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# MAKING A DIFFERENCE: KEEPING RESIDENTS SAFE FROM INFECTIONS

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## Objectives

- To identify ten strategies for preventing resident infections.
- To discuss the value of preventing resident infections.
- To describe what data is needed to evaluate the impact of an infection prevention program.

2

# Why prevent infections?

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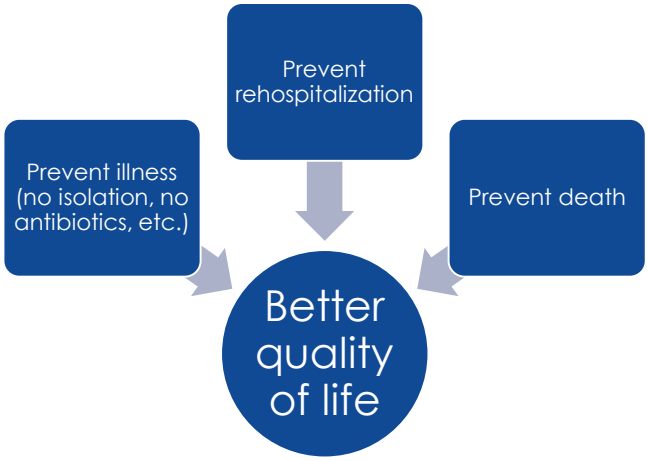


3

# National Standards

4

Evidence-based practice guidelines

- Centers for Disease Control (CDC)
- Society for Healthcare Epidemiology of America (SHEA)
- Infectious Disease Society of America (IDSA)
- American Society for Heating, Refrigeration, and Air Conditioning (ASHRAE)
- American Society for Healthcare Engineering (ASHE)

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## Core Infection Prevention Strategies

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- Hand hygiene
- Standard precautions
- Personal protective equipment
- Environmental cleaning and disinfection
- Injection safety
- Respiratory hygiene

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## Infection Prevention Strategies

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- Enhanced barrier and transmission-based precautions
- Medical equipment management – low-level disinfection, high-level disinfection, sterilization, resident-dedicated, and disposable
- Device-associated prevention bundles – CAUTI, CLABSI
- Employee health – Exclusion, post-exposure prophylaxis, and annual Fit testing (OSHA requirement for N95)
- Air management
- Water management

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# Spaulding Classification

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| | |
|---|---|
| Categorize patient/ resident care items according to the degree of risk for infection when using these items | |
| Non-critical | Contact with intact skin but not mucous membranes → lower risk for infection |
| Semi-critical | Contact with mucous membranes → high risk for infection |
| Critical | Enter sterile tissue → highest risk for infection |

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# Spaulding Classification System

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- What type of equipment is coming into your facility?
- High-level disinfection or sterilization may be necessary
- Other options: resident dedicated or disposable

- Dentistry
- Podiatry
- Dermatology
- Speech therapy

Follow manufacturer instructions for use

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# High-level disinfection

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- Internet search bar – “high level disinfectants”
- Follow manufacturer instructions
  - Clean
  - Soak
  - Rinse

**FDA-Cleared Sterilants and High Level Disinfectants with General Claims for Processing Reusable Medical and Dental Devices**

Section VI. of FDA's *Final Guidance for Industry and FDA Staff: Reprocessing Medical Devices in Health Care Settings: Validation Methods and Labeling* outlines six criterion that should be addressed in reprocessing instructions. Criterion 4 recommends that reprocessing instructions should include devices and accessories that are legally marketed. On this page is a table of FDA-cleared liquid chemical sterilants and high level disinfectants, last updated December 2023.

https://www.fda.gov/medical-devices/reprocessing-reusable-medical-devices-information-manufacturers/fda-cleared-sterilants-and-high-level-disinfectants-general-claims-processing-reusable-medical-and

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# Low & Intermediate Level Disinfection

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Antimicrobial Products Registered with EPA for Claims Against Common Pathogens

