EPIDEMIOLOGY

KSU

College of Applied Medical Sciences

CHS 334

Epidemiology

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Surveillance for Nosocomial Infection

Purpose of Surveillance

Hospital-acquired infection (HAI) — also known as nosocomial infection are infections acquired in hospitals and other healthcare facilities, the patient must have been admitted for reasons other than the infection, and should not have any signs of active or incubating infection at the time of admission.

Surveillance for Nosocomial Infection

Purpose of Surveillance

Hospital-acquired infection (HAI) —A large percentage of these infections are preventable and the scientific literature has established that incorporating surveillance systems into infection prevention and control activities are a means to reduce the frequency of these events.

Surveillance for Nosocomial Infection

Purpose of Surveillance

With the emergence of antibiotic-resistant organisms (AROs) in health care settings, increasingly immunocompromised patients in acute care and increasing numbers of individuals requiring long-term care and complex continuing care, health care-associated infections represent an important and growing challenge to the entire health care system.

Surveillance for Nosocomial Infection

Purpose of Surveillance

A surveillance system in hospitals and long-term care homes forms an integral part of an infection prevention and control program aimed at reducing health care-associated infections.

There are two key aspects of surveillance systems:

1. **Surveillance is an organized and ongoing component of a program to improve a specific area of population health.**

Surveillance for Nosocomial Infection

Purpose of Surveillance

2. **Surveillance is also useful in monitoring the effectiveness of the infection prevention and control activities programs in the healthcare organization.**

- **Surveillance is defined as "*the ongoing, systematic collection, analysis, interpretation and evaluation of health data closely integrated with the timely dissemination of these data to those who need it*"**

Surveillance for Nosocomial Infection

Purpose of Surveillance

- **Surveillance systems go beyond the collection of information. They involve mechanisms by which the knowledge gained through surveillance is delivered to those who can use it to direct resources where needed to improve health.**

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Purpose of Surveillance

Surveillance systems for infections in acute care and long-term care homes serve several related purposes towards the end goal of reducing the risk of acquiring health care-associated infection or Nosocomial Infection:

1. **Detect and Monitor**

   A well-functioning surveillance system provides the means to establish the endemic, or baseline, rate of health care-associated infection in a health care setting.

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Purpose of Surveillance

2. **Identify Risk Factors for Health Care-Associated Infection**

   The data collected as part of a surveillance system in a health care setting can be used to identify patients or residents at high risk for HAIs or practices associated with a high risk of infection.

3. **Evaluate Preventive Interventions**

   Following the implementation of preventive practices, data from the surveillance system can be used to investigate whether the measures were effective in achieving their intended outcome of improved infection control.

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Purpose of Surveillance

4. **Provide Information to Inform, Educate and Reinforce Practice**

Surveillance information can trace evolution of infection over time and inform public health practice. In addition, the continued presence of a surveillance system can increase awareness through discussions initiated by ICPs as they gather information from wards.

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Goals and information needs of a surveillance system will vary across health care settings, as well as the resources available for the establishment and operation of a surveillance system.

The general steps required in setting up a surveillance program are:

1. **Assess the population to be surveyed**
2. **Select the outcome(s) for surveillance**

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Surveillance of Nosocomial Infection

The general steps required in setting up a surveillance program are:

3. **Use standardized, validated case definitions for infection**
4. **Use case definitions consistently over time**
5. **Collect the surveillance data**
6. **Calculate and analyze surveillance rates**
7. **Apply risk stratification methodology where applicable**
8. **Interpret Hospital-acquired infection rates**

