

Infection Prevention

TB screening

- A 63-year-old man undergoes annual screening for tuberculosis. The patient is a physician, and this screening is required for maintaining his hospital appointment. His medical history is significant for bladder cancer diagnosed 1 year ago that was treated with bacillus Calmette-Guérin. There is no current evidence of active bladder cancer on follow-up cystoscopy, and he has no respiratory or systemic symptoms. On physical examination, vital signs are normal. The remaining physical examination findings, including cardiopulmonary examination, are normal.
- **Which of the following is the most appropriate next step in management?**
 - A. CXR
 - B. Interferon- γ release assay
 - C. Tuberculin skin test
 - D. Two-step tuberculin skin testing

TB screening

- A 23-year-old man undergoes preliminary evaluation. He has just been admitted to a detoxification center because of injection drug use. On physical examination, temperature is 36.8 °C (98.2 °F), blood pressure is 125/75 mm Hg, pulse rate is 90/min, and respiration rate is 18/min. Findings of physical examination demonstrate evidence of injection drug use on the bilateral upper extremities but are otherwise normal. Tuberculin skin testing induces 6 mm of induration. The patient has not had previous tuberculin skin tests. Results of a serologic test for HIV infection are negative.
- **Which of the following is the most appropriate next step in the management of this patient?**
 - A. CXR
 - B. Isoniazid
 - C. Isoniazid, rifampin, pyrazinamide, and ethambutol
 - D. No additional therapy or evaluation

TB screening

- 23 year old admitted to detox center for IVDA with TST 6mm. No h/o prior TST, no symptoms, exam normal, HIV neg.
- **What is your next step?**
 - A. CXR
 - B. Isoniazid
 - C. Isoniazid, rifampin, pyrazinamide, & ethambutol
 - D. NO additional therapy or evaluation
- **What if he is a teacher whose annual TST is 12mm induration?**

TB screening

- 32 year old female physician beginning fellowship at a university hospital must undergo TB skin testing for the first time. She is healthy, grew up in Africa and completed medical school and residency training in London. She received BCG vaccine as a child. TB skin testing reveals 16mm area of induration. Physical exam is normal.
- **Which of the following is the most appropriate next step in the management of this patient?**
 - (A) Chest radiograph
 - (B) INH, rifampin, pyrazinamide, and ethambutol
 - (C) Repeat TB skin testing in 2 weeks
 - (D) No additional therapy or evaluation

TB screening

- 65 year old man recently migrated to the US from Africa. He is evaluated in the ER for 3-week history of cough and dyspnea, now with hemoptysis. He also has fevers, night sweats, and a 30-lb weight loss over the past 3 months. On exam he is thin, coughs frequently. Temp 101 F, BP 100/60, P 101/min, RR 30/min. Pulmonary exam reveals crackles over right upper lung field.
- **Which of the following is the most important initial infection-control option in this setting?**
 - A. CXR
 - B. Institution of airborne precautions
 - C. Sputum for AFB stain and culture
 - D. Tuberculin skin testing

TB screening

- 40 year old male high school teacher is evaluated because of a reactive TST of 12mm of induration as part of pre-employment physical exam. He has always been in good health and takes no meds. At the end of the last high school term, he relocated to a different state and will begin teaching at a new school. He has occ dry cough but otherwise is asymptomatic and has no known contact with persons with tuberculosis. His last annual TST induced 10mm of induration. Physical exam is normal.
- **Which of the following is the most appropriate management at this time?**
 - A. Begin isoniazid, 300mg/day
 - B. Collect sputum for acid-fast stain and culture
 - C. Obtain a CXR
 - D. No intervention is necessary

TB screening

- 25 year old man has a pre-employment physical exam before beginning medical residency program at urban teaching hospital. He is from India, where he completed his medical training. He is in good health & takes no meds. Exam is normal. TST induces 22mm of induration. He remembers receiving BCG vaccination as a child. A follow-up CXR is normal.
- **Which of the following is most appropriate at this time?**
 - A. Repeat the CXR in 6 months
 - B. Obtain an induced sputum sample for M. Tb stain and culture
 - C. Treat with isoniazid for 9 months
 - D. Treat with isoniazid, pyrazinamide, & ethambutol for 1 month

