A 5-year-old girl attended a birthday party at a local fast food restaurant. About 48 hours later, she developed cramping abdominal pain and a low-grade fever and had five episodes of loose, bloody stools. She is taken to a local emergency department the next evening because the diarrhea has continued, and she now appears pale and lethargic. On presentation, she has a temperature of 38°C, and she is hypotensive and tachycardic. The abdominal examination reveals tenderness in the lower quadrants. Laboratory work is remarkable for a serum creatinine of 2.0 mg/dL (elevated), a serum hemoglobin of 8.0 mg/dL (low), thrombocytopenia, and evidence of hemolysis.

Q. What is the most likely pathogen causing this child's illness?

A. Escherichia coli O157:H7
B. Salmonella enterica serotype Typhimurium
C. Enteropathogenic Escherichia coli
D. Edwardsiella tarda
E. Plesiomonas shigelloides
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Q. What medium should be inoculated to help the laboratory staff make the diagnosis of this infection?

A. Blood agar
B. Sorbitol MacConkey agar
C. Hektoen enteric agar
D. CIN (cefuroxide, imipenem, novobiocin) agar
E. Thiosulfate citrate bile salts sucrose agar

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Q. How would you explain the findings on physical exam and laboratory data? What is this constellation of symptoms called?

A 5-year-old girl attended a birthday party at a local fast food restaurant. About 48 hours later, she developed cramping abdominal pain and a low-grade fever and had five episodes of loose, bloody stools. She is taken to a local emergency department the next evening because the diarrhea has continued, and she now appears pale and lethargic. On presentation, she has a temperature of 38°C, and she is hypotensive and tachycardic. The abdominal examination reveals tenderness in the lower quadrants. Laboratory work is remarkable for a serum creatinine of 2.0 mg/dL (elevated), a serum hemoglobin of 8.0 mg/dL (low), thrombocytopenia, and evidence of hemolysis.

Q. What antibiotics might be good choices in this case?
A 47-year-old man with a history of sickle cell disease has had numerous hospitalizations requiring the placement of IV lines. The patient has poor peripheral venous access, and a catheter is placed in right Subclavian vein. The patient subsequently develops right arm discomfort and swelling and a temperature of 40.1°C with chills. Multiple blood cultures are taken, and gram-positive cocci are isolated. The organism is catalase-positive and coagulase negative. The colonies are non-hemolytic on sheep blood agar.

Q. Which of the following organisms is the most likely cause of this patient's symptoms?
A: Enterococcus faecalis
B: Staphylococcus aureus
C: Staphylococcus epidermidis
D: Streptococcus agalactiae
E: Streptococcus pyogenes

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Q. What are some possible treatment options?
Case 3

A baby born at 32 weeks' gestation with Apgar scores of 2 and 7 was placed in the neonatal intensive care unit. She developed a fever and leukocytosis; lumbar puncture revealed pleocytosis with increased protein, decreased glucose.

Q. What is the most likely clinical diagnosis?

A: Escherichia coli  
B: Listeria monocytogenes  
C: Neisseria meningitidis  
D: Streptococcus agalactiae  
E: Streptococcus pneumoniae
A baby born at 32 weeks’ gestation with Apgar scores of 2 and 7 was placed in the neonatal intensive care unit. She developed a fever and leukocytosis; lumbar puncture revealed pleocytosis with increased protein, decreased glucose. The Gram stain of the CSF shows Gram-positive rods.

Q. What antibiotics that you have learned about can be used as treatment? Can you name any side effects associated with this treatment course?

Case 4

A 16-year-old boy with sickle cell disease is hospitalized for a severe infection. His spleen has autosplenectomized, and he has had other minor infections in the past. His symptoms include fever, chills, cough, and chest pain. Bacteria from the patient’s sputum are optochin-sensitive organisms and are bile soluble (dissolve in the presence of bile).

