

Centers for Disease Control and Prevention



Antibiotic Stewardship in Long-term Care Settings: Data for Action

Sarah Kabbani, MD, MSc

Katryna Gouin, MPH

Office of Antibiotic Stewardship

Division of Healthcare Quality & Promotion

August 12, 2022

1

Speaker Disclosures

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

2

Learning Objectives

1. Discuss the framework and actions for implementing antibiotic stewardship in the long-term care setting.
2. Identify strategies for tracking of antibiotic use in long-term care settings.
3. Review opportunities to improve stewardship implementation in long-term care settings.

3

Antibiotics are frequently prescribed inappropriately in nursing homes.

- An estimated **50-70%** of NH residents will be prescribed one or more courses of systemic antibiotics in a year.
- In nursing homes, small studies have shown an estimated **40-75%** of antibiotic prescribing is inappropriate.



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

4

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

- **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}

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.

5

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

- 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.

6

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

- 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
- The intensity of antibiotic prescribing was significantly associated with prescribing of benzodiazepines, opioids and proton pump inhibitors⁵
 - Six times more likely to prescribe multiple drugs at a higher rate



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.
5. Quinn et al, J Gen Intern Med. 2019 Dec;34(12):2763-2771

7



Policy Requirement for Antibiotic Stewardship.

- CMS issued a final rule **requiring** nursing homes to have antibiotic stewardship integrated within pharmacy and infection prevention and control programs (IPC)
 - An antibiotic stewardship program that includes **antibiotic use protocols** and a **system to monitor antibiotic use**
 - Interpretive guidance is based on the CDC's core elements of Antibiotic stewardship

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Medicare & Medicaid Services

42 CFR Parts 405, 431, 447, 482, 483, 485, 488, and 489

[CMS-3260-F]

RIN 0938-AR61

Medicare and Medicaid Programs; Reform of Requirements for Long-Term Care Facilities

AGENCY: Centers for Medicare & Medicaid Services (CMS), HHS.

ACTION: Final rule.

SUMMARY: This final rule will revise the requirements that Long-Term Care facilities must meet to participate in the Medicare and Medicaid programs. These changes are necessary to reflect the substantial advances that have been made over the past several years in the theory and practice of service delivery and safety. These revisions are also an integral part of our efforts to achieve broad-based improvements both in the quality of health care furnished through federal programs, and in patient safety, while at the same time reducing procedural burdens on providers.

DATES: *Effective date:* These regulations are effective on November 28, 2016.

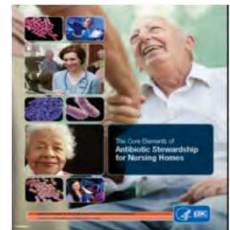
<https://www.gpo.gov/fdsys/pkg/FR-2016-10-04/pdf/2016-23503.pdf>

8

The Core Elements of Antibiotic Stewardship for Nursing Homes

Provide a **framework** for assessing current and new antibiotic stewardship activities , and for monitoring and improving antibiotic use:

- Leadership Commitment: demonstrate support and commitment
- Accountability: identify physician, nursing and pharmacy leads responsible for stewardship implementation
- Drug Expertise: establish access to individuals with experience and training
- Action: implement at least one policy
- Tracking: monitor at least one measure
- Reporting: provide regular feedback
- Education: provide educational resources to staff



<http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html>

9

Leadership, Accountability and Expertise

10

Leadership Commitment & Accountability



- Providing the necessary human and financial resources to implementing antibiotic stewardship
 - Including stewardship-related duties in position description
 - Statements of support, regular meetings with program leaders, communication with clinicians, reporting activities and outcomes
 - Appointing a “**champion**” to ensure that the program has resources and support to accomplish its mission



<https://www.cdc.gov/longtermcare/pdfs/Stewardship-Commitment-Poster-508.pdf>

11

Drug Expertise: Support for Antibiotic Stewardship Implementation.



- 1. Ensure Documentation of the Indication for Every Antibiotic Order**
 - Consideration of the indication for every antibiotic order (ie, obtain antibiotic selection and onset with determining the appropriate duration during an antibiotic review process.
 - Alert the provider if the indication for an antibiotic order is not documented.
- 2. Use the Shortest Effective Antibiotic Duration**
 - Consideration for antibiotic duration are available for common bacterial diseases such as pneumonia, urinary tract infection (UTI), and skin and soft tissue infection.¹⁴
 - Contact the provider if the length of antibiotic therapy exceeds the recommended duration.
- 3. Improve Fluoroquinolone Prescribing Practices**
 - Due to the risk of adverse drug events, the U.S. Food and Drug Administration issued a black box warning for both fluoroquinolone prescribing in specific conditions, such as acute bacterial sinusitis and otitis media.¹⁵ Where other treatment options are available.
 - When possible, discuss alternatives to fluoroquinolones with providers.
- 4. Avoid Treatment of Asymptomatic Bacteriuria**
 - Residents with asymptomatic bacteriuria should not be treated with antibiotics in most settings.¹⁶
 - Antibiograms for the use of prophylaxis that help providers evaluate UTI signs and symptoms before testing for UTI and starting antibiotics.
- 5. Limit the Use of Prolonged Antibiotic Prophylaxis for UTI**
 - There is no clear evidence supporting prolonged antibiotic use for prevention of recurrent UTI in nursing home residents with asymptomatic bacteriuria.¹⁷ Antibiotic use can increase adverse drug events and contribute to antibiotic resistance.
 - Identify residents on prolonged antibiotic therapy for prevention of UTI and discuss with providers to ensure that the benefits outweigh the risks of adverse drug events.

The expertise and recommendations are applicable to most nursing home residents. Prior to using these resources, review the disclaimer in the medication, discuss with facility staff, and use your clinical judgment. Follow your facility protocol and treatment guidelines when applicable.



SCENARIO
During the monthly medication review, you find a resident who has received five months of nitrofurantoin to prevent urinary tract infection (UTI).

Antibiotics are frequently prescribed for prolonged duration for the prevention of infection or prophylaxis in nursing homes.¹⁸ While antibiotic prophylaxis may reduce recurrent UTIs in specific populations,¹⁹ there is no clear evidence on prevention of recurrent UTIs among nursing home residents with asymptomatic bacteriuria.¹⁷ Furthermore, antibiotic use carries the risk of harm to residents, including adverse drug events and increased antibiotic resistance, which argue against the use of prolonged antibiotic therapy in nursing home residents.²⁰

Consultant pharmacists can help limit the use of prolonged antibiotic prophylaxis by:

1. Identifying residents on prolonged antibiotic therapy for the prevention of recurrent UTI.
2. Discussing the indications, rationale, and planned duration of prolonged antibiotic therapy with healthcare professionals to ensure that the benefits outweigh the risk of adverse drug events.

