Puerto Rican Endocrinology and Diabetes Society Meeting

Clinical Vignettes

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Impact of Antibiotics Used

- Antibiotics are prescribed at more than 100 million adult ambulatory care visits annually
- 41% of these prescriptions are for respiratory conditions
- In 2009, direct antibiotic prescription costs totaled $10.7 billions
  - $6.5 billions (62%) in the community setting
  - $3.6 billions in hospitals
  - $527 millions in nursing homes and long-term care facilities

Ann Intern Med. 2016; 164: 425-434.

Impact of Antibiotics Used

- In the U.S. , at least 2 million antibiotic resistant illnesses and 23,000 deaths occur each year, at a cost to the U.S. economy of at least $30 billions

- Inappropriate antibiotic use is an important contributor to antibiotic resistance an urgent public health threat

Ann Intern Med. 2016; 164: 425-434.

Impact of Antibiotics Used

Ann Intern Med. 2016; 164: 425-434.

- 50% of antibiotic prescriptions may be unnecessary or inappropriate in the outpatient setting
- Equates to > $3 billions in excess costs
- Antibiotic prescriptions has decreased by 18% among persons aged 5 years an older in the United States
  - However, prescriptions for broad-spectrum antibiotics have increased by at least 4-fold
- Reducing inappropriate antibiotic prescribing in the ambulatory setting is a public health priority

Impact of Antibiotics Used

Ann Intern Med. 2016; 164: 425-434.

- Antibiotics are responsible for the largest number of medication related adverse events
- Implicated in 1 of every 5 visits to ER for adverse reactions
- An estimated 5% to 25% of patients who use antibiotics have adverse events , and about 1 in 1,000 has a serious adverse events
- C difficile diarrhea causes 500,000 infections and 29,300 deaths in the U.S. each year
    - Estimated $1 billion in extra medical costs

Antibiotic Prescribing Strategies for Adult Patients

Harm of using antibiotics:

Mild reactions: diarrhea, rash

Severe reactions: Stevens-Johnson syndrome

Severe infection: *Clostridium difficile* - associated diarrhea

Life Threatening reactions: anaphylactic shock and sudden cardiac death

Antibiotic specific:

Doxycycline: pill-induced esophagitis

Fluoroquinolones: prolongation of QT, musculoeskeletal problems

Ann Intern Med. 2016; 164: 425-434.

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CLINICAL GUIDELINE

Appropriate Antibiotic Use for Acute Respiratory Tract Infection in Adults: Advice for High-Value Care From the American College of Physicians and the Centers for Disease Control and Prevention

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Background: Acute respiratory tract infection (ARTI) is the most common reason for antibiotic prescription in adults. Antibiotics are often inappropriately prescribed for patients with ARTI. This article presents best practices for antibiotic use in healthy adults (those without chronic lung disease or immunocompromising conditions) presenting with ARTI.

Methods: A narrative literature review of evidence about appropriate antibiotic use for ARTI in adults was conducted. The most recent clinical guidelines from professional societies were complemented by meta-analyses, systematic reviews, and randomized clinical trials. To identify evidence-based articles, the Cochrane Library, PubMed, MEDLINE, and EMBASE were searched through September 2015 using the following Medical Subject Headings terms: "acute bronchitis," "respiratory tract infection," "pharyngitis," "rhinosinusitis," and "the common cold."

High-Value Care Advice 1: *Clinicians should not perform testing or initiate antibiotic therapy in patients with bronchitis unless pneumonia is suspected.*

High-Value Care Advice 2: *Clinicians should test patients with symptoms suggestive of group A streptococcal pharyngitis (for example, persistent fevers, anterior cervical adenitis, and tonsillopharyngeal exudates or other appropriate combination of symptoms) by rapid antigen detection test and/or culture for group A* Streptococcus. *Clinicians should treat patients with antibiotics only if they have confirmed streptococcal pharyngitis.*

High-Value Care Advice 3: *Clinicians should reserve antibiotic treatment for acute rhinosinusitis for patients with persistent symptoms for more than 10 days, onset of severe symptoms or signs of high fever (>39 °C) and purulent nasal discharge or facial pain lasting for at least 3 consecutive days, or onset of worsening symptoms following a typical viral illness that lasted 5 days that was initially improving (double sickening).*

High-Value Care Advice 4: *Clinicians should not prescribe antibiotics for patients with the common cold.*

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For author affiliations, see end of text.
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Clinical Vignette 1

- 27 y/o man is evaluated for a 4-day history of sore throat, malaise, rhinitis, and fever. He reports no cough, diarrhea, or vomiting. His 4 year old daughter, who attend preschool, has similar symptoms.
- Medical Hx: non contributory
- Allergies: none
- Rx: Ibuprofen

Clinical Vignette 1

- T 38.1 C BP 23
- No distress a
- HEENT: tymp nx shows
  tonsilla
  lympha
- Lungs: clear
- Remainder o

Clinical Vignette 1

Which of the following is the most appropriate management?