- EPA's Registered Antimicrobial Products Effective as Sterilizers [List A]
- EPA's Registered Antimicrobial Products Effective Against *Mycobacterium tuberculosis* (TB) [List B]
- EPA's Registered Antimicrobial Products Effective Against Norovirus (Feline calicivirus) [List G]
- EPA's Registered Antimicrobial Products Effective Against Methicillin-resistant *Staphylococcus aureus* (MRSA) and/or Vancomycin Resistant *Enterococcus faecalis* or *faecium* (VRE) [List H]
- EPA's Registered Antimicrobial Products for Medical Waste Treatment [List J]
- EPA's Registered Antimicrobial Products Effective Against *Clostridium difficile* Spores [List K]
- EPA's Registered Antimicrobial Products Effective Against Ebola Virus [List L]
- EPA's Registered Antimicrobial Products Effective Against Avian Influenza [List M]
- Disinfectants for Use Against SARS-CoV-2 [List N]
- Disinfectants for Use Against Rabbit Hemorrhagic Disease Virus (RHDV2) [List O]
- EPA's Registered Antimicrobial Products Effective Against *Candida auris* [List P]
- Disinfectants for Emerging Viral Pathogens (EVPs) [List Q]
- EPA's Registered Antimicrobial Products Effective Against Bloodborne Pathogens (HIV, Hepatitis B and Hepatitis C) [List S]

https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants

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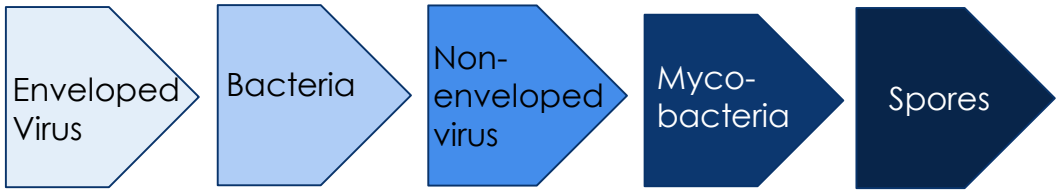
# How Hard Am I To Kill?




SARS-CoV-2 = Enveloped Virus = Easiest to Kill
*C. difficile* = Spores = Hardest to Kill

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# Strategies to Mitigate Viral Transmission

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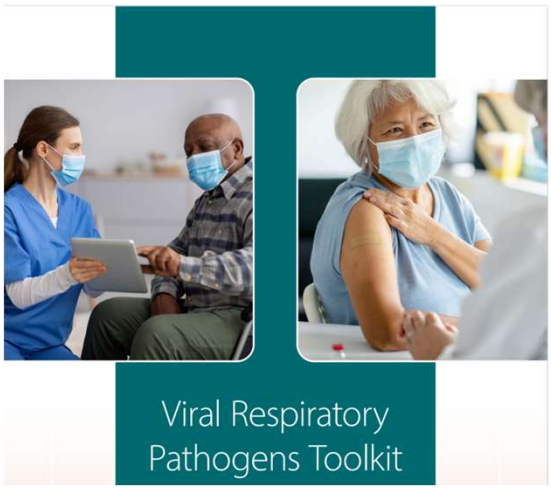
CDC's Actions for LTC

- Prepare for respiratory viruses
- Respond when a resident or healthcare personnel (HCP) develop symptoms of viral infection
- Control transmission




https://www.cdc.gov/long-term-care-facilities/media/pdfs/Viral-Respiratory-Pathogens-Toolkit-508.pdf

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## Respiratory Illness Mitigation

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- Vaccination
- Standard and transmission-based precautions
- Respiratory hygiene
- Exclusion of healthcare personnel (symptoms/ positive test)
- Masking for source control
- Ventilation
- Testing
- Treatment
- Outbreak investigation and response

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## Transmission Via Air

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- Air can be a medium/mode for transmission of infectious pathogens
- Infectious pathogen transmitted to correct portal of entry in a susceptible host
- When a person inhales, pathogen may be deposited in nasal or oral passages or lungs
- Larger particles more likely to fall to the ground faster vs. smaller, lighter particles may remain in the air and more easily transmitted on air currents

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## Factors Influencing Infection

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- How much is necessary to be an inoculating dose?
  - Is the concentration of the particles/infectious pathogen in the air space enough to be an inoculating dose?
- Pathogen virulence
- Pathogen viability while suspended in the air
- Impact of temperature, humidity, and sunlight on pathogen survival

