Anaerobes Anonymous: The Secret Life of Aspiration Pneumonia

Brandon Anderson, PharmD

Allina Health

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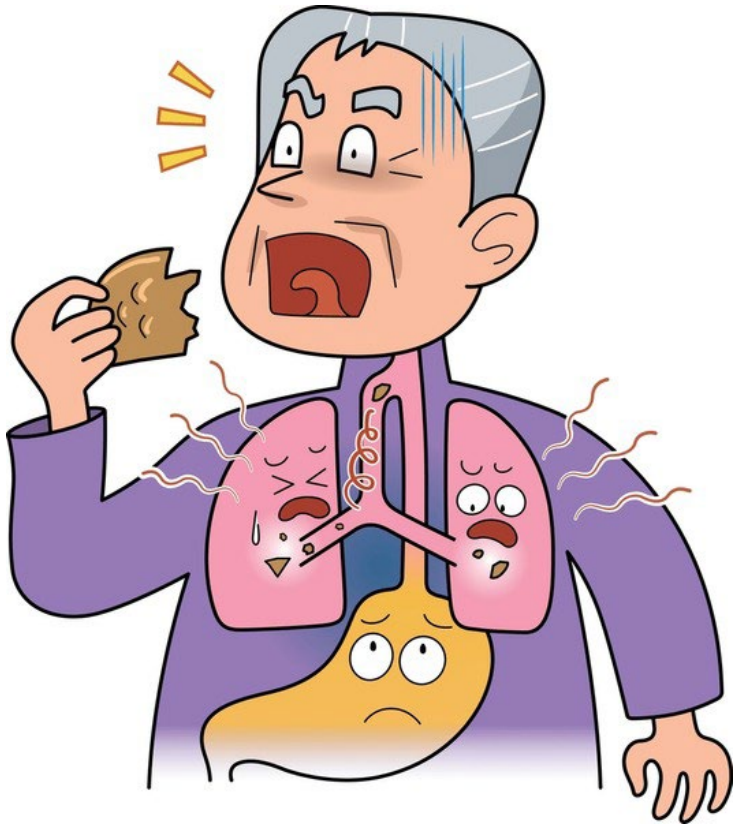
Objectives

- Define aspiration pneumonia and compare to aspiration pneumonitis
- Recognize common pathogens associated with aspiration pneumonia
- Discuss IDSA and Allina treatment guidelines for aspiration pneumonia
- Identify scenarios where anaerobe coverage is beneficial

Defining Aspiration Pneumonia

- Aspiration: inhalation of foreign substance into the lungs
- Microaspiration
  - Low volumes - “silent aspiration”
  - Very common
- Macroaspiration
  - High volumes – “aspiration event”
  - Overwhelm defense mechanisms



