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September 2019 ~ Resource #350915

Aspiration Pneumonia FAQs

Aspiration pneumonia is difficult to diagnose and differentiate from other aspiration syndromes, community-acquired pneumonia, and hospital-acquired pneumonia.[1] Aspiration pneumonia is linked to a higher mortality rate (29.4%) compared to community-acquired pneumonia (11.6%).[1] Choice of antibiotics will depend on where the pneumonia developed (e.g., community, hospital, long-term care facility), risk factors for resistant infections, and the likelihood that anaerobes are involved.[1] The chart below provides answers to common questions about aspiration pneumonia.

Abbreviations: CAP = community-acquired pneumonia; GI = gastrointestinal; HAP = hospital-acquired pneumonia; PPI = proton pump inhibitor; VAP = ventilator-associated pneumonia.

Question	Answer/Pertinent Information

What is aspiration pneumonia?	• Aspiration pneumonia is a lung infection caused by inhalation of pathologically-colonized oropharyngeal or upper GI secretions. Think of aspiration pneumonia as part of the pneumonia spectrum including community- and hospital-acquired pneumonias, rather than its own entity.[1]
	• Large-volume aspiration of oropharyngeal or upper GI secretions leads to aspiration pneumonia.[1]
	• Microaspiration (small-volume aspiration) of oropharyngeal secretions is normal, especially during sleep. However, microaspiration is involved in the pathogenesis of most pneumonias.[1]
	• Aspiration pneumonia is DIFFERENT from chemical pneumonitis from aspiration.[1]
	  ○ Chemical pneumonitis from aspiration leads to **inflammation** due to aspiration of irritating acidic gastric contents.[1] This inflammation can lead to sudden onset (almost immediate) of symptoms that can easily be confused with pneumonia (e.g., fever, cough, elevated white blood cell count, wheezing, tachycardia).[1,2] Chemical pneumonitis can also appear like acute respiratory distress syndrome (ARDS) with bronchospasms and frothy sputum with bilateral patchy infiltrates on chest x-ray.[9]
	  ○ Aspiration pneumonia is a **secondary infection** that develops over a few days due to the combination of aspirated microorganisms and damaged lung tissue.[1,2] Infiltrates on chest x-ray may not be seen early in cases of pneumonia.[1]

What are risk factors for aspiration pneumonia?
 	
Continued…
	• Patients with multiple risk factors for large-volume aspiration are at increased risk for aspiration pneumonia and death.[1] These risk factors include:[1,9,13]
	  ○ alcohol use
	  ○ poor dentition (increases bacterial load, not necessarily risk of aspiration)
	  ○ dysphagia and gastroesophageal reflux
	  ○ head, neck, and esophageal cancer

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Question	**Answer/Pertinent Information**
Risk factors, continued	○ esophageal strictures ○ chronic obstructive pulmonary disease (COPD) ○ seizures ○ degenerative neurologic disease (e.g., multiple sclerosis, Parkinson's disease; dementia) ○ impaired consciousness ○ enteral feeding (especially if associated with impaired gastric motility, poor cough reflex, and altered mental status)
How do chest x-rays help diagnose aspiration pneumonia?	• Chest x-rays, along with clinical history, are used to diagnose aspiration pneumonia.[1] • Infiltrates on chest x-ray seen in gravity-dependent locations can be a clue that a patient with pneumonia has an aspiration pneumonia.[1] ○ Aspiration from a supine position leads to infiltrates in the superior lower lobe or posterior upper lobes.[1] ○ Aspiration from an upright position leads to infiltrates in the basal segments of the lower lobes.[1]
What role do proton pump inhibitors play in aspiration pneumonia?	• PPIs reduce gastric acid, and have the potential to promote an environment more favorable for bacterial growth in secretions that may be aspirated.[9] • It is not known if PPIs increase the risk of aspiration pneumonia. However, PPIs seem to **reduce** the risk of chemical pneumonitis.[1,9] • See our chart, *Proton Pump Inhibitors: Appropriate Use and Safety Concerns*, for how PPIs impact CAP, HAP, and VAP.
What microorganisms are typically responsible for aspiration pneumonia?	• It was previously thought (i.e., in the 1970s) that anaerobes (alone or in combination with aerobes) were involved in a large number of cases of aspiration pneumonia (45% to 48%).[1,2] Common anaerobes include *Bacteroides*, *Peptostreptococcus*, *Porphyromonas*, *Prevotella melaninogenica*, and *Fusobacterium* species.[2,9] • However, the bacteria most often involved in aspiration pneumonia appear to be similar to the bacteria involved in non-aspiration pneumonias.[1,2] ○ Bacteria associated with **community-acquired cases of aspiration pneumonia** are commonly *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Haemophilus influenzae*, and Enterobacteriaceae.[1] ○ Bacteria associated with **hospital-acquired cases of aspiration pneumonia** are commonly gram-negative organisms, including *Pseudomonas aeruginosa*.[1]
When should therapy be started after aspiration?	• Follow hospital protocols for when to initiate antibiotics with suspected pneumonias. • If it is not clear if a patient has chemical pneumonitis versus aspiration pneumonia after an acute episode of aspiration:[1] ○ Can consider waiting about 48 hours before starting antibiotics in patients who display mild to moderate symptoms if the chest x-ray is clear. ○ Can consider empirically starting antibiotics in patients with severe symptoms. Re-evaluate the need for continued antibiotics in a two to three days based on clinical course and chest x-ray.

More. . .

