Infection Surveillance in Skilled Nursing Facilities

Last Updated 2019

Basics of Infection Prevention
Healthcare-Associated Infections Program
Center for Health Care Quality
California Department of Public Health

Objectives

- Discuss basic principles of epidemiology and how they apply to healthcare-associated infection (HAI) surveillance
- Review recommended surveillance practices
- Describe surveillance outcome and process measures for infection prevention
- Review surveillance definitions (McGeer Criteria)

Epidemiology

- Definition: Study of disease in populations

  Clinical care: focus on the individual

  vs

  Epidemiology: focus on the group

- Healthcare epidemiology answers questions such as:
  - What factors contribute to increased infection rates?
  - What populations are at higher risk for developing HAI?
  - How have HAI changed over time?
- Assessment of trends over time

Epidemiology of Infection Prevention

- Goal is HAI prevention
- Professional societies
  - Association for Professionals in Infection Control and Epidemiology (APIC)
  - Society for Healthcare Epidemiology of America (SHEA)
  - Infectious Diseases Society of America (IDSA)
- Epidemiology and surveillance underlay HAI prevention
  - Use data for action!

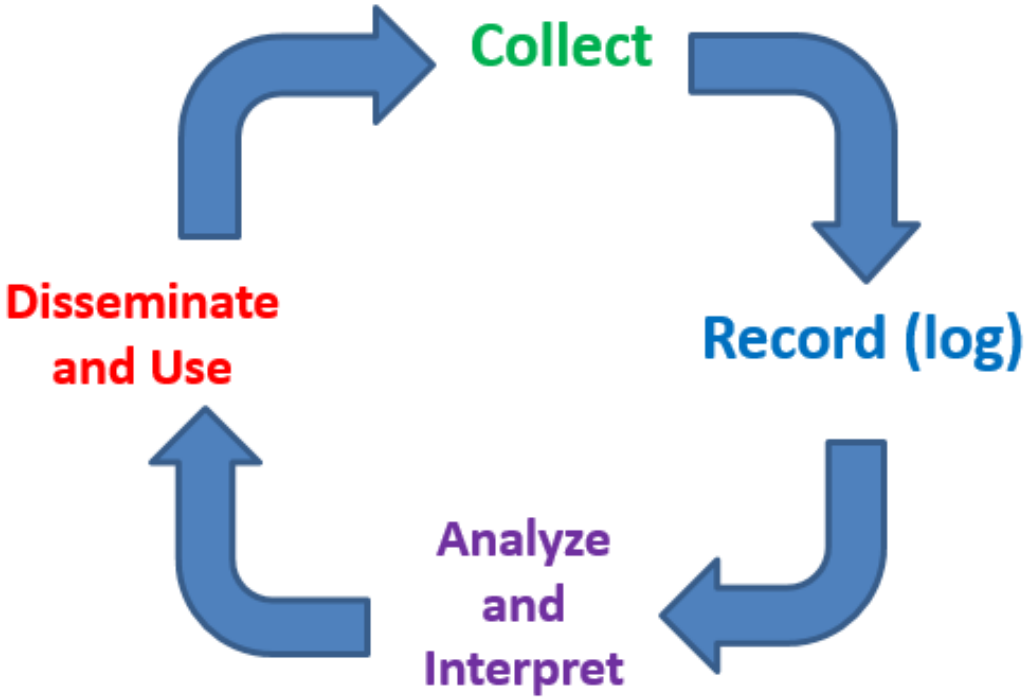
Epidemiologic Surveillance

- The ongoing, systematic collection, recording, analysis, interpretation, and dissemination of data
- Reflects rate of disease onset or current disease status of a community or population (e.g., SNF)
- Aims to identify risk factors for disease
- Used for public health action to reduce illness and death

Surveillance

A surveillance system is an information loop that starts and ends with communication and action

Flow of Surveillance Data



Key Tenets of HAI Surveillance

- A written plan serves as the foundation
  - What HAI am I tracking? Why?
  - How will data be used?
  - Where are opportunities to prevent HAI in my facility?
- The intensity of surveillance efforts need to be maintained over time
- Stay consistent over time; always apply same surveillance definitions

Recommended Practices for Surveillance

1. Assess the population
2. Select the outcome or process for surveillance
   - Comply with State and Federal requirements
3. Use surveillance definitions (McGeer criteria in LTC)
4. Collect surveillance data
5. Calculate and analyze infection rates
6. Apply risk stratification methods
7. Report and use surveillance information

AJIC *Am J Infect Control,* 26:277-88, 1998

AJIC *Am J Infect Control,* 35:427-40, 2007

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Examples of Process Measures

- CAUTI prevention: percent urinary catheters with appropriate indication
- CLABSI prevention: percent adherence to central line maintenance practices
- CDI prevention: thoroughness of environmental cleaning
- HAI prevention: percent adherence to hand hygiene

Examples of Outcome Measures

- Central line associated bloodstream infection (CLABSI) rate
- Urinary Tract Infection (UTI) rate
- Catheter associated UTI (CAUTI) rate
- *C. difficile* infection rate