a. Penicillin
b. Rapid streptococcal antigen test
c. Throat culture
d. Clinical observation

Centor Criteria

1. Fever >38.1°C (100.5°F)
2. Absence of cough
3. Tonsillar exudates
4. Tender anterior cervical lymphadenopathy

Meet 4 criteria:

- High risk (40% greater chance of having Group A Strep)
- Can be treated empirically with antibiotics

Meet 2 or 3:

- Intermediate risk
- Rapid test or throat culture – if either test is positive antibiotics should be initiated

Meet 1:

- Low probability (3%)
- Reassurance and symptomatic treatment

Clinical Scoring System and Likelihood of Positive Throat Culture for Group A Streptococcal Pharyngitis*

Criteria	Points†
Fever (temperature >38°C)	1
Absence of cough	1
Swollen, tender anterior cervical nodes	1
Tonsillar swelling or exudate	1
Age	
3 to <15 yr	1
15 to <45 yr	0
≥45 yr	−1

* The information is adapted from McIsaac et al.[10]
† A score of 0 or a negative score is associated with a risk of 1 to 2.5%, 1 point is associated with a risk of 5 to 10%, 2 points is associated with a risk of 11 to 17%, 3 points is associated with a risk of 28 to 35%, and 4 or more points is associated with a risk of 51 to 53%.

Wessels MR. N Engl J Med 2011;364:648-655

Antibiotic Prescribing Strategies for Adult Patients Pharyngitis

Definition: Sore throat (often worse with swallowing) with usual duration of 1 week, with possible associated constitutional symptoms

Causes: Most cases are viruses

Nonviral: < 15% of cases and include Group A β-hemolytic streptococci, and groups C and G streptococci, *Fusobacterium necrophorum*

Benefits of using antibiotics: If patient has a streptococcal infection, antibiotics may shorten the duration of illness and prevent acute rheumatic fever or suppurative complications.

Antibiotic Strategy: Prescribe antipyretics and analgesics

β-lactam antibiotics are indicated with positive results on a streptococcal test.

Harris AM et al Advice for High Value Care from the ACP and CDC, Ann Intern Med. 2016; 164: 425-434.

Antibiotic Prescribing Strategies for Adult Patients: Pharyngitis

Recommended antibiotic regimen:

No Penicillin Allergy

- Oral penicillin V: 250 mg four times a day or 500 twice a day for 10 days
- Oral amoxicillin: 1 gram once a day or 500 mg twice a day for 10 days
- Benzathine penicillin G 1.2 million units IM single dose

Harris AM et al Advice for High Value Care from the ACP and CDC, Ann Intern Med. 2016; 164: 425-434.

Antibiotic Prescribing Strategies for Adult Patients: Pharyngitis

Recommended antibiotic regimen:
Penicillin Allergy:

No history of Type 1 Hypersensitivy (anaphylaxis):

- Oral cephalexin 500mg mg twice a day for 10 days
- Oral cefadroxyl 1 gram for 10 days

History of anaphylaxis:

- Oral clindamycin 300mg three times a day for 10 days
- Oral azithromycin 500mg once daily for 5 days
- Oral clarithromycin 250 mg twice a day for 10 days

Harris AM et al Advice for High Value Care from the ACP and CDC, Ann Intern Med. 2016; 164: 425-434.

Clinical Vignette 2

- 68 y/o woman is evaluated for sinus symptoms of 2 to 3 days' duration. She reports nasal congestion and a whitish nasal discharge, a full sensation over both maxillary sinuses, and pain in her upper teeth. She does not have fever or ear or throat pain and has no sick contacts.

- Medical hx: Arterial hypertension and DM Type II

- Allergies: none

- Rx: Fosinopril and metformin

Clinical Vignette 2

Physical examination:

- PE: T 37.2 C BP 122/72 HR 68/min BMI 26
- HEENT: tenderness to palpation over both maxillary sinuses oropharynx mildly erythematous w/o exudates no cervical lymphadenopathy tympanic membrane and dentition are normal
- Lungs: clear
- Remainder of examination is normal

Clinical Vignette 2

Which of the following is the most appropriate management?

a. Amoxicillin-clavulanate
b. Doxycycline
c. Sinus CT Scan
d. Supportive care

Antibiotic Prescribing Strategies for Adult Patients
Acute Rhinosinusitis

Definition: Nasal congestion, purulent nasal discharge, maxillary tooth pain, facial pain or pressure, fever, fatigue, cough, hyposmia, or anosmia, ear pressure of fullness, headache, and halitosis.

Symptoms have a variable duration (1 to 33 days) and sometimes take longer to resolve completely.

Causes: Most cases are viruses, allergies, or irritants

Nonviral: < 2% of cases: *Streptococcus pneumoniae, Haemophilus influenzae, Streptococcus pyogenes, Moraxella catarrhalis,* and anaerobic bacteria

Benefits of using antibiotics: Limited benefit

Harris AM et al Advice for High Value Care from the ACP and CDC, Ann Intern Med. 2016; 164: 425-434.

