστήριξης της αναπνοής.

- The development of hospital-acquired pneumonia (HAP) represents **an imbalance** between normal host defenses and the ability of microorganisms to colonize and then invade the lower respiratory tract.

ΠΑΘΟΦΥΣΙΟΛΟΓΙΑ ΠΝΕΥΜΟΝΙΑΣ

- **ΠΝΕΥΜΟΝΙΑ <u>ΑΠΟ ΕΙΣΡΟΦΗΣΗ</u>:**

  - Εισρόφηση **αποικισμένων εκκρίσεων** ανώτερων αναπνευστικών οδών

- Το στομάχι είναι ένα είδος «αποθήκης» gram – αρνητικών παθογόνων τα οποία αποικίζουν το αναπνευστικό σύστημα

- Η χρήση των φαρμάκων <u>για καταστολή παραγωγής γαστρικών υγρών αυξάνει</u> την συχνότητα στην εμφάνιση της πνευμονίας (κυρίως οι αναστολείς αντλίας πρωτονίων)

ΠΑΘΟΦΥΣΙΟΛΟΓΙΑ ΠΝΕΥΜΟΝΙΑΣ

- **<u>Η αιματογενής οδός</u>** περιλαμβάνει την παρουσία λοίμωξης από μακρινή πηγή

- Οι μικροοργανισμοί φθάνουν στους πνεύμονες μέσω **αιματικής κυκλοφορίας**

- Πνευμονία: ορισμός
- Πνευμονία: παθοφυσιολογία
- **Πνευμονία: «κατηγορίες»**
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« Κατηγορίες » ΠΝΕΥΜΟΝΙΑΣ

- **CAP**
- **HCAP**
- **HAP**
- **VAP**

CAP (community – acquired pneumonia)
HAP (hospital – acquired pneumonia)
VAP (ventilator – associated pneumonia)
HCAP (health – care associated pneumonia

ΣΕ ΤΙ ΑΠΟΣΚΟΠΟΥΝ ΑΥΤΟΙ ΟΙ ΔΙΑΧΩΡΙΣΜΟΙ;

Στο γεγονός οτι **διαφορετικοί μικροοργανισμοί** εμπλέκονται στην αιτιολογία της πνευμονίας ανάλογα με την περίπτωση

Διαφορετική η εμπειρική θεραπεία που εφαρμόζεται

- Πνευμονία: ορισμός
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ΟΡΙΣΜΟΣ

The term healthcare-associated pneumonia (HCAP) was defined as pneumonia in NONHOSPITALIZED patients who had significant experience with the healthcare system and were believed to be at an increased risk for infection with multidrug-resistant (MDR) organisms because of such contact

Am J Respir Crit Care Med Vol 171. pp 388–416, 2005

ΟΡΙΣΜΟΣ

- Retrospective studies have actually suggested a **worse outcome** when broad-spectrum antibiotics were NOT used in these cases.

ΟΡΙΣΜΟΣ

- Any patient who was hospitalized in an acute care hospital for two or more days **within 90 days** of the infection;
- Resided in a nursing home or long-term care facility;
- Received recent intravenous antibiotic therapy, chemotherapy, or wound care within **the past 30 days** of the current infection;
- Hemodialysis clinic
- Are exposed to a family member with a drug-resistant pathogen infection

HCAP

- Η έννοια της HCAP εισήχθη **το 2005** ως ξεχωριστή νοσολογική οντότητα στις κατευθυντήριες γραμμές για την θεραπεία της νοσοκομειακής πνευμονίας .

American Thoracic Society Documents

Guidelines for the Management of Adults with Hospital-acquired, Ventilator-associated, and Healthcare-associated Pneumonia

Am J Respir Crit Care Med Vol 171. pp 388–416, 2005

Που στηρίχθηκε αυτή η οδηγία;

Epidemiology and Outcomes of Health-care–Associated Pneumonia: Results From a Large US Database of Culture-Positive Pneumonia

- **Of a database of 3209 patients from**
- **59 US hospitals with CAP and a positive culture,**
- **34% of patients had a pathogen resistant to standard empirical therapy, mostly MRSA and PA**

- KollefMarin H.MD, FCCPaShorrAndrewMD, MPH, FCCPbTabakYing P.PhDccGuptaVikasPharmD, BCPScLiuLarry Z.MD, PhDdJohannesR.S.MD, MSc

Chest 2005;128:3854e62.

Epidemiology and Outcomes of Health-care–Associated Pneumonia: Results From a Large US Database of Culture-Positive Pneumonia

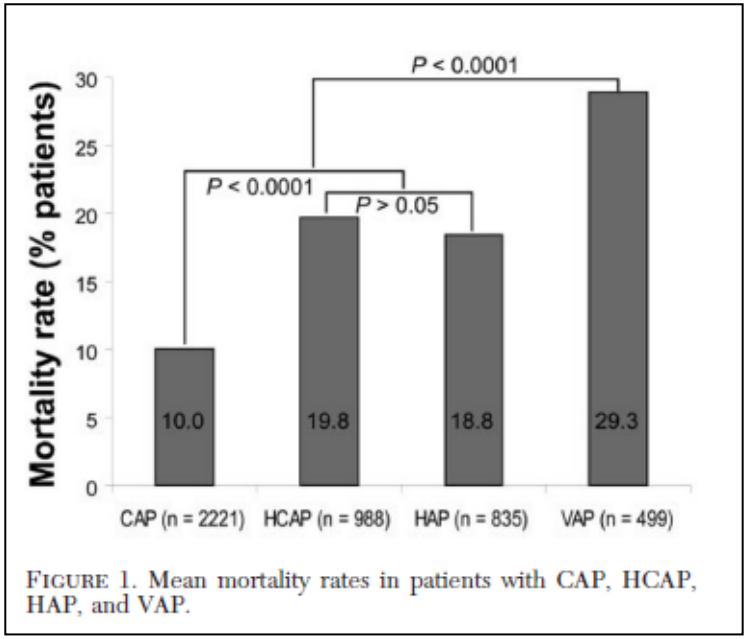

FIGURE 1. Mean mortality rates in patients with CAP, HCAP, HAP, and VAP.

- KollefMarin H.MD, FCCPaShorrAndrewMD, MPH, FCCPbTabakYing P.PhDccGuptaVikasPharmD, BCPScLiuLarry Z.MD, PhDdJohannesR.S.MD, MSc

Chest 2005;128:3854e62.

- Οι μικροοργανισμοί που θεωρήθηκε οτι ΔΕΝ καλύπτονταν από την εμπειρική αγωγή και στους οποίους αποδιδόταν η αυξημένη θνητότητα ήταν

- ***Staph aureus***
- ***Pseudomonas aeruginosa***

Chest 2005;128:3854e62.

- Η τακτική αυτή εφαρμόστηκε κυρίως σε ΗΠΑ
- Ιαπωνία, Κορέα,
- Ιταλία

- Κατέληξε σε αυξημένη χρήση αντιμικροβιακών έναντι σταφυλοκόκκου

- However, more recent studies have indicated that many individuals who met the criteria for HCAP were not infected with MDR pathogens.

ΣΥΧΝΟΤΗΤΑ HCAP

- 17,3 % - 67,4%

Curr Opin Infect Dis. 2008 Apr;21(2):168-73.