Measuring Infections

Incidence

- Number of persons in a population who develop a disease or condition within a specified period of time
- **Measure of NEW infections**

Prevalence

- Proportion of persons in a population who have a disease or condition at a given point in time
- **Measure of infections that are present**

Incidence

Incidence measures the frequency of **disease onset** (i.e., rate).
Answers: 'What is the risk of X occurring?'

$$\text{Incidence} = \frac{(\#\text{ of } \textbf{new cases}) \text{during a specified time period}}{(\text{size of a specific population})}$$

Example:

$$\frac{5 \text{ scabies infections}}{180 \text{ residents}} \times 100 =$$

2.7 new infections per 100 residents in the facility during January 2017

Prevalence

Prevalence measures disease status in a population at a particular time. Answers: 'How common is X?'

Prevalence = $\frac{\text{(\# of \textbf{existing cases}) during a specified time period}}{\text{(size of a specific population)}}$

Example:

$$\frac{\text{2 patients colonized with MRSA}}{\text{10 patients admitted Mar 31, 2017}} = 0.2 = 20\%$$

Incidence Density Rate

Incidence density accounts for **variation in the time** each person is at risk for the event.

Incidence density rate =

$$\frac{\text{(\# of new cases)}}{\text{(person-time at risk)}} \quad \text{during a specified time period}$$

Example:

$$\frac{5 \text{ UTI}}{1050 \text{ of resident days}} \times 1000 = 4.76 \text{ UTI per 1000 resident days}$$

Clinical vs Surveillance Definitions

- Clinical
  - Patient centered
  - Used for therapeutic decisions

- Surveillance
  - Population based
  - Applied exactly the same way each time

HAI Surveillance Definitions

- Case definition (surveillance definition)
  - Clinical and laboratory characteristics that a patient must have to be counted as an event or case for tracking purposes
  - **Time, place, & person** (e.g., age, sex)

Laboratory-based surveillance

A surveillance method in which the reports of cases come from clinical laboratory data only (forgoing case review/symptoms)

Applying Surveillance Definitions

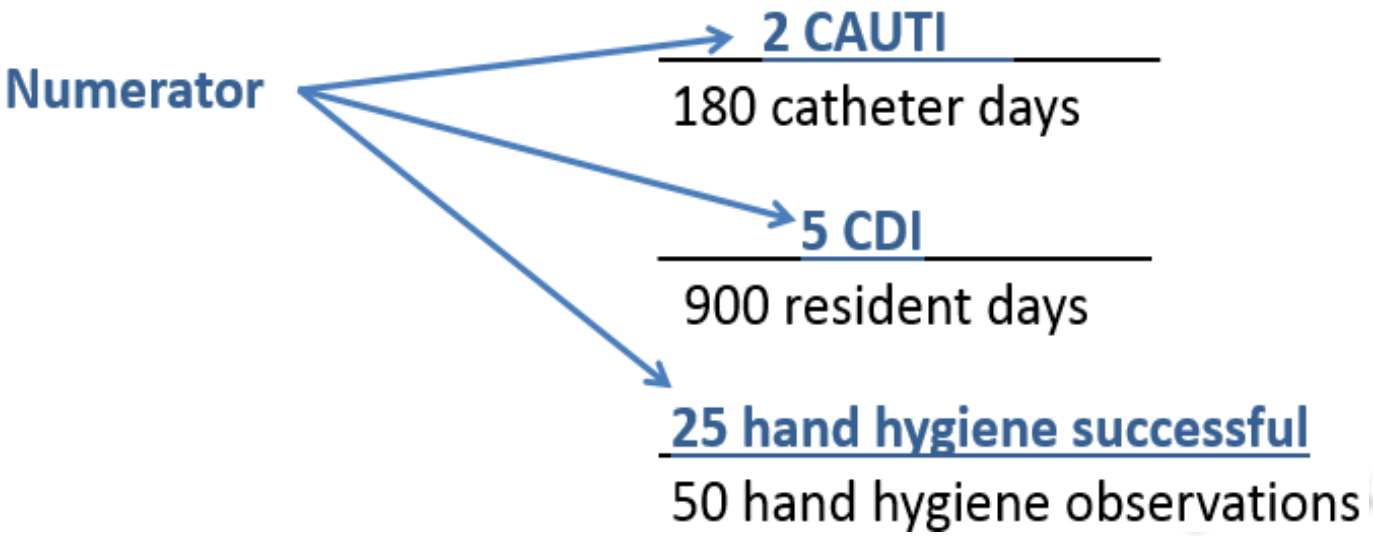
- Always refer to written definitions to ensure accuracy of applying case definitions
  - Use standardized, published, validated definitions where available (McGeer)
- For accurate and valid comparisons, use the same definitions
  - If definitions change, the comparability of rates over time will be compromised

Collect Surveillance Data

- Include IP, staff, and others with responsibility or interest
- Limit collection to only what is needed
- Be involved in efforts when creating or revising the electronic health records to enable HAI data collection