Defining Aspiration Pneumonia

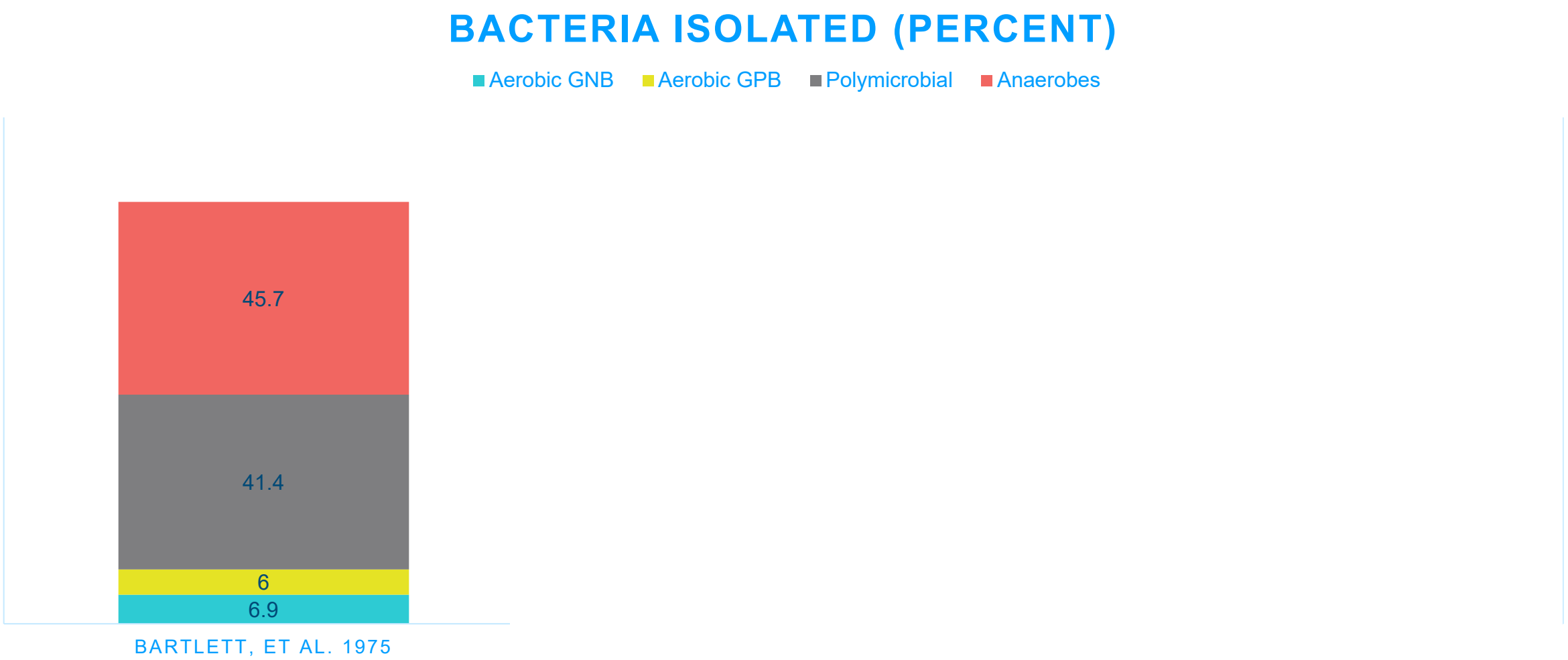
Aspiration Pneumonitis

- Chemical injury – gastric contents
- Rapid onset – 2-5 hours
- Presentation:
  - Infiltrate on chest imaging
  - Respiratory distress
- Treatment: supportive care

Aspiration Pneumonia

- Infection – primarily oropharyngeal
- Longer onset – 24-48 hours
- Presentation:
  - Infiltrate on chest imaging
  - Respiratory distress
- Treatment: antibiotics

