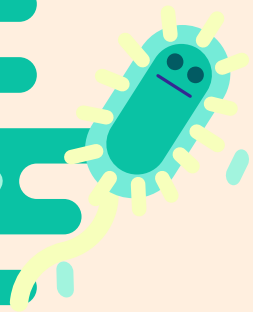
Aspiration Pneumonia & Anaerobic Antibiotic Utilization



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Are we inappropriately covering for anaerobes in aspiration pneumonia at Ualley Medical Center?

Objectives

01

Overview of the Pathophysiology of Pneumonia

02

Review Treatment for Pneumonia

03

Assess Anaerobic Antibiotic Utilization for Pneumonia

4.6 million

Outpatient and emergency visits annually

650 adults per 1000

Adults are hospitalized every year

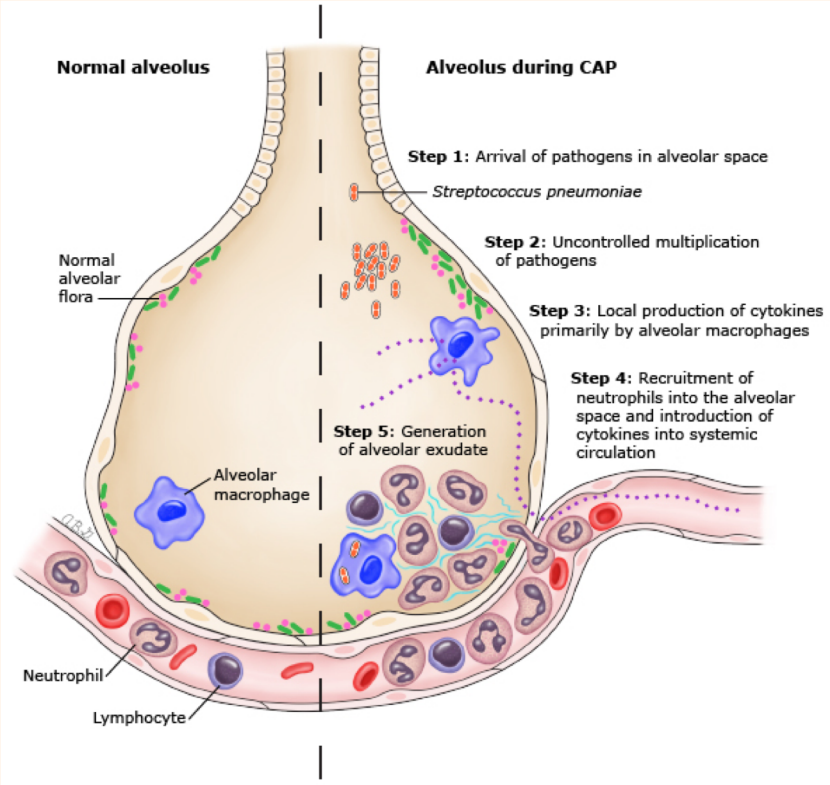
9%

Of patients hospitalized with CAP will be rehospitalized again for a new episode of CAP

Pneumonia Risk Factors

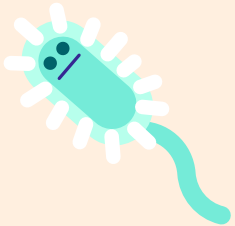
- Risk Factors:
  - Older age >/= 65 yo
  - Chronic comorbidities - COPD, asthma, immunocompromised, CHF
  - Impaired airway protection
  - Smoking and alcohol overuse
  - Lifestyle factors - crowded living condition, low-income settings, exposure to environmental toxins

Pneumonia Pathophysiology



https://www.uptodate.com/contents/overview-of-community-acquired-pneumonia-in-adults/print

Bacteria Causing Pneumonia



-S. Pneumoniae
-Moraxella catarrhalis
-Haemophilus influenzae
-S. Aureus
-Klebsiella

Atypicals

Anaerobes?

