# Point Prevalence Survey of Healthcare Associated Infection (HAI) and Antimicrobial use (AU) in US nursing homes: Methods, Results, and Next Steps

**The Centers for Disease Control and Prevention (CDC)**

**& the Emerging Infections Program (EIP)**

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# Measures of frequency: Incidence and Prevalence

| Incidence: Incidence Rate | Prevalence: Prevalence Rate |
|---|---|
| New cases in a population under observation over a given time period | Existing cases in a population under observation at a given point in time |
| Measure of risk of acquiring disease/infection | Measure of how widespread disease/infections is |
| Example: Number of UTIs per 100,000 resident-days during 2019 | Example: Number of UTIs per 100 residents on July 9, 2019 |

# Point Prevalence Survey (PS) of HAI and AU: Provides 1-day "snap shot" in a facility

- US Veterans Affairs ~130 Community Living Centers
  - PS in 2005, 2007 & 2009

- European CDC multiple counties ~ many thousands LTCF
  - PS in 2012, 2014 & 2016

**Nursing home-associated infections in Department of Veterans Affairs community living centers**

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Tsan et al. AJIC 2008
Tsan et al. AJIC 2010

**Point prevalence survey of healthcare-associated infections and antimicrobial use in European long-term care facilities**

April–May 2013

www.ecdc.europa.eu

# Example: Nursing home-associated infections Dept. VA community living centers, 2007

**Table 1.** Types of NHAIs in VA CLC residents

| NHAI | Number of NHAIs | Percentage of all NHAIs | Point prevalence, % |
|---|---|---|---|
| Symptomatic UTI | 179 | 29.2 | 1.64 |
| Skin | 79 | 12.9 | 0.72 |
| Asymptomatic bacteriuria | 64 | 10.4 | 0.58 |
| Pneumonia | 49 | 8.0 | 0.45 |
| Soft tissue | 33 | 5.4 | 0.30 |
| Decubitus ulcer | 28 | 4.6 | 0.26 |
| Gastrointestinal tract | 26 | 4.2 | 0.24 |
| Osteomyelitis | 24 | 3.9 | 0.22 |
| Conjunctivitis | 24 | 3.9 | 0.22 |
| Gastroenteritis | 21 | 3.4 | 0.19 |
| Laboratory-confirmed bloodstream infection | 15 | 2.4 | 0.14 |
| Upper respiratory tract | 14 | 2.3 | 0.13 |
| Oral cavity | 10 | 1.6 | 0.09 |
| Other urinary tract | 7 | 1.1 | 0.06 |
| Joint or bursa | 6 | 1.0 | 0.05 |
| Eye other than conjunctivitis | 5 | 0.8 | 0.05 |
| Sinusitis | 5 | 0.8 | 0.05 |
| Bronchitis without pneumonia | 5 | 0.8 | 0.05 |
| Ear mastoid | 4 | 0.7 | 0.04 |
| Disseminated infection | 4 | 0.7 | 0.04 |
| Clinical sepsis | 3 | 0.5 | 0.03 |
| Other lower respiratory tract infection | 3 | 0.5 | 0.03 |
| Hepatitis | 2 | 0.3 | 0.02 |
| Laryngitis | 1 | 0.2 | 0.01 |
| Tracheobronchitis, no pneumonia | 1 | 0.2 | 0.01 |
| Burns | 1 | 0.2 | 0.01 |
| Total | 613 | 100.0 | 5.3 |

Tsan et al. AJIC 2010

# Prevalence surveys attributes

- Time-limited surveillance activity

- Includes all types of HAIs and AU

- *Rapidly* provide data for analysis and feedback

- When performed serially, can be used to measure changes over time

# CDCs nursing home HAI and AU prevalence surveys



| 2012 | 2013-14 | 2015-16 | 2017 |
|------|---------|---------|------|
| Planning | Pilot survey: 9 nursing homes in 4 states | Planning | Full-scale survey: 161 nursing homes in 10 states |

www.cdc.gov/hai/eip/antibiotic-use.html

# Primary objectives

- Measure number/proportion of HAIs and HAI types in nursing homes
  - Using revised McGeer criteria for residents in LTC