Q. Which of the following is the most likely pathogen?
A: Escherichia coli
B: Haemophilus influenzae
C: Klebsiella pneumoniae
D: Neisseria gonorrhoeae
E: Streptococcus pneumoniae
A 16-year-old boy with sickle cell disease is hospitalized for a severe infection. His spleen has autosplenectomized, and he has had other minor infections in the past. His symptoms include fever, chills, cough and chest pain. Bacteria from the patient’s sputum are optochin-sensitive organisms and are bile soluble (dissolve in the presence of bile).

Q. What puts him at risk for this infection? Can you name other organisms that might pose the same risk?

Bacteria from the patient’s sputum are optochin-sensitive organisms and are bile soluble (dissolve in the presence of bile).

Q. What are some potential treatment options for this patient?
A patient presents with right lower-quadrant pain, fever, and diarrhea. Physical examination reveals diffuse abdominal tenderness; laboratory examination shows a moderate leukocytosis, leading to a presumptive diagnosis of acute appendicitis. Surgical exploration of the abdomen reveals mesenteric adenitis, but the appendix is normal.

Q. Which of the following organisms is most likely responsible for these signs and symptoms?

A: Enterohemorrhagic Escherichia coli  
B: Enteroinvasive E. coli  
C: Enteropathogenic E. coli  
D: Enterotoxigenic E. coli  
E: Yersinia enterocolitica

Q. What are some potential treatment options for this infection? What might be some side effects of these treatment choices?

Case 6
A mailman gets a severe bite wound from a neighborhood dog. The wound is cleansed and he receives a booster injection of tetanus toxoid and an injection of penicillin G. Several days later, the wound is inflamed and purulent. The exudate is cultured on blood agar and the next day yields Gram-negative rods that are catalase and oxidase positive and does not grow on MacConkey agar.

Q. Which of the following is the most likely pathogen?

A: Bartonella henselae  
B: Brucella canis  
C: Clostridium tetani  
D: Pasteurella multocida  
E: Toxocara canis

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Q. What are some potential treatment options? Why didn’t he get better on the antibiotics he was given? What are some potential side effects from these choices?
A 78-year-old woman with a history of renal calculi and recurrent urinary tract infections presents with fever, chills, leukocytosis, and cloudy urine that has a pH of 8.2. A urine culture grows a lactose-negative, urease-positive, Gram-negative rod.

Q. Which of the following microorganisms is most likely responsible for her infection?

A: Enterococcus faecalis
B: Escherichia coli
C: Proteus mirabilis
D: Pseudomonas aeruginosa
E: Staphylococcus saprophyticus

A 78-year-old woman with a history of renal calculi and recurrent urinary tract infections presents with fever, chills, leukocytosis, and cloudy urine that has a pH of 8.2. A urine culture grows a lactose-negative, urease-positive, Gram-negative rod.

Q. What are some potential treatment options for this infection?

Case 8
A 56-year-old man undergoes coronary bypass surgery. He receives cefazolin prophylactically and at a dosage that is continued for 3 days postoperatively. On the 10th postoperative day, he develops a fever of 40°C with a heart rate of 110 beats per minute; a blood pressure of 100/70 mm Hg. His white blood cell (WBC) count is 14,000/mm³, and a urinalysis reveals many white blood cells per high power field. Cultures of blood, urine, and the surgical wound are then obtained. The blood, urine and wound cultures are positive with Gram-negative rods. The organism is oxidase-positive. Large, spreading, beta-hemolytic colonies are seen on sheep blood agar, and colorless colonies are noted on MacConkey agar. This organism is susceptible to carbapenems and some beta lactams.

Q: These results are characteristic of which organism?
A: Acinetobacter haemolyticus
B: Burkholderia cepacia
C: Moraxella catarrhalis
D: Pseudomonas aeruginosa
E: Stenotrophomonas maltophilia

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Q: Which of the following penicillins has anti-pseudomonal activity?
A: penicillin VK
B: ampicillin
C: nafcillin
D: piperacillin

A 56-year-old man undergoes coronary bypass surgery. He receives cefazolin prophylactically and at a dosage that is continued for 3 days postoperatively. On the 10th postoperative day, he develops a fever of 40°C with a heart rate of 110 beats per minute; a blood pressure of 100/70 mm Hg. His white blood cell (WBC) count is 14,000/mm³, and a urinalysis reveals many white blood cells per high power field. Cultures of blood, urine, and the surgical wound are then obtained. The blood, urine and wound cultures are positive with Gram-negative rods. The organism is oxidase-positive. Large, spreading, beta-hemolytic colonies are seen on sheep blood agar, and colorless colonies are noted on MacConkey agar. This organism is susceptible to carbapenems and some beta lactams.

