Capability 13: Public Health Surveillance and Epidemiological Investigation

Definition: Public health surveillance and epidemiological investigation is the ability to create, maintain, support, and strengthen routine surveillance and detection systems and epidemiological investigation processes. It also includes the ability to expand these systems and processes in response to incidents of public health significance.

Functions: This capability consists of the ability to perform the functions listed below.

- **Function 1**: Conduct or support public health surveillance
- **Function 2**: Conduct public health and epidemiological investigations
- **Function 3**: Recommend, monitor, and analyze mitigation actions
- **Function 4**: Improve public health surveillance and epidemiological investigation systems

Summary of Changes: The updates align content with new national standards, updated science, and current public health priorities and strategies. Listed below are specific changes made to this capability.

- Increases alignment to public health surveillance and data strategies
- Strengthens surveillance systems for persons in isolation or quarantine and persons placed under monitoring and movement protocols
- Emphasizes syndromic surveillance and data collection to improve situational awareness and responsiveness to hazardous events and disease outbreaks, for example, participation in the CDC’s National Syndromic Surveillance Program BioSense Platform

For the purposes of Capability 13, partners and stakeholders may include the following:

- agricultural agencies
- clinical laboratories
- clinicians
- community health centers
- environmental health agencies
- first responders
- food safety agencies
- health care organizations
- law enforcement agencies
- medical examiner or coroner offices
- poison control centers
- public health officials
Function 1: Conduct or support public health surveillance

Function Definition: Conduct or support ongoing systematic collection, analysis, interpretation, and management of public health-related data to effectively detect, verify, characterize, and manage a threat, hazard, risk, or incident of public health concern throughout and following an incident.

Tasks

Task 1: Engage stakeholders to support public health surveillance and investigation. Coordinate activities with jurisdictional laboratories, partners, and stakeholders who can provide public health-related surveillance data to support routine and emergency responses requiring surveillance and epidemiological investigation.

Task 2: Conduct or support routine and incident-specific surveillance. Use data to conduct and support health-related surveillance. Data sources for surveillance may include:
- Case findings
- Hospital discharge abstracts
- Population-based surveys
- Pre-hospital emergency medical services records
- Registries
- Reportable disease surveillance
- Syndromic surveillance
- Vital records
- Other inputs

Task 3: Share surveillance findings. Share surveillance data and communicate statistical analyses of surveillance data to the jurisdictional public health agency and other applicable jurisdictional leaders, health care providers, and data providers to assist with the prompt identification of potentially affected populations at risk for adverse health outcomes and enable rapid decision making during a natural or human-caused public health threat or incident.

Task 4: Maintain and improve surveillance systems. Maintain, assess, and strengthen surveillance systems, and continuously support bi-directional information exchange to respond promptly to public health threats, hazards, and incidents.

Preparedness Resource Elements

P1: (Priority) Legal and procedural frameworks for jurisdiction personnel involved in surveillance and epidemiology to support mandated and voluntary information exchange with a wide variety of community partners and stakeholders, including tribal communities and populations at risk to be disproportionately impacted by the incident.

P2: (Priority) Procedures in place to gather and analyze data on a broad range of health indicators, such as indicators identified in novel or emerging public health threats, case definitions, and World Health Organization (WHO) public health emergencies of international concern (PHEIC) declarations.
Capability 13: Public Health Surveillance and Epidemiological Investigation

Surveillance activities, ranging from passive to active, may include

- Reportable condition surveillance for conditions mandated for inclusion in case reporting to public health agencies, such as monitoring travelers from high-risk areas. Reportable condition surveillance activities may include
  - Electronic laboratory reporting (ELR)
  - Electronic case reporting (eCR) for reportable conditions from clinical laboratories and health care providers
  - Other notifiable disease and injury surveillance, such as non-electronic reporting and astute clinician notification
- Environmental health surveillance
- Incident-specific surveillance (sentinel surveillance)
- Syndromic surveillance to improve situational awareness, which may include
  - CDC’s National Syndromic Surveillance Program BioSense Platform
  - Surveillance systems for pregnancy, infants, and birth defects
  - State or locally developed syndromic surveillance systems
- Vital statistics surveillance, including birth and death registration
- Animal-related surveillance and vector control

Data to gather and analyze may include

- Active case finding data, such as health care logs and record reviews
- Background or baseline disease data
- Chemical exposure assessment data, such as data from the Assessment of Chemical Exposure (ACE) Program
- Environmental data, such as air quality, ground or surface water, water quality testing, and soil or sediment data
- HazMat data, such as hazardous material spills
- Hospital and other health care services data, such as discharge abstracts
- Immunization data
- Law enforcement data
- Mental/behavioral health data
- Poison control center data
- Population-based survey data
- Radiological exposure and dose reconstruction data
- Responder monitoring data
- Unusual incident of unexplained morbidity or mortality in humans or animals data
- Workers compensation claims data
- Work-related injuries and illnesses data, such as Occupational Safety and Health Administration (OSHA) 300 logs
- Zoonotic disease or animal data

P3: **(Priority)** Procedures specific to public health surveillance in place to access and share health-related information while following jurisdictional requirements and federal laws for protecting personal health information and personally identifiable information, such as institutional security and confidentiality policies.


