

Beyond the  
Basics of  
Infection  
Prevention

# **SURVEILLANCE AND INFECTION PREVENTION**

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# Objectives

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Define surveillance and its role in an infection prevention and control program

Describe types of surveillance

Advantages and disadvantages of various surveillance strategies

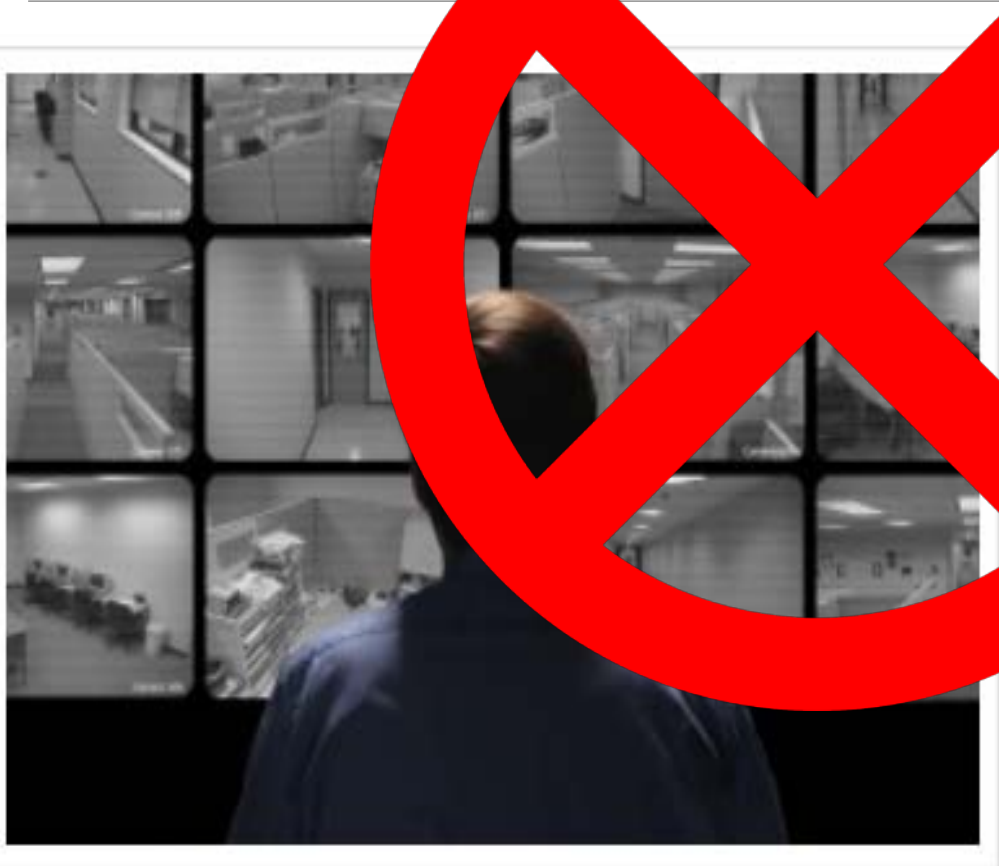
How to conduct Infection Prevention Risk Assessment and develop a plan

# Question

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What do you think of when you hear the word “surveillance”?





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What do you suppose is the definition of surveillance when applied to infection prevention and control?



# Surveillance



**Patient Safety**

**Healthcare  
Personnel  
Safety**

**Research &  
Development**

**Biovigilance\***



# Infection Prevention & Control (IPC) Surveillance

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- **Cornerstone of all successful hospital IPC program**
- IPC Surveillance is only the starting point and benchmark for assessing the need for intervention strategies
- **Effective surveillance involves**
  - *Counting cases and then*
  - *Calculating rates of various infections*
  - *Analyzing these data*
  - *Reporting the data in an appropriate way to personnel involved in patient care*
- **Challenges**
  - Changing healthcare delivery system
  - Emerging and reemerging infectious diseases
  - Mandatory reporting requirements



