Antibiotic Stewardship in Long-Term Care Facilities

NHSN LTC Training 2024

Sarah Kabbani, MD, MSc, Director, Office of Antibiotic Stewardship, Medical Product Safety Branch

Katryna Gouin, MPH, Epidemiologist, Office of Antibiotic Stewardship, Medical Product Safety Branch

Terri Rowe, DO, MS, Long-term Care Unit Lead, Surveillance Branch

Division of Healthcare Quality Promotion

July 23, 2024

Speaker Disclosures

- The speakers have no financial relationship(s) or disclosures.

- The conclusions in this talk are the speakers' and do not necessarily represent the Centers for Disease Control and Prevention.

Learning Objectives

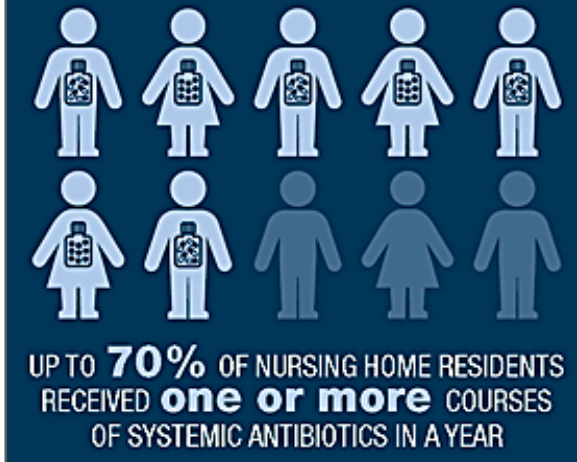
- **By the end of the session, participants will be able to:**

1. Identify antibiotic stewardship priorities in long-term care settings.
2. Discuss ways to track the Core Elements of antibiotic stewardship implementation using the annual survey.
3. Review CDC's Antibiotic Use & Stewardship | A.R. & Patient Safety Portal (cdc.gov) to find data on Core Elements uptake across long-term care facilities.

Antibiotics are frequently prescribed in LTC, often inappropriately.

- An estimated 50-70% of LTC residents will be prescribed one or more courses of systemic antibiotics in a year.[1,2]

- In nursing homes, small studies have shown an estimated 40-75% of antibiotic prescribing is inappropriate.[2,3]

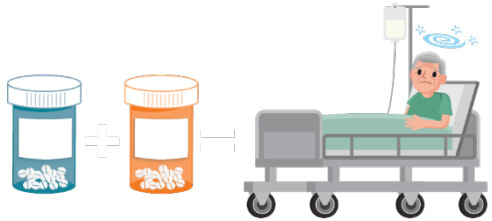


1. Kabbani et al. Antimicrob Steward Healthc Epidemiol. 2021 Dec 7;1(1):e58.
2. Lim et al. Clin Interven Aging. 2014 Jan 13;9:165-77.
3. Nicolle et al. Infect Control Hosp Epidemiol. 2000 Aug;21(8):537-45.

Antibiotic use (both necessary and unnecessary) can cause harm.

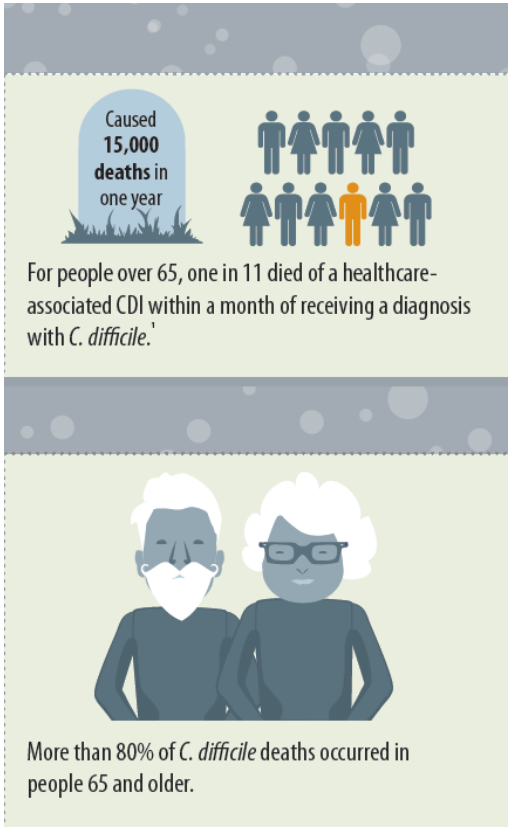
- Antibiotic use can lead to adverse events and allergic reactions.[1-4]

- Polypharmacy is associated with an increased risk of adverse drug events in older adults.[1,2]
  - Antibiotics contribute to clinically significant drug interactions.[3,4]
  - In a cohort study at two nursing homes, 13% of adverse drug events were secondary to antibiotic use.[1]

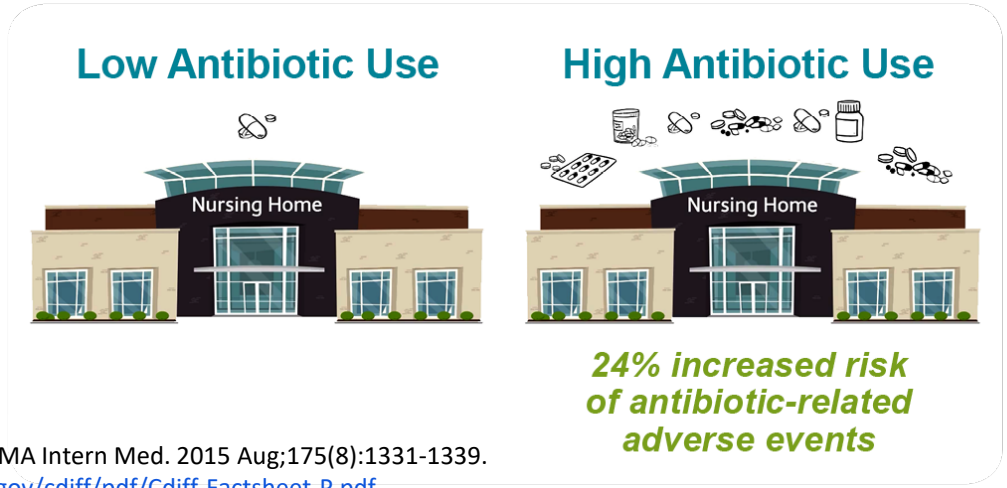


1. Gurwitz et al. Am J Med. 2005 Mar;118(3):251-8.
2. Tamura et al, Clin Geriatr Med. 2012 May;28(2):217-36.
3. Field et al, Arch Intern Med. 2001 Jul 9;161(13):1629-34.
4. Corsonello et al, Clin Microbiol Infect. 2015 Jan;21(1):20-6.

