

Introduction to Outbreak Disease Surveillance

Module 1 | STRIPE HIV Pandemic Preparedness Certification

Facilitator 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

How to tailor this module

- This module is designed for use in live, facilitator-led workshops. Workshops may be held in-person, online, or in a hybrid format and must consist of an interprofessional group of learners.
- Objective #4 (know how to report a potential outbreak in your context) may require some advanced knowledge from facilitators to effectively educate the group.
- We encourage you to adapt this training to align with local guidelines or conditions if they differ from recommendations. You may want to adapt examples and scenarios to fit your local context.
- If you think your learners would benefit from extra time, adjust the activity schedule in advance so participants know what to expect.
- Share learner materials (e.g., the Learner Guide) with learners before the workshop. These materials are also available to learners on the course website.

Reminder to facilitators

Key learning points in the answers will be underlined. Please emphasize these learning points as you move through the module.

Additional Facilitator Materials

Introduction to Outbreak Surveillance Facilitator Answer Slides (PowerPoint)

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 and Answer Key

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.

Facilitator Instructions

Please greet the learners and welcome them to the training. Facilitators can also conduct an “icebreaker” activity of their choice to start the module. Most of the activities in this module will be conducted in small interprofessional groups, so please be ready to organize your learners into small groups, each comprised of as much of a mix of health professions as possible.

Explain to learners that this case covers the topic of outbreak surveillance. We will focus on the key role that front-line healthcare workers play in identifying emerging and re-emerging infectious diseases and notifying the public health system of potential threats.

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?

Facilitator Instructions

Discuss the questions above as a large group. Give learners the opportunity to answer each question if anyone feels comfortable. Then advance to slides 2 and 3 to reveal sample answers. Feel free to skip quickly through slides 2 and 3; however, if you feel like your audience already understands these definitions quite well.

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?

Facilitator Instructions

Discuss these questions as a large group. If learners cannot think of examples, it may be helpful to think about the early stages of the COVID-19 pandemic and how communication and collaboration between public health officials and frontline healthcare workers were particularly important during this time.

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?

Facilitator Instructions

Divide learners into small groups (ideally with a mix of health professions in each group) and have them spend 10 minutes answering this question. Then spend 5 minutes asking each small group to share their answers.

Facilitator Answer

Advance to Slide 4 to reveal a sample answer. These are not the only possible answers, and learners may have thought of other important reasons why disease surveillance is important.

Disease surveillance can:

- Serve as an **early warning system** for impending outbreaks that could become public health emergencies
- Allow for an early response, which can prevent or limit the further spread of disease
- Help in understanding the dynamics of the outbreak and directing interventions
- Enable monitoring and evaluation of the impact of interventions
- Guide **priority-setting and planning** for public health strategies

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

Facilitator Instructions

Advance to Slide 5 to explain the ways of identifying EWIs in greater detail.

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.

Facilitator Instructions

1. Divide learners into groups of 4 to 5 people and assign each group one of the syndromic presentation scenarios.
2. Next, advance to Slide 7 to demonstrate a sample syndromic presentation. Explain that each group will receive similar information for a different syndromic presentation.
3. Ask a learner to read the sample syndromic presentation on Slide 7 aloud.
4. As a large group, ask learners how they would fill in each section of their blank Syndromic Presentation Scenario Table (below) based on this case prompt.
5. Advance through Slides 8-9 to reveal a sample answer for the sample syndromic presentation scenarios.
6. Assign a different syndromic scenario to each group (scenarios listed below).
7. Give small groups 10 minutes to work on their assigned scenario and fill out the table below.
8. For the next 20 minutes, have each small group explain their scenario and teach their answers back to the larger group.
9. After learners have completed the table and shared their answers, review Slides 10-17. These slides have sample answers for the syndromic presentation scenarios, possibly providing additional information.

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.

Facilitator Answers

Learners should use the following table to record their answers. **A sample scenario and example responses for each scenario can be found in the Facilitator Answer Slides.**

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.

Facilitator Instructions

Allow small groups to work on filling in the table, then ask each small group to share their answers for each of the three categories in the table. When complete, review slides 19-21. Spend 15 minutes on this activity.