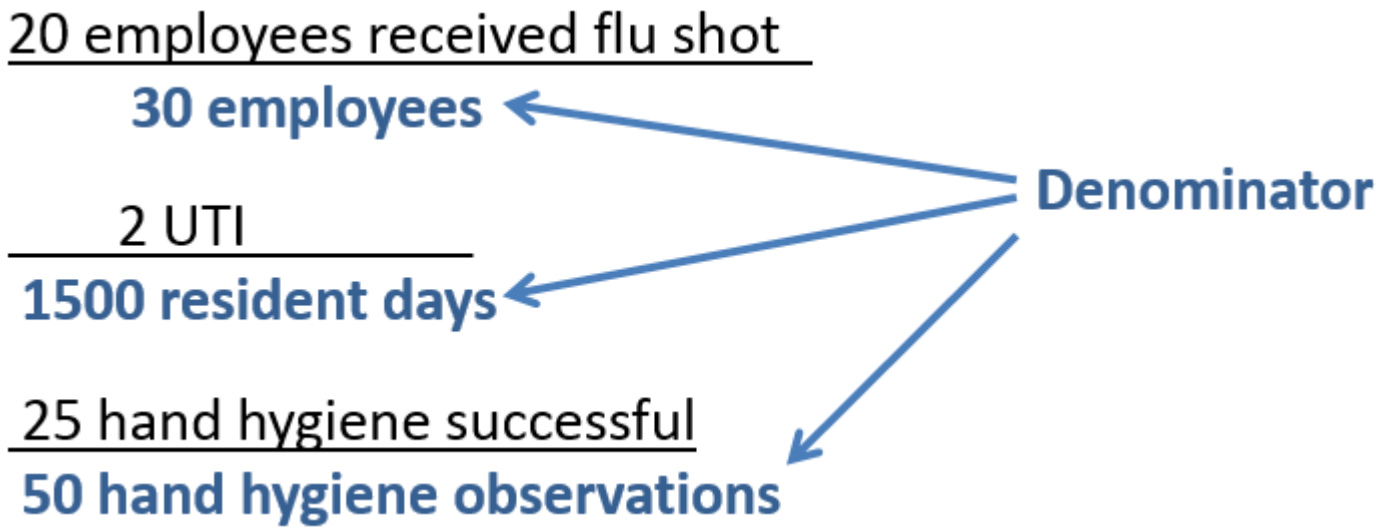
Numerator Data

- Numerator = number of instances of the "event" being measured
- Includes:
  - HAI identified through **active** surveillance: CLABSI, CAUTI
  - HAIs identified by **laboratory** finding alone: CDI
  - Care **practices, processes**, observations: hand hygiene, gown and glove use compliance
- Record point in time or time period



Denominator Data

- Denominator = number of residents or procedures being followed, the population size, or person-time at risk (resident or line days)
- Includes: procedures, observations, number of employees or number of resident days