Ann Intern Med. 2009;150:19-26

Surveillance of infections in long-term care facilities (LTCFs): The impact of participation during multiple years on health care-associated infection incidence

A. P. J. Haenen[1,2], L. P. Verhoef[1], A. Beckers[3], E. F. Gijsbers[1], J. Alblas[1], A. Huis[2], M. Hulscher[2], S. C. de Greeff[1] and on behalf of the SNIV study group

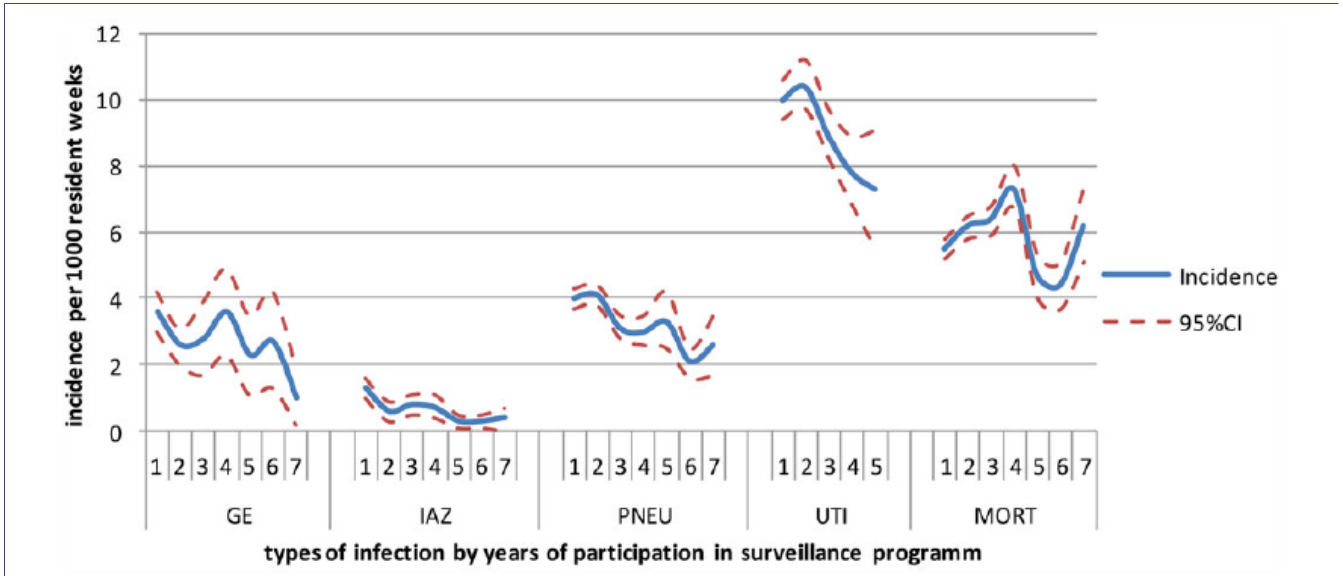

Fig. 2. Incidence per 1000 residents weeks per each successive year participating in surveillance. GE, gastroenteritis; IAZ, influenza-like illness; PNEU, probable pneumonia; UTI, urinary tract infections; MORT, mortality.

Association of guideline-based antimicrobial therapy and outcomes in healthcare-associated pneumonia

Michael B. Rothberg[1]*, Marya D. Zilberberg[2], Penelope S. Pekow[3], Aruna Priya[3], Sarah Haessler[4], Raquel Belforti[5], Daniel Skiest[4], Tara Lagu[3], Thomas L. Higgins[6] and Peter K. Lindenauer[3]

[1]Center for Value-Based Care Research, Medicine Institute, Cleveland Clinic, Cleveland, OH, USA; [2]EviMed Research Group, LLC, Goshen, MA, USA; [3]Center for Quality of Care Research, Baystate Medical Center, Springfield, MA, USA; [4]Division of Infectious Diseases, Baystate Medical Center, Springfield, MA, USA; [5]Division of General Medicine, Baystate Medical Center, Springfield, MA, USA; [6]Division of Pulmonary/Critical Care Medicine, Baystate Medical Center, Springfield, MA, USA

Patients and methods: We conducted a pharmacoepidemiological cohort study at 346 US hospitals. We included adults hospitalized between July 2007 and June 2010 for HCAP, defined as patients admitted from a nursing home, with end-stage renal disease or immunosuppression, or discharged from a hospital in the previous 90 days. Outcome measures included in-hospital mortality, length of stay and costs.

Conclusions: Among patients who met HCAP criteria, GBT was not associated with lower adjusted mortality, length of stay or costs in any analyses. Better criteria are needed to identify patients at risk for MDR infections who might benefit from broad-spectrum antimicrobial coverage.

J Antimicrob Chemother 2015; **70**: 1573–1579

Guideline-Concordant Antimicrobial Therapy for Healthcare-Associated Pneumonia: A Systematic Review and Meta-analysis

Anthony X. Troitino · Jahan Porhomayon · Ali A. El-Solh

Results A total of six studies were included in the analysis and involved 15,850 participants. Meta-analysis showed that GCAT was associated with increased 30-day mortality compared to non-GCAT (OR 1.80, 95 % confidence interval [CI] 1.26–2.7). There was no advantage in GCAT over non-GCAT in terms of hospital length of stay (WMD 1.18 days, 95 % CI −0.48 to 2.84) or time to clinical stability (WMD 0.17 days, 95 % CI −0.32 to 0.67).

Conclusion In hospitalized patients with HCAP, GCAT did not show survival benefit compared to non-GCAT. However, our results are limited by the cohort design of the selected studies and the degree of heterogeneity among them. Future trials are needed to identify risk factors for multidrug-resistant pathogens in HCAP patients who may benefit from broad-spectrum antimicrobial regimens.

Lung (2013) 191:229–237

Guideline-Concordant Antimicrobial Therapy for Healthcare-Associated Pneumonia: A Systematic Review and Meta-analysis

Anthony X. Troitino · Jahan Porhomayon · Ali A. El-Solh

- Απουσιάζουν οι τυχαιοποιημένες κλινικές μελέτες για να αξιολογήσουν την επίπτωση της εφαρμογής των κατευθυντηριων οδηγιών

Lung (2013) 191:229–237

Health Care–Associated Pneumonia
Is It Still a Useful Concept?

Grant W. Waterer, MBBS, PhD[a,b,*]

Clin Chest Med 39 (2018) 765–773

- Οι επόμενες μελέτες δεν επιβεβαίωσαν την ύπαρξη του υψηλού ποσοστού πολυανθεκτικών της μελέτης Kollef
- Η αυξημένη θνητότητα δεν μπορούσε εύκολα να αποδοθεί στη μη σωστή χρήση αντιμικροβιακών
- Η παρουσία μάλλον διαφόρων παραγόντων κινδύνου φαίνεται να εμπλέκεται με την αυξημενη θνητότητα

Health Care–Associated Pneumonia

Is It Still a Useful Concept?