- Identify number/proportion and types of antimicrobial drugs used in nursing home residents

- Important: Two separate outcomes
  - Not everyone with HAI is receiving AU
  - Not everyone receiving AU has HAI

Stone at al. ICHE 2012

# To illustrate: European CDC HAI and AU Prevalence Survey in LTCF, 2013



LTCF residents (n=77 264)

HAI (n=2 626)
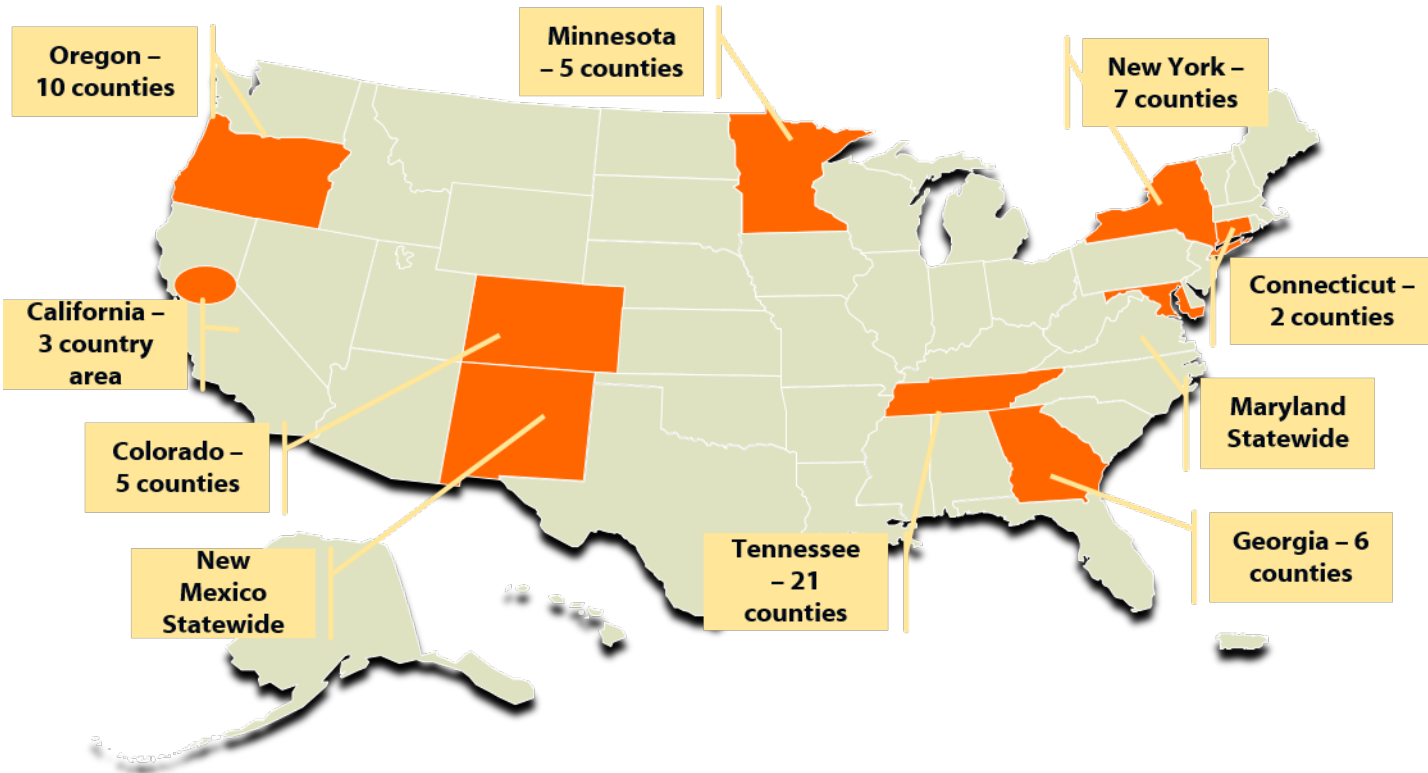
AU (n=3 367)

