

Culture-based management

- 73-year-old woman evaluated for 2-day history of fatigue, fever, nausea, and vomiting. No localizing symptoms. Otherwise healthy.
- PE: Ill-appearing. T 39.8 °C (103.6 °F); BP 125/75 mm Hg; HR 115/min; RR 15/min. Cardiopulmonary and abdominal examinations are unremarkable.
- WBC 17,500/ μL ($17.5 \times 10^9/\text{L}$) with 85% neutrophils. UA: > 50 leukocytes/hpf, pos leukocyte esterase. Gram-negative rods are seen on microscopic examination. A chest radiograph is normal.
- She is admitted to the hospital and treated with aggressive IV fluids, empiric piperacillin-tazobactam. On hospital day 2, her urine and blood cultures become positive for *Escherichia coli* susceptible to piperacillin-tazobactam, imipenem, ciprofloxacin, ampicillin, and nitrofurantoin.
- Which of the following is the most appropriate management?
 - A. Continue piperacillin-tazobactam
 - B. Discontinue piperacillin-tazobactam and begin ampicillin
 - C. Discontinue piperacillin-tazobactam and begin ciprofloxacin
 - D. Discontinue piperacillin-tazobactam and begin imipenem
 - E. Discontinue piperacillin-tazobactam and begin nitrofurantoin

Catheter-associated UTI

- 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 SICU.
- 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 four times daily because of chronic bladder dysfunction, although an indwelling urinary catheter was placed 2 weeks ago because of difficulty with self-catheterization.
- On physical examination, the temperature 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

Dysuria

- A 22-year-old woman is evaluated for a 1-day history of dysuria and urinary urgency and frequency. She had an episode of cystitis 2 years ago. The patient has a sulfa allergy.
- PE: VSS. There is mild suprapubic tenderness, but no flank tenderness. The remainder of the examination is normal.
- Urine dipstick analysis shows 3+ leukocyte esterase. A pregnancy test is negative.
- Treatment with which of the following antibiotics is most appropriate?
 - A. Amoxicillin
 - B. Fosfomycin
 - C. Levofloxacin
 - D. Nitrofurantoin

Pyelonephritis

- A 32-year-old woman is evaluated for a 2-day history of dysuria and urinary urgency and frequency and a 1-day history of fever. She has had no nausea or vomiting.
- On physical examination, temperature is 38.5 °C (101.3 °F), blood pressure is 120/70 mm Hg, pulse rate is 90/min, and respiration rate is 12/min. There is right flank tenderness on palpation.
- A urinalysis shows more than 20 leukocytes/hpf and 4+ bacteria. A pregnancy test is negative.
- In addition to obtaining a urine culture, which of the following is the most appropriate empiric treatment?
 - A. Ampicillin
 - B. Ciprofloxacin
 - C. Nitrofurantoin
 - D. Trimethoprim-sulfamethoxazole

Postcoital UTI

- A 26-year-old woman undergoes follow-up evaluation after completing an appropriate antibiotic course for a urinary tract infection (UTI) diagnosed 3 days ago; she is currently asymptomatic. She has had five similar episodes in the past year, the symptoms for all of which began after sexual intercourse and responded well to antibiotic treatment. She has increased her fluid intake and routinely voids after sexual intercourse. She is sexually active with one partner and does not use spermicides. Her only form of birth control is an intrauterine device, which has been in place for 6 months. She is otherwise healthy, with no medical problems and no history of sexually transmitted infections. She currently takes no medications.
- Physical examination, including vital signs, is normal.
- Which of the following is the most appropriate next step to reduce this patient's risk for UTIs?
 - A. Chronic suppressive therapy with trimethoprim-sulfamethoxazole
 - B. Drinking cranberry juice
 - C. Postcoital antimicrobial prophylaxis
 - D. Removal of intrauterine device
 - E. Using a spermicide prior to intercourse

Asymptomatic bacteriuria

- A 65-year-old man undergoes a routine examination. He feels well. He has a history of hypertension treated with lisinopril. The remainder of the history is noncontributory.
- T = 37.2 °C (99.0 °F), BP = 124/84 mm Hg, HR = 86/min, RR = 22/min. Physical examination is notable for a soft, nontender enlarged prostate without nodules.
- As part of a health insurance evaluation, urinalysis and culture are performed. Urinalysis shows 1+ protein and trace leukocyte esterase, and the urine culture grows more than 10^5 colony-forming units of *Escherichia coli* susceptible to ciprofloxacin and trimethoprim-sulfamethoxazole.
- Which of the following is the most appropriate management?
 - A. Ciprofloxacin
 - B. Kidney ultrasound
 - C. Repeat urinalysis and urine culture
 - D. Trimethoprim-sulfamethoxazole
 - E. No further evaluation or treatment necessary

