ID Test Review

8/28/2018

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Question 1

B. Dexamethasone

- TB Meningitis
  - **Mortality benefit if dexamethasone given for TB meningitis (dexamethasone 12 mg/d x 3 weeks followed by taper)**

Other answers:

- Diuretics (acetazolamide and furosemide) can be used in hydrocephalus to decrease CSF production by the choroid plexus
- Hydrocephalus can be a complication of TB meningitis which may require VP shunt, though not indicated in this patient

Official American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America Clinical Practice **Guidelines: Treatment of Drug-Susceptible Tuberculosis**

- Chemotherapy for tuberculous meningitis is initiated with INH, RIF, PZA, and EMB in an initial 2-month phase

- After 2 months of 4-drug therapy, for meningitis known or presumed to be caused by susceptible strains, PZA and EMB may be discontinued, and INH and RIF continued for an additional 7–10 months

- We recommend initial adjunctive corticosteroid therapy with dexamethasone or prednisolone tapered over 6–8 weeks for patients with tuberculous meningitis (strong recommendation; moderate certainty in the evidence).

Optimal Duration of TB Treatment
Regardless of HIV status

Site of Disease	Duration
Pulmonary	6 months*
Bone/joint	6-9 months
CNS/meningeal	9-12 months
Other extrpulmonary	6 months

*Extend to 9 months if cavitary and culture + at 2 months

American Thoracic Society, Centers for Disease Control, IDSA. Treatment of Tuberculosis. AJRCCM 2003;167:603-62

Question 2

D. Switch vancomycin to daptomycin

- MKSAP key points
  - **Vancomycin should not be used for bacteremia if MIC ≥ 2 mcg/mL** (slowly bactericidal and worse outcomes if MIC ≥ 2 mcg/mL)
  - Other answers:
    - Goal vanco trough 15-20 mcg/mL; increasing vanco dose would increase trough and risk of adverse effects without adding to benefit
    - No clinical benefit to addition of rifampin

MRSA Bacteremia

- Duration of treatment
  - **At least 14 days**
    - ***Uncomplicated bacteremia***
      - Exclude endocarditis (TEE>TTE)
      - No implanted prostheses
      - Negative f/u cultures at 2-4 days
      - Defervescence within 72 hours of therapy
      - No e/o metastatic sites of infection
- Endocarditis
  - Native valve: **6 weeks**; addition of gent/rifampin not recommended
  - Prosthetic valve: IV vancomycin plus rifampin for at least **6 weeks** plus gentamicin for 2 weeks
- Osteomyelitis
  - Debridement + **8 weeks**

Question 3

B. Fluconazole

- MKSAP key points
  - Primary coccidioidal infection subclinical or manifested as chest pain, cough and fever
  - Disseminated infection can include coccidioidal meningitis
    - CSF: lymphocytic pleocytosis, elevated protein/low glucose; eosinophils in CSF in 70% of pts
  - **Fluconazole effective and favorable safety profile**
  - Other answers:
    - Intrathecal amphoterecin B used only for non-responders
    - Caspofungin without activity against *C. immitus* and no CSF penetration
    - Not as much experience with itraconazole -> second line therapy

2016 Infectious Diseases Society of America (IDSA) Clinical Practice Guideline for the Treatment of Coccidioidomycosis

- XIV. For Patients With Newly Diagnosed CM, What Is the Primary Treatment?
  Recommendation

  – 22. For **CM, we recommend fluconazole 400–1200 mg orally daily as initial therapy for most patients with normal renal function** (strong, moderate). Some experts prefer to use itraconazole 200 mg 2–4 times daily, but this requires closer monitoring to assure adequate absorption, and there are more drug–drug interactions than with fluconazole.

2016 Infectious Diseases Society of America (IDSA) Clinical Practice Guideline for the Treatment of Coccidioidomycosis

- XV. For Patients With CM Who Improve or Become Asymptomatic on Initial Therapy, When Can Treatment be Stopped?
  - 23. For **CM, we recommend azole treatment for life** (strong, moderate).
- XVI. In Patients With CM Who Do Not Have a Satisfactory Response to Initial Antifungal Therapy, What Modifications Can Be Considered?
  - 24. In patients who clinically fail initial therapy with fluconazole, higher doses are a first option (strong, moderate). Alternative options are to change therapy to another orally administered azole, or to initiate intrathecal AmB therapy.

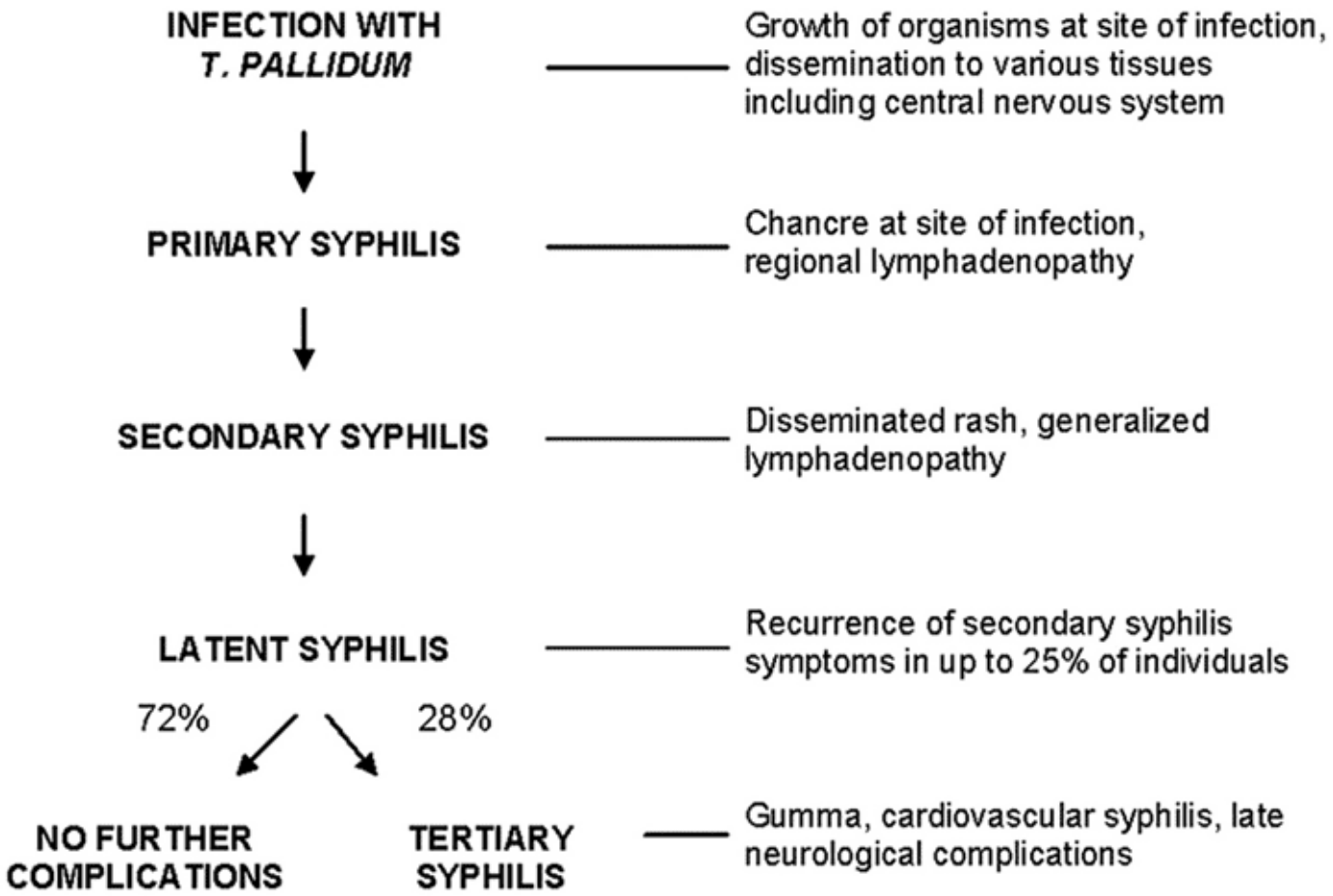
Question 4

A. Cerebrospinal fluid analysis

- MKSAP key points
  - Positive syphilis serology with unknown duration and with progressive cognitive decline → needs eval for neurosyphilis
    - CSF for protein, glucose, cell count with diff and VDRL testing
    - Has implications for treatment

