Operation Outbreak

Virology Review

Teacher's note: before printing, review and modify areas highlighted in yellow

Words in blue can be found in posters, glossaries and other printouts.

1 Objectives

After attending the laboratory the student should demonstrate achievement of at least 70% in written and practical examinations focusing on the following objectives.

1. State the structural properties unique to the *Paramyxoviridae* family.
2. Work collaboratively with student peers in a social setting.
3. Explore a sample surveillance database tool.
4. Discuss the statistical requirements needed for effective vaccination and control measures.
5. List members of the *Paramyxoviridae* family and the clinical conditions associated with each.

2 Procedure

Simulation:

1. Download the Operation Outbreak app and make sure Bluetooth is enabled.
2. Meet in the classroom for initial instructions.
3. Discuss pathogen, interventions and limitations.
4. Determine roles of laboratory, nurse, scientific communicator.
5. Complete questions on laboratory report—due at the end of class.

Assessment:

1. Log into classroom platform to review simulation data. (video of your simulation will be provided by Operation Outbreak)
2. Answer follow up questions.

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Name_____ Date_____

Operation Outbreak

LABORATORY EXERCISE

Virology lesson

1. **Predict** (to be completed BEFORE starting the simulation):
   Your classroom is undergoing a simulation of exposure to a measles-like virus. This virus is highly contagious (measured by proximity on the Operation Outbreak app).
   a. If 2 of the 45 members of the group carry the pathogen, how many do you think will become ill?

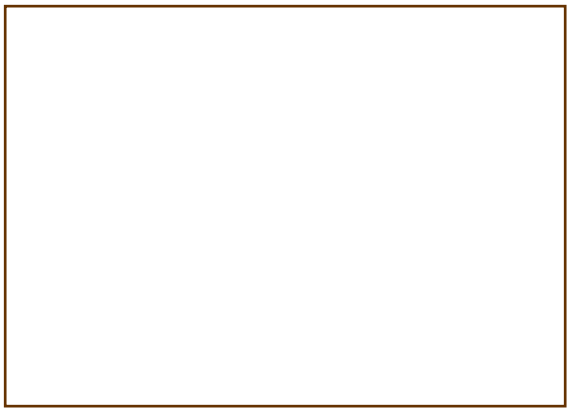
   b. How many classmates do you think you will be in contact with over the next XX minutes?

   c. Will you stay "well"?

   d. Record your ID name for the outbreak here.

2. **Investigate:**
   Explore the classroom space and answer the following questions:
   a. What is our case definition of an infected person? How are cases characterized?

   b. Our "outbreak" is defined as a "measles-like" virus. For the purpose of this investigation, we will study Rubeola (Measles) virus. Diagram and label the structure of the virus here: Include labels indicating type of nucleic material (DNA/RNA/ss/ds), if it is enveloped, key proteins. You can find answers to these questions around the classroom and hallway.



c. Describe the transmission of measles here. How is it spread? What mitigation measures would be best implemented?

d. List the symptoms of measles here. Include a timeline of when these symptoms would occur and possible complications.

e. List diagnostics tests used to identify measles in the lab.

3. **Describe:**
   a. Explain briefly how R_0 relates to infectious disease. Describe the difference between infection risk in measles (with a R_0 of 12-18) and a virus with a R_0 of 2.

   b. What is needed to provide *herd immunity* in terms of R_0 and how could that be achieved?

   c. Look at the example of an infectious disease model posted in the hallway. How would the following factors affect spread of disease: (teacher's note: this knowledge is not expressly spelled out but must be inferred by the student)

      Age range of population?

      Asymptomatic transmission?

      Population concentration?

4. **Create:**
   Find a person infected with our measles-like virus and write a brief summary of your " measles" case and fill out the following sample case report. Points will be awarded for accuracy of details. Details must match clinical picture for full credit. You may "embellish" your case details to give a more complete clinical story. The patient may be yourself if you are "infected" in the outbreak simulation.

   a. Case write-up (Write 3 to 4 sentences include how infection was acquired, symptoms and lab tests performed). Then complete the table on the next page.

Sample Measles-"like" virus Case Report (for classroom purposes only, this table is a teaching tool and not for medical use)				
Patient Demographics				
Patient name:		Age: □days □weeks □months □years		Gender:
Signs and Symptoms				
Rash: □ yes □no □unknown	Date of onset:	Duration: _____ of days	Origin on body:	Direction of spread
Fever: □yes □no □unknown	Date of onset:	Temperature taken:	Was temp >38.3C?	If not taken, skin was: □hot □warm □normal
Cough □yes □no □unknown	Conjunctivitis: □yes □no □unknown	Koplik's spots □yes □no □unknown	Other symptoms? Describe	
Laboratory Tests (note to student: these must make clinical sense for full points) you may need to add some future or past dates for the clinical picture to be complete)				
Specimen obtained for lab testing. List specimen type here:	Serology performed: IgM	Specimen date: / /	Test results: □P □N □I □E □X	Key: P= positive
	IgG (acute)	/ /	□P □N □I □E □X	N= negative
	IgG (convalescent)	/ /	□P □N □I □E □X	I= Indeterminate E= pending X= not done
Virus test done? □ yes □no □unknown	If yes, list specimen type:	Note: Send to CDC for genotyping	Date sent: / /	
Other tests done? List here:				
Vaccination status				
Received one or more doses of vaccine? □yes □no □unknown	Number of doses and dates: Dose 1: / /	Dose 2: / /	Dose 3: / /	
If unvaccinated choose all that apply:	Reason not vaccinated: □Personal beliefs exemption □Permanent medical exemption □Temporary medical exemption □Underage for vaccine □MD diagnosis of previous disease □Delay in starting series □Other: please list			
Contact investigation				
List spread setting (e.g. school, daycare, etc.)	List travel history:	Possible number of exposures:	Inform patient that follow-up call for contact tracing will be initiated.	

5. **Assess**: Visit the online classroom, post- simulation to view our dashboard and answer final questions.
    a. Examples of assessment questions:
        i. What do you think went well with this simulation? Did you learn anything new?
        ii. What suggestions do you have to improve this simulation?
        iii. Review your predictions on page one. Compare them to the simulation review video. How accurate were you about the number of contacts you had and your health?
        iv. Students may calculate specific statistics such as
            1. Total population
            2. Mortality rate vs morbidity rate
            3. Vaccination rate
            4. Discussion of "prevalence"
        v. Students may answer a sample measles question or two (structure, symptoms etc.) to prepare for upcoming virology exams