

Introduction to Outbreak Disease Surveillance

Module 1 | STRIPE HIV Pandemic Preparedness Certification

Learner Guide



Overview

Goal

The goal of this module is to educate front-line healthcare workers on their role in epidemiologic surveillance of emerging or re-emerging infectious diseases. This course should enable healthcare workers to identify and notify the wider public health system of potential threats from emerging infectious disease outbreaks.

Objectives

By the end of the module, the learner will be able to:

1. Appreciate how epidemiology fits into public health practice
2. Understand the role of outbreak disease surveillance in improving public health
3. Identify early warning indicators of a potential outbreak by recognizing patterns, unusual trends and case presentations
4. Know how to report a potential outbreak in your context

Workshop Roadmap

Workshop Timeline: 120 minutes

Duration	Content	Activities
5 minutes	Introduction	Icebreaker activity
10 minutes	Objective #1 : Appreciate How Epidemiology Fits into Public Health Practice	• Activity 1: Large group discussion • Activity 2: Large group discussion
15 minutes	Objective #2 : Understand the Role of Disease Surveillance in Improving Public Health	Activity 3 : Large group discussion and sharing
65 minutes	Objective #3 : Identify early warning indicators of a potential outbreak by recognizing patterns, unusual trends and case presentations	• Activity 4: Syndromic presentations scenarios table in small groups • Activity 5: Early Warning Indicator Patterns Discussion and Table • Activity 6: Large group discussion
20 minutes	Objective #4 : Know How to Report a Potential Outbreak in Your Context	• Activity 7: Large Group Discussion and Reporting Table • Activity 8: Large Group Discussion
5 minutes	Conclusion	Review objectives

Glossary of Key Terms

1. **Outbreak Disease Surveillance:** The systematic process of monitoring, detecting, and investigating the occurrence of unusual or unexpected patterns of infectious diseases in a population.
2. **Epidemiology:** The branch of medicine that deals with understanding and controlling diseases within populations. It involves studying patterns, causes, and effects of diseases or health-related events to develop strategies for prevention and control.
3. **Epidemiological Surveillance:** The ongoing collection, analysis, and interpretation of health data that is essential to the planning, implementation, and evaluation of public health practices, specifically aimed at identifying and controlling emerging or re-emerging infectious diseases.
4. **Emerging Infectious Diseases:** Infections that are new or have been uncommon but are characterized by sporadic outbreaks or a recent rise in cases, such as COVID-19 or Ebola.
5. **Re-emerging Infectious Diseases:** Previously controlled or declining infectious diseases that are showing a resurgence in incidence, such as measles.
6. **Early Warning Indicators (EWI):** Signs that may indicate the onset of an outbreak, including unusual disease trends, abnormal patterns in healthcare utilization, and clustering of cases.
7. **Syndromic Presentations:** Clinical signs and symptoms that suggest the presence of a specific disease or condition, which can be used to identify potential outbreaks.
8. **Public Health:** the science of protecting and improving the health of people and their communities.
9. **Case Definition:** A set of standard criteria used to determine what counts as a possible or confirmed case. These criteria help track outbreaks consistently and assist healthcare workers in making clinical decisions.
10. **Disease Incidence:** The number of new cases of a disease in a population over a specific period.

Acronyms/Abbreviations

EWI Early Warning Indicators

Teaching Content with Objectives

Introduction (5 minutes)

Welcome to Module 1 – Outbreak Disease Surveillance. Outbreak disease surveillance refers to the systematic process of monitoring, detecting, and investigating the occurrence of unusual or unexpected patterns of infectious diseases in a population.

The goal of this module is to educate front-line healthcare workers on their role in epidemiologic surveillance of emerging or re-emerging infectious diseases. These are infections that are new (such as COVID-19 in 2020) or have been uncommon but are characterized by sporadic outbreaks or a recent rise in cases (such as Ebola or Measles). Prompt identification of early warning signs of an emerging outbreak will enable healthcare workers to notify the wider public health system of potential threats. This will allow measures to be put in place to protect healthcare workers and the public while increasing the chances that an outbreak can be controlled before spreading to a larger population.

Activity: Icebreaker (5 minutes)

The facilitator may choose to conduct an icebreaker to start the module.

Objective 1: Appreciate How Epidemiology Fits into Public Health Practice (10 minutes)

There may be times in our careers when we are caring for a patient who we think has an illness that is the result of an outbreak of an infectious disease due to a common exposure or risk factor. Front-line healthcare workers play a critical role in epidemiologic surveillance and serve as the interface between the clinical care of patients and public health officials, but many healthcare workers do not receive basic training in epidemiology and public health.