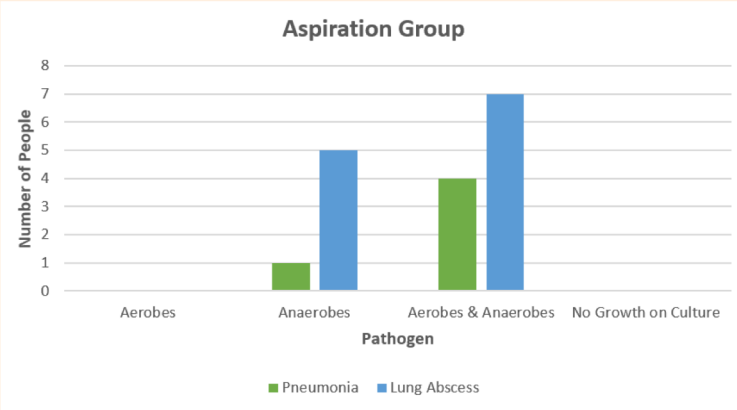
** 1 / 3 of pneumonia cases are viral

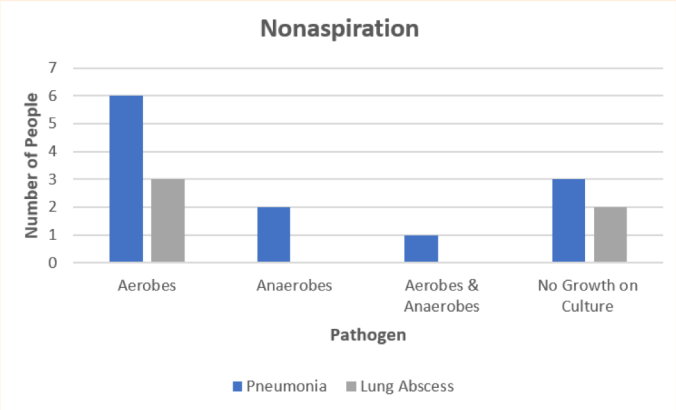
Anaerobic Coverage

2007 IDSA CAP Guidelines	2019 IDSA CAP Guidelines
recommended adding empiric anaerobic coverage for aspiration pneumonia	does NOT recommend adding empiric anaerobic coverage for aspiration pneumonia unless there is evidence of a lung abscess of empyema

Anaerobic Coverage

- Previous Data from the 1970s:





- **Objective:** determine the bacteriologic flora of pulmonary infections that were aspiration induced
- **Methods:** 34 patients with pneumonia and lung abscess; 17 in the aspiration group & 17 in the nonaspiration group; used transtracheal aspiration to identify pathogens
- **Conclusion:** anaerobes were recovered from all patients in the aspiration group

Gonzalez-C. CL, Calia FM. *Arch Intern Med.* 1975;135(5):711–714. doi:10.1001/archinte.1975.00330050085014

Anaerobic Coverage

- Previous Data from the 1970s:

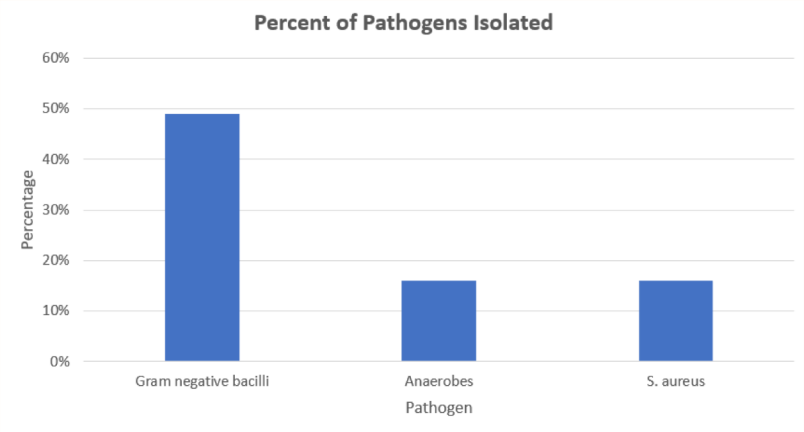
	Penicillin G-Treated Patients (n=49)	Clindamycin-Treated Patients (n=35)
Bacteriological results		
Anaerobic isolates, No. (%)		
Fusobacteria	19(39)	15(43)
Bacteroides melaninogenicus	19(39)	11(31)
B fragilis	7(14)	5(14)
Peptostreptococci	28(57)	20(57)
Peptococci	6(12)	8(22)
Aerobic potential pathogens isolated concurrently, No. (%)	22(45)	20(57)

- **Objective:** compare the efficacy of penicillin G to clindamycin as anaerobes are generally involved in aspiration pneumonitis and lung abscess
- **Methods:** 49 patients treated with penicillin G and 35 patients treated with clindamycin; transtracheal aspirate was used to identify the pathogen
- **Conclusion:** clindamycin was equally effective as penicillin G when treating anaerobic pulmonary infections