HAI + AU (n=1 791)
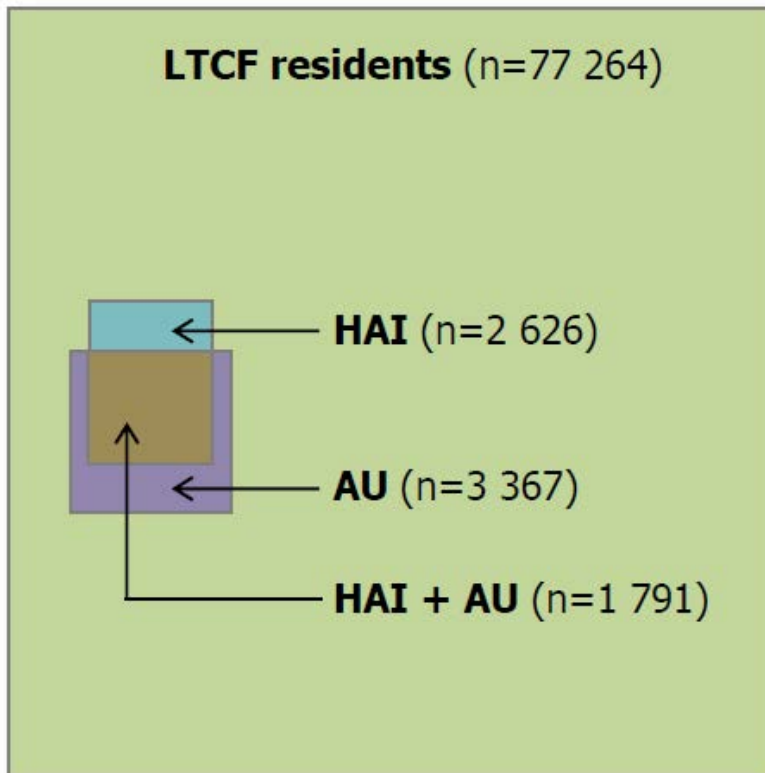
# Methods

# Prevalence survey implementation

- Leverage unique expertise of CDC EIP staff
  - Highly trained surveillance officers
  - HAI and AU data collection via medical chart review
  - Experienced in survey methods and data collection approaches
  - Local proximity to NHs being recruited

- Within each state, EIP staff implement the project
  - NH project promotion and recruitment
  - Performed majority of data collection & applied HAI surveillance definitions
    - Reduce burden on participating NH
    - Increase likelihood of NH participation
    - High quality & standardized data collection

# CDC EIP sites and Prevalence Survey recruiting areas



Oregon – 10 counties

Minnesota – 5 counties

New York – 7 counties

California – 3 country area

Connecticut – 2 counties

Colorado – 5 counties

Maryland Statewide

New Mexico Statewide

Tennessee – 21 counties

Georgia – 6 counties

In US, ~15,550 certified nursing homes
In EIP recruiting area, 1061 certified nursing homes

# Inclusion of nursing homes and residents

- Eligible facilities must be nursing home or skilled nursing facility certified by the Centers for Medicare & Medicare Services (CMS)

- Nursing Homes
  - Contacted a random sample of CMS certified nursing homes within EIP recruitment area
    - Nursing home participation rate ~55%

- Residents
  - Eligible for inclusion if in the facility at 8:00am on the day of the survey and also there for entire day before
    - >98% residents were eligible