Antibiotic Prescribing Strategies for Adult Patients Acute Rhinosinusitis

Antibiotic Strategy: Antibiotics may be prescribed if symptoms last > 10 days, severe symptoms last for > 3 consecutive days, or worsening symptoms last after 3 consecutive days.

Recommended antibiotic regimen:

No Penicillin Allergy

- Oral amoxocillin, 500mg, and clavulanate , 125 mg, 3 times daily for 5 to 7 days
- Oral amoxocillin, 875mg, and clavulanate , 125 mg, twice daily for 5 to 7 days
- Oral amoxocillin 500mg 3 times daily for 5 to 7 days

Harris AM et al Advice for High Value Care from the ACP and CDC, Ann Intern Med. 2016; 164: 425-434.

Antibiotic Prescribing Strategies for Adult Patients: Acute Rhinosinusitis

Recommended antibiotic regimen:

Penicillin Allergy:

- Oral doxycycline 100 mg twice daily for 5 to 7 days
- Oral levofloxacin 500 mg once daily for 5 to 7 days
- Oral moxifloxacin 400 mf once daily for 5 to 7 days

Harris AM et al Advice for High Value Care from the ACP and CDC, Ann Intern Med. 2016; 164: 425-434.

Clinical Vignette 3

- 32-year-old man is evaluated for a 3-day history of productive cough, sore throat, coryza, rhinorrhea, nasal congestion, generalized myalgia, and fatigue. His sputum is slightly yellow.
- His two children (ages 3 years and 1 year) had similar symptoms 1 week ago. He is a nonsmoker and has no history of asthma.
- Medical hx: none
- Allergies: none
- Rx: none

Clinical Vignette 3

Physical examination:

- PE: T 37.5 C BP 128/76 HR 92/min RR 14/min
- HEENT: bilateral conjunctival injection oropharynx is erythematous w/o exudates no cervical lymphadenopathy tympanic membrane are normal nasal mucosa is boggy, with clear drainage
- Lungs: clear
- Remainder of examination is normal

Clinical Vignette 3

Which of the following is the most appropriate management?

a. Azithromicin
b. Chlorpheniramine- pseudoephedrine
c. Codeine
d. Inhaled albuterol

Antibiotic Prescribing Strategies for Adult Patients
Common Cold

Definition: Mild upper respiratory viral illness with sneezing, rhinorrhea, sore throat, cough, low grade fever, headache, and malaise that lasts up to 14 days

Causes: All causes are viral

Benefits of using antibiotics: **No** benefit

Antibiotic prescribing strategy: Antibiotics should not be used

Recommended antibiotic regimen: Never indicated

Harris AM et al Advice for High Value Care from the ACP and CDC, Ann Intern Med. 2016; 164: 425-434.

Antibiotic Prescribing Strategies for Adult Patients
Acute Bronchitis

Definition: Productive or non productive cough that lasts up to 6 week, with mild constitutional symptoms

Causes: Most cases are viruses (influenza, rhinovirus, RSV etc)
Nonviral: *Mycoplasma pneumoniae* and *Chlamydophyla pneumoniae*

Benefits of using antibiotics: No benefit

Antibiotic Strategy: In the absence of pneumonia, antibiotics are not indicated. Routine testing for nonviral causes is not recommended.

Clinical Vignette 4

- A 55-year-old female with long-standing type 2 diabetes presents to the ED in diabetic ketoacidosis. The patient does not monitor her glucose regularly and is often noncompliant with her diabetic medications.

- Last week, she presented to urgent care complaining of sinus pressure, thick nasal discharge, and fevers. She was prescribed amoxicillin-clavulanate for 10 days as well as prednisone 40 mg orally once per day. After 5 days of the antibiotic, her symptoms have not improved. Indeed they have worsened, as she now has developed erythema and edema around his right nostril, extending up towards her eye.

- In the ED she is placed on an insulin drip for her diabetic ketoacidosis, and she is fluid resuscitated. An ENT consultant advises administration of levofloxacin at 500 mg IV once per day to treat presumed "resistant" bacterial sinusitis.

Clinical Vignette 4

Which of the options below is the correct response?

a. Replace levofloxacin with piperacillin-tazobactam; treat for 14 days

a. Shorten levofloxacin course to 5 days

b. Replace levofloxacin with piperacillin-tazobactam; treat for 5 days

d. Increase levofloxacin dose to 750 mg once per day; treat for 5 days

e. CT of Sinus and re-consult ENT

Rhinocerebral Mucormmycosis

Aggressive diagnostic testing: endoscopy with biopsy and initiation of antifungal therapy

Clinical Vignette 5

- A 94-year-old man with a history of myeloproliferative disorder with myelofibrosis (leukocytosis and thrombocytosis) developed increasing bilateral lower extremity edema several weeks before presentation. His physician prescribed furosemide and potassium with some improvement in the edema.