- Lord Kelvin



# Components of a Strong Surveillance Program

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Should be based on sound epidemiological and statistical principles

- Designed in accordance with current recommended practices
- Needs to be able to identify risk factors for infection
  - Adverse events
  - Implement risk-reduction measures
  - Monitor the effectiveness of intervention
- Identify
  - Outbreaks
  - Emerging infectious diseases
  - Antibiotic-resistant organisms
  - Bioterrorist events

# Components of a Strong Surveillance Program

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- Include
  - Infection prevention
  - Performance improvement
  - Patient safety
  - Public health activities
- Mandatory and public reporting requirements
- Surveillance data
  - Reduce the occurrence of infections by using risk factors and implementation of risk-reduction measures and monitoring effectiveness of interventions.

# Surveillance Definition and History

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- “Ongoing collection and analysis of data and the ongoing dissemination of information to those who need to know so that action can be taken.”

Reference: Last JM, ed. *A Dictionary of Epidemiology*. 4th ed. New York: Oxford University Press; 2001:174

- Surveillance is an essential component of an effective infection prevention program.
  - First recommended for hospitals by the American Hospital Association in 1958
- *Staphylococcus aureus*
  - 1960 CDC
  - 1976 Joint Commission

# SENIC PROJECT

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- 1985 **Study on the Efficacy of Nosocomial Infection Control**
  - Scientific evidence that hospitals with strong surveillance program has strong prevention and control program
  - **improved patient outcomes by reducing HAI**
- Since 1985 healthcare delivery systems has shifted outside of the acute care hospital
  - Publication of surveillance recommendations for outpatient settings, LTC, rehab, ASC, dialysis, home care, hospice, mental health, and correctional facilities

# Purpose of Surveillance

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- Provide data to conduct a facility risk assessment for health care associated infection, diseases, such as legionellosis or tuberculosis
- Ensure compliance with state and federal regulations and state mandatory reporting requirement
- Meet requirements of accrediting agencies, such as the Joint Commission and the Commission on Accreditation of Rehabilitation Facilities (CARF)
- Provide information for the education of healthcare personnel
- Monitor injuries and identify risk factors for injuries in personnel
- Detect an emerging infectious disease or a bioterrorist event

# Types of Surveillance

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- **Total or Whole House Surveillance**
  - Monitors all HAI in the entire facility
  - Overall facility infection rate should not be calculated  
Rates should be calculated for specific HAIs in a defined population
  - Example:
    - » Central line-associated bloodstream infections
    - » MRSA Blood Stream Infection

# Types of Surveillance

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- Overall facility rates are not sensitive enough to identify problem or not adjusted for specific infection or injury risks so they are not appropriate for:
  - *measuring trends over time*
  - *Comparisons between groups*
  - *Benchmarking*
- Although ideal most facilities do not have the technical and personnel resources to do house-wide surveillance
- **Target surveillance is generally conducted**

# Types of Surveillance

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- **Target surveillance**

- 1990 CDC shifted from total house surveillance to target surveillance (NNIS system)


- Focuses on:

- particular care units (e.g., ICU, nurseries etc)
- Infections related to devices (e.g., intravascular and urinary catheters)
- Invasive procedures (e.g., surgery)
- Organisms (e.g., resistant organisms such as MRSA, VRE, ESBL, etc)

- Focuses on high-risk, high-volume procedures and adverse outcomes that are potentially preventable



# Infection Definitions – Acute Care




Surveillance Definitions

## CDC/NHSN Surveillance Definitions for Specific Types of Infections

### INTRODUCTION

This chapter contains the CDC/NHSN surveillance definitions and criteria for all specific types of infections. This chapter also provides additional required criteria for the specific infection types that constitute organ space surgical site infections (SSI) (e.g., mediastinitis [MED] that may follow a coronary artery bypass graft, intra-abdominal abscess [IAB] after colon surgery, etc.). **Comments and reporting instructions that follow the site-specific criteria provide further explanation and are integral to the correct application of the criteria.** Refer to [Chapter 2 \(Identifying HAIs in NHSN\)](#) for specific guidance for making HAI determinations.