Early Warning Indicator 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	Diagnostic test utilization: An increase in diagnostic testing (e.g. malaria testing or COVID-19 testing) could indicate an outbreak of those infections or (if tests are commonly negative) infections with similar clinical presentations.	Radiology and laboratory workers
Abnormal patterns of healthcare utilization	ICU bed utilization or patients visiting the emergency room: This could indicate a rise in rates of a severe illness in the community.	Hospital administrators, front-line healthcare workers
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	Temporal clustering: Look for an unusual spike in cases within a short period of time (e.g., a sudden increase in the number of people showing symptoms of a specific disease in the community) or a rise in cases during the time of year (e.g. rainy or dry season) that is atypical	Clinicians, nurses, community healthcare workers
Clustering of cases by shared risk factor	Age/sex/occupation clustering: Look out for cases occurring in specific demographic groups or occupations (e.g., healthcare workers, sex workers, students, prisoners, people without access to running water).	Clinicians, nurses, community healthcare workers
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

Early Warning Indicators	Potential Patterns	Cadres Who Could Identify the Patterns
Unusual disease trends	Changes in disease incidence: An increase in cases of a disease beyond expected seasonal or usual (baseline) levels could indicate an emerging outbreak.	Clinicians, nurses, community healthcare workers
Unusual disease trends	Changes in Disease Demographics: Keep an eye out for changes in disease demographics. An increase in a previously unaffected group or an abnormal surge in the group that is primarily affected could be a signal for a new outbreak.	Clinicians, nurses, community healthcare workers
Unusual disease trends	Severity of Cases: A higher-than-usual severity of illness or mortality could be an indicator that an outbreak is under way, or that the outbreak is more severe than expected.	Clinicians, nurses, community healthcare workers

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?

Facilitator Instructions

Spend 5-10 minutes on this question. Encourage learners to share any relevant experiences.

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?

Facilitator Instructions

The answers to these questions will vary depending on the location and clinical site. If you are uncertain about how to fill in the table, please investigate how to do this prior to the training.

Explain that the first section (reporting at the local level and/or the place of employment) is most important for most front-line healthcare workers. However, they should also know how reporting structures work and how things move to higher levels of government after an initial report is made.

Then, share some examples of where you report potential outbreaks (responsible body) for each reporting level. You can add your examples to Slide 22 in the Facilitator Answer Slides document.

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:

Facilitator Instructions

In advance of the module, please investigate any local tools for answering the last question in this activity above. Look for websites, mobile apps, or other forms of accessible communication that can be shared with learners.

Activity #8: Large Group Discussion (10 minutes)

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

Facilitator Instructions

Advance to Slide 23 to review this answer as a large group.

Facilitator Answers:

1. **Identification of Potential Outbreak:** This includes identification of unusual clusters, facility reports, unusual disease trends, community surveillance systems etc.
2. **Initial investigation:** This step involves gathering relevant information to confirm the outbreak, including the number of cases, clinical features (e.g., symptoms, severity), demographic information (age, sex, location, etc.), dates of onset etc.
3. **Reporting to relevant authorities:** Once an outbreak is suspected, health authorities (e.g., healthcare facilities and local health departments) should report the potential outbreak to higher levels of authority as required. Reporting could be to:
 - a. **Local Health Authorities:** To initiate a local investigation and possible response measures.
 - b. **National Health Agencies:** For coordination and resource allocation, particularly if the outbreak has the potential for widespread transmission.
4. **Case definition creation:** Defining what constitutes a possible or confirmed case is vital to creating standards for how the outbreak is going to be tracked. Definitions of possible and confirmed cases will also help healthcare workers know when to make clinical decisions, such as initiation of isolation precautions or treatment.
5. **Monitoring:** Once reports are available at the relevant authorities, it is essential that consolidated reports are developed, updated, and disseminated in a timely manner. These data are analyzed and presented to support decision-making at the relevant levels of action. Ideally, countries should have dashboards where this information can be consumed.
6. **Public Health Communication:** Once a disease is detected and reported, authorities provide response measures to the public. These may include quarantine, isolation, travel restrictions, vaccination, public facility closures, etc. Critical in communication is providing clear, transparent, and timely information to the public about the outbreak, preventive measures, and what they should do or not do. Such information should be regularly updated to avoid rumours and misinformation. Effective communication also includes the identification of vulnerable groups with targeted messaging to these groups.

Conclusion (5 minutes)

Activity: Review Objectives (5 minutes)

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

Facilitator Instructions

Advance to Slide 24. Have learners read through each objective and summarize key learning points from 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/>