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## Air Management

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- Increase air changes per hour (ACH)
  - Number of times the air within a defined space is replaced
  - Increase ACH can decrease concentration of particles in a space more quickly
- Air filtration
  - Removal of particles from the air
  - HVAC MERV filters, portable room HEPA filters, germicidal UV lights
- Air pressurization - pressure differential between two adjacent air spaces
  - Negative pressure keeps particles inside the room; air flows in
  - Positive pressure pushes particles outside of the room; air flows out

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# Air Changes Per Hour (ACH)

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- Strive to increase from 2 ACH to 5 ACH in common areas, staff areas, etc.
  - Greatly reduces the time to remove airborne contaminants

https://www.cdc.gov/niosh/ventilation/prevention/Aim-for-5.html

Airborne Contaminant Removal

Table B.1. Air changes/hour (ACH) and time required for airborne-contaminant removal by efficiency *

| ACH § ¶ | Time (mins.) required for removal 99% efficiency | Time (mins.) required for removal 99.9% efficiency |
|---|---|---|
| 2 | 138 | 207 |
| 4 | 69 | 104 |
| 6* | 46 | 69 |
| 8 | 35 | 52 |
| 10* | 28 | 41 |
| 12* | 23 | 35 |
| 15* | 18 | 28 |
| 20 | 14 | 21 |
| 50 | 6 | 8 |

The number of air changes per hour and time and efficiency.

Appendix B. Air | Infection Control | CDC

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# Air Filtration

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Filters on HVAC system

- Minimum Efficiency Reporting Values (MERV) – report a filter's ability to capture particles between 0.3 to 10 microns (µm) (in accordance with HVAC system capacity)
- The higher the efficiency rating the higher the quantity of smaller particles it can capture
- MERV 13 or higher preferred (MERV 16 providing the highest filtering capability)

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# Air Filtration

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Portable air filtration units - High efficiency particulate air filtration (HEPA)

- HEPA air filter captures at least 99.97% of particles with a size of 0.3 microns (µm)
- HEPA filters should be able to recirculate air and provide the equivalent of ≥ 12 ACH
- HEPA filter efficiency is higher than MERV 16
- Use of unit may change the pressure in the room (typically drops the pressure)
- Size of unit needed depends on size of room and amount of air expected to flow through the unit

https://www.cdc.gov/niosh/ventilation/faq/index.html

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# Air Filtration

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Germicidal ultraviolet (GUV), otherwise known as ultraviolet germicidal irradiation (UVGI)

- Used in combination with other air filtration strategies
- Upper-room GUV
- In-duct GUV systems
- Can inactivate or kill bacteria, viruses, and fungi
- Benefit influenced by ACH and filtration provided by HVAC
- UV light is harmful to eyes

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# Other Notes: Air Pressurization

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| Location | Air Pressurization | Air Flow | ACH | Air exhausted outdoors |
|---|---|---|---|---|
| Clean linen storage | Positive | Out | 2 | No |
| Clean workroom or clean holding (including clean and sterile supplies) | Positive | Out | 4 | No rating |
| Soiled workroom, soiled holding, soiled sorting, soiled storage | Negative | In | 10 | Yes |
| Soiled linen sorting and storage | Negative | In | 10 | Yes |
| Linen and trash chute | Negative | In | 10 | Yes |
| Housekeeping rooms | Negative | In | 10 | Yes |
| Bathing room | Negative | In | 10 | Yes |

https://www.cdc.gov/infection-control/hcp/environmental-control/appendix-b-air.html#cdc_generic_section_4-ventilation-specifications-for-health-care-facilities

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# Data Driven Decision Making

Are all these strategies making a difference?

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# Scenario 1

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- The ADON is responsible for surveillance and presents a report to the QA&A Committee that has the following information:
  - 12 healthcare-associated infections (HAI) for November
    - 5 on unit A
    - 4 on unit B
    - 3 on unit C
  - In October, there were 8 healthcare-associated infections
- What decisions would you make in response to this report?

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# Scenario 2

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The IP monthly report to QA&A Committee includes the following information:

- 8 UTIs for November
  - 6 are healthcare-associated and 2 are present on admission (POA)
    - Unit A = 4 HAI UTI/0 POA
    - Unit B = 1 HAI/1 POA
    - Unit C = 1 HAI/1 POA
- What decisions would you make in response to this report?