Microbiology of Aspiration Pneumonia Through Time

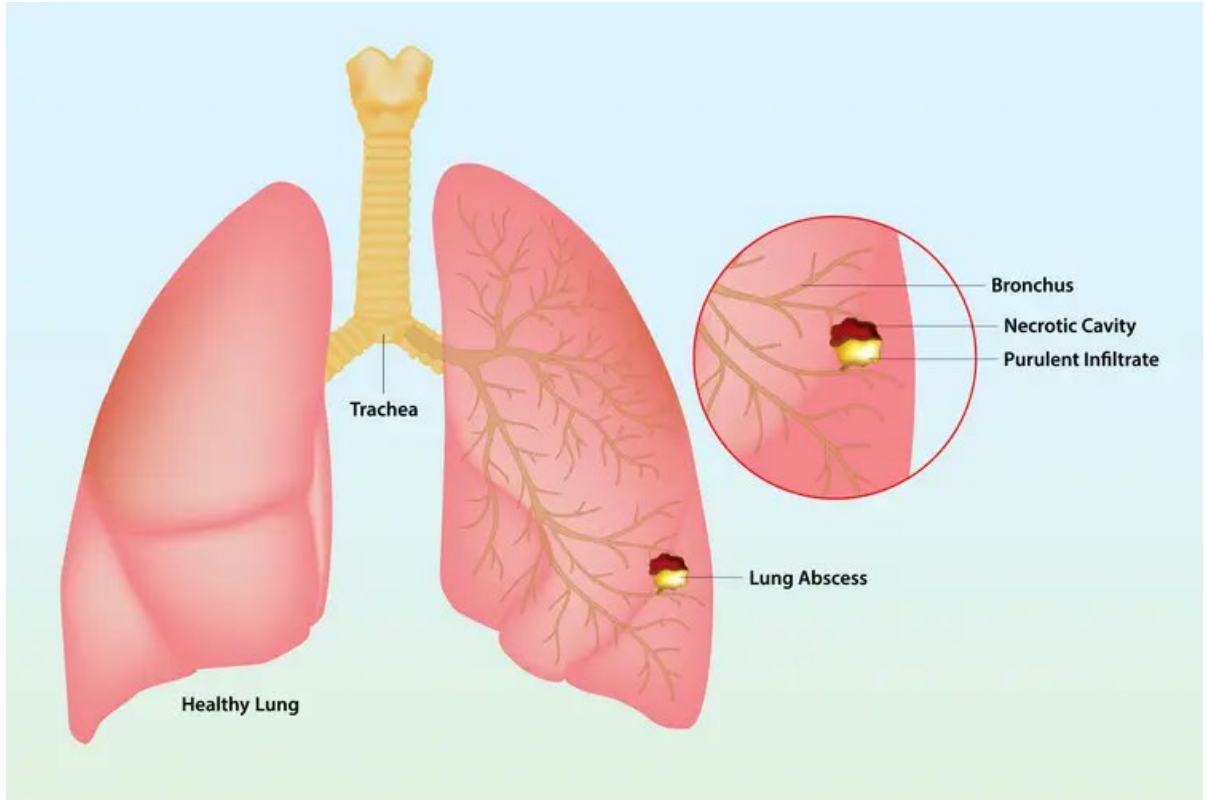


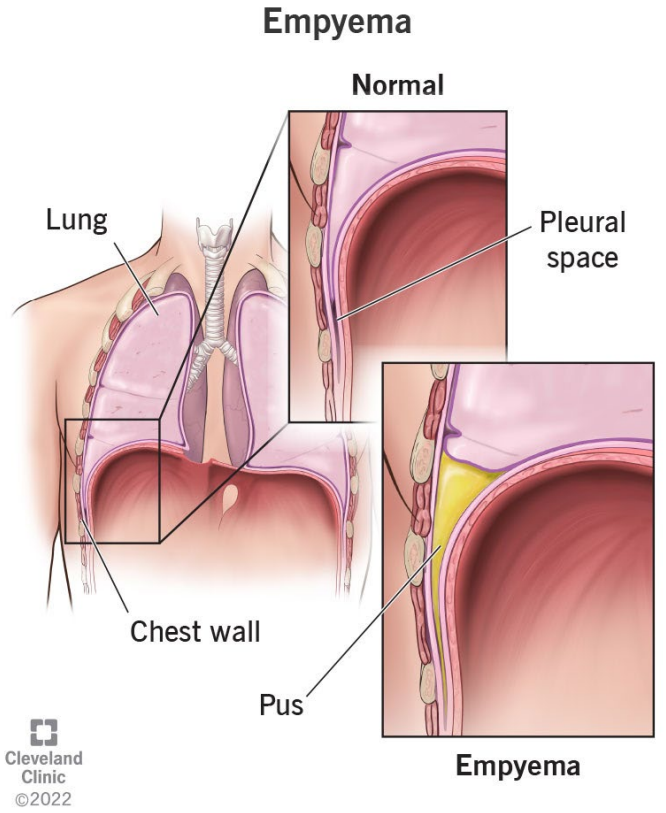
Changing Microbiology of Aspiration Pneumonia

- Late 1960s – 1980s – “anaerobic renaissance”
  - New technology to culture medically relevant anaerobes
  - Up to 30% of positive blood cultures grew anaerobes (compared to less than 3% today)
  - Rapid development of anaerobe-targeting antibiotics
- Design of microbiologic studies
  - Early studies often included patients later in their course
  - Many with lung abscess or empyema
- Societal factors
  - Improved dental health
  - Earlier medical presentation and treatment

IDSA 2019 Community Acquired Pneumonia Guideline

- “We suggest not routinely adding anaerobic coverage for suspected aspiration pneumonia unless lung abscess or empyema is suspected”