- Syphilis Limerick

Stages of syphilis



Syphilis treatment by stage

Table 2: Recommended Treatment for Syphilis, by Stage[a]

Stage	Treatment	Dose
Early latent	Benzathine penicillin G	2.4 million units IM x 1
Late latent or unknown duration	Benzathine penicillin G	2.4 million units IM x 3, given at weekly intervals (assuming neurosyphilis has been ruled out)
Primary	Benzathine penicillin G	2.4 million units IM x 1
Secondary	Benzathine penicillin G	2.4 million units IM x 1
Tertiary	Benzathine penicillin G	2.4 million units IM x 3, given at weekly intervals
Neurosyphilis	Aqueous crystalline penicillin G	3–4 million units IV every 4 hours or a continuous infusion, for a total dose of 18–24 million units per day for 10–14 days

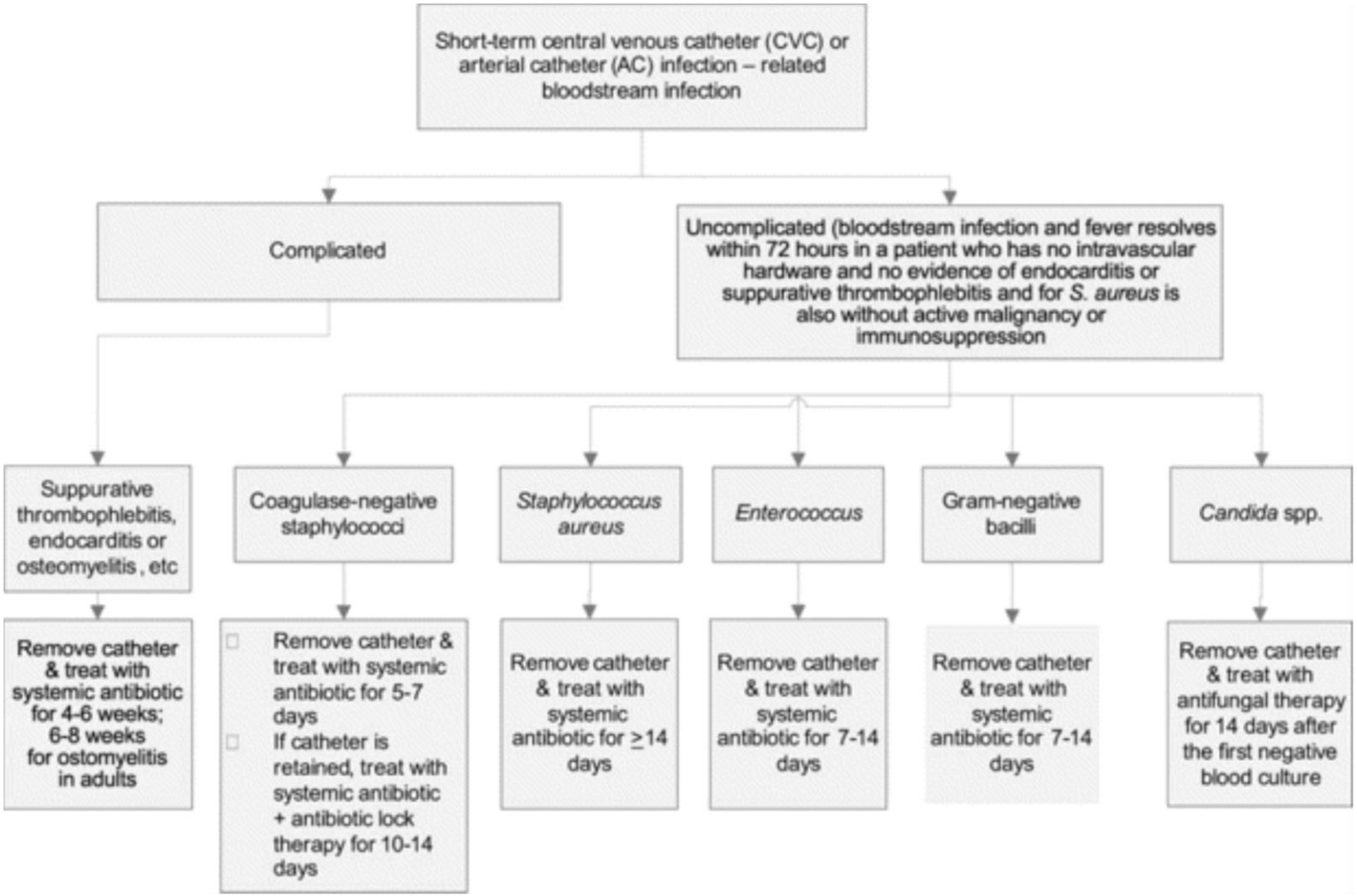
[a]*MMWR Recomm Rep* 2006; 55(RR-11):1.

IM, intramuscular; IV, intravenous

Question 5

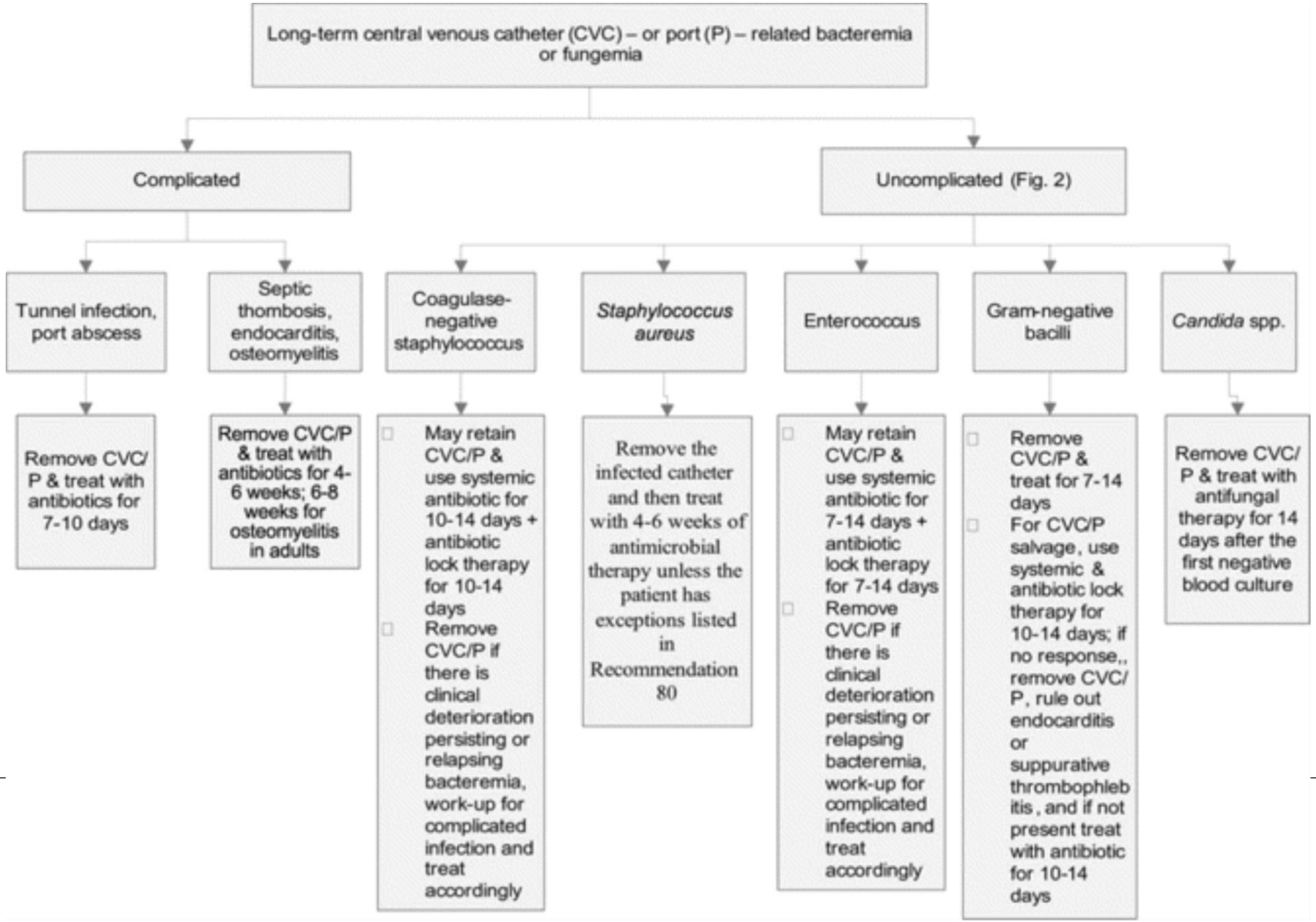
D. Remove PICC and add antifungal therapy