Surveillance Definitions

Type	Page
<b>BJ – Bone and Joint Infection</b>	<a href="#">6</a>
BONE – Osteomyelitis	<a href="#">6</a>
DISC – Disc space infection	<a href="#">6</a>
JNT – Joint or bursa infection	<a href="#">7</a>
PJI – Prosthetic joint infection	<a href="#">7</a>
McGreer LTC Infection Definitions	
<b>CNS – Central Nervous System</b>	<a href="#">8</a>
IC – Intracranial infection	<a href="#">8</a>
MEN – Meningitis or ventriculitis	<a href="#">9</a>
SA – Spinal abscess without meningitis	<a href="#">10</a>
<b>CVS – Cardiovascular System Infection</b>	<a href="#">10</a>
CARD – Myocarditis or pericarditis	<a href="#">10</a>
ENDO – Endocarditis	<a href="#">11</a>
MED – Mediastinitis	<a href="#">14</a>
VASC – Arterial or venous infection	<a href="#">14</a>
<b>EENT – Eye, Ear, Nose, Throat, or Mouth Infection</b>	<a href="#">15</a>
CONJ – Conjunctivitis	<a href="#">15</a>
EAR – Ear, mastoid infection	<a href="#">16</a>
EYE – Eye infection, other than conjunctivitis	<a href="#">17</a>
ORAL – Oral cavity infection (mouth, tongue, or gums)	<a href="#">17</a>
SINU – Sinusitis	<a href="#">18</a>
UR – Upper respiratory tract infection, pharyngitis, laryngitis, epiglottitis	<a href="#">18</a>

[https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef\\_current.pdf](https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf)

## Tracking Infections in Long-term Care Facilities



Eliminating infections, many of which are preventable, is a significant way to improve care and decrease costs. CDC's National Healthcare Safety Network provides long-term care facilities with a customized system to track infections in a streamlined and systematic way. When facilities track infections, they can identify problems and track progress toward stopping infections. On the national level, data entered into NHSN will gauge progress toward national healthcare-associated infection goals.

NHSN's long-term care component is ideal for use by: nursing homes, skilled nursing facilities, chronic care facilities, and assisted living and residential care facilities



### C. difficile & MRSA Infections



Surveillance for C. difficile, MRSA, and other Drug-resistant

### Urinary Tract Infections (UTI)



Surveillance for Urinary Tract Infections (UTI)

### Prevention Process Measures



Surveillance for Prevention Process Measures – Hand Hygiene, Gloves and

NHSN

NHSN Login

About NHSN

+

Enroll Here

+

Materials for Enrolled Facilities

-

Ambulatory Surgery Centers

+

Acute Care Hospitals/Facilities

+

Long-term Acute Care Hospitals/Facilities

+

**Long-term Care Facilities**

-

Surveillance for C. difficile and MRSA Infections

Surveillance for Urinary Tract Infections

Surveillance for Process Measures – Hand Hygiene, Gloves and Gown Adherence

Surveillance for Healthcare Personnel Exposure

Surveillance for Healthcare Personnel Vaccination

Newsletters and Archived

# Data Collection

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- Data to collect depends on the event being monitored
- Data collection for infectious events:
  - Demographics:  
name, sex, age, unique identifier (MD #, acct. # unit, MD, date of admission, date of onset of infection, type of infection, date of discharge, transfer, or death
  - Information needed to determine whether the case definition is met:  
lab results, diagnostic tests, dates performed, sites and dates cultured and organisms isolated, antibiotic susceptibility, clinical signs and symptoms specific for the infection being monitored.
  - Risk factors for the infection being monitored:  
underlying conditions and diseases, surgical procedure and date performed, including surgeon, ASA score, wound classification, use of IV catheters including date of insertion and duration of use etc.