- Thereafter, both legs developed increasing redness, warmth, and edema without fever, chills, or significant pain. He was started on levofloxacin 3 days prior to admission for presumptive cellulitis. Findings persisted, and he was instructed by his home care nurse to go to the ED due to "antibiotic failure" and need for intravenous antibiotics. In the ED, he was afebrile. He was noted to have bilateral swelling and erythema right greater than left.

Clinical Vignette 5

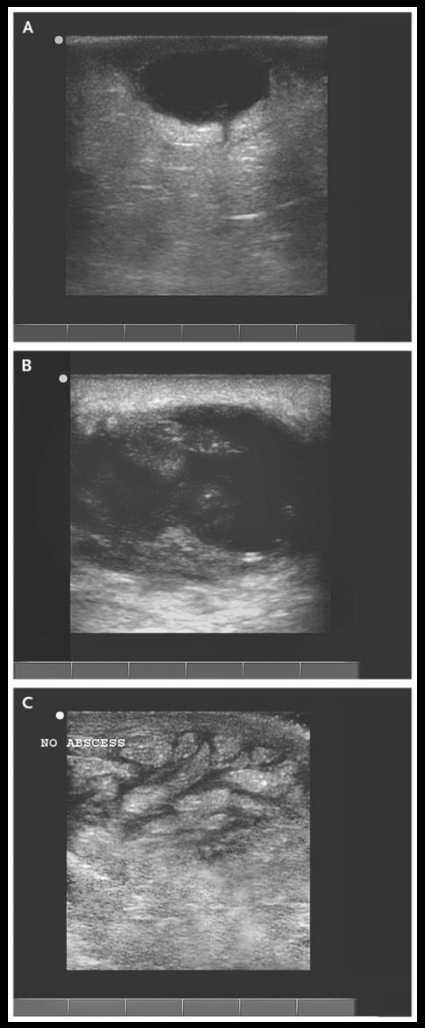
- The patient was afebrile and had normal vital signs.
- Both legs were mildly erythematous and swollen, although the right leg was more swollen than the left.
- His WBC count was at baseline.
- He was diagnosed with cellulitis and started on vancomycin and cefazolin.
- Infectious disease consultation was requested the next day after review by the stewardship team.

Clinical Vignette 5

Which of the following was recommended?

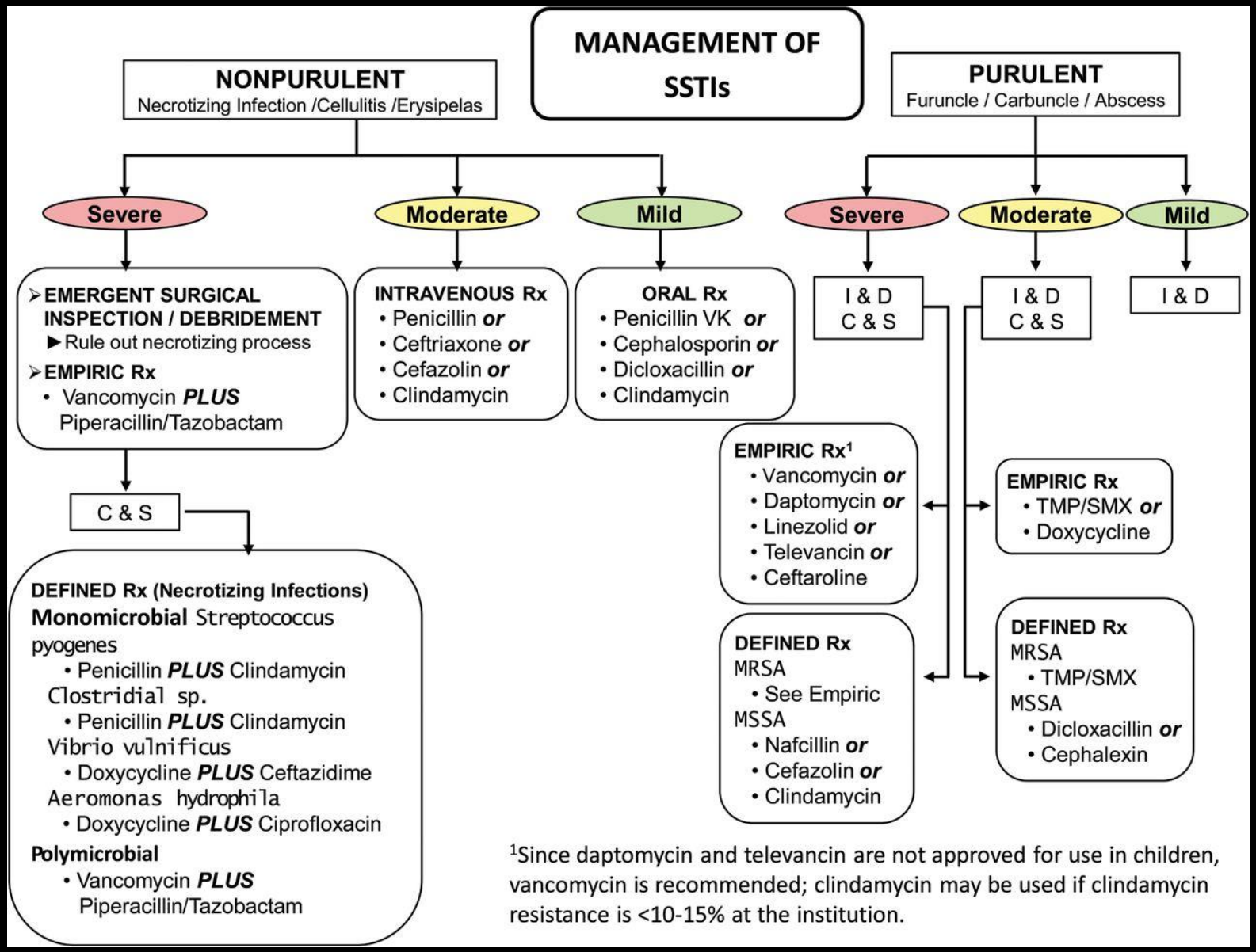
a. D/C the vancomycin as nonpurulent cellultis can be treated effectively with a beta-lactam alone
b. Change to cephalexin
c. D/C antibiotics; encourage elevation of leg and use of compression stockings
d. Change the cefazolin to piperacillin-tazobactam for better gram-negative coverage given his underlying hematologic disorder

