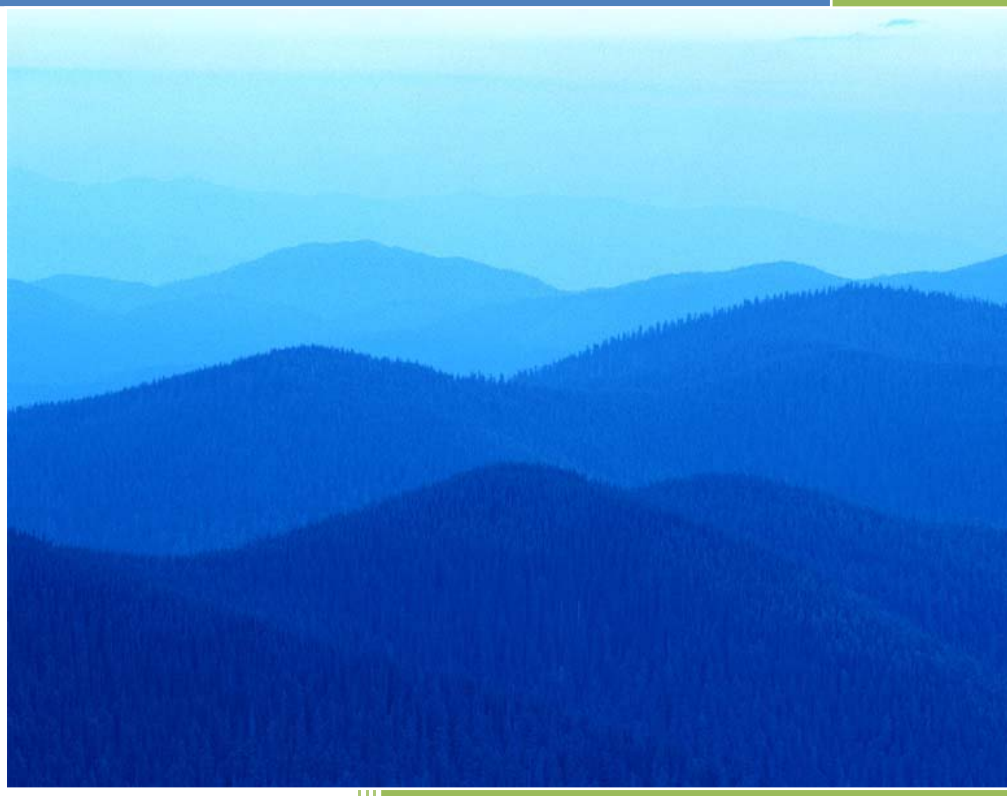
Orientation Program for Infection Control Professionals



Module 5: Surveillance

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Objectives

At the completion of this module the ICP will:

1. Describe a surveillance program within the Infection Control Program of your facility and assess its strengths and limitations in terms of:
   - Purpose and objectives
   - Type of surveillance used
   - Date sources for identifying cases
   - Definition used to confirm cases
   - Data collection methods and forms
   - Data analysis method
   - Summary of the findings including conclusions, recommendations and follow-up

2. Collect, manage, analyze, interpret and report data from a surveillance program

Number of hours

- Key Concepts – 4 hours
- Methods – 4 hours

Required reading

APIC Text: chapter 3 or Bennett and Brachman: chapter 6

- CDC/NHSN Surveillance definition of healthcare-associated infection and criteria for specific types of infections in the acute care setting.
  http://www.cdc.gov/ncidod/dhqp/pdf/nnis/NosInfDefinitions.pdf
- PowerPoint presentations on CHICA website from 2007 conference
  http://www.chica.org/Members/conf_presentations07.html
  - Surveillance half day session given by Drs. D. Moralejo and E. Henderson
  - Focus Your Surveillance
  - Maximizing Data Collection
  - Surveillance – Data Handling
  - Interpreting and Reporting Surveillance Results
- Ontario's Best Practices for Surveillance of Healthcare-associated Infections in Patient and Resident Populations available on line at:
  http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_hai.pdf

Overview

We spend a lot of time doing surveillance. It's important to be able to identify where problems are so we can focus interventions to improve patient outcomes. Each HAI surveillance program, e.g., surgical site infections (SSI), ventilator associated pneumonia (VAP), Methicillin resistant *Staphylococcus aureus* (MRSA), should have a clear purpose and specific objectives. This helps focus data collection and analysis and also helps sell the program to administrators! Before we review concepts and apply them to your program, you need to know what HAI surveillance is taking place in your facility . Complete the following exercise.