Microbiology of Aspiration Pneumonia vs. Empyema

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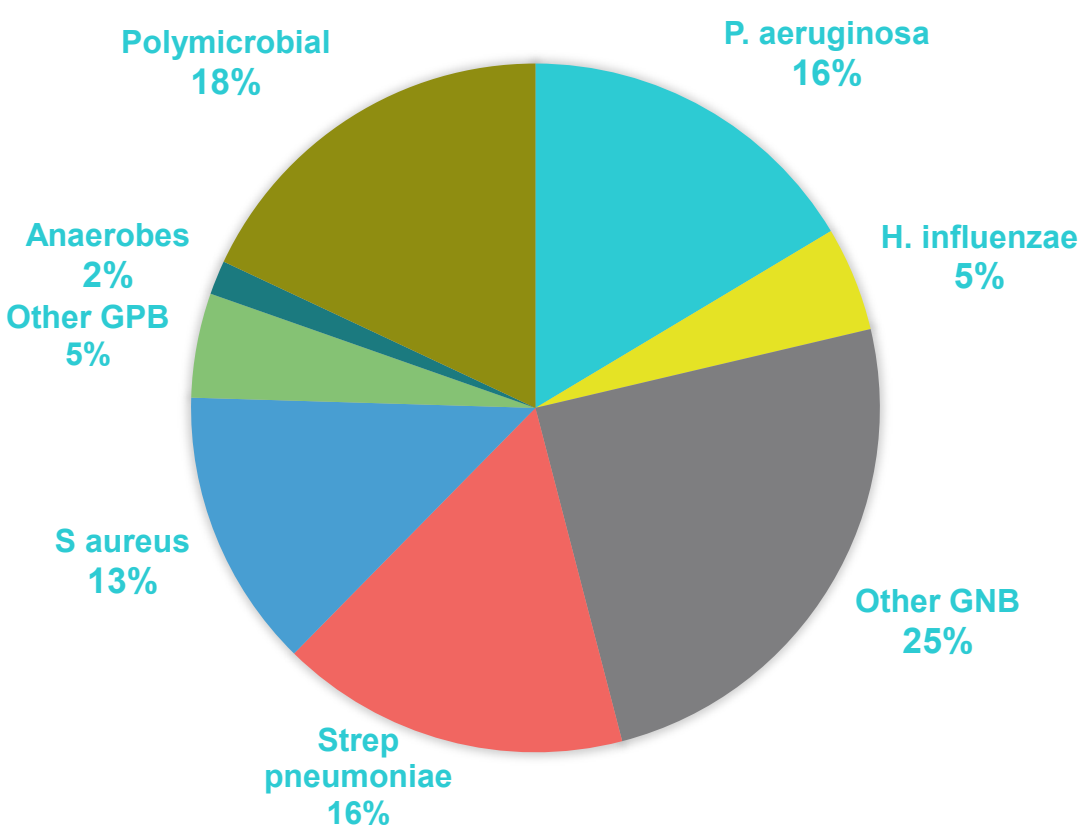
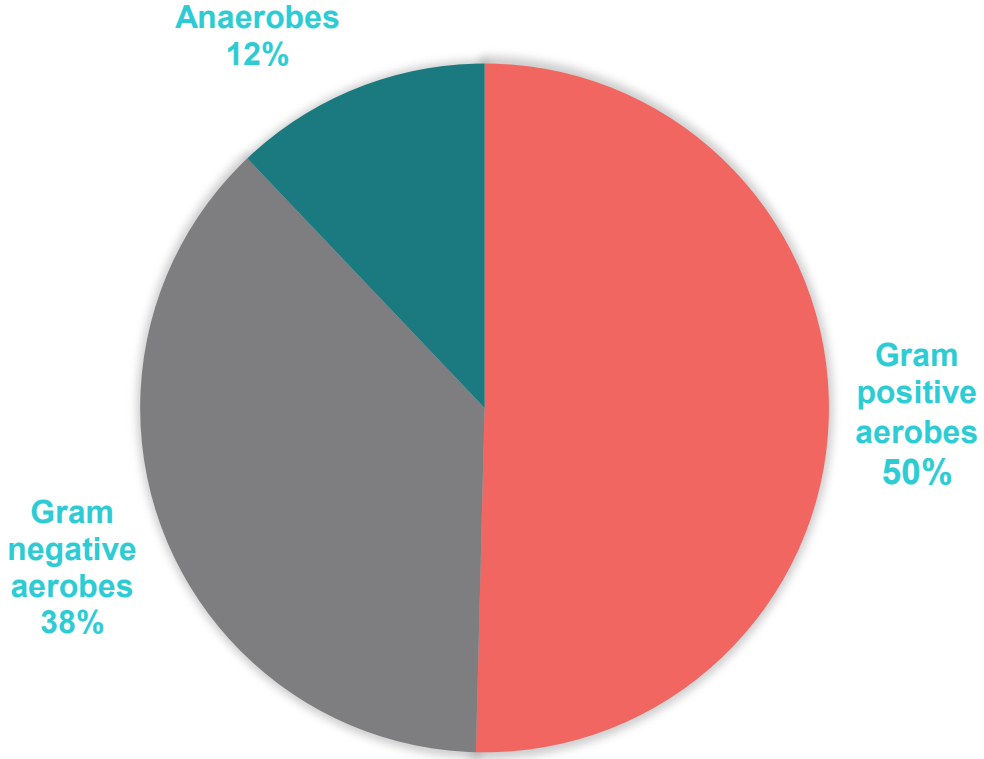
MARIN-CORRAL, ET AL. 2021 ASPIRATION PNEUMONIA