Ultrasonographic Images of Skin Abscesses.



Singer AJ, Talan DA. N Engl J Med 2014;370:1039-1047.

Practice Guidelines for the Dx and Management of SST Infections: 2014 Update by the IDSA



Clin Infect Dis. (2014) doi: 10.1093/cid/ciu296 First published online: June 18, 2014

Clinical Vignette 6

- A 58-year-old man with type 2 diabetes mellitus has an asymptomatic plantar ulcer on the left foot that remains unhealed after four months.
- The ulcer measures 2 cm by 1 cm and is surrounded by callus under the first metatarsal head.
- Neurologic examination reveals loss of sensation of light touch, pinprick, and vibration below the midcalf level bilaterally and the absence of ankle reflexes.
- The foot pulses are normal.
- How should this patient be evaluated and treated?

Diabetic Foot Ulcer

Diagnosis:

- Ulcer assessment
- Is the ulcer infected?
- Is the bone involved?

Diabetic Foot Ulcer

Diagnosis:

- **Ulcer assessment**
  - Present for months, asymptomatic and pulses are palpable: neuropathic ulcer
  - Noninvasive assessment of peripheral circulation is recommended if there is any suggestion of ischemia

- Is the ulcer infected?

- Is osteomyelitis present?

Diabetic Foot Ulcer

Diagnosis

- Ulcer assessment

- **Is the ulcer infected?**
  - Infection is the consequence, rather than the cause of ulceration
  - Fever, leukocytosis , purulent secretions, redness, warmth, induration, pain or tenderness are signs of infection
  - Swabs cultures are not useful in clinical uninfected patient
  - Obtain a deep –tissue specimen aseptically for culture

- Is the bone involved?

Diabetic Foot Ulcer

Diagnosis

- **Is the bone involved?**
  - Up to 2/3 of diabetics patients with infected foot ulcers may have osteomyelitis
  - Ability to probe bone has a positive predictive value of 89% for osteomyelitis
  - Plain radiographs
    - Gas
    - Foreign object
    - Periosteal reaction, bone destruction etc
  - MRI is the test of choice when osteomyelitis is suspected

Diabetic Foot Ulcer

Management

- Diabetes and General Care
- Preparation of the wound bed
- Removal of pressure
- Dressings
- Treatment of infection
- Adjunctive treatments

Diabetic Foot Ulcer

Management

- Diabetes and General Care
  - Glycemic control
  - Quit smoking
- Preparation of the wound bed
  - Debridement and removal of callus
- Removal of pressure
  - Use of casts or boots, half shoes or sandals
  - Total-contact casts (nonremovable)
  - Removal walking cast
- Dressings
  - Dressings containing a cellulose-protease-modulating framework (Promogram®) and those containing the matrix replacement agent hyaluronan (Hyalofill®)
- Adjunctive treatments: growth factors, tissue engineered skin

Infected Diabetic Foot Ulcer Clinical Classification

Infection Severity	Clinical manifestations of infection
Uninfected	• Wound lacking purulence or any manifestations of inflammation
Mild	• Presence of 2 ≥ manifestations of inflammation : purulence, erythema, pain, tenderness, warmth or induration • Cellulitis erythema extends ≤ 2 cm around the ulcer • Infection limited to the skin or superficial subcutaneous tissues
Moderate	• Systemically well and metabolically stable • Has ≥ 1 one of the following: cellulitis extending > 2 cm, lymphagitic streaking, spread beneath the superficial fascia, deep-tissue abscess, gangrene, and involvement of muscle, tendon, joint or bone
Severe	

Clin Infect Dis. (2012) 54 (12): e132-e173.