The expertise and recommendations are applicable to most nursing home residents. Prior to making recommendations, always assess the individual resident, review the disclaimer in the medication, discuss with facility staff, and use your clinical judgment. Follow your facility protocol and treatment guidelines when applicable.

https://www.cdc.gov/antibiotic-use/training/materials.html#anchor_1626372118971

12

Hospital-Nursing Home Collaboration Structure

13 Medical Directors

Hospital Expert Team

- Hospital Infectious Diseases Physician
- Hospital Antimicrobial Stewardship Pharmacist
- Project Infection Preventionist and Coordinator



Leadership

- Nursing Home Administrator
- Medical Director
- Director of Nursing
- Director of Quality

Hospital Expert Team

- Hospital Infectious Diseases Physician
- Hospital Antimicrobial Stewardship Pharmacist
- Project Infection Preventionist and Coordinator

Felsen et al, J Am Med Dir Assoc. 2020 Jan;21(1):55-61.e2.
Slide courtesy of Ghinwa Dumyati

13

Tracking and Reporting Antibiotic Use

14

Tracking Antibiotic Use

- Monitoring antibiotic use can help identify opportunities for improvement and guide and monitor practice changes
- Antibiotic use can be tracked using:
 - Long-term Care (LTC) Pharmacies **dispensing** data
 - Dispense and deliver medications, provide drug regimen review and medication management, can generate reports on antibiotic days dispensed
 - Electronic Health Record Systems (EHR) **order** data:
 - Medication orders can be used to generate antibiotic use reports
 - Manual Chart Review:
 - May be only the possible way to collect antibiotic use data in some facilities, can be added to infection tracking log



15

Electronic Reporting of Antibiotic Use Data

Innovative methods to summarize nursing home antibiotic data

Christina B. Felsen MPH¹, Grant R. Barney BS² and Ghinwa K. Dumyati MD^{1,3}

¹Center for Community Health and Prevention, University of Rochester Medical Center, Rochester, New York, ²University at Albany, School of Public Health, Albany, New York and ³Infectious Diseases Division, University of Rochester Medical Center, Rochester, New York

Antimicrobial Stewardship & Healthcare Epidemiology (ASHE), 4, 48, 1-7
doi:10.1093/ashe/abz011



Original Article

Description of antibiotic use variability among US nursing homes using electronic health record data

Sarah Kabbani MD, MSc¹, Stanley W. Wang MA, MS², Laura L. Ditz RN², Katryna A. Couin MPH¹, Danielle Palms MPH¹, Theresa A. Rowe DO, MS¹, David Y. Hyun MD³, Nancy W. Chi MBA¹, Nimalie D. Stone MD, MS¹ and Lauri A. Hicks DO¹

Infection Control & Hospital Epidemiology (2019), 1-2
doi:10.1017/ice.2019.25

Research Brief

Potential utility of pharmacy data to measure antibiotic use in nursing homes

Sarah Kabbani MD, MSc¹, Danielle L. Palms MPH¹, Monina Bartoces PhD¹, Joseph Marek BS², Nimalie D. Stone MD, MS¹, Lauri A. Hicks DO¹ and Robin L.P. Jump MD, PhD^{3,4}

¹Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, GA, USA; ²Communicable, Cincinnati, Ohio, USA; ³Geriatric Research Education and Clinical Center (GRECC) and Specialty Care Center of Innovation at the Louis Stokes Cleveland, Department of Veterans Affairs Medical Center, Cleveland, Ohio, USA and ⁴Division of Infectious Diseases & HIV Medicine, Department of Medicine and Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine, Cleveland, Ohio, USA



199. Evaluating long-term care pharmacy dispense data to monitor antibiotic use in U.S. nursing homes

Katryna A. Couin, MPH¹; Stephen M. Creasy, PharmD²; Manjiri Kulkarni, MS²; Martha Wdowicki, PharmD²; Nimalie D. Stone, MD, MS¹; Lauri Hicks, DO¹; Sarah Kabbani; ¹Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia; ²PharMerica, Louisville, Kentucky; ³CDCC Division of Healthcare Quality and Promotion, Atlanta, GA; ⁴Centers for Disease Control and Prevention, Atlanta, Georgia

Session: P-7. Antimicrobial Stewardship: Special Populations

TECHNICAL ADVANCE

Open Access

Use of electronic pharmacy transaction data and website development to assess antibiotic use in nursing homes

Sunah Song^{1,2,3}, Brigid M. Wilson^{4,5}, Joseph Marek⁶ and Robin L.P. Jump^{3,4,7}

Kabbani S, et al. *Infect Control Hosp Epidemiol.* 2019;40(7):819-820. <https://pubmed.ncbi.nlm.nih.gov/31014405/>

Felsen CB, et al. *Infect Control Hosp Epidemiol.* 2019;40(10):1210-1211. <https://pubmed.ncbi.nlm.nih.gov/31358073/>

Gouin, K. et al. *Open Forum Infect Dis.* 2020; 7(Supplement_1):S104 https://academic.oup.com/ofid/article/7/Supplement_1/S104/6058292

Song S, et al., *BMC Med Inform Decis Mak.* 2021;21(1):148. <https://pubmed.ncbi.nlm.nih.gov/33952239/>

Kabbani, S., et al. *Antimicrobial Stewardship & Healthcare Epidemiology.* 2021; 1(1):E58. <https://doi.org/10.1017/ash.2021.207>

16

Key Variables for Tracking Antibiotic Use



- Resident characteristics: Resident identifier, age, gender



- Antibiotic characteristic: Antibiotic class and agent, route of administration, **# of starts/courses, days of therapy (DOTs), course duration**, indication



- Type of Nursing Home Stay:
 - Short Stay: ≤ 100 day stay in nursing home
 - Long Stay: > 100 day stay in a nursing home

17

Tracking Antibiotic Use

- Antibiotic starts: Many nursing home IPC programs track new antibiotic starts as part of their infection surveillance activity.
 - Reflect the effort to decrease prescribing, can be tracked by indication
 - Does not capture duration
 - Multiple antibiotic dispenses/orders can be found in the LTC pharmacy or EHR systems for a single antibiotic course
 - To better capture duration of discreet courses, antibiotic starts can be replaced by the number of antibiotic courses

18

Tracking Antibiotic Use

- Antibiotic days of therapy (DOT):
 - Total burden of use, better reflects efforts to decrease duration
 - Skewed by prophylaxis

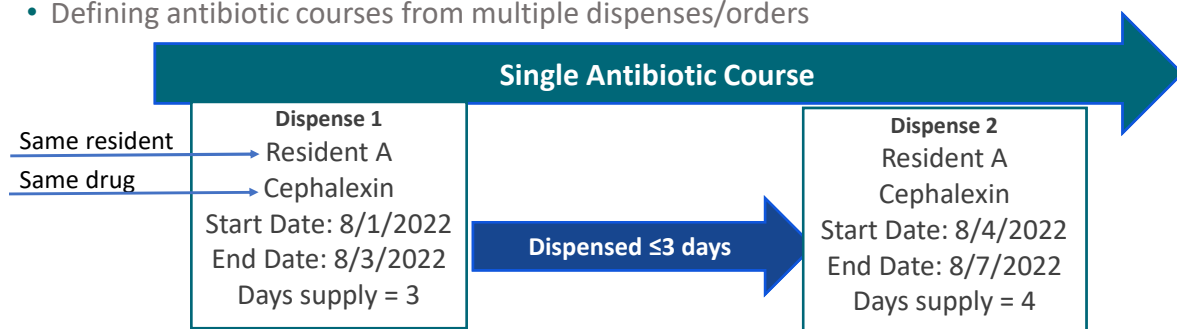
Name	Date of Antibiotic Order or Transaction	Antibiotic Name	Calendar Days Antibiotic was Administered or Dispensed
Resident A	January 7	Nitrofurantoin	3
Resident B	January 7	Cephalexin	3
Resident A	January 10	Nitrofurantoin	2
Resident C	January 18	Ceftriaxone	7
Resident D	February 5	Vancomycin	10
Resident B	February 24	Ciprofloxacin	5
Resident B	February 24	Metronidazole	5