POSITIVE URINE CULTURE

- 65 year old woman has a screening urine culture for insurance policy that grows greater than 10^5 cfus/mL of *E. coli*. She denies fever, dysuria, urinary frequency, or other symptoms. Medical history is unremarkable. She has no allergies, on no meds. PE is normal.
- **Which of the following is the most appropriate treatment?**
 - A. Amoxicillin
 - B. Ciprofloxacin
 - C. Trimethoprim-sulfamethoxazole
 - D. No treatment

Recurrent Diarrhea

- A 42 yo man is evaluated for recurrent diarrhea. Four weeks ago, he was diagnosed with a mild *C. difficile* infection and treated with a 14 day course of metronidazole, 500mg PO q8, with symptom resolution. He currently takes no medications.
- One week after last dose of metronidazole, he again gets recurrent watery stools, no fever or other symptoms. No visible blood or mucus in the stool. PE noncontributory.
- Labs: WBC 10,400; normal Cr. Stool sample FOBT positive. Stool assay again positive for *C difficile* toxin.
- What should be given?
 - A. oral metronidazole x14 days
 - B. oral metronidazole taper x42 days
 - C. oral vancomycin x14 days
 - D. oral vancomycin plus IV metronidazole x14days
 - E. oral vancomycin taper over 42 days

Bloody diarrhea

- A 47-year-old woman is evaluated in the ED for abdominal pain and diarrhea. 3 days ago started as semi-formed stools, but in the last 24 hours, has streaks of bright red blood. + abdominal cramps that are unrelated to bowel movements. No fever. Five days before diarrhea, she ate potato salad, coleslaw, and a hamburger at a cookout. Two other guests also developed a diarrheal illness.
- PE: temp and BP wnl; HR 115/min. Abdominal examination w/ hyperactive bowel sounds with diffuse tenderness to palpation.
- Labs: WBC 17,400/ μL ($17.4 \times 10^9/\text{L}$); creatinine 1.0 mg/dL (88.4 $\mu\text{mol}/\text{L}$). A stool sample shows gross blood.
- Which pathogens is most likely causing this patient's current illness?
 - A. *Bacillus cereus*
 - B. *Campylobacter jejuni*
 - C. Shiga toxin–producing *Escherichia coli*
 - D. *Staphylococcus aureus*
 - E. *Yersinia enterocolitica*

Food poisoning

- 32 year old woman presents to urgent care facility with severe vomiting, no diarrhea. Several other people who ate at the church picnic 4 hours earlier are also sick with the same symptoms. She is diagnosed with food poisoning. A health department investigation reveals that all affected individuals had eaten the same ham salad.
- **What is the bacterial agent responsible for the signs/symptoms?**
 - A. *Campylobacter jejuni*
 - B. *Clostridium perfringens*
 - C. Rotavirus
 - D. *Salmonella* sp.
 - E. *Staphylococcus aureus*

Diarrhea in traveler

- 20 year old male brought to the ER for severe abdominal cramping/non-bloody diarrhea. He had lower abdominal pain and 8 loose BMs in the 3 days prior to presentation. He had just returned from a trip to Thailand a week ago where he ate “everything”. No sick contacts. PE: temp 98.4°F, P 102 bpm, RR 16/min, BP 122/72mmHg. Exam notable for abdominal discomfort diffusely. WBC 12,600/ul (72% PMNs), Cr 1.1., HIV neg. X-ray of abdomen normal. Stool cx + for gram-negative curved rods in on special media in microaerophilic 42°C incubation.
- **What is the most appropriate management plan?**
 - A. Call the general surgeons
 - B. Metronidazole 500mg po tid
 - C. Vancomycin 250mg po qid
 - D. Rehydration
 - E. Ciprofloxacin 500mg po bid

