

Antibiotic Update 2010: ABRS, CAP and AECB

Wendy L. Wright, MS, APRN, BC, FAANP
Adult / Family Nurse Practitioner
Owner - Wright & Associates Family Healthcare
Amherst, New Hampshire
Partner – Partners in Healthcare Education, PLLC

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Objectives

- Upon completion of this lecture, the nurse will be able to:
 1. Recognize the impact of antimicrobial resistance on infections encountered in a primary care setting.
 2. Discuss diagnostic criteria for ABRS, CAP and AECB.
 3. Identify latest treatment guidelines for the above conditions.

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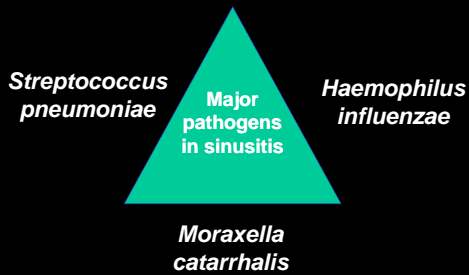
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Pathogens and Resistance

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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 beta 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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Clinically-When Do You Suspect Resistance?

- One of the largest predictors of drug resistance is recent antibiotic use
 - Usually defined as within the previous 6 weeks
 - 3-4 fold increased risk of DRSP
- Other risk factors include:
 - Daycare settings, Nursing homes
 - Age > 65
 - Poor hygiene
 - Recurrent antibiotic use

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Why is Resistance Becoming Such a Problem?

- Antibiotic Overuse
 - 50% of prescriptions are not needed
 - 100 million prescriptions for antibiotics yearly
 - 50 million not needed
 - Increased use of prophylactic antibiotics
 - Animal husbandry
 - Disinfectant soaps / cleansers
 - Managed care organizations

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Why is Resistance Becoming Such a Problem?

- Antibiotic Misuse
 - Not prescribing the correct antibiotic
 - Not taking as prescribed (entire course, tid)

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There is still hope....

- Reducing antibiotic usage can reverse resistance
- Choosing the most appropriate antibiotic for the patient can also reverse resistance
- Educating patients about the importance of antibiotic compliance can reduce resistance

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Acute Bacterial Rhinosinusitis

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Marcia

- 45 year old woman with an 11 day history of nasal discharge; Initially clear. Within last 3 days has become green, thick. Significant amount of post-nasal drip and pain over both cheeks. Temp: 99.6-101. Denies ear pain, st, cough, SOB. Had 1 sinus infection 3 years ago.
 - PMH: Noncontributory (Nonsmoker, No allergies)
 - PE: Nasal mucosa erythem, green discharge. Maxillary-2+ tender.

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New Definition of Rhinosinusitis

Take into consideration:



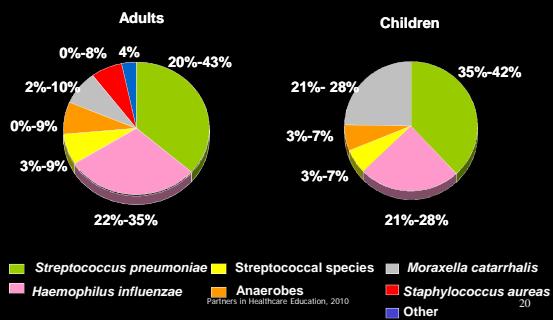
Mucosa of both nose and sinuses

Fluids that lie within cavities of nose and sinuses

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Microbiology of ABRS



Incidence of Acute Bacterial Rhinosinusitis (ABRS)

- Up to 1 billion cases of viral and bacterial sinusitis occur annually
- Affects 16% of US population yearly
- 5.8 billion dollars spent yearly on this condition

http://www.medscape.com/viewarticle/557184_2 accessed 01-28-2010

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Remember...

