SURVEILLANCE AND EPIDEMIOLOGIC INVESTIGATION-PART I

CIC REVIEW COURSE
JULY 14, 2023

Presented by:

Evelyn Cook, Associate Director

NC Statewide Program for Infection Control and Epidemiology (SPICE)

https://spice.unc.edu/

KEY CONCEPTS

▶ Surveillance is an essential component of an effective infection prevention program

▶ Surveillance activities should support a system that can identify risk factors for infection and other adverse events, implement risk reduction measures and monitor the effectiveness of interventions

▶ Critical role in outbreak, emerging infectious diseases, antibiotic resistant organisms and bioterrorist events

▶ Epidemiology forms the basis of all health-related studies

SPICE

OBJECTIVES

▶ Describe the recommended components for an infection prevention program

▶ List the elements required for an organization surveillance system

▶ Discuss general principles of epidemiology

▶ Apply information to practice questions

SPICE

▶ *"The field of infection prevention emerged from the results of the Study of the Efficacy of Nosocomial Infection Control (SENIC), which demonstrated that strategies such as surveillance and feedback led to sizeable decreases in hospital-acquired infections"*

SPICE

WHAT ARE THE CORE INFECTION PREVENTION PRACTICES?
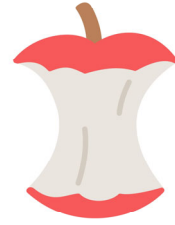
➢ The core set of infection prevention and control practices should be implemented in **all** healthcare settings

➢ Applies to inpatient settings, outpatient settings, and non-traditional healthcare settings (e.g., homes, pharmacies, health fairs)

➢ There are eight core practices:

> ➢ **Leadership Support**
>
> ➢ **Education and Training of Healthcare Personnel on Infection Prevention**
>
> ➢ **Patient, Family and Caregiver Education**
>
> ➢ **Performance Monitoring and Feedback**

  ➢ Standard Precautions

  ➢ Transmission-Based Precautions

  ➢ Temporary Invasive Medical Devices for Clinical Management

  ➢ Occupational Health

https://www.cdc.gov/hicpac/pdf/core-practices.pdf

INFECTION PREVENTION PROGRAM

▶ Effective infection control programs prevent HAIs

▶ A comprehensive infection control program consists of numerous elements including:

  ▶ Evidence-based written policies and procedures

  ▶ Training and education

  ▶ Healthcare personnel safety

  ▶ Surveillance and disease reporting

▶ Activities should reflect the type of care provided, infection risks, and population served

▶ Conducting infection control program assessments can help to identify program strengths and weaknesses

▶ Assessment findings can be utilized for staff education and improved patient outcome

INFECTION PREVENTION TEAM

- Infection prevention committee
  - Multi-disciplinary
  - Not required by TJC but some states do require
  - Dissemination of information is critical
- Infection preventionist
  - Primary background in nursing, microbiology, public health or medical technology.
  - Daily collaboration with all facets of healthcare
  - Functions as consultant, educator, role model, researcher and change agent
- Healthcare epidemiologist
  - May be the chair of committee or be technical advisory
  - Often physician with special training in healthcare epidemiology and infection prevention

SPICE

EVOLUTION OF TERMINOLOGY

Program Terminology

- Infection Control
- Infection Prevention
- Nosocomial
- Hospital acquired
- Healthcare-associated infection
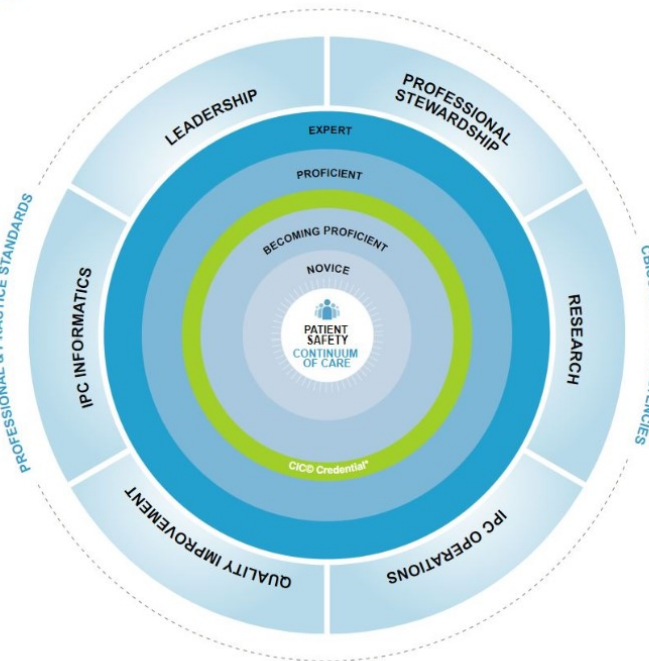- Health care epidemiology

Staffing Terminology

- Infection Control Nurse
- Infection Control Officer
- Infection Control Professional
- Infection Preventionist
- Infectious Disease Physician
- Hospital Epidemiologist

PREVENTION WORKS!

SPICE

2019 APIC COMPETENCY MODEL

Figure 2-2.

The 2019 APIC Competency Model.

