

**Antibiotic Update 2024:
Respiratory Infections in the Challenging Patient**

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Disclosures

- Speaker Bureau: Sanofi-Pasteur, Merck, Pfizer, Seqirus, Moderna, Idorsia, AbbVie, Biohaven
- Consultant: Pfizer, Sanofi-Pasteur, Merck, Idorsia, Shield Scientific

** all disclosures have been mitigated

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Objectives

- Upon completion of this lecture, the participant will be able to:
- 1. Identify statistics related to incidence/prevalence of various conditions requiring antibiotics,
- 2. Discuss the signs and symptoms of pneumonia, ABRS, AOM, AECB.
- 3. Discuss treatment options for the above conditions

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Pathogens and Resistance

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Causative Pathogens in ABRS

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Streptococcus pneumoniae

- Gram positive diplococci
- Most common cause of Community Acquired Pneumonia
 - Also the most common bacterial cause of OM and sinusitis
- 70% of children and 30% of adults have nasopharyngeal colonization
- Disease results from a microaspiration

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Mechanism for the Development of Antimicrobial Resistance

- *Streptococcus pneumoniae*
 - Many mechanisms for resistance
 - Most common mechanism: Resistance from an alteration in the penicillin binding proteins which reduce/eliminate binding of penicillin to the proteins

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Mechanism for the Development of Antimicrobial Resistance

- *Streptococcus pneumoniae*
 - Erythromycin resistance: ribosome modification and alteration in antibiotic transport
 - Of increasing concern is the ermAM gene. This gene confers cross-resistance to other 14, 15, and 16 membered rings (clarith, azith)

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Where are we now?

- *S. pneumoniae*
 - 25% - 50% is not fully responsive to penicillin
 - 33% is resistant to macrolides

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Of Increasing Concern...

- The first clinical isolate of *S. pneumoniae* to exhibit a high level of resistance to fluoroquinolones was found in 2001 in Taiwan

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Streptococcus pneumoniae

- Most likely to be present with recurrent disease and least likely of all pathogens to resolve without treatment
- <30% chance of spontaneous resolution; Some sources say <10%

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H. influenzae

- Gram negative coccobacillus
 - Bronchotracheal tree becomes colonized and microaspiration occurs
- Most commonly seen among smokers, children of smokers and daycare children
 - 33% - 35% of *H. influenzae* is beta lactamase producing
 - TRUST results (Tracking Resistance in the United States)
 - 31.3% produced B lactamase in 99-2000
 - TMP-SMX resistance increased to 14% from 11.9%
 - Ampicillin resistance decreased from 33.9% to 30.7%

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M. catarrhalis

- Gram negative bacillus
- Implicated in recurrent OM and Sinusitis
- Will often spontaneously resolve if left untreated
- 90% - 98% beta lactamase producing

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Acute Bacterial Rhinosinusitis

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Tammy

- 27 year old woman with an 12 day history of nasal discharge
- Seemed to be improving until past 2 days; developed worsening of post-nasal drip and pain over both cheeks. Temp past 1-2 days: 99.8 – 100.5
- Last antimicrobial use: 1 year ago
- PMH: Noncontributory; No tobacco, No allergies
- LMP: 2 weeks ago; denies pregnancy
- PE: Nasal mucosa erythematous. Maxillary sinuses 2+ tender

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Remember...

- Secondary bacterial infection of the paranasal sinuses following a viral URI is relatively uncommon, estimated to be 0.5%–2% of adult cases and approximately 5% in children
- A national survey of antibiotic prescriptions for URI in the outpatient setting showed that antibiotics were prescribed for 81% of adults with acute rhinosinusitis despite the fact that approximately 70% of patients improve spontaneously in placebo-controlled randomized clinical trials

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<http://guidelines.gov/content.aspx?id=36681> accessed 12-29-2012 16

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- Antimicrobials rarely needed
- Majority of illnesses are viral or allergic and will resolve on own

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Pathophysiology of ABRS

- Normally, bacteria is removed from the sinuses by the mucous and the action of the cilia
- Ostia of a sinus becomes blocked
- Bacteria is normally present in the sinus
- Once the sinus opening is blocked, the bacteria is trapped and begins to grow in number