- Only 0.5 – 2% of viral sinusitis cases turn into bacterial sinusitis

www.nejm.org

Piccirillo, J. Acute Bacterial Sinusitis; N Engl J Med 351; 9. August 26, 2004

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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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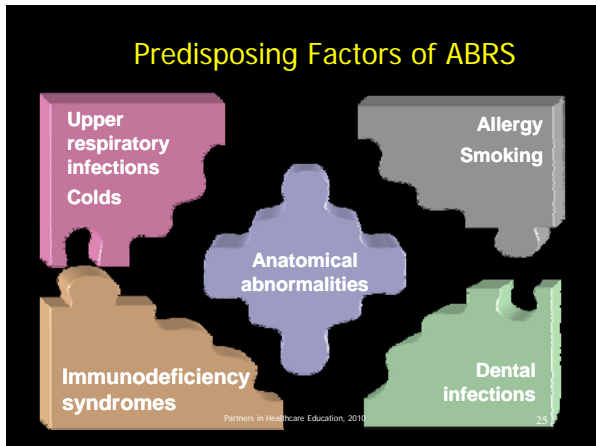
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Pathophysiology of ABRS

- 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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Diagnosis of ABRS

A diagnosis of ABRS may be made in adults or children with symptoms of a viral upper respiratory infection that have not improved after 10 days or have worsened after 5 to 7 days

Symptoms:

• Headache	• Fever
• Facial pain/pressure	• Halitosis
• Nasal drainage	• Cough
• Nasal congestion	• Fatigue
• Postnasal drip	• Maxillary dental pain
• Hyposmia/anosmia	• Ear fullness/pressure

Sinus and Allergy Health Partnership. *Otolaryngol Head Neck Surg* 2000;123(1 part 2):S1-S32. 26

Diagnosis

- Presence of two major
 - purulent rhinorrhea
 - nasal obstruction/congestion
 - facial pain/pressure
 - hyposmia/anosmia
 - postnasal purulent drainage
- OR...

http://www.medscape.com/viewarticle/557184_2 accessed 01-28-2010

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Diagnosis

- Presence of one major and two minor symptoms
 - ear fullness/pressure
 - fever
 - sore throat
 - fatigue
 - headache
 - cough
- Must persist beyond 10 days or worsen after 5-7 days

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http://www.medscape.com/viewarticle/557184_2 accessed 01-28-2010

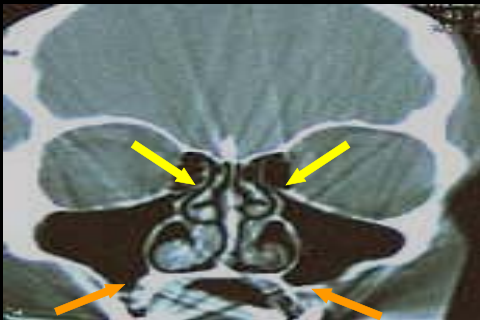
Diagnostic Testing

- 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

http://www.medscape.com/viewarticle/557184_2 accessed 01-28-2010

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Normal sinuses



Source: MD Consult Online. Available at <http://www.mdconsult.com>. Retrieved October 1, 2001. Fitzgerald Health Education Associates, Inc; 2007
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Management Strategies in ABRS

- Guaifenesin
- Antihistamines
 - Should not be used unless allergic component
 - 2nd generation antihistamines
- Topical corticosteroids
- Corticosteroids
- Antimicrobials

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SAHP Treatment Guidelines

Otolaryngol Head Neck Surg.
2004;130:1-45.

Adults with mild ABRS No antimicrobial use in past 4-6 weeks

- Amoxicillin 1.5-4 g/d or...
- Amoxicillin/clavulanate (Augmentin) 1.75-4 g/250 mg/d or....
- Cefpodoxime (Vantin) or cefuroxime (Ceftin) or cefdinir (Omnicef)

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Adults with mild ABRS
No antimicrobial use in past 4-6 weeks
No improvement or worse at 72 h

- HD amoxicillin/ clavulanate (4 g/d) or...
- Respiratory fluoroquinolone
 - Levofloxacin (Levaquin) or moxifloxacin (Avelox)

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Adults w/ mild ABRS
 β -Lactam allergy
No prior antimicrobial use

- TMP/SMX (Bactrim) or...
- Doxycycline or...
- Azithromycin (Zithromax), clarithromycin (Biaxin), erythromycin

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Adults w/ mild ABRS
 β -Lactam allergy
No prior antimicrobial use
No improvement, worse after 72 h

- Levofloxacin or moxifloxacin or...
- Clindamycin (Cleocin) with rifampin

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Adults with mild ABRS
w/ prior antimicrobial use (past 4-
6 weeks) *or* with moderate ABRS
± prior antimicrobial use

- Levofloxacin or moxifloxacin or...
- HD amoxicillin/clavulanate or...
- Ceftriaxone (Rocephin) or...
- Clindamycin with rifampin or...