- Patient safety is the core of the model-application through the continuum of care
- Concentric circles radiate outward, representing the career stages, with an additional band representing the ideal location for the CIC credential
- 6 future-oriented competency domains
- Final band supports professional development and CBIC core competencies

SPICE

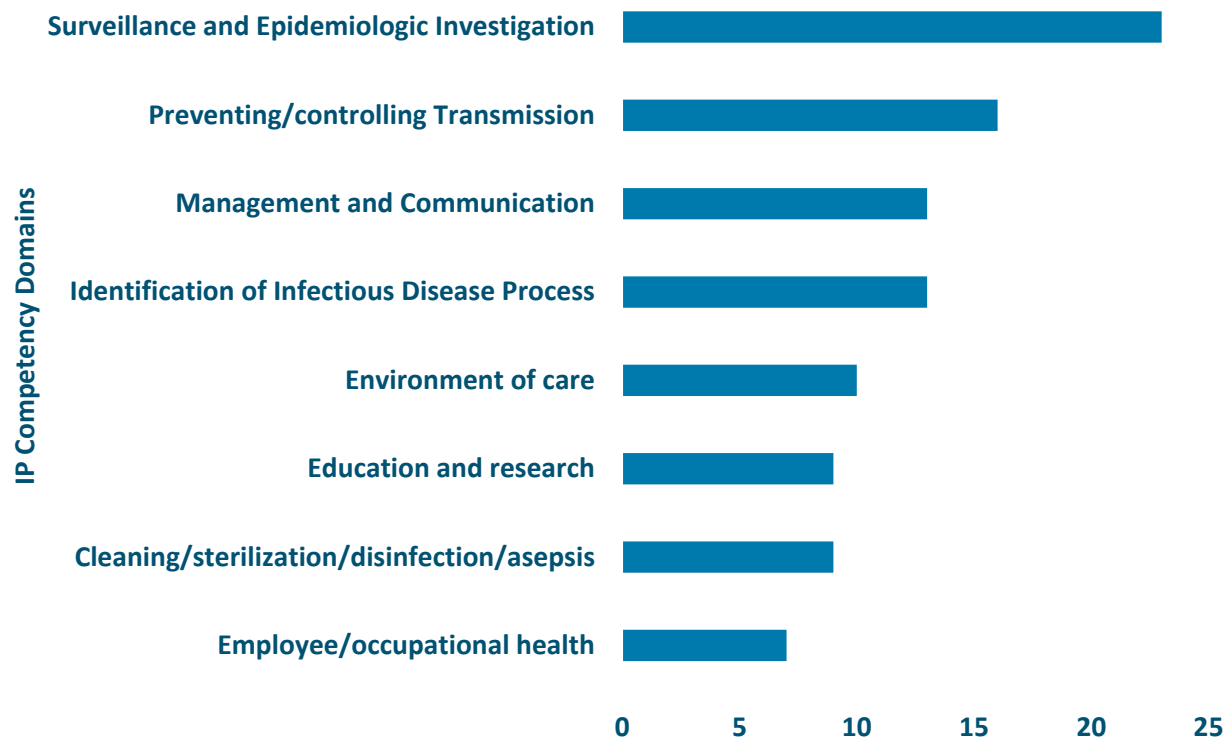
INFECTION PREVENTIONIST

- Collection and analysis of infection data
- Evaluation of products and procedures
- Development of policies
- Consultation
- Education

- Implementation of mandated changes
- Application of epidemiologic principles-*outbreak management*
- Antimicrobial management
- Research
- High quality services in a cost-efficient manner

SPICE

% Time Spent on IPC Activities

Bar chart — IP Competency Domains (y-axis) vs % time (x-axis, 0 to 25):
- Surveillance and Epidemiologic Investigation ≈ 23
- Preventing/controlling Transmission ≈ 16
- Management and Communication ≈ 13
- Identification of Infectious Disease Process ≈ 13
- Environment of care ≈ 10
- Education and research ≈ 9
- Cleaning/sterilization/disinfection/asepsis ≈ 9
- Employee/occupational health ≈ 7

• 10.1016/j.ajic.2022.12.002

IP STAFFING

▶ 1969
  ▶ CDC recommended 1 FTE per 250 occupied beds (SENIC) acute care

▶ 2004
  ▶ Health Canada model projected 3 FTE per every 500 beds in acute care

▶ Netherlands
  ▶ 1 FTE per 178 beds acute care

▶ APIC's Delphi project
  ▶ 0.8-1 IP for every 100 occupied beds, acute care

STAFFING CHALLENGES

▶ Recruitment and hiring practices in U.S. infection prevention and control departments: Results of a national survey[1]

  ▶ Vacant IP position reported by 25%

  ▶ 56% reported positions vacant < 3 months; 24% 3- 6 months and 15% 6-12 months

▶ Retirements

  ▶ 52% anticipate in the next 1-2 years

▶ Non-acute care settings[2]

  ▶ Less than 50% of time officially dedicated to IPC

[1]H Gilmartin, SM Reese, S Smathers: AJIC-Volume 49 Number 1 pgs 70-74
[2]M Pogorzelska-Maziarz, E Kalp: AJIC 45 (2017) 597-602

SPICE

Identify Risks

Evaluate Plan

Risk Assessment Process

Create Goals

Develop & Implement Plan

INFECTION PREVENTION RISK ASSESSMENT

SPICE

INFECTION CONTROL RISK ASSESSMENT IS ESSENTIAL TO INFECTION CONTROL PLAN

Infection Control Risk Assessment

↓

Priorities

↓

Goals

↓

Infection Control Plan

SPICE

DETERMINE YOUR EVENTS

EVENT	PROBABILITY OF OCCURRENCE *(How likely is this to occur)*				RISK LEVEL OF FAILURE *(What would be the most likely)*				POTENTIAL CHANGE IN CARE *(Will treatment/care be needed for resident/staff)*				PREPAREDNESS *(Are processes in place and can they work)*			YEAR: _____ RISK LEVEL Add rankings (score of 8 or > are considered highest priority for improvement efforts)
Score	High	Med	Low	None	Life Threatening	Permanent Harm	Temp Harm	None	High	Med	Low	None	Poor	Fair	Good	
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	
Example: Lack of Communication with Transferring Facility		2					1			2					1	6

Scoring Each Event/Risk

▶ **Probability-** *How likely is it to happen/occur?*

▶ **Risk Level-** *What degree of harm could occur; potential impact?*

▶ **Change Needed-** *Will treatment be needed for patient/staff?*

▶ **Preparedness-** *Are control measures in place, policies written, staff educated?*

Final Risk Level

▶ Determine by adding score from each category (some tools multiply)

▶ Rank by top 3-5 highest scores to determine **priorities and goals**

SPICE

	Likelihood	Severity	Preparedness	Risk Score
Facility Related	1(low)-5(high)	1(low)-5(high)	1(low)-5(high)	(Likelihood X Severity)/ Preparedness
Influenza like illness				
Symptomatic UTI	5	5	1	25
Cellulitis/SST Infection				
C difficile				

Example:
Symptomatic UTI:
➢ **10** symptomatic UTIs were documented to meet surveillance criteria and reported as HAIs in **2019**
➢ **30** symptomatic UTIs were documented to meet surveillance criteria and reported as HAIs in **2020**

SPICE

---

2 TYPES OF EVENTS/RISKS

▶Community/External

- ▶ TB risk (HCP & patients)-
- ▶ Emerging pathogens-COVID-19
- ▶ Geographical area & environmental issues such as flooding, hurricane, tornado, legionella, etc.
- ▶ Population served & socioeconomic status such as rural, low income, drug abuse, etc.