Tuberculosis

- 44 year old woman with 3-week h/o cough & fever. 6 months ago, when working as a nurse, her annual TST was positive for the first time at 15mm induration. She was advised to take INH prophylaxis but declined b/c of concerns about her age & risk of hepatotoxicity. Subsequently, she decided to seek employment in non-health care setting. On exam, temp 101 F, other vitals stable. + Crackles over left posterior chest. CXR with density in posterior left upper lobe.
- **Which of the following is the most appropriate management at this time?**
 - A. Begin empiric therapy with isoniazid
 - B. Begin empiric therapy with isoniazid, pyrazinamide, ethambutol, and rifampin
 - C. Obtain sputum for AFB stain & culture
 - D. Repeat the TST
 - E. Begin empiric therapy with IV ceftriaxone & azithromycin

CAUTI

- A 46-year-old man is admitted to the hospital with a ruptured gallbladder requiring emergent open cholecystectomy. An indwelling urinary catheter is inserted prior to surgery, and a drain is left in his upper right abdominal quadrant. The patient is stabilized and transferred to the surgical intensive care unit.
- **In addition to removing the urinary catheter at the first possible moment, which of the following will decrease this patient's risk of catheter-associated urinary tract infection?**
 - A. Daily cleansing of the meatal area of the catheter with antiseptics
 - B. Maintenance of urine-collecting bag below the level of the bladder
 - C. Routine catheter change every 5 days
 - D. Treatment of asymptomatic bacteriuria
 - E. Use of antiseptic-coated urinary catheters

CAUTI

- A 46-year-old man with quadriplegia is evaluated for fever and increased muscle spasticity. He self-catheterizes intermittently 4 times daily because of chronic bladder dysfunction, although an indwelling urinary catheter was placed 2 weeks ago because of difficulty with self-catheterization. On exam, temp is 38.9 °C (102.0 °F). The remainder of the examination is consistent with the diagnosis of quadriplegia. An indwelling bladder catheter is in place. A urinalysis and culture are obtained.
- **Which of the following is required to establish the diagnosis of catheter-associated urinary tract infection in this patient?**
 - A. Grossly cloudy urine
 - B. Positive urine dipstick for leukocyte esterase
 - C. Positive urine Gram stain
 - D. Urine culture with more than 10^3 colony-forming units/ml

CAUTI

- An unusually high # of UTIs are occurring in residents in a long-term-care facility. Many residents are infirm & incontinent & have indwelling urinary catheters in place.
- **Which of the following will most likely decrease the frequency of urinary tract infection in these residents?**
 - A. Administration of prophylactic antibiotics
 - B. Washing the collecting bags with hydrogen peroxide
 - C. Acidification of the urine
 - D. Removal of the indwelling catheters whenever possible
 - E. Changing of the indwelling catheters weekly

CLABSI

- A 21-year-old man undergoes evaluation in the ICU before surgical intervention scheduled for tomorrow. He was admitted to the surgical ICU 17 days ago for multiple gunshot wounds. He is mechanically ventilated and had a central line catheter placed in the right femoral vein. *Acinetobacter baumannii* has been isolated from blood cultures drawn from the central line catheter, sputum, and one of the abdominal drains. The patient shares the room with one additional patient, who is also mechanically ventilated.
- **Which of the following is most likely to reduce spread of this patient's *Acinetobacter* infection to his roommate?**
 - A. Clean the patients' room with bleach
 - B. Ensure strict adherence to hand hygiene practices
 - C. Give prophylactic antimicrobial agents active against *Acinetobacter* species to the roommate
 - D. Replace source patient's central line catheter, endotracheal tube, and abdominal drain with new devices

CLABSI

- An excessive # of central line catheter-related bloodstream infections are occurring in an ICU. The infections develop within 1 week of catheter placement. A colleague is observed placing a central venous catheter. She washes her hands with alcohol gel, selects the subclavian site for insertion, & cleanses the site with povidone-iodine. The patient is covered in a large sterile drape, & the colleague wears a mask, sterile gown, & gloves.
- **Which of the observed practices is most likely to have contributed to the increased rate of bloodstream infections?**
 - A. Handwashing before the procedure
 - B. Selection of the subclavian site for the catheter insertion
 - C. Cleansing of the catheter insertion site
 - D. Draping of the patient
 - E. Protective garb (mask, gown, gloves) of the colleague