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## Scenario 3

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- Your facility has zero to one facility-associated *C. difficile* infection a month
- This month there are 3 *C. difficile* infections. One of the infections is facility-associated on Unit A and the other two infections were present on admission on Unit B.
  - What is an appropriate response to this finding?
- What would you do if the infections on Unit B were both facility-associated?

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## Data-driven Decision Making

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- Need data over time
  - If only look at one month at a time, then may not be able to see trend evolving over time
- Need point for comparison
  - What is your baseline? What is expected?
  - How does this compare to last year's rate?
  - How does this compare to your goal?
- Visual representation of data may be helpful to see trends/changes in the data – tables or graphs

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# Presenting the Data

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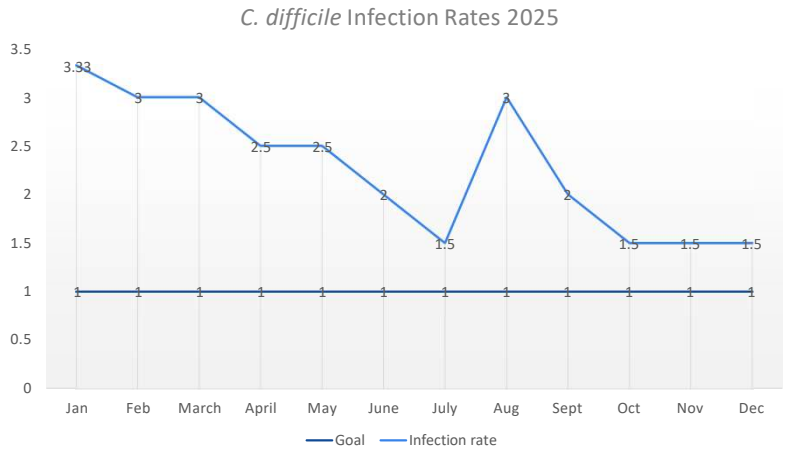
**Objective: By December 31, 2025, Decrease *C. difficile* infection rate to <1.0/ 1000 resident days**

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# CMS Interpretive Guidance

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- *"The facility's surveillance system must include a data collection tool and the use of nationally-recognized surveillance criteria, such as but not limited to, the CDC's National Healthcare Safety Network (NHSN) Long Term Care Criteria to define infections or updated McGeer criteria."*
  - Does not state must color in a map for surveillance.
- Most recent update to McGeer criteria is 2012

CMS Appendix PP 07-09-2025 page 788

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# Number vs. Rates

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| Raw Numbers | Rates |
| --- | --- |
| Total count of events | Events per unit |
| Hard to compare across populations | Normalize data for fair comparison |
| Need to be put into context | Accounts for population size or exposure |
| Hard to identify trends or patterns | Shows changes over time |

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# Rates

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Compares two different units

- Allows for fair comparison of different size populations
  - 500 flu cases for a city of 1 million is different than 500 cases for a town of 10,000 people
  - Car crashes per 100,000 people 2024
  - Falls per 1000 resident days
- Shows how frequently something happens over time
  - Miles per hour
  - Words per minute

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# Outcome Surveillance

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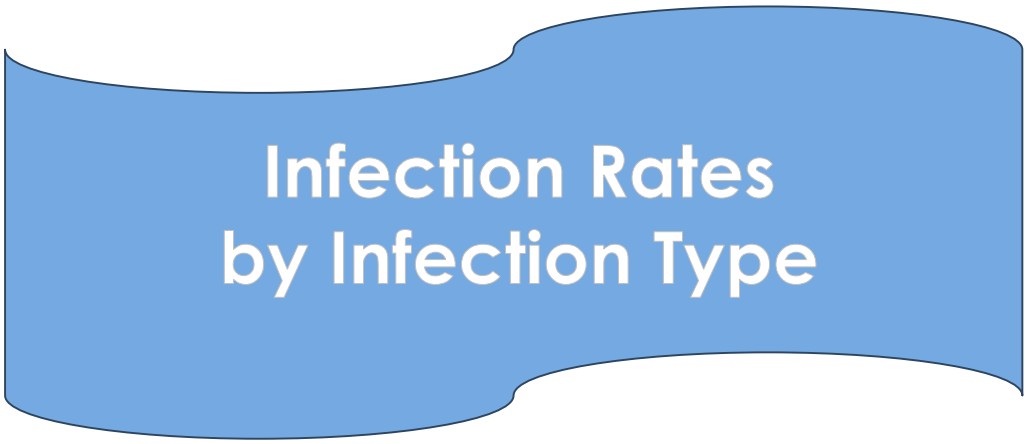