HASSAN, ET AL. 2019 EMPYEMA



Spectrum of Activity – Ampicillin-Sulbactam

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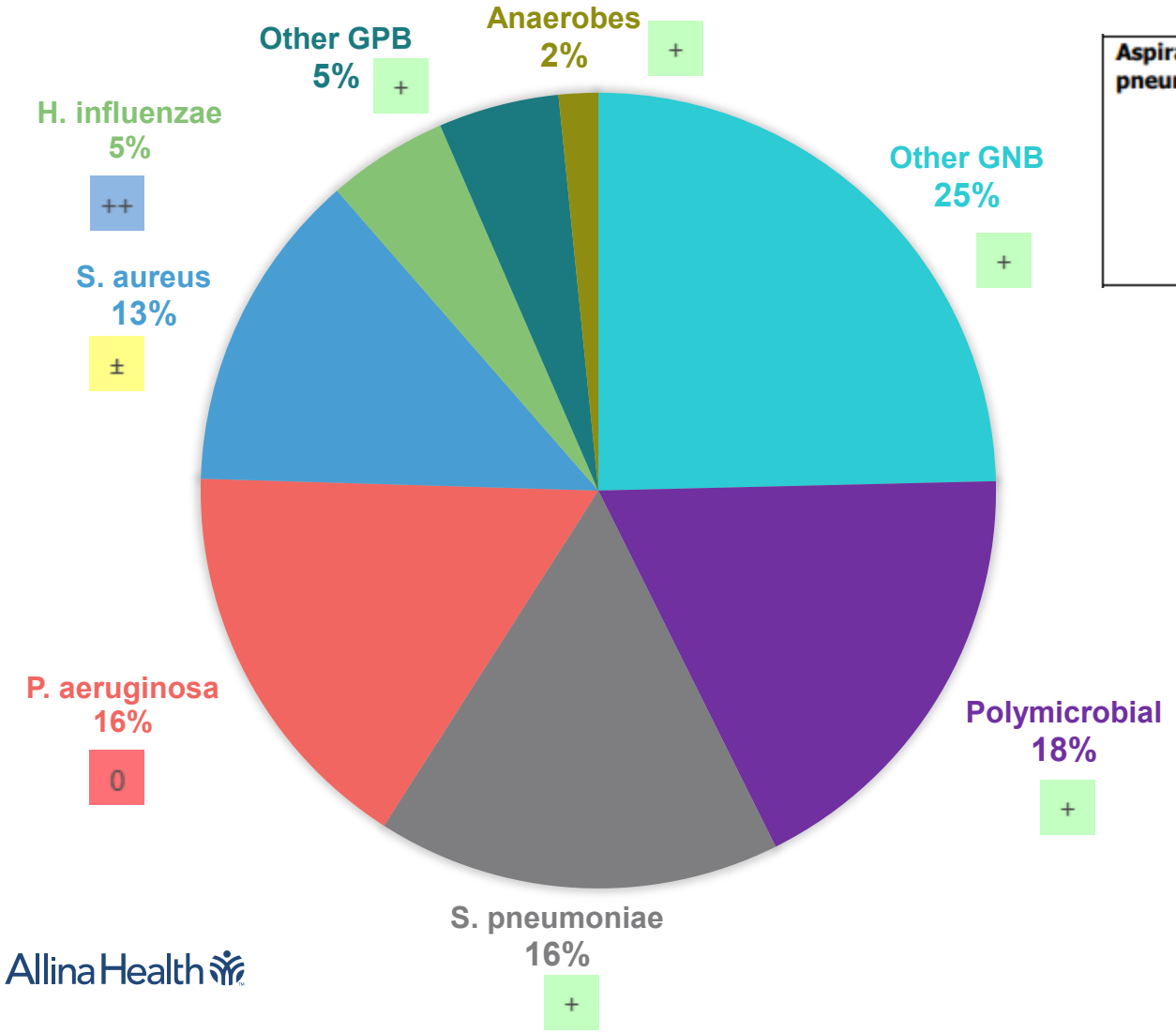
ASPIRATION PNEUMONIA