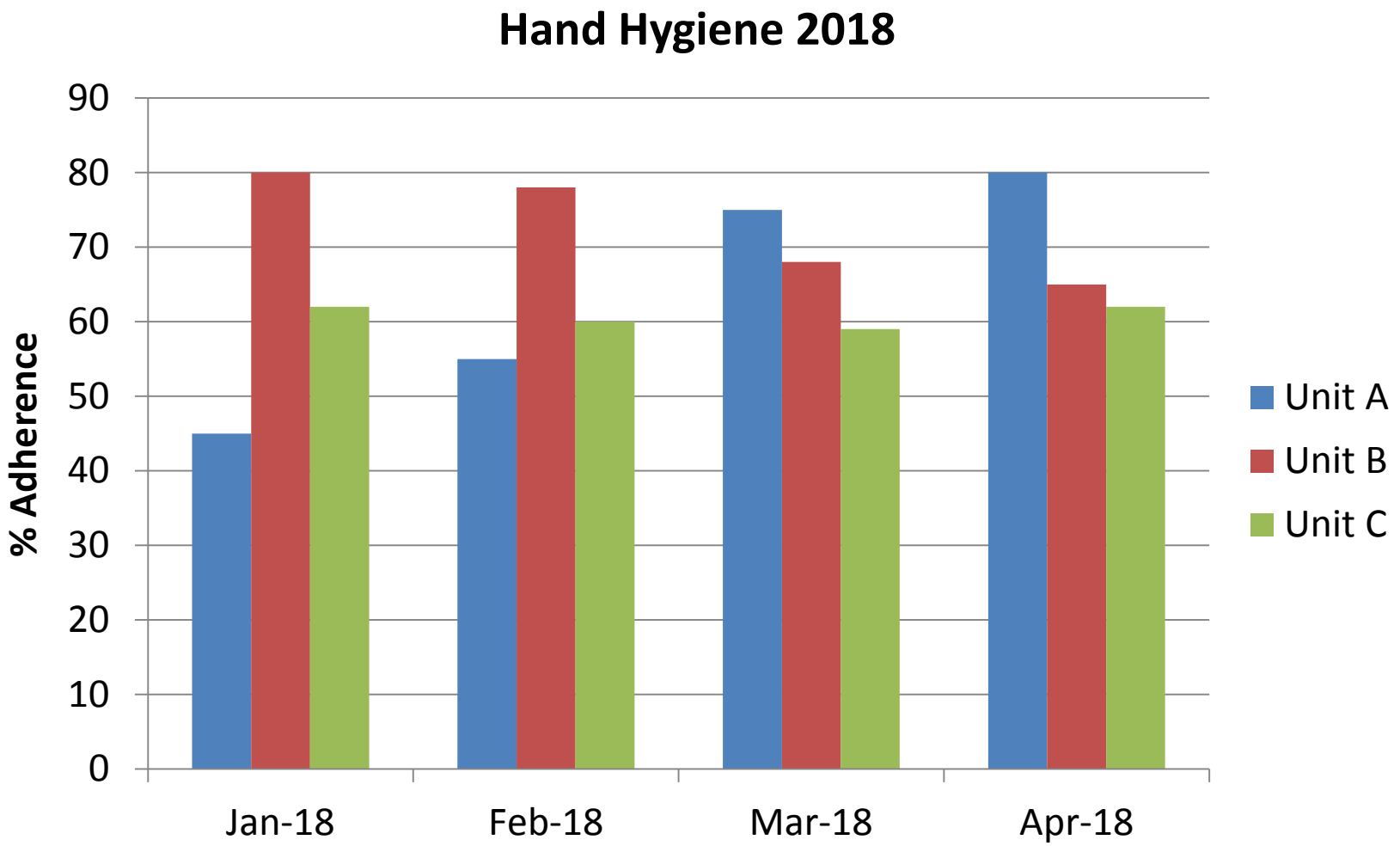
Report and Use Surveillance Data

"The demonstrable power of surveillance is in sharing findings with those who need to know and who can act on the findings to improve patient safety."

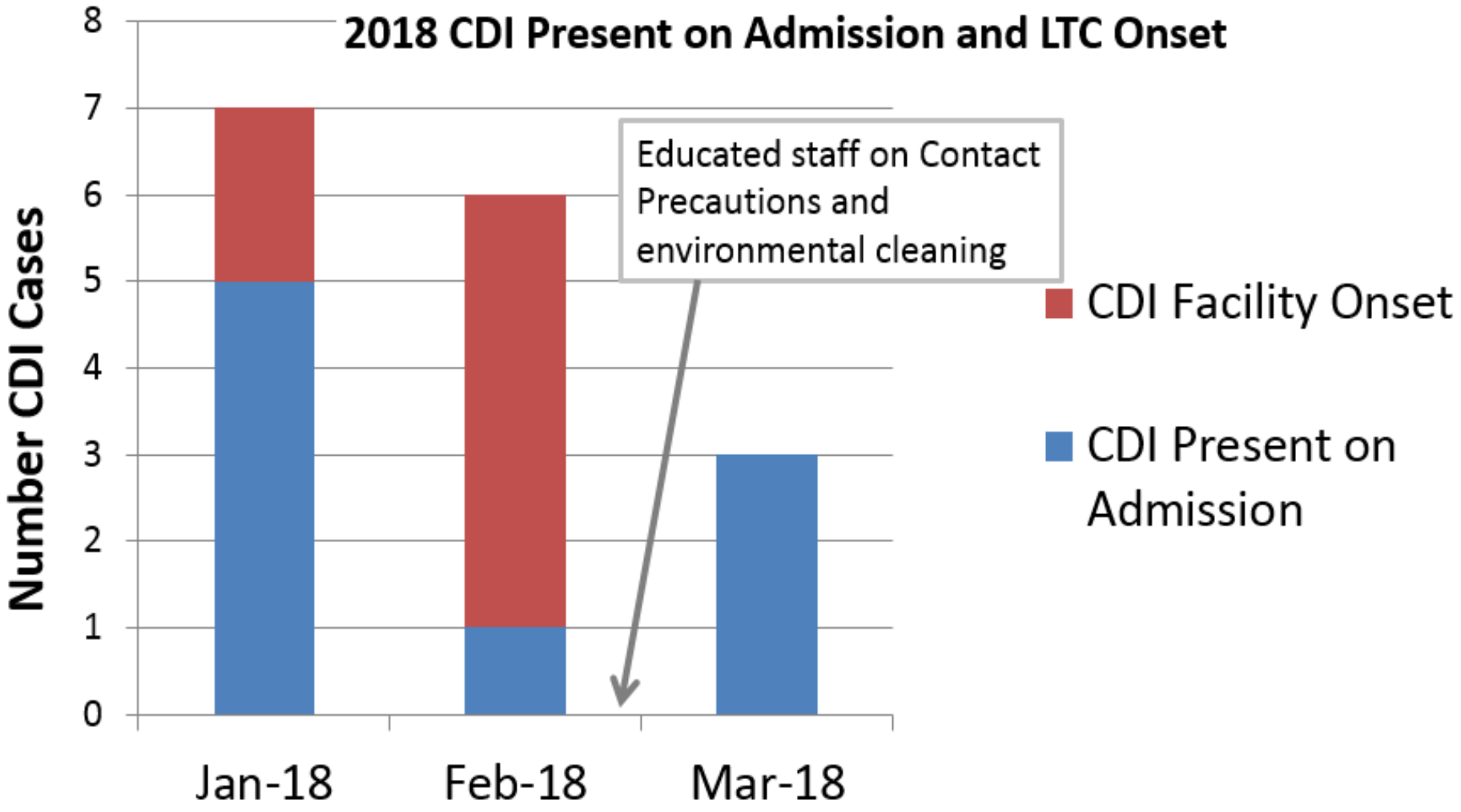
AJIC Am J Infect Control, 35:427-40, 2007