Risk of *Clostridioides difficile*-related morbidity and mortality is highest in older adults.



- A cohort study of nursing homes in Canada showed that diarrhea, gastroenteritis and *C. difficile* infection were the most common antibiotic-related adverse events.



Daneman et al. JAMA Intern Med. 2015 Aug;175(8):1331-1339.
https://www.cdc.gov/cdiff/pdf/Cdiff-Factsheet-P.pdf

What is Antibiotic Stewardship?

- Antibiotic stewardship is a set of commitments and actions designed to **optimize** the treatment of infections while **reducing** the adverse events associated with antibiotic use.
- Antibiotic stewardship is fundamentally about resident **safety** and **high-quality** healthcare.

CMS Requirements for Antibiotic Stewardship

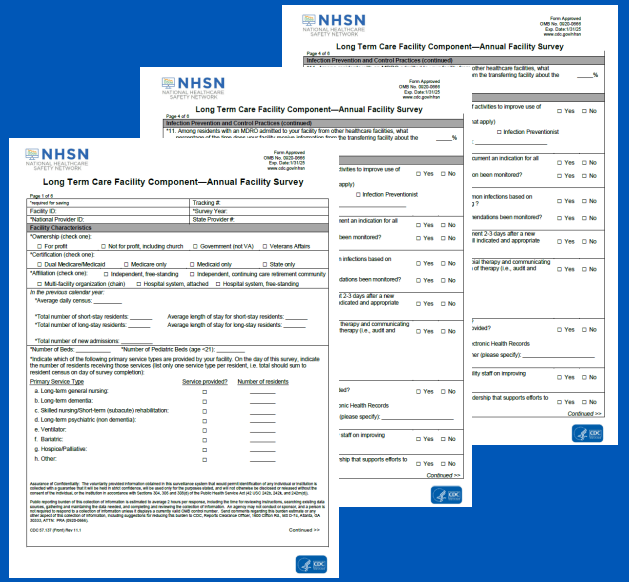
- CMS issued a final rule requiring nursing homes to have antibiotic stewardship integrated within infection prevention and control programs.
  - **Develop and implement protocols** to optimize the treatment of infections by ensuring that residents who require an antibiotic are prescribed the appropriate antibiotic
  - **Develop, promote, and implement** a facility-wide system to monitor the use of antibiotics

1. https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/downloads/som107ap_pp_guidelines_ltcf.pdf

The Core Elements of Antibiotic Stewardship for Nursing Homes

The CMS Antibiotic Stewardship Interpretive Guidance includes the CDC's Core Elements of Antibiotic Stewardship.

- Leadership Commitment
- Accountability
- Drug Expertise
- Action
- Tracking
- Reporting
- Education



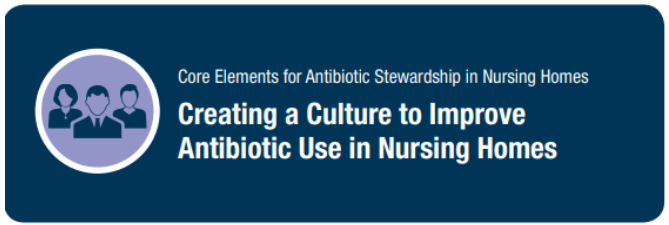
NHSN LTCF Component Annual Facility Survey

Antibiotic Stewardship Survey Questions

Leadership Commitment: Demonstrate support and commitment to safe and appropriate antibiotic use.

*17. Does your facility have a written statement of support from leadership that supports efforts to improve antimicrobial use? ☐ Yes ☐ No

*18. Are antimicrobial use and resistance data reviewed by leadership in quality assurance/performance improvement committee meetings? ☐ Yes ☐ No




Our Commitment to Antibiotic Stewardship

Antibiotics save lives, but are frequently prescribed unnecessarily. Harms from antibiotic overuse can be significant, especially for frail older adults. Potential harms include adverse drug events, drug interactions, and antibiotic-resistant and *Clostridioides difficile* infections.

As part of our continuing commitment to provide the best quality care to our residents, we are dedicated to improving antibiotic use through antibiotic stewardship implementation. **Antibiotic stewardship** refers to a set of commitments and activities designed to "optimize the treatment of infections while reducing the adverse events associated with antibiotic use."

We are committed to improving antibiotic prescribing practices. We will provide staff and resources to support antibiotic stewardship implementation. We are confident that with the support of front-line staff, prescribing clinicians, and residents and families, we will continue to provide residents with the best quality care by improving antibiotic use, and protecting them from the unintended harms of inappropriate antibiotic use.

Sincerely,

To learn more about appropriate antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use.

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

1. https://www.cdc.gov/antibiotic-use/core-elements/pdfs/Stewardship-Leadership-Committment-Letter-508.pdf
2. https://www.cdc.gov/antibiotic-use/core-elements/pdfs/Stewardship-Committment-Poster-508.pdf

Accountability: Identifying Individuals Who Will Lead Antibiotic Stewardship Implementation.