Aspiration pneumonia	Ampicillin-sulbactam 3 g IV q6h x 5 days ***Severe Sepsis/Septic Shock:*** Piperacillin-tazobactam 4.5 g IV x 1 over 30 minutes, followed by 3.375 g IV q8h over 4 hours x 5 days	1) Ceftriaxone 1-2g IV q24h x 5 days 2) Levofloxacin 750 mg PO/IV q24h x 5 days ***Severe Sepsis/Septic Shock:*** If beta-lactam allergy or history of ESBL: Meropenem 1 g IV q8h x 5 days

++ Preferred agent

\+ Alternative agent

± Limited utility

0 Not recommended

Spectrum of Activity - Ceftriaxone

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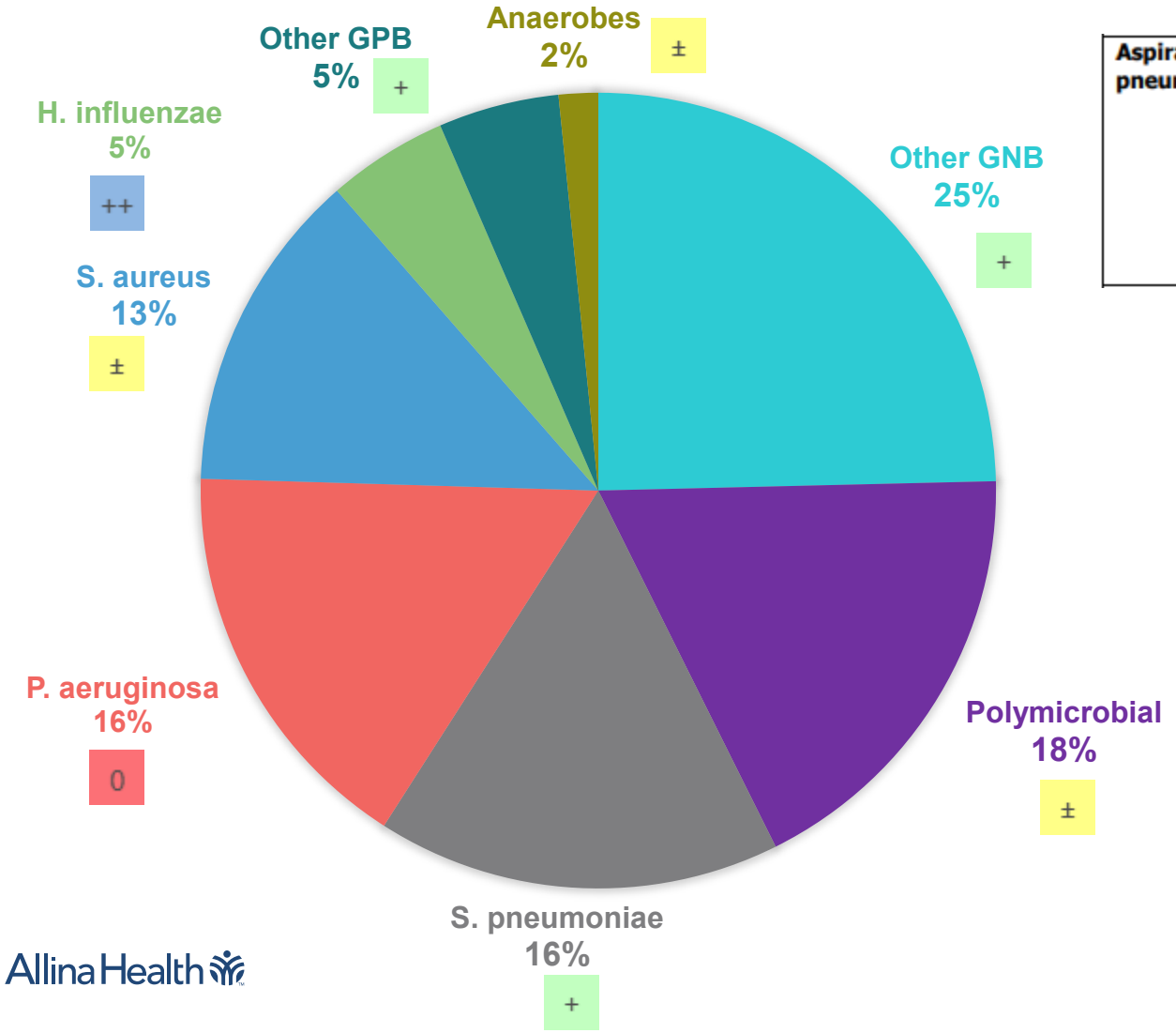
ASPIRATION PNEUMONIA