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Adults with mild ABRS
w/ prior antimicrobial use
or w/ moderate ABRS
± prior antimicrobial use

- No improvement or worsening after 72 h
 - Re-evaluate patient
 - Consider alternate diagnosis, complication

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Adults with mild ABRS
w/ prior antimicrobial use
or with moderate ABRS
± prior antimicrobial use and beta-lactam
allergy

- Levofloxacin or moxifloxacin or...
- Clindamycin with rifampin

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Adults with mild ABRS
w/ prior antimicrobial use
(past 4-6 weeks) or w/
moderate ABRS
± prior antimicrobial use and
beta-lactam allergy

- No improvement or worsening after 72 hours
 - Re-evaluate patient
 - Consider alternate diagnosis, complication

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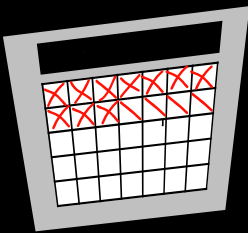
Fluoroquinolone Side Effects

- Associated with tendonitis and spontaneous tendon rupture
 - Rupture may occur during or after use
 - Discontinue with any tendon pain
 - **Clinical Pearl: Biggest risk factor is concomitant oral steroid use
 - Give magnesium 325 mg (Magnesium oxide) 6 hours before fluoroquinolone dose

Lecture – Paul Iannini, MD; Worcester, MA, 2006
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Duration of Therapy

- The current recommendation for ABRS is 10 to 14 days
- Based on clinical trials in which pre- and post-treatment sinus aspirates were obtained
- Longer or shorter courses of antibiotics should be based on the results of sinus aspirates from individual patients



Sinus and Allergy Health Partnership. *Otolaryngol Head Neck Surg* 2000;123(1 part 2):S1–S32.
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Community Acquired Pneumonia

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Earl

- 56 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; quit 15 years ago
 - PE: Crackles in right lower lobe; Do not clear with coughing
 - Xray: Consolidation-RLL
 - Sputum Gram Stain: Pending

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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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Community Acquired Pneumonia

- 4 million Americans yearly are diagnosed with Community Acquired Pneumonia
 - Results in 1 million hospital admissions
 - 75% of CAP's are managed on an outpatient basis
- 23 billion dollars is spent yearly on the care of patients with Community Acquired Pneumonia

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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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Symptoms of Pneumonia

- Cough
- Fever
- Sputum production
- Shortness of breath
- Pleurisy
- Fatigue
- Malaise
- Anorexia

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Signs

- Fever
- Tachypnea
- Tachycardia
- Crackles or decreased breath sounds
- Egophony, Bronchophony, Whispered Pectoriloquy
- Increased tactile fremitus
- Pleural rub

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Community Acquired Pneumonia Pathogens

- *Streptococcus Pneumoniae*
 - 66% of CAP and 66% of deaths r/t pneumonia
- *Haemophilus Influenzae*
 - Smokers
- *Moraxella Catarrhalis*

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Residential Facilities

- *Strep Pneumoniae*
- *Klebsiella Pneumonia*

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CAP Pathogens

- *Staphylococcus Aureus*
 - Immunocompromised
 - Recent URI
 - Increasing rates of MRSA
- Anaerobes
 - Immunocompromised

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CAP Pathogens

- *Neisseria Meningitidis*
- *Klebsiella*
 - Gram negative bacilli
 - Alcohol Abuse
 - Nursing home residents

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Community Acquired Pneumonia Pathogens

- *Streptococcus Pyogenes*
- Atypicals
 - *Mycoplasma, Chlamydia, and Legionella*
 - Most common cause of pneumonia in individuals between 5-40
 - Seems to occur in epidemics
 - Account for approximately 15% of CAP's

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Earl

- 56 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
 - PE: Crackles in right lower lobe; Do not clear with coughing. RR – 20; Blood pressure – 110/76
 - Xray: Consolidation-RLL
 - Sputum Gram Stain: Pending
 - CBC: wbc 16,500; Bands 7%, Neuts: 73%

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Most Important Decision!!!