# Data Collection Tool



Form Approved  
OMB No. 0920-0666  
Exp. Date: 11/30/2019  
www.cdc.gov/nhsn

## Denominator for Procedure

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\*required for saving

Facility ID	Procedure #:	
*Patient ID:	Social Security #:	
Secondary ID:	Medicare #:	
Patient Name, Last:	First:	Middle:
*Gender: F M Other	*Date of Birth:	
Ethnicity (Specify):	Race (Specify):	
Event Type: PROC	*NHSN Procedure Code:	
*Date of Procedure:	ICD-10-PCS or CPT Procedure Code:	
<b>Procedure Details</b>		
*Outpatient: Yes No	*Duration: _____ Hours _____ Minutes	
*Wound Class: C CC CO D	*General Anesthesia: Yes No	
ASA Score: 1 2 3 4 5	*Emergency: Yes No	
*Trauma: Yes No	*Scope: Yes No	*Diabetes Mellitus: Yes No
*Height: _____ feet _____ inches	*Closure Technique: Primary Other than primary	
(choose one) _____ meters	Surgeon Code: _____	
*Weight: _____ lbs/kg (circle one)		
CSEC: *Duration of Labor: _____ hours		
Circle one: FUSN		
*Spinal Level (check one)	*Approach/Technique (check one)	
<input type="checkbox"/> Atlas-axis	<input type="checkbox"/> Anterior	
<input type="checkbox"/> Atlas-axis/Cervical	<input type="checkbox"/> Posterior	
<input type="checkbox"/> Cervical	<input type="checkbox"/> Anterior and Posterior	
<input type="checkbox"/> Cervical/Dorsal/Dorsolumbar	<input type="checkbox"/> Transoral	
<input type="checkbox"/> Dorsal/Dorsolumbar		
<input type="checkbox"/> Lumbar/Lumbosacral		
Circle one: HPRO KPRO		
ICD-10-PCS Supplemental Procedure Code for HPRO/KPRO: _____		
*Check one: <input type="checkbox"/> Total <input type="checkbox"/> Hemi <input type="checkbox"/> Resurfacing (HPRO only)		

# Numerator/Denominator

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- **Numerator:** the upper portion of a fraction used to calculate a rate or ratio. In surveillance, it is usually the number of cases of a disease or event being studied.
- **Denominator:** the lower portion of a fraction used to calculate a rate or ratio.

## Example:

- 5 UTIs/135 Catheter Days = rate  
5 is the Numerator      135 is the Denominator
- Denominator can be: census (rarely used), patient or resident days, device days, number of visits, number of surgical site cases (by type of surgery)

# Standardized Infection Ratio (SIR)

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- **Provides improved risk adjustment and replace risk-stratified SSI rate**
  - *Risk models* developed specific for each procedure
  - Example: SSI Risk factors for C-Section Proc.
    - *Age, Anesthesia type, ASA score, Duration, BMI, Duration of labor, wound class, # of beds*

# What is Standardize Infection Ratio (SIR)

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## ➤ Terminology

- SIR is not a rate
  - It is a ratio derived from 2 different rates
  - Compares 1 number to another

$$\text{SIR} = \frac{\text{Observed SSIs}}{\text{Predicted SSIs (Expected)}}$$

## ➤ Example:

- We have 4 SSI after 100 C-Section procedures. Based on our mix of surgical patients undergoing C-Section, national data predicts (expected) we should have 2.5 SSI. SIR is calculated as

$$\text{SIR} = 4/2.5 = 1.6$$

# What is Standardize Infection Ratio (SIR)

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## ➤ Interpreting SSI SIR

- Value of **1.0** = number of SSI observed in our hospital is the **same as the predicted (expected)** number of SSI as compared to national referent data
  - Less than 1.0 = fewer SSI than predicted
  - Greater than 1.0 = more SSI than predicted
  - If P-value  $>0.05$  – SIR is not statistically significant
  - Confidence Interval (CI) overlaps 1.0 – not statistically significant