- Plan for distribution of findings
- Report to health care providers most able to impact patient care
- Report in a manner to stimulate improvement
- Use visual displays of data (e.g., charts, graphs, tables)

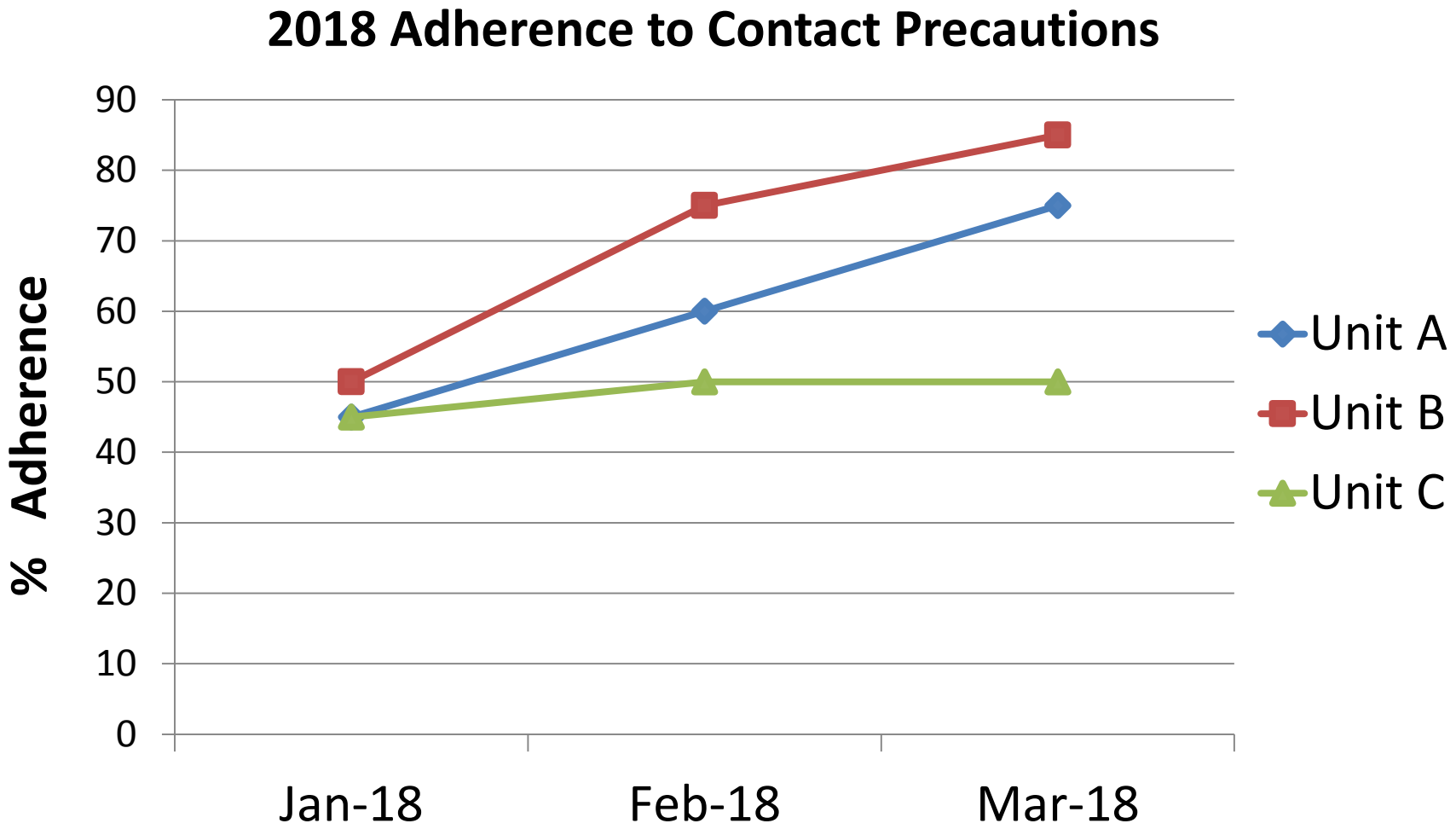
Sample Bar Chart



Sample CDI Chart



Sample Line Graph



Standardized Infection Surveillance Definitions for SNF

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY OCTOBER 2012, VOL. 33, NO. 10

SHEA/CDC POSITION PAPER

Surveillance Definitions of Infections in Long-Term Care Facilities: Revisiting the McGeer Criteria

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(See the commentary by Moro, on pages 978–980.)