Bartlett JG, Gorbach SL. *JAMA*. 1975;234(9):935–937. doi:10.1001/jama.1975.03260220039016

Anaerobic Coverage

- New Data:



- **Objective:** identify pathogens in aspiration pneumonia of institutionalized elders with severe aspiration pneumonia
- **Methods:** prospective study of 95 elders; pathogens isolated with bronchoalveolar lavage =
- **Results:** 67 pathogens identified - 49% gram negative enteric bacilli, 16% anaerobic bacteria, and 12% S. aureus
    - 7 patients initially had inadequate antimicrobial therapy, but 6 had effective clinical resolution

Anaerobic Coverage

- New Data
  - **Objective:** determine the incidence of anaerobic bacteria in patients with ventilator-associated pneumonia (VAP) and aspiration pneumonitis (AP)
  - **Study design:** prospective study, non-randomized, interventional study with 143 patients with 185 cases
  - **Results:** 63 of 185 VAP episodes and 12 of 25 AP episodes were diagnosed with bacterial pneumonia.
    - **Only 1 out of 91 anaerobic organism was isolated**

El-Solh AA, et al. Am J Respir Crit Care Med. 2003 Jun 15;167(12):1650-4.

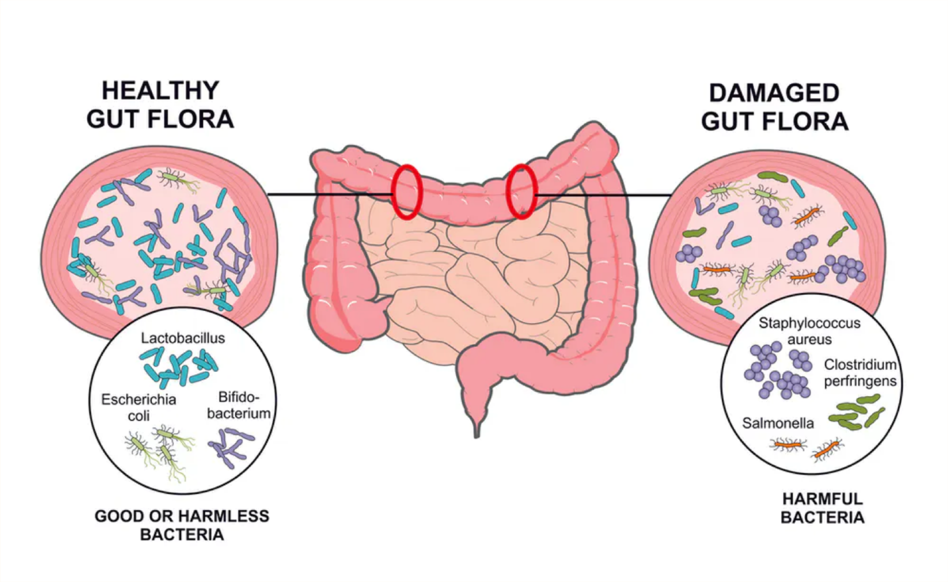
Pneumonia Treatment

- Standard Treatment:
  - Beta-lactam + Macrolide
    or
  - Respiratory Fluoroquinolone
    +/-
  - MRSA coverage
    +/-
  - Pseudomonas aeruginosa

- Valley Medical Center:
  - Recommend empiric treatment with ceftriaxone + azithromycin
  - Avoid anaerobic coverage unless there is **large volume aspiration** or **lung abscess**

Consequences of Anaerobic Coverage

- Disruption to the GI flora
  - C. difficile
- Adverse effects
- Antibiotic-resistance



https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.shutterstock.com%2Fimage-illustration%2Fantibiotics-wrong-diet-damage-good-bacteria-1390060613&psig=AOvVaw26_ttXy26OkldK797s9n_-&ust=1617307457682000&source=images&cd=vfe&ved=0CAIQjRxqFwoTCOilyvmp2-8CFQAAAAAdAAAAABBQ

