



## Outpatient Antibiotic Use and Stewardship in Minnesota

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# Agenda

## Outpatient Antibiotic Use Summary

- Measuring Antibiotic Use (AU)
- Total Outpatient AU
  - Minnesota and U.S. Estimates
- Appropriate AU
  - US Estimates
  - HEDIS Measures-Minnesota
- National Goal for Reduced Inappropriate AU

## Survey Summary Reports

- 2015 Dental Survey
- 2017 Outpatient Clinic Survey
- 2018 Community Pharmacy Survey

## Resources and Tools

- Commitment Toolkit
- Factsheets
- Website
- Others

# Measuring Antibiotic Use

- How many antibiotics?
  - Units: Any Dose – Defined Daily Dose – Days of Therapy – Among others
  - Outpatient Oral Antibiotics: Prescriptions
- Total Antibiotic Use
  - Data Sources: Medical records, health and pharmaceutical claims, drug administration records, drug purchasing data, pharmacy dispensing data
  - Outpatient: Medical records, health and pharmaceutical claims, pharmacy dispensing data
  - Examples today: Pharmacy dispensing data, medical records

# Measuring Antibiotic Use

## Appropriate Antibiotic Use

Harder to Measure

Subjectivity – Inconsistent or incomplete documentation

Uncertainty involved in prescribing

Data Sources: each possible source limited differently

Examples today: Medical records – coded diagnoses, health and pharmaceutical claims

# Total and Appropriate Antibiotic Use

## **Key Study:**

Fleming-Dutra KE, Hersh AL, Shapiro DJ, et al. Prevalence of Inappropriate Antibiotic Prescriptions Among US Ambulatory Care Visits, 2010-2011. *JAMA*. 2016;315(17):1864–1873.

## **2010-2011 National surveys: medical records reviewed as basis for estimates**

National Ambulatory Care Medical Care Survey (NACMS) and National Hospital Ambulatory Medical Care Survey (NHAMCS)

## **Regional and National Estimates:**

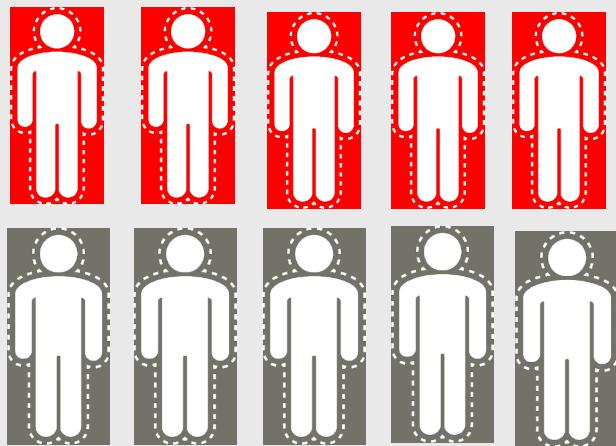
Visits with antibiotic prescriptions

Visits for common outpatient infections

Percent with appropriate antibiotics

# Total Antibiotic Use: Key Findings

**Outpatient Antibiotic Prescribing Rate:**  
**506/1000 persons per year**



## Regional Variation:

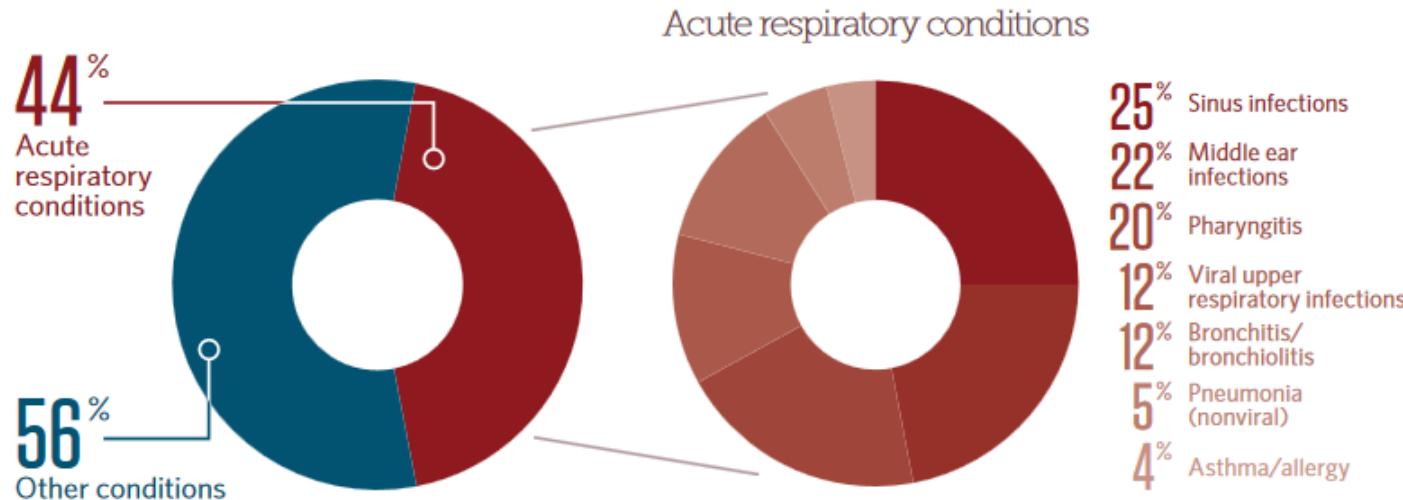
West:	423/1000
Midwest:	497/1000
Northeast:	525/1000
South:	553/1000

## Age Variation:

0-19 years	646/1000
20-64 years	418/1000
65+ years	617/1000

# U.S. Estimates: Total Antibiotic Prescriptions by Diagnosis

Figure 1  
Outpatient Antibiotic Prescriptions by Diagnosis



Note: Not pictured are influenza and viral pneumonia. There are not enough visits with an antibiotic prescribed in the data set to calculate reliable estimates for these diagnoses individually. Both diagnoses do contribute to the total number of antibiotics prescribed for acute respiratory conditions.