- It is critical to identify a local "champion" who will lead the implementation of antibiotic stewardship actions.[1]

*10. Are there one or more individuals responsible for the impact of activities to improve use of antimicrobials at your facility? ☐ Yes ☐ No

If Yes, what is the position of the individual(s)? (select all that apply)

☐ Medical director ☐ Director of Nursing ☐ Infection Preventionist

☐ Consultant Pharmacist ☐ Other (please specify): _____

  - IPC coordinator have key expertise and data to improve antibiotic use. Training, dedicated time, and resources can help IPC program coordinators support stewardship activities.

1. McElligott et al, Infect Dis Clin North Am. 2017 Dec;31(4):619-638.

Drug Expertise: Support for Antibiotic Stewardship Implementation.

- Establishing access to individuals with antibiotic expertise

*19. Does your facility have access to individual(s) with antimicrobial stewardship expertise (e.g., consultant pharmacist trained in antimicrobial stewardship, stewardship team at referral hospital, external infectious disease/stewardship consultant)? ☐ Yes ☐ No

- Engage consultant pharmacists
  - Review AU data and can support tracking of AU, ensure documentation of prescribing elements, limit antibiotic duration, improve prescribing practices (protocol development/review, education, ASB treatment, prophylaxis, fluoroquinolones)

1. Ashraf et al, J Am Med Dir Assoc. 2021 Jan;22(1):6-8. https://pubmed.ncbi.nlm.nih.gov/33271122/

Action: Implement at least one policy or practice to improve antibiotic use.

*11. Does your facility have a policy that requires prescribers to document an indication for all antimicrobials in the medical record or during order entry?	☐ Yes	☐ No
*12. Does your facility provide treatment recommendations for common infections based on national guidelines to assist with antimicrobial decision making ?	☐ Yes	☐ No
*13. Is there a formal procedure for performing a follow-up assessment 2-3 days after a new antimicrobial start to determine whether the antimicrobial is still indicated and appropriate (e.g. antibiotic time out)?	☐ Yes	☐ No
*14. Is there a formal procedure for reviewing courses of antimicrobial therapy and communicating with prescribers on antimicrobial selection, dosing, or duration of therapy (i.e., audit and feedback) at your facility?	☐ Yes	☐ No

Action: Implementing Antibiotic Prescribing Policies to Improve Antibiotic Use.

- Antibiotic prescribing and use policies:

*11. Does your facility have a policy that requires prescribers to document an indication for all antimicrobials in the medical record or during order entry? ☐ Yes ☐ No

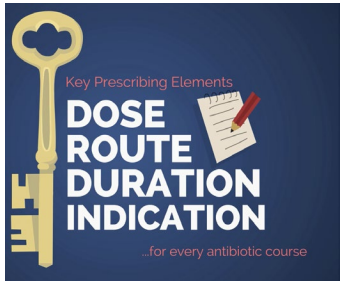
If Yes, has adherence to the policy to document an indication been monitored? ☐ Yes ☐ No

Journal of the American Medical Directors Association
Volume 18, Issue 11, 1 November 2017, Pages 913-920

Special Article

Template for an Antibiotic Stewardship Policy for Post-Acute and Long-Term Care Settings

Robin L.P. Jump MD, PhD [a b], Swati Gaur MD, MBA, CMD [c], Morgan J. Katz MD [d], Christopher J. Crnich MD, PhD [e f], Ghinwa Dumyati MD [g], Muhammad S. Ashraf MBBS [h], Elizabeth Frentzel MPH [i], Steven J. Schweon RN, MPH, MSN, CIC, HEM [j], Philip Sloane MD, MPH [k], David Nace MD, MPH, CMD [l],
Infection Advisory Committee for AMDA—The Society of Post-Acute and Long-Term Care Medicine



Jump RLP et al., *J Am Med Dir Assoc.* 2017 Nov 1;18(11):913-920. doi:10.1016/j.jamda.2017.07.018. https://pubmed.ncbi.nlm.nih.gov/28935515/

Action: Implementing Antibiotic Prescribing Policies to Improve Antibiotic Use.

- Antibiotic prescribing and use policies:

*12. Does your facility provide treatment recommendations for common infections based on national guidelines to assist with antimicrobial decision making ?	☐ Yes	☐ No
If Yes, has adherence to facility-specific treatment recommendations been monitored?	☐ Yes	☐ No

1. Rowe et al. Infect Control Hosp Epidemiol. 2022 Apr;43(4):417-426.
2. Learn Best Practices: https://www.ahrq.gov/antibiotic-use/long-term-care/best-practices/index.html
3. Guidelines for Treatment of Common Infections: https://www.rochesterpatientsafety.com/index.cfm?Page=For%20Nursing%20Homes
4. Loeb et a. Infection Control & Hospital Epidemiology , Volume 22 , Issue 2 , February 2001 , pp. 120 - 124

Action: Implementing Antibiotic Prescribing Policies to Improve Antibiotic Use.

- Antibiotic prescribing and use policies:

*14. Is there a formal procedure for reviewing courses of antimicrobial therapy and communicating with prescribers on antimicrobial selection, dosing, or duration of therapy (i.e., audit and feedback) at your facility?	☐ Yes	☐ No

Tracking and Reporting of process and measures of antibiotic use

*15.Does your facility have a system for tracking antimicrobial use? ☐ Yes ☐ No

If yes, what is the source of the antimicrobial use report provided?

☐ Pharmacy services ☐ Electronic Health Records

☐ Manual reporting (i.e., facility infection control log) ☐ Other (please specify): _____

*11. Does your facility have a policy that requires prescribers to document an indication for all antimicrobials in the medical record or during order entry? ☐ Yes ☐ No

If Yes, has adherence to the policy to document an indication been monitored? ☐ Yes ☐ No

*12. Does your facility provide treatment recommendations for common infections based on national guidelines to assist with antimicrobial decision making ? ☐ Yes ☐ No

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*14. Is there a formal procedure for reviewing courses of antimicrobial therapy and communicating with prescribers on antimicrobial selection, dosing, or duration of therapy (i.e., audit and feedback) at your facility? ☐ Yes ☐ No

Tracking Antibiotic Use of process and measures of antibiotic use

- Antibiotic use can be tracked using:

*15.Does your facility have a system for tracking antimicrobial use? ☐ Yes ☐ No

If yes, what is the source of the antimicrobial use report provided?