Month	Antibiotic DOT	Monthly Resident-Days	Rate of DOT/1,000 Resident-Days
January	$(3+3+2+7)=15$	200	$(15/200) \times 1,000=75$
February	$(10+5+5)=20$	250	$(20/250) \times 1,000=80$

19

Tracking: Antibiotic Course

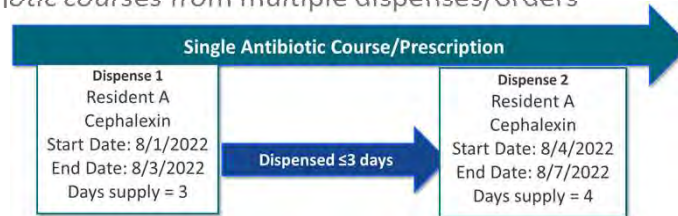
- Defining antibiotic courses from multiple dispenses/orders



20

Tracking: Antibiotic Course

- Defining antibiotic courses from multiple dispenses/orders



- Course duration: length of discreet antibiotic course (collapse dispenses/orders)

Sum of DOTs for all dispenses/orders in the course

$$3 \text{ days (Dispense 1)} + 4 \text{ days (Dispense 2)} = 7 \text{ days}$$

OR

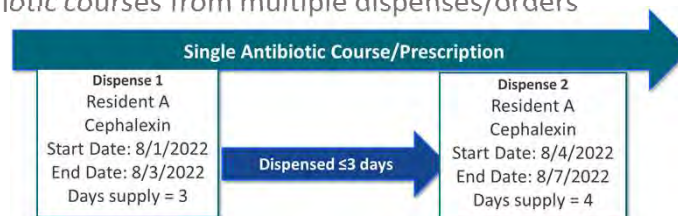
(End Date – Initial Start Date) + 1

$$8/7/2022 \text{ (Dispense 2 End Date)} - 8/1/2022 \text{ (Dispense 1 Start Date)} + 1 = 7 \text{ days}$$

21

Tracking: Antibiotic Use Measures

- Defining antibiotic courses from multiple dispenses/orders



Antibiotic use rates (reported monthly, quarterly, yearly):

- Proportion of residents with antibiotic
- Antibiotic DOTs per 1,000 resident-days
- Antibiotic Courses per 1,000 resident-days
 - Mean course duration

22

Long-term Care Antibiotic Use Data: Study Example

Data Source: LTC pharmacy data from 326,713 unique residents in 1,348 nursing homes
 Antibiotic Courses: 576,288 dispenses → **324,306 antibiotic courses**

Proportion of Residents

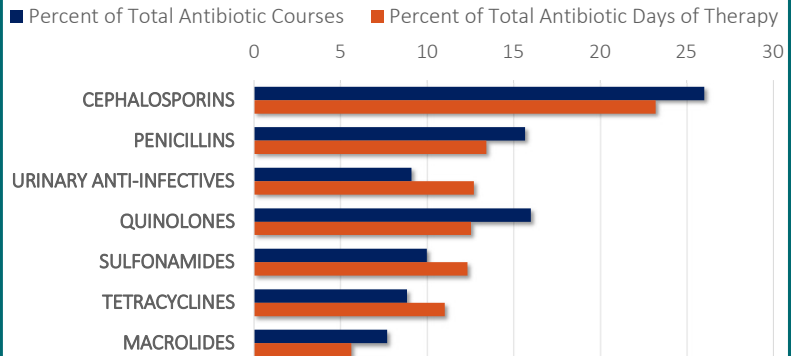


45% of residents received an antibiotic

Antibiotic Use Rates

- 324,306 courses/38 million resident-days
9 antibiotic courses/1,000 resident-days
- 3.3 million DOTs/ 38 million resident-days
86 antibiotic DOT/1,000 resident-days

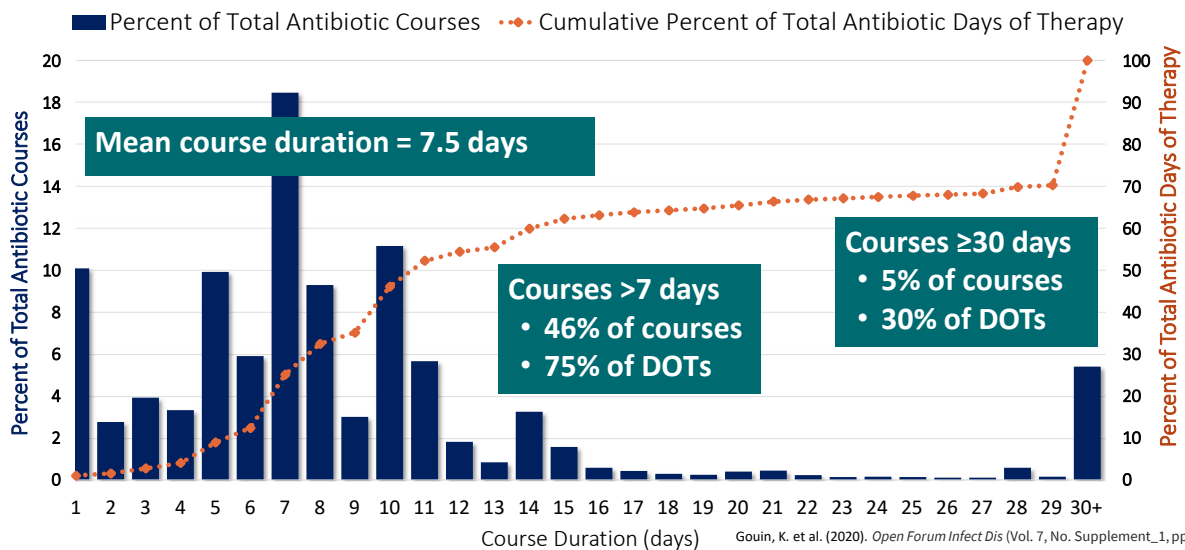
Antibiotic Courses and Days of Therapy by Antibiotic Class



Gouin, K. et al. (2020). *Open Forum Infect Dis* (Vol. 7, No. Supplement_1, pp. S104)

23

Long-term Care Antibiotic Use Data: Study Example



Gouin, K. et al. (2020). *Open Forum Infect Dis* (Vol. 7, No. Supplement_1, pp. S104)

