Surveillance of water-related infectious diseases

Module 1.2
Overview

• What is disease surveillance?
• WRID surveillance objectives
• Core activities and building blocks of surveillance
• The epidemic intelligence framework and different types of surveillance
• Surveillance attributes
• How to strengthen WRID surveillance?
What is disease surveillance?

• Ongoing systematic collection, analysis and interpretation of health-related data
  
  ➢ for use in planning, implementing and evaluating public health policies and practices

• Right information at the right time to inform public health decision making
WRID surveillance objectives

- Monitor trends over time
- Detect outbreaks
- Identify new, emerging or re-emerging pathogens
- Estimate WRID burden
- Identify at-risk groups, populations and areas → target control and prevention measures
- Identify priorities for drinking water supply system improvement
- Assess effectiveness of control measures
- Inform water quality and WRID policies and regulations
Ideally WRID surveillance will:

• Integrate monitoring of health outcomes with monitoring of drinking water quality and environmental contamination events

• Involve strong co-ordination and collaboration between:
  • Public health surveillance agencies
  • Drinking water service providers
  • Regulators
  • Environmental agencies

→ *timely sharing of information on water supply incidents and water-related outbreaks*

• Operate at the national and sub-national (regional and local) level
Multilevel approach to WRID surveillance – example France

Core activities and building blocks of surveillance

- Core surveillance activities:
  - Case detection
  - Case reporting
  - Investigation and confirmation
  - Analysis and interpretation
  - Communication
  - Action - *public health response, policy development and feedback to stakeholders*

- Support processes enable the core activities

- Integrated disease surveillance
  - Indicator-based surveillance
  - Event-based surveillance

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Epidemic intelligence framework

Kaiser et al. (2006): What is epidemic intelligence, and how is it being improved in Europe? Eurosurveillance, https://doi.org/10.2807/esw.11.05.02892-en
Indicator-based surveillance

- Notifiable disease – urgent reporting of serious diseases requiring an immediate public health response
- Syndromic – Cases that comply with a specified syndromic case definition
- Laboratory – number of isolates or positive tests for specific organisms
- Sentinel – health facilities representing high risk areas or groups
- Environmental monitoring – indicator based or event based – legally mandated monitoring of key environmental indicators at set time-periods
- Other types
  - prescriptions,
  - calls to medical helplines,
  - health insurance claims etc
Event-based surveillance

• Notifications of events related to water supply
  • water providers, municipal authorities

• Media monitoring
  • Mass media (TV, newspapers), social media reports

_EBS can be a sensitive and rapid way to detect outbreaks, but may lead to false alarms._
Outbreak Surveillance

**Event based**

- Notifications of clusters of cases or suspected outbreaks
  - Health facilities, the public

*Prevent and control outbreaks*

**Indicator based**

- Number of confirmed outbreaks related to water
  - Disease burden
  - Causal agents
  - Risk factors
  - Geographical distribution

*Inform on the need for investments in the water supply system and public health action*
Other types of surveillance and studies

• Seroprevalence surveys
  • Public health agencies, laboratories, research institutes
  • estimate the burden of WRID

• Environmental surveys
  • Environmental agencies, research institutes
  • Detect outbreaks, risk assessment, monitoring emerging and re-emerging pathogens, estimate burden

• Case control studies using surveillance data
  • Identify water sources as risk factor for infection
  • Estimate burden of disease associated with waterborne transmission
Surveillance attributes

- Completeness
- Timeliness
- Usefulness
- Sensitivity
- Specificity
- Positive predictive value
- Representativeness
- Simplicity
- Flexibility
- Acceptability
- Stability

*Table 4 of the guidance document*
Timeliness and sensitivity

• Sensitivity – how well the system detects cases
  • % of symptomatic cases
  • % of cases seeking care
  • Sampling practices
  • Laboratory practices and capacity
  • Sensitivity and specificity of laboratory assays
  • Completeness of reporting of cases

Source: K. Nygard
Timeliness of outbreak detection varies by surveillance type.

- Event based surveillance is usually the fastest.
- Surveillance based on clinical or laboratory diagnoses are much slower and are less suitable for outbreak detection.
- Surveillance based on clinical diagnosis – risk of incorrect diagnosis → delayed or missed outbreak detection.

Proctor et al. (1998): Surveillance data for waterborne illness detection: an assessment following a massive waterborne outbreak of Cryptosporidium infection. Epidemiology and Infection, https://doi.org/10.1017/S0950268897008327
How to strengthen WRID surveillance?

• **Build on or expand existing surveillance systems to include WRID**
  - Include additional waterborne pathogens in the existing notifiable or laboratory based surveillance system
  - Reported using the existing surveillance procedures

• What are the surveillance objectives?

• How well will this type of surveillance meet the surveillance objectives?
  - *timeliness, sensitivity, specificity, completeness, representativeness etc.*

• Feasibility??
  - Human and laboratory capacity for collection, transportation, detection
  - Funding for surveillance
  - E-reporting and database
  - Acceptability and participation by health care workers
Questions?