Infected Diabetic Foot Ulcer Clinical Classification

Infection Severity	Clinical manifestations of infection
Moderate	• Systemically well and metabolically stable • Has ≥ 1 one of the following: cellulitis extending > 2 cm, lymphagitic streaking, spread beneath the superficial fascia, deep-tissue abscess, gangrene, and involvement of muscle, tendon, joint or bone
Severe	Systemic toxicity or metabolic instability (eg, fever, chills, tachycardia, hypotension, confusion, vomiting, leukocytosis, acidosis, severe hyperglycemia, or azotemia

Clin Infect Dis. (2012) 54 (12): e132-e173.

Infected Diabetic Foot Ulcer: Oral Agents

Infection Severity	Bacterial Pathogens	Antibiotic Regimen
Uninfected		• no antibiotic recommended
Mild	Streptococci and MSSA	• Cephalexin, dicloxacillin, amoxicillin/ca, clindamycin
	Streptococci and MRSA	• Cephalexin or dicloxacillin + TMP\SMTX or doxycyline, clindamycin
Moderate	Streptococci and MRSA Anaerobes Aerobic GNB	• TMP\SMTX + amoxicillin\CA • clindamycin + FQ (ciprofloxacin, levofloxacin, moxifloxacin)

Clin Infect Dis. (2012) 54 (12): e132-e173.

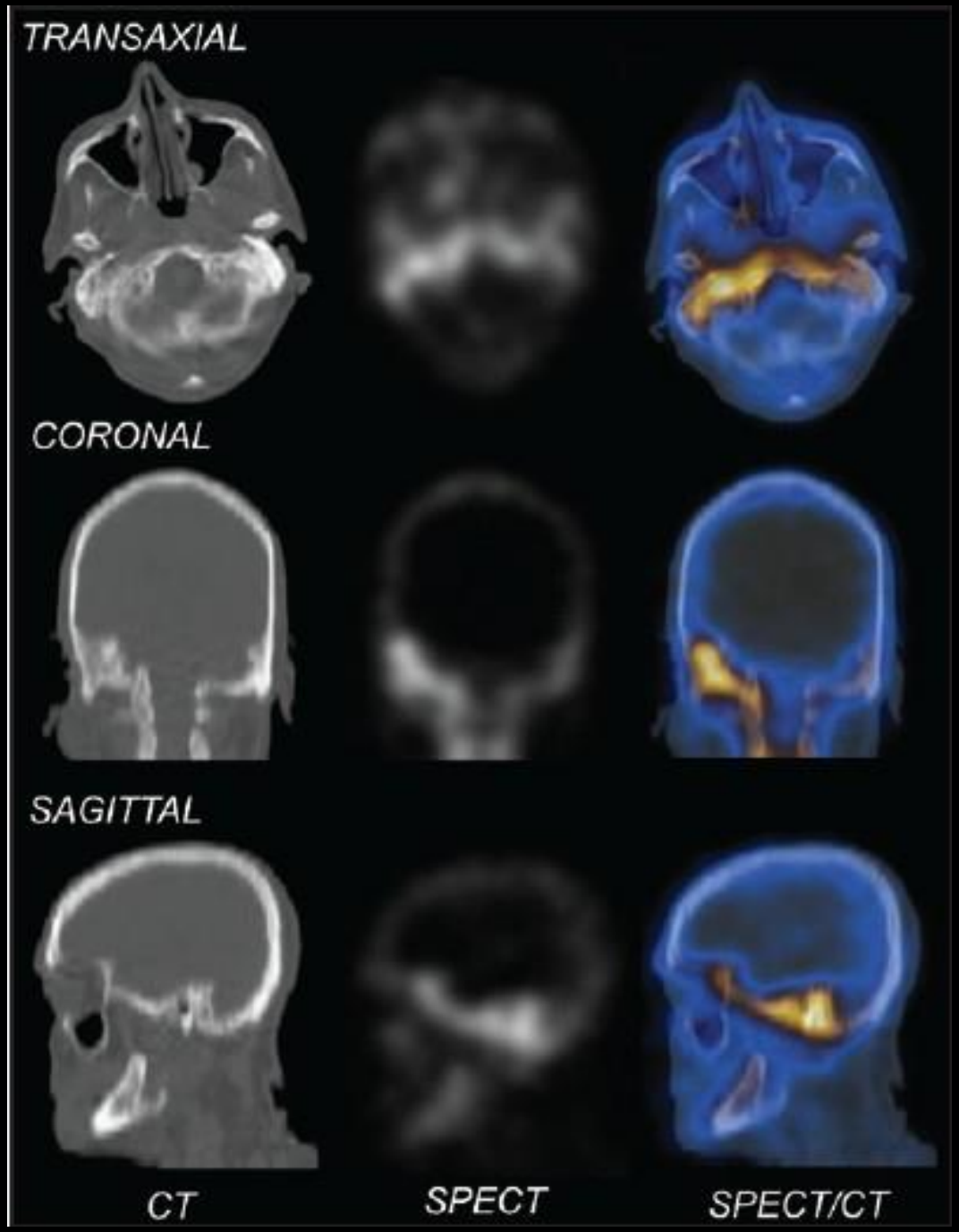
Empiric Parenteral Rx of Moderate to Severe Diabetic Foot Infections