P4: **(Priority)** Procedures in place for the jurisdictional public health agency to access, collect, analyze, interpret, and respond to reports of potential public health threats or incidents.

*(See Capability 3: Emergency Operations Coordination)*

P5: **(Priority)** Regularly updated and verified list(s) of identified stakeholders who will share, receive, and distribute surveillance reports.

*(See Capability 6: Information Sharing)*

P6: **(Priority)** Procedures in place to notify CDC of cases of diseases or conditions included in the National Notifiable Disease Surveillance System (NNDSS). Procedures also include immediate notifications concerning PHEICs.

*(See Capability 6: Information Sharing)*

P7: Procedures in place to ensure the electronic exchange of personal health information meets applicable patient privacy-related laws, standards, and jurisdictional requirements. Laws, standards, and requirements may include:

- Health Insurance Portability and Accountability Act (HIPAA)
- Health Information Technology for Economic and Clinical Health Act
- Standards from the National Institute of Standards and Technology and the Office of the National Coordinator for Health Information Technology of the U.S. Department of Health and Human Services (HHS)
- Message mapping guides for Health Level 7 (HL7) case notifications

*(See Capability 6: Information Sharing)*

P8: Procedures in place to assess and improve systems to ensure continuity of surveillance operations if primary surveillance and detection systems are disrupted for example, due to power failure or compromise of electronic infrastructure.

**Skills and Training Resource Elements**

S/T1: **(Priority)** Public health personnel who participate in data collection, analysis, and reporting to support surveillance investigations trained, at a minimum, in the Tier 1 level Applied Epidemiology Competencies (AEC). Personnel skilled and able to use software systems to support data collection, reporting, management, and analysis. Consideration should be given to:

- Securing assistance (through coordination with academic institutions or state-level personnel) from individuals with Tier 2 level AECs when creating a new system or updating an existing system
- The Public Health Informatics Institute Applied Public Health Informatics Competency Model
Equipment and Technology Resource Elements

E/T1: Systems to accept, process, analyze, exchange, and share surveillance and epidemiological data across multiple disciplines. These systems also may track and monitor known cases and exposed persons through disposition to enable short- and long-term follow-up. Systems may include

- ELR systems
- Electronic laboratory test order and reporting (ETOR) systems
- eCR systems
- Electronic death registration systems (EDRS)
- Syndromic surveillance systems
- Outbreak management systems
- System for tracking investigation or monitoring of potential contacts to cases, meaning systems that track isolated and quarantined persons for direct active monitoring
- Immunization registries or immunization information systems
- Emergency management information sharing systems, such as WebEOC
- Emergency Responder Health Monitoring and Surveillance™ (ERHMS™) and occupational registries
- Zoonotic disease surveillance systems
- HazMat reporting systems
- National Poison Data System (NPDS)
- Environmental public health tracking systems (EPHT)


E/T2: Systems to ensure the electronic management and exchange of information, including laboratory test orders, samples, results, and other information, with jurisdictional partners and stakeholders. Systems should be capable of interfacing with pertinent databases and meet necessary computing power and technical specifications.

Function 2: Conduct public health and epidemiological investigations

Function Definition: Identify the source of a case or outbreak of disease, injury, or exposure and the associated determinants in a population, including time, place, person, vital status, or other indices, to report results and findings to cross-disciplinary jurisdictional and federal partners and stakeholders.

Tasks

Task 1: Conduct public health and epidemiological investigations. Investigate diseases, injuries, and exposures in response to natural or human-caused threats or incidents in collaboration with jurisdictional stakeholders.

Task 2: Provide support to local public health and epidemiological investigations. Provide clinical and public health-related consultations to support public health agency investigations.