Grant W. Waterer, MBBS, PhD[a,b,*]

Table 1
Individual risk factors for methicillin-resistant *Staphylococcus aureus* and multiresistant gram negatives like *Pseudomonas*

Risks for MRSA	Risks for *Pseudomonas* and Other Multiresistant Gram Negatives
Recent hospitalization[20,25,59,60]	Recent hospitalization[25,61]
Residence in aged-care facility[25,62,63]	Residence in aged-care facility[62,64]
Severe chronic obstructive pulmonary disease[25,59]	Severe chronic obstructive pulmonary disease[61,62,65–67]
Antibiotics in the prior 90 d[25]	Antibiotics in the prior 90 d[25,62,66,68]
Prior culture of MRSA[20,21,27,60,70]	Bronchiectasis[61,66,69]
Diabetes[25,60,62,63,71]	Prior culture of PA or multiresistant gram negative[27,64]
Tube feeding[60]	Tube feeding[46,66,72,73]
Cerebrovascular disease[60,63]	Cerebrovascular disease[25]
Chronic wound care[74]	

Narrative review

Healthcare-associated pneumonia: is there any reason to continue to utilize this label in 2019?

S. Ewig [1,*], M. Kolditz [2], M.W. Pletz [3], J. Chalmers [4]

[1] Thoraxzentrum Ruhrgebiet, Kliniken für Pneumologie und Infektiologie, Herne und Bochum, Germany
[2] Division of Pulmonology, Medical Department I, University Hospital Carl Gustav Carus, Technische Universität Dresden, Germany
[3] Institute for Infectious Diseases and Infection Control, Jena University Hospital, Jena, Germany
[4] Scottish Centre for Respiratory Research, University of Dundee, Ninewells Hospital and Medical School, Dundee, DD1 9SY, UK

Μελέτες για HCAP μεταξύ 2014 και 2018

Clinical Microbiology and Infection 25 (2019) 1173–1179

Narrative review

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- 41 μελέτες συμπεριλήφθησαν αρχικά
- Δέκα μελέτες συνέκριναν HCAP και CAP
- Οι ασθενείς με HCAP μεγαλύτερης ηλικίας και με περισσότερες συννοσηρότητες.
- Η θνητότητα ήταν μεγαλύτερη στην HCAP
- Αλλά οι προγνωστικοί παράγοντες για την θνητότητα, ΔΕΝ ήταν η λοίμωξη από MDR αλλά **η λειτουργική κατάσταση** του ασθενούς και η **παρουσία κακοήθειας**

Clinical Microbiology and Infection 25 (2019) 1173–1179

Narrative review

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The DRIP score for the prediction of multidrug-resistant (MDR) pathogens in pneumonia patients [46]. The cutoff is ≥4 points

Characteristic	No. of points
Major risk factors	
Antibiotic use previous 60 days	2
Residence in long-term care facility	2
Tube feeding	2
Prior infection with MDR (1 year)	2
Minor risk factors	
Hospitalization within previous 60 days	1
Chronic pulmonary disease	1
Poor functional status	1
Gastric acid suppression	1
Wound care	1
MRSA colonization (1 year)	1
Total no. of points possible	14

ΤΙ ΘΑ ΠΡΕΠΕΙ ΝΑ ΚΑΝΟΥΜΕ ΣΕ ΠΕΡΙΠΤΩΣΗ HCAP?

- Να στηριχτούμε σε τοπικά επιδημιολογικά δεδομένα
- Να πάρουμε **καλλιέργειες** ΠΡΙΝ την έναρξη ή την ΤΡΟΠΟΠΟΙΗΣΗ της αγωγής
- **Αν στηριχτούμε σε επιδημιολογικά δεδομένα άλλων κινδυνεύουμε να υπο – η υπερ θεραπεύσουμε**
- Οι μοριακές τεχνικές πιθανόν να αποδειχτούν χρήσιμες

Clin Chest Med 39 (2018) 765–773

Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society

Andre C. Kalil,[1,a] Mark L. Metersky,[2,a] Michael Klompas,[3,4] John Muscedere,[5] Daniel A. Sweeney,[6] Lucy B. Palmer,[7] Lena M. Napolitano,[8] Naomi P. O'Grady,[9] John G. Bartlett,[10] Jordi Carratalà,[11] Ali A. El Solh,[12] Santiago Ewig,[13] Paul D. Fey,[14] Thomas M. File Jr,[15] Marcos I. Restrepo,[16] Jason A. Roberts,[17,18] Grant W. Waterer,[19] Peggy Cruse,[20] Shandra L. Knight,[20] and Jan L. Brozek[21]

- **Αφαίρεση της έννοιας HCAP από τις κατευθυντήριες γραμμές**

CID • Kalil et al 2016

- Πνευμονία: ορισμός
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ΟΡΙΣΜΟΣ

- **Hospital-acquired pneumonia (HAP)**
- Λοίμωξη κατώτερου αναπνευστικού που ΔΕΝ βρισκόταν σε επώαση όταν ο ασθενής εισήχθη στο νοσοκομείο και η οποία παρουσιάζεται 2 ή περισσότερες ημέρες ΜΕΤΑ την είσοδο στο νοσοκομείο
- Το επεισόδιο της πνευμονίας ΔΕΝ σχετίζεται με τον μηχανικό αερισμό (VAP)

ΑΙΤΙΟΛΟΓΙΑ HAP
συχνά αίτια

- ***P aeruginosa***
- ***Staphylococcus aureus***, including methicillin-susceptible *S aureus* (MSSA) and methicillin-resistant *S aureus* (MRSA)
- ***Klebsiella pneumoniae***
- ***Escherichia coli***
- **Non-Enterobacteriaceae** bacteria such **as *S marcescens*, *Stenotrophomonas maltophilia*, and *Acinetobacter* species** are less common causes
- *Acinetobacter* species commonly colonize respiratory tract secretions in patients in the ICU. HAP caused by *Acinetobacter* species or *B cepacia* may be associated with outbreaks.
- ***Streptococcus pneumoniae* and *Haemophilus influenzae*** are recovered only in early-onset HAP.

ΑΙΤΙΟΛΟΓΙΑ HAP
Σπάνιες αιτίες

***Legionella* species**

Influenza A virus

Respiratory syncytial virus (RSV)

Human parainfluenza virus 3 (HPIV-3)

Human metapneumovirus (hMPV)

Nosocomial *Legionella* pneumonia occurs often in outbreaks or clusters.

Influenza A, RSV, hMPV, or HPIV-3 may cause hospital-acquired pneumonia (HAP) from person-to-person spread.

Epidemiology, pathogenesis, microbiology, and diagnosis of hospital-acquired (and ventilator-associated pneumonia) in adults

The pathogenesis of HAP (or nosocomial pneumonia) (and VAP) is related to the number and virulence of micro-organisms entering the lower respiratory tract and the response of the host (eg, mechanical, humoral, and cellular host defenses)

- Approximately 45 percent of healthy subjects aspirate during sleep and an even higher proportion of severely ill patients aspirate routinely

- Michael Klompas, MD, MPH, Thomas M File, Jr, MD, Sheila Bond, MD, uptodate 2019

Epidemiology, pathogenesis, microbiology, and diagnosis of hospital-acquired and ventilator-associated pneumonia in adults

- Hospitalized patients often become **colonized** with **microorganisms** acquired from the hospital environment, and as many as 75 percent of severely ill patients will be colonized within 48 hours

- Sievert DM, Ricks P, Edwards JR, et al. Infect Control Hosp Epidemiol 2013; 34:1.