- Decision to hospitalize or not
- Single most important decision in the course of the illness
 - Can determine life or death
 - Average mortality for hospitalized patients: 14% compared with non-hospitalized: <1%
- Average cost of treatment for CAP in the hospitalized patient vs. non-hospitalized
 - \$7500 (20x more than non-hospitalized)

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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 and 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 \geq 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

Remember Earl...

- Age: 56
- Confusion 0
- Urea 0
- Respiratory rate 0
- Blood pressure 0
- Age 0

- CURB Score outpatient 0 -

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Diagnosis

- All patients suspected of pneumonia need to have a chest x-ray to confirm or establish the diagnosis
- Infectious Disease Society of America also recommends sputum for gram staining prior to initiating antibiotic therapy, particularly if you are going to be hospitalizing the individual

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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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Sputum Sample: To obtain or not?

- Prospective studies have failed to identify the cause of 40 - 60% of all CAP cases in the adult patient
 - However, *S. pneumoniae* is the most common cause of CAP
 - Responsible for approximately 2/3 of all cases of bacteremic pneumonia

- <http://www.journals.uchicago.edu/CID/journalissues/v44nS2/41620/41620.text.html> accessed on 02-20-07

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Considerations When Choosing an Antibiotic

- What is the most likely pathogen?
 - Choose the antibiotic with the narrowest but most accurate coverage
- What is the likelihood of a resistant pathogen?
 - Recent antibiotic use
 - Daycare

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**Can Co-morbid Conditions
Help Predict Pathogens?**

- Adults > 50 years of age
 - *S. pneumoniae*
- Alcohol Abusers
 - *K. pneumoniae*
- Immunocompromised
 - *S. pneumoniae*, *S. aureus*
- Smokers and COPD patients
 - *H. influenzae*, *M. catarrhalis*

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**Considerations When
Choosing an Antibiotic**

- What could/will happen if the antibiotic fails?
 - Hospitalization
 - Death

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**IDSA/ATS 2007 Guidelines
for CAP in Adults**

- Practice Guidelines for the Management of Community-Acquired Pneumonia in Adults
 - Revised and published in *Clinical Infectious Diseases* 2007;44:S27 – S72

<http://www.medscape.com/viewarticle/546317> accessed 01-28-2010

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IDSA / ATS 2007 Guidelines				
Criteria	Previously Healthy and No Risks for DRSP	Previously Healthy and Recent Antibiotics	Comorbidities and No Recent Antibiotics	Comorbidities and Recent Antibiotics
Antibiotic Options	Macrolide	Respiratory Quinolone	Respiratory Quinolone	Respiratory Fluoro-quinolone
Antibiotic Options	Doxycycline	Macrolide + High dose amoxicillin	Macrolide + Beta Lactam	Advanced Macrolide plus beta lactam
Antibiotic Options		Macrolide + High Dose amox/clav		*** > 25% of infection with high level Macrolide resistance - Quinolone

IDSA/ATS CAP classification for outpatient treatment

- Classification
 - Previously healthy, no recent (within past 3 months) antimicrobial use
- Likely causative pathogens
 - *S. pneumoniae* (Gm pos) with low DRSP risk
 - Atypical pathogens (*M. pneumoniae*, *C. pneumoniae*)
 - Respiratory virus including influenza A/B, RSV, adenovirus, parainfluenza

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IDSA/ATS CAP classification for outpatient treatment

- Strong recommendation
 - Macrolide such as azithromycin, clarithromycin, or erythromycin