Diarrhea and Daycare

- A 33-year-old woman is evaluated for a 2-day history of diarrhea. The stools are mucoid but without visible blood. Bowel movements are associated with mild abdominal cramping. She has no nausea or vomiting. The patient works with infants in a day care center, and several children have recently had a diarrheal illness.
- PE: T 37.8 °C (100.0 °F); other vital signs are normal. Abdominal examination discloses normal bowel sounds and diffuse mild tenderness to palpation.
- A stool sample shows no gross blood, but results of guaiac testing and a test for fecal leukocytes are positive.
- The patient is advised to increase fluid intake and take over-the-counter antipyretic agents for fever. No antibiotics are prescribed. Two days later, a stool culture is reported to be growing *Shigella sonnei*. The patient is contacted and reports that her diarrhea and fever have both resolved and that she wishes to return to work.
- Which of the following is the most appropriate treatment at this time?
 - A. Azithromycin
 - B. Ciprofloxacin
 - C. Metronidazole
 - D. No treatment is needed

Outpatient CAP

- A 26-year-old man is evaluated for a 3-day history of fever, myalgia, dry cough, and malaise. He has no known drug allergies, and the remainder of the medical history is noncontributory.
- On physical examination, temperature is 38.3 °C (100.9 °F), blood pressure is 125/75 mm Hg, pulse rate is 95/min, and respiration rate is 16/min. Oxygen saturation is 100% with the patient breathing ambient air. Crackles are heard in the left lung base.
- Chest radiograph shows left lower lobe airspace disease.
- Which of the following oral agents is the most appropriate treatment?
 - A. Amoxicillin
 - B. Azithromycin
 - C. Cefuroxime
 - D. Ciprofloxacin

CAP

- A 47-year-old man is admitted to the hospital with community-acquired pneumonia. He has hypertension and a 25-pack-year smoking history. His only medication is chlorthalidone.
- PE: Mild respiratory distress. T=40.1 °C (104.2 °F), BP 145/85, HR 130/min, RR 16/min. Oxygen sat 89% on ambient air. Exam demonstrates dullness to percussion with bronchial breath sounds localized to the right lung base. CXR: right lower lobe consolidation without significant pleural effusion. Intravenous ceftriaxone and azithromycin are initiated.
- HD#2: Blood cultures obtained on admission are positive for gram-positive cocci in pairs and chains. The ceftriaxone is continued and the azithromycin is stopped.
- HD#3: Feeling better, has been afebrile for the past 12 hours, and is eating and drinking well. The blood culture isolate is identified as *Streptococcus pneumoniae* susceptible to penicillin. BP 140/80 mm Hg, HR 88/min, RR 16/min. Oxygen saturation is 97% with the patient breathing ambient air.
- Which of the following is the most appropriate management?
 - A. Discharge on oral levofloxacin to complete 7 days of therapy
 - B. Discharge on oral amoxicillin to complete 14 days of therapy
 - C. Discharge on oral amoxicillin to complete 7 days of therapy
 - D. Switch to oral amoxicillin and discharge tomorrow, if stable

CAP w/ risk factors

- A 48-year-old woman is admitted to the hospital with a 1-week history of nasal congestion, rhinorrhea, dry cough, fever, chills, and myalgia. She was beginning to feel better until 48 hours ago when she developed a recurrence of fever and chills, a cough productive of blood-streaked yellow sputum, and right-sided pleuritic chest pain. She has had no recent hospitalizations.
- PMH: type 2 diabetes mellitus. Soc Hx neg x3. Current medications are metformin and glipizide.
- PE: T=39.0 °C (102.2 °F), BP =100/50, HR = 110/min, RR =24/min. Crackles are heard over the right lateral chest with egophony and increased fremitus.
- Labs: WBC 20,000/ μ L (20×10^9 /L), BUN 28 mg/dL (10.0 mmol/L), Cr 1.3 mg/dL (114.9 μ mol/L). Chest radiograph shows right middle lobe airspace disease with a small area of cavitation and blunting of the right costophrenic angle.
- Which of the following is the most appropriate empiric treatment of this patient?
 - A. Aztreonam
 - B. Ceftriaxone and azithromycin
 - C. Ceftriaxone, azithromycin, and vancomycin
 - D. Moxifloxacin