Your Surveillance Programs

Instructions: List your facility's HAI surveillance programs. For each, in the rows below, identify its purpose and specific objectives

Program	Purpose and specific objectives

Key Concepts

Key concepts refer to the basic information that an ICP will require in order to do surveillance effectively. From the readings, complete each of the following tables. Doing so will help you take notes of important definitions, facts and comparisons.

Definition, purpose and objectives of surveillance

Define surveillance:
List five purposes of surveillance:
1.
2.
3.
4.
5.

Define each of the following terms:

Epidemiology	
Population	
Case	
Case definition	
Numerator	
Denominator	
Rate	
Attack rate	
Endemic	
Cluster	
Epidemic	
Pandemic	
Prevalence	
Incidence	
Incidence density	
Distribution	
Proportion	
Baseline	
Surgical site infections surveillance terms	
Wound classification	
Risk index	
ASA score	

Types of Surveillance

There are many different types of surveillance approaches, each of which has strengths and limitations. It is important to decide which approach will best suit your surveillance program's purpose and objectives.

	Total Surveillance	**Targeted Surveillance**
Definition		
Strengths		
Limitations		
Examples		

	Syndromic	**Sentinel**
Definition		
Strengths		
Limitations		
Examples		

	Process	**Outcome**
Definition		
Strengths		
Limitations		
Examples		

	Retrospective	**Prospective**
Definition		
Strengths		
Limitations		
Examples		

Methods

In this section you will focus on the steps that need to be followed in order to identify, collect, handle and analyze the data.

Definition of cases

Consistent criteria must be used to define cases in order to accurately collect the data and be able to compare the results of different surveillance programs. National organizations have identified case definitions for surgical site infections, urinary tract infections and other healthcare-associated infections. For example, the CDC's healthcare-associated surveillance definitions are widely used in North America. They are available at http://www.cdc.gov/ncidod/dhqp/pdf/nnis/NosInfDefinitions.pdf. Other samples of definitions are provided in Appendix A.

Review Your Surveillance Program: Case Definitions
Choose one of your surveillance activities [e.g. *Clostridium difficile* Infections- (CDI)] and answer the following.
Identify the case definition(s) used for CDI in the program, where did these come from? Are they consistent with definitions used by others in the province?
Are the definition(s) clear and concise?
How comparable are the results of your surveillance program to other facilities in your province?

Sources of cases

There are a number of sources that will be utilized to identify cases and may include: admission forms, nurses on the patient care units, microbiology lab, ICP ward rounds, antibiotic use, physicians and community health practitioners. Complete the following table to help you summarize the strengths and limitations of the different options.

Source of information	Strengths	Limitations
Admission forms		
Chart review (retrospective)		
Chart review on unit		
ICP ward rounds		

Source of information	Strengths	Limitations
Microbiology lab reports		
Antibiotic use reports		
Reports from nurses		
Reports from doctors (e.g. post discharge)		
Other		

Review Your Surveillance Activity: Sources of Data
Identify the sources of data for identifying infections used in the surveillance program you have chosen. Can you identify additional strengths or limitations?
Explain why you need multiple sources for identifying possible cases

Data collection

Describe how you collect data to confirm or reject a case—what data do you collect and why, and how do you collect it (e.g., form to use, accessing Meditech results). It may be necessary to collect information from multiple sources such as pharmacy, chart review, x-ray data, and laboratory data therefore usually a form is required so that the same information is collected on all cases. For efficiency and ethical reasons, you should only collect the data that you need. Data collection procedures should include strategies for ensuring accuracy and completeness of data.

Review Your Surveillance Program: Data Collection
Instructions: Describe the surveillance activity you have chosen in terms of the following:
Identify the methods used for collecting data to confirm or reject cases.

Review Your Surveillance Program: Data Collection
Describe strategies to ensure you are collecting quality data.
Describe the methods used for obtaining denominator data.

Review your surveillance activity: Practice with data collection
Instructions: For the activity you have chosen, collect some data, e.g., do a chart a review using the form and definition; collect the information from pharmacy etc. Answer the following questions:
Assess what worked and didn't work well in terms of identifying infections e.g., issues with applying the definition, finding the information. How could data collection be improved?
Assess what worked and didn't work well in terms of identifying the denominator. How could this be improved?

Data handling

How you manage your data can affect both the efficiency and effectiveness of your surveillance program. A computerized system is essential, but there are many options available. Rather than being familiar with the variety of potential options, you need to understand the one used in your facility, even if you are not the person responsible for data entry.