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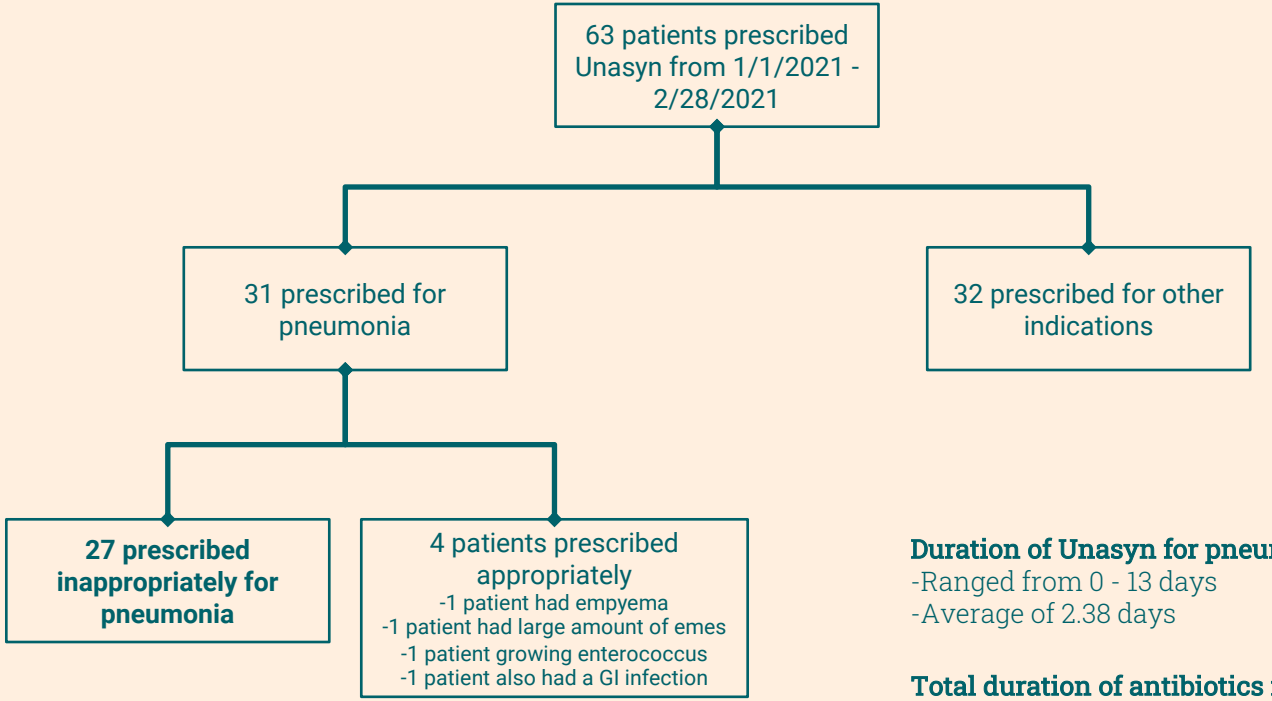
Unasyn use for Aspiration Pneumonia