- MKSAP key points
  - Catheter salvage very difficult with fungal colonization; decreases duration of candidemia and improved mortality with catheter removal
  - Metastatic complications of prolonged candidemia
    - Endopthalmitis, endocarditis, osteomyelitis
  - Empiric therapy: echinocandin; can transition to azole if susceptible; repeat blood cxs until clear



From: Clinical Practice Guidelines for the Diagnosis and Management of Intravascular Catheter-Related Infection: 2009 Update by the Infectious Diseases Society of America

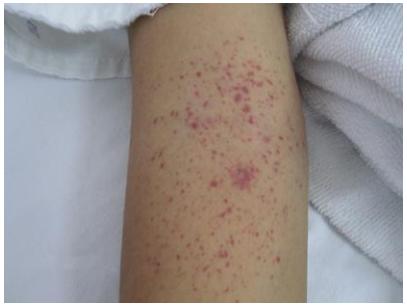
Clin Infect Dis. 2009;49(1):1-45. doi:10.1086/599376


Long-term central venous catheter (CVC) – or port (P) – related bacteremia or fungemia
Complicated
Uncomplicated (Fig. 2)
Tunnel infection, port abscess
Septic thombosis, endocarditis, osteomyelitis
Coagulase-negative staphylococcus
Staphylococcus aureus
Enterococcus
Gram-negative bacilli
Candida spp.
Remove CVC/P & treat with antibiotics for 7-10 days
Remove CVC/P & treat with antibiotics for 4-6 weeks; 6-8 weeks for osteomyelitis in adults
May retain CVC/P & use systemic antibiotic for 10-14 days + antibiotic lock therapy for 10-14 days
Remove CVC/P if there is clinical deterioration persisting or relapsing bacteremia, work-up for complicated infection and treat accordingly
Remove the infected catheter and then treat with 4-6 weeks of antimicrobial therapy unless the patient has exceptions listed in Recommendation 80
May retain CVC/P & use systemic antibiotic for 7-14 days + antibiotic lock therapy for 7-14 days
Remove CVC/P if there is clinical deterioration persisting or relapsing bacteremia, work-up for complicated infection and treat accordingly
Remove CVC/P & treat for 7-14 days
For CVC/P salvage, use systemic & antibiotic lock therapy for 10-14 days; if no response,, remove CVC/P, rule out endocarditis or suppurative thrombophlebitis, and if not present treat with antibiotic for 10-14 days
Remove CVC/P & treat with antifungal therapy for 14 days after the first negative blood culture

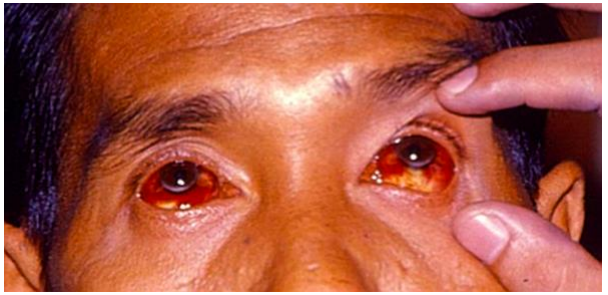
Question 6

C. Dengue fever

- MKSAP key points
  - Dengue fever:
    - Hallmarks: sudden high fever, frontal headache with retro-orbital pain, myalgia/arthralgia, severe lower back pain "break bone fever", maculopapular rash; hemorrhagic sxs (petechiae with tourniquet test)
    - Lab findings: leukopenia (with lymphocytosis), hemoconcentration, thrombocytopenia, ↑ LFTs
    - Confirm with serologic testing or PCR
    - SE Asia, S pacific, S. and C. America, Carribean
    - Aedes mosquito



  - Other answers:
    - Anasplasmosis: rash is rare; similar lab abnormalities to DF; Ixodes tick
    - Chikungunya: Aedes mosquito; Carribean; polyarticular and migratory joint pains; don't get the profound thrombocytopenia
    - Leptospirosis: pulm, renal, hepatic, CNS involvement; conjunctival suffusion; rodents



Question 7

B. Airborne and contact

- MKSAP key points
  - Localized zoster: 1-2 dermatomes; if not immunocompromised → standard precautions alone
  - Disseminated zoster: 3 or more dermatomes and may involve respiratory tract
  - No longer contagious once lesions have crusted over
  - Other answers:
    - Droplet (for organisms that are transmitted via large droplets (>5 µm) and travel less than 3 feet on air currents)

Precautions

Types of precautions for infection control

Type of precaution	Selected patients	Major specifications
Standard	All patients	Perform hand hygiene before and after every patient contact*. Gloves, gowns, eye protection as required. Safe disposal or cleaning of instruments and linen. Cough etiquette: Patients and visitors should cover their nose or mouth when coughing, promptly dispose used tissues, and practice hand hygiene after contact with respiratory secretions.
Contact	Colonization of any bodily site with multidrug-resistant bacteria (MRSA, VRE, drug-resistant gram-negative organisms) Enteric infections (Norovirus, *Clostridium difficile*, *Escherichia coli* O157:H7) Viral infections (HSV, VZV, RSV, parainfluenza, enterovirus) Scabies Impetigo Noncontained abcesses or decubitus ulcers (especially for *Staphylococcus aureus* and group A *Streptococcus*)	**In addition to standard precautions:** Private room preferred; cohorting allowed if necessary. Gloves required upon entering room. Change gloves after contact with contaminated secretions. Gown required if clothing may come into contact with the patient or environmental surfaces or if the patient has diarrhea. Minimize risk of environmental contamination during patient transport (eg, patient can be placed in a gown). Noncritical items should be dedicated to use for a single patient if possible.