Question	Answer/Pertinent Information
Which antibiotics are most appropriate for suspected aspiration pneumonia?	• There are limited data to guide anaerobic coverage when treating pneumonia.[13] Avoid empirically covering for anaerobes in most patients with suspected aspiration pneumonia (including pneumonia patients with aspiration risks).[1,2] Instead, choose antibiotics based on hospital protocols for CAP, HAP, and VAP.[2] However, consider initially covering for anaerobes in patients with: o risk factors for aspiration AND at highest risk for an anaerobic infection:[1,2] ▪ severe gum disease. ▪ poor dentition. o foul smelling sputum or drainage from an abscess or empyema.[2] **Antibiotic Selection** • Keep in mind that additional medications may not be required to cover for anaerobes. For example, most beta-lactam/beta-lactamase inhibitor combos (e.g., piperacillin/tazobactam), carbapenems, and some fluoroquinolones (e.g., moxifloxacin), already cover many anaerobes.[1,3,6,7,9] (Note ceftazidime/avibactam and levofloxacin, a common formulary fluoroquinolone, should not be used for anaerobic coverage.) In addition, antibiotics used to treat CAP, HAP, or VAP can be changed to an antibiotic that covers typical CAP pathogens and anaerobes. For example, beta-lactams can be changed to ampicillin/sulbactam or amoxicillin/clavulanate.[6] • Note that data using metronidazole to treat pneumonias are very limited. However, if adding specific anaerobic coverage to existing therapy, consider metronidazole over clindamycin. **Metronidazole** has good oral bioavailability (>90%), covers anaerobes from both "**above and below the belt,**" and has a lower risk of *C. difficile* infections compared to clindamycin. **Clindamycin** also has good oral bioavailability (~90%), has a higher risk of *C. difficile* infections, and only covers gram-positive organisms and anaerobes from "above the belt."[4,7,8] o If using metronidazole, be sure to combine with a beta-lactam. Metronidazole lacks coverage of organisms commonly associated with pneumonia, such as gram-positive bacteria (e.g., *S. pneumoniae*).[12] • Can consider a **fluoroquinolone** (e.g., moxifloxacin [covers anaerobes], levofloxacin plus metronidazole if covering for anaerobes), in patients with a severe penicillin allergy. Also, see our charts, *Beta-Lactam Allergy: FAQs* and *Antibiotic Desensitization and Challenge*, when considering a beta-lactam in a patient who reports a penicillin allergy. **Assessment and Follow-up** • Promote antibiotic stewardship and adjust antibiotic therapy based on culture and sensitivity results.[2] o Sputum cultures are easy to get (noninvasive) and inexpensive, but are often inconclusive. However, they can be used to guide therapy when organisms are able to be identified.[2] o Be aware, anaerobic bacteria are slow growing and results may not return until after patients are discharged.[12] • In addition, follow hospital protocols to convert patients to oral therapy once stable, clinically improving, and able to take things by mouth. For example, patients on an intravenous beta-lactam (e.g., ampicillin/sulbactam) can usually be converted to oral amoxicillin/clavulanate.[11]

More. . .

Question	Answer/Pertinent Information
How long should patients with aspiration pneumonia be treated?	• Treat most patients with aspiration pneumonia like you would for CAP (at least five days) or HAP and VAP (seven days total) [Evidence Level C].[1,5,10] Can consider longer durations of treatment for patients:[1] o who are not responding well to antibiotic therapy. o with necrotizing pneumonia (destruction of the underlying lung tissue, leading to multiple small, thin-walled cavities). o with lung abscesses. o with empyema (a collection of pus in the pleural cavity). • Expect patients with an abscess or empyema to require drainage in addition to antibiotic therapy.[1]
What prevention strategies can be used?	• Use the following to minimize post-operative chemical pneumonitis:[1] o Ensure patients fast for at least EIGHT hours, and avoid clear liquids for at least two hours, prior to surgery. o If possible, avoid using medications that increase risk of aspiration or interfere with swallowing (e.g., sedatives, antipsychotics). • Though data are not conclusive, can consider promoting oral intake with a mechanical soft diet with thickened liquids over pureed foods to reduce the risk of aspiration pneumonia in patients with dysphagia.[1,9] • When enteral feedings are needed, ensure patients are semirecumbent, not supine to reduce the risk of gastric aspiration.[1] • Follow hospital protocols for elevating the head of the bed in ventilated patients, to reduce the risk of aspiration.[9] • For patients with swallowing disorders, promote nutritional rehab with swallowing exercises and early mobilization.[1,2] • The data are weak to support oral hygiene in preventing aspiration pneumonia, but these efforts are unlikely to lead to harm.[1,9] Promote good oral hygiene (e.g., tooth brushing, cleaning dentures, gargling disinfectant solution, extraction of nonviable teeth).[2,9]

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Levels of Evidence

In accordance with our goal of providing Evidence-Based information, we are citing the **LEVEL OF EVIDENCE** for the clinical recommendations we publish.

Level	Definition	Study Quality
A	Good-quality patient-oriented evidence.*****	1. High-quality RCT 2. SR/Meta-analysis of RCTs with consistent findings 3. All-or-none study
B	Inconsistent or limited-quality patient-oriented evidence.*****	1. Lower-quality RCT 2. SR/Meta-analysis with low-quality clinical trials or of studies with inconsistent findings 3. Cohort study 4. Case control study
C	Consensus; usual practice; expert opinion; disease-oriented evidence (e.g., physiologic or surrogate endpoints); case series for studies of diagnosis, treatment, prevention, or screening.	

***Outcomes that matter to patients** (e.g., morbidity, mortality, symptom improvement, quality of life).
RCT = randomized controlled trial; **SR** = systematic review
[Adapted from Ebell MH, Siwek J, Weiss BD, et al. Strength of Recommendation Taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. *Am Fam Physician* 2004;69:548-56. http://www.aafp.org/afp/2004/0201/p548.pdf.]

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