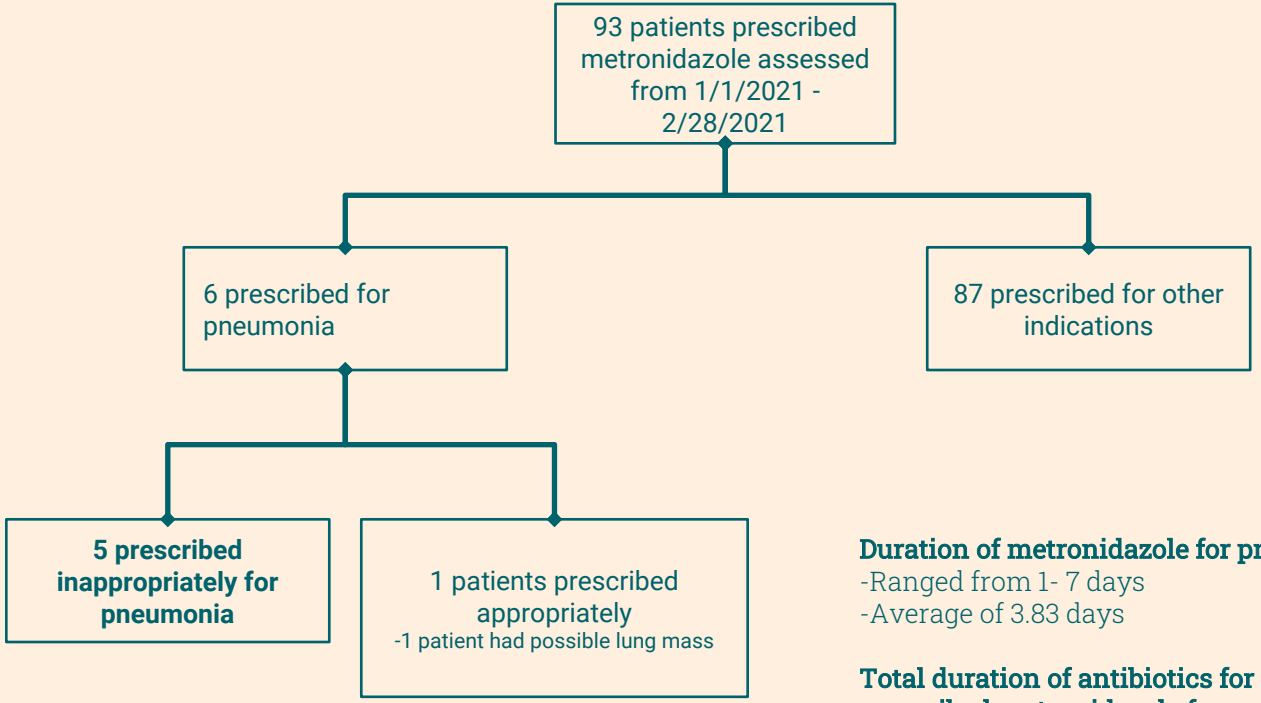


*4 patients were de-escalated from Zosyn

Duration of Unasyn for pneumonia:
-Ranged from 0 - 13 days
-Average of 2.38 days

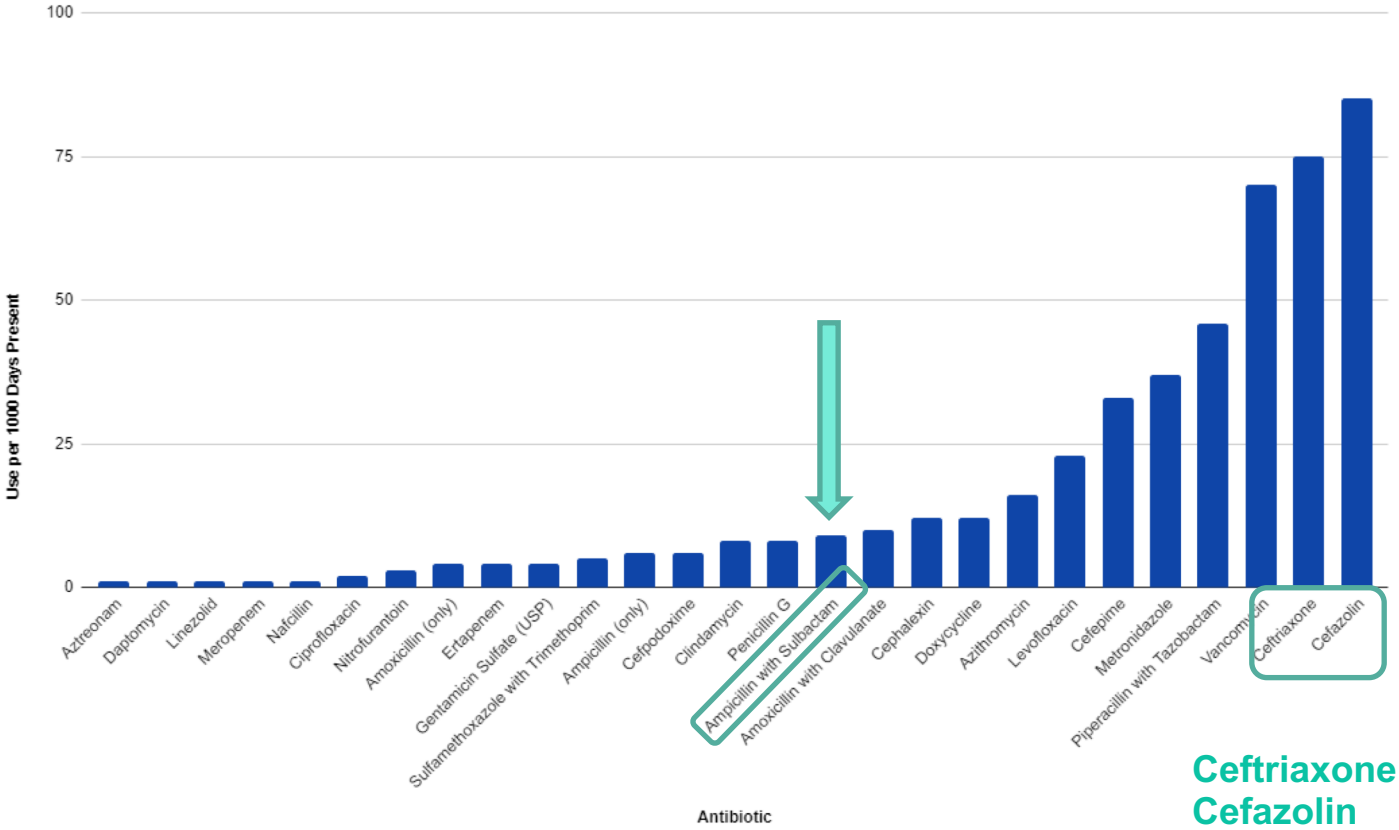
Total duration of antibiotics for patients prescribed Unasyn for pneumonia :
-Ranged from 0 - 30 days
-Average of 7.9 days