Activity #1: Large Group Discussion (5 minutes)

Discuss in a large group:

- What is the definition of public health?
- What is epidemiology?
- What does an epidemiologist do?

Activity #2: Large Group Discussion (5 minutes)

Discuss in a large group:

- Have you interacted with health officials about an unusual or new clinical presentation that could be a sign of an early outbreak in your career?
- Have you ever seen patients who you thought were infected with an emerging or re-emerging infectious disease?

Objective 2: Understand the Role of Outbreak Disease Surveillance in Improving Public Health (15 minutes)

As a reminder, outbreak disease surveillance refers to the systematic process of monitoring, detecting, and investigating the occurrence of unusual or unexpected patterns of infectious diseases in a population.

Activity #3: Small Group Discussion (15 minutes)

Discuss in your small group: What is the importance of outbreak disease surveillance to the health of communities?

Objective 3: Identify Early Warning Indicators of a Potential Outbreak by Recognizing Patterns, Unusual Trends, and Case Presentations (65 minutes)

Identifying early warning indicators (EWI) of outbreaks is a crucial part of effective disease surveillance and is often performed by front-line health workers to identify abnormal patterns of disease presentation or healthcare utilization. When you identify potential outbreaks early, you can help prevent the spread and enable timely interventions that save lives and reduce the impact of an epidemic. EWIs may be identified through the following:

- Syndromic disease presentations
- Abnormal patterns of healthcare utilization
- Unusual disease trends
- Clustering of cases
- Public health alerts

Activity #4: Syndromic Presentations Scenarios and Table in Small Groups (40 minutes)

This activity is designed to help you understand how healthcare workers should respond to early warning indicators of increased syndromic presentations. Questions to consider:

1. How should health care workers respond when they suspect they may be seeing early warning indicators due to an increased prevalence of a syndromic presentation?
2. What information should be collected?
3. What early actions should be taken?

You will be assigned one of the following clinical scenarios with an increased syndromic presentation of a select illness. In small groups, discuss the scenario and fill in the table below. Be prepared to share your answers with the larger group.

Syndromic Presentation Scenarios

Case 1: Possible Avian Influenza Outbreak

A clinic in a rural village has recently seen an increase in respiratory illnesses, specifically over the past four days. The clinic has witnessed seven individuals from the same family become ill with fever, cough, muscle aches, and difficulty breathing. Physical examination of the patients has revealed crackles in the lung fields and a few patients with conjunctivitis. One of the affected individuals, a 50-year-old man, quickly deteriorated and died from respiratory failure. Investigation revealed that the family had recently slaughtered and consumed several chickens from their farm, as they had noticed that the poultry was too weak to make it to the market.

Case 2: Possible Ebola Outbreak

A physician in a city clinic receives a 45-year-old man presenting with high fever, difficulty breathing, vomiting, diarrhea, and severe abdominal pain. His exam is notable for lethargy, crackles over the lung fields, red conjunctivae, and tenderness over his abdomen without signs of peritonitis. A few days after admission to the ICU, he develops bleeding from gums & bruising. He has no known travel history outside the country but had gone to his hometown 10 days earlier to attend a funeral ceremony of a relative who died of an unexplained illness characterized by high fever, vomiting and diarrhea. The community is known to handle the dead body as part of their traditional burial practices.

Case 3: Possible Meningococcal Disease Outbreak

While discussing their day's work, two clinicians at the district hospital discovered that they had both recently seen three students from the local college with symptoms of acute fever, severe headache, nausea, and vomiting. One of the students developed a rash consisting of purpuric lesions, and some students had lethargy and stiff neck. All were quite sick and needed to be admitted to the hospital.

Case 4: Possible Cholera Outbreak

A health clinic in a semi-arid region has recently seen a surge in severe gastrointestinal illnesses, specifically over the past week. Individuals, mostly from the same family, have been presenting with acute severe diarrhea and vomiting. Physical exam indicates that most patients have severe dehydration. One of them, a 68-year-old woman, rapidly deteriorated and died within 24 hours of admission due to severe dehydration. The region during this time of year experiences severe drought and migration of the nomadic communities into the region.

Syndromic Presentation Scenario Table - Case number:

Assessment Categories	Notes and Findings
Patient History and Exam: • Main complaint • Other symptoms • Physical exam findings	
Exposure History: Who or what were patients exposed to that could have led to this possible infection?	
Possible causes of the clinical syndrome: • Consider both “routine” causes and less common, emerging, or re-emerging causes • Include causes that could be life threatening or pose a risk of a community outbreak	
Early warning indicators: What are the reasons to be concerned that this pattern is unusual?	
Initial control measures while waiting for laboratory/diagnostic tests: • Should the patient be isolated? • Should PPE be worn (and, if so, what PPE)? • Should patients start on any medications?	
Actions after confirmation of your differential diagnosis: • What should be communicated to the public? • What can public health officials do?	