Infection surveillance definitions for long-term care facilities (ie, the McGeer Criteria) have not been updated since 1991. An expert consensus panel modified these definitions on the basis of a structured review of the literature. Significant changes were made to the criteria defining urinary tract and respiratory tract infections. New definitions were added for norovirus gastroenteritis and *Clostridium difficile* infections.

Infect Control Hosp Epidemiol 2012;33(10):965-977

LTC Constitutional Criteria Used in Definitions

Constitutional findings used as part of infection surveillance definitions

- Fever
- Leukocytosis
- Acute change in mental status from baseline
- Acute functional decline

Constitutional Criteria - Fever

A. Fever

- ❑ Single oral temperature >37.8°C (>100.0°F)

  OR

- ❑ Repeated oral temperatures >37.2°C (99°F)

  or rectal temperatures >37.5°C (99.5°F)

  OR

- ❑ Single temperature >1.1°C (2°F) over baseline from any site (oral, tympanic, axillary)

Constitutional Criteria - Leukocytosis

B. Leukocytosis

- ❑ Neutrophilia (>14,000 leukocytes/mm^3)

  OR

- ❑ Left shift (>6% bands or ≥1,500 bands/mm^3)

Constitutional Criteria – Acute Change in Mental Status From Baseline

C. **All criteria must be present**

- ❑ **Acute onset**

AND

- ❑ **Fluctuating course** -behavior coming and going or changing in severity during assessment

AND

- ❑ **Inattention** – unable to keep track of discussion or easily distracted

AND EITHER

- ❑ **Disorganized thinking-** rambling conversation, unclear flow of ideas, unpredictably switches subject

OR

- ❑ **Altered level of consciousness –** different from baseline, hyperalert, sleepy, drowsy, difficult to arouse, non responsive

Constitutional Criteria – Acute Functional Decline

D. Acute functional decline

- A new **3-point increase** in total activities of daily living (ADL) score (range, 0-28) from baseline based on the following ADL items scored from 0 (independent) to 4 (total dependence):
  - Bed mobility
  - Transfer
  - Locomotion within LTC facility
  - Dressing
  - Toilet use
  - Personal hygiene
  - Eating

Respiratory Infections Surveillance Definitions

- Four respiratory infection definitions with varying criteria
  1. Common cold symptoms/pharyngitis
  2. Influenza-like illness
  3. Pneumonia
  4. Lower respiratory tract (bronchitis or tracheobronchitis)

Common Cold or Pharyngitis Surveillance Definition

- **At least 2** criteria must be present
  - ❑ Runny nose or sneezing
  - ❑ Stuffy nose
  - ❑ Sore throat, hoarseness, or difficulty swallowing
  - ❑ Dry cough
  - ❑ Swollen or tender glands in the neck

Influenza-like Illness Surveillance Definition

- **Both Criteria 1 and 2** must be present
  - ❑ 1. Fever (refer to constitutional criteria)
  - ❑ 2. **At least 3** of the following influenza-like illness sub-criteria
    - ❑Chills
    - ❑New headache or eye pain
    - ❑Myalgias or body aches
    - ❑Malaise or loss of appetite
    - ❑Sore throat
    - ❑New or increased dry cough

Pneumonia Surveillance Definition

- **All 3** criteria must be present
  - ❑ 1. Interpretation of a chest radiograph as demonstrating **pneumonia** or the presence of a **new infiltrate**
  - ❑ 2. **At least 1** of the following respiratory subcriteria
    - ❑ New or increased cough
    - ❑ New or increased sputum production
    - ❑ 0_2 saturation <94% on room air or a reduction in 0_2 saturation of >3% from baseline
    - ❑ New or changed lung examination abnormalities
    - ❑ Pleuritic chest pain
    - ❑ Respiratory rate of >25 breaths/minute
  - ❑ 3. **At least 1** of the constitutional criteria

Lower Respiratory Tract Infection Surveillance Definition

Bronchitis or tracheobronchitis

- **All 3** criteria must be present
  - ❑ 1. Chest radiograph either not performed, or negative for pneumonia or new infiltrate
  - ❑ 2. At least **2** of the respiratory subcriteria listed in previous slide
  - ❑ 3. At least **1** of the constitutional criteria

UTI in Resident Without a Urinary Catheter

Must meet Criteria 1, **or** 2 **or** 3

Criteria -1

Either of the following:
- ❑ Acute dysuria
- ❑ Pain, swelling, or tenderness of testes, epididymis, or prostate