Task 3: Share public health and epidemiological investigation findings. Report investigation results to impacted communities and jurisdictional and federal partners, as applicable.
Preparedness Resource Elements

P1: (Priority) Templates for outbreak or multiple exposure investigation reports that may include

- **Context and background**—Information to characterize the incident may include
  - Population(s) affected, including the estimated number of persons exposed, number of persons affected, and relevant demographic information, such as age, disability status, chronic health condition(s), and pregnancy or lactation status
  - Location(s), such as setting or venue
  - Geographical area(s) involved
  - Timeframe(s)
  - Suspected or known etiology
  - Jurisdictional risks

- **Initiation of investigation**—Information regarding receipt of the case report or notification and initiation of the investigation may include
  - Date and time initial notification was received by the agency
  - Date and time investigation was initiated by the agency

- **Investigation methods**—Epidemiological or other investigative methods employed may include
  - Initial investigative activity, such as verified laboratory results
  - Interviews
  - Case definitions (as applicable)
  - Data collection and analysis methods, such as case-finding, cohort or case-control studies, and environmental data
  - Disaster epidemiology tools, such as the Community Assessment for Public Health Emergency Response (CASPER) toolkit and the Assessment of Chemical Exposures (ACE) Program toolkit
  - Data presentation and visualization, such as disaster epidemiology tools, epidemic curves, attack rate tables, and maps
  - Questionnaires
  - Exposure assessments and classifications
  - Radiation dose assessment or reconstruction
  - Review reports developed by first responders, laboratory testing of environmental samples, reviews of environmental testing records, and industrial hygiene assessments

- **Investigation findings and results**—Applicable investigation results may include
  - Epidemiological results
  - Exposure assessment results
  - Laboratory results
  - Biomonitoring results
  - Clinical results
  - Other analytic findings
  - Record(s) of case notification(s)

- **Discussion and conclusions**—Analysis and interpretation of investigation results and conclusions drawn as a result of performing the investigation
Capability 13: Public Health Surveillance and Epidemiological Investigation

- Recommendations—Suggested approaches for controlling spread of disease or preventing future outbreaks or preventing or mitigating the effects of an acute environmental hazard
- Key investigators and report authors—Names and titles to facilitate communication with partners, clinicians, and other stakeholders

**P2:** Procedures in place to support jurisdictional methods for conducting investigations of public health, environmental, and occupational threats, incidents, and hazards. Investigation considerations may include

- Elements or instances that trigger the start of an investigation, including the initiation date and time of investigation
- Identification of population(s) at risk to be disproportionately impacted by an incident
- Identification of individual case or exposure status (confirmed, probable, and suspected cases)
- Identification of jurisdictional risks, including jurisdictional risk assessment findings
- Identification of exposed persons and contact tracing
- Determination of source, exposure, and, as applicable, transmission mapping of identified and suspect cases, injuries, or exposures within the jurisdiction

**P3:** Procedures in place to establish partnerships, conduct investigations, and share information with other governmental agencies, partners, and organizations to support populations at risk of adverse health outcomes as a result of the incident.

**P4:** Written agreements, such as contracts or memoranda of understanding (MOUs), to authorize joint investigations and information exchange and to clarify agency roles between public health and other partners and stakeholders.

**P5:** Laws, statutes, policies, and procedures that ensure jurisdictional public health agencies have the authority to collect and share a uniform set of jurisdictional health-related data associated with diseases, exposures, or injury conditions of public health importance.

*(See Capability 6: Information Sharing)*

**Skills and Training Resource Elements**

**S/T1:** Personnel trained to manage and monitor routine surveillance and epidemiological investigation systems at the jurisdictional level and support surge requirements in response to natural and human-caused threats or incidents. Personnel skilled and able to use software systems to support data collection, reporting, management, and analysis. Specific jurisdictional needs may include

- Personnel, including surge support personnel with Tier 1 level AECs
- Access to individuals, such as academic or state-level personnel, with Tier 2 level AECs when creating a new or updating an existing system

**Equipment and Technology Resource Elements**

**E/T1:** Public health surveillance systems to monitor health status and exposure risks of individuals and groups, including criteria for reporting health events and criteria or processes for maintaining or contributing to population health surveillance registries.

**E/T2:** Information systems to aid in the development of public health investigation reports using available and relevant information, such as results from clinical, environmental, or forensic samples may include
• Databases or registries with the capacity to both receive and transmit data cross-jurisdictionally using standards-based electronic messaging that adheres to relevant HHS standards for Certified Electronic Health Records, Meaningful Use, and other interoperability standards
• Databases and registries that include protocols to protect personal health information in conformity with jurisdictional requirements and federal law, such as privacy and cybersecurity policies

*(See Capability 6: Information Sharing)*

**Function 3: Recommend, monitor, and analyze mitigation actions**

**Function Definition:** Recommend, implement, and support public health interventions that contribute to the mitigation of a threat, hazard, risk, or incident, and monitor intervention effectiveness.

**Tasks**

**Task 1: Identify public health guidance and recommendations.** Determine appropriate clinical, epidemiological, and environmental-related public health actions to mitigate threats, hazards, risks, or incidents based on current public health science-based standards.

**Task 2: Share appropriate public health guidance and recommendations.** Communicate and coordinate guidance and recommendations with public health officials, partners, and stakeholders to support decision-making related to mitigation actions.

