



Infectious Disease - Unit 2 - The Agent

Unit Focus

Students will explore the world of microbiology as they investigate microbes to better understand how pathogens are able to cause disease, become resistant, and spread through vectors. Students will be able to classify and differentiate various types of pathogens with an emphasis on treatment and prevention of different pathogenic illness. Students will utilize standard laboratory procedures, such as gram-staining and bacterial culturing, including interpretation of the zone of inhibition and microscopic analysis, as they analyze a case study of a person suffering from a mysterious illness. Students will grapple with global issues with regard to the factors that influence the susceptibility of different countries to the spread of disease as well as how globalization has increased exposure to pathogens. Additionally, students will engage in discourse about the various societal issues impacting disease transmissions such as the availability of medicines for treatment and prevention as well as the ongoing concerns about vaccines and overuse of antibiotics and the associated consequences. Ultimately, students will synthesize their understanding of infectious disease, treatment, and transmission as they analyze and diagnose a patient and propose a scientifically-supported prevention plan.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
<p>Common Core Science & Technical Subjects: 11-12</p> <ul style="list-style-type: none"> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. (CCSS.ELA-LITERACY.RST.11-12.3) Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (CCSS.ELA-LITERACY.RST.11-12.7) Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. (CCSS.ELA-LITERACY.RST.11-12.9) <p>Next Generation Science Standards Science and Engineering Practices: High School</p> <ul style="list-style-type: none"> Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, 	<p><i>Students will be able to independently use their learning to...</i></p> <p>T1 Analyze qualitative and quantitative data to interpret patterns, draw conclusions, and/or make predictions. T2 Use the scientific process to generate evidence that addresses the original questions.</p>	
	Meaning	
	Understanding(s)	Essential Question(s)
<p><i>Students will understand that...</i></p> <p>U1 There are several mechanisms and factors that allow pathogens to spread through populations, some of which are easily controlled and others that are difficult to prevent and treat. U2 The spread of infectious diseases can be prevented by vaccinations and sanitary and hygienic practices. U3 Vaccines have been developed for both viral and bacterial infections. U4 Due to the structure and processes of a virus, they cannot be treated with antibiotics. U5 Antibiotic resistance is a growing threat that is spurred on by the overuse of antibiotics for treatment and prevention of infections. U6 Antibiotics and antivirals are treatment options for some diseases, but there is much work to do to maintain the efficacy, delivery, and evolution of these treatments. U7 Good experimental design leads to precise and accurate data.</p>	<p><i>Students will keep considering...</i></p> <p>Q1 How do bacteria and viruses cause infection and spread through populations? Q2 How do vaccines work to prevent individuals and populations from becoming ill? Q3 How does mutation lead to antibiotic resistance and how does this resistance spread in the bacterial population? Q4 How do I use tools and materials to carry out my test? How do I collect and record quality data? Q5 What do the results tell me? What patterns do I see or what conclusions can I draw?</p>	

Stage 1: Desired Results - Key Understandings

<p>textually, and mathematically). (HS-LS4-1) (HS.NSE.SEP.4.1)</p> <p>Next Generation Science Standards (DCI) Science: 10</p> <ul style="list-style-type: none"> All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. (LS1.9.A2) <p>Madison Public Schools Profile of a Graduate</p> <ul style="list-style-type: none"> Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2) 	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<p><i>Students will know...</i></p> <p>K1 Pathogens can avoid immune detection through a variety of methods. Often it is due to mutation or evolution of resistance to treatments.</p> <p>K2 Bacteria and viruses can reproduce inside a host causing symptoms that can enable the pathogen to spread.</p> <p>K3 Antibiotics and antivirals work against the pathogens and their processes to decrease their population in a body.</p> <p>K4 Vaccines work with a person's immune system to prevent or lessen the onset of a disease.</p> <p>K5 Vocabulary: Lysogenic, lytic, antibody, antigen, gram-positive, gram-negative, antibiotic, antiviral, vaccine, conjugation, transformation, retrovirus, ELISA assay, bacterial culture</p>	<p><i>Students will be skilled at...</i></p> <p>S1 Employ the techniques used in infectious disease laboratories.</p> <p>S2 Utilize microbiology concepts to analyze patient profiles.</p> <p>S3 Apply microbiology concepts to diagnose and create a treatment plan for a patient</p>