Or

- Weak recommendation
 - Doxycycline

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IDSA/ATS CAP classification for outpatient treatment

- Classification
 - Comorbidities including: COPD, diabetes, renal or heart failure, asplenia, alcoholism, immunosuppressing conditions or use of immunosuppressing medications, malignancy or use of an antimicrobial in past 3 months

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IDSA/ATS CAP classification for outpatient treatment

- Likely causative organism
 - *S. pneumoniae* (Gm pos) with DRSP risk
 - *H. influenzae* (Gm neg)
 - Atypical pathogens (*M. pneumoniae*, *C. pneumoniae*, *Legionella*)
 - Respiratory virus as mentioned above

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IDSA/ATS CAP classification for outpatient treatment

- Respiratory fluoroquinolone
- Or*
- Advanced macrolide (azithro- or clarithromycin) plus b-lactam such as HD amoxicillin (3- 4 g/d), HD amoxicillin-clavulanate (4 g/d), ceftriaxone (Rocephin), cefpodoxime (Vantin), cefuroxime (Ceftin)
- Alternative to macrolide: doxycycline

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Continuing With Earl

- 56 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
 - PE: Crackles in right lower lobe; Do not clear with coughing. RR - 20
 - Xray: Consolidation-RLL
 - Sputum Gram Stain: Pending
 - CBC: wbc 16, 5000; Bands 7%, Neuts: 73%

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Treated With...

- Macrolide x 5 days
- Clinical improvement within 48 hours
- Chest x-ray repeated in 12 weeks to confirm resolution
 - R/O any underlying pathology

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Length of Therapy

- Shortened to 5 days
- Provided that the patient is afebrile by 48 – 72 hours

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Bronchitis

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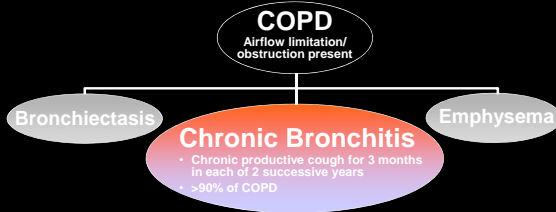
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Bronchitis

- 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 = 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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Disease Burden

- 16 million people in the U.S. have COPD
- 110,000 deaths annually
- Prevalence and mortality are increasing as population ages
- 14 million COPD patients have chronic bronchitis (median of 3 exacerbations per year)

Adams & Marano. *Vital Health Statistics* 1996; Ball. *Q J Med* 1995; 88:61; NCHS, 1996; NHLBI, 2000

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Role of Cigarette Smoking

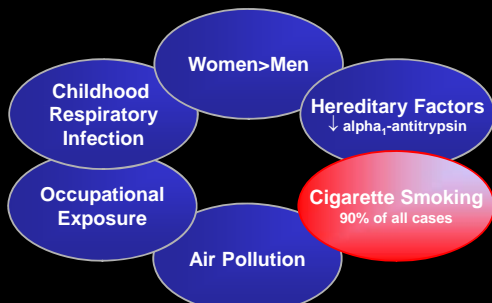
- In the U.S., up to 90% of chronic bronchitis is related to tobacco smoke exposure
- Smokers are more likely than nonsmokers to die of COPD
- Persistent inflammation in the airway and in the parenchyma is present in ex-smokers
- Loss of lung function at an accelerated rate may continue in ex-smokers 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* 1999; Sethi. *Clin Pulm Med* 1999; 6:327; Ohaq. *American Thoracic Society International Conference 2001 (Poster K9)*; Hoidal. *Semin Respir Infect* 1994; 9:8

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Risk Factors for Chronic Bronchitis



Sethi. *J Antimicrob Chemother* 1999; 43(Suppl A):97; Barnes. *N Engl J Med* 2000; 343:269; American Thoracic Society. *Am J Respir Crit Care Med* 1998; 152:377; Balter. *Can Med Assoc J* 1994; National Center for Health Statistics. National Health Interview Survey, 1982-1999, 1997-1998. Cited in: American Lung Association. *Trends in Chronic Bronchitis and Emphysema: Morbidity and Mortality*, Dec 2000.