Review your surveillance activity: Data Handling
For the activity you have chosen, answer the following questions:
Describe the system used for data management: 1. What database is used? 2. Who enters the data? 3. Who is responsible for maintaining the system?

Review your surveillance activity: Data Handling
What strategies are used to ensure data entry is accurate and complete, and data are “clean”?

Review your surveillance activity: practice data handling
Practice entering data from at least 3 data collection forms.

Data analysis

Surveillance data are used to generate infection rates, which can then be interpreted to identify if there is a problem to be addressed or if interventions have been effective.

Review your surveillance activity: practice with data analysis
For the activity you have chosen: Calculate and interpret the following rates (as appropriate for the data). Interpretation could be: rates are high, low, changed, “good”, “bad” etc. • Incidence rate • Prevalence rate
Discuss sources for benchmark or comparison data (e.g., NHSN, other published literature) with strengths and limitations (e.g., definitions used, completeness of data, availability, comparability of populations). Defend the choice of comparison data.
Interpret the rates using appropriate benchmark or comparison.

Documentation and Reporting

Discuss the purpose and value of writing reports. Who should get the report and what information do they need, and how often?
Describe the parts of a report

Discuss the role of the ICP in following up recommendations

Review Your Surveillance Program Reports
Review a previously written report and answer the following questions:
Assess the written report in terms of its readability, completeness and clarity
Determine what actions were taken as a result of the report to improve patient outcomes, or surveillance, as a result of the report
What recommendations would you make for improving the report or follow-up?

Other Issues: Ethics

Discuss ethical issues relating to surveillance in terms of why they are issues and how they can be addressed	
Confidentiality	
Privacy	
Mandatory reporting	

Conclusion

This concludes the review of surveillance. You should now feel more comfortable with both the key concepts and methods associated with surveillance. If you identified recommendations for strengthening the surveillance program you reviewed, discuss with your mentor how they might be implemented.

Appendix A - Definitions

Surgical site infections

The CDC/NHSN system for definitions of the three types of SSIs:

Superficial Incisional SSI
Infection occurs within 30 days after the operation, and
Infection involves only the skin or subcutaneous tissue, and
At least one of the following:

- Purulent drainage (culture documentation not required)
- Organisms isolated from fluid/tissue of superficial incision
- At least one sign of inflammation (e.g. pain or tenderness, induration, erythema, local warmth of the wound)
- The wound is deliberately opened by the surgeon
- Surgeon or attending physician declares the wound infected

A wound is not considered a superficial site infection if:

- A stitch or abscess is present
- Infection of episiotomy or circumcision site
- Infected burn wound
- Incisional SSI that extends into the fascia or muscle

Deep Incisional SSI
Infection occurs within 30 day of operation, or within one year if an implant is present, and
Infection involves deep soft issues (e.g., fascia and/or muscle) of the incision, and
At least one of the following:

- Purulent drainage from the deep incision but without organ/space involvement
- Fascial dehiscence, or fascia is deliberately separated by the surgeon due to signs of inflammation
- Deep abscesses is identified by direct examination, or during re-operation, or by histopathology, or radiologic examination
- Surgeon or attending declares that deep incisional infection is present

Organ / Space SSI
Infection occurs within 30 days after operation, or within one year if an implant is present, and
Infection involves anatomic structures not opened or manipulated by the operation, and
At least one of the following:

- Purulent drainage from a drain placed by a stab wound into the organ/space
- Organisms isolated from organ/space by aseptic culturing techniques
- Identification of abscess in the organ/space by direct examination, during re-operation, or by histopathologic or radiologic examination
- Diagnosis of organ/space SSI by surgeon or attending physician

Urinary Tract Infections

Catheter-associated urinary tract infections are classified into two groups with specific sets of criteria for each: symptomatic urinary tract infections (SUTI) and asymptomatic bacteriuria (ASB).

Symptomatic Urinary Tract Infection (SUTI)

A symptomatic urinary tract infection must meet at least *one* of the following criteria:

Criterion 1: Patient has at least *one* of the following signs or symptoms with no other recognized cause: fever (>38°C), urgency, frequency, dysuria, or suprapubic tenderness;
and
patient has a positive urine culture, that is, ≥105 microorganisms per mL of urine with no more than two species of microorganisms.