☐ Pharmacy services ☐ Electronic Health Records

☐ Manual reporting (i.e., facility infection control log) ☐ Other (please specify): _____

EHR Access in LTCFs – Results from NHSN Annual Survey

- In 2022, 98% of LTCFs reported having access to an electronic health record (EHR).
  - Majority had electronic medication orders or eMAR capabilities; only 28% reported using the EHR for AU tracking.
- In 2022, 99% of LTCFs (N=4,898) respondents indicated having a system for tracking antimicrobial use:
  - Manual AU tracking (48%)
  - EHR (31%)
  - Pharmacy services (25%)
- Increased EHR implementation can improve quality of care in LTCFs and serve as a useful tool for healthcare providers.

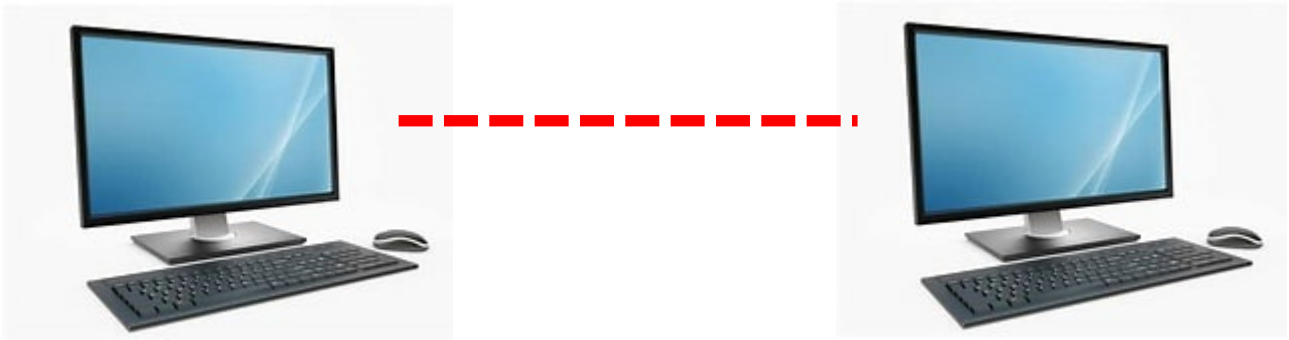
Kruse et al. Impact of electronic health records on long-term care facilities: systematic review JMIR medical informatics 2017;5(3):e7958.
JMIR Medical Informatics Impact of Electronic Health Records on Long-Term Care Facilities: Systematic Review

Tracking: Antibiotic Use Measures

- Describe baseline **prescribing rates** and track changes over time.
- Track the rate of total or specific **antimicrobial courses** to assess the impact of an intervention to prevent antibiotic initiation (e.g., avoiding testing and treatment of asymptomatic bacteriuria).
- Assess antibiotic **course durations** and determine proportion of antibiotic courses used for prophylaxis.
- Track **antibiotic classes** that may be a target for improvement (e.g., fluroquinolones) or agents used for the treatment of specific infections (e.g., *Clostridioides difficile*).
- Identify the **site of initiation** to allow facilities to tailor their stewardship interventions by engaging prescribers or referring hospitals.

Long-term Care – Antimicrobial Use Module

- Electronic Data Reporting
  - Reduce time on data entry
  - **No manual reporting**
- Person level
- Orders/administrations



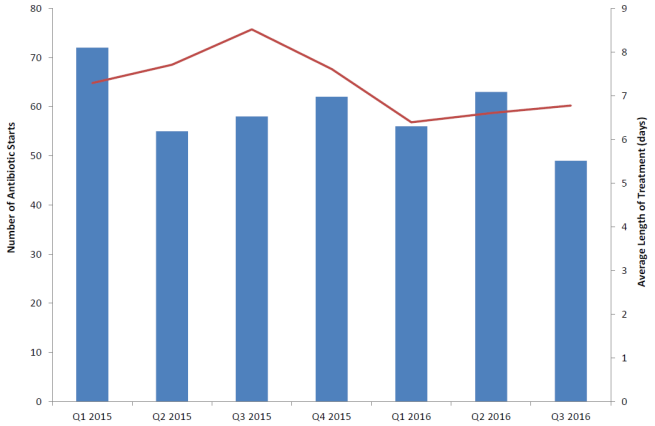
Long-term care Antimicrobial Use Module

- Data readily available to nursing homes
  - Quality Assurance and Performance Improvement (QAPI)
  - Evaluate antibiotic stewardship programs

- Potential Metrics
  - Antibiotic Courses and length of courses
  - Days of therapy

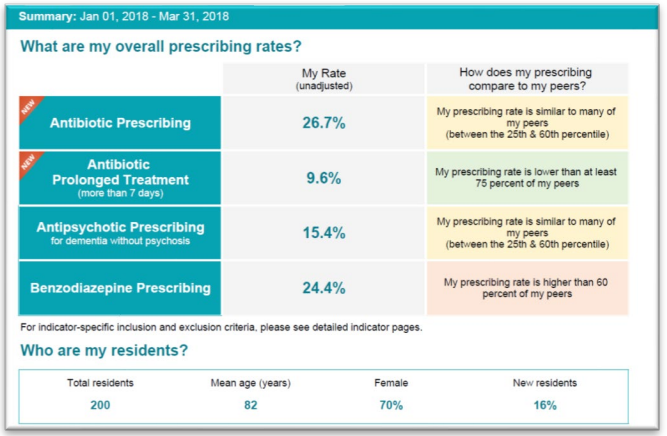
Long Term Care – Antimicrobial Use Module Timeline

- Anticipated development Spring 2025
- Pilot phase
- Development of dashboards



Reporting: Providing feedback on prescribing practices and compliance with facility antibiotic use protocols

- Reporting can motivate staff and sustain practice changes.
  - Provider-specific feedback and peer comparison may be an effective way to change prescribing behavior as demonstrated in the outpatient setting.
  - Audit and feedback was associated with a significantly greater decline in prolonged antibiotics in LTC settings (adjusted difference −2.65%)
    - Resulted in 335,912 **fewer days of treatment,**
    - No significant difference in antibiotic initiation



Summary: Jan 01, 2018 - Mar 31, 2018

What are my overall prescribing rates?