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# Infection Rate by Infection Type

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| | SST Rate | LRI Rate | PNEU Rate | C. diff Rate | UTI Rate (without catheter) | CAUTI Rate | Sepsis Rate |
|---|---|---|---|---|---|---|---|
| GOAL | <1.05 | <0.50 | <0.75 | <0.10 | <1.00 | <3.50 | 0 |
| January | 1.77 | 0.00 | 0.44 | 0.00 | 1.86 | 18.87 | 0.00 |
| February | 0.45 | 0.89 | 1.78 | 0.00 | 1.40 | 19.61 | 0.00 |
| March | 1.69 | 2.11 | 1.69 | 0.00 | 1.32 | 19.80 | 0.00 |
| Q1 Subtotal | 1.31 | 1.02 | 1.31 | 0.00 | 1.52 | 19.42 | 0.00 |
| April | 1.75 | 0.87 | 1.31 | 0.00 | 2.74 | 20.20 | 0.00 |
| May | 0.46 | 0.00 | 0.92 | 0.46 | 2.42 | 30.93 | 0.00 |
| June | 1.34 | 0.34 | 1.01 | 0.00 | 0.69 | 0.00 | 0.00 |
| Q2 Subtotal | 1.21 | 0.40 | 1.08 | 0.13 | 1.82 | 16.89 | 0.00 |
| July | 1.90 | 0.38 | 0.00 | 0.00 | 0.39 | 9.90 | 0.00 |
| August | 1.43 | 0.00 | 0.48 | 0.00 | 1.50 | 0.00 | 0.00 |
| September | 1.33 | 0.44 | 0.44 | 0.00 | 0.46 | 0.00 | 0.00 |
| Q3 Subtotal | 1.57 | 0.29 | 0.29 | 0.00 | 0.75 | 3.39 | 0.00 |
| October | 1.19 | 0.40 | 0.79 | 0.00 | 2.06 | 0.00 | 0.00 |
| November | 1.99 | 0.40 | 0.00 | 0.00 | 0.41 | 10.10 | 0.00 |
| December | 2.03 | 0.41 | 0.81 | 0.41 | 0.42 | 0.00 | 0.41 |
| Q4 Subtotal | 1.73 | 0.40 | 0.53 | 0.13 | 0.97 | 3.37 | 0.13 |
| 2025 Summary Total | 1.46 | 0.52 | 0.80 | 0.07 | 1.27 | 10.86 | 0.03 |

- Per 1000 resident days & CAUTI per catheter days
- Goals met?
- What needs to be the priority focus areas moving forward?
- What are the new goals?

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# Evaluation

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# Evaluation

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Lower infection rate =

Fewer infections =

You did keep residents from getting an infection!

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# Set Goals

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| Goal | Strategies | Process Measures | Outcome Measure |
|---|---|---|---|
| By December 31, 2025, achieve a UTI rate of < 1.00 per 1000 resident days and sustain it. | Ensure peri care is provided according to protocol and promote hydration among residents | 1. To have 100% compliance with peri care protocol.<br>2. To have fluids offered every shift to 80% of the residents. | UTI rate |
| To sustain infections due to ESBL to <0.05 per 1000 resident days. | Sustain hand hygiene and EBP compliance | 1. To have 95% compliance with doing hand hygiene upon exiting resident room.<br>2. To have 100% compliance with EBP. | ESBL Infection rate (all infection types with positive ESBL culture) |
| By December 31, 2025, to achieve skin/soft tissue (SST) infection rate of < 1.05 per 1000 resident days and sustain it through the end of the year. | Proper management of supplies for daily care and wound care<br><br>Nurse assigned to do all dressing changes; floor nurse back-up only | 1. To have 100% compliance with proper management of supplies for daily care.<br>2. To have 100% compliance with proper management of wound care supplies.<br>3. To have same nurse provide wound care/dressing changes (by unit) for 80% of dressing changes. | SST infection rate |