OR

Criteria -2

Either of the following:
- ❑ Fever
- ❑ Leukocytosis

and

ONE or more of the following:
- ❑ Costovertebral angle pain or tenderness
- ❑ Suprapubic pain
- ❑ Gross hematuria
- ❑ New or increased incontinence
- ❑ New or increased urgency
- ❑ New or marked increased frequency

OR

Criteria -3

Two or more of the following:
- ❑ Costovertebral angle pain or tenderness
- ❑ Suprapubic tenderness
- ❑ Gross hematuria
- ❑ New or increased incontinence
- ❑ New or increased urgency
- ❑ New or marked increased frequency

AND

Either of the following microbiological criteria:
- ❑ Positive culture (10^5 cfu/ml) from clean catch voided urine with only 1 or 2 organism types
- ❑ Positive culture from straight catheter, at least 10^2 cfu/ml of any number of organisms

UTI in Resident With a Urinary Catheter

One or more of the following:

- ❑ Fever, rigors, or new onset hypotension, with no other site of infection
- ❑ Either acute change in mental status or acute functional decline, with no alternate diagnosis and leukocytosis
- ❑ New onset suprapubic pain or costovertebral angle pain or tenderness
- ❑ Purulent discharge from around catheter, or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

AND

Any of the following:

If urinary catheter removed within the last 2 calendar days

- ❑ Positive culture from clean catch voided urine with no more that 2 species of microorganisms, at least one is 10^5 cfu/ml
- ❑ Positive culture from straight catheter, at least 10^2 cfu/mL of any number of organisms

If urinary catheter in place

- ❑ Urinary catheter specimen* culture with at least 10^5 cfu/mL of any number of organism(s)

Asymptomatic Bacteremic UTI (ABUTI)

With or without a urinary catheter and **no qualifying** fever or signs or symptoms of UTI

AND

One of the following

- ❑ Positive culture from clean catch voided urine with no more that 2 species of microorganisms, at least one is 10^5 cfu/ml
- ❑ Positive culture from straight catheter, at least 10^2 cfu/mL of any number of organisms
- ❑ Urinary catheter specimen culture with at least 10^5 cfu/mL of any number of organism(s)

AND

- ❑ A positive blood culture with at least 1 matching bacteria to the urine culture

Norovirus Gastroenteritis

Both criteria 1 and 2 must be present

- ❑ 1. **At least one** of the following subcriteria
  - ❑ Diarrhea: 3 or more liquid or watery stool above what is normal for the resident in 24 hours
  - ❑ Vomiting: 2 or more episodes in 24 hours
- ❑ 2. Positive stool specimen detected by electron microscopy, enzyme immunoassay, or polymerase chain reaction (PCR)

Clostridium difficile Infection

Both criteria 1 and 2 must be present

- 1. **One** of the following GI subcriteria
  - Diarrhea: 3 or more liquid or watery stool above what is normal for the resident in 24 hours
  - Presence of toxic megacolon
- 2. **One** of the following diagnostic subcriteria
  - Stool positive for *C. difficile* toxin A or B, by culture, or PCR
  - Pseudomembranous colitis identified during endoscopy or surgery or in histopathologic examination of biopsy

Other Gastroenteritis

At **least 1** of the following criteria must be present in resident with symptoms NOT from another cause (medication, tube feeding)

- ❑ 1. Diarrhea- 3 or more liquid, watery stool above what is normal for resident in 24 hours
- ❑ 2. Vomiting: 2 or more episodes in 24 hours
- ❑ 3. **Both** of the following signs and symptoms subcriteria
  - ❑ A stool specimen positive for a pathogen (such as *Salmonella, Shigella, E. coli* 0157:H7*, Campylobacter* spp, rotavirus)

    AND
  - ❑ **At lease 1** of the following gastrointestinal (GI) subcrieria
    - ❑Nausea
    - ❑Vomiting
    - ❑ Abdominal pain or tenderness
    - ❑ Diarrhea

Scabies

Must meet both criteria 1 and 2

- ❑ 1. A maculopapular and/or itching rash
- ❑ 2. At least 1 of the following scabies subcriteria
  - ❑ Physician diagnosis
  - ❑ Lab confirmation (scraping or biopsy)
  - ❑ Epidemiologic linkage to a case of scabies with lab confirmation

Skin, Soft Tissues, and Mucosal Infection

- See McGeer criteria for surveillance definitions
  - Cellulitis
  - Fungal oral or perioral infections
  - Herpesvirus skin infections
    - Cold sores
    - Shingles
  - Conjunctivitis
    - “Pink eye”

Sample Surveillance Log

Infection Surveillance Log

ContinueCARE Hospital at Baptist Health Corbin

Patient Name	Culture Date	Site	ORGANISM CULTURED	ABX start	ABX stop	HAI Y/N	TYPE ISOLATION
Admit Date:_____ MRN:_____ Prev.Hospt:_____ DOB:_____ ___Dialysis: ___Vent ___Trach ___Wounds ___CL date:_____ ___FC date:_____ reason:_____ Co-morbidities:							