	My Rate (unadjusted)	How does my prescribing compare to my peers?
Antibiotic Prescribing	26.7%	My prescribing rate is similar to many of my peers (between the 25th & 60th percentile)
Antibiotic Prolonged Treatment (more than 7 days)	9.6%	My prescribing rate is lower than at least 75 percent of my peers
Antipsychotic Prescribing for dementia without psychosis	15.4%	My prescribing rate is similar to many of my peers (between the 25th & 60th percentile)
Benzodiazepine Prescribing	24.4%	My prescribing rate is higher than 60 percent of my peers

For indicator-specific inclusion and exclusion criteria, please see detailed indicator pages.

Who are my residents?

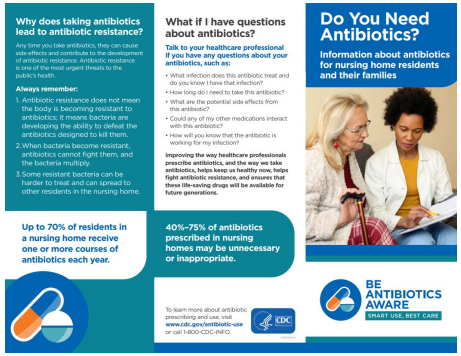
Total residents	Mean age (years)	Female	New residents
200	82	70%	16%

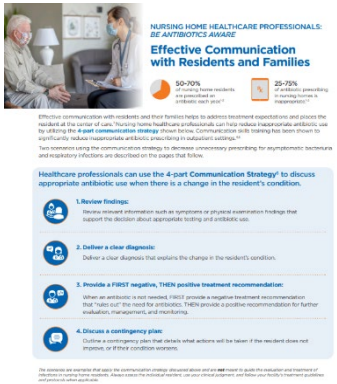
Daneman N, Lee SM, Bai H, et al. *Clin Infect Dis*. 2021;73(6):e1296-e1304. doi:10.1093/cid/ciab256

Education and Improving Communication with Residents and Families.

- Provide ongoing education to residents and families to set expectations and address concerns about antibiotic prescribing.

*16. Has your facility provided education to clinicians and other facility staff on improving antimicrobial use in the past 12 months? ☐ Yes ☐ No





Urinary Tract Infections

Download the EASIL informational Trifold Pamphlet or watch the video case example for active monitoring and communication with residents and their families.

Resident and family educational pamphlet about active monitoring before starting UTI antibiotics

Nurse-Resident interction training video for active monitoring before starting UTI antibiotics

Antibiotic use: Nursing home (cdc.gov)
https://www.cdc.gov/antibiotic-use/pdfs/NursingHome-Toolkit-508.pdf
https://med.emory.edu/departments/medicine/divisions/infectious-diseases/studies-programs/easil/education.html

All Healthcare Professionals can *Be Antibiotics Aware*

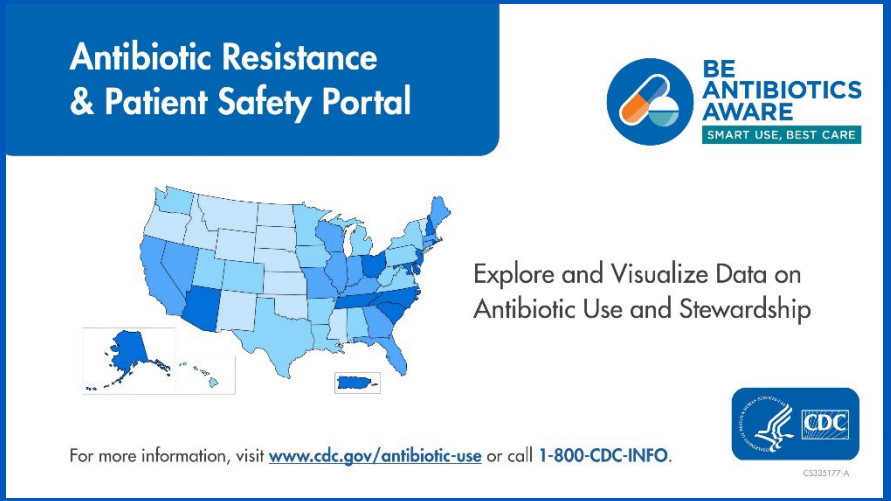
BE ANTIBIOTICS AWARE

SMART USE, BEST CARE

For more information, visit www.cdc.gov/antibiotic-use.