▶Facility specific/Internal

- ▶ Healthcare-associated infections
- ▶ Antibiotic stewardship/ MDROs
- ▶ Exposure related events
- ▶ HCP compliance
- ▶ New services/construction
- ▶ Procedures/devices

SPICE

SURVEILLANCE *PLAN*-developed based on the goals identified in the <u>risk assessment</u>

KEY CONCEPTS

▶ Surveillance is an essential component of an effective infection prevention program.

  ▶ Should be based on *sound epidemiological and statistical principles*

  ▶ Should be designed in accordance with current recommended practices and consist of defined elements

  ▶ Plays a critical role in identifying outbreaks, emerging infectious disease and bioterrorist events
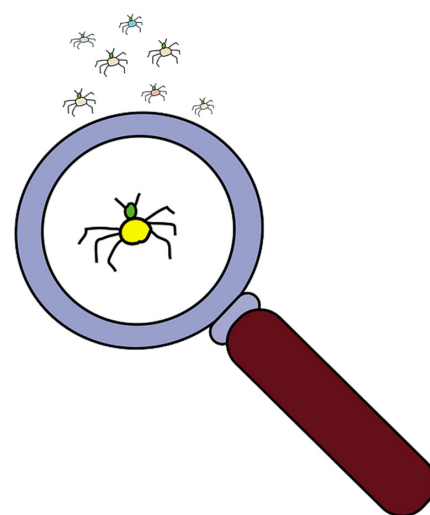
DEFINITION CONT'D

➢ "Surveillance is a comprehensive method of measuring outcomes and related processes of care, analyzing the data, and providing information to members of the healthcare team to assist in improving those outcomes and processes"

RECOMMENDED PRACTICES FOR SURVEILLANCE

I. Assess the population served, services provided and regulatory or other requirements

II. Select the outcome or process for surveillance and determine the time period

III. Use surveillance definitions

IV. Collect surveillance data

V. Calculate and analyze infection rates

VI. Apply risk stratification methodology

VII. Report and use surveillance information

VIII. Validate surveillance methodologies and findings

TYPES OF SURVEILLANCE
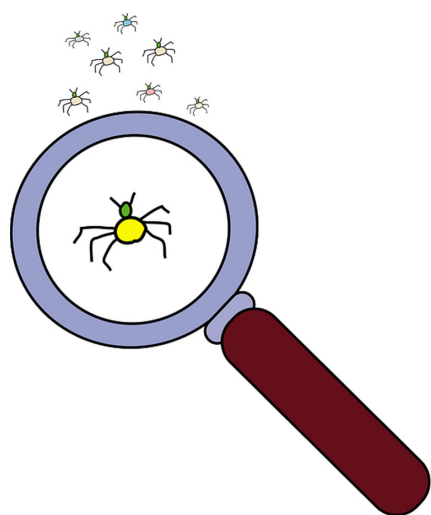
- Total (or Whole) House Surveillance
- Targeted Surveillance
- Combination Surveillance Strategy

TOTAL (WHOLE HOUSE)

▶ Monitor:
- ▶ All infections
- ▶ Entire population
- ▶ All units

Pros	Cons
Monitor all infections	Overall rate not sensitive or risk-adjusted
Include entire population	No trends or comparison
	Labor intense and inefficient use of resources
	Not based on risk assessment

PRIORITY DIRECTED (TARGETED)

- Focus on:
  - Care units
  - Infections related to devices
  - Invasive procedures
  - Significant organisms – epidemiologically important
  - High-risk, high-volume procedures
  - Infections having known risk reduction methods

TARGETED SURVEILLANCE

Pros	Cons
Risk-adjusted rates	May miss some infections
Can measure trends and make comparisons	Limited information on endemic rates
More efficient use of resources	
Can target potential problems	
Identify performance improvement opportunities	
Can evaluate effectiveness of prevention activities	

COMBINATION

- Monitor:
  - Targeted events in defined populations and
  - Selected whole-house events
- Pros:
  - Rates are risk-adjusted
  - Measure trends
  - Target potential problems
  - Track selected events house-wide
- Cons:
  - May miss some infections

NEED FOR SURVEILLANCE

- One of the most important aspects of an IP's responsibilities
- Should cover patients and healthcare personnel
- Include process and outcome measures

Establish Baseline Data
Reduce Infection Rates
Detection of Outbreaks
Monitor Effectiveness of Interventions
Education of HCP

Required as a Component of Plan

SELECTION OF PROCESSES AND OUTCOMES

Processes
- ▶ Hand hygiene
- ▶ Urinary Catheter insertion/maintenance

Outcomes
- ▶ Acute respiratory infections
- ▶ Urinary tract infections
- ▶ Skin/Soft Tissue Infections
- ▶ Gastroenteritis

SPICE

WHAT SHOULD BE INCLUDED?