Source: Analysis of NAMCS and NHAMCS data on U.S. antibiotic prescribing, 2010-2011

## Estimated Appropriate and Inappropriate Antibiotic Prescriptions per 1,000 Persons, U.S. 2011

	Total Prescriptions	Estimated Appropriate Prescriptions	Estimated Inappropriate Prescriptions
	Prescriptions per 1000	Percent of Total	Percent of Total
Acute Respiratory Conditions	221	50%	50%
Other Conditions	284	85%	15%
<b>Total</b>	<b>506</b>	<b>70%</b>	<b><u>30%</u></b>

Fleming-Dutra KE, et al, JAMA. 2016

# HEDIS Measures of Antibiotic Appropriateness

## Healthcare Effectiveness Data and Information Set

Defined quality measures collected by health plans

### Appropriate Treatment for Children with Upper Respiratory Infection (URI)

Percent of children 3 months-18 years diagnosed with URI not given an antibiotic within 3 days of an office visit

Health claims data

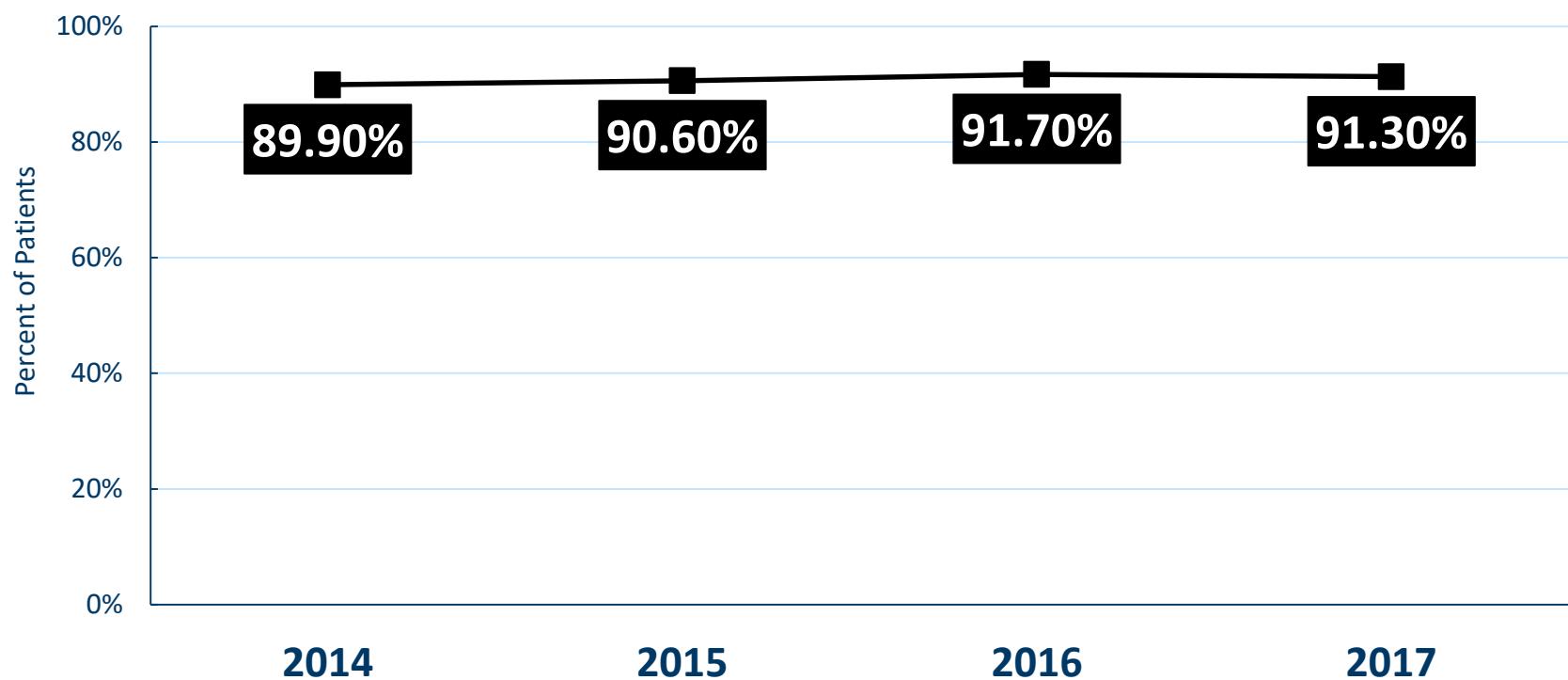
### Avoidance of Antibiotics in the Treatment of Adults with Acute Bronchitis

Ages 18-64 years

Exclusions for chronic bronchitis and immunocompromising comorbidities

Health claims data