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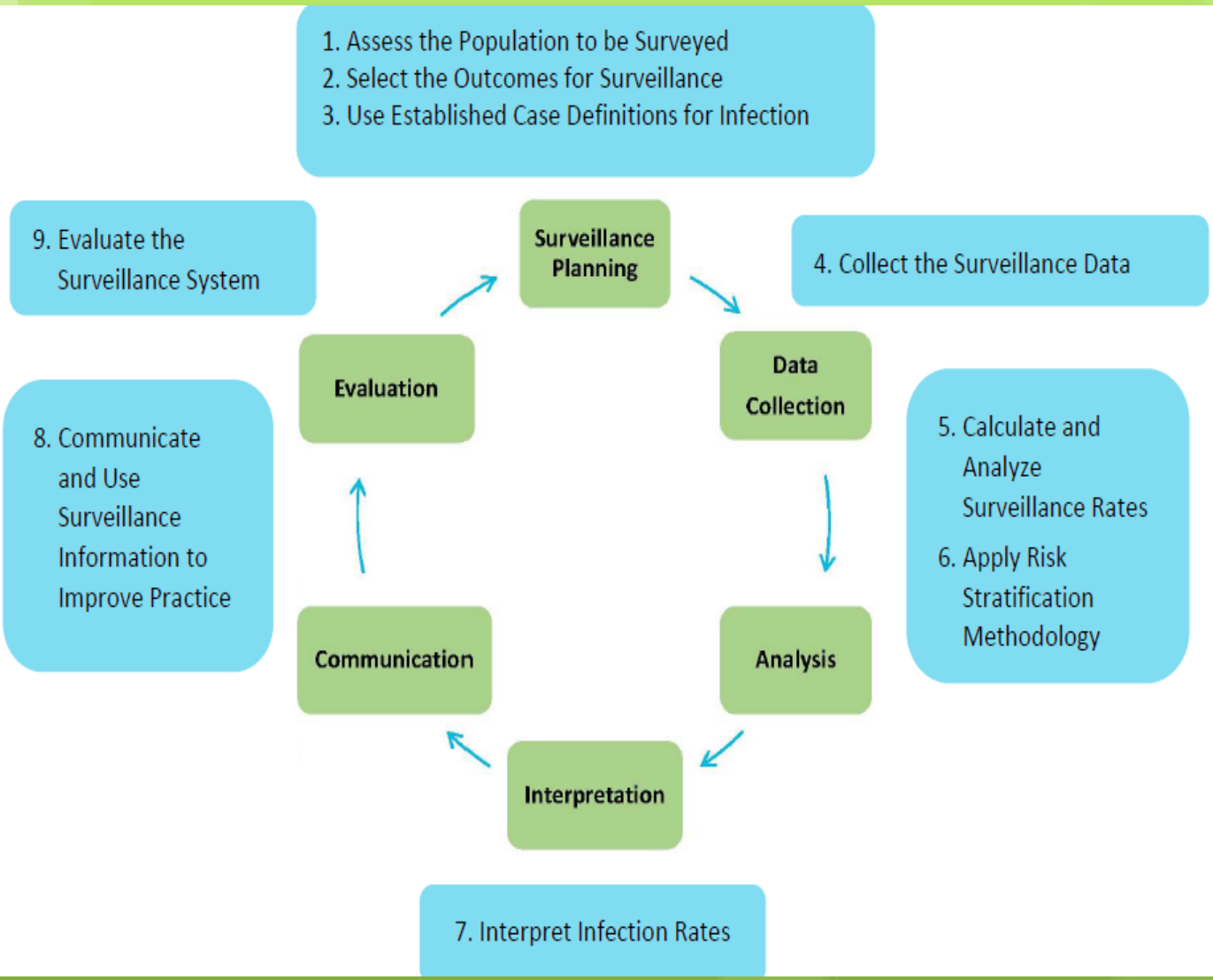
The general steps required in setting up a surveillance program are:

9. **Communicate surveillance information to stakeholders**
10. **Use surveillance information to improve practice**
11. **Evaluate the surveillance system.**

The general steps required in setting up a surveillance program



Surveillance for Nosocomial Infection

Surveillance of Nosocomial Infection

Data Sources

Many different sources provide information about patients with infections:

Patient Based

- Patient examination
- Clinical records
- Communication with staff

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Data Sources, Patient Based

- **Patient medical record**
  - **Treatments**
  - **Wound-dressing changes**
  - **Intravenous fluids**
  - **Urinary catheter**
  - **Surgical databases**
  - **Isolation precaution**
  - **Antibiotics**

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Data Sources, Patient Based

- Medication records
- Temperature records
- Radiology reports

Surveillance for Nosocomial Infection

Data Sources, Laboratory based

- Bacteriology reports دراسة البكتيريا
- Mycology reports الفطريات
- Parasitology reports علم الطفيليات
- Serology reports علم الأمصال
- Virology reports علم الفيروسات
- Pathology reports علم الأمراض
- Antimicrobial susceptibility patterns مضادات الميكروبات

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Data Sources, Other Departments, Services, or Agencies

- Admission department
- Operating suite
- Emergency department
- Outpatient clinics
- Risk control (for incident reports and other data)
- Employee health
- Home-care agencies
- Multicenter surveillance systems
- Local and state health departments

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Data Sources,

In addition, infection control personnel can obtain data from databases maintained by other departments such as medical records, pharmacy, respiratory therapy, admissions, risk control, and financial management. However, these databases were not designed for collecting data on infections.

Surveillance for Nosocomial Infection

Surveillance Methods

Each infection control team must determine which of many surveillance methods is best for their hospital. There are five basic surveillance methods, each one of these methods has some advantages and disadvantages.

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Surveillance Methods

Hospital Wide Traditional Surveillance

Hospital-wide surveillance, the most comprehensive method, first was described by the CDC in 1972. In this method, the infection controls professional (ICP) prospectively and continuously surveys all care areas to identify patients who have acquired infections during hospitalization.