**Task 3: Monitor and assess public health interventions.** Evaluate public health mitigation actions throughout the duration of the public health response and recommend additional mitigation measures as appropriate.

**Preparedness Resource Elements**

**P1: (Priority)** Procedures in place, developed in consultation with appropriate public health officials, to initiate and sustain surveillance, exposure containment, control, and mitigation actions, such as embargo, access restrictions, and isolation and quarantine in response to public health threats, hazards, risks and incidents. Procedures may include

• Case definitions
• Contact investigations
• Clinical management of potential or actual cases
• Provision of medical countermeasures
• Processes for exercising relevant legal authorities
• Provision of essential goods and services for isolated or quarantined persons
• Consultation with the Council of State and Territorial Epidemiologists (CSTE)

*(See Capability 1: Community Preparedness, Capability 6: Information Sharing, Capability 8: Medical Countermeasure Dispensing and Administration, and Capability 11: Nonpharmaceutical Interventions)*

**P2:** Procedures in place to use health-related data and statistics from partners, stakeholders, and jurisdictional public health agency programs that support recommendations for populations at higher risk for adverse outcomes during a natural or human-caused threat, hazard, risk, or incident.

*(See Capability 1: Community Preparedness and Capability 6: Information Sharing)*
P3: Procedures in place to track mitigation actions, monitor performance, and document and share outcomes using data instruments, such as data reports or statistical summaries consistent with recommended science-based standards and sources, which include

- Control of Communicable Diseases Manual
- Epidemic Information Exchange (Epi-X)
- Health Alert Network (HAN) alerts
- Morbidity and Mortality Weekly Report
- Red Book of Infectious Diseases
- State or CDC incident reports/annexes

(See Capability 2: Community Recovery, Capability 5: Fatality Management, Capability 7: Mass Care, Capability 8: Medical Countermeasure Dispensing and Administration, Capability 11: Nonpharmaceutical Interventions, and Capability 14: Responder Safety and Health)

Skills and Training Resource Elements

S/T1: Personnel trained to conduct epidemiological investigations, including radiation assessment and monitoring, public health informatics, and public health information systems. CDC recommends that personnel are trained on the specific information systems used within their jurisdiction.

(See Capability 1: Community Preparedness)

S/T2: Personnel trained on Homeland Security Exercise and Evaluation Program (HSEEP) processes for developing after-action reports (AARs) and improvement plans (IPs).

Function 4: Improve public health surveillance and epidemiological investigation systems

Function Definition: Assess internal agency surveillance and epidemiologic investigation systems and implement quality improvement measures within jurisdictional public health agency control.

Tasks

Task 1: Evaluate effectiveness of public health surveillance and epidemiological investigation processes and systems. Evaluate surveillance and epidemiological investigation outcomes to identify deficiencies encountered during responses to public health threats and incidents and recommend opportunities for improvement.

Task 2: Identify and prioritize corrective actions. Conduct post-incident or post-exercise agency evaluation meetings with response participants and relevant partners and stakeholders to identify procedures and organizational opportunities for improvement requiring corrective action.

Task 3: Establish an after-action process, share after-action report(s) and improvement plan(s), and implement and monitor corrective actions. Obtain feedback from after-action conferences, hot washes, and incident debriefings. Develop and share AARs and IPs, and implement corrective actions.
**Preparedness Resource Elements**

**P1: (Priority)** Procedures in place to assess jurisdictional response effectiveness with local public health agencies, data submitters, affected populations, and other key partners and stakeholders after the acute phase of a threat or incident. Recommended procedures may include

- Hot washes to effectively communicate response strengths and opportunities for improvement
- After-action processes, including completing AARs and IPs, and committees to effectively identify corrective actions
- Venues, such as town hall meetings to inform affected populations and other stakeholders
- Presentation and publication of epidemiologic investigations to contribute to the scientific body of evidence and improve knowledge of best practices and lessons learned

*(See Capability 3: Emergency Operations Coordination)*

**P2: (Priority)** Procedures in place to communicate AAR and IP findings to data submitters and other key partners and stakeholders, including groups representing affected populations, to implement identified corrective actions.

**Skills and Training Resource Elements**

**S/T1:** Personnel trained on quality improvement processes and techniques.

**S/T2:** Personnel trained on HSEEP AAR and IP guidelines.

*(See Capability 3: Emergency Operations Coordination)*

**S/T3:** Personnel trained to meet public health informatician competencies, as defined in CDC’s Competencies for Public Health Informaticians, to contribute to information sourcing, use, and re-use for surveillance and epidemiologic analysis.

**Equipment and Technology Resource Elements**

**E/T1:** Electronic and non-electronic tools and methods for data collection, management, analysis, and sharing.

**E/T2:** Systems to track implementation and impact of corrective actions identified within AARs and IPs.

*(See Capability 3: Emergency Operations Coordination)*