24

Infection Tracking Log

2019		Avg. Daily Census					Resident Days per Month										Clinical Information				Treatment				Prescriber		Therapy		
Site of Infection	Meets McGee's Criteria	Lab Identified C. difficile Infection (CDI)	MRSA Infected	Admitted with Infection	Health care Acquired Nosocomial Infection	Temp	X-Ray Taken	Culture Taken	Foley	Trach	Causative Organism (list or "none found")	Class	Medication	Treatment	Follow-up De-escalation	Diagnosis	Was this antibiotic prescribed at the facility?	Who prescribed this antibiotic?	Start Date	Stop Date	Length of Therapy (days)	Reportable infectious	Control Techniques Utilized						
UTI	No	N/A	No	No	Yes	Yes	No	Yes	Yes	N/A	xxx	Penicillins	Ampicillin	250 mg	Continue	UTI	No	David	3/2/2019	3/10/2019	9	No	Hosp did						
Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Multi-Rx	Macrolides	Doxycycline	100mg QD	Narrow	UTI	No	Dr6	3/2/2019	3/11/2019	10	No							
UTI	Yes	Skin	Skin	No	Yes	Yes	No	Yes	Yes	N/A	pseudomon	Urinary_anti	Fosfomycin	2gm Bid	Discontinue	UTI	Yes	Dr4	3/9/2019	3/16/2019	8	No	Repeat due						
UTI	Yes	N/A	No	No	Yes	Yes	No	Yes	N/A	No	influenza A	Anti_infectiv	Aztreonam	75mg Bid	Discontinue	influenza	Yes	Dr2	3/3/2019	3/7/2019	5	No	droplet						
UTI	Yes	N/A	No	No	Yes	No	No	Yes	No	N/A	enterococu	Penicillins	Amoxicillin	100mg Bid	Change	UTI	Yes	Dr4	3/9/2019	3/19/2019	11	No							
UTI	Yes	N/A	No	No	Yes	No	No	No	N/A	N/A	No culture	Fluoroquinol	Gatifloxacin	800-160mg	Discontinue	cellulitis	Yes	Dr1	3/9/2019	3/18/2019	11	No							
Skin	No	N/A	no	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Penicillins	Amoxicillin	1gm IV	Continue	cellulitis	Yes	Dr2	3/21/2019	3/24/2019	3	No							
Resp	Yes	N/A	No	Yes	Yes	No	Yes	No	N/A	No	No culture	Cephalospor	Cefuroxime	500mg QOD	Continue	bronchiti	No	Dr5	3/24/2019	3/28/2019	5	No							
UTI	Yes	N/A	No	No	Yes	Yes	Yes	Yes	Yes	N/A	MRSA	Fluoroquinol	Gatifloxacin	1.25-	Continue	infected	No	Dr3	3/12/2019	4/13/2019	33	No							
UTI	No	N/A	No	No	Yes	No	No	Yes	No	N/A	e-coll	Macrolides	Clarithromycin	250mg Bid	Continue	UTI	Yes	Dr1	3/22/2019	3/27/2019	6	No							
GI	Yes	N/A	No	No	Yes	No	No	Yes	No	N/A	proteus mirabilis	Anti_infectiv	Aztreonam	300mg Bid	Continue	UTI	Yes	Dr5	3/29/2019	4/5/2019	8	No							

<https://www.brown.edu/academics/public-health/qandi/providers/infectionlog>

25

Reporting: Antibiotic Use and Outcomes.

- Providing regular feedback on antibiotic use to all relevant stakeholders important for the success and sustainability of stewardship practices
- Feedback on prescribing practices and compliance with facility antibiotic use protocols.
 - Provider-specific feedback and peer comparison may be an effective way to change prescribing behavior as demonstrated in the outpatient setting.

Meeker et al, JAMA. 2016 Feb 9;315(6):562-70.

26

Peer Comparison Audit and Feedback in Nursing Homes can lead to reduced prolonged antibiotic durations

- Randomized controlled trial in Ontario in 2019 among 1,238 providers in long-term care facilities
 - 28% of physicians **received audit and feedback**
- **Audit and feedback** was associated with:
 - a significant decline in prolonged antibiotics
 - 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 & 50th 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 & 50th 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, et al. *Clin Infect Dis.* 2021;73(6):e1296-e1304.

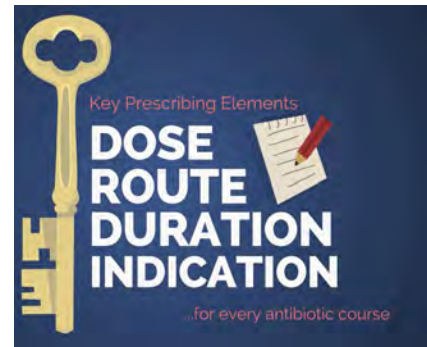
27

Action & Education

28

Implementing Antibiotic Use Protocols and Improving Documentation

- Evaluation, communication and documentation of changes in clinical condition and suspected infection.
- Antibiotic use protocols that incorporate Treatment guidance for common infections based on practice guidelines.



29

Improving Microbiology Testing Practices

- Develop algorithms for appropriate diagnostic testing and best practices for microbiology testing.
 - Avoiding “test of cure” for urinary tract or *C. difficile* infection
 - Avoiding testing on admission when asymptomatic
 - Avoiding testing for asymptomatic bacteriuria in the absence of symptoms



30

Opportunity: Diagnosis, Treatment and Prophylaxis Urinary Tract Infections.



- Asymptomatic bacteriuria is common in nursing home residents.
 - Urine cultures are positive in 25-50% of women and 15-35% of men in nursing homes.
 - Up to 1/2 of antibiotics prescribed to treat UTI in older adults are inappropriate.
 - Foul-smelling or cloudy urine frequently leads to unnecessary urine testing.
- Overtesting leads to overdiagnosis of UTI, treatment of asymptomatic bacteriuria, risk for adverse drug events, and delays in diagnosis.
- There is limited evidence to support prophylaxis for UTI in nursing home residents.

1. Nicolle et al. Int J Antimicrob Agents. 2006 Aug;28 Suppl 1:542-8. 2. Nicolle et al. Infect Control Hosp Epidemiol. 2001 Mar;22(3):167-75.
 3. Nicolle et al. Clin Infect Dis. 2005;40(5):643-654. 4. Crnich et al. J Am Geriatr Soc. 2017 Aug;65(8):1661-1663.
 5. Trautner. Nat Rev Urol. 2012;9(2):85-93. 6. Nicolle et al. Infect Dis Clin North Am. 1997; 11(3):647-662.
 7. Eure et al. Infect Control Hosp Epidemiol 2017 Aug;38(8):998-1001. 8. Wald. JAMA Intern Med. 2016 May 1;176(5):587-8.
 9. Ahmed. BMJ Open. 2017 May 29;7(5):e015233.