APIC IP Talk

(Community.apic.org/communities)

California Department of PublicHealth

NHSN UTI Data Collection Form

Event Details

*Specify Criteria Used: (check all that apply)

Signs & Symptoms

- ☐ Fever: Single temperature ≥ 37.8°C (>100°F), or > 37.2°C (>99°F) on repeated occasions, or an increase of >1.1°C (>2°F) over baseline
- ☐ Rigors
- ☐ New onset hypotension
- ☐ New onset confusion/functional decline
- ☐ Acute pain, swelling, or tenderness of the testes, epididymis, or prostate
- ☐ Acute dysuria
- ☐ Purulent drainage at catheter insertion site

New and/or marked increase in (check all that apply):

- ☐ Urgency
- ☐ Costovertebral angle pain or tenderness
- ☐ Frequency
- ☐ Suprapubic tenderness
- ☐ Incontinence
- ☐ Visible (gross) hematuria

Laboratory & Diagnostic Testing

- ☐ Specimen collected from clean catch voided urine and a positive culture with no more than 2 species of microorganisms, at least one of which is a bacterium of ≥ 10^5 CFU/ml
- ☐ Specimen collected from in/out straight catheter and a positive culture with any number of microorganisms, at least one of which is a bacterium of ≥ 10^2 CFU/ml
- ☐ Specimen collected from indwelling catheter and a positive culture with any number of microorganisms, at least one of which is a bacterium of ≥ 10^5 CFU/ml
- ☐ Leukocytosis (> 14,000 cells/mm^3), or Left shift (> 6% or 1,500 bands/mm^3)
- ☐ Positive blood culture with 1 matching organism in urine culture

*Specific Event (Check one):

☐ Symptomatic UTI (SUTI) ☐ Symptomatic CA-UTI (CA-SUTI) ☐ Asymptomatic Bacteremic UTI (ABUTI)

Urinary Tract Infection for LTCF

(www.cdc.gov/nhsn/forms/57.140_UTI_LTCF_BLANK.pdf)

Sample Resident HAI Worksheet

Revised McGeer Criteria for Infection Surveillance Checklist

See Handout

Patient Name: _____ **MRN:** _____ **Location:** _____

Date of Infection: _____ **Date of Review:** _____ **Reviewed by:** _____

UTI: ▫ evaluated ▫ criteria met **RTI:** ▫ evaluated ▫ criteria met **SSTI:** ▫ evaluated ▫ criteria met **GITI:** ▫ evaluated ▫ criteria met

Table 1. Constitutional Criteria for Infection

Fever	Leukocytosis	Acute Mental Status Change	Acute Functional Decline
Single oral temp >37.8 °C (100 °F), *OR* Repeated oral temp >37.2 °C (99 °F), *OR* Repeated rectal temp >37.5 °C (99.5 °F), *OR* Single temp >1.1 °C (2 °F) from baseline from any site	>14,000 WBC / mm³, *OR* >6% band, *OR* ≥1,500 bands / mm³	Acute onset, *AND* Fluctuating course, *AND* Inattention, *AND* Either disorganized thinking, OR altered level of consciousness	3-point increase in baseline ADL score according to the following items: 1. Bed mobility 2. Transfer 3. Locomotion within LTCF 4. Dressing 5. Toilet use 6. Personal hygiene 7. Eating [Each scored from 0 (independent) to 4 (total dependence)]

Table 2. Urinary Tract Infection (UTI) Surveillance Definitions

Syndrome	Criteria	Selected Comments*
UTI without indwelling catheter	***Must fulfill both 1 AND 2.*** ▫ 1. At least one of the following sign or symptom ▫ Acute dysuria or pain, swelling, or tenderness of testes, epididymis, or prostate ▫ Fever or leukocytosis, and ≥ 1 of the following: ▫ Acute costovertebral angle pain or tenderness ▫ Suprapubic pain ▫ Gross hematuria ▫ New or marked increase in incontinence ▫ New or marked increase in urgency ▫ New or marked increase in frequency ▫ If no fever or leukocytosis, then ≥ 2 of the following: ▫ Suprapubic pain ▫ Gross hematuria	The following 2 comments apply to both UTI with or without catheter: • UTI can be diagnosed without localizing symptoms if a blood isolate is the same as the organism isolated from urine and there is no alternate site of infection • In the absence of a clear alternate source of infection, fever or rigors with a positive urine culture result in the non-catheterized resident or acute confusion in the catheterized resident will often be treated as UTI. However, evidence suggests that most of these episodes are likely not due to infection of a urinary source.

Summary

- The IP must understand the basic principles of epidemiology and apply them to HAI surveillance
- Accurate and consistent data collection, recording, analysis, interpretation, and communication of findings is an essential part of the infection prevention and surveillance plan
- Surveillance of process measures helps focus prevention activities to improve adherence to care practices that prevent infections
- Consistent application of standard surveillance definitions will ensure accurate comparison over time

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Questions?

For more information,
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