Precautions

Droplet	**Known or suspected:** *Neisseria meningitidis* *Haemophilus influenzae* type B *Mycoplasma pneumoniae* *Bordetella pertussis* Diphtheria Pneumonic plague Influenza Rubella Mumps Adenovirus Parvovirus B19 RSV	**In addition to standard precautions:** Private room preferred; cohorting allowed if necessary. Wear a mask when within three feet of the patient. Mask the patient during transport. Cough etiquette: Patients and visitors should cover their nose or mouth when coughing, promptly dispose used tissues, and practice hand hygiene after contact with respiratory secretions.
Airborne	**Known or suspected:** Tuberculosis Varicella Measles Smallpox SARS Ebola¶	**In addition to standard precautions:** Place the patient in an AIIR (a monitored negative pressure room with at least 6 to 12 air exchanges per hour). Room exhaust must be appropriately discharged outdoors or passed through a HEPA filter before recirculation within the hospital. A certified respirator must be worn when entering the room of a patient with diagnosed or suspected tuberculosis. Susceptible individuals should not enter the room of patients with confirmed or suspected measles or chickenpox. Transport of the patient should be minimized; the patient should be masked if transport within the hospital is unavoidable. Cough etiquette: Patients and visitors should cover their nose or mouth when coughing, promptly dispose used tissues, and practice hand hygiene after contact with respiratory secretions.

Question 8

E. Vancomycin for 6 weeks

- MKSAP key points
  - 20% of pts with c. diff experience a relapse
  - 1st episode and 1st recurrence, severity-based treatment
  - Metronidzaole not recommended for prolonged administration due to risk of neurotoxicity
  - Rifaximin can be useful at the end of a vancomycin taper, but not recommended for stand-alone therapy

Treatment Regimens

Treatment of nonsevere *Clostridium difficile*-associated diarrhea in adults

Initial episode
Metronidazole 500 mg orally three times daily or 250 mg four times daily for 10 to 14 days
Vancomycin 125 mg orally four times daily for 10 to 14 days
First relapse
Confirm diagnosis (refer to text)
If symptoms are mild, conservative management may be appropriate
If antibiotics are needed, repeat treatment as in initial episode above. Alternative: fidaxomicin 200 mg orally twice daily for 10 days.[1,2]
Second relapse[3,4]
Confirm diagnosis (refer to text)
Tapering and pulsed oral vancomycin (below), with or without probiotics (for example, *Saccharomyces boulardii* 500 mg orally twice daily). The probiotics may be overlapped with the final week of the taper and continued for two additional weeks in the absence of antibiotics.
125 mg orally four times daily for 7 to 14 days
125 mg orally twice daily for 7 days
125 mg orally once daily for 7 days
125 mg orally every other day for 7 days
125 mg orally every 3 days for 14 days
Alternative: fidaxomicin 200 mg orally twice daily for 10 days[1,2]
Subsequent relapse[1,2,5]
Confirm diagnosis (refer to text)
Fidaxomicin 200 mg orally twice daily for 10 days if not used previously
Fecal bacteriotherapy (fecal microbiota transplant)

Question 9

B. Oral vancomycin

- MKSAP key points
  - Severity:
    - Severe: WBC > 15K or Cr > 1.5 times premorbid level
    - Severe, Complicated: hypotension, ileus, or megacolon

Severity	Clinical picture	Treatment	S/Q
First episode (Mild/Mod)	WBC <15,000 OR sCr < 1.5 x baseline	Metronidazole 500 mg PO TID x 10-14 days	AI
First episode (Severe)	WBC >15,000 OR sCr > 1.5 x baseline	Vancomycin 125 mg PO QID x 10-14 days	BI
First episode (Severe/Complicated)	Hypotension, shock, ileus, megacolon	Vancomycin 500 mg PO/NG QID PLUS Metronidazole 500 mg IV Q8H	CIII
First Recurrence	...	Same as first episode	AII
Second Recurrence	...	Vancomycin in a tapered or pulsed regimen	BIII

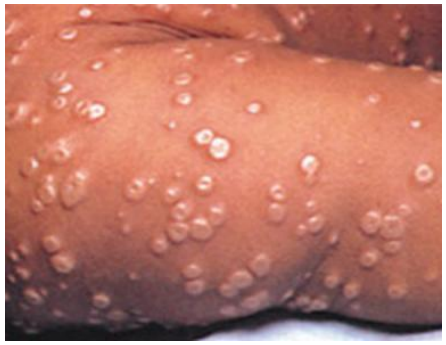
Question 10

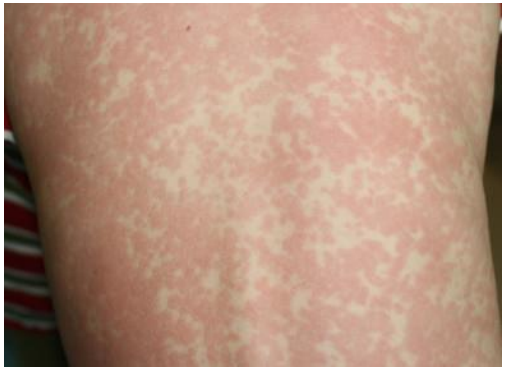
C. Smallpox

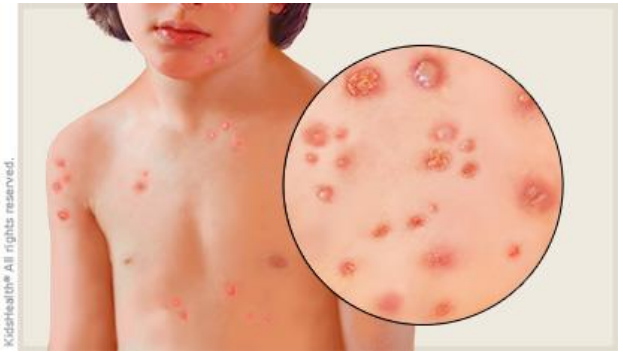
- MKSAP key points
  - Incubation period of 10-14 days
  - Prodromal phase: fever, HA, vomiting, pharyngitis
  - Rash: small red dots on pharyngeal and buccal mucosa; vesicles; spreads to hands, face, arms, legs, feet (then to trunk); lesions progress in synchronous fashion

Other answers:

- Measles: fever, malaise, URI sxs, koplik spots, morbilliform rash
- Rickettsial pox: lesion at site of inoculation
- Chickenpox (varicella): most closely resembles smallpox, but begins on trunk and then spreads outward; lesions in various stages







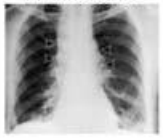
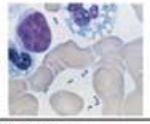
Bioterrorism Agents

Bioterrorism Agents (CDC)	
Category A	Anthrax (*Bacillus anthracis*)
	Botulism (*Clostridium botulinum* toxin)
	Plague (*Yersinia pestis*)
	Smallpox (variola major)
	Tularemia (*Francisella tularensis*)
	Viral hemorrhagic fevers (filoviruses and arenaviruses)
Category B	Brucellosis (*Brucella* species)
	Clostridium perfringens' Epsilon toxin
	Food safety threats (e.g., *Salmonella* species, *Escherichia coli* O157:H7, *Shigella*)
	Glanders (*Burkholderia mallei*)
	Melioidosis (*Burkholderia pseudomallei*)
	Psittacosis (*Chlamydia psittaci*)
	Q fever (*Coxiella burnetii*)
	Ricin toxin from *Ricinus communis* (castor beans)
	Staphylococcal enterotoxin B
	Typhus fever (*Rickettsia prowazekii*)
	Viral encephalitis (Equine encephalitis viruses)
	Water safety threats (e.g., *Vibrio cholerae*, *Cryptosporidium parvum*)
Category C	Emerging infectious diseases such as Nipah virus and hantavirus
	http://emergency.cdc.gov/agent/agentlist-category.asp

- Category A:
  - can be easily disseminated or transmitted from person to person;
  - result in high mortality rates and have the potential for major public health impact;
  - might cause public panic and social disruption; and
  - require special action for public health preparedness
- Category B:
  - are moderately easy to disseminate;
  - result in moderate morbidity rates and low mortality rates; and
  - require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance
- Category C:
  - emerging pathogens that could be engineered for mass dissemination in the future because of
    - availability;
    - ease of production and dissemination; and
    - potential for high morbidity and mortality rates and major health impact.