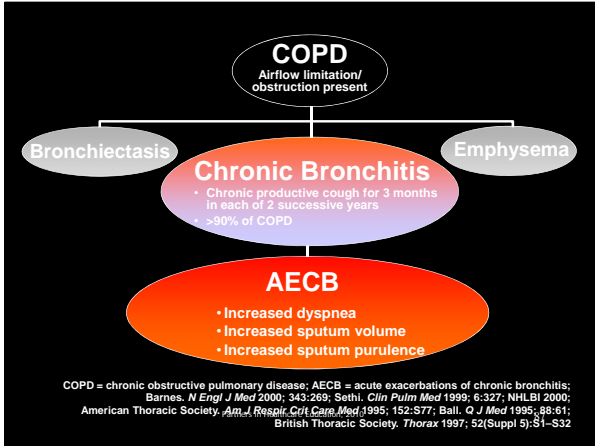
AECB:
Acute bacterial exacerbation
of chronic bronchitis

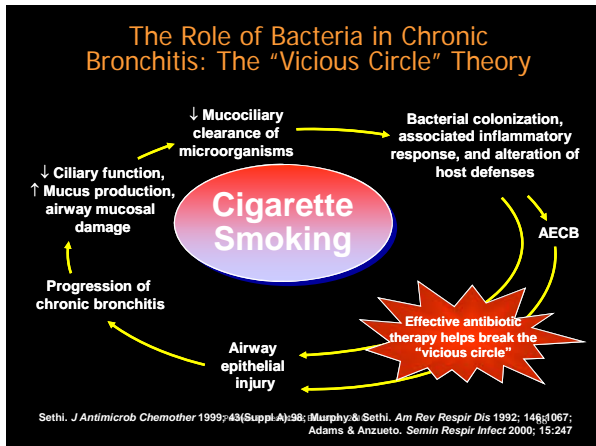
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Importance of These Events

- We now recognize ABECB as clinically important events in the patient with COPD
- Believed that inadequate treatment of ABECB can worsen the underlying COPD

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- ### Economic Impact of AECB
- Treatment sought for >90% of acute exacerbations (1994)
 - >\$1.5 billion in direct healthcare costs for AECB
 - Majority of costs were for hospitalizations
 - Therapy allowing patients to be treated in the outpatient setting would significantly reduce costs
- Partners in Healthcare Education, 2010 89
Niederman. *Clin Ther* 1999; 21:576

Clinical Diagnosis of AECB

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Criteria for Diagnosis

- Chronic bronchitis
- Plus:

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AECB Diagnostic Clues

- Increased
 - **Dyspnea***
 - **Sputum volume***
 - **Sputum purulence***
 - **Cough**
- Chest tightness
- Fluid retention
- Wheeze
- Decrease in airflow
- Fatigue or not feeling well

* The three cardinal symptoms of AECB

Sethi. *Clin Pulm Med* 1999; 6:327; British Thoracic Society. *Thorax* 1997; 52(Suppl 5): S1; Reynolds. In Mandell GL, Bennett JE, Dolin R, eds. *Principles and Practice of Infectious Diseases*, 5th ed. Philadelphia, Pa: Churchill Livingstone, 2000:706; Niederman. *Sem Resp Infect* 2000; 15:61

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Diagnosis May Include

- History
- Physical examination
- Laboratory
 - **CBC with differential**
- Additional testing
 - **PFT's**
 - **Sputum sample**
 - **Chest x-ray**
 - **ABG's, if hospitalized**

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Etiology and Role of Bacteria

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Causes of AECB

- Result of a virus in 25 – 50% of the cases
- Role of bacteria in AECB remains controversial
 - *S. pneumoniae*
 - *H. influenzae*
 - *M. catarrhalis*
 - All are isolated from tracheobronchial tree between acute exacerbations

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Bacterial Etiology of AECB

Bacterium	Percentage
<i>H. influenzae</i>	49%
<i>S. pneumoniae</i>	19%
<i>M. catarrhalis</i>	14%
Other	18%