- ▶ Mandatory/required
- ▶ Frequency (incidence) of the infection
- ▶ Communicability
- ▶ System/patient cost (↑morbidity, ↑LOS, ↑morbidity)
- ▶ Early Detection

Surveillance activities should be re-evaluated annually as a component of the IP risk assessment

SPICE

COLLECTING SURVEILLANCE DATA

- Train personnel in data collection methods
- Develop a data collection form to fit the surveillance objective-based on the definition
- Determine the appropriate approach to surveillance concurrent (prospective) and/or retrospective
- Incorporate post-discharge surveillance for certain outcomes
- Collect data from a variety of sources (communication with caregivers)
- Be aware that passively obtained data may be biased

ORGANIZATION-SPECIFIC SOURCES OF POPULATION INFORMATION

- Medical records
- Financial services
- Quality/utilization management
- Surgical database
- Administrative/management reports
- Risk management
- Public health reports
- Community agencies
- Occupational Health
- Human resources records

Table 1. Comparison of Semiautomated vs Fully Automated Surveillance Approaches

Characteristic	Semiautomated	Fully Automated
Clinical data	Accurate, reliable (clinical) data	Accurate, reliable (clinical) data
Definition	Standardized; not specifically adapted to automation	Standardized; adapted to automation (healthcare-associated infection metric)
Final ascertainment	Chart review required; some room for clinical judgment	No chart review; subjective interpretation impossible
Performance characteristics	High sensitivity, high negative predictive value	High specificity, high positive predictive value
Features	Clinical acceptance; room for adaptation within hospitals remains	Possible reduction in clinician buy-in; standardization, trade-off with sensitivity, specificity

https://academic.oup.com/cid/article/66/6/970/4161609

SPICE

PRACTICE QUESTION:
Targeted surveillance focuses on

A. Tracking high-risk, high-volume procedures and potentially preventable healthcare-associated infections (HAIs)

B. Providing whole-house infection rates

C. Tracking infections that are publicly reported

D. Using the electronic surveillance systems to identify infections

SPICE

PRACTICE QUESTION:
An appropriate indicator to monitor process compliance would be:

A. Class 1 SSI rate

B. Appropriate antibiotic dosage

C. Central line-associated bloodstream infections (CLABSI) in the Neonatal Intensive Care Unit (NICU)

D. Infections caused by multi-drug resistant organisms

PRACTICE QUESTION
What key infection control activity is defined as the systematic ongoing collection, management, analysis and interpretation of data

a. Research

b. Surveillance

c. Benchmarking

d. Accreditation

HEALTHCARE INFORMATICS AND INFORMATION TECHNOLOGY

Key Concepts:

▶ Information technology

- ▶ Retrieve, distribute and store information
- ▶ Speed and simplify data collection and management
- ▶ Safeguards to protect health information

▶ Informatics

- ▶ Applying computer technology to the scientific process
- ▶ Foster QI via use of evidence to monitor and improve process/outcomes
- ▶ Support accurate, efficient extraction and upload of publicly reported data

SPICE

DEFINITIONS

▶ Informatics

- ▶ Study of information processing with the purpose to translate knowledge into practice
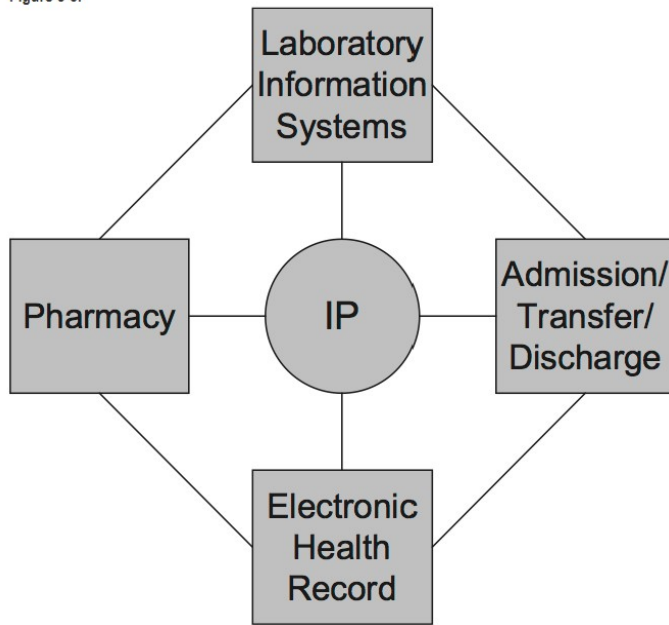
▶ Healthcare Informatics

- ▶ Science of using IT to design, develop, apply, manage, organize, analyze and optimize healthcare delivery
- ▶ Goal to improve patient care processes

▶ Nursing Informatics

- ▶ Enhance documentation accuracy and enables data analysis of nursing practice

SPICE

Figure 6-3.

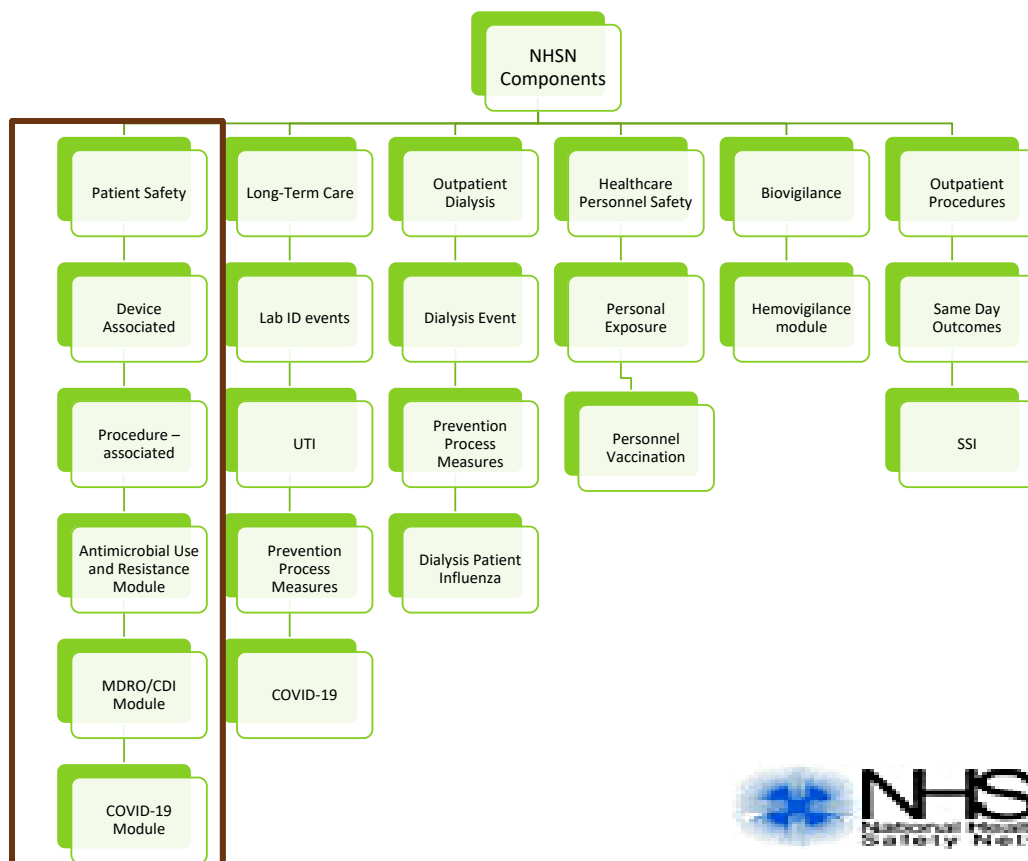Linking information to the infection preventionist.