BIOTERRORIST AGENTS

WATCH FOR THESE SYMPTOMS

Disease	Signs & Symptoms	Incubation Time (Range)	Person-to-Person Transmission	Isolation	Diagnosis	Postexposure Prophylaxis for Adults	Treatment for Adults
Anthrax *Bacillus anthracis* A. Inhalation 	Flu-like symptoms (fever, fatigue, muscle aches, dyspnea, nonproductive cough, headache), chest pain; possible 1-2 day improvement then rapid respiratory failure and shock. Meningitis may develop.	1 to 6 days (up to 6 wks)	None	Standard Precautions	Chest x-ray evidence of widening mediastinum; obtain sputum and blood culture. Sensitivity and specificity of nasal swabs unknown - do not rely on for diagnosis.	Prophylaxis for 60 days: Ciprofloxacin* 500 mg PO q 12h Or Doxycycline 100 mg PO q 12h Alternative (if strain susceptible and above contraindicated): Amoxicillin 500 mg PO q 8h **In vitro* studies suggest that Levofloxacin 500 mg PO q 24h Or Gatifloxacin 400 mg PO q 24h Or Moxifloxacin 400 mg PO q 24h could be substituted	Inhalation anthrax Combined IV/PO therapy for 60d Ciprofloxacin 500 mg q 12h Or Doxycycline 100 mg q 12h, AND 1 or 2 additional drugs (vancomycin, rifampin, imipenem clindamycin, chloramphenicol, clarithromycin, and if susceptible penicillin or ampicillin Cutaneous anthrax Ciprofloxacin 500 mg PO q 12h Or Doxycycline 100 mg PO 12h
B. Cutaneous 	Intense itching followed by painless papular lesions, then vesicular lesions, developing into eschar surrounded by edema.	1 to 12 days	Direct contact with skin lesions may result in cutane-ous infection.	Contact Precautions	Peripheral blood smear may demonstrate gram positive bacilli on unspun smear with sepsis.		
C. Gastrointestinal (GI) 	Abdominal pain, nausea and vomiting, severe diarrhea, GI bleeding, and fever.	1 to 7 days	None	Standard Precautions	Culture blood and stool.	Recommendations same for pregnant women and immunocompromised persons	Recommendations same for pregnant women and immunocompromised persons
Botulism botulinum toxin 	Afebrile, excess mucus in throat, dysphagia, dry mouth and throat, dizziness, then difficulty moving eyes, mild pupillary dilation and nystagmus, intermittent ptosis, indistinct speech, unsteady gait, extreme symmetric descending weakness, flaccid paralysis; generally normal mental status.	Inhalation: 12-80 hours Foodborne: 12-72 hours (2-8 days)	None	Standard Precautions	Laboratory tests available from CDC or Public Health Dept; obtain serum, stool, gastric aspirate and suspect foods prior to administering antitoxin. Differential diagnosis includes polio, Guillain Barre, myasthenia, tick paralysis, CVA, meningococcal meningitis.	Pentavalent toxoid (types A, B, C, D, E) 0.5 ml SQ may be available as investigational product from USAMRIID.	Botulism antitoxins from public health authorities. Supportive care and ventilatory support. Avoid clindamycin and aminoglycosides.
Pneumonic Plague *Yersinia pestis* 	High fever, cough, hemoptysis, chest pain, nausea and vomiting, headache. Advanced disease: purpuric skin lesions, copious watery or purulent sputum production; respiratory failure in 1 to 6 days.	2-3 days (2-6 days)	Yes, droplet aerosols	Droplet Precautions until 48 hrs of effective antibiotic therapy	A presumptive diagnosis may be made by Gram, Wayson or Wright stain of lymph node aspirates, sputum, or cerebrospinal fluid with gram negative bacilli with bipolar (safety pin) staining.	Doxycycline 100 mg PO q 12h Or Ciprofloxacin 500 mg PO q 12h	Streptomycin 1 gm IM q 12h; Or Gentamicin 2 mg/kg, then 1.0 to 1.7 mg/kg IV q 8h Alternatives: Doxycycline 200 mg PO load, then 100 PO mg q 12h Or Ciprofloxacin 400 mg IV q 12h
Smallpox variola virus 	Prodromal period: malaise, fever, rigors, vomiting, headache, and backache. After 2-4 days, skin lesions appear and progress uniformly from macules to papules to vesicles and pustules, mostly on face, neck, palms, soles, and subsequently progress to trunk.	12-14 days (7-17 days)	Yes, airborne droplet nuclei or direct contact with skin lesions or secretions until all scabs separate and fall off (3 to 4 weeks)	Airborne (includes N95 mask) and Contact Precautions	Swab culture of vesicular fluid or scab, send to BL-4 laboratory. All lesions similar in appearance and develop synchronously as opposed to chickenpox. Electron microscopy can differentiate *variola virus* from varicella.	Early vaccine critical (in less than 4 days). Call CDC for vaccinia. Vaccinia immune globulin in special cases - call USAMRIID 301-619-2833.	Supportive care. Previous vaccination against smallpox does not confer lifelong immunity. Potential role for Cidofovir.

Question 11

E. No antifungal therapy

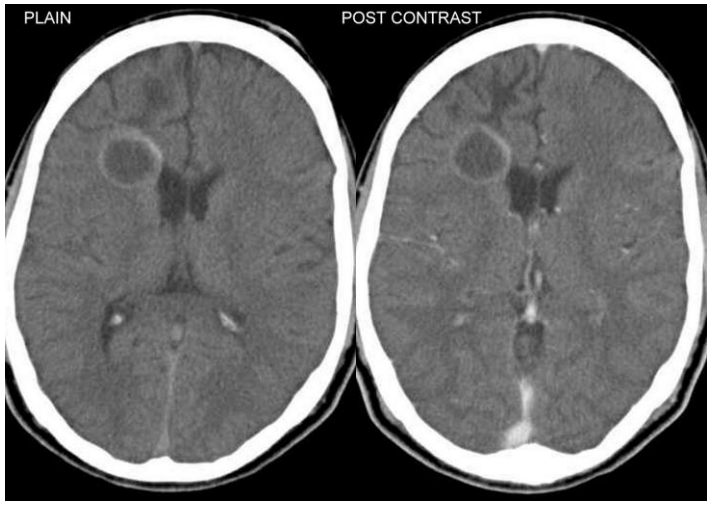
- MKSAP key points
  - Candiduria:
    - Contaminated urine specimen vs. colonization of bladder or catheter vs. infection vs. manifestation of candidemia
    - Remove catheter if present
    - Treat patients with neutropenia or undergoing urinary tract procedures
- If treatment required, fluconazole is the drug of choice
- Echinocandins, voriconazole, posaconazole not recommended as little active drug found in urine

Indications for urinary catheter

Indication	Comment(s)
Clinically significant urinary retention	Temporary relief or longer-term drainage if medical therapy is not effective and surgical correction is not indicated.
Urinary incontinence	For comfort in a terminally ill patient; if less invasive measures (eg, behavioral and pharmacological interventions or incontinence pads) fail and external collecting devices are not an acceptable alternative.
Accurate urine output monitoring required	Frequent or urgent monitoring needed, such as with critically ill patients.
Patient unable or unwilling to collect urine	During prolonged surgical procedures with general or spinal anesthesia; selected urological and gynecological procedures in the perioperative period.

NOTE. Adapted from [30, 120, 121].