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++ Preferred agent

\+ Alternative agent

± Limited utility

0 Not recommended

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Spectrum of Activity – Piperacillin-Tazobactam

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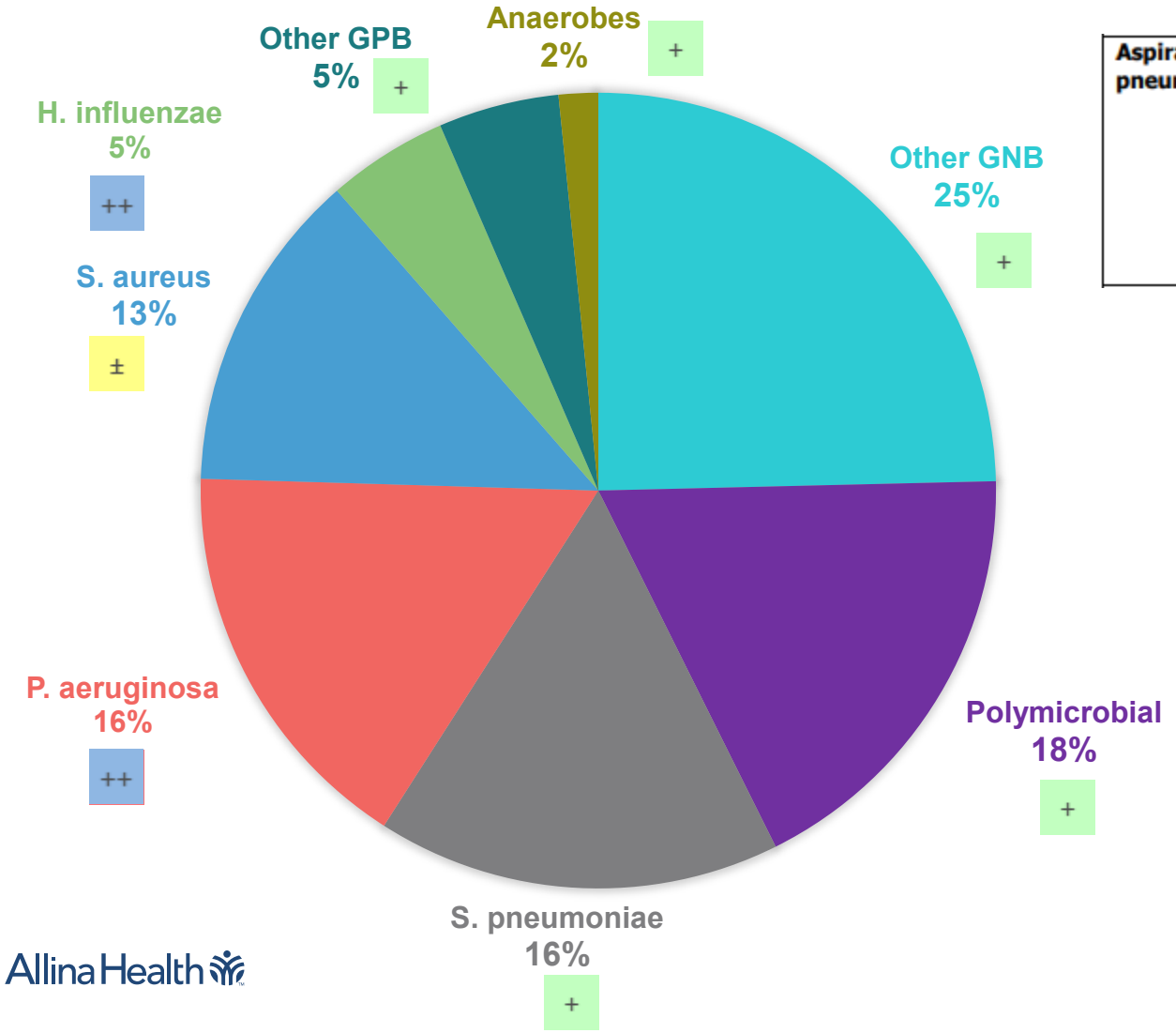
ASPIRATION PNEUMONIA



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- ++ Preferred agent
- + Alternative agent
- ± Limited utility
- 0 Not recommended

Benefits of Anaerobe Coverage in Aspiration Pneumonia?