- *H. influenzae* is the most common isolate
- *Streptococcus pneumoniae* and *Moraxella catarrhalis* are also common
- *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* are rarely documented

Southard. *Am J Manag Care* 1999; 5:S677; Rosell. *Eur Resp J* 2001; 18:3619; Adams & Anzueto. *Semin Respir Infect* 2000; 15:234; Reynolds HY; In Mandell GL, Bennett JE, Dolin R, eds. *Principles and Practice of Infectious Diseases*, 5th ed. Philadelphia, Pa: Churchill Livingstone, 2000:706

Mechanisms Facilitating *H. influenzae* Infection in Smokers

- Nicotine directly stimulates the growth of *H. influenzae*
 - *H. influenzae* requires NAD⁺ in order to grow
 - Nicotine provides a substrate for the generation of NAD⁺
- *H. influenzae* releases factors that are ciliotoxic, resulting in
 - Decline in ciliary activity
 - Damage to the respiratory epithelium

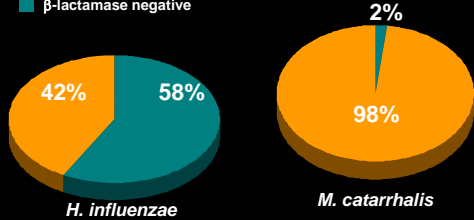
Jansen. *Am J Respir Crit Care Med* 1995; 151:2073; Sethi. *J Antimicrob Chemother* 1999; 43(Suppl A):97; Wilson & Cole. *Am Rev Respir Dis* 1988; 138(Suppl):S49; Roberts & Cole. *J Clin Pathol* 1979; 32:728-731; Caballero. *Rev Cubana Med Trop* 1997; 49:21-23; Voet & Voet. *Biochemistry*. New York: John Wiley & Sons. 1990:1222

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Prevalence of β -Lactam Resistance in *H. influenzae* and *M. catarrhalis*

- β -lactamase positive
- β -lactamase negative



- The presence of the β -lactamase inhibitor clavulanate extends antibiotic activity

Jacobs. *Antimicrob Agents Chemo* 1999; 43:1901-1908; Jacobs. *Interscience Conference on Antimicrobial Agents and Chemotherapy* 1999; Abstract C-61

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Diagnosis

- Assess spirometry, if able
- O₂ saturation of < 90% may indicate respiratory failure
- Chest x-ray
 - Consider if fever is present

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Goals of Therapy for AECB

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Ideal Goals of Therapy for AECB

**Return the patient to baseline
(pulmonary function, symptoms, etc.)**

**Reduce morbidity,
hospitalization and
mortality**

**Decrease the risk of failure or return visit
(extend the “exacerbation-free” interval)**

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Adams & Anzueto. *Semin Respir Infect* 2000; 15:234, 246;
American Thoracic Society. *Am J Respir Crit Care Med* 1995; 152:S77–S120

Potential Benefits of Antibiotics in AECB

- **Short term**
 - Reduce duration of symptoms
 - Increase clinical cure and decrease clinical deterioration
 - Avoid hospitalization
 - Return to work earlier
 - Prevent progression to pneumonia
- **Long term**
 - Prevent progressive airway damage
 - Prolong time between exacerbations
 - Prevent secondary bacterial colonization

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Niederman. *Sem Resp Infect* 2000; 15:59–70

Who Should Receive Antimicrobials?

- Individuals with 3 cardinal symptoms of COPD
 - Increased dyspnea
 - Increased sputum volume
 - Increased sputum purulence
- Individuals with 2 cardinal symptoms of COPD if one of the symptoms is:
 - Increased purulence of sputum
- Individuals requiring hospitalization

Adapted from www.goldcopd.org accessed 01-28-2010

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Adapted from www.goldcopd.org accessed 01-28-2010