Question 12



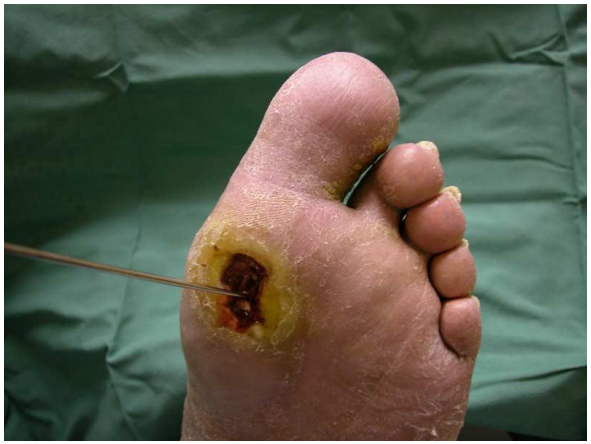
B. Penicillin and metronidazole

- MKSAP key points
  - Think of brain abscess with HA (severe, non-responsive to analgesia), +/- fever; MS changes and vomiting seen later; PE with focal neuro or CN deficits
  - Hematogenous (multifocal) vs. contiguous spread (solitary)
  - Complication of otitis media, sinusitis, odontogenic infection; or, foreign body or complication of NSG procedure
  - Empiric treatment based on predisposing condition
  - Drain abscess > 2.5 cm; tx 4-8 weeks

Rapid empiric management of bacterial brain abscess in adults

Empiric antibiotics	
Immediately begin empiric antibiotics following stereotactic or open biopsy/aspiration to obtain a specimen for Gram stain, culture, and pathology.	
The antibiotic regimen is dependent on Gram stain results, if available, and the likely source of abscess.	
Origin of abscess and likely causative organisms	**Treatment regimen***
Oral, otogenic, or sinus source (aerobic and anaerobic streptococci, *Bacteroides* spp, *Haemophilus* spp, *Fusobacterium* spp; less commonly, *Pseudomonas aeruginosa* and Enterobacteriaceae)	Metronidazole (15 mg/kg [usually 1 g] IV as a loading dose, followed by 7.5 mg/kg [usually 500 mg] IV every eight hours) **PLUS** **Either** penicillin G (20 to 24 million units per day IV in six equally divided doses) for a suspected oral focus **OR** Ceftriaxone (2 g IV every 12 hours) **or** cefotaxime (2 g IV every four to six hours) for a suspected sinus or otogenic source.
Hematogenous spread (*Staphylococcus aureus*, *Streptococcus viridans*, other streptococci)	Vancomycin¶ (15 to 20 mg/kg per dose every 8 to 12 hours, not to exceed 2 g per dose) for empiric coverage of methicillin-resistant *Staphylococcus aureus*. Metronidazole may be added for anaerobic coverage.
Postoperative neurosurgical patients (*S. aureus*, streptococci, enterococci, *P. aeruginosa*)	Vancomycin¶ (15 to 20 mg/kg per dose every 8 to 12 hours, not to exceed 2 g per dose) **PLUS** **Either** ceftazidime (2 g IV every eight hours) **or** cefepime (2 g IV every eight hours) **or** meropenemΔ (2 g IV every eight hours).
Penetrating head trauma (*S. aureus*, *Enterobacter* spp)	Vancomycin¶ (15 to 20 mg/kg per dose every 8 to 12 hours, not to exceed 2 g per dose) **PLUS** **Either** ceftriaxone (2 g IV every 12 hours) **or** cefotaxime (2 g IV every four to six hours) If the paranasal sinuses are involved, add metronidazole (15 mg/kg [usually 1 g] IV as a loading dose, followed by 7.5 mg/kg [usually 500 mg] IV every eight hours).
Unknown source	Vancomycin¶ (15 to 20 mg/kg per dose every 8 to 12 hours, not to exceed 2 g per dose) **PLUS** **Either** ceftriaxone (2 g IV every 12 hours) **or** cefotaxime (2 g IV every four to six hours) **PLUS** Metronidazole (15 mg/kg [usually 1 g] IV as a loading dose, followed by 7.5 mg/kg [usually 500 mg] IV every eight hours).
Glucocorticoids	
Glucocorticoids should be used when substantial mass effect can be demonstrated on imaging and the mental status is significantly depressed.	
Dexamethasone is administered at a loading dose of 10 mg IV, followed by 4 mg every six hours.	

Question 13



A. Bone biopsy and culture

- MKSAP key points
  - Osteomyelitis:
    - Hematogenous seeding accounts for 20%
      - Typically monomicrobial
        - » Staph aureus most common
        - » Salmonella – sickle cell
        - » Pseudomonas – injection drug users
    - Contiguous spread (DFU, vascular insufficiency)
      - More likely to be polymicrobial
    - Draining sinus tract pathognomonic for chronic osteo
    - Bone bx – definitive diagnostic study (best to obtain before empiric abx started)
    - MRI best imaging technique

SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	*Evidence rating*	*References*
The preferred diagnostic criterion for osteomyelitis is a positive bacterial culture from bone biopsy in the setting of bone necrosis.	C	17, 21
Magnetic resonance imaging is as sensitive as and more specific than bone scintigraphy in the diagnosis of osteomyelitis.	C	27-30
Parenteral followed by oral antibiotic therapy is as effective as long-term parenteral therapy for the treatment of chronic osteomyelitis in adults.	B	31, 36

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to http://www.aafp.org/afpsort.xml.

Imaging studies

Table 1. Diagnostic Criteria for Chronic Osteomyelitis

- Imaging studies (e.g., plain radiography, magnetic resonance imaging, bone scintigraphy) demonstrating contiguous soft tissue infection or bony destruction
- Clinical signs
  - Exposed bone
  - Persistent sinus tract
  - Tissue necrosis overlying bone
  - Chronic wound overlying surgical hardware
  - Chronic wound overlying fracture
- Laboratory evaluation
  - Positive blood cultures
  - Elevated C-reactive protein level
  - Elevated erythrocyte sedimentation rate

NOTE: *Items listed in order of decreasing diagnostic ability for osteomyelitis. If osteomyelitis is suspected, a bone biopsy with bacterial culture should be considered for definitive diagnosis.*

Information from reference 17.

Table 2. Diagnostic Imaging Studies for Osteomyelitis

Imaging modality	*Sensitivity (%)*	*Specificity (%)*	*Comments*
Computed tomography	67	50	Generally should not be used in osteomyelitis evaluation
Leukocyte scintigraphy	61 to 84	60 to 68	Combining with technetium-99 bone scintigraphy can increase specificity
Magnetic resonance imaging	78 to 90	60 to 90	Useful to distinguish between soft tissue and bone infection, and to determine extent of infection; less useful in locations of surgical hardware because of image distortion
Plain radiography (anteroposterior, lateral, and oblique views)	14 to 54	68 to 70	Preferred imaging modality; useful to rule out other pathology
Positron emission tomography	96	91	Expensive; limited availability
Technetium-99 bone scintigraphy	82	25	Low specificity, especially if patient has had recent trauma or surgery; useful to differentiate osteomyelitis from cellulitis, and in patients in whom magnetic resonance imaging is contraindicated

Information from references 24 through 30.

Question 14

D. Outpatient treatment with levofloxacin

- MKSAP key points
  - Treatment setting:
    - PSI,
    - CURB/CRB-65
      - Confusion
      - BUN > 20
      - Respiratory rate > 30
      - BP < 90
    - Other tools for severity: ***SMART-COP: who goes to ICU?***

Where to treat

PSI: I and II: home
III: home vs. brief inpt stay
IV and V: inpt

CURB-65:
Confusion (1)
Urea >20 (1)
RR ≥ 30 (1)
SBP <90 or DBP ≤ 60 (1)
Age ≥ 65

Favor hospital admission for CURB-65 of 1.