Healthcare informatics has been broadened to include the cognitive, information processing, and communication tasks involved in medical practice, education, and research.
Clinical specialists with training in informatics are now being called on to design and develop systems for use in acute and long-term healthcare settings.

https://text.apic.org/toc/overview-of-infection-prevention-programs/healthcare-informatics-and-information-technology

SPICE

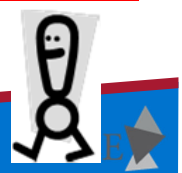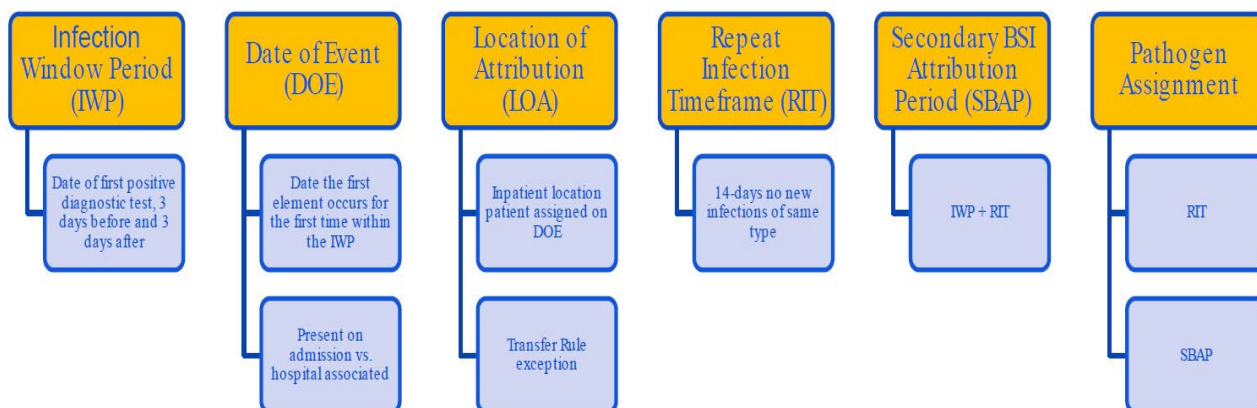# LAYING A STRONG FOUNDATION FOR SURVEILLANCE-STANDARDIZED DEFINITIONS

SPICE

Slide 1

```
                    NHSN
                  Components

   Patient      Long-Term    Outpatient    Healthcare      Biovigilance    Outpatient
   Safety       Care         Dialysis      Personnel                       Procedures
                                           Safety

   Device       Lab ID       Dialysis      Personal        Hemovigilance   Same Day
   Associated   events       Event         Exposure        module          Outcomes

   Procedure –  UTI          Prevention    Personnel                       SSI
   associated                Process       Vaccination
                             Measures

   Antimicrobial Prevention  Dialysis
   Use and      Process      Patient
   Resistance   Measures     Influenza
   Module

   MDRO/CDI     COVID-19
   Module

   COVID-19
   Module
```

NHSN
National Healthcare
Safety Network

SPICE

Slide 2

CLINICAL DISAGREEMENT?

	Surveillance Definitions	Clinical Diagnosis
Purpose	Identify trends within a population for prevention	Identify disease in, and treatment for, individual patients
Components	Limited predetermined data elements	All diagnostic information available
Clinical Judgment	Excluded if possible	Valued

Bottom Line: At times clinical judgment and surveillance determinations will not match. Surveillance determinations always "trump" in epidemiologic surveillance

NHSN Foundational Building Blocks

Infection Window Period (IWP)	Date of Event (DOE)	Location of Attribution (LOA)	Repeat Infection Timeframe (RIT)	Secondary BSI Attribution Period (SBAP)	Pathogen Assignment
Date of first positive diagnostic test, 3 days before and 3 days after	Date the first element occurs for the first time within the IWP	Inpatient location patient assigned on DOE	14-days no new infections of same type	IWP + RIT	RIT
	Present on admission vs. hospital associated	Transfer Rule exception			SBAP

SPICE

PRACTICE QUESTION:

For which of the following procedure(s) is the surveillance period for deep incisional or organ/space SSI 90 days

A. Cesarean section

B. Craniotomy

C. Coronary artery bypass graft

D. Laminectomy

    A. A, B

    B. B, C

    C. C, D

    D. A, D

SPICE

PRACTICE QUESTION:
What type of rate would the IP want to calculate to give feedback to the surgeons at her facility?