31

Improving Diagnosis of Urinary Tract Infections

Risks may outweigh benefits for urinary tract infection (UTI) prophylaxis in older adults

Visual Abstract



Antibiotic prophylaxis was defined as at least 30 days of antibiotics after a positive urine culture for presumed prevention of UTI in adults over 66 years

1.7% of patients received antibiotic prophylaxis

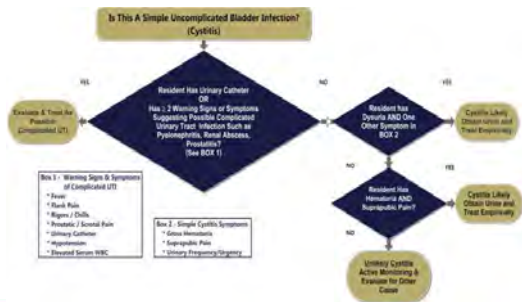
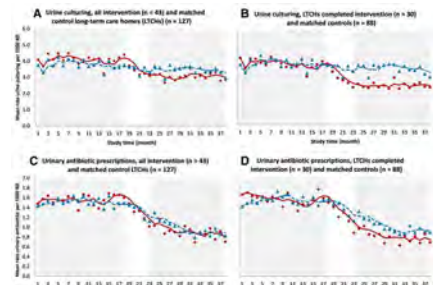
Antibiotic prophylaxis recipients experienced more harm compared to patients without antibiotic prophylaxis

- 1.3x risk of hospital visit
- 1.6x risk of *C. difficile* diarrhea
- 1.3x risk of antibiotic resistance
- 1.6x risk of side effects

Langford BJ, Brown KA, Dong C, Marchand-Austin A, Adomako K, Saedi A, Schwartz K, Johnson J, MacFadden DR, Mahajan LM, Patel SN, Garber G, Davenport N. The Benefits and Harms of Antibiotic Prophylaxis for Urinary Tract Infection in Older Adults. Clinical Infectious Diseases. 2021

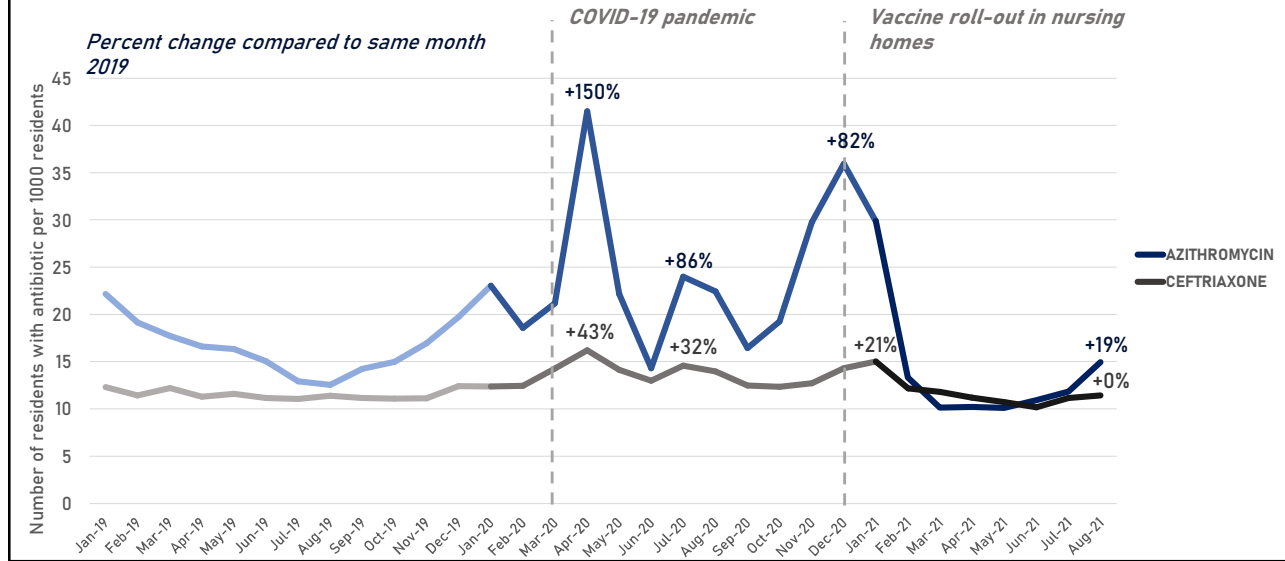


Chambers et al. BMJ Qual Saf 2022 Feb;31(2):94-104.
 Nace et al. J Am Med Dir Assoc. 2018 Sep;19(9):765-769.e3.
 Ashraf et al. J Am Med Dir Assoc. 2020 Jan;21(1):12-24.e2.



32

Prescribing antibiotics for respiratory infections



33

Opportunities for Improvement When not to treat



12 Common Nursing Home Situations in Which Systemic Antibiotics are Generally Not Indicated

1. Positive urine culture in an asymptomatic resident.
2. Urine culture ordered solely because of change in urine appearance.
3. Nonspecific symptoms or signs not referable to the urinary tract, such as falls or mental status change (with or without a positive urine culture).
4. Upper respiratory infection (common cold).
5. Bronchitis or asthma in a resident who does not have COPD.
6. "Infiltrate" on chest x-ray in the absence of clinically significant symptoms.
7. Suspected or proven influenza in the absence of a secondary infection (but DO treat influenza with antivirals).
8. Respiratory symptoms in a resident with advanced dementia, on palliative care, or at the end of life.
9. Skin wound without cellulitis, sepsis, or osteomyelitis (regardless of culture result).
10. Small (<5cm) localized abscess without significant surrounding cellulitis (drainage is required of all abscesses).
11. Decubitus ulcer in a resident at the end of life.
12. Acute vomiting and/or diarrhea in the absence of a positive culture for shigella or salmonella, or a positive toxin assay for Clostridium difficile.

AHRC
Agency for Healthcare Research and Quality
Advancing Excellence in Health Care www.ahrq.gov

34

Antibiotic Review

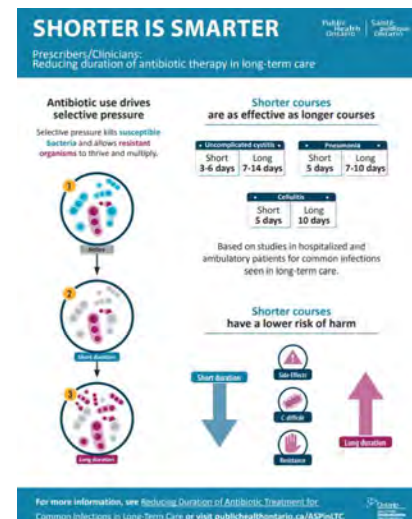
- Antibiotic review or “Antibiotic time-out”
 - Reassessing treatment after antibiotic start based on clinical response and laboratory results to determine whether antibiotics are still needed, can be stopped or should be adjusted.



35

Antibiotic Review

- Antibiotic review or “Antibiotic time-out”
 - Reassessing treatment after antibiotic start based on clinical response and laboratory results to determine whether antibiotics are still needed, can be stopped or should be adjusted.
- Treatment for the minimum effective duration of residents who are stable with appropriate clinical response



https://www.publichealthontario.ca/-/media/Documents/F/2018/factsheet-duration-antibiotics-ltc-common-infections.pdf?sc_lang=en

36

Antibiotic Use Protocols and Improving Communication.

No Infection

Infection

Supportive Care
Active monitoring
Diagnostic Tests
Antibiotic Stewardship

Integrating antibiotic stewardship into existing workflow

Improving documentation of critical information

Standardizing communication between front-line nursing staff and offsite prescribers
SBAR

<https://www.ahrq.gov/nhguide/toolkits/determine-whether-to-treat/toolkit1-suspected-uti-sbar.html>

37

Communication with Emergency Departments and Hospitals

- Standardized transfer forms can improve the communication of important information related to resident care when residents are transferred to other healthcare settings.
- There are critical gaps in communication between nursing homes, emergency departments, and acute care hospitals.
 - Antibiotic stewardship at hospital discharge is important.

