

Part 1 – Assessment:

Course: Post-Baccalaureate: Microbiology and Immunology Course (~20 students).
Bacteriology Unit.

Instructor: Kaitlyn Grando, PhD.

Learning Objectives Assessed:

1. (Application, Foundational Knowledge) Given a disease scenario, identify the likely causative pathogen.
2. (Integration, Foundational Knowledge) Compare common and unique virulence strategies used by important human pathogenic bacteria.
3. (Human Dimension) Be able to communicate medical & scientific information effectively with peers and with non-experts.
4. (Learning How to Learn) Independently investigate and identify reliable sources of medical information.

Prompt:

You are an infectious disease doctor. You have recently encountered several cases of a particular type of bacterial infection in your patient population and have decided to develop educational material to inform your patients about this disease.

Work in the assigned groups of 3-4.

Choose one of the following bacterial infections that we have not covered in class to investigate:

- Cutaneous anthrax (*Bacillus anthracis*)
- Legionnaire's disease (*Legionella pneumophila*)
- Lyme disease (*Borrelia burgdorferi*)
- Leptospirosis (*Leptospira* sp.)
- Neonatal Listeriosis (*Listeria monocytogenes*)
- Yersiniosis (*Yersinia enterocolitica*)

Develop your choice of a brochure, data packet, infographic, textbook section, website page, or educational video. If you would like a different format, please ask for approval.

Include the most important information about:

- Symptoms and diagnostic tests
- Disease pathogenesis
 - Transmission (e.g. tickborne, fecal-oral, airborne)
 - Key virulence factors (e.g. toxins, biofilm formation, intracellular infection, tissue or cell-type target)
 - Timeline of infection (e.g. onset within hours, or weeks after exposure)
 - Relevant risk factors (e.g. age or sex of patients most likely to get sick)
- Treatment and prevention strategies (e.g. antibiotics, vaccines, food safety)

General instructions:

- For written material, aim for 500-800 words. For video, aim for 2-6 minutes.
- Include both written and visual elements.
- Keep audience in mind, all information should be understandable to non-experts.
- Regarding virulence factors, you do not need to list everything, just pick 1 or 2 that are the key:
 - Causes for the disease (e.g. a toxin that causes food poisoning)
 - Treatment targets (e.g. a capsule that evades the immune system, targeted by a vaccine)
 - OR Barriers to treatment (e.g. biofilm formation that makes antibiotics less effective)
- Use reliable sources and cite them appropriately. Information should be accurate.
- I do not expect you to be a trained graphic designer or animator, but material should be:
 - Organized
 - Interesting to look at
 - Accessible
 - Use colorblind-aware color choices
 - Use fonts that are big and clear enough for dyslexic or visually-impaired readers
 - For images, provide Alt Text for screen-readers
 - For audio components, provide written captions or transcripts
 - (Temple uses Yuja Panorama which can check documents for accessibility and provides resources)

Peer Review:

- A first draft of this material will be submitted to Canvas, then I will assign them to two other groups for peer review.
- Your group will be given two other groups' projects to review.
- Together your group will provide:
 - A brief summary of the material you were given (2-4 sentences).
 - A brief explanation of what you thought the group did well (2-4 sentences).
 - Up to 1 major suggestion for improvement (something that would require significant time and effort to alter, often associated with the content of the material. There may be no major revisions needed if your group believe everything was covered.)
 - 1-2 minor suggestions for improvement (something that is fixed quickly, like formatting, presentation order, or grammar.)
 - Submit reviews to Canvas and I will re-distribute to the appropriate groups.
- Reviews should be polite and professional, and provide constructive criticism, not simply "We did not like..."

Final submission:

- Your group will submit:
 - The final revised product.
 - A brief written rebuttal to each peer review comment received, explaining how the comments were addressed, or why they were not addressed (1-4 sentences).
- Each individual will submit a Self-Reflection answering the following questions (~500-800 words):
 - What similarities or differences did you notice in the virulence strategies utilized by your pathogen and others we've discussed in class, or from other groups' projects?
 - Were there details you learned about this pathogen that you left out of your education materials, and if so, why?
 - What barriers may prevent patients from utilizing and understanding the materials presented in this way? Can you think of alternative ways to address these barriers?

Final products from all groups will be posted to Canvas for the entire class.

Examples:

[Staphylococcus Food Poisoning Infographic](#)

[Staphylococcus Food Poisoning Video](#)

[STEC Video](#)

[Staph Food Poisoning Data Packet](#)

[STEC data sheet](#)

Part 2 - Reflection

My intention is for this assessment to be an educative, or perhaps formative, forward-looking, assessment as outlined by Fink and Noyd. I do not think it would work as a final project for the course, but one of several forms of assessment throughout. I would also count it as an Active Learning activity, taking place after they have gotten the basic foundational knowledge about bacterial pathogens and how they cause disease, and some in-class practice with case-based questions and interacting with scientific literature. This assessment will be an additional opportunity to practice what they've learned, and for me to assess whether they can apply those same principles to a pathogen unknown to them.

This assessment addresses the learning objectives in the following ways:

1. Though presented in an opposite order (given a pathogen, identify the relevant disease scenario), the idea of applying foundational knowledge to a real-life scenario remains.
2. The self-reflection directly asks students to find patterns in disease-causing strategies between their chosen pathogen and those they've otherwise encountered, integrating their knowledge from both this unit and their earlier immunology unit.
3. Most-directly addressed is their ability to communicate effectively with both peers and non-experts (hypothetical patients), providing a human dimension to their learning that I hope they take with them past this course.
 - The peer-review process contributes to their communication skills with peers, in a professional and informed manner.
 - Translating their topic into lay-terms has the added benefit of assessing their foundational knowledge, disallowing parroting-back of medical terminology without understanding what it means.
4. This activity requires students to do the research on their own, compile it together with their groups, and cite it properly, instead of relying on my information, thus assessing their ability to choose legitimate and accurate sources of information independently.

This assessment is forward-looking because it puts them in the shoes of a professional in a capacity that real professionals encounter (making patient education materials or at least communicating with patients about infectious diseases.) The ability to respond to peer reviews and revise their product contributes to the educational value of the activity, rather than simply being an auditive assessment, as Fink puts it.

I believe it utilizes the concepts of UDL by providing students with a choice of pathogen to investigate and multiple means of engagement and presentation of their knowledge through the choice of written or audio-visual material to create. The group-work aspect can be difficult for some students with social barriers, but the individual component in the self-reflection helps to balance it. And importantly, this not being the only method of assessment in the course also embodies UDL principles – other methods of assessment should take a different approach and should be more individual. Encouraging students to use multiple means of presentation (written, visual, and/or audio) also hopefully instills UDL principles in students as they become educators themselves in the future.