Epidemiology, pathogenesis, microbiology, and diagnosis of hospital-acquired and ventilator-associated pneumonia in adults

261 episodes of HAP in nonventilated patients were identified

Sievert DM, Ricks P, Edwards JR, et al. Infect Control Hosp Epidemiol 2013; 34:1.

Epidemiology, pathogenesis, microbiology, and diagnosis of hospital-acquired and ventilator-associated pneumonia in adults

- The infecting flora **in nonventilated patients with HAP** was similar, except non-Enterobacteriaceae gram-negative bacilli (***P. aeruginosa, Acinetobacter, and S. maltophilia***) were less likely

- Specifically, it included ***MSSA*** (13 percent), ***MRSA*** (20 percent), ***P. aeruginosa*** (9 percent), ***S. maltophilia*** (1 percent), ***Acinetobacter spp*** (3 percent), and other species (18 percent).

Γιατί μας απασχολεί η HAP ?

- **Επειδή παρουσιάζει σημαντική νοσηρότητα και θνητότητα**
- **Η εκτιμώμενη θνητότητα από HAP είναι 20-30%**
- **Ειναι η δεύτερη σε συχνότητα νοσοκομειακή λοίμωξη**
- **Αυξάνει τη διάρκεια και το κόστος νοσηλείας**

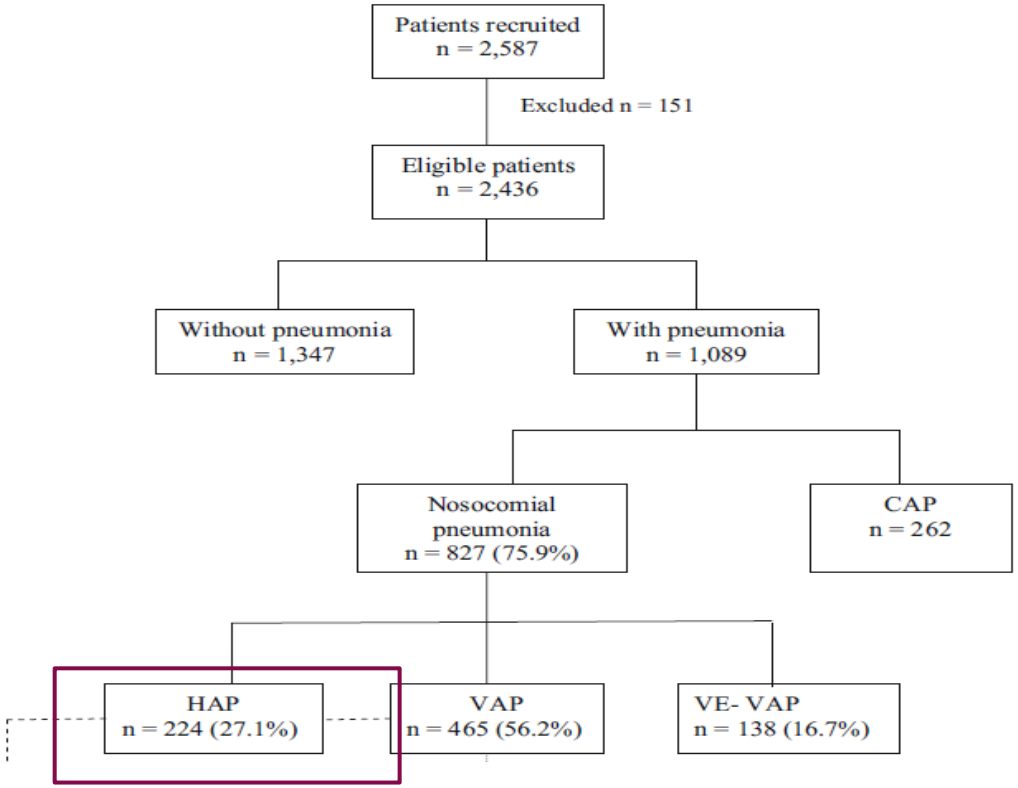
An overview of guidelines for the management of hospital-acquired and ventilator-associated pneumonia caused by multidrug-resistant Gram-negative bacteria

Curr Opin Infect Dis 2019, 32:000–000

Catia Cillóniz[a,b], *Cristina Dominedò*[c], *and Antoni Torres*[a,b]

Nosocomial pneumonia in 27 ICUs in Europe: perspectives from the EU-VAP/CAP study

D. Koulenti [1,2] · E. Tsigou [3] · J. Rello [4,5]



Eur J Clin Microbiol Infect Dis 10 June 2016

MDR risk factors

- The etiology of HAP (and VAP) depends in large part upon whether the patient has risk factors for MDR pathogens
- The frequency of specific MDR pathogens **varies** among hospitals, within hospitals, and between different patient populations.
- **Prolonged hospitalization and recent exposure to antibiotics** are two of the most important risk factors for MDR pathogens.
- An awareness of the susceptibility patterns of the nosocomial pathogens within a given health care setting is important for appropriate empiric antimicrobial therapy

Uptodate 2019

MDR ΟΡΙΣΜΟΙ

- **Multidrug resistant (MDR**) refers to acquired nonsusceptibility to at least one agent in three different antimicrobial classes.
- **Extensively drug resistant (XDR**) refers to nonsusceptibility to at least one agent in all but two antimicrobial classes.
- **Pandrug resistant (PDR**) refers to nonsusceptibility to all antimicrobial agents that can be used for treatment.

Magiorakos AP, Srinivasan A, Carey RB, et al. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. Clin Microbiol Infect 2012; 18:268.

Table 1. Hospital-acquired pneumonia/ventilator-associated pneumonia caused by multidrug-resistant Gram-negative pathogens: prevalence and outcomes

Micek et al 2015	**retrosp**	**HAP (PSEUD)**	**31%MDR**
Behnia et al 2014	retrosp	HAP/VAP	75% k.pneum, ESBL
Di Pasquale 2014	retrosp	HAP/VAP	28% MDR P.AERUGINOSA

Curr Opin Infect Dis 2019, 32:000–000

ΦΥΣΙΚΗ ΕΞΕΤΑΣΗ

- Physical findings in nosocomial pneumonia relate to the pneumonia's **distribution in the chest**.
- Physically, **lobar lesions** caused by nosocomial pneumonia mimic those caused by any other type of pneumonia (eg, rales in the location of the pneumonic process).
- A 10-year retrospective study by Qi et al found that the most common clinical manifestation and **signs of pneumonia** were **fever/cough and pulmonary rales**, occurring in 491/543 and 344/543 patients. [29]
- Symptoms can also include components of the CURB-65 scoring system, including confusion, blood urea >7 mmol/L, respiratory rate >30 breaths/min, systolic blood pressure < 90 mmHg or diastolic blood pressure < 60 mmHg, and age >65.
- A score of **less than or equal to 2** classified a patient as low-risk, while a score **of greater or equal to 3 indicated** a high-risk patient.