# Data collection timeline
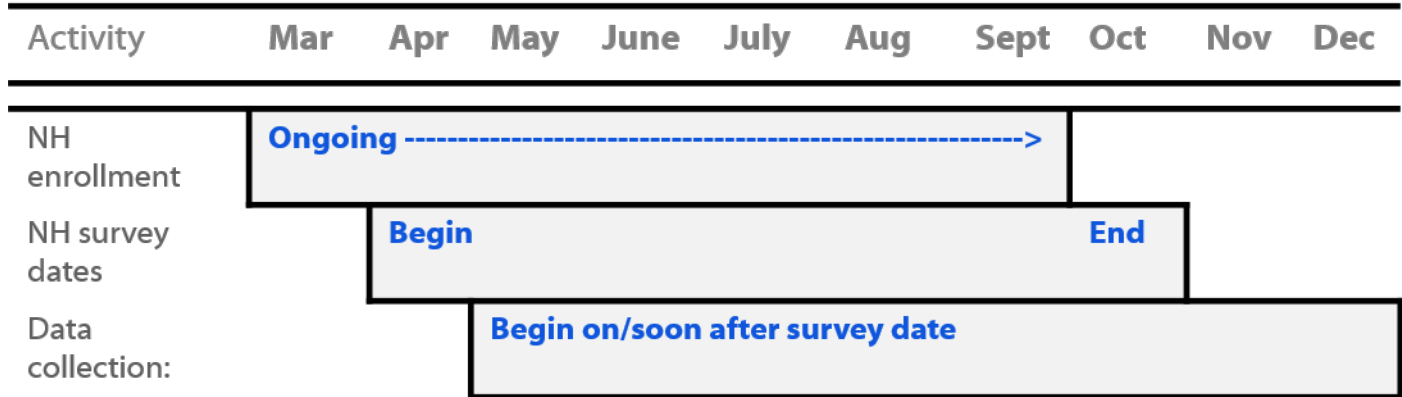
# Types of data collected

| Healthcare Facility Assessment | Resident Demographic, Clinical Data | Antimicrobial Use Data | Infection Data : revised McGeer |
|---|---|---|---|
| For each NH | For each eligible resident | For each eligible drug taken by residents | For each HAI in residents |
| Collected by NH Staff | Collected by EIP with help from NH staff | Collected by EIP Staff | Collected by EIP staff |
| NH beds, services provided, Infection Control and Antibiotic Stewardship programs | Age, race, gender, short vs long stay, diabetes, mobility, devices, wounds | Drug type, reason given, planned duration | Infection signs, symptoms, testing<br>1. Urinary tract<br>2. Respiratory Tract<br>3. Soft tissue/wound<br>4. Mucosal<br>5. Gastrointestinal<br>6. Systemic |

# Results

# Participation

| NHs | NH beds | Census | Eligible residents |
|-----|---------|--------|--------------------|
| 161 | 18,342 | 15,768 | 15,276 |

# Characteristics of participating nursing homes

| NH characteristic | All NH, 161 |
|---|---|
| Mean # NH beds | 113 |
| Mean # pediatric beds | 0.04 |
| Mean #resident rooms | 71 |
| Mean # single rooms | 28 |
| Average dailycensus | 99 |
| Mean # Attending physicians | 3.6 |
| Mean days/weekMedical Director at NH | 1.8 |
| Mean IP #years experience | 7.4 |
| Mean IP # years at the surveyedNH | 2.9 |

# Primary care, clinical services provided by participating NH

| Primary care or clinical service | Percent of NH, 161 |
|---|:---:|
| Skilled nursing/short term rehab | 98 |
| Long-term Nursing | 97 |
| Hospice/Palliative | 89 |
| Long-term Dementia | 80 |
| Bariatric | 54 |
| Long-term Psychiatric | 29 |
| Ventilator | 7 |
| IV infusions using central lines | 90 |
| Facility staff provide wound care | 81 |
| 24-hour day on-site supervision by RN | 70 |
| Manage residents with tracheostomy | 63 |
| Facility staff perform blood draws | 27 |
| Hemodialysis (in facility) | 7 |

# Number (%) of Residents by NHSN Location Type

| Location Type | Percent |
| --- | --- |
| Long-term general nursing unit | 47 |
| "Mixed" nursing unit | 23 |
| Skilled nursing/Short-term rehab (subacute) unit | 17 |
| Dementia unit | 11 |
| Psychiatric unit | 1 |
| Ventilator dependent unit | 1 |
| Other unit | <1 |
| Bariatric unit | <1 |
| Hospice unit | <1 |