Metronidazole use for Aspiration Pneumonia



Duration of metronidazole for pneumonia:
-Ranged from 1- 7 days
-Average of 3.83 days

Total duration of antibiotics for patients prescribed metronidazole for pneumonia :
-Ranged from 5- 15 days
-Average of 8.5 days


Antimicrobial Usage Data per 1000 Days Present - January 2021
Use per 1000 Days Present
100
75
50
25
0
Aztreonam
Daptomycin
Linezolid
Meropenem
Nafcillin
Ciprofloxacin
Nitrofurantoin
Amoxicillin (only)
Ertapenem
Gentamicin Sulfate (USP)
Sulfamethoxazole with Trimethoprim
Ampicillin (only)
Cefpodoxime
Clindamycin
Penicillin G
Ampicillin with Sulbactam
Amoxicillin with Clavulanate
Cephalexin
Doxycycline
Azithromycin
Levofloxacin
Cefepime
Metronidazole
Piperacillin with Tazobactam
Vancomycin
Ceftriaxone
Cefazolin
Antibiotic
Ceftriaxone
Cefazolin

Antimicrobial Stewardship Summary and Future Directions

- 27/31 patients who received Amp/sulbactam for pneumonia did not have IDSA-defined aspiration pneumonia
- Of note: ampicillin/sulbactam is among the list of therapeutic treatments 2019 IDSA guidelines recommend for inpatients with CAP
- Metronidazole is uncommonly used for pneumonia (6/93)
- Amp/sulbactam does not make the top 10 most prescribed antibiotics at VMC (#12)
- Total antibiotic duration = 7.5 days (amp/sulbactam) and 8.5 days (metronidazole)
- Antibiotic duration may be a more impactful area of focus vs. selection

References

- Bartlett JG, Gorbach SL. Treatment of Aspiration Pneumonia and Primary Lung Abscess: Penicillin G vs Clindamycin. *JAMA.* 1975;234(9):935–937. doi:10.1001/jama.1975.03260220039016
- El-Solh AA, Pietrantoni C, Bhat A, Aquilina AT, Okada M, Grover V, Gifford N. Microbiology of severe aspiration pneumonia in institutionalized elderly. Am J Respir Crit Care Med. 2003 Jun 15;167(12):1650-4. doi: 10.1164/rccm.200212-1543OC. Epub 2003 Apr 10. PMID: 12689848.
- Gonzalez-C. CL, Calia FM. Bacteriologic Flora of Aspiration-Induced Pulmonary Infections. *Arch Intern Med.* 1975;135(5):711–714. doi:10.1001/archinte.1975.00330050085014
- Mandell, Lionel A., et al. "Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults." *Clinical infectious diseases* 44.Supplement_2 (2007): S27-S72.
- Marik, Paul E., and Pamela Careau. "The role of anaerobes in patients with ventilator-associated pneumonia and aspiration pneumonia: a prospective study." *Chest* 115.1 (1999): 178-183.
- Pletz, Mathias W., et al. "International perspective on the new 2019 ATS/IDSA CAP guideline–a critical appraisal by a global expert panel." *Chest* (2020).

Thanks!

Do you have any questions?