ΔΙΑΓΝΩΣΗ

- Clinical diagnosis based upon a new lung infiltrate plus clinical evidence that the infiltrate is of infectious origin,
- Which includes **the new onset of fever, purulent sputum, leukocytosis, and decline in oxygenation**
- No individual sign or symptoms nor any combination of signs and symptoms have been found to be **highly sensitive or specific for diagnosis.**

CID • Kalil et al 2016

ΔΙΑΦΟΡΙΚΗ ΔΙΑΓΝΩΣΗ

- **The most common causes of infiltrates in ventilated patients with fever and/or leukocytosis include the following conditions:**

- **Congestive heart failure**
- **Pulmonary embolus or infarction**
- **Acute respiratory distress syndrome**
- **Pulmonary drug reactions**
- **Collagen vascular diseases with pulmonary manifestations**
- **Alveolar hemorrhage**
- **Pulmonary contusion**
- **Bronchiolitis obliterans-organizing pneumonia (BOOP)**
- **Hypersensitivity pneumonitis.**
- **Interstitial lung disease**
- **Bronchogenic carcinomas**

ΔΙΑΓΝΩΣΗ

- **Cultures of pulmonary secretions** (sputum, endotracheal aspirates, bronchoalveolar lavage) are also prone to false positives and false negatives
- **Quantitative endotracheal aspirate cultures** had a pooled sensitivity of 48 percent (95% CI 38-57 percent) and positive predictive value of 81 percent (95% CI 67-91 percent)
- **Quantitative bronchoalveolar lavage cultures** had a sensitivity of 75 percent (95% CI 58-88 percent) and positive predictive value of 77 percent (95% CI 66-85 percent)

ΔΙΑΓΝΩΣΗ

- **Molecular diagnostic tests** for detection of respiratory pathogens are being developed and offer promise for more rapid identification of the causes of HAP or VAP
- Although there are **limitations regarding the specificity of these tests** (eg, colonization or true pathogen), they offer the potential for more rapid identification of pathogens and resistance patterns

ΑΡΧΕΣ ΘΕΡΑΠΕΙΑΣ HAP

Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society

Andre C. Kalil,[1,a] Mark L. Metersky,[2,a] Michael Klompas,[3,4] John Muscedere,[5] Daniel A. Sweeney,[6] Lucy B. Palmer,[7] Lena M. Napolitano,[8] Naomi P. O'Grady,[9] John G. Bartlett,[10] Jordi Carratalà,[11] Ali A. El Solh,[12] Santiago Ewig,[13] Paul D. Fey,[14] Thomas M. File Jr,[15] Marcos I. Restrepo,[16] Jason A. Roberts,[17,18] Grant W. Waterer,[19] Peggy Cruse,[20] Shandra L. Knight,[20] and Jan L. Brozek[21]

- Δεν αναγνωρίζεται η έννοια της HCAP
- Η σύσταση να υπάρχει σε κάθε νοσοκομείο το δικό του αντιβιόγραμμα
- Τα δεδομένα χρειάζονται για να ελαττωθεί η περιττή χρήση αντιμικροβιακών εναντι *STAPH AUREUS , PSEUDOMONAS AERUGINOSA*
- Σύσταση για βραχεια διάρκεια χορήγησης αντιμικροβιακών

ΑΡΧΕΣ ΘΕΡΑΠΕΙΑΣ HAP

- Να είναι βασισμένη σε λήψη καλλιεργειών και όχι εμπειρική
- Οι καλλιέργειες να λαμβάνονται με ΜΗ επεμβατικές μεθόδους
- Η έναρξη αγωγής να βασίζεται σε ΚΛΙΝΙΚΑ ΚΡΙΤΗΡΙΑ και όχι σε δείκτες φλεγμονής οπως η προκαλσιτονίνη και η CRPούτε και σε σκορ CPIS

ΑΡΧΕΣ ΘΕΡΑΠΕΙΑΣ HAP

Table 2. Risk Factors for Multidrug-Resistant Pathogens

Risk factors for MDR VAP
Prior intravenous antibiotic use within 90 d
Septic shock at time of VAP
ARDS preceding VAP
Five or more days of hospitalization prior to the occurrence of VAP
Acute renal replacement therapy prior to VAP onset
Risk factors for MDR HAP
Prior intravenous antibiotic use within 90 d
Risk factors for MRSA VAP/HAP
Prior intravenous antibiotic use within 90 d
Risk factors for MDR *Pseudomonas* VAP/HAP
Prior intravenous antibiotic use within 90 d

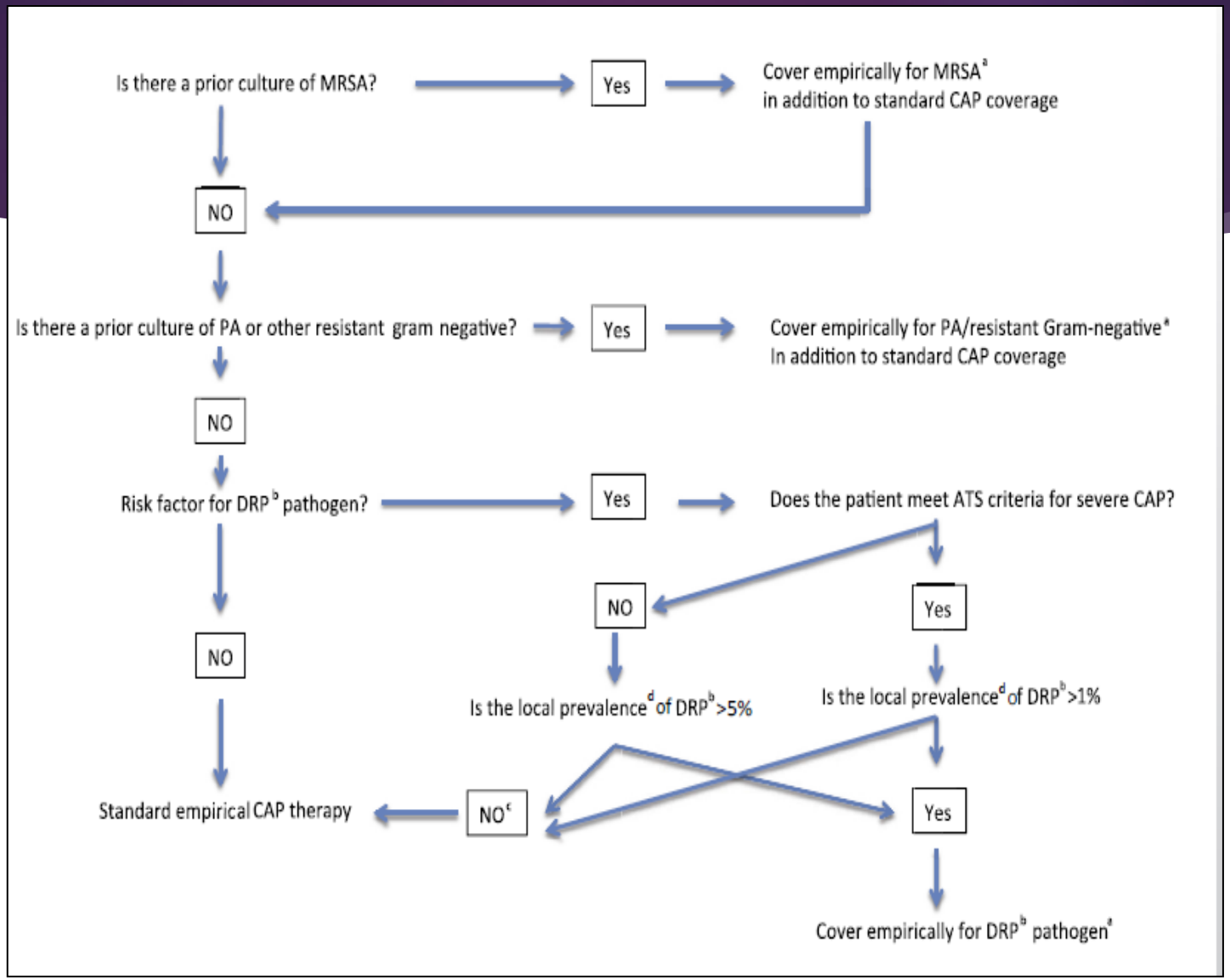
Abbreviations: ARDS, acute respiratory distress syndrome; HAP, hospital-acquired pneumonia; MDR, multidrug resistant; MRSA, methicillin-resistant *Staphylococcus aureus*; VAP, ventilator-associated pneumonia.