A. Procedure-specific

B. Provider-specific

C. Unit-specific

D. Device specific

PRACTICE QUESTION:
An IP is preparing the quarterly report for the infection control committee. What information will be needed to calculate a CLABSI rate for the ICU?
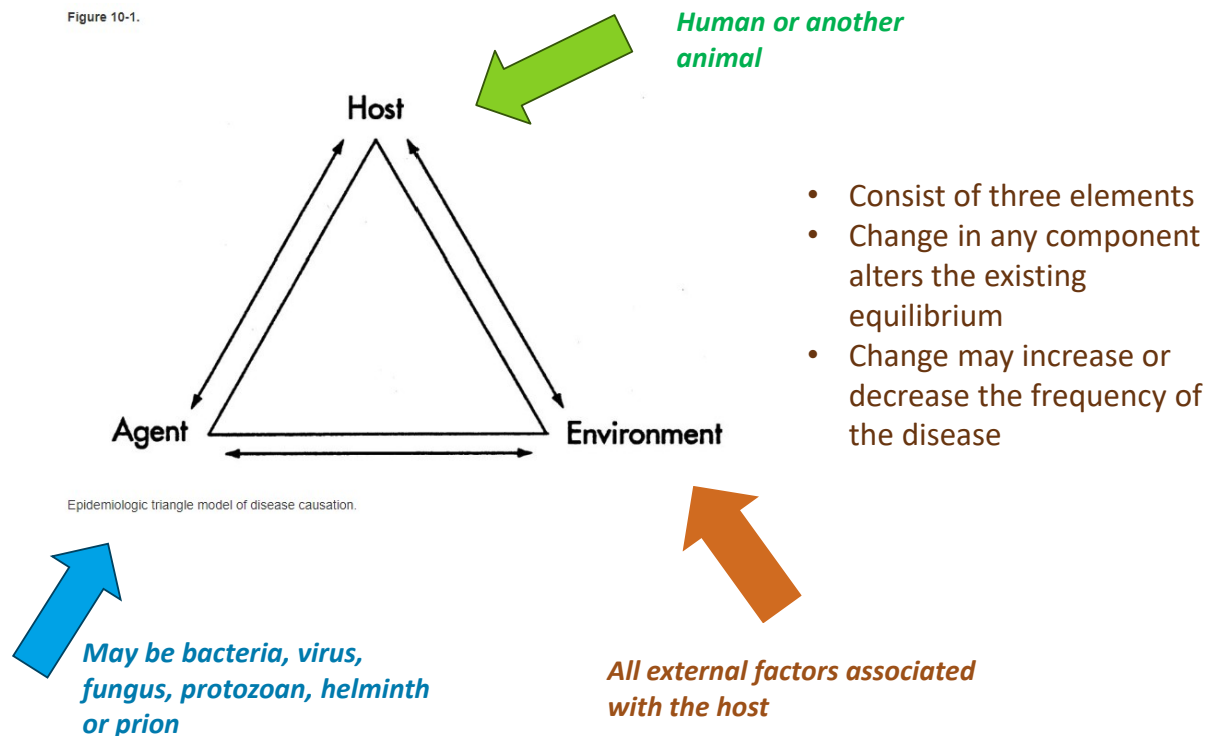
A. The total number of patients in the unit for the time period

B. The total number of central line catheters for the time period

C. The number of patients who had bloodstream infections identified

D. The number of device days for the time period

 i. B, C

 ii. A, C

 iii. A, B

 iv. C, D

GENERAL PRINCIPLES OF EPIDEMIOLOGY

▶ Epidemiology-the study of the _frequency, distribution, cause and control_ of disease in populations.

  ▶ Aids in understanding the cause of a disease by knowing its distribution; determinants in terms of person, place and time; and natural history

  ▶ Both a body of knowledge and a method of study

  ▶ _Population_ based

  ▶ Incorporates use of statistics to determine associations and test hypotheses

  ▶ Professional discipline that encompasses all academic fields of study

---

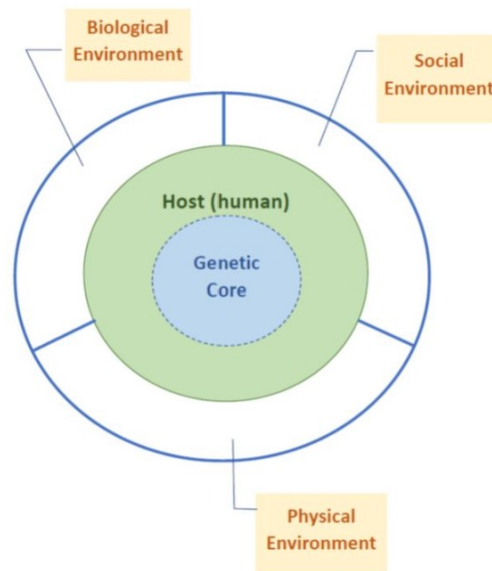# EPIDEMIOLOGICAL MODEL-EPI TRIANGLE

Figure 10-1.

Human or another animal

Host

Agent

Environment

Epidemiologic triangle model of disease causation.

- Consist of three elements
- Change in any component alters the existing equilibrium
- Change may increase or decrease the frequency of the disease

May be bacteria, virus, fungus, protozoan, helminth or prion

All external factors associated with the host

EPIDEMIOLOGIC MODEL-"WHEEL" MODEL

Consist of:
- Hub-host
- Environment
  - Biological
  - Social
  - Physical

No focus on agent but the interactions between the host and environment

Figure 10-2.

"Wheel" model of disease causation.

SPICE

EPIDEMIOLOGICAL MODEL-"WEB" MODEL

Figure 10-3.
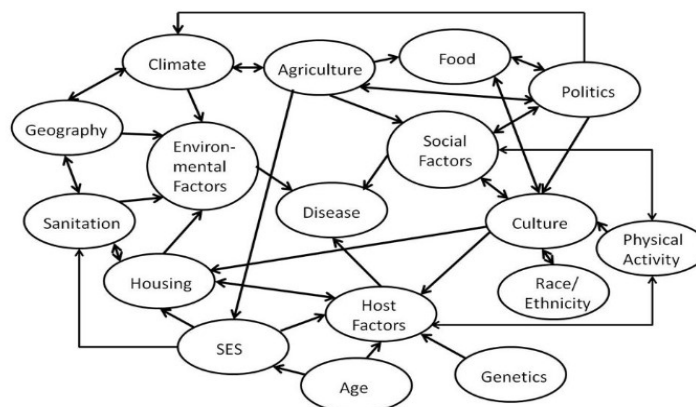
"Web" model of disease causation. SES = socioeconomic status.