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Pathophysiology of ABRS

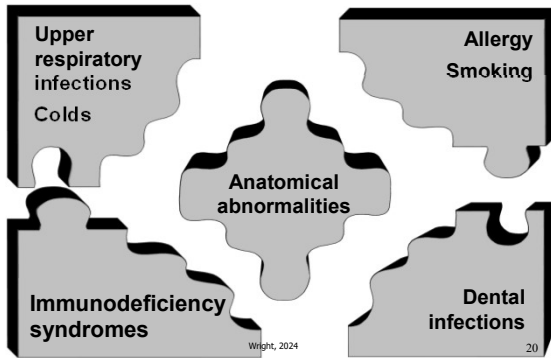
- Mucosa of the sinuses become inflamed and swollen; The body responds by sending neutrophils to the area
- Result: Increased production of thick, green discharge; Pain in affected sinus(es)

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Predisposing Factors of ABRS



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Diagnosis of Bacterial Acute Sinusitis

- Who should be treated with antimicrobial:
 - Persistent symptoms or signs compatible with acute rhinosinusitis, lasting for ≥ 10 days without any evidence of clinical improvement
 - Onset with severe symptoms or signs of high fever ($\geq 39^\circ\text{C}$ [102°F]) and purulent nasal discharge or facial pain lasting for at least 3–4 consecutive days at the beginning of illness
 - Onset with worsening symptoms or signs characterized by the new onset of fever, headache, or increase in nasal discharge following a typical viral upper respiratory infection (URI) that lasted 5–6 days and were initially improving ("double sickening")

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<http://guidelines.gov/content.aspx?id=36681> accessed 12-29-2012

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- Features most consistent with bacterial rhinosinusitis:
 - Fever and symptom duration of 10 days or more
 - Maxillary toothache
 - Double sickening
 - Cacosmia (sense of a bad odor in nose)
 - Unilateral facial pain

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Diagnostic Testing

- Sinus X-rays
 - Allows visualization of the maxillary and frontal sinuses
 - Lack of specificity is a limiting factor
 - US Agency on Healthcare Policy – not cost effective
- CT Scan
 - Best visualization of the paranasal sinuses
 - Not recommended unless patient suspected to have suppurative complications²

http://www.medscape.com/viewarticle/557184_2 accessed 01-28-2010
²<http://guidelines.gov/content.aspx?id=36681> accessed 12-29-2012

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IDSA Clinical Practice Guideline for Acute Bacterial Rhinosinusitis in Children and Adults Clinical Infectious Diseases Advance Access published March 20, 2012

<http://cid.oxfordjournals.org/content/early/2012/03/20/cid.cir1043.full.pdf+html>
Accessed 12-29-2012

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Goals of Treatment

- Restore integrity and function of ostiomeatal complex
 - Reduce inflammation
 - Restore drainage
 - Eradicate bacterial infection

<http://www.medscape.com/viewprogram/5621> accessed 01-22-07

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Treatment of Acute Bacterial Rhinosinusitis

- Nonpharmacologic Therapies
 - Intranasal saline irrigations with either physiologic or hypertonic saline are recommended as an adjunctive treatment in adults with ABRS¹

¹<http://cid.oxfordjournals.org/content/early/2012/03/20/cid.cir1043.full.pdf+html>
Accessed 12-29-2012

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Management Strategies in ABRS

- Antihistamines or decongestants
 - No longer recommended
- Topical corticosteroids
 - Intranasal corticosteroids are recommended as an adjunct to antibiotics in the empiric treatment of ABRS, primarily in patients with a history of allergic rhinitis¹

¹<http://cid.oxfordjournals.org/content/early/2012/03/20/cid.cir1043.full.pdf+html>
Accessed 12-29-2012

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- Initial therapy:
 - Amoxicillin 500 mg three times daily or 875 mg two times daily OR
 - Amoxicillin-clavulanate 875 mg/125 mg 1 pill two times daily x 5-7 days

Gilbert, D., Chambers, H., Saag, M. Pavia, A. (2024) The Sanford Guide to Antimicrobial Therapy. Sperryville, VA: Antimicrobial Therapy, Inc

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- If beta-lactam allergy (5-7 days):
 - No anaphylaxis:
 - Cefdinir 600 mg/day or cefpodoxime 200 mg two times daily or cefuroxime 500 mg two times daily
 - Anaphylaxis:
 - Levofloxacin 750 mg once daily or moxifloxacin 400 mg once daily or doxycycline 100 mg two times daily