ΑΡΧΕΣ ΘΕΡΑΠΕΙΑΣ HAP

Οχι σε μεγάλο κινδυνο θνητοτητας , οχι RF (MRSA,)	ΟΧι mortality αλλά κίνδυνος MRSA	ΨΗΛΟς κινδυνος Θνητότητας
PIP/TAZO	PIP/TAZO	PIP/TAZO
CEFEPIME	CEFEPIME	CEFEPIME,CEFTA
LEVOFLOXACIN	LEVOFLOX	LEVOFLOX
CARBAPENEM	CARBAPE,AZTREP	IMIP/MEROP
	VANCO,LINEZOLID	AMIKACIN,GENTA,TOBRA
		VANCO, LINEZOLID

ΑΡΧΕΣ ΘΕΡΑΠΕΙΑΣ HAP

- Η βελτιστοποίηση της αγωγής πρέπει να συμπεριλαμβάνει τις αρχές της PK/PD



Clin Chest Med 39 (2018) 765–773

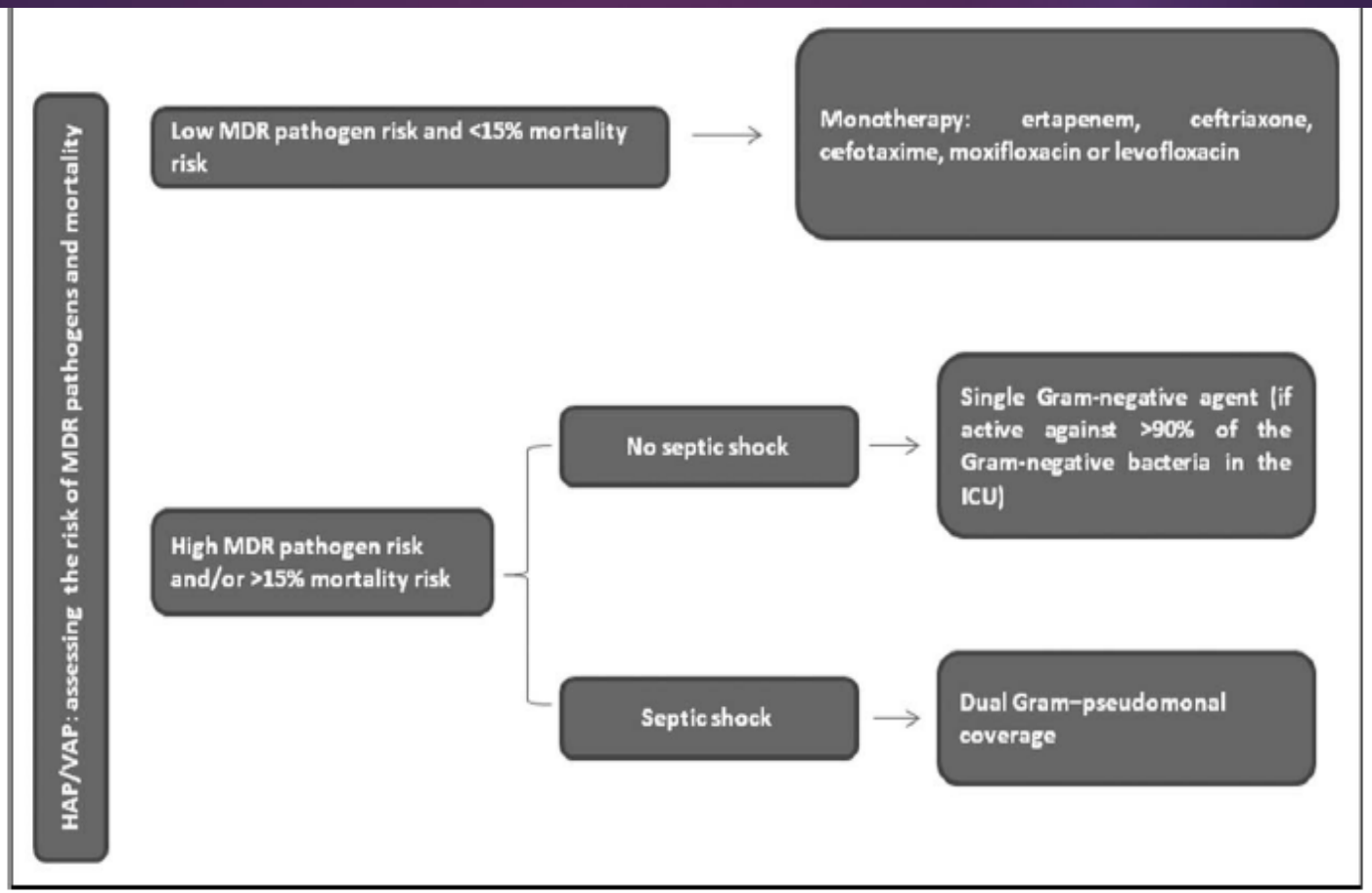


FIGURE 2. Algorithm for the empiric antibiotic treatment of hospital-acquired pneumonia/ventilator-associated pneumonia caused by multidrug-resistant Gram-negative pathogens.

ΘΕΡΑΠΕΙΑ ΚΑΤΕΥΘΥΝΟΜΕΝΗ

- **MRSA** (vancomycin or linezolid)
- ***PSEUDOMONAS AERUGINOSA*** (ανάλογα με το αντιβιόγραμμα) – οχι μονοθεραπέια με αμινογλυκοσίδη

Σε απομόνωση *Pseudomonas aeruginosa*

- Σε αιμοδυναμικά σταθερό ασθενή δεν χρειάζεται συνδυασμένη θεραπεία
- Σε ασταθή αιμοδυναμικά ασθενή καλύτερος ο συνδυασμός
- ΟΧΙ μονοθεραπεία με αμινογλυκοσίδη

Σε απομόνωση gram negative *ESBL (extended spectrum beta lactamase)*

- Ανάλογα με το αντιβιόγραμμα
- Λαμβάνουμε υπόψη και παράγοντες που αφορούν στον ασθενη, πχ αλλεργίες.