CLABSI

- 70 year old man with non-Hodkin's lymphoma is admitted for complications of chemo. He is on fluconazole, ciprofloxacin, & metoclopramide. Hickman catheter in place to treat dehydration 2/2 vomiting. On admit, his po meds are stopped & 3L IV saline is given through the Hickman. He improves. However, on the 3rd hospital day he develops fever, slight confusion, and loss of appetite. On exam he appears ill, temp 101.7 F, P 112/min, RR 18/min, BP 110/70. Gen exam is normal. There is no redness or tenderness over the site of the Hickman catheter. WBC 4,000/uL, platelets 94,000/uL, Cr. 0.9mg/dL. After blood cultures are drawn, broad spectrum IV antibiotic therapy is begun for suspected bacteremia. The next day, the lab reports that two culture bottles are growing what appears to be yeast.
- **In addition to removing the Hickman catheter and continuing supportive care, which of the following is most appropriate at this time?**
 - A. Monitor temperature for 24 hours before beginning specific therapy
 - B. Await blood culture species identification before beginning specific therapy
 - C. Begin oral flucytosine now
 - D. Begin intravenous caspofungin now
 - E. Begin intravenous fluconazole now

C. Diff isolation measures

- 68 year old man diagnosed with *C. difficile* infection 5 days after elective hip replacement surgery. This hospital has recently reported a high incidence of *C. difficile* infections. The patient was in a two-bed hospital room.
- **In addition to bleach for enhanced room cleaning, which of the following “bundled” measures would be most effective in preventing the spread of *C. difficile* in this hospital setting?**
 - A. Airborne precautions and alcohol hand sanitizer
 - B. Airborne precautions and soap and water for hand hygiene
 - C. Barrier precautions and alcohol hand sanitizer
 - D. Barrier precautions and soap and water for hand hygiene
 - E. Droplet precautions and soap and water for hand hygiene

C. Diff isolation measures

- 52-year old man s/p right hip replacement surgery 2 days ago. Today with watery diarrhea q 1-2 hours. Stool assay positive for *C. difficile* toxin, & appropriate treatment begun. He is in 2-bed hospital room.
- **Which of the following should be done to prevent the spread of *C. difficile* to the roommate & to other persons in the hospital?**
 - A. Bathe the patient with antiseptic soap
 - B. Put UV lights in the patient's room
 - C. Place the patient in contact isolation
 - D. Place the patient in respiratory isolation
 - E. Place the patient in droplet isolation

Protective measures

- A 64-year-old woman is hospitalized for a 24-hour history of diffuse erythroderma, nausea, vomiting, and a rapidly progressive left lower leg soft tissue infection associated with fever, tachycardia, and hypotension. An emergent MRI of the left lower leg is compatible with superficial fascial necrosis. Empiric broad-spectrum antibiotics are initiated, and emergent surgical débridement and fasciotomy are performed. Gram stain reveals gram-positive cocci in short chains ultimately identified as *Streptococcus pyogenes*.
- **Which of the following precautions is most appropriate for this patient to prevent spread of this organism?**
 - A. Airborne precautions
 - B. Contact precautions
 - C. Droplet precautions
 - D. Standard precautions only

Protective measures

- 39 year old migrant worker from Central America comes to the ED because of 2 month history of cough, occ fever, night sweats, 10-lb weight loss, and one episode of hemoptysis. The patient does not smoke or use ETOH or illicit drugs. Family members & friends are well, and he is unaware of exposure to anyone with TB. He has never received BCG. He is in a monogamous sexual relationship and has never been tested for TB.
- **Which of the following precautions is needed before evaluating this patient?**
 - A. A mask for the patient
 - B. Droplet precautions for healthcare workers
 - C. Airborne isolation for the patient and personal respirators for healthcare workers
 - D. No special precautions are required

Protective measures

- 19 year old female college freshman is evaluated in the ER for 1-day h/o HA, fever, stiff neck. On exam, temp 102.7 F, BP 80/50. Pt unable to flex her neck & has photophobia. All cranial nerves intact, & remainder of the neuro exam is normal. CSF analysis reveals WBC 13,259/uL with 85% PMNs, glucose 40mg/dL, protein 230mg/dL. Gram stain with many PMNs & gram-negative diplococci.
- **In addition to placing the patient in a private room & instituting appropriate antimicrobial therapy, use of which of the following is the most appropriate next step in infection-control management?**
 - A. Face mask
 - B. High filter mask
 - C. Nonsterile gloves & gowns
 - D. Sterile gloves & gown

Protective measures

- 24 year old woman brought to the ER for fever, photophobia, stiff neck. On exam she is irritable. Temp 104 F. + nuchal rigidity and purpuric rash is seen on dependent areas of the body. While in the ER she develops respiratory distress & requires intubation & is admitted to the ICU. During transfer, she is isolated with droplet precautions, & all healthcare workers wear masks & use the appropriate barriers. LP done in the ICU & CSF exam shows gram-negative diplococci, consistent with meningitis.
- **Which of the following health care workers requires antibiotic prophylaxis?**
 - A. All staff who were present in the ER & ICU when the patient was in these areas
 - B. All staff who examined the patient in the ER & ICU
 - C. The resident who intubated the patient in the ER
 - D. Prophylaxis is not required for any staff