# Resident demographic characteristics

| Resident characteristic | Percent of residents |
|---|:---:|
| Age, years: < 65 | 17 |
| 65-74 | 20 |
| 75-84 | 26 |
| 85+ | 37 |
| Gender: Male | 38 |
| Race/Eth: White, not Hispanic | 72 |
| Black, not Hispanic | 14 |
| Hispanic or Latino | 6 |
| Asian | 3 |
| Other or unknown | 5 |

# Resident clinical characteristics

| Resident characteristic | Percent |
|---|---|
| Wheelchair dependent/bedbound | 53 |
| Diabetes | 32 |
| Short stay | 20 |
| Receiving wound care | 19 |
| Pressure ulcer | 7 |
| Urinary catheter: Indwelling | 5 |
| Urinary catheter: Other | 2 |
| Feeding (PEG/J) tube | 5 |
| Dialysis (in or outside NH) | 2 |
| Central line | 2 |
| Trach Tube | 2 |
| Ventilator | 0.7 |

All data shown are preliminary and subject to change

# How CDC will use prevalence survey data



DATA → KNOWLEDGE → ACTION

# Data for action: Participating nursing homes

- Summarized data in a "Facility Feedback Report"
- Help NH identify appropriate next steps for infection surveillance, infection prevention, or stewardship activity

**Assessment of Healthcare-Associated Infections & Antimicrobial Use in Nursing Homes or Skilled Nursing Facilities**

**Facility Feedback Report**

**Characteristics of Residents Included in Assessment**

| Your Facility, Total | | |
|---|---|---|
| 81 | Residents* | |
| Female 28% | Male 72% | |
| Age Range, Yrs. | 38 to | 87 |
| Average Age, Yrs. | 63 | |
| # Short Stay Residents | 0 | 0% |
| # With Diabetes | 22 | 27% |
| # Wheelchair Bound or Bedridden | 29 | 36% |
| # With Pressure Ulcers | 1 | 1% |
| # Receiving Wound Care | 8 | 10% |

| Participating Facilities, Average | | |
|---|---|---|
| 82 | Residents* | |
| Female 59% | Male 41% | |
| Age Range, Yrs. | 59 to | 82 |
| Average Age, Yrs. | 75 | |
| # Short Stay Residents | 12 | 15% |
| # With Diabetes | 23 | 28% |
| # Wheelchair Bound or Bedridden | 38 | 46% |
| # With Pressure Ulcers | 6 | 7% |
| # Receiving Wound Care | 15 | 18% |

# Data for action: State health departments

- Provide local/regional data on HAI and AU

- EIP site participation in NH prevalence survey established or strengthened relationships with state-based NH partners, e.g.
  - NH corporate groups
  - Professional organizations
  - State Quality Improvement Organizations

- New opportunities to bring NH into existing State HAI surveillance, infection prevention or stewardship work

- Propagate lessons learned from working with NH to other states, share use of prevalence survey data collection tools and resources

# Data for action: Federal/national

- Essential descriptive data on epidemiology of HAIs and AU in NH
    - Develop an approach for national HAI burden estimate

- Inform developments to CDC NHSN surveillance for long-term care facilities[1]
    - Additional HAIs should be under surveillance
    - Identify information important for risk adjustment of surveillance data

- Identify antibiotic stewardship priorities in NH

- Inform design and implementation of additional NH-based projects

# Summary

- Prevalence surveys provide a quick and efficient approach to obtain data on HAIs and Antimicrobial Use
  - Compliment to existing NHSN surveillance data

- Can help inform public health action at NH, state or regional, and Federal level
  - On-going data dissemination during 2019 and 2020

- Most useful when performed serially over time
  - CDC evaluating when next survey should be conducted
  - Typically ~5 year intervals

Acknowledgements:

- All 161 participating NHs
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