Aims to capture the more complex interactions between the host, environmental and social factors that contribute to disease.

SPICE

ASSOCIATION AND CAUSATION

Association

▶ Occurs if, as one variable changes, there is concomitant or resultant change in the quantity or quality of another variable.

  ▶ Artifactual-occurs by chance

  ▶ Indirect or noncausal-mixing of effects between exposure, disease and a third factor

  ▶ Causal-one factor is clearly shown to increase the probability of the occurrence of disease (*not the same as causality which requires several conditions to be met*)

Causation

▶ Roots in Koch's postulates:

  ▶ The organism must always be found with the disease, in accordance with the clinical stage observed

  ▶ The organism must then be grown in pure culture from a diseased host

  ▶ The same disease must be reproduced when a pure culture of the organism is inoculated into a healthy susceptible host

  ▶ The organism must then be recovered from the experimentally infected host

▶ Hill's Criterion:

  ▶ Currently used criteria for causality-use modern epidemiological methods to determine whether a factor is causal for given disease.
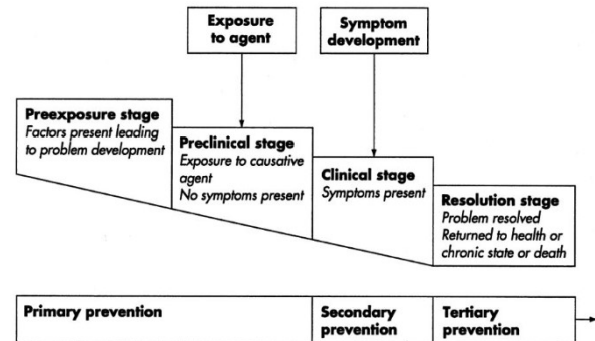
SPICE

HILL's CRITERIA EXAMPLE

- Strength of association: This is demonstrated by disease occurrence among those exposed to the organism.

- Consistency: The association between ingestion of *S. sonnei* and gastroenteritis has been demonstrated consistently in numerous studies by different investigators, although development of disease may not occur 100% of the time.

- Temporality: This is demonstrated because exposure to the organism precedes development of gastroenteritis and occurs within the correct incubation period.

- Biological gradient: The biological gradient is evident because larger doses of *S. sonnei* are more likely to result in disease.

- Biological plausibility: *S. sonnei* is a biologically plausible cause of gastroenteritis, based on knowledge of its toxin production.

- Coherence: Disease caused by *S. sonnei* is coherent with other facts known about gastroenteritis.

- Analogy: Experiments have shown that *S. sonnei* causes gastroenteritis and that other species of *Shigella* cause, analogously, similar disease.

SPICE

EPIDEMIOLOGY IN HEALTHCARE

- Three categories of prevention (*Leavell's levels*)
  - Primary
    - Geared at complete prevention before any manifestation of the disease occurs
    - Health promotion programs, wellness programs, immunization
  - Secondary
    - Early diagnosis and treatment (TST; mammograms, cessation of smoking)
    - Prevent further deterioration
  - Tertiary
    - Seeks to improve quality of life
    - Disease well established
    - Deals with sequelae (rehab and organ transplant)

Figure 10-4.

	Exposure to agent	Symptom development
Preexposure stage *Factors present leading to problem development*	**Preclinical stage** *Exposure to causative agent* *No symptoms present*	**Clinical stage** *Symptoms present*	**Resolution stage** *Problem resolved* *Returned to health or chronic state or death*

Primary prevention	**Secondary prevention**	**Tertiary prevention**

SPICE

USEFUL TERMS

Endemic
- The usual or expected occurrence of disease
- The "baseline"

Epidemic
- Increased occurrence of disease above the usual or expected frequency
- An "outbreak"

Pandemic
- An epidemic that involves large geographical areas or several continents

SPICE

Herd immunity (aka-community immunity)

- Immunity to infectious disease of an adequate number of individuals in a population to be protective for those who are not immune to the disease

SPICE

Enzootic

- Usual presence of disease among animals within a geographic area

Epizootic

- Excess over expected extent of disease within an animal population in a geographical area during a specified time

Zoonosis

- A disease transmitted from animals to humans (cat scratch fever, psittacosis)

SPICE

▶ Risk:

  ▶ The probability or likelihood of an event occurring

▶ Risk factor:

  ▶ A characteristic, behavior or experience that increases the probability of developing a negative health status (e.g., disease, infection)

▶ Infection:

  ▶ The entry into and multiplication of an infectious agent in the tissues of the host and tissue damage resulting in *apparent or unapparent* changes in the host

▶ Colonization

  ▶ The presence of microorganisms in or on a host with growth and multiplication but without tissue invasion or damage

SPICE

PRACTICE QUESTION:
Which of the following is <u>not</u> considered one of the criteria for causality?