Gilbert, D., Chambers, H., Saag, M. Pavia, A. (2024) The Sanford Guide to Antimicrobial Therapy. Sperryville, VA: Antimicrobial Therapy, Inc

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Sanford Guide to Antimicrobial Therapy, 2024

- Treatment failure after 3-5 days
 - Mild or moderate disease:
 - Amoxicillin-clavulanate 2000 mg/125 mg two times daily or Levofloxacin 750 mg once daily
 - Severe disease:
 - Levofloxacin 750 mg once daily

Gilbert, D., Chambers, H., Saag, M. Pavia, A. (2024) The Sanford Guide to Antimicrobial Therapy. Sperryville, VA: Antimicrobial Therapy, Inc

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FDA recommending

- Restrictions on fluoroquinolones for uncomplicated UTIs, bronchitis and ABRS
 - Ciprofloxacin, moxifloxacin, gemifloxacin, levofloxacin and ofloxacin

<http://www.consultant360.com/topic/fda-alerts> accessed 05-12-2016

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Important Changes

- Macrolides (clarithromycin and azithromycin) are not recommended due to high rates of resistance among *S. pneumoniae* (30%)
- TMP/SMX is not recommended due to high rates of resistance among both *S. pneumoniae* and *H. influenzae* (30%–40%)
- Second and third-generation cephalosporins are no longer recommended due to variable rates of resistance among *S. pneumoniae*.

<http://cid.oxfordjournals.org/content/early/2012/03/20/cid.cir1043.full.pdf+html> accessed 12-29-2012

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Length of treatment

- The recommended duration of therapy for uncomplicated ABRS is 5–7 days
- For recalcitrant cases, can consider 7-10 days

<http://cid.oxfordjournals.org/content/early/2012/03/20/cid.cir1043.full.pdf+html> Accessed 12-29-2012

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When to Change Treatments

- An alternative treatment should be considered if symptoms worsen after 48–72 hours of initial empiric antimicrobial therapy, or when the individual fails to improve despite 3–5 days of antimicrobial therapy

<http://cid.oxfordjournals.org/content/early/2012/03/20/cid.cir1043.full.pdf+html>
Accessed 12-29-2012

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What Does AAP Say?

- Amoxicillin alone or in combination with clavulanate is the first-line antibiotic choice
 - Length of treatment: 5-7 days
 - 90 mg/kg/day in two divided doses (max 2 grams per dose)
- Children with hypersensitivity to amoxicillin (type 1 and non-type 1):
 - cefdinir, cefuroxime, or cefpodoxime

AAP Releases Guideline on Diagnosis and Management of Acute Bacterial Sinusitis in Children One to 18 Years of Age - Practice Guidelines – American Family Physician (aafp.org) accessed 11-28-2020

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When to Refer

- 3-4 ABRS cases in 1 year (chronic sinusitis)
- Suppurative complications

<http://cid.oxfordjournals.org/content/early/2012/03/20/cid.cir1043.full.pdf+html>
Accessed 12-29-2012

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Diagnosis and Treatment of Adults with Community-acquired Pneumonia

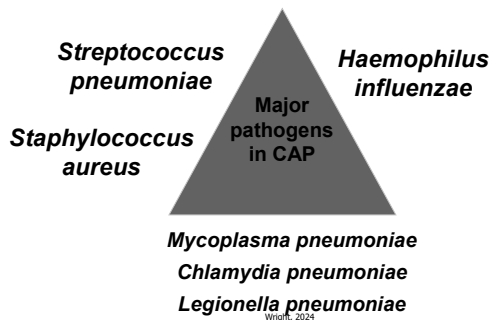
<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST>
accessed 10-06-2019

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Causative Pathogens in CAP



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Microbial Etiology of CAP

- Microbial causes of CAP are changing
- Due in part to the introduction of the pneumococcal conjugate vaccines
- Increased recognition of the role of viral etiology

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H. influenzae

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 - Bronchotracheal tree becomes colonized and microaspiration occurs
- Most commonly seen among smokers, children of smokers and daycare children
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Atypical pathogens

- *Mycoplasma pneumoniae*
- *Chlamydia pneumoniae*
- *Legionella pneumoniae*

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S. Aureus

- Cover for this pathogen in individuals with CAP who are post-influenza/recovering from influenza