Griffiths et al, Int J Nurs Stud. 2014 Nov;51(11):1517-23.
Dalawari et al, Geriatr Nurs. 2011 Jul-Aug;32(4):270-5.
Terrell et al, Acad Emerg Med. 2005 Feb;12(2):114-8.

<https://www.cdc.gov/hai/pdfs/toolkits/InfectionControlTransferFormExample1.pdf>
<https://www.cdc.gov/antibiotic-use/pdfs/BAA-Hospital-Discharge-Flowchart-P.pdf>

Infectious Disease Transfer Form

This document is intended for use by healthcare providers at the sending and receiving facilities. It is not to be used for billing purposes.

1. Patient Information

First Name	Last Name	Room	Unit

2. Infection Information

Is the patient currently on antibiotics? NO YES
If YES, list antibiotic(s) (check all that apply): Cefazolin Clindamycin Levofloxacin Vancomycin

3. Is the patient currently on any of the following?

4. Is the patient currently on any of the following?

- 1 Use the most targeted and safe antibiotic!**
If a patient already is taking the regular course of antibiotic treatment for a patient is truly allergic, the antibiotic of a prior discharge prescription. Examples of safe treatment options for common infections:
Community-acquired pneumonia: 1st line? Hospital-acquired pneumonia: 1st line? Nosocomial infections: 1st line?
- 2 Use the shortest effective antibiotic duration!**
Adjustment for important antibiotic class when considering the duration of a prior discharge prescription. Examples of safe treatment options for common infections:
Community-acquired pneumonia: 7 days? Hospital-acquired pneumonia: 7 days? Nosocomial infections: 7 days?
- 3 Document and communicate a structured and timely discharge summary!**
Discharge summary should include:
- Antibiotic therapy
- List important antibiotic and dose/information about antibiotic therapy
- If antibiotic therapy was completed in the hospital or if antibiotic therapy was not started
- For a short discharge prescription, list the planned antibiotic, dose, and end date.
- Details of response, changes, tests (including pending tests), and follow-up for follow-up medical care (including contact information for antibiotic stewardship).
- 4 Educate patients and caregivers!**
Education and shared antibiotic course prescriptions for home use (medical care) should include components of monitoring effectiveness and safety.
Steps and frequency of antibiotic monitoring (including laboratory tests), including laboratory reference information.

38

Improving Communication with Residents and Families.



NURSING HOME HEALTHCARE PROFESSIONALS: BE ANTIBIOTICS AWARE

Effective Communication with Residents and Families

50-70% of nursing home residents are prescribed an antibiotic each year.¹

25-75% of antibiotic prescriptions in nursing homes is inappropriate.²


Effective communication with residents and their families helps to address treatment expectations and places the resident at the center of care. Training home healthcare professionals can help increase inappropriate antibiotic use by utilizing the 4-part communication strategy shown below. Communication skills training has been shown to significantly reduce inappropriate antibiotic prescribing in outpatient settings.³

Two scenarios using the communication strategy to decrease unnecessary prescribing for asymptomatic bacteriuria and respiratory infections are described on the pages that follow.

Healthcare professionals can use the 4-part Communication Strategy⁴ to discuss appropriate antibiotic use when there is a change in the resident's condition.

- 1. Review findings:**
Review relevant information such as symptoms or physical examination findings that support the decision about appropriate testing and antibiotic use.
- 2. Deliver a clear diagnosis:**
Deliver a clear diagnosis that explains the change in the resident's condition.
- 3. Provide a FIRST negative, THEN positive treatment recommendation:**
When an antibiotic is not needed, FIRST provide a negative treatment recommendation that "rules out" the need for antibiotics. THEN provide a positive recommendation for further evaluation, management, and monitoring.
- 4. Discuss a contingency plan:**
Outline a contingency plan that details what actions will be taken if the resident does not improve or if their condition worsens.

The scenarios are examples that apply the communication strategy discussed above and are not meant to guide the evaluation and treatment of infections in nursing home residents. Always assess the problem, discuss your clinical judgment, and follow your facility's antibiotic guidelines. Recommendations are general.



Effective Communication about Asymptomatic Bacteriuria

SCENARIO 1


Ms. Smith's daughter is concerned because her mother did not sound like herself on the phone. She is worried that her mother may have a urinary tract infection and needs an antibiotic.

Asymptomatic bacteriuria refers to the isolation of bacteria in a urine culture from a resident without signs or symptoms of a urinary tract infection. Residents with asymptomatic bacteriuria **should not** be treated with antibiotics in most cases.⁵

Healthcare professionals can use the 4-part Communication Strategy⁴ discussed above to avoid unnecessary testing and antibiotic treatment for residents with asymptomatic bacteriuria.

- 1. Review findings:**
Ms. Smith is less talkative than usual today. She is not complaining of pain or urgency when she urinate and she has no other symptoms to suggest an infection. On exams, she does not have a fever, her lungs sound clear, and her abdomen is not tender.
- 2. Deliver a clear diagnosis:**
Her urine is clearer than usual, which seems more consistent with fluid deficit than a urinary tract infection.
- 3. Provide a FIRST negative, THEN positive treatment recommendation:**
Since the clinical findings do not indicate a urinary tract infection, an antibiotic will not help and may cause side effects, such as diarrhea. Instead, we will give her fluids and monitor her over the next 24 hours.
- 4. Discuss a contingency plan:**
If Ms. Smith does not improve, develops a fever or any new symptoms consistent with an infection, we will perform further testing and start antibiotics if needed.

The scenarios are examples that apply the communication strategy discussed above and are not meant to guide the evaluation and treatment of infections in nursing home residents. Always assess the problem, discuss your clinical judgment, and follow your facility's antibiotic and treatment policies when applicable.



Effective Communication about Respiratory Infections

SCENARIO 2

Mr. Jones woke up with a cough. He is concerned and asks for an antibiotic because in the past, antibiotics have helped him feel better when he is sick.

Antibiotics should not be prescribed for residents with upper respiratory infections or acute uncomplicated bronchitis unless pneumonia is suspected or they meet criteria for antibiotic initiation.⁶

Healthcare professionals can use the 4-part Communication Strategy⁴ discussed above to avoid unnecessary antibiotic treatment for residents with respiratory tract infections.

- 1. Review findings:**
Mr. Jones, I am sorry you are not feeling well today. When I examined you your respiratory sound and temperature were normal, you have no chest swelling or viral tenderness, and your lungs sounded clear.
- 2. Deliver a clear diagnosis:**
The doctor and I discussed your symptoms. It seems that you have acute bronchitis, also known as a chest cold, which is most commonly caused by a virus.
- 3. Provide a FIRST negative, THEN positive treatment recommendation:**
As antibiotics will not seem against a viral infection, and may cause side effects, such as diarrhea. Instead, we will test you for respiratory viruses, including flu. We will provide treatment to help you feel better and closely monitor your symptoms.
- 4. Discuss a contingency plan:**
If you become short of breath, develop a fever or any other concerning symptoms, we will perform more testing, a chest X-ray, and start antibiotics if needed.

The scenarios are examples that apply the communication strategy discussed above and are not meant to guide the evaluation and treatment of infections in nursing home residents. Always assess the problem, discuss your clinical judgment, and follow your facility's antibiotic and treatment policies when applicable.