Protective measures

- 24 year old medical student is asked to evaluate a 43 year old fireman who developed fevers & chills 2 days ago & a rash 1 day ago. The triage nurse reports that the patient appears ill, temp 102 F, & has a rash that consists of papules & crops of vesicles on the trunk with sparing of the extremities. United States is on Code Red advisory (high threat), & medical personnel are being asked to identify anyone with a prodrome consistent with the most likely agents of bioterrorism. Med student has never had chickenpox & has no h/o exposures to it. Her most recent varicella titer was neg, and she did not receive varicella vaccine.
- **In addition to washing her hands with soap & alcohol, which precautions should the medical student take when evaluating the patient.**
 - A. Wear gloves & a gown
 - B. Wear gloves, a gown, & a mask
 - C. Wear gloves, a gown, & a personal respirator
 - D. No additional precautions are needed

Protective measures

- 45 year old woman hospitalized because of acute onset HA, malaise, chest pain, sore throat, abdominal pain, myalgias, and a dry, nonproductive cough preceded by a 2-day prodrome of coryza and some diarrhea. The US has been on Code Red advisory alert (high threat) for weeks. On exam, temp 104 F, P 64/min, RR 24/min. Bilateral coarse rhonchi heard. Cardiac exam is normal. Abdominal exam is normal except for decreased bowel sounds. Blood cultures grow *Francisella tularensis*.
- **In addition to standard precautions, which type of isolation is most appropriate for this patient?**
 - A. Contact isolation
 - B. Droplet isolation
 - C. Airborne isolation
 - D. No additional isolation precautions are required

Pathogen exposure

- 16 year old boy develops increasing redness, pain, and swelling around an abraded area on his right arm acquired during a high school wrestling match. He subsequently becomes febrile, lightheaded, and confused and is brought to the ER. On exam temp 100.2 F, P 108/min, RR 22/min, BP 110/79mm Hg. Marked swelling, erythema are present from the right mid-forearm to the shoulder. There are no areas of pale skin suggestive of early necrosis. The remainder of the exam is unremarkable. WBC 23,000/uL, Cr 0.7, LFTs wnl. Blood cultures grow gram-positive cocci in chains.
- **Which of the following prophylactic regimens should be offered to household contacts?**
 - A. Oral penicillin V
 - B. Intramuscular benzathine penicillin
 - C. Throat cultures followed by oral penicillin V
 - D. Throat cultures followed by intramuscular benzathine PCN G
 - E. No prophylaxis or cultures required

Pathogen exposure

- A 23-year-old man was admitted to a hospital 2 days ago with a 3-day h/o fever, severe HA and backache, vomiting, and sores in the back of his throat. The patient is a soldier. Yesterday, he developed spots on his hands and face, and today, the spots have spread to his arms and trunk, and he has developed a papular rash on his face and hands; all of the lesions are now at the same stage of development. The patient's nurse, a 28-year-old woman, did not use any personal protective equipment during her first 2 days of his care.
- **Which of the following interventions is most appropriate for the nurse?**
 - A. Acyclovir
 - B. Cidofovir
 - C. Smallpox vaccine
 - D. Varicella vaccine
 - E. No intervention required

VAP prevention

- A 61-year-old man undergoes preoperative evaluation CABG & aortic valve replacement surgery, both scheduled for tomorrow. He has been hospitalized in the CVICU for 4 days after collapsing and experiencing cardiogenic shock. He was intubated in the field with a standard, nonsilver-coated endotracheal tube and placed on mechanical ventilation in the ICU. He is being treated with both paralytic and sedating medications, in addition to a proton pump inhibitor and intravenous nitroglycerin. On exam, the patient's condition has stabilized and he is afebrile. No attempts are made to wean him from the ventilator because of his impending surgery and his heart condition.
- **Which of the following is the most appropriate measure to prevent ventilator-associated pneumonia in this patient?**
 - A. Bathe patient daily in chlorhexidine
 - B. Begin preoperative antimicrobial prophylaxis immediately and continue until extubation
 - C. Maintain the head of bed above a 30° angle
 - D. Perform tracheostomy and remove endotracheal tube
 - E. Replace endotracheal tube with a silver-coated endotracheal tube