Q: Which carbapenem does not have activity against Pseudomonas?
A: imipenem
B: doripenem
C: ertapenem
D: meropenem
A 56-year-old man undergoes coronary bypass surgery. He receives ceftazolin prophylactically and at a dosage that is continued for 2 days postoperatively. On the 10th postoperative day, he develops a fever of 40°C with a heart rate of 110 beats per minute and a blood pressure of 100/70 mm Hg. His white blood cell (WBC) count is 14,000/mm³, and a urinalysis reveals many white blood cells per high power yield. Cultures of blood, urine, and the surgical wound are then obtained. The blood, urine, and wound cultures are positive with Gram-negative rods. The organism is oxidase-positive. Large, spreading, beta-hemolytic colonies are seen on sheep blood agar, and colorless colonies are noted on MacConkey agar. This organism is susceptible to carbapenems and some beta-lactams.

Q. What is the clinical diagnosis in this patient? What other clinical presentation can develop quickly in a patient with this infection?

Case 9

A 2-year-old male child experienced an upper respiratory infection 2 weeks prior to hospital admission. Four days prior to admission, anorexia and lethargy were noted. The patient was seen in the ER 3 days prior to admission. At that time he had a fever of 39.9°C. Physical examination revealed a clear chest, exudative pharyngitis, and bilaterally enlarged cervical lymph nodes. A throat culture was taken, and a course of penicillin was begun. The child's course worsened, and he became increasingly lethargic; he developed respiratory distress on the day of admission. It was noted that the throat culture from 3 days prior to admission had not grown any group A streptococci. On examination, the patient was febrile to 38.9°C and had an exudate in the posterior pharynx that was described as a yellowish thick membrane, which bleeds when scraped and removed. The patient's medical history revealed that he had received no immunizations.

Q. Which pathogen would you like to tell the laboratory to 'look' for?

A. Arcanobacterium hemolyticum  
B. Corynebacterium diphtheriae  
C. Erysipelothrix rhusiopathiae  
D. Listeria monocytogenes  
E. Streptococcus pyogenes
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Q. What additional testing is required in this case? Why don't we see this in the US very often?

Case 10

A 63 year old male on hemodialysis presents with fever, chills, and rigors starting after dialysis earlier that day. He has no known drug allergies. On physical exam he is diaphoretic (sweating profusely) with a temperature of 103.1°F and heart rate of 106 beats per minute. Blood cultures are drawn and he is admitted to the hospital. You suspect Staphylococcus bacteremia and he is started on IV antibiotics.

Q. What antibiotics will be given empirically?
A 63 year old male on hemodialysis presents with fever, chills, and rigors starting after dialysis earlier that day. He has no known drug allergies. On physical exam he is diaphoretic (sweating profusely) with a temperature of 103.1°F and heart rate of 106 beats per minute. Blood cultures are drawn and he is admitted to the hospital. You suspect Staphylococcus bacteremia and he is started on IV antibiotics.

The next day the blood culture grows a Gram positive cocci in pairs. The organism in culture is catalase negative and PYR positive.

Q. What is the most likely cause of this patient’s infection?

A 63 year old male on hemodialysis presents with fever, chills, and rigors starting after dialysis earlier that day. He has no known drug allergies. On physical exam he is diaphoretic (sweating profusely) with a temperature of 103.1°F and heart rate of 106 beats per minute. Blood cultures are drawn and he is admitted to the hospital. You suspect Staphylococcus bacteremia and he is started on IV antibiotics.

The next day the blood culture grows a Gram positive cocci in pairs. The organism in culture is catalase negative and PYR positive.

The vanA gene is detected in the lab.

Q. How does this change your management of the patient?