- **The ICP gather information from daily microbiology reports and from the medical records of patients who have fever or positive cultures**

Surveillance for Nosocomial Infection

Surveillance Methods

Hospital Wide Traditional Surveillance

- **The ICP gather information from patients who are receiving antibiotics or are on isolation precautions; by talking with the nursing staff and by occasionally seeing patients; by periodically reviewing all autopsy reports and employee health records.**
- **Each month, the infection control team calculates the overall hospital infection rates and infection rates by site, nursing units, physician service, pathogen, or operative procedure.**

Surveillance for Nosocomial Infection

Surveillance Methods

Hospital Wide Traditional Surveillance

- **Advantages**
  - **Collects comprehensive data on all infections in the facility**
  - **Establishes baseline infection rates**
  - **Identifies patterns of infections**
  - **Recognizes outbreaks early**
  - **Increases visibility of ICP**

Surveillance for Nosocomial Infection

Surveillance Methods

Hospital Wide Traditional Surveillance

- **Disadvantages**
  - **Expensive, labor intensive, and time consuming**
  - **Yields excessive data**
  - **Leaves little time to analyze data and initiate changes**
  - **Detects infections that cannot be prevented**
  - **Overall infection rate not valid for inter-hospital comparison**

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Surveillance Methods

Periodic Surveillance

There are several ways to conduct periodic surveillance.

- **In one method, the infection control program conducts hospital-wide surveillance only during specified time intervals, such as 1 month each quarter.**
- **In another method, the infection control program conducts surveillance on one or few units for a specified time period and then shifts to another unit or units.**

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Surveillance Methods

Periodic Surveillance

- **Advantages**
  - **Increase efficiency of surveillance**
  - **Liberates ICP to perform other activities**

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Surveillance Methods

Periodic Surveillance

- **Disadvantages**
- **Provides data only during periods in which surveillance is conducted**
- **May miss clusters or outbreaks during none surveyed periods**

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Surveillance Methods

Prevalence Survey

- In a prevalence survey, the ICP counts the number of active infections during a specified time period.
- Active infections are defined as all infections that are present during the time of the survey, including those that are newly diagnosed and those that are being treated when the survey begins.
- The total number of active infections is divided by the number of patients present during the survey.

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Surveillance Methods

Prevalence Survey

- **The rates obtained from prevalence surveys are usually higher than incidence, because new and existing infections are included in the count.**
- **Prevalence surveys can focus on particular populations or important organisms.**
- **It can also be used to assess risk factors for infection in a particular population.**

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Surveillance Methods

Prevalence Survey

- **Advantages**
- **Documents nosocomial infection trends**
- **Identifies risk factors**
- **Relatively quick and inexpensive**
- **Identifies areas that need additional surveillance**

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Surveillance Methods

Prevalence Survey

- **Disadvantages**
- **Data collection may be tedious**
- **Must collect data in short time period**
- **Data are restricted to specific time period**
- **Cannot compare prevalence rates with incidence rates**
- **Few studies on prevalence rates published**
- **May miss clusters or outbreaks**

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Surveillance Methods

Targeted Surveillance

- There are several approaches to targeted surveillance.
- Many infection control programs focus their efforts on selected geographic areas as ICU or selected services such as cardiothoracic surgery.
- Other programs focus surveillance on specific populations such as patients at high risk acquiring infections (e.g., transplant patients), patients undergoing specific medical interventions (e.g., hemodialysis patients), or patients with infections at specific sites (e.g., bloodstream or surgical site).

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Surveillance Methods

Targeted Surveillance

- **Some infection control staff target surveillance to infections associated with specific devices such as ventilator-associated pneumonia (VAP).**
- **Some infection control programs use data from the microbiology laboratory to limit their surveillance.**

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Surveillance Methods

Targeted Surveillance

- **Advantages**
- **Concentrates limited resources on high-risk areas**
- **Focuses on infections with known control measures to reduce infection risk**
- **Can determine valid denominator**
- **Flexible, can be mixed with other strategies**
- **Increases efficiency of surveillance**
- **Liberates ICP to perform other activities**

Surveillance for Nosocomial Infection

Surveillance Methods

Targeted Surveillance

- **Disadvantages**
- **Collects data only for targeted patients or risks**
- **May miss clusters or outbreaks none surveyed areas or populations**

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Surveillance Methods

Outbreak Thresholds

- **Some investigators have conducted surveillance to assess their baseline infection rates.**
- **On the bases of their data, they developed outbreak thresholds.**
- **Subsequently, they stopped conducting routine surveillance and only evaluated problems when the number of isolates of a particular species or the number of positive cultures exceeds outbreak thresholds.**

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Surveillance Methods

Outbreak Thresholds

- **Advantages**
- **Automatic, ongoing monitor**
- **Thresholds are institution specific**
- **Investigation is prompted by objective thresholds**

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Surveillance Methods

Outbreak Thresholds

- **Disadvantages**
- **Does not provide data on endemic rates**
- **Difficult to compare rates with those of outside institutions**

THANK YOU