Pneumonia Severity Index

Characteristic	No. of Points Assigned
Demographic factors	
Age	
Men	Age (in yr)
Women	Age (in yr) − 10
Nursing home resident	+10
Coexisting illnesses	
Neoplastic disease	+30
Liver disease	+20
Congestive heart failure	+10
Cerebrovascular disease	+10
Renal disease	+10
Findings on physical examination	
Altered mental status	+20
Respiratory rate ≥30/min	+20
Systolic blood pressure <90 mm Hg	+20
Temperature <35°C or ≥40°C	+15
Pulse ≥125 beats/min	+10
Laboratory and radiographic findings	
Arterial pH <7.35	+30
Blood urea nitrogen ≥30 mg/dl (11 mmol/liter)	+20
Sodium <130 mmol/liter	+20
Glucose ≥250 mg/dl (14 mmol/liter)	+10
Hematocrit <30%	+10
Partial pressure of arterial oxygen <60 mm Hg or oxygen saturation <90%	+10
Pleural effusion	+10

Stratification of Risk Score

Risk	Risk Class	Score	Mortality
Low	I	Based on algorithm	0.1%
Low	II	≤70	0.6%
Low	III	71–90	0.9%
Moderate	IV	91–130	9.3%
High	V	>130	27.0%

Outpatient CAP treatment: IDSA

- Previously healthy and no risk factors for DRSP infection:
  - A macrolide (azithromycin, clarithromycin, or erythromycin) (strong recommendation; level I evidence)
  - Doxycycline (weak recommendation; level III evidence)

- Presence of comorbidities, such as chronic heart, lung, liver, or renal disease; diabetes mellitus; alcoholism; malignancies; asplenia; immunosuppressing conditions or use of immunosuppressing drugs; use of antimicrobials within the previous 3 months (in which case an alternative from a different class should be selected); or other risks for DRSP infection:
  - A respiratory fluoroquinolone (moxifloxacin, gemifloxacin, or levofloxacin [750 mg]) (strong recommendation; level I evidence)

  - A b-lactam **plus** a macrolide (strong recommendation; level I evidence) (High-dose amoxicillin [e.g.,1 g 3 times daily] or amoxicillin-clavulanate [2 g 2 times daily] is preferred; alternatives include ceftriaxone, cefpodoxime, and cefuroxime [500 mg 2 times daily]; doxycycline [level II evidence] is an alternative to the macrolide.)

Question 15

B. Change vancomycin to nafcillin

- MKSAP key points
  - ß-lactam abx more rapidly bactericidal than vancomycin and recommended treatment if MSSA
  - Other answers:
    - No improvement in outcomes with addition of rifampin
    - Vancomycin monitored by trough (not peak) levels
    - Ultrasound recommended if concern for suppurative thrombophlebitis or fluid collection

Question 16

A. Antimicrobial prophylaxis

- MKSAP key points
  - Recurrent UTI: 3 UTIs within the previous 12 months or 2 within the previous 6 months
  - Modifiable behavioral practice:
    - Postcoital voiding and liberal fluid intake - reasonable but have not been shown in controlled studies to be associated with a reduced risk of recurrent UTI (unlikely to be harmful)
  - Abx prophylaxis (continuous prophylaxis, postcoital prophylaxis, and intermittent self-treatment)
  - Other answers:
    - Methenamine salts: antiseptic (antimicrobial sparing); carcinogenic potential if prolonged treatment
    - Vitamin C: no shown efficacy
    - Anatomic or functional abnormalities should be excluded in post-menopausal women, though yield is low in premenopausal women

Recurrent Urinary Tract Infections in Women: Diagnosis and Management
AAFP 2010

Table 4. Continuous vs. Postcoital Antimicrobial Prophylaxis for Recurrent Urinary Tract Infections

Antimicrobial agent	*Continuous prophylaxis (daily dosage)**	*Cost (brand)†*	*Postcoital prophylaxis (one-time dose)‡*	*In retail discount programs§*
Cephalexin (Keflex)	125 to 250 mg	$14 ($66); only available in 250-mg capsule	250 mg	✔
Ciprofloxacin (Cipro)	125 mg	$12 ($68); half tablet (250 mg) for 30 days	125 mg	✔
Nitrofurantoin (Macrodantin)	50 to 100 mg	$28 ($68) for 50-mg dose	50 to 100 mg	
Norfloxacin (Noroxin)	200 mg	NA ($63); half tablet (400 mg) for 30 days	200 mg	
Trimethoprim (Proloprim)	100 mg	$20 (NA)	100 mg	
Trimethoprim/sulfamethoxazole (Bactrim, Septra)	40/200 mg	$16 ($26); half tablet for 30 days	40/200 to 80/400 mg	✔

NA = not applicable.

**—Typically taken at night.*[1]

†—Estimated retail price of one month's treatment based on information obtained at http://www.drugstore.com (accessed July 28, 2010).

‡—Taken within two hours of intercourse.[1,20]

§—May be available at discounted prices ($10 or less for one month's treatment) at one or more national retail chains.

Information from references 1, 6, 19, and 20.

Other prophylactic treatments

- Topical estrogen for postmenopausal women —

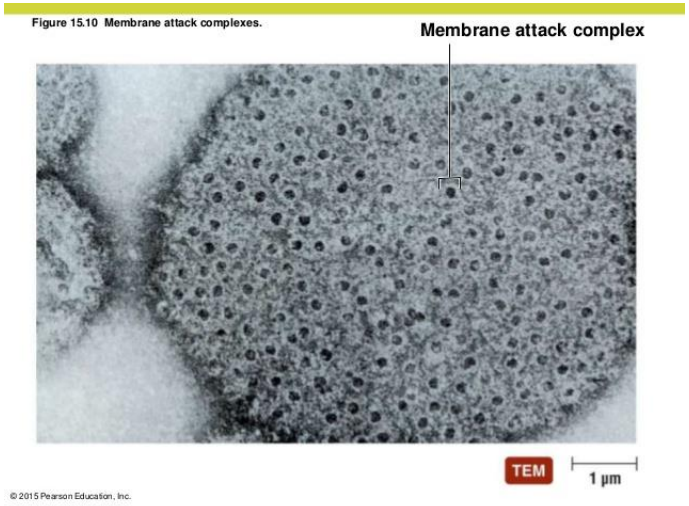
- Normalizes the vaginal flora and greatly reduces the risk of UTI in postmenopausal women; has not been directly compared with antimicrobial prophylaxis, but both strategies appear to be effective in postmenopausal women

Question 17

C. Late complement component pathway

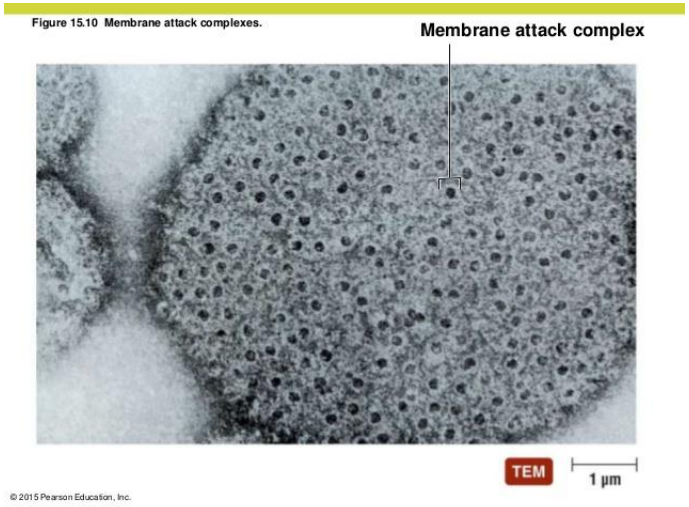
- MKSAP key points
  - Patients with late complement component deficiency (C5-C9) may present with recurrent, invasive meningogoccal or gonococcal infections
  - Classical complement pathway deficiencies (C1, C4, C2) assoc. with rheumatologic disorder; if infections occur, usually caused by encapsulated bacteria (esp. strep pneumo)