# Written Surveillance Plan

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## ❑ Describe

- Type of healthcare setting
- Services provided and population
- The surveillance program purpose
- The indicators (what are you monitoring)
- The methodology used for case definition
- Data collection
- Analysis
- Types of reports generated and to whom they are provided
- Process used to evaluate the surveillance program

# Sample IPC Plan

## **Meriter Unity Point Infection Prevention and Control Plan 2016**

### **PURPOSE**

UnityPoint Health- Meriter is a community based healthcare organization which strives to provide high quality health care services in a safe and cost effective manner. The Infection Prevention Program supports this effort by defining a systemic, coordinated and continuous approach to improving performance by focusing upon surveillance, prevention and control of infections throughout the organization. This Infection Prevention Program is a multidisciplinary collaboration to support the organizations effort to improve patient safety and quality of care.

This program plan applies to the following locations:

1. Hospital
2. Ambulatory Care Sites
3. Administrative Buildings

### **GOALS**

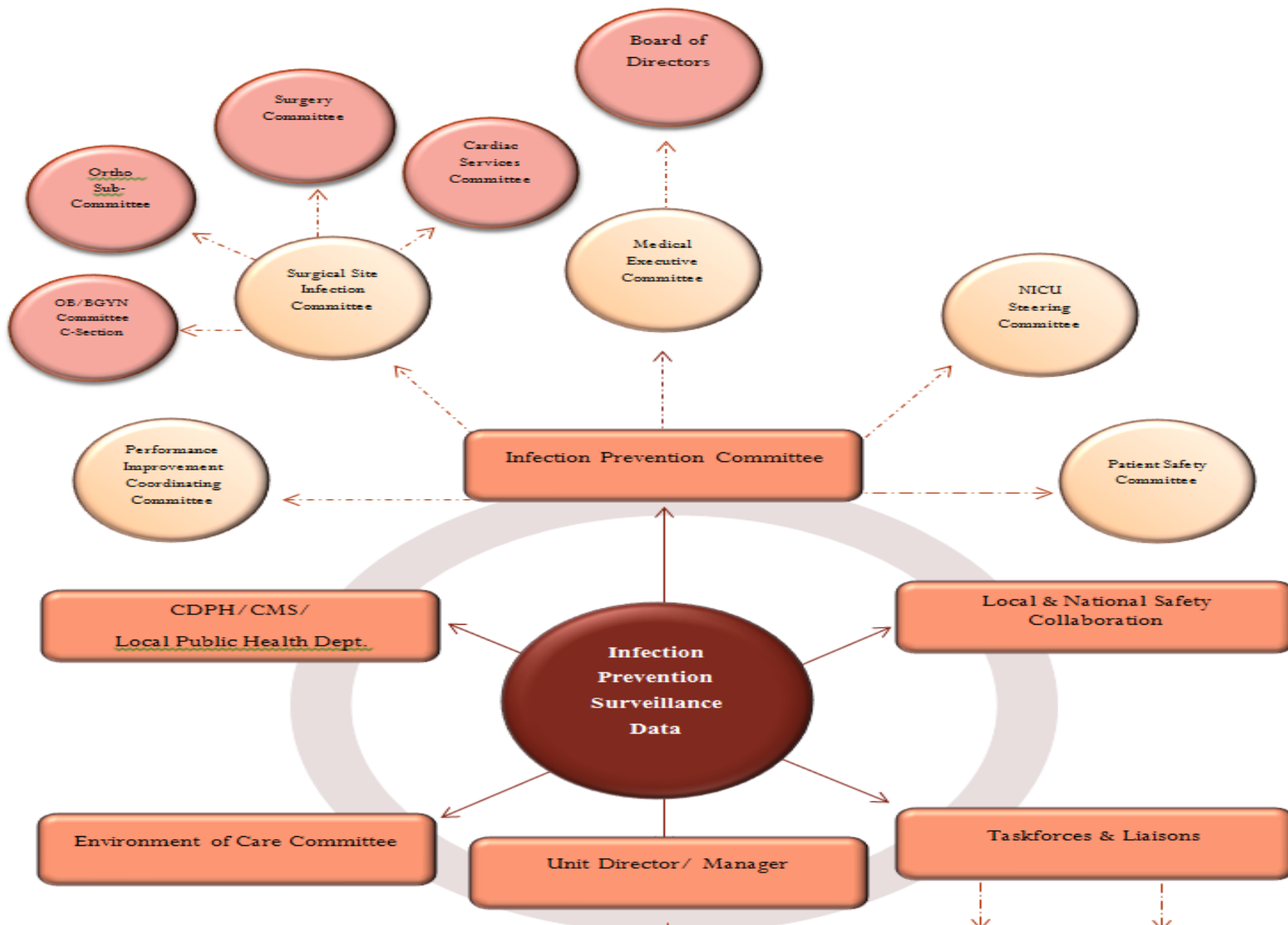
There are three principal goals for the UnityPoint Health-Meriter Infection Prevention Program.