Beyond syndromic presentations, EWIs can be identified by other means, and any health care worker can identify EWIs. While some EWIs may be identified by observing patterns when evaluating patients, their history, and presentations, other EWIs may be noted by observing abnormal patterns in health care utilization.

Activity #5: EWI Patterns Discussion and EWI Patterns Table (15 minutes)

In your small groups:

- Discuss what patterns you could notice in your day-to-day work that might be an early warning indicator.
- In the blank spaces under each category, list potential patterns. For each pattern you add, list the healthcare professionals (cadres) who could identify the pattern. Each category has had one example filled in to guide you.
- Be prepared to share your ideas with the larger group.

Early Warning Indicator Patterns Table

Early Warning Indicators	Potential Patterns	Cadres Who Could Identify the Patterns
Abnormal patterns of healthcare utilization	Pharmacy utilization: An increase in purchases of medications beyond what is expected (e.g., a rise in medication purchases to treat diarrhea or cough)	Pharmacists
Abnormal patterns of healthcare utilization		
Abnormal patterns of healthcare utilization		
Clustering of cases by shared risk factor	Geographic clustering: Monitor for cases of disease that occur in specific geographic areas that wouldn't normally be expected, or for a sudden concentration of cases in an area where the disease is not endemic.	Clinicians, nurses, community healthcare workers
Clustering of cases by shared risk factor		
Clustering of cases by shared risk factor		
Unusual disease trends	Abnormal case presentation: A change in the clinical presentation of disease (e.g., new or more severe symptoms) can indicate a novel pathogen or a change in the behavior of an existing pathogen.	Clinicians, nurses, community healthcare workers
Unusual disease trends		
Unusual disease trends		
Unusual disease trends		

Activity #6: Large Group Discussion (5 to 10 minutes)

In your large group, discuss the following questions:

- During your career so far, have you or a colleague been concerned about a potential disease outbreak from any of these patterns?
- If so, what did you see or notice?

Objective 4: Know How to Report a Potential Outbreak in Your Context (20 minutes)

Reporting potential outbreaks is a critical step in public health surveillance and response. Early detection and rapid reporting of potential outbreaks allow public health authorities to investigate the situation, confirm the disease, and implement control measures to prevent further spread. Timely and accurate reporting also helps in providing data to inform broader epidemic management strategies, including resource allocation, public communication, and coordination across stakeholders.

Activity #7: Large Group Discussion and Reporting Table (10 minutes)

In your large group, discuss the following questions and fill out the table:

- If you suspect you are noticing an EWI of a potential outbreak, to whom do you report this?
- Where can you find information on current outbreaks and transmissible diseases in your context?

Reporting Early Warning Indicators Table

Reporting Level	Responsible Body
Local / Place of employment	
District / Regional	
National	
International	

Information on local disease outbreaks and cases of transmissible diseases can be found at:

Activity #8: Large Group Discussion (10 minutes)

In your large group, discuss the following question: What happens after a potential outbreak is reported?

Conclusion (5 minutes)

Activity: Review Objectives (5 minutes)

Read through each learning objective and summarize the key learning points for each.

Resources

1. Disease surveillance thresholds: <https://emergency.unhcr.org/emergency-assistance/health-and-nutrition/disease-surveillance-thresholds>
2. Surveillance and outbreak tools. European Center for Disease Prevention and Control: <https://www.ecdc.europa.eu/en/tools/outbreak-surveillance-tools>
3. Guidelines for writing outbreak investigation reports: https://www.ecdc.europa.eu/sites/default/files/documents/Annex%2005_Guide%20for%20writing%20outbreak%20investigation%20reports_2019.pdf
4. Outbreak reporting and management: <https://hr.un.org/page/reporting-outbreaks>
5. Guidelines for evaluating surveillance systems. <https://www.cdc.gov/mmwr/preview/mmwrhtml/00001769.htm>
6. CDC Field Epidemiology Manual: Chapter 3: Conducting a Field Investigation: <https://www.cdc.gov/field-epi-manual/php/chapters/field-investigation.html>
7. Cordes KM, Cookson ST, Boyd AT, et al. Real-Time Surveillance in Emergencies Using the Early Warning Alert and Response Network. *Emerging Infectious Diseases*. 2017;23(13). doi:10.3201/eid2313.170446 : https://wwwnc.cdc.gov/eid/article/23/13/17-0446_article#;
8. Africa CDC: Surveillance and Disease Intelligence Programs: <https://africacdc.org/programme/surveillance-disease-intelligence/>