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Community Acquired Pneumonia

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Earl

- 66 year old man employed by the town presents with a 6-day history of a cough, worsening SOB, fever, chills, pain in back with inspiration, and yellow-brown sputum.
 - PMH: Nonsmoker, Hx: MI age 51, Type 2 Diabetes
 - PE: T: 103.8; P: 98; R: 32; BP: 138/90; HEENT: unremarkable; Tired appearing; Lethargic; Crackles in right lower lobe; Do not clear with coughing
 - Finger stick: 188
 - Xray: Consolidation-RLL

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Community Acquired Pneumonia

- Acute infection of the pulmonary parenchyma that is associated with symptoms of an infection such as fever, chills, shortness of breath and physical examination findings
 - Found in a person not hospitalized or residing in a long-term care facility for ≥ 14 days before the onset of symptoms

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Statistics: Community Acquired Pneumonia

- 915,900 episodes of CAP occur in adults 65 years of age each year in the United States
- Despite advances in antimicrobial therapy, rates of mortality due to pneumonia have not decreased significantly since penicillin became routinely available

<http://www.thoracic.org/statements/resources/mtpi/idsaats-cap.pdf> accessed 12-29-2012

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Community Acquired Pneumonia

- Leading cause of death from an infectious disease
- 6th leading cause of death
 - 45,000 deaths in the US yearly
- Highest incidence: winter months

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Most Common Outpatient Pathogens

- *Streptococcus pneumoniae*
- *Mycoplasma pneumoniae*
- *Haemophilus influenzae*
- *Chlamydomphila pneumoniae*
- *Staphylococcus aureus*
- *Legionella pneumoniae*
- Respiratory viruses

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Earl

- 66 year old man employed by the town presents with a 6 day history of a cough, worsening SOB, fever, chills, pain in back with inspiration, and yellow-brown sputum.
 - PMH: Nonsmoker, Type 2 Diabetes
 - PE: Crackles in right lower lobe; Do not clear with coughing. RR - 32
 - Xray: Consolidation-RLL
 - CBC: wbc 16,500; Bands 7%, Neuts: 83%
 - BUN - 42
 - Blood cultures pending

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Most Important Decision!!!

- Decision to hospitalize or not
- Single most important decision in the course of the illness
- Guidelines encourage clinical decision making and a validated tool:
 - Either: CURB-65 or PSI (Pneumonia Severity Index)

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CURB-65 Score

- Confusion
- Urea > 7 mmol/L (BUN > 19 mg/dL)
- Respiratory rate \geq 30/min
- Systolic blood pressure < 90 mm OR Diastolic blood pressure \leq 60 mm Hg
- Age \geq 65 years of age

<http://www.mdcalc.com/curb-65-severity-score-community-acquired-pneumonia> accessed 01-28-2010

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CURB-65 Score

- CURB ≥ 4 – ICU management
– (27.8% 30-day mortality)
- CURB = 3 – Hospital admission (consider ICU)
– (14% 30-day mortality)
- CURB = 2: Hospital admission or outpatient management with very close follow-up
– (6.8% 30-day mortality)
- CURB = 0 – 1: Outpatient management
– (2.7% 30-day mortality)

<http://www.mdcalc.com/curb-65-severity-score-community-acquired-pneumonia>
accessed 01-28-2010

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Remember Earl...

- Age: 66
- Confusion 0
- Urea 1
- Respiratory rate 1
- Blood pressure 0
- Age 1

- CURB Score outpatient 3

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Reaffirmed: 2007 IDSA/ATS Criteria for Defining Severity

- One major or three minor criterion suggests severe pneumonia
 - Minor: RR ≥ 30 breaths/min; Multilobar infiltrates; Confusion or disorientation; BUN ≥ 20 mg/dL; WBC < 4000 cells; Thrombocytopenia $< 100,000$; Hypothermia < 36 degrees C; Hypotension requiring aggressive fluid resuscitation
 - Major: septic shock, Respiratory failure requiring mechanical ventilation

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<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST> accessed 10-06-2019

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Next Day:
Repeat CBC with Differential

- Earl seems to be worsening
 - Temp still 102-103;
 - RR: 34 labored
- More lethargic; seems confused
- Moved to intensive care unit

Something you never want to see...