Group A

Patient characteristics	Likely pathogens	Recommended ABX
<ul style="list-style-type: none"> • Mild exacerbation • No risk factors for poor outcome <ul style="list-style-type: none"> • Comorbidities • Severe COPD • Frequent exacerbations • Antimicrobial use within past 3 months 	<ul style="list-style-type: none"> • Gram-positive <ul style="list-style-type: none"> – <i>S. pneumoniae</i> • Gram-negative <ul style="list-style-type: none"> – <i>H. influenzae</i> – <i>M. catarrhalis</i> • Viruses • Atypical pathogens <ul style="list-style-type: none"> – <i>C. Pneumoniae</i> 	<ul style="list-style-type: none"> • First options <ul style="list-style-type: none"> • PCN • Amoxicillin • Tetracycline • TMP/SMX • Second option <ul style="list-style-type: none"> • Amox/Clav • Azithromycin • Clarithromycin • Cephalosporins <ul style="list-style-type: none"> – Cefuroxime – Cefpodoxime – Cefprozil

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Group B

Patient characteristics	Likely pathogens	Recommended ABX
<ul style="list-style-type: none"> • Moderate exacerbation • HAS risk factors for poor outcome <ul style="list-style-type: none"> • Comorbidities • Severe COPD • Frequent exacerbations • Antimicrobial use within past 3 months 	<ul style="list-style-type: none"> • Gram-positive <ul style="list-style-type: none"> – <i>S. pneumoniae</i> • Gram-negative <ul style="list-style-type: none"> – <i>H. influenzae</i> – <i>M. catarrhalis</i> • Viruses • Atypical pathogens <ul style="list-style-type: none"> – <i>C. Pneumoniae</i> • Plus <ul style="list-style-type: none"> – <i>DRSP</i> – <i>K. Pneumoniae</i> – <i>E. Coli</i> – <i>Proteus</i> – <i>Enterobacter</i> 	<ul style="list-style-type: none"> • First option <ul style="list-style-type: none"> • Amox/Clav • Second options <ul style="list-style-type: none"> • Fluoroquinolones <ul style="list-style-type: none"> • Gemifloxacin • Moxifloxacin • Levofloxacin

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Group C

Patient characteristics	Likely pathogens	Recommended ABX
<ul style="list-style-type: none">• Severe exacerbation• HAS risk factors for poor outcome<ul style="list-style-type: none">• Comorbidities• Severe COPD• Frequent exacerbations• Antimicrobial use within past 3 months	<ul style="list-style-type: none">• Gram-positive<ul style="list-style-type: none">– <i>S. pneumoniae</i>• Gram-negative<ul style="list-style-type: none">– <i>H. influenzae</i>– <i>M. catarrhalis</i>• Viruses• Atypical pathogens<ul style="list-style-type: none">– <i>C. Pneumoniae</i>-Plus<ul style="list-style-type: none">- <i>DRSP</i>- <i>K. Pneumoniae</i>- <i>E. Coli</i>- <i>Proteus</i>- <i>Enterobacter</i>- <i>P. aeruginosa</i>	<ul style="list-style-type: none">• First option<ul style="list-style-type: none">• IV antimicrobials only

Additional Pharmacologic Treatments

- Corticosteroids
 - If FEV1 < 50% of predicted: 30 - 40 mg prednisone per day for 7 - 10 days
- Inhaled Beta-2 agonist
 - Consider anticholinergic, if not already using
- Cough suppressants
- Oxygen therapy

Additional Nonpharmacologic Treatments

- Smoking cessation
- Immunizations: yearly influenza,
 - *Pneumovax*
- Increased water intake
- Good nutrition
- Avoidance of pollutions

Additional Considerations

- 10 – 30% of individuals with AECB will not respond to standard therapies
- Consider additional differential diagnoses
 - Pneumonia
 - Pneumothorax
 - Pleural Effusion
 - Pulmonary Embolism

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Hospitalization

- The following patients should be considered for hospitalizations
 - Marked increase in intensity of symptoms
 - Severe COPD
 - Onset of new physical signs (i.e. cyanosis)
 - Failure of exacerbation to respond to initial treatments
 - Significant comorbidities
 - Newly occurring dysrhythmias
 - Older age
 - Insufficient home assistance

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End of Presentation!

Thank you for your time and attention.

Wendy L. Wright, MS, APRN, BC, FAANP
WendyARNP@aol.com
www.4healtheducation.com

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