- The Lack of a Big MAC Attack

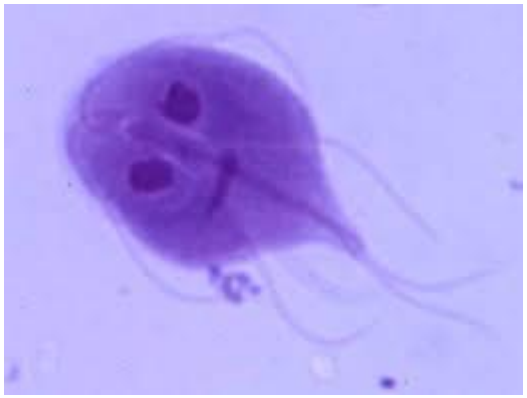


Immunodeficiencies

- Selective IgA deficiency (B-cell)
  - Recurrent sinopulmonary infections or GI infections (giardiasis)
  - Association with IBD, celiac disease, RA, SLE
  - Association with allergic disorders
  - Anaphylaxis with transfusions
- Common variable immunodeficiency (B and T cell)
  - Hypogammaglobulinemia: recurrent respiratory infections and GI tract involvement (malabsorption and chronic diarrhea)
- Complement abnormalities
  - Early: rheum
  - Late:
    - Recurrent invasive meningogocal or gonococcal disease or blood stream infections with encapsulated bacteria
    - Check CH50 as screening tool



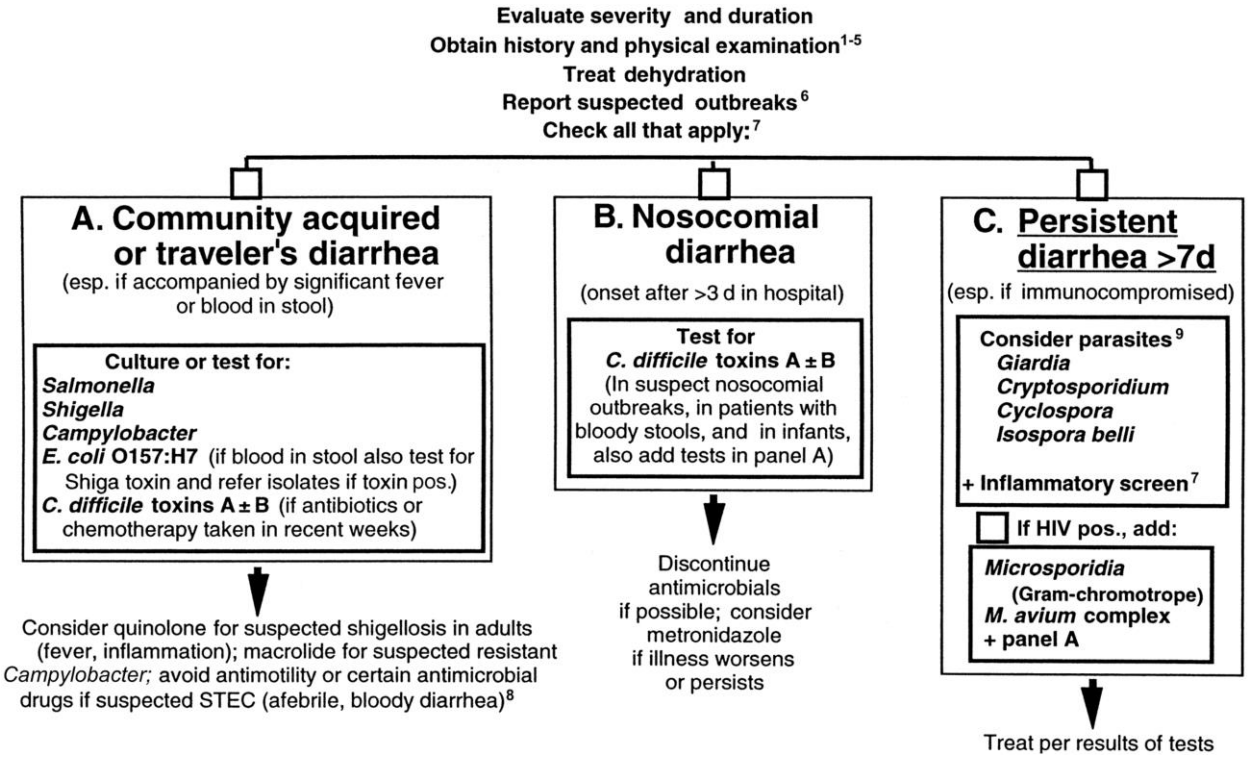
Question 18



B. Giardia antigen testing

- MKSAP key points
  - Steatorrhea, abd distension and weight loss suggests a parasitic GI illness
  - Common in outdoor enthusiasts
  - Giardia antigen testing with sensitivity >80%
  - Other answers:
    - Amebiasis uncommon in developed countries
    - Stool microscopy: not preferred diagnostic test as may need multiple samples to exclude diagnosis
    - Acid-fast staining required for cyclospora species

IDSA "Practice Guidelines for the Management of Infectious Diarrhea"



Question 19

A. Switch to ampicillin

- MKSAP key points
  - Resistance: e. faecium > e. faecalis
  - Chose most narrow spectrum agent and should de-escalate as soon as culture results available
- Addition of gent (to ampicillin or vanco) not needed in absence of endocarditis

Antimicrobial stewardship

- ADVERSE EFFECTS OF ANTIBIOTIC USE
  - Emergence of antibiotic resistance (drug resistant organsims cause 2 million infections in the US each year resulting in 23,000 deaths
  - Selection of pathogenic organisms such as *Clostridium difficile*
  - Drug toxicity

- PRINCIPLES OF OPTIMAL ANTIBIOTIC USE
  - Initiating empiric therapy — Initiation of empiric antibacterial therapy consists of the following:
    - Choosing the optimal antibiotic regimen considering the severity and trajectory of illness; likely pathogens and their anatomic source (with consideration of source control), likelihood of drug resistance
    - Host factors
    - Determining the appropriate dosing and route of administration
    - Initiating antibiotic therapy as promptly as possible
  - Tailoring antibiotic therapy ("antibiotic time-out")
  - Converting from intravenous to oral antibiotic administration
  - Using the shortest effective duration of therapy
  - Pharmacokinetic monitoring

Question 20

A. Amoxicillin-clavulanate

- MKSAP key points
  - Prophylaxis recommended if immunosuppressed, moderate to severe wounds (esp. hands and face), wounds near a joint or bone or significant crush injury or edema
  - Augmentin provides broad spectrum against bacteria of a dog's oral flora

  - Wound irrigation and debridement
  - Other answers:
    - Metronidazole lacks aerobic coverage
    - Tetanus vaccination if not done within past 5 years as "dirty wound"
    - 3 to 5 day course of prophy

Bites

- Animal bites:
  - *Pasteurella*, *Staphylococcus*, and *Streptococcus* species and anaerobic bacteria
  - *Capnocytophaga canimorsus*, a gram-negative rod, can cause bacteremia and fatal sepsis after animal bites, especially in asplenic patients, chronic alcohol abusers, or those with underlying hepatic disease
  - Cat bites can also transmit *Bartonella henselae*, the organism responsible for cat scratch disease
- Human bites:
  - *Pasteurella multocida* rare
  - Eikenella corrodens, a gram-negative anaerobe common
  - Aerobic gram-positive cocci (eg, Group A *Streptococcus*) and anaerobes are found more frequently in bites from humans than from other animals