Flu prevention

- A 28-year-old woman who is 3 months pregnant undergoes evaluation in September. She is a nurse and works at a local hospital. There is an influenza A virus outbreak in the community, and she wants to prevent infection during her pregnancy. On physical examination, temperature is 36.5 °C (97.7 °F), blood pressure is 110/70 mm Hg, pulse rate is 88/min, and respiration rate is 14/min. The remainder of the examination is normal.
- **Which of the following is the most appropriate influenza virus prophylaxis for this patient?**
 - A. Amantadine
 - B. Live attenuated intranasal influenza vaccine
 - C. Oseltamivir
 - D. Trivalent inactivated influenza vaccine

Surgical site infection

- A 32-year-old woman who is 41 weeks pregnant is admitted to the hospital for an elective C-section. She is a known carrier of group B *Streptococcus* as evidenced by a vaginal/rectal surveillance culture obtained at gestational week 36. She has gestational diabetes that has been well controlled throughout pregnancy with diet only. She also has a 10-pack-year smoking history and continues to smoke approximately 5 cigarettes daily. Her only medication is a daily prenatal vitamin. Physical examination, including vital signs, is normal.
- **Which of the following is the most appropriate measure for preventing surgical site infection in this patient?**
 - A. Decolonization of group B *Streptococcus* vaginal/rectal carriage before surgery
 - B. Prophylactic antibiotics for 72 hours after incision
 - C. Shaving of the surgical field
 - D. Surgical antimicrobial prophylaxis 30 to 60 minutes before initial incision

Surgical site infection

- 55 year old man with CAD & DM will undergo elective CABG. Last HgA1C 7.8% and plasma glucose 2 hours pre-surgery was 238mg/dL. Hg 11.9g/dL. Meds include glipizide, metformin, and pioglitazone. No allergies. Prior to surgery his hair is clipped from his anterior chest in the area of the anticipated surgical incision. He is scheduled to receive preoperative cefazolin with a second dose if the surgery duration is longer than 4 hours.
- **The addition of which of the following interventions will most likely contribute to a decreased risk of surgical site infection for this patient?**
 - A. Blood transfusion
 - B. Maintenance of operative hypothermia
 - C. Mupirocin nasal ointment at the time of anesthesia
 - D. Perioperative intravenous insulin therapy

Surgical site infection

- 68 year old man requires pre-op assessment for potential surgical risks before CABG. He has CHF, DM, and COPD. Surgeon expects the procedure to last 5 hours. Because he is at high risk for surgical site infection, cefazolin will be used for periop prophylaxis.
- **Which of the following cefazolin regimens is most appropriate?**
 - A. Begin cefazolin 30 mins to 1 hour pre-op, repeat dose after 3.5-4 hours intra-op, then repeat the dose every 8 hours for 24 hours post-op
 - B. Begin cefazolin 30 mins to 1 hour pre-op, repeat dose after 3.5-4 hours intra-op, then repeat the dose every 8 hours until the surgical drains are removed
 - C. Begin cefazolin 8 hours before surgery, then repeat the dose every 8 hours for 24 hours post-op
 - D. Begin cefazolin 24 hours before surgery, then repeat the dose every 8 hours for 48 hours post-op

Needlestick injury

- 31 year old female MD collects blood for blood culture. As she attempts to transfer the blood to the culture bottle, she sticks her left index finger with the needle and sustains a deep injury. She immediately washes the area with soap and water and reports to the employee health department. The source of the blood is seropositive for HIV and Hep C and the source patient has never taken HAART. 6 months ago his HIV viral RNA was 26,000 copies/mL. There was no available data on his Hep C viral load or Hep B status. The MD is not pregnant. She has been immunized against Hep B. Results of the MD's baseline HIV and Hep B & C virus serologies and pregnancy test are pending. Also pending are the source patient's HIV and Hep C viral loads and Hep B serologies.
- **In addition to counseling, which of the following would be the most appropriate next step in management?**
 - A. Immediately begin interferon alfa-2b & ribavirin
 - B. Immediately begin interferon alfa-2b, ribavirin, and 2 antiretroviral agents
 - C. Immediately begin 3 antiretroviral agents
 - D. Immediately begin zidovudine
 - E. No additional measures are required

Vaccinations for Healthcare Workers

- 27 year old nurse is to begin working in a physician's office. The physician sees a broad range of patients, many of whom have chronic illnesses. The nurse received all the required childhood vaccinations and was vaccinated against hepatitis B in nursing school.
- **In addition to vaccination for seasonal influenza, which of the following vaccinations should the nurse receive to help prevent transmission of communicable diseases between patients and health care workers.**
 - A. Hepatitis A
 - B. Varicella
 - C. Pneumococcal pneumonia
 - D. *Hemophilus influenza*