CAP w/ risk factors

- A 68-year-old woman is admitted to the ICU with severe CAP complicated by hypercapnic respiratory failure. Medical history is significant for COPD, with several exacerbations occurring in the past 6 months that were successfully managed with prednisone in the outpatient setting. She also has a 60-pack-year smoking history. Medications are prednisone, albuterol, fluticasone-salmeterol, and tiotropium.
- The patient is intubated and placed on mechanical ventilation. T=37.8 °C (100.0 °F), BP=160/100 mm Hg, HR=115/min, RR=22/min. There are diminished breath sounds throughout the lung fields, with scattered rhonchi, wheezing, and marked prolongation of the expiratory phase.
- CXR: hyperinflation, flattened diaphragms, RLL consolidation with air bronchograms.
- Results of a Gram stain and culture of the endotracheal aspirate show numerous PMNs, few epithelial cells, and moderate gram-negative rods.
- Which of the following is the most appropriate initial treatment?
 - A. Aztreonam and azithromycin
 - B. Cefepime, tobramycin, and azithromycin
 - C. Cefotaxime and azithromycin
 - D. Cefotaxime, azithromycin, and levofloxacin

Severe CAP Diagnosis

- A 36-year-old man is admitted to the emergency department for a 1-week history of fever, chills, and cough productive of yellow sputum and a 2-day history of progressive dyspnea. He experiences progressive respiratory distress in the ED and is intubated. Two sets of blood cultures are obtained, and empiric antibiotic therapy is begun.
- T = 38.8 °C (101.8 °F), BP = 85/50 mm Hg, HR = 130/min, RR = 28/min. BMI is 28. Bronchial breath sounds are heard over the left and right lower lung fields.
- Labs: Hgb 10.7 g/dL , WBC 4000/ μ L, platelets 97,000/ μ L
- CXR: consolidation in left and right lower lobes and RML patchy airspace opacity
- In addition to Gram stain and culture of an endotracheal aspirate, which of the following is the most appropriate next step in the evaluation?
 - A. Bronchoscopy with quantitative cultures
 - B. *Legionella* and *Streptococcus pneumoniae* urine antigen assays
 - C. *Legionella* serologic testing
 - D. No further testing

Complicated CAP

- A 58-year-old man is admitted to the emergency department with a 2-day history of fever, chills, cough, progressively worsening dyspnea, and left-sided pleuritic chest pain. He has no other medical problems and takes no medications. Pneumonia is diagnosed, and two sets of blood cultures and a urine sample for pneumococcal and *Legionella* antigens are obtained. Treatment with cefotaxime and azithromycin is begun. The patient is admitted to the medical ward.
- T = 38.2 °C (100.8 °F), BP = 130/80 mm Hg, HR = 115/min, RR = 28/min. Oxygen saturation is 87% on room air. Markedly diminished breath sounds are heard in the left lung base with dullness to percussion.
- CXR: consolidation of the LLL and lingula, with pleural effusion to the midpoint of the left hemithorax on upright images.
- Which of the following is the most appropriate management of this patient?
 - A. Add metronidazole to ceftriaxone and azithromycin
 - B. Change antimicrobial therapy to cefepime and vancomycin
 - C. Diagnostic ultrasound-guided thoracentesis if no improvement within 24 to 48 hours
 - D. Immediate ultrasound-guided thoracentesis

Management of CAP

- A 68-year-old man is admitted to the emergency department for a 3-day history of cough and increasing dyspnea. He was previously healthy and takes no medications.
- On physical examination, temperature is 38.6 °C (101.5 °F), blood pressure is 145/90 mm Hg, pulse rate is 100/min, and respiration rate is 30/min. Oxygen saturation is 95% with the patient breathing ambient air. There are crackles in the right lower posterior lung field. The remainder of the physical examination is normal.
- Laboratory studies:
- Hgb 12.2 g/dL; WBC 10,700/ μ L; Platelet 210,000/ μ L; BUN 25 mg/dL; Cr 1.0 mg/dL; Glu 110 mg/dL Electrolytes Normal. CXR: right lower lobe airspace disease. Results of blood cultures, sputum Gram stain, and pneumococcal urine antigen assays are pending.
- Which of the following is the most appropriate management of this patient?
 - A. Administer a single dose of empiric intravenous antibiotic therapy and discharge on oral antibiotic therapy
 - B. Begin empiric antibiotic therapy and admit to the intensive care unit
 - C. Begin empiric antibiotic therapy and admit to the medical ward
 - D. Discharge and prescribe oral antibiotic therapy

Sputum Gram Stain

- How does the micro lab evaluate sputum for gram stain/culture?
 - <10 squamous epithelial cells and >25 PMNs per LPF
- Sputum Gram stain
 - Gram pos diplococci
 - Gram neg coccobacilli
 - Gram neg diplococci
 - GNR
 - GPR branching beaded