<https://www.cdc.gov/antibiotic-use/pdfs/NursingHome-Toolkit-508.pdf>

39

Antibiotic Stewardship

- Antibiotic stewardship implementation can help avoid delays in diagnosis and initiation of treatment of suspected infections.
- Integrate antibiotic stewardship in quality improvement initiatives that improve the evaluation, treatment and surveillance of infections
 - Improve screening and management of residents with suspected sepsis.



40

Antibiotic stewardship implementation can improve antibiotic prescribing in nursing homes.

- Systematic reviews assessing antibiotic stewardship programs in nursing homes revealed the following:
 - Interventions are multifaceted
 - Most commonly implemented strategies were educational materials, educational meetings, and guideline implementation
 - Report a decrease in overall, indication-specific antibiotic prescribing or improved “guideline adherence” as an outcome
 - None reported a significant change in mortality or hospitalization.



Feldstein et al, J Am Med Dir Assoc. 2017 Aug 7.
McElligott et al, Infect Dis Clin North Am. 2017 Dec;31(4):619-638.
Wu et al. J Am Geriatr Soc. 2019 Feb;67(2):392-399.

41

Antibiotic Stewardship Implementation

42

Core Elements Checklist



Checklist for Core Elements of Antibiotic Stewardship in Nursing Homes

The following checklist is a companion to the Core Elements of Antibiotic Stewardship in Nursing Homes. The CDC recommends that all nursing homes take steps to implement antibiotic stewardship activities. Before getting started, use this checklist as a baseline assessment of policies and practices which are in place. Then use the checklist to review progress in expanding stewardship activities on a regular basis (e.g., annually). Over time, implement activities for each element in a step-wise fashion.

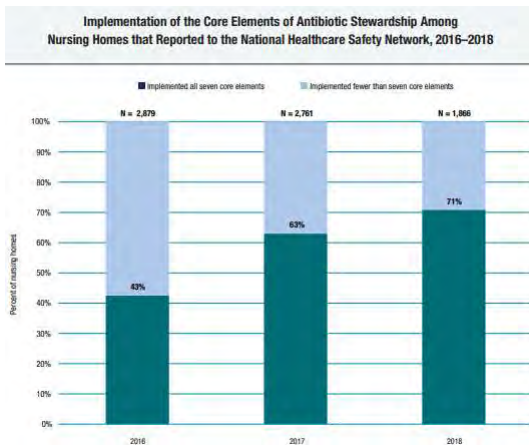
LEADERSHIP SUPPORT	ESTABLISHED AT FACILITY
1. Can your facility demonstrate leadership support for antibiotic stewardship through one or more of the following actions? If yes, indicate which of the following are in place (select all that apply) <input type="checkbox"/> Written statement of leadership support to improve antibiotic use <input type="checkbox"/> Antibiotic stewardship duties included in medical director position description <input type="checkbox"/> Antibiotic stewardship duties included in director of nursing position description <input type="checkbox"/> Leadership monitors whether antibiotic stewardship policies are followed <input type="checkbox"/> Antibiotic use and resistance data is reviewed in quality assurance meetings	<input type="checkbox"/> Yes <input type="checkbox"/> No
ACCOUNTABILITY	
2. Has your facility identified a leader(s) for antibiotic stewardship activities? If yes, indicate who is accountable for stewardship activities (select all that apply) <input type="checkbox"/> Medical director <input type="checkbox"/> Director or assistant director of nursing services <input type="checkbox"/> Consultant pharmacist <input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No
DRUG EXPERTISE	
3. Does your facility have access to individual(s) with antibiotic stewardship expertise? If yes, indicate who is accountable for stewardship activities (select all that apply) <input type="checkbox"/> Consultant pharmacy has staff trained/experienced in antibiotic stewardship <input type="checkbox"/> Partnering with stewardship team at referral hospital <input type="checkbox"/> External infectious disease/stewardship consultant <input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No
ACTIONS TO IMPROVE USE	
4. Does your facility have policies to improve antibiotic prescribing/use? If yes, indicate which policies are in place (select all that apply) <input type="checkbox"/> Requires prescribers to document a dose, duration, and indication for all antibiotic prescriptions <input type="checkbox"/> Developed facility-specific algorithm for assessing residents <input type="checkbox"/> Developed facility-specific algorithms for appropriate diagnostic testing (e.g., obtaining cultures) for specific infections <input type="checkbox"/> Developed facility-specific treatment recommendations for infections <input type="checkbox"/> Reviews antibiotic agents listed on the medication formulary <input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No

<https://www.cdc.gov/antibiotic-use/core-elements/pdfs/core-elements-antibiotic-stewardship-checklist-508.pdf>

43

Nursing home antibiotic stewardship implementation

- Assessing implementation through the NHSN’s LTCF annual survey



NHs that dedicated at least **20 hours to IPC activities per week** were **14% more likely to implement all seven core elements.**

Gouin et al, Infect Control Hosp Epidemiol. 2021 May 10;1-5

44



Data Source: Certification and Survey Provider Enhanced Reporting (CASPER)



- Public database contains CMS deficiency citations issued by state surveyors during nursing home facility inspections.
- Assessing stewardship citations
- Citation text structure:

Facility information

Regulatory language explaining citation

Summary including resident examples and/or chronologic order of what transpired

Interviews with residents, staff, and administrators



45

Antibiotic Stewardship Citations-Qualitative Analysis

Objective: Identify opportunities for improvement in nursing home antibiotic stewardship programs

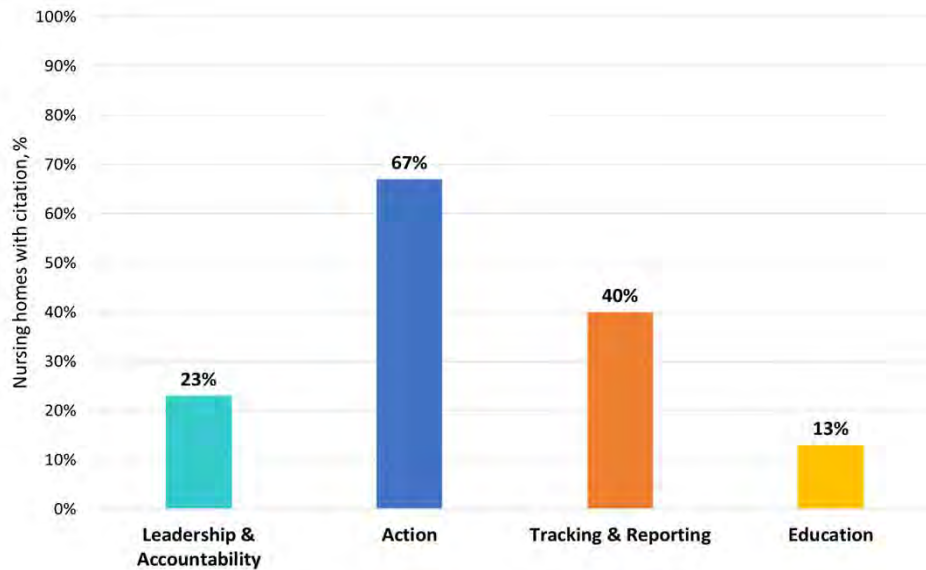
Approach: Conduct qualitative review of a randomly selected subset (318/635) of citations and categorize into themes based on the CDC Core Elements of Antibiotic Stewardship

1. **Leadership & Accountability**
 - Antibiotic Stewardship roles and policy
2. **Action**
 - Antibiotic prescribing protocols and review
3. **Tracking & Reporting**
 - Antibiotic and infection logs and report-out
4. **Education**
 - Staff training



46

Action was most the most common deficiency cited in nursing homes among the 318 citations reviewed.