Criterion 2: Patient has at least *two* of the following signs or symptoms with no other recognized cause: fever (>38°C), urgency, frequency, dysuria, or suprapubic tenderness;
and
at least *one* of the following:
a) positive dipstick for leukocyte esterase and/or nitrate;

b) pyuria (urine specimen with ≥10 /mL or ≥3 /high power field of unspun urine);

c) organisms seen on Gram stain of unspun urine;

d) at least two urine cultures with repeated isolation of the same uropathogen (Gram-negative bacteria or *S. saprophyticus*) with ≥102 colonies/mL in non-voided specimens;

e) ≤105 colonies/mL of a single uropathogen (gram-negative bacteria or *S. saprophyticus*) in a patient being treated with an effective antimicrobial agent for a urinary tract infection;

f) physician diagnosis of a urinary tract infection;

g) physician institutes appropriate therapy for a urinary tract infection.

Criterion 3: Patient ≤1 year of age has at least one of the following signs or symptoms with no other recognized cause: fever (>38°C rectal), hypothermia (<37°C rectal), apnoea, bradycardia, dysuria, lethargy, or vomiting;
and
patient has a positive urine culture, that is, ≥105 microorganisms per mL of urine with no more than two species of microorganisms.

Criterion 4: Patient ≤ 1 year of age has at least one of the following signs or symptoms with no other recognized cause: fever (>38°C rectal), hypothermia (<37°C rectal), apnoea, bradycardia, dysuria, lethargy, or vomiting;

and
at least *one* of the following:
a) positive dipstick for leukocyte esterase and/or nitrate;

b) pyuria (urine specimen with ≥10 WBC/mL or ≥3 WBC/high power field of unspun urine);

c) organisms seen on Gram stain of unspun urine;

d) at least two urine cultures with repeated isolation of the same uropathogen (Gram-negative bacteria or *S. saprophyticus*) with ≥102 colonies/mL in non-voided specimens;

e) ≤105 colonies/mL of a single uropathogen (Gram-negative bacteria or *S. saprophyticus*) in a patient being treated with an effective antimicrobial agent for a urinary tract infection;

f) physician diagnosis of a urinary tract infection;

g) physician institutes appropriate therapy for a urinary tract infection.

Asymptomatic Bacteriuria (ASB)
An asymptomatic bacteriuria must meet at least *one* of the following criteria:

Criterion 1: Patient has had an indwelling urinary catheter within 7 days before the culture;
and
patient has a positive urine culture, that is, ≥105 microorganisms per mL of urine with no more than two species of microorganisms;
and
patient has no fever (>38°C), urgency, frequency, dysuria, or suprapubic tenderness.

Clostridium difficile infection (PICNet definition)

A diagnosis of CDI applies to a person with:

- Acute onset of diarrhea (≥ 3 loose stools within a 24 hr period) without another etiology (loose stool is defined as that which takes the shape of the container that holds it).

  And one or more of the following

  - Laboratory confirmation (positive toxin or culture with evidence of toxin production)
    or
  - Diagnosis of typical pseudo-membranes on sigmoidoscopy or colonoscopy or histological/pathological diagnosis of CDI
    or
  - Diagnosis of toxic megacolon.

Note: It is assumed that any stool sent to the laboratory for C. *difficile* testing is from a patient that has had a least 3 episodes of loose stools in a 24 hour period. It is accepted that the surveillance protocol may overestimate the number of cases as some patients may have had only one or two loose stools prior to a specimen being collected.

Healthcare-associated; New infection your Acute Care Facility
A case as defined above occurring more than three calendar days after admission to your acute care facility AND the case has not had CDI in the past 8 weeks

OR

A case as defined above with symptom onset in the community or 3 calendar days or less after admission to your acute care facility, provided that symptom onset was less than 4 weeks after the last discharge from your acute care facility.

Healthcare-associated: New Infection another healthcare facility:
A case as defined as above with symptom onset 3 calendar day or less after admission to your acute care facility; AND the case had an encounter with another healthcare facility, either as an inpatient (including Acute Care and Long Term Care), or an outpatient (including emergency care and clinics), within the last 4 weeks; AND the case has not had CDI in the past 8 weeks.

Not Healthcare-associated
A case as defined above with symptom onset in the community or 3 calendar days or less after admission to a your acute care facility AND the case has not an encounter with another healthcare facility in your Health Authority, either as an inpatient (including Acute Care and Long Term Care), or an outpatient (including emergency care and clinics), within the last 4 weeks; AND the case has not had CDI in the past 8 weeks.

Unknown
A case where there is insufficient information on healthcare exposure history to classify as a healthcare-associated case or not.

PICNet
PROVINCIAL INFECTION CONTROL NETWORK OF BRITISH COLUMBIA
A program of the Provincial Health Services Authority

PICNet welcomes your comments and feedback on these modules.
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