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# Evaluation

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| Goal | Status | Next Steps |
|---|---|---|
| By December 31, 2025, achieve a UTI rate of < 1.00 per 1000 resident days and sustain it. | Goal met!<br>Quarter 3 rate was 0.75 and Quarter 4 rate was 0.97 per 1000 (non-catheter) resident days | Celebrate success!<br>Sustainment plan |
| To sustain infections due to ESBL to <0.5 per 1000 resident days. | Goal met! | Celebrate success! |
| By December 31, 2025, to achieve an SST rate of <1.05 per 1000 resident days and sustain it through the end of the year. | Goal not met. | More detailed analysis – facility wide or unit-based problem<br>Root cause analysis<br>Develop action plan<br>Implement accountability actions |

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## Assessment

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- Additional data analysis/summaries
  - Unit specific or facility-wide?
  - What is in common?
  - Use of Excel can assist with data sorting to do additional analysis.
- Think about how that type of infection is spread and develop strategies/plan accordingly.
- Strive to identify system issues.
  - How are supplies handled/managed, care practices, etc.

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## Action Plan

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- Who is going to do what? By when?
- Other than education, what are you going to do?
  - System changes, foster behavior change, etc.
- What tools are needed?
  - Procedure, signs, checklist, stop screen for medical record documentation
- What actions are needed?
  - Coaching, audits, and accountability

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# CMS IP Report to QA&A Committee

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Reporting to include but not limited to

- Incidents identified under the IPCP such as healthcare-associated infections (HAI)
- Process and outcome surveillance
- Outbreaks and control measures
- Occupational health communicable disease illnesses
- Antibiotic stewardship program
  - Antibiotic use and resistance data

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# IP Report to QA&A Committee

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- Vaccination summaries for residents and staff
- Summary of MDRO and other significant pathogens and transmission status (I.e., potential transmission, no transmission)
- Environment of care findings
- Opportunities and successes
- Recommendations
- Discussion items

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# Q & A

- Questions???

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## 42 How to calculate infection rates

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## Calculating Infection Rates

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- Numerator = number of new onset of healthcare-associated infections for the time period such as monthly, quarterly, or annually
- Denominator = population at risk
  - Resident days = census each day added together for time period = per 1000 resident days
  - Device days = number of days device in resident added together for time period = per 1000 device days (specific device)
  - Caution with UTI = separate residents with indwelling catheter from those without catheters

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## Infection Rates

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- Infection rate =

  (Number of new infections ÷ population at risk) x 1000

Example

- 4 pneumonia infections during the month of October
  - 1 present on admission
  - 3 facility-associated/healthcare-associated
- Resident days = 2705

Pneumonia infection rate for October =

(3 ÷ 2705) x 1000 = 1.11 per 1000 resident days

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# UTI Rate

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- Number of symptomatic UTI
- Denominator = population at risk
  - Population at risk for UTI = residents without indwelling urinary catheter
  - Population at risk for CAUTI = residents with indwelling urinary catheter
  - Population at risk for UTI = Resident days (all residents) minus catheter days (residents with indwelling urinary catheter)

UTI Rate = Number of UTI ÷ (Total resident-days – catheter days) x 1,000

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# UTI Rate

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Example

- 8 UTI and 5 are facility associated
- Resident days = 2535 and device days = 180
- Denominator = resident days – device days

UTI rate = 5 ÷ (2535 - 180) x 1000 = 2.12 per 1000 resident days

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# CAUTI Rate

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- Catheter-associated UTI rate
  - (Number of CAUTI ÷ Indwelling urinary catheter days) x 1,000
- Numerator = number of CAUTI
- Denominator = Indwelling urinary catheter days
  - Excludes suprapubic, straight in and out, or condom catheters
- CAUTI criteria applies to symptomatic events when an indwelling catheter is in place or recently removed (within last 2 calendar days) and are facility associated will contribute to the CAUTI rate

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# CAUTI Rate

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Example

- 5 CAUTI during the month of May and 3 are facility-associated
  - Excluding suprapubic catheters
- Total device days for the month of May = 180

CAUTI Rate = (3 CAUTI ÷ 180) x 1000 = 16.67 per 1000 catheter days

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