Study Design	Retrospective cohort non-inferiority study including 18 Canadian hospitals, 2015 - 2022
Methods	Limited anaerobic coverage (LAC) vs. extended anaerobic coverage (EAC) • LAC: ceftriaxone, cefotaxime, levofloxacin (n = 2,863) • EAC: amoxicillin-clavulanate, moxifloxacin, or LAC + metronidazole/clindamycin (n = 1,316) Exclusions: • Not receiving a first-line antibiotic (including withholding antibiotics for pneumonitis) • Only receiving oral antibiotic treatment • Patients with lung abscess or empyema
Results	**Primary outcome:** In-hospital mortality • 30.3% in LAC vs. 32.1% in EAC – aRD 1.6% (95% CI -1.7% to 4.9%) **Secondary outcome:** *Clostridioides difficile* colitis • <0.2% in LAC vs. 0.8-1.1% in EAC – aRD 1% (95% CI 0.3% to 1.7%)
Conclusion	No significant difference in mortality outcomes with additional anaerobe coverage, potentially higher risk of *C diff* infection with extended anaerobic coverage

Bai AD, Srivastava S, Digby GC, et al. Anaerobic Antibiotic Coverage in Aspiration Pneumonia and the Associated Benefits and Harms: A Retrospective Cohort Study. *CHEST*. 2024;166(1):39-48.

Ampicillin-Sulbactam vs. Ceftriaxone

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Study Design	Retrospective cohort study using nation-wide inpatient database in Japan between 2010 and 2022
Methods	548,972 eligible patients diagnosed with aspiration pneumonia • 424,446 patients treated with ampicillin-sulbactam • 124,526 patients treated with third-generation cephalosporins Exclusions: • Receiving any other antibiotic regimen • Patients with lung abscess or empyema
Results	**Primary outcome:** In-hospital mortality • 14.6% with AMP/SUL vs. 16.4% with CRO – RD -1.6% (95% CI -2.1% to -1.5%) **Secondary outcome:** *Clostridioides difficile* colitis • 2% with AMP/SUL vs. 2.8% with CRO – RD -0.8% (95% CI -0.9% to -0.7%)
Conclusion	Statistically significant improvement in both mortality and *C diff* rate with ampicillin-sulbactam compared to ceftriaxone treatment

Taniguchi J, Aso S, Matsui H, et al. Ampicillin-sulbactam versus third-generation cephalosporins in aspiration pneumonia: A nationwide retrospective cohort study. *Respiratory Medicine*. 2025;247:108276.

Conclusion

- Not all aspirations require antibiotic treatment
- Aspiration pneumonia microbiology has changed significantly over time
- Additional anaerobic coverage is only necessary in a few specific circumstances
- Ampicillin-sulbactam remains a primary treatment option

Assessment Question

Patient BA is a 70-year-old male. He experienced an acute aspiration event 2 days ago and has developed progressive hypoxia. His chest X-ray shows a consolidation of the right lower lobe. He has a penicillin allergy, so he is started on ceftriaxone for treatment of aspiration pneumonia. What other antibiotics need to be added?

A. Azithromycin for atypical coverage
B. Metronidazole for anaerobic coverage
C. Vancomycin for MRSA coverage
D. None of the above

Assessment Question

Patient RD is a 68-year-old-female who developed shortness of breath following an aspiration event in the hospital. She was experiencing dysphagia while recovering from a stroke. What are the most likely organisms to cause aspiration pneumonia?

A. *Staphylococcus aureus* and *Pseudomonas*
B. *Haemophilus influenzae* and *Klebsiella pneumoniae*
C. *Legionella pneumophila* and *Mycoplasma pneumoniae*
D. *Bacteroides* spp. and *Prevotella* spp.

References

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Thank you!

Questions?