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CBC with differential

- WBC count: 12,100/mm³ (↓)
- Neuts: 58% (↓)
- Bands: 20% (↑)
- Now we see the presence of:
 - Metas: 3% (↑)
 - Metamyelocytes: 2% (↑)

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Cells typically found in bone marrow

- Metamyelocyte
 - Crescent-shaped nucleus
- Myelocyte
 - Round nucleus, small number of granules
- These cells are typically recruited when circulating wbc's i.e. neutrophils and bands have been exhausted

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Degenerative Left Shift

- When available and more mature neutrophils forms are exhausted
 - Less mature forms accessed
 - Total number of wbc's begin to fall
 - General supply is less

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The sign of....



- A desperate attempt to control infection.....
- Often associated with a very poor prognosis

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Earl: CBC with differential

- WBC count: 12,100 (↓): Was 16,500
- Neuts: 58% (↓): Was 83%
- Bands: 20% (↑): Was 7%
- Metas: 3% (↑)
- Metamyelocytes: 2% (↑)

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Unfortunately, Earl...

- Continued to worsen
- Grew out: drug-resistant pathogens and despite multiple antibiotics/ventilator assistance etc, he did not survive the pneumonia and died within 48 hours of presentation

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Management Inpatient

Table 4. Initial Treatment Strategies for Inpatients with Community-acquired Pneumonia by Level of Severity and Risk for Drug Resistance

	Standard Regimen	Prior Respiratory Isolation of MRSA	Prior Respiratory Isolation of Penicillinsensitive pneumococci	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for MRSA	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for <i>A. aeruginosa</i>
Nonsevere inpatient pneumonia ^{1,2}	β-lactam + macrolid or respiratory PCP to allow deescalation or confirmation of need for continued therapy	Add MRSA coverage and obtain culture/rapid PCR to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>A. aeruginosa</i> and obtain culture/rapid PCR to allow deescalation or confirmation of need for continued therapy	Obtain cultures but without MRSA coverage unless culture results are positive. If rapid PCR is available, without additional empiric therapy against MRSA. Rapid testing is negative or add coverage if PCR is positive and obtain cultures	Obtain cultures but include coverage for <i>A. aeruginosa</i> only if culture results are positive
Severe inpatient pneumonia ^{1,2}	β-lactam + macrolid or β-lactam + fluoroquinolone	Add MRSA coverage and obtain culture/rapid PCR to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>A. aeruginosa</i> and obtain culture/rapid PCR to allow deescalation or confirmation of need for continued therapy	Add MRSA coverage and obtain rapid PCR and cultures to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>A. aeruginosa</i> and obtain culture to allow deescalation or confirmation of need for continued therapy

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<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST> accessed 10-06-2019

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What If He Met Criteria for Outpatient Treatment?

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Diagnosis

- All patients suspected of pneumonia need to have a chest x-ray to confirm or establish the diagnosis
- 2019 New Guideline: Sputum gram stain only in those with severe disease or those with suspected MRSA or *Pseudomonas aeruginosa*
- CBC, BUN should be obtained with other labs dictated by comorbidities

<http://www.thoracic.org/statements/resources/mtp/idsaats-cap.pdf> accessed 12-29-2012

<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST> accessed 10-06-2019

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Please Remember...

- Four potential causes of a false negative chest x-ray
 - Early disease: Delay can be up to 10 days
 - Dehydration: Controversial but must be considered
 - Neutropenia: Unable to mount an inflammatory response
 - Pneumocystis Carinii: 10-40% of patients with this infection have a normal x-ray

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Additional Diagnostics

- Pretreatment blood cultures:
 - Those with severe disease managed inpatient
 - Those inpatients with suspected MRSA or *P. aeruginosa*
- Procalcitonin: not addressed in guideline
- Pretreatment urinary antigens for *Legionella* and *Mycoplasma* are NOT recommended
- Obtain influenza cultures if influenza circulating

<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST> accessed 10-06-2019

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Diagnosis and Treatment of Adults with Community-acquired Pneumonia

<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST>
accessed 10-06-2019

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IDSA/ATS CAP Outpatient Treatment