Σε απομόνωση *ACINETOBACTER SPP*

- Carbapenem or ampicillin/sulbactam επι ευαισθησίας
- Colistin *επί αντοχής*
- *Δεν προτείνεται τιγκεκυκλινη*
- Δεν προτείνεται προσθήκη ριφαμπικινης

International ERS/ESICM/ESCMID/ALAT guidelines for the management of hospital-acquired pneumonia and ventilator-associated pneumonia

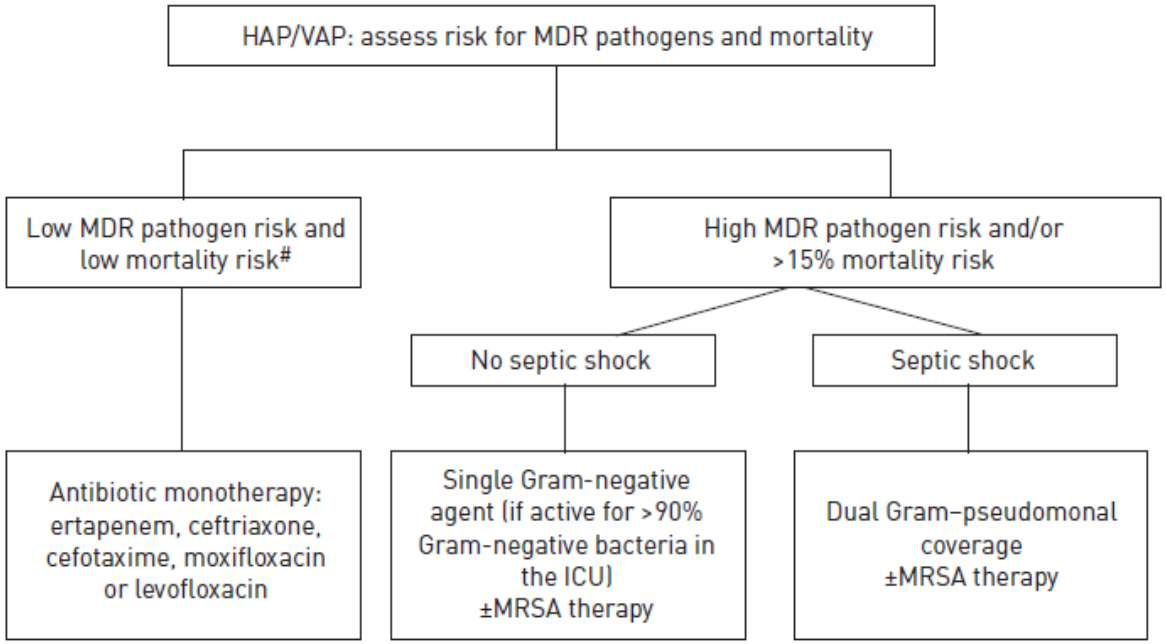


FIGURE 2 Empiric antibiotic treatment algorithm for hospital-acquired pneumonia (HAP)/ventilator-associated pneumonia (VAP). MDR: multidrug-resistant; ICU: intensive care unit; MRSA: methicillin-resistant *Staphylococcus aureus*. #: low risk for mortality is defined as a ⩽15% chance of dying, a mortality rate that has been associated with better outcome using monotherapy than combination therapy when treating serious infection [80].

Eur Respir J 2017; 50:

VAP/HAP
High Risk

American guidelines (2016)	European guidelines (2017)
Previous antibiotic use	Previous antibiotic use
≥5 days of hospitalization	≥5 days of hospitalization
Septic shock	Septic shock
ARDS before VAP	*Hospital settings with high rates of MDR pathogens*
Acute renal replacement therapy before VAP onset	*Previous colonization with MDR pathogens.*

FIGURE 1. Hospital-acquired pneumonia/ventilator-associated pneumonia high risk.

ΔΙΑΡΚΕΙΑ ΘΕΡΑΠΕΙΑΣ

- Σε ασθενείς με HAP, προτείνεται θεραπεία 7 ημερών (strong recommendation, very low quality evidence).
- Παράγοντες που πρέπει να ληφθούν υπόψη: ρυθμός βελτίωσης κλινικών και ακτινολογικών παραμέτρων

Review

Strategies to reduce non-ventilator-associated hospital-acquired pneumonia: A systematic review

Brett G. Mitchell [a,b,*], Philip L. Russo [c,d,e], Allen C. Cheng [f,g], Andrew J. Stewardson [h], Hannah Rosebrock [a], Stephanie J. Curtis [h], Sophia Robinson [i], Martin Kiernan [j]

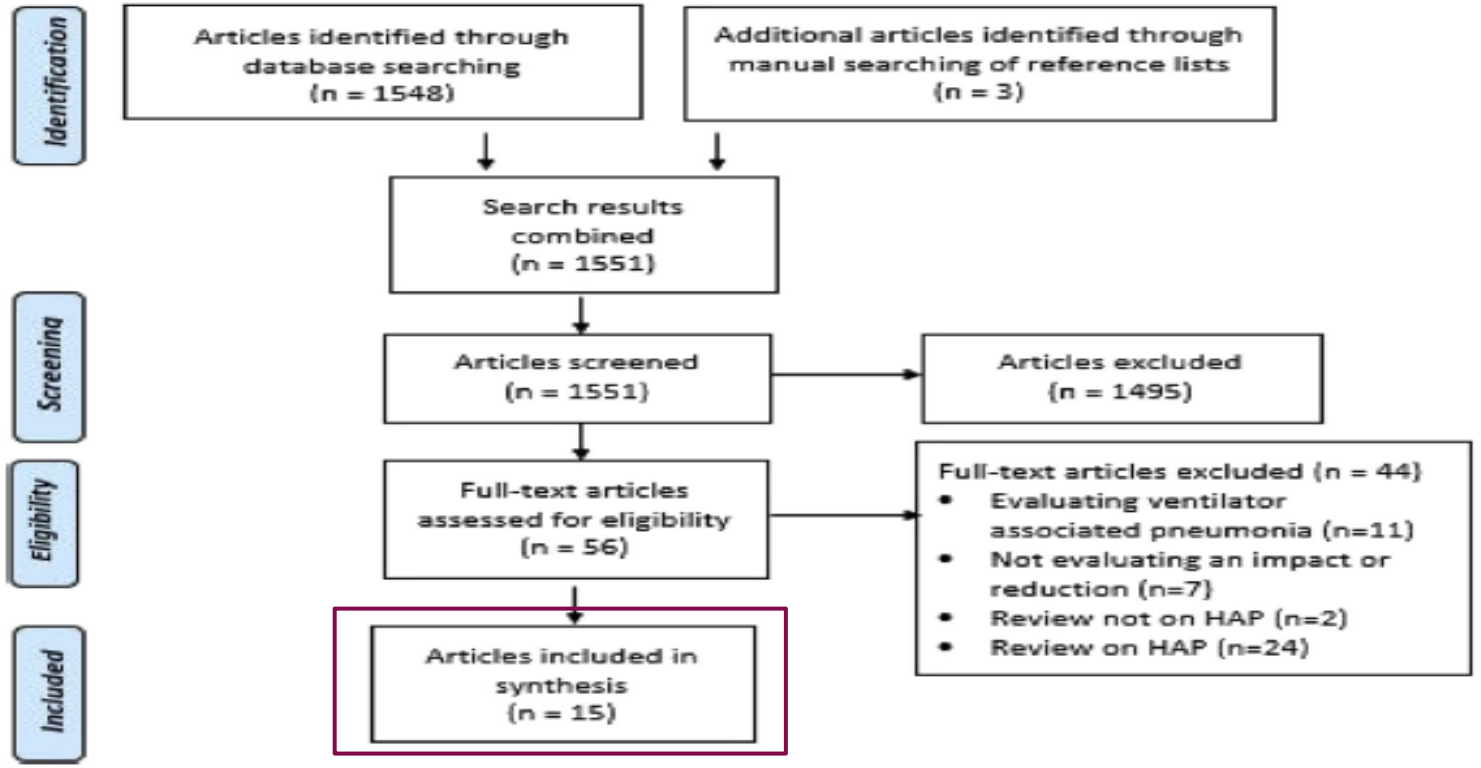


Figure 1 Flow diagram for selection of articles.

