Infection Surveillance in Long-term Care: A National Perspective

Jeneita Bell, MD, MPH
CDR, US Public Health Service
Long-term Care Team Lead

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Outline

- NHSN enrollment update
- *Clostridium difficile* Reporting and Reduction Project
- Analysis of *Clostridium difficile* event data
- Implications
- Future directions
- Training agenda at-a-glance
NHSN Long-term Care Facility (LTCF) Component

- Released in September 2012
- Standardized event criteria and data analysis
- Tailored to LTCFs
- Reporting modules:
  - Urinary tract infections (UTIs); including antibiotic-use
  - Multidrug-resistant organisms and C. difficile
  - Adherence to hand hygiene, gown- and glove-use
NURSING HOMES ENROLLED IN NHSN — Dec 2017

Total Number of NH: 3223
~ 20% of 15,600 US NH
NURSING HOMES ENROLLED IN NHSN — Apr 2018

Total number of Nursing Homes: 3281
~21% of 15,600 US NH
**Clostridium difficile (CDI) Reporting and Reduction Project**

- Collaboration between CDC, CMS, QIN-QIOs
- Project timeline: May 23, 2016 – December 28, 2018
- Objectives:
  - Increase NHSN reporting; establish CDI baseline; improve outcomes
- Recruitment and NHSN enrollment:
  - May 23, 2016 – April 7, 2017
  - National Target: 2,330
- Nursing Home CDI data submission for baseline:
  - March 1, 2017 – December 31, 2017
  - National Target submitting data: 1,864 (min. 80%)
## CDI Project NH Characteristics (N=2,594)

<table>
<thead>
<tr>
<th>AFFILIATION</th>
<th>N (%)</th>
</tr>
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<tbody>
<tr>
<td>Independent (free-standing / continuing care retirement community</td>
<td>741 (29)</td>
</tr>
<tr>
<td>Multi-facility organization</td>
<td>1660 (64)</td>
</tr>
<tr>
<td>Hospital system (attached / free-standing)</td>
<td>193 (7)</td>
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<tr>
<th>FACILITY OWNERSHIP</th>
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<tr>
<td>Government / VA</td>
<td>93 (4)</td>
</tr>
<tr>
<td>Non-Profit</td>
<td>637 (25)</td>
</tr>
<tr>
<td>Private</td>
<td>1864 (72)</td>
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<th>FACILITY CERTIFICATION</th>
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<tr>
<td>Medicare/Medicaid (Dual)</td>
<td>2509 (97)</td>
</tr>
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<td>Medicare or Medicaid only</td>
<td>83 (3)</td>
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<table>
<thead>
<tr>
<th>NUMBER OF BEDS</th>
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<tr>
<td>&lt; 50</td>
<td>203 (8)</td>
</tr>
<tr>
<td>50 – 99</td>
<td>972 (38)</td>
</tr>
<tr>
<td>100 – 199</td>
<td>1224 (47)</td>
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### NHSN Enrolled NHs Compared to All US NHs

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<td>25</td>
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CDI Project Data Summary, March – December, 2017

- 3,281 nursing homes (NHs) enrolled in NHSN
- 2,594 (79%) NHs enrolled in CDI Project
  - 2,485 (96%) reported at least one month of complete data
  - Complete data = submitted CDI events and resident days
- CDI event and reporting patterns
  - 93% (2301/2,485) reported 10 consecutive months
  - 53% (1,324/2,485) reported zero events
  - 47% (1161/2,485) reported ≥1 events
    - Median: 2 (min 1, max 47)
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Nursing Homes Reporting CDI Events, Mar—Dec 2017
Nursing Homes Reporting ≥12 CDI Events, Mar—Dec 2017
NH-A CDI Events by Month, Mar—Dec 2017
N=36
NH-B CDI Events by Month, Mar—Dec 2017
N=27

![Bar chart showing CDI events by month.](chart.png)
NH-C CDI Events by Month, Mar—Dec 2017
N=5
What does this mean?
Bottom Line

- CDI Reporting and Reduction Project greatly improved NHSN participation
  - QIN-QIOs frontline training and technical assistance to NHs
- CDI NH cohort is a more representative of US NHs than early enrollees
  - Quality data provides better understanding of CDI in NHs across US
- Lessons learned about challenges to reporting
  - Internal and external factors
- Reporting patterns and CDI incidence raise questions to explore
Questions Raised