- For healthy outpatient adults without comorbidities or risk factors for antibiotic resistant pathogens:
 - Amoxicillin 1 g three times daily or
 - Doxycycline 100 mg twice daily, or
 - A macrolide (azithromycin 500 mg on first day then 250 mg daily or clarithromycin 500 mg twice daily or clarithromycin extended release 1,000 mg daily) only in areas with pneumococcal resistance to macrolides <25%

<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST> accessed
10-06-2019

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IDSA/ATS CAP classification for outpatient treatment

- For outpatient adults with comorbidities such as chronic heart, lung, liver, or renal disease; diabetes mellitus; alcoholism; malignancy; or asplenia:
 - Combination therapy is now the recommendation

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Higher Risk Individuals

- Combination therapy:
 - Amoxicillin/clavulanate 500 mg/125 mg three times daily, or amoxicillin/clavulanate 875 mg/125 mg twice daily, or 2,000 mg/125 mg twice daily, or a cephalosporin (cefepodoxime 200 mg twice daily or cefuroxime 500 mg twice daily);
 - AND
 - Macrolide (azithromycin 500 mg on first day then 250 mg daily, clarithromycin [500 mg twice daily or extended release 1,000 mg once daily]), OR doxycycline 100 mg twice daily OR
- Monotherapy:
 - Respiratory fluoroquinolone (levofloxacin 750 mg daily, moxifloxacin 400 mg daily, or gemifloxacin 320 mg daily)

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What Agent to Use?

- Recent therapy or a repeated course of therapy with beta-lactams, macrolides, or fluoroquinolones are risk factors for pneumococcal resistance to the same class of antibiotic.
- An antimicrobial agent from an alternative class is preferred for a patient who has recently received one of these agents

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How Long?

- Minimum of 5 days
- Ideally, patient should be afebrile and clinically stable for 48 – 72 hours prior to discontinuation of antibiotics

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Corticosteroids

- Not recommended for use outpatient with pneumonia; consider in patients with septic shock

<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST> accessed 10-06-2019

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What About Follow-up Chest Imaging?

- Not recommended
- Patients eligible for lung cancer screening should have it performed

<https://www.atsjournals.org/doi/10.1164/rccm.201908-1581ST> accessed 10-06-2019

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Bronchitis

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Bronchitis

- Definition: Inflammatory condition of the tracheobronchial tree
 - Acute bronchitis
 - Most cases of acute bronchitis are viral (90-95%)
 - Chronic bronchitis

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COPD

Airflow limitation/
obstruction present

Bronchiectasis

Chronic Bronchitis

- Chronic productive cough for 3 months in each of 2 successive years
- >90% of COPD

Emphysema

COPD = chronic obstructive pulmonary disease; AECB = acute exacerbations of chronic bronchitis; Barnes. *N Engl J Med* 2000; 343:269; Sethi. *Clin Pulm Med* 1999; 6:327; NHLBI 2000; American Thoracic Society. *Am J Respir Crit Care Med* 1995; 152:S77; Ball. *Q J Med* 1995; 88:61; British Thoracic Society. *Thorax* 1997; 52(Suppl 5):S1-S32

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Role of Cigarette Smoking

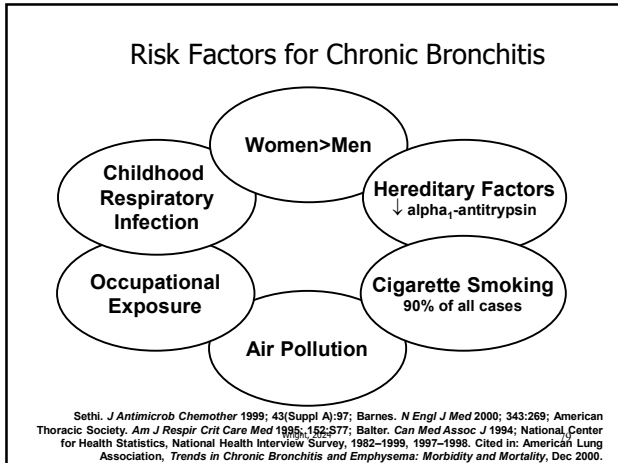
- **In the U.S., up to 90% of chronic bronchitis is related to tobacco smoke exposure**
- **Smokers are more likely than nonsmokers to die of COPD**
- **Persistent inflammation in the airway and in the parenchyma is present in ex-smokers**
- **Loss of lung function at an accelerated rate may continue in ex-smokers with established COPD**
- **FEV₁ decline equivalent in ex-smokers and active smokers (65 mL/y vs. 69 mL/y)**