Table 1 Studies included in the review.

Author, Year	Design	Sample	Setting	Broad intervention strategy	Significant change in pneumonia
Adachi et al., 2002 [28]	RCT	141	Nursing home	Oral care (professional)	YES
Bellisimo-Rodrigues et al., 2014 [29]	RCT	254	Hospital (Intensive Care Unit)	Oral care (professional)	YES
Boden et al., 2018 [32]	RCT	441	Hospital	Physical activity	YES
Bouringault et al., 2010 [30]	RCT	2513	Nursing home	Oral care (professional)	NO
Chen et al., 2016 [40]	Cohort	873	Hospital (Intensive Care Unit)	Oral care	YES
Cuesy et al., 2010 [33]	RCT	223	Hospital	Physical activity	YES
Johansen et al., 2016 [37]	Cohort	88	Hospital (Ear, Nose and Throat Department)	Prophylactic antibiotics	YES
McNally et al., 2018 [38]	Quasi-experimental	2891	Hospital (non-ICU)	Oral care	NO
Quinn et al., 2014 [14]	Quasi-experimental		Hospital	Oral care	Decrease+
Robertson et al., 2013 [20]	Quasi-experimental	85	Hospital (acute neurosurgical unit)	Oral care	YES
Schrock et al., 2018 [35]	Cohort	2372	Hospital	Dysphagia screen	YES
Stolbrink et al., 2014 [34]	Quasi-experimental	156	Hospital (respiratory and elderly wards)	Physical activity	YES
Titsworth et al., 2013 [36]	Cohort	2334	Hospital	Dysphagia screen	YES
Wagner et al., 2016 [39]	Cohort	1656	Hospital	Oral care	YES
Yoneyama et al., 2012 [31]	RCT	366	Nursing Home	Oral care (professional)	NO

Note: + significance values not provided.

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- Υπάρχει μεγαλη ετερογένεια μεταξύ των μελετών ως προς τους ορισμούς, τις παρεμβάσεις, τις μεθόδους
- **Η βελτίωση της στοματικής φροντίδας**
- **Η αυξημένη κινητικότητα**
- **Ο αποτελεσματικός χειρισμός της δυσφαγίας**
- **Αποτελούν καποιους από** τους τροπους πρόληψης της HAP
- Ωστόσο, χρειάζονται περισσότερες και καλά σχεδιασμένες μελέτες για την εξαγωγή έγκυρων συμπερασμάτων

- Ελαχιστοποίηση διάρκειας θεραπείας
- Βελτιωση πρακτικών υγιεινής που αφορούν στα χέρια και στον εξοπλισμό
- Προφυλάξεις επαφής
- Σωστή φροντίδα στόματος
- Προφυλάξεις έναντι της εισρόφησης

An overview of guidelines for the management of hospital-acquired and ventilator-associated pneumonia caused by multidrug-resistant Gram-negative bacteria

Catia Cillóniz[a,b], Cristina Dominedò[c], and Antoni Torres

Curr Opin Infect Dis 2019, 32:000–000

Nonventilator hospital-acquired pneumonia: A call to action

- **Recommendations from the National Organization to Prevent Hospital-Acquired Pneumonia (NOHAP) among nonventilated patients**
- Published online by Cambridge University Press: **09 June 2021**

This national call to action includes

- (1) launching a national healthcare conversation about NVHAP prevention;
- (2) adding NVHAP prevention measures to education for patients, healthcare professionals, and students;
- (3) challenging healthcare systems and insurers to implement and support NVHAP prevention;
- and (4) encouraging researchers to develop new strategies for NVHAP surveillance and prevention

- Πνευμονία: ορισμός
- Πνευμονία: παθοφυσιολογία
- Πνευμονία: «κατηγορίες»
- HCAP (health – care associated pneumonia)
- HAP (hospital - acquired pneumonia)
- **Συμπεράσματα**

ΣΥΜΠΕΡΑΣΜΑΤΑ

- Η έννοια της HCAP τείνει να καταργηθεί
- Η αντιμικροβιακή αγωγή σε ασθενή **με πνευμονία της κοινότητας εξατομικεύετα**ι αναλόγως με τη βαρύτητα της κατάστασής του και την παρουσία ή **όχι παραγόντων κινδύνου** για ανθεκτική ***Ps.aeruginosa*** *ή* ***MRSA*** **.**
- η αντιμικροβιακή αγωγή του ασθενούς με νοσοκομειακή πνευμονία ΕΚΤΟΣ ΜΕΘ επιλέγεται με βάση **τα τοπικά επιδημιολογικά δεδομένα.**

ΕΥΧΑΡΙΣΤΩ ΓΙΑ ΤΗΝ ΠΡΟΣΟΧΗ ΣΑΣ

Table 1. Interpretation of Strong and Weak (Conditional) Recommendations

	Strong Recommendation	Weak (Conditional) Recommendation
Patients	Most individuals in this situation would want the recommended course of action, and only a small proportion would not.	The majority of individuals in this situation would want the suggested course of action, but many would not.
Clinicians	Most individuals should receive the intervention. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator. Formal decision aids are not likely to be needed to help individuals make decisions consistent with their values and preferences.	Recognize that different choices will be appropriate for individual patients and that you must help each patient arrive at a management decision consistent with his or her values and preferences. Decision aids may be useful in helping individuals to make decisions consistent with their values and preferences.
Policy makers	The recommendation can be adopted as policy in most situations.	Policymaking will require substantial debate and involvement of various stakeholders.

ισχυουν για την πνευμονία που συνδεεται με τις υπηρεσιες υγειας

1. Η έννοια εισηχθη στις κατυεθυντηριες οδηγιες του εταυς 2016
2. Η αγωγή που δινεται πρεπει να συμπεριλαμβανει αγωγή για την ψευδομονάδα.
3. Η τοπική χλωρίδα πρεπει να λαμβάνεται οπωσδήποτε υπόψη στην αγωγή
4. Η λήψη αντιβιοτικών τις προηγουμενες 120 ημέρες εναι ενδειξη κάλυψης με αντιβιοτικά για το σταφυλοκοκκο και την ψευδομοναδα

Η πνευμονία που αποκτηθηκε στο νοσοκομείο (εκτός αναπνευστήρα)

1. Οταν οφείλεται σε pseudomonas aeruginosa πρεπει να χορηγούνται πάντα δύο αντιβιοτικά
2. Η προληψη της σχετίζεται με την αποφυγή εισρόφησης
3. Η διάρκεια θεραπείας που προτείνεται είναι συνήθως 14 ημέρες
4. Για την εναρξη αγωγής πρέπει να λαμβανονται υπόψη οι δείκτες φλεγμονής CRP, procalcitonine