A. The incidence of disease is higher in those who are exposed to the factor.

B. Evidence that the independent and dependent variables are related

C. The association has been observed in numerous studies

D. The onset of disease must precede exposure to the causal factor

SPICE

PRACTICE QUESTION:

The use of influenza vaccines in school age children to decrease the number of cases in the community uses the principle of:

A. Epizootic
B. Endemic
C. Herd immunity
D. Epidemic

PRACTICE QUESTION:

Plague is endemic in parts of the southwest united states. the word "endemic" means:

A. Natives are immune to plague

B. An expected number of cases occurs each year in each geographical area

C. Plague has become resistant to all forms of treatment for this population

D. The disease is seen in a seasonal pattern each year for this area

PRACTICE QUESTION:
A pandemic differs from an epidemic in that:

A. Only one disease is involved

B. It is usually vector borne

C. There is a higher mortality rate
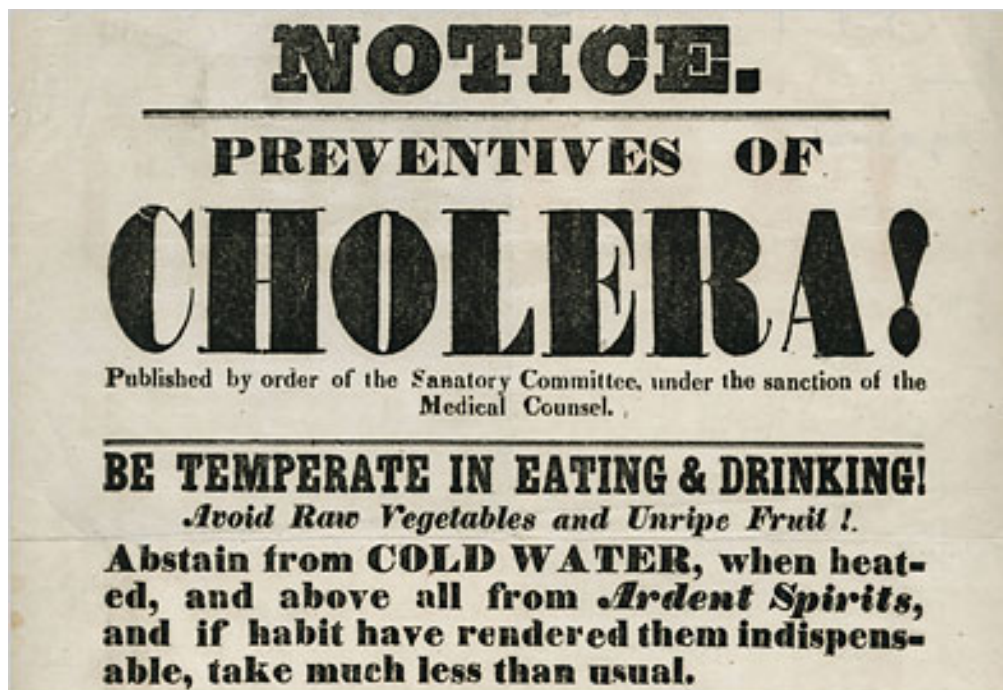
D. Several countries or continents are involved

SPICE

PRACTICE QUESTION:
The IP monitors all patients who have coronary artery bypass graft surgery for infections and pneumonia. The probability or likelihood of an event occurring is the:

A. Risk

B. Attack rate

C. Host factor

D. Incidence

SPICE

OUTBREAKS

OUTBREAKS

▶ *Outbreaks of both infectious and noninfectious adverse events can occur in <u>any</u> healthcare setting and pose a threat to patient safety*

▶ Suspected when:

- ▶ HAIs, recovery of specific pathogens or other adverse events occur above historical rates

- ▶ <u>When an unusual microbe or adverse event is recognized</u>

- ▶ Term Pseudo-outbreak used when there is a rise in test results without clinical disease
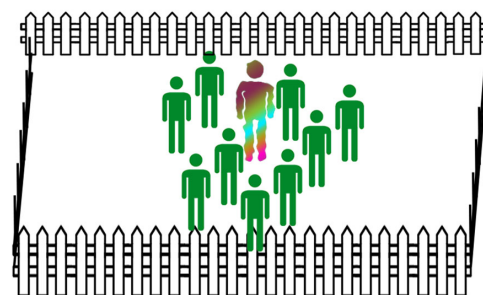
OUTBREAKS ARE

▶ Often multifactorial

▶ Most often caused by one or more of the following:

  ▶ Lapses in infection prevention/clinical practices

  ▶ Colonization or infection of HCW

  ▶ Intrinsic contamination of device or product

  ▶ Extrinsic contamination of device or product

  ▶ Visitors with infectious/communicable disease (flu, chickenpox)

SPICE

KEY TERMS

▶ *Case definition*-a set of uniformly applied criteria such as clinical, laboratory and other diagnostic modalities for identifying a particular infectious disease *(will determine who is in the group you need to investigate further).*

▶ *Custer:* An aggregation of cases grouped by time and place, sometimes called a small outbreak

▶ *Control Measures:* Various actions deployed in order to interrupt and reduce or eliminate the occurrence of a communicable disease or infection

SPICE

Goal:
Control by identifying and modifying contributing factors and to develop/implement measures to prevent similar outbreaks in the future

SPICE

INITIAL INVESTIGATION

- Confirm presence
- Identify investigation team and resources
- Verify the diagnosis
- Establish a preliminary case definition
- Alert administration and key individuals
- Perform a literature review

- Develop methodology for case finding
- ***Prepare an initial line list or epidemic curve***
- Observation patient care activities
- Consider environmental sampling
- Implement control measures

SPICE

FOLLOW UP INVESTIGATION

▶ Refining the case definition

▶ Continuing case finding and surveillance

▶ Reviewing regularly control measures

▶ Considering whether an analytic study should be performed

▶ Communication after an outbreak occurs

COMING SOON
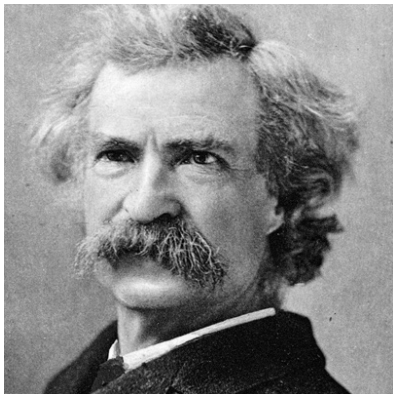
**"There are 3 kinds of lies.
Lies, damned lies, and statistics."**

~Popularized by Mark Twain

**" I love statistics.
I just love numbers and data"**

~Popularized by Lauren DiBiase