Note: These categories are not mutually exclusive; citations could be classified into one or more categories.

47

Leadership & Accountability (23%)

Accountability

- No designated person/committee
- Staff turnover



Antibiotic Stewardship Policy

- Missing or not implemented
- Staff unaware



48

Leadership & Accountability (23%)



“did not have one [Antibiotic Stewardship Program] currently...”

Antibiotic Stewardship Policy

- Missing or not implemented
- Staff unaware

41/72 (57%)

No stewardship policy available

49


Action Related to Antibiotic Prescribing (67%)



Prescribing Protocols	Criteria for initiation	Reassessment	Review upon admission
<ul style="list-style-type: none"> ▪ Missing or not implemented 	<ul style="list-style-type: none"> ▪ No documented indication ▪ Did not meet based on symptoms, diagnostics, and lab results 	<ul style="list-style-type: none"> ▪ Appropriate drug, dose, and duration ▪ Diagnostic test results 	<ul style="list-style-type: none"> ▪ No review of antibiotics prescribed during hospitalization or emergency department visit

50


Action Related to Antibiotic Prescribing (67%)



<p>Prescribing Protocols</p> <ul style="list-style-type: none"> ▪ Missing or not implemented ▪ Antibiotic initiation, reassessment, communication tools 	<p>Criteria for initiation</p> <ul style="list-style-type: none"> ▪ Did not meet criteria on symptoms, diagnostics, and lab results 	<p><i>“...did not include protocols on prescribing, documentation of the indication, dosage and duration of use of antibiotics.”</i></p>
--	---	--

51

Action Related to Antibiotic Prescribing (67%)




<p>Prescribing Protocols</p> <ul style="list-style-type: none"> ▪ Missing or not implemented ▪ Antibiotic initiation, reassessment, communication tools 	<p>Criteria for initiation</p> <ul style="list-style-type: none"> ▪ No documented indication ▪ Did not meet based on symptoms, diagnostics, and lab results 	<p><i>“... the physician order did not indicate the reason the antibiotic medication was being prescribed.”</i></p>
--	--	---

115/213 (54%)
missing or incomplete criteria documented for antibiotic initiation

52

Action Related to Antibiotic Prescribing (67%)




Prescribing Protocols	Criteria for initiation	Reassessment	Review upon admission
<ul style="list-style-type: none"> ▪ Mis... ▪ Ant... ▪ rea... ▪ com... ▪ tools 	<ul style="list-style-type: none"> ▪ ...ted ▪ ... ▪ ... ▪ ... ▪ ... 	<ul style="list-style-type: none"> ▪ Appropriate drug, dose, and duration ▪ Diagnostic test results 	<ul style="list-style-type: none"> ▪ No review of antibiotics prescribed during hospitalization or emergency department visit

*“...did not have a **stop date** for the antibiotic.”*

“...prescriber was not asked to change the order”

53

Action Related to Antibiotic Prescribing (67%)



Pre...	ment	Review upon admission
<ul style="list-style-type: none"> ▪ ... ▪ ... 	<ul style="list-style-type: none"> ▪ ...to drug, ▪ ...tic test 	<ul style="list-style-type: none"> ▪ No review of antibiotics prescribed during hospitalization or emergency department visit

“...the facility does not require surveillance to be done if the infection and antibiotic order occurred in the hospital.”

54

Tracking & Reporting (40%)



Antibiotic/Infection Surveillance Log

- Missing or incomplete

Report-out

- Not reviewed with prescribers or at quality improvement meetings

55

Tracking & Reporting (40%)



Antibiotic/Infection Surveillance Log

- Missing or incomplete

“Logs did not include enough information to allow analysis of whether infections met criteria for treatment with ABXs prior to being treated or information about the length of treatment...”

**117/126 (93%)
missing or incomplete antibiotic or infection
tracking logs**

56



Education (13%)

Training for Healthcare Professionals

- Staff not trained on antibiotic use policies and protocols
- Frontline/nursing staff, infection preventionist, physicians, other

57

Conclusions

1. Opportunities for improvement

- **Ensure policy is available**
- **Implement antibiotic use protocols**
 - Document criteria for antibiotic initiation
 - Document assessment and review of antibiotics
 - Integrated in nursing home workflows
- **Education and staff training**

2. Resources needed to support nursing homes

- **Antibiotic use reports for tracking and reporting**
 - Electronic health record, long-term care pharmacy, manual
 - Training resources

3. Further evaluation to identify barriers to implementation

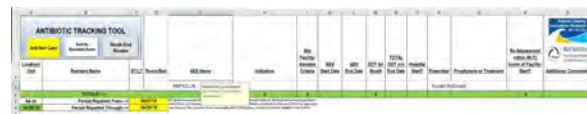
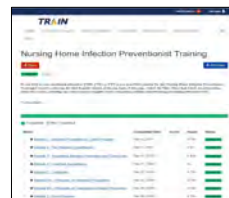
58

Resources

59

Resources

- **Core Elements of Antibiotic Stewardship for Nursing Homes**
<https://www.cdc.gov/antibiotic-use/core-elements/nursing-homes.html>
- **Checklist for Core Elements of Antibiotic Stewardship for Nursing Homes**
<https://www.cdc.gov/antibiotic-use/core-elements/pdfs/core-elements-antibiotic-stewardship-checklist-508.pdf>
- **Implementation Resources for Nursing Homes**
<https://www.cdc.gov/antibiotic-use/core-elements/nursing-homes/implementation.html>
- **CDC Nursing Home Infection Preventionist Training Course**
https://www.train.org/cdctrain/training_plan/3814
- **AHRQ Toolkit to Improve Antibiotic Use in Long-Term Care**
<https://www.ahrq.gov/antibiotic-use/long-term-care/index.html>
- **Rochester Nursing Home Collaborative Antibiotic Tracking Sheet**
<https://www.rochesterpatientsafety.com/index.cfm?Page=For%20Nursing%20Homes>
- **Template for an Antibiotic Stewardship Policy for Post-Acute and Long-Term Care Settings**
<https://pubmed.ncbi.nlm.nih.gov/28935515/>
- **Resources from Quality Innovation Network-Quality Improvement Organizations (QIN-QIOs)**
<https://www.telligencingio.com/antibiotic-stewardship-long-term-care/>
- **Infographics and Evidence Briefs from Public Health Ontario**
<https://www.publichealthontario.ca/en/health-topics/antimicrobial-stewardship/long-term-care>



60

Contact Information

Sarah Kabbani
SKabbani@cdc.gov

Katryna Gouin
KGouin@cdc.gov



**U.S. ANTIBIOTIC
AWARENESS WEEK**
November 18-24, 2022
www.cdc.gov/antibiotic-use

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

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.