- Are the low CDI event counts a true reflection of NH experience?
  - NHs actually have zero events for several consecutive months
- Is there a misunderstanding of the NHSN CDI protocol?
  - Facilities have inadequate case finding
  - Facilities not reporting data correctly
- Is there an issue with testing practice?
  - Infrequent use of CDI tests; diarrhea empirically treated
- Are cases being lost during care transition?
  - Cases diagnosed on admission to an acute care facility are not reported into NHSN by the NHs (consistent with current protocol)
Implications

- Data validation is required to answer questions by specifically:
  - Assessing data entry errors
  - Determining how cases may be lost or missed
  - Identifying misinterpretations of protocol
  - Identifying user resource or educational needs

- Comparison of NH data to similar data indicate that the occurrence of zero events over consecutive months is plausible
  - CDI burden is NOT equally distributed across US NHs
  - Clustering of CDI events may be a flag for action
CDI Data Validation

- Improve data quality
  - Check accuracy of reported data
  - Understand users’ protocol comprehension
  - Identify education and support needs
- Can be done internally and externally
  - Long-term care facility (LTCF)
  - State health department
  - QIN-QIO
- More information on Day 3
  - Suparna Bagchi and Bonnie Norrick
CDI Data Analysis
Analysis Dataset

- Time period:
  - Analyzed CDI data reported to NHSN between January 1, 2016 – December 31, 2016

- Inclusion criteria:
  - NHs reporting at least one complete month of CDI events
  - Submitted both numerator (CDI) AND denominator data (number of resident days)
Statistical Approach

- Negative binomial regression model

- Outcome: Facility onset incident CDI rate
  - Incident CDI Event: first positive C. difficile specimen from a NH resident or a positive specimen collected >8 weeks from the most recent positive
  - Long term care facility-onset CDI events: Specimen collected > 3 calendar days after current admission to the facility (i.e., on or after day 4)

- Facility characteristics
  - Hospital affiliation: (Y/N)
  - Bed size: (≥100/<100)
  - CDI test type: Nucleic acid amplification test (NAAT) (Y/N)
  - Facility ownership: Non-profit/ Government compared to Private
  - Proportion of residents receiving skilled nursing care on a single day (≥ 40% / <40%)
Facility Characteristics Associated with CDI Rates — 2016

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<th>Estimate</th>
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1. Note: Referent groups are bed size less than 100 beds, non-hospital affiliated facilities, less than 40% skilled nursing care.
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Conclusions

- Characteristics associated with higher rates of CDI
  - Hospital affiliation
  - Large bed size
  - High proportion of skilled nursing beds (≥ 40%)
- Characteristics may be a proxy for high-risk resident populations
  - Recent hospitalization
  - Antibiotic-use
- Crude rates insufficient for fair comparison between facilities
What We Have Learned

- Nursing home enrollment has significantly increased
  - More opportunity to understand infection epidemiology
  - Improve healthcare quality and save lives
- CDI Reporting and Reduction Project has improved LTCF Component representativeness and knowledge of CDI in NHs
- Volume of CDI reporting has permitted more sophisticated data analyses
  - Permits more learning
  - Provides data to translate into action
- Accomplishments guide future directions
  - Improve, expand, grow
  - SAVE LIVES!!!!!!!
Agenda At-a-Glance

- Day 1 and 2
  - NHSN overview and HAI event modules
  - Epidemiology and prevention of HAI
  - Data analysis labs
  - Introduction to other modules
  - Antibiotic stewardship
  - Case studies

- Day 3
  - Data quality and data validation
  - Guest speakers
  - Future directions
Benefits of NHSN MDRO Module

- Standardized definitions and evidence-based protocols - Data comparable across facilities also using NHSN
- Systematic data collection - Track trends in infection rates - Create profile of MDROs for facility
- Identify clusters of illness
- Meet CMS requirements for surveillance

Thank You!

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone: 1-800-CDGINFO (232-4636)/TTY: 1-888-232-6348
E-mail: NHSN@cdc.gov Web: http://www.cdc.gov/nhsn

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.