Bacterial pathogens: Streptococci, MRSA, anaeroboes, aerobic gram-negative bacilli

Antibiotic regimen	Dosing (adult)
Ampicillin-sulbactam	3 g q 6 hours
Piperacillin-tazobactam	4.5 g q 6 to 8 hours
Imipenem-cilastatin	500mg to 1 g q 6 hours
Meropenem	1 g q 8hours
Ertapenem	1 g q 24 hours
Moxifloxacin	400 mg q 24 hours
Tigecycline	100 mg loading dose, 50 mg q 12 hours
If MRSA coverage is warranted:	
Vancomycin	15 to 20 mg/kg q 8 to 12 hours
Daptomycin	4 to 6 mg\kg q 24 hours
Linezolid	Not recommended for long-term use

Clinical Vignette 7

A 68-year-old diabetic woman presents to the emergency department complaining of ear pain and purulent discharge. On otologic examination, the tympanic membrane is found to be intact. There is mild weakness of the ipsilateral face.


TRANSAXIAL
CORONAL
SAGITTAL
CT
SPECT
SPECT/CT

Invasive External Otitis

- Invasive infection of external auditory canal and skull base.
- Risk factors: elderly patients with DM.
- Etiology: *Pseudomonas aeruginosa* (95% of cases).
- Clues for dx: exquisite otalgia and otorrhea, which are not responsive to topical measures used to treat simple external otitis.

Invasive External Otitis

- Complications: meningitis, brain abscess, and dural sinus thrombophlebitis.
- Dx: CT, MRI and Gallium SPECT scans are useful for both diagnosis and follow-up
- Rx: Antibiotics with activity against Pseudomonas aeruginosa
    - Intial treatment with IV antibiotics until is obtain a subjective clinical response and/or a decrease in ESR or CRP
    - Duration: 6 to 8 weeks is generally recommended, as indicated for osteomyelitis

Antibitoics for Rx of Invasive External Otitis

Agent	Dosing (adults)	Comments
Ciprofloxacin	IV: 400 mg q 8 hours Oral: 750 mg q 12 hours	Prolonged QT, rupture of Achilles tendon Hypoglycemia
Levofloxacin	IV: 750 mg q 24 hours Oral: 750 mg q 24 hours	Prolonged QT, rupture of Achilles tendon Hypoglycemia
Piperacillin-tazobactam	4.5 g IV q 6 hours	
Ceftolazone - tazobactam	1.5 g IV q 8 hours	
Ceftazidime - avibactam	2.5 g IV q 8 hours	
Imipenem	1 g IV q 6 hours	Seizures
Meropenem	1 g IV q 8 hours	
Cefepime	2 g IV q 12 hours	
Ceftazidime	2 g IV q 8 hours	Strong beta-lactamse inducer
Aztreonam		Only beta-lactam that can be used in an allergic patient

Clinical Vignette 8

A 67-year-old male, a known diabetic with poor control, with 3 days of swelling, pain, and foul smelling discharge from the scrotum.

Local examination revealed that his scrotum was grossly edematous with gangrenous patches.

Scrotum was tender with diffuse palpable crepitation.

How should this patient be evaluated and treated?

Fournier's Gangrene – Necrotizing Fasciitis

- Fulminant tissue destruction, systemic signs of toxicity, and high mortality
- Risk factors: adults with DM
- Etiology:
  - Type 1: Polymicrobial: aerobic GNB, anaerobes +/- MRSA
  - Type 2: Streptococci sp, Group A, B, C or G
  - Type 3: Clostridial sp
  - Type 4: Community associated MRSA
  - Type 5: *Klebsiella pneumoniae*
- Clues for dx: Pain out of proportion to physical exams

Fournier's Gangrene – Necrotizing Fasciitis

- Complications: multi-organ failure, cystostomy, colostomy, or orchiectomy
- Dx: noncontrast CT: to assess gas in fascial planes

  MRI: overly sensitive, it tends to overstimate deep tissue involvement

Fournier's Gangrene – Necrotizing Fasciitis

- Emergency surgical debridement + antibiotic

Type	Pathogens	Antibiotic Regimen
1	Polymicrobial: aerobic GNB, anaerobes +/- MRSA	Carbapenem or BL\BLI + clindamycin + vancomycin or daptomycin or linezolid
2	Streptococci sp, Group A, C or G	Penicillin G + clindamycin
3	Clostridial sp	Penicillin G + clidamycin
4	Community associated MRSA	Vancomycin or daptomycin + clindamycin
5	Klebsiella pneumoniae	Imipenem or Meropenem

