

Appendix 2: Student Case Study Handout

Lab 13: Putting it all Together- Case Studies in Microbiology

Instructions: There are 10 stations set up around the room. Each station is a case study with slide(s) and/or some media we have used during the semester. Work in pairs to answer the questions below. Try to answer the questions without looking at your notes—this will be good practice for your final practical exam. When identifying pathogens, remember to use the full scientific name.

Note: Slides with potential vectors are located on one side of the room. In some cases you will need to also refer to these slides.

STATION 1

A 38 year-old male returned 4 weeks ago from a trip to Myanmar. He came into the emergency room complaining of severe headaches and high fevers. Blood work indicated that his RBC count was low. During his hospital stay he displayed recurring high fevers followed by massive sweating and a subsequent drop in body temperature. His lungs were clear, he had no skin rashes and his heartbeat was normal. His urine was dark brown.

Slide: Blood smear

Diagnosis: _____

Scientific name of pathogen: _____

Is this pathogen a bacterium, a protist, a helminth or a fungus? _____

Why is the urine brown? _____

How is this disease transmitted? _____

If it is transmitted by a vector, which slide is the correct vector?

Vector slide number _____

Name of vector (both scientific and common name) _____

STATION 2

A family with a four- year old daughter and a seven-year old son arrive at the doctor. The parents notice that both children have been scratching in their buttocks region. A sample was taken and is shown on this slide.

Slide: Sample from children

Diagnosis: _____

Scientific name of pathogen: _____

Is this pathogen a bacterium, a protist, a helminth or a fungus? _____

How is the pathogen transmitted? _____

How was this sample obtained? _____

What part of the life cycle does the sample represent? _____

STATION 3

A 22 year old female from a rural area around Socorro, New Mexico came to the hospital in Albuquerque complaining of a fever, chills, a headache and weakness. Upon examination, the patient was found to have very swollen and tender lymph glands. The patient had chest pain and was coughing up bloody sputum.

Slide: Sputum sample

Medium: Kirby-Bauer plate

Diagnosis: _____

Scientific name of pathogen: _____

Is this pathogen a bacterium, a protist, a helminth or a fungus? _____

How is this disease transmitted? _____

If it is transmitted by a vector, which slide is the correct vector?

Vector slide number _____

Name of vector (both scientific and common name) _____

Should the patient be placed in isolation? Explain your answer. _____

Based on the results of the antibiotic-sensitivity testing (see Kirby-Bauer plate), which antibiotic should be used to treat this patient? _____

Name one antibiotic that would **not** be effective against this pathogen. _____

STATION 4

A pig farmer from Central America has several relatives visit his farm from the US. A few days after they arrive, his relatives develop severe gastroenteritis, including stomach pain, nausea and vomiting. Stool samples are found to contain blood, and a smear from one stool sample is shown here. Based on this outbreak, the local health authorities tested the well water used at the farm. The EMB plate shown here is the result of this water testing.

Slide: Stool sample

Medium: EMB plate with water sample

Diagnosis: _____

Scientific name of pathogen: _____

Is this pathogen a bacterium, a protist, a helminth or a fungus? _____

How is this disease transmitted? _____

If it is transmitted by a vector, which slide is the correct vector?

Vector slide number _____

EMB plate: What type of organism is found here? _____

What does this result indicate about the patient's water source? _____

STATION 5

An adult male patient arrives at the hospital with a fixed grin on his face, clenched teeth, and muscle stiffness. A conversation with a relative of the patient reveals that he had recently been bitten by a wild dog. Unfortunately his treatment is delayed, and the patient does not survive. Autopsy samples are used to inoculate the plates shown here. A bacterial colony from the plate that shows growth is used for simple staining and is shown on the slide you are viewing.

Slide: Autopsy sample- simple stained

Media: 2 TSA plates, one incubated aerobically, one incubated anaerobically

Diagnosis: _____

Scientific name of pathogen: _____

Is this pathogen a bacterium, a protist, a helminth or a fungus? _____

How is this disease transmitted? _____

If it is transmitted by a vector, which slide is the correct vector?

Vector slide number _____

How did the plates assist you with your diagnosis? _____

Would this same pathogen cause respiratory infections? Why or why not?