1. Protect the Patient by minimizing the risk of transmission of pathogen's associated with procedures, medical equipment, and medical devices in an effort to reduce morbidity and mortality and shorten periods of illness and hospitalization.
2. Protect healthcare workers, visitors and others in the healthcare environment. This is accomplished by limiting unprotected exposure to pathogens using administrative controls, engineering controls, isolation, hand hygiene, barrier precautions including personal protective equipment (PPE), case investigation, education, immunization, and employee health programs that protect employees from work-related exposures.
3. Accomplish the previous two goals in a cost effective manner by preventing costs associated with the treatment of complications due to healthcare associated infections.

### **SCOPE AND AUTHORITY**

The Infection Prevention Program implements a multidisciplinary collaborative plan designed to prevent and control the spread of infection based upon the clinical needs and demographics of our patients and employees. The Centers for Disease Control and Prevention's (CDC) National Healthcare Safety Network (NHSN) is used to define healthcare associated infections. An Infectious Disease Physician contracted by UnityPoint Health-Meriter provides oversight for the Infection Prevention Program and Employee Health Services Program. The Infection Prevention Program plan is designed to protect patients, healthcare workers and visitors and to ensure the optimal operation of the healthcare system by means of the

## Communication of Infection Prevention Data



# Evaluation of Surveillance Program

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- Team Approach and Data driven
- The usefulness and ability to meet the organization's objectives
- Revisions should be made as needed
- Compare program structure and activities to current practices and published recommendations for surveillance
- The program resources
  - Adequate number of trained personnel
  - Appropriate computer hardware and software, or lab support
  - Need for data analyst, or administrative support

# Benchmarking and Comparing Data

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- Benchmarks are measures against which outcomes and processes can be compared.
- There are currently few external benchmarks that can be used for interfacility comparisons of HAIs and other adverse events.
  - CDPH reports
- The NHSN program for HAI surveillance in acute care hospitals is the most widely used.
- NHSN provides Web-based reporting, feedback of comparative data for performance improvement, and access to preventive tools and best practices.

*<http://www.cdc.gov/nhsn/>*

# Summary

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- Surveillance practices evolve in response to changes in healthcare delivery.
- The use of surveillance data has shifted from measuring clinical outcomes, such as infections, to guiding performance improvement activities and demonstrating improvements in clinical outcomes and healthcare practices.
- With the increase of antimicrobial resistance and outbreaks caused by emerging and reemerging infectious diseases highlights the need for local, regional, national, and global surveillance systems.
- ICPs responsible for managing surveillance programs must ensure that their programs are based on sound epidemiological and statistical principles and designed and evaluated in accordance with current recommendation and practices and have the resources needed to promote quality healthcare.

# Resources

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- **APIC**- Association for Professional in Infection Control and Epidemiology
  - Local APIC chapter
  - CACC – California Coordinating Council
- **SHEA** - Society for Healthcare Epidemiology of America
- **NHSN** – National Healthcare Safety Network
- **CDPH** – California Department of Public Health
- **TJC** - The Joint Commission