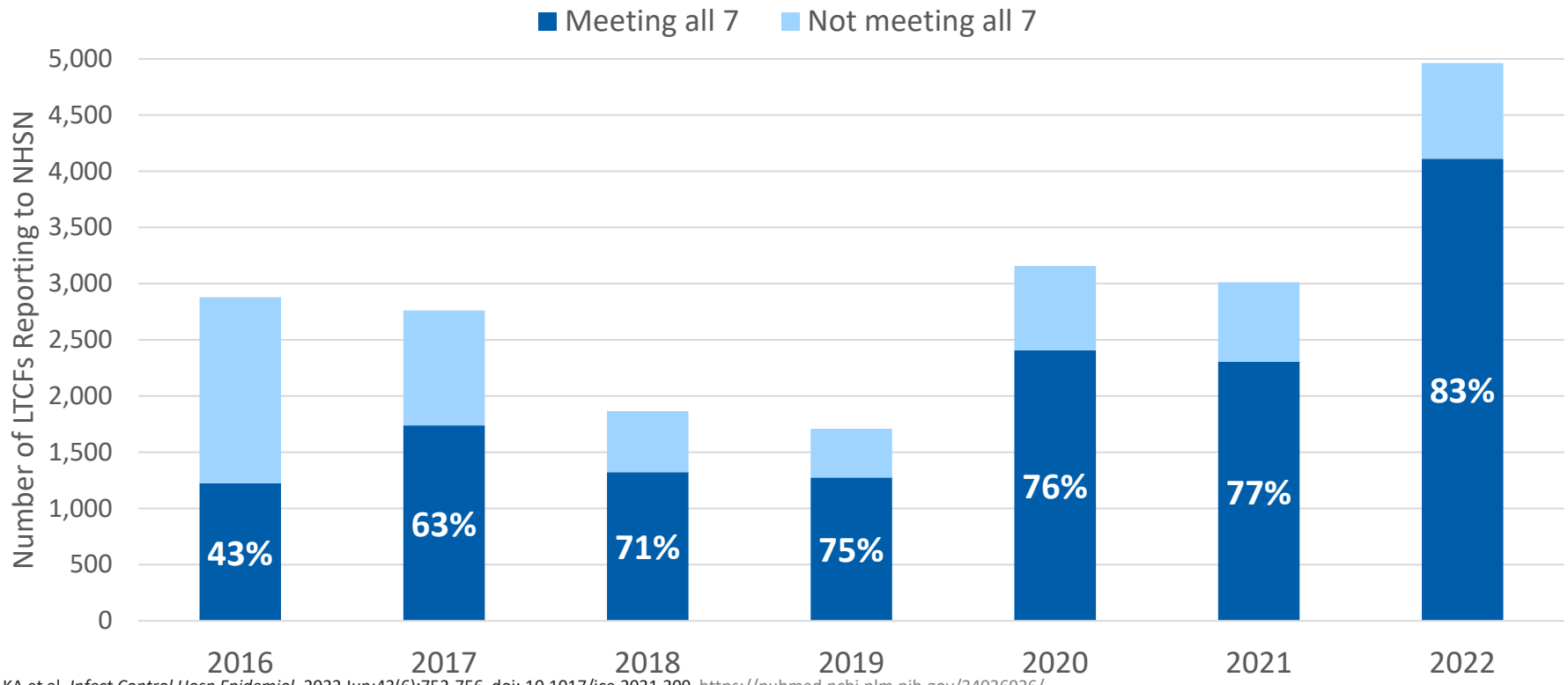
CDC

CS335343-A



Core Elements Uptake

Percent of U.S. LTCFs Reporting Implementation of All CDC Core Elements on Annual NHSN Survey, 2016-2022



Gouin KA et al. *Infect Control Hosp Epidemiol*. 2022 Jun;43(6):752-756. doi: 10.1017/ice.2021.209. https://pubmed.ncbi.nlm.nih.gov/34036926/

Palms DL et al., *Clin Infect Dis.* 2019 Sep 13;69(7):1235-1238. doi: 10.1093/cid/ciz102. PMID: 30945729. https://pubmed.ncbi.nlm.nih.gov/30945729/

Long-term Care Antibiotic Stewardship

LONG-TERM CARE FACILITIES REPORTING IMPLEMENTATION OF THE CORE ELEMENTS

4963 Facilities reporting implementation in 2022

LONG-TERM CARE IMPLEMENTATION OF ALL 7 CORE ELEMENTS OF ANTIBIOTIC STEWARDSHIP

83% National implementation in 2022

IMPLEMENTATION CHANGE FROM PREVIOUS SURVEY YEAR

↑ The percent of long-term care facilities reporting implementation of all 7 Core Elements increased by 6% from 2021 to 2022.

LONG-TERM CARE STEWARDSHIP

Long-term Care Antibiotic Stewardship

Antibiotic stewardship is critical to improving the treatment of infections, protecting long-term care residents from unintended consequences of antibiotic use, and helping combat antimicrobial resistance. The data presented on this page reflect the implementation of the Core Elements of Antibiotic Stewardship for Nursing Homes *(https://www.cdc.gov/antibiotic-use/core-elements/nursing-homes.html)*.

The implementation of antibiotic stewardship in long-term care facilities is assessed through the National Healthcare Safety Network's *(https://www.cdc.gov/nhsn/index.html)* (NHSN) Long-term Care Facility Component Annual Facility Survey *(https://www.cdc.gov/nhsn/forms/57.137_ltcfsurv_blank.pdf)*. Annual surveys are completed by staff in the long-term care facilities, including certified skilled nursing facilities/nursing homes. Survey questions relating to antibiotic stewardship gauge a facility's uptake of CDC's Core Elements of antibiotic stewardship. Facility responses are mapped to the seven Core Elements of antibiotic stewardship: leadership commitment, accountability, drug expertise, action, tracking, reporting, and education.

DATA SOURCE

NATIONAL HEALTHCARE SAFETY NETWORK (NHSN) *(https://www.cdc.gov/nhsn/index.html)*

YEARS INCLUDED

2016 - 2022

Core Element Implementation in 2022

LEADERSHIP: 99%

% Long-term care facilities implementing the leadership commitment Core Element in 2022

Demonstrating support and commitment to safe and appropriate antibiotic use

ACCOUNTABILITY: 98%

% Long-term care facilities implementing the accountability Core Element in 2022

Identifying physician, nursing and pharmacy leads responsible for promoting and overseeing antibiotic stewardship activities