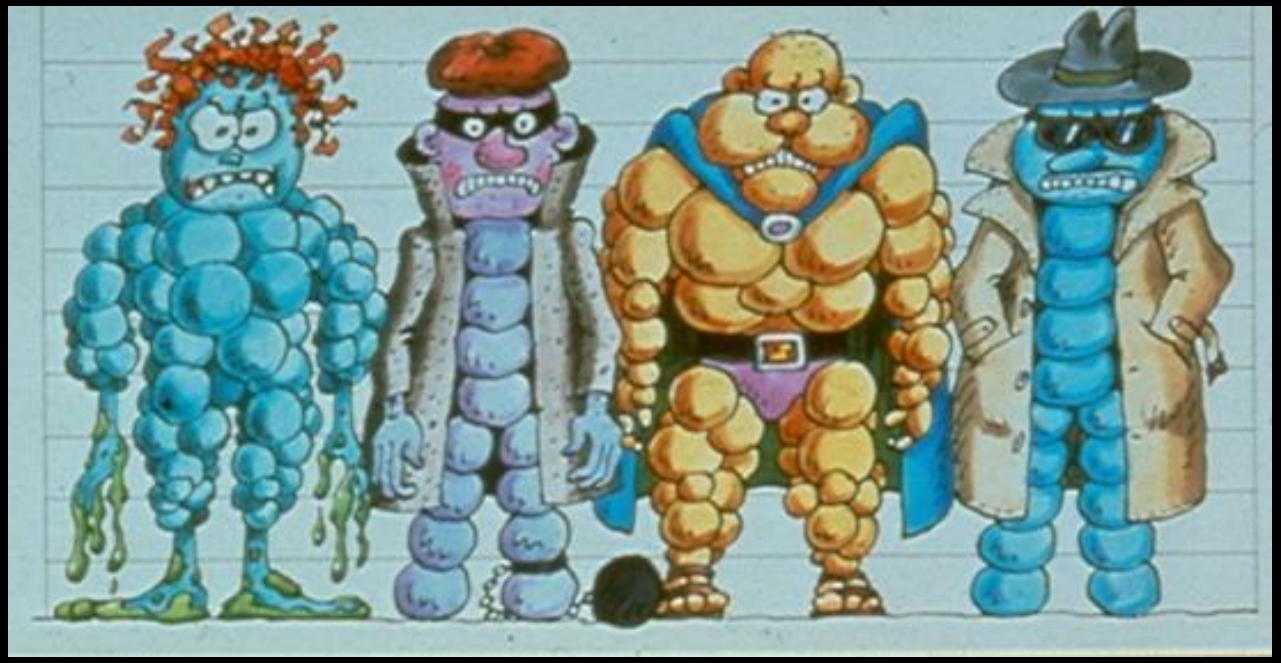
- Hyperbaric oxygen ?, IV immunoglobulin ?

Clinical Features, Diagnosis, and Causative Organisms of Selected Infections in Patients with Diabetes.

Infection	Clinical Features	Diagnostic Procedure*	Organisms	Comments
Respiratory tract				
Community-acquired pneumonia	Cough, fever	Chest radiography	*Streptococcus pneumoniae, Staphylococcus aureus, Haemophilus influenzae,* other gram-negative bacilli, atypical pathogens	Pneumococcal infection carries a higher risk of death in diabetic than in nondiabetic patients
Urinary tract				
Acute bacterial cystitis	Increased urinary frequency, dysuria, suprapubic pain	Urine culture	*Escherichia coli,* proteus species	Bacteriuria more common in diabetic than in nondiabetic women
Acute pyelonephritis	Fever, flank pain	Urine culture	*E. coli,* proteus species	Emphysematous infection should be considered
Emphysematous pyelonephritis	Fever, flank pain, poor response to antibiotics	Radiography or CT scanning	*E. coli,* other gram-negative bacilli	Emergency nephrectomy often required
Perinephric abscess	Fever, flank pain, poor response to antibiotics	Ultrasonography or CT scanning	*E. coli,* other gram-negative bacilli	Surgical drainage usually required
Fungal cystitis	Same as for acute bacterial cystitis	Urine culture	Candida species	Difficult to distinguish colonization from infection
Soft tissue†				
Necrotizing fasciitis	Local pain, redness, crepitus, bullous skin lesions	Radiography or CT scanning	Gram-negative bacilli, anaerobes (type I), or group A streptococci (type II)	High mortality; emergency surgery required
Other				
Invasive otitis externa	Ear pain, otorrhea, hearing loss, cellulitis	Clinical examination, magnetic resonance imaging	*Pseudomonas aeruginosa*	Prompt otolaryngologic consultation recommended
Rhinocerebral mucormycosis	Facial or ocular pain, fever, lethargy, black nasal eschar	Clinical examination, magnetic resonance imaging, pathological findings	Mucor and rhizopus species	Strong association with ketoacidosis; emergency surgery required
Abdomen				
Emphysematous cholecystitis	Fever, right-upper-quadrant abdominal pain, systemic toxicity	Radiography	Gram-negative bacilli, anaerobes	High mortality; gallstones in 50%; emergency cholecystectomy required

Joshi N et al. N Engl J Med 1999;341:1906-1912.

Questions?



Thanks