How could this type of infection be prevented? _____

What type of treatment is appropriate for this infection? _____

Should this patient have been isolated? Why or why not? _____

STATION 6

Slide: Throat culture

Blood agar plate: Throat culture

A patient presents with a severe sore throat following a bad cold. A throat culture was streaked on a blood agar plate, and a gram stain was prepared from one of the colonies on the plate.

Diagnosis: _____

Scientific name of pathogen: _____

What is the morphology/arrangement of this pathogen? _____

How is this disease transmitted? _____

If it is transmitted by a vector, which slide is the correct vector?

Vector slide number _____

Name of vector (both scientific and common name) _____

What is the result shown on the blood agar plate? _____

Are there possible complications to this type of infection? If so, what are they? _____

STATION 7

A 75 year old man appeared at the doctor's office complaining of a cough, chest pain, night sweats, fever, and weight loss. He said that he had been coughing for 3 weeks, and that he occasionally produced frothy sputum when coughing. Based on a preliminary diagnosis and an initial antibiotic sensitivity test (Plate 1), the patient was admitted to the hospital and antibiotic treatment began. A week later the patient showed significant improvement and was discharged from the hospital. He was told to continue taking the antibiotic for the next 3 months. Two months later, the patient reappeared at the hospital with the same symptomology as previously. Upon questioning, the patient admitted that he felt so much better after 2 weeks that he stopped taking his prescription. A second sputum sample was taken and an antibiotic sensitivity test was done (Plate 2).

Slide 8: sputum sample (Note: this is NOT a Gram stain!)

Media: 2 Kirby-Bauer plates

Diagnosis: _____

Scientific name of pathogen: _____

Is this pathogen a bacterium, a protist, a helminth or a fungus? _____

What staining procedure was used? _____

What is the morphology/arrangement of this pathogen? _____

How is this disease transmitted? _____

Should this patient be isolated? Why or why not? _____

If it is transmitted by a vector, which slide is the correct vector?

Vector slide number _____

Name of vector (both scientific and common name) _____

Compare and describe the results of the first antibiotic sensitivity test to the second antibiotic sensitivity test for the indicated antibiotic disk.

How do these results explain the initial patient improvement, followed by patient decline?

STATION 8

Two patients visit the same hospital ER on the same day. One is currently undergoing chemotherapy, the other has an advanced HIV infection). Samples were taken from each patient and observed microscopically. The results are shown here.

The two slides seen here share a common bond. What is it? _____

Name the pathogens A. _____ B. _____

What type(s) of people are typically most susceptible to this type of pathogens?

Why do these organisms appear so different even though they are closely related? _____

Which of these organisms (A or B) is more likely to cause infection in a person taking antibiotics?

STATION 9

A 46 year old woman came to her doctor complaining of dysuria, urgency when urinating, and pelvic pain. The urine sample she provided was cloudy with a slight pink tinge. A dilution of a urine sample was spread on an EMB plate, and a colony from this plate was gram stained (Slide 1) and used to inoculate a urea slant. A different staining procedure was done on Slide 2.

Slide 1: From urine sample

Slide 2: From urine sample

**Media: Inoculated urea slant
EMB plate**

Diagnosis: _____

Scientific name of pathogen: _____

Describe the pathogen in terms of morphology, arrangement and Gram reaction.

Did you get enough information from the Slide 1 alone to make your diagnosis? Explain.

What structures are seen on Slide 2? _____ What is the function of these structures?

What staining procedure was used to detect these structures? _____

How is this disease transmitted?

Explain how the urea slant and the EMB plate assisted you in your diagnosis. _____

How many organisms/ml are in the urine? _____

What does this tell you about the patient's condition? _____

What other organism is a common cause of this type of infection? _____

STATION 10

Three young women visit a gynecology clinic. The clinician who exams them takes vaginal swabs from each patient and examines them microscopically. The results are shown here.

The 3 slides that are shown here share a common bond. Can you figure out what that bond is?

What types of organisms (bacteria, fungi, protozoa, helminths) are they?

A _____ B _____ C _____

Which of these slides (A, B, or C) appears to have been gram stained? _____

Give the morphology, gram reaction and arrangement for this slide

Which of these slides (A, B, or C) was prepared with a special stain?
Give the morphology of the organism on this slide.

Which slide (A, B, or C) shows an organism that would give similar symptoms to a vaginal yeast infection?

Identify the pathogens (species names)

A. _____ B. _____ C. _____