Balter. *Can Med Assoc J* 1994; 151(Suppl 10):5; American Thoracic Society. *Am J Respir Crit Care Med* 1995; Sethi. *Clin Pulm Med* 1999; 6:327; Obajl. *American Thoracic Society International Conference 2001 (Poster K9)*; Hoidal. *Semin Respir Infect* 1994; 9:8

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Global Strategy for Diagnosis, Management and Prevention of COPD

Manage Exacerbations

An exacerbation of COPD is:

“an acute event characterized by a worsening of the patient’s respiratory symptoms that is beyond normal day-to-day variations and leads to a change in medication.”

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2023
Teaching
Slide Set

Key Points for the Management of Exacerbations Table 5.5

- Short-acting inhaled beta₂-agonists, with or without short-acting anticholinergics, are recommended as the initial bronchodilators to treat an acute exacerbation **(Evidence C)**
- Systemic corticosteroids can improve lung function (FEV₁), oxygenation and shorten recovery time and hospitalization duration. Duration of therapy should not normally be more than 5 days **(Evidence A)**
- Antibiotics, when indicated, can shorten recovery time, reduce the risk of early relapse, treatment failure, and hospitalization duration. Duration of therapy should normally be 5 days **(Evidence B)**
- Methyloxanthines are not recommended due to increased side effect profiles **(Evidence B)**
- Non-invasive mechanical ventilation should be the first mode of ventilation used in COPD patients with acute respiratory failure who have no absolute contraindication because it improves gas exchange, reduces work of breathing and the need for intubation, decreases hospitalization duration and improves survival **(Evidence A)**

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New Information Emerging...

- 40 mg daily x 5 days may be all that is necessary for exacerbation of COPD for individuals with exacerbation of more than mild severity
- Equal outcomes
- Language from Sanford Guide: prednisone 40 mg po x 5 days is recommended for all COPD exacerbations of more than mild severity

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Global Strategy for Diagnosis, Management and Prevention of COPD

Manage Exacerbations: Treatment Options

Antibiotics should be considered and/or prescribed with moderate – severe exacerbations:

- Three cardinal symptoms: increased dyspnea, increased sputum volume, and increased sputum purulence.
- Who require mechanical ventilation or hospitalization.

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Antimicrobial Therapy

Mild to Moderate Exacerbations
Antimicrobial therapy may not be indicated. If prescribed, consider spectrum of antimicrobial activity and side effects)

If prescribed, use one of the following:

1. Amoxicillin 500 mg 1 pill tid x 5 – 7 days
2. TMP-SMX DS 1 pill bid x 5 – 7 days
3. Doxycycline 100 mg 1 pill bid x 5 – 7 days

For more severe exacerbations

Use one of the following:

1. Amoxicillin-clavulanate 875 mg 1 pill bid x 5 – 7 days
2. Azithromycin or clarithromycin
3. Respiratory fluoroquinolone (moxifloxacin or levofloxacin)

Source: Gilbert, D., Chambers, H., Saad, M., Pavia, A. (2023) The Sanford Guide to Antimicrobial Therapy. Sperryville, VA: Antimicrobial Therapy, Inc. 84

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FDA Warning

- Fluoroquinolones:
 - Spontaneous tendon rupture
 - Tendonitis
 - Peripheral neuropathy
 - Aortic dissection
 - Significant hypoglycemia

<https://www.forbes.com/sites/brucelee/2018/12/21/fda-warns-about-what-fluoroquinolone-antibiotics-may-do-to-your-aorta/#121315605e7e>

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Potential Indications for Hospitalization Assessment*

Table 5.3

- Severe symptoms such as sudden worsening of resting dyspnea, high respiratory rate, decreased oxygen saturation, confusion, drowsiness
- Acute respiratory failure
- Onset of new physical signs (e.g., cyanosis, peripheral edema)
- Failure of an exacerbation to respond to initial medical management
- Presence of serious comorbidities (e.g., heart failure, newly occurring arrhythmias, etc.)
- Insufficient home support

*Local resources need to be considered



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End of Presentation!

Thank you for your time and attention.

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