DRUG EXPERTISE: 97%

% Long-term care facilities implementing the drug expertise Core Element in 2022

Establishing access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship

ACTION: 99%

% Long-term care facilities implementing the action Core Element in 2022

Implementing at least one policy or practice to improve antibiotic use

TRACKING: 100%

% Long-term care facilities implementing the tracking Core Element in 2022

Monitoring antibiotic prescribing and resistance patterns

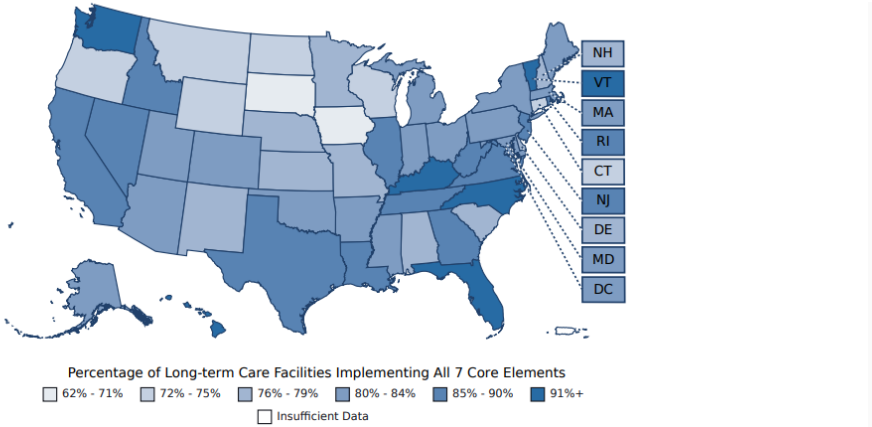
REPORTING: 90%

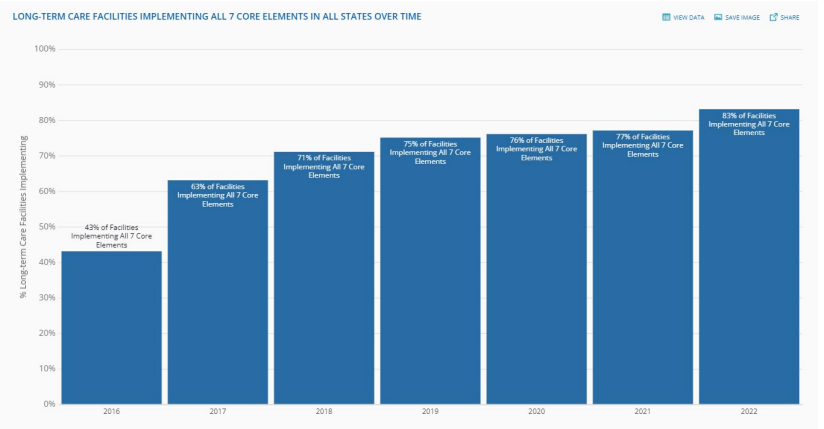
% Long-term care facilities implementing the reporting Core Element in 2022

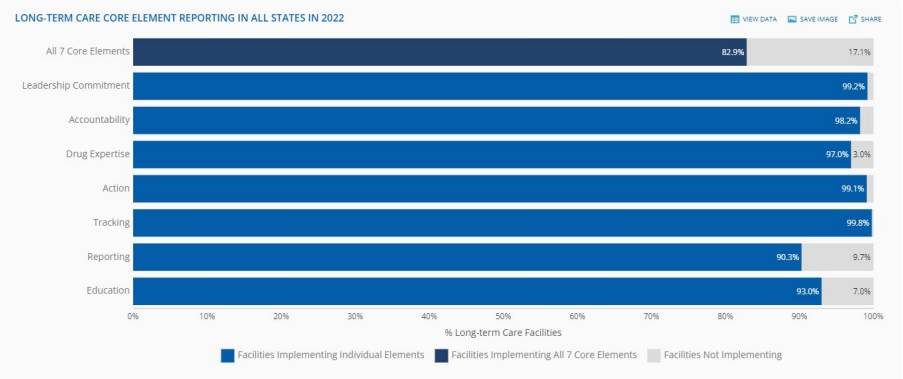
Provide regular feedback on antibiotic use and resistance to prescribing clinicians and nursing staff

Antibiotic Resistance & Patient Safety Portal: LTC Core Element Implementation Data by State, Year, and Core Element

LONG-TERM CARE FACILITIES IMPLEMENTING ALL 7 CORE ELEMENTS IN 2022







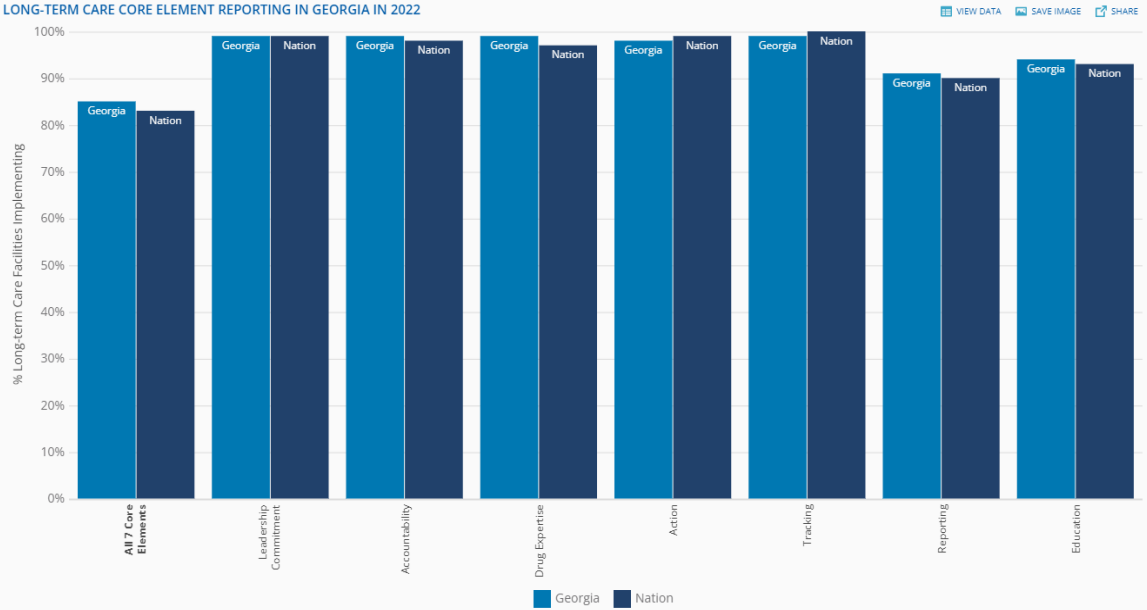
LTC Core Element Implementation Data Added to State Profile Pages

LONG-TERM CARE ANTIBIOTIC STEWARDSHIP (AS) IMPLEMENTATION BY CORE ELEMENT

YEAR

2022

This graphic shows the percent of long-term care facilities that report the implementation of each core element of antibiotic stewardship in 2022. Hover over a bar in the graphic to see the percentage of long-term care facilities reporting the implementation of each core element.



BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

UPDATED CDC Training on Antibiotic Stewardship

To access the training and free continuing education credits, visit *www.train.org/cdctrain/training_plan/3697*.

CS336932-A

Antibiotic Stewardship Training Course: *https://www.train.org/cdctrain/training_plan/3697*
Nursing Home Infection Preventionist Training Course: *https://www.train.org/cdctrain/training_plan/3814*

Resources for AU Tracking in LTCFs

- **AHRQ Toolkit to Improve Antibiotic Use in Long-Term Care**
  https://www.ahrq.gov/antibiotic-use/long-term-care/index.html
- **Colorado Department of Public Health and Environment**
  https://cdphe.colorado.gov/antimicrobial-stewardship-in-long-term-care-facilities
- **Cleveland Institute for Computational Biology – Antibiotic Use in Nursing Homes Dashboard**
  https://sunahsong.shinyapps.io/USNursingHomes/
- **Minnesota Department of Health Antimicrobial Stewardship Program Resources for Long-term Care Facilities**
  https://www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/ltc/index.html#NaN
- **Nebraska Medicine Tools and Templates for Long Term Care**
  https://asap.nebraskamed.com/facilities/long-term-care/tools-and-templates-for-long-term-care/
- **Rochester Nursing Home Collaborative Antibiotic Tracking Sheet**
  https://www.rochesterpatientsafety.com/index.cfm?Page=For%20Nursing%20Homes
- **Washington State Department of Health**
  https://doh.wa.gov/public-health-healthcare-providers/healthcare-professions-and-facilities/healthcare-associated-infections/antibiotic-stewardship/nursing-homes
- **Quality Innovation Network-Quality Improvement Organizations (QIN-QIOs) Resources**
  https://qioprogram.org/sites/default/files/2022-07/21.QIO_.12.131-Antibiotic%20Stewardship%20Toolkit.pdf

Takeaways

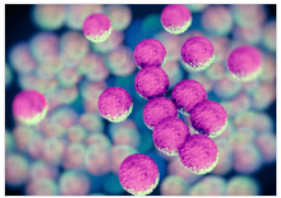
- Antibiotic stewardship is a set of commitments and actions designed to optimize the treatment of infections while reducing the adverse events associated with antibiotic use.

- The annual facility survey can help you identify opportunities to implement the core elements of antibiotic stewardship at your facility.

Active Monitoring of Health Outcomes.

- **Monitor antibiotic use and health outcomes to guide practice changes**
  - Health outcomes:
    - Rates of *C. difficile* infection
    - Antibiotic susceptibility profiles

C. difficile & MRSA Infections



Surveillance for C. difficile, MRSA, and other Drug-resistant Infections

*4. Does your laboratory provide a report summarizing the percent of antibiotic resistance seen in common organisms identified in cultures sent from your facility (often called an antibiogram)?

☐ Yes ☐ No

If Yes, how often is this summary report or antibiogram provided to your facility? (check one)

☐ Once a year ☐ Every 2 years ☐ Other (specify): _____

Antibiogram

(Data Collected 7/1/2013 - 6/30/2014)

Percent of Non-Duplicate Patient Isolates Susceptible to Achievable Serum Levels

ORGANISM	No. of Isolates	Amikacin	Gentamicin	Tobramycin	Ampicillin	Amoxicillin-Clavulanate	Ampicillin-Sulbactam	Piperacillin-Tazobactam	Oxacillin	Imipenem	Meropenem	Ertapenem	Cefazolin	Cefepime	Ceftriaxone	Vancomycin	Linezolid	Clindamycin	Ciprofloxacin	TMP-SMZ	Tigecycline	Levofloxacin	Moxifloxacin	Nitrofurantoin[1]	Nitrofurantoin[2]	Tigecycline
E. coli	143	100	92	96	39		85	99		100	100	99	88	91	89	95				76	97			93		100
Klebsiella pneumoniae	63	100	91	98	0		87	95		100	100	100	74	73	75	73				90	88			66		100
Proteus mirabilis	88	100	100	100	71		90	100		100	100	100	100	95	100	100				93	88					
Ps. aeruginosa	34	100	87	87				100		100	83		96		100						85					
Staph aureus	36		87			31		7		31					31		100	100	16	39	97		10		100	
Enterococcus	73		67[3]		90			90									83	98					47	91	32	

[1] Susceptible to achievable levels in urine only

[2] Susceptible to high level gentamicin

http://www.rochesterpatientsafety.com/Images_Content/Site1/Files/Pages/Nursing%20Homes/Managing%20Common%20Infections%20in%20Older%20Adults.pdf

Integrating Quality Improvement Initiatives

- Implementing infection control practices, antibiotic stewardship and vaccination policies can prevent infections in nursing home residents.

- Education is key for infection prevention, antibiotic stewardship implementation and early sepsis detection.
  - Front line nursing staff are critical in building a team working to improve communication and implementing any quality improvement initiative.

1. https://www.cdc.gov/sepsis/education/hcp-resources.html
2. Reyes et al, J Am Med Dir Assoc. 2018 Jun;19(6):465-471.

Additional questions?
Please contact nhsn@cdc.gov or submit questions through ServiceNOW
https://servicedesk.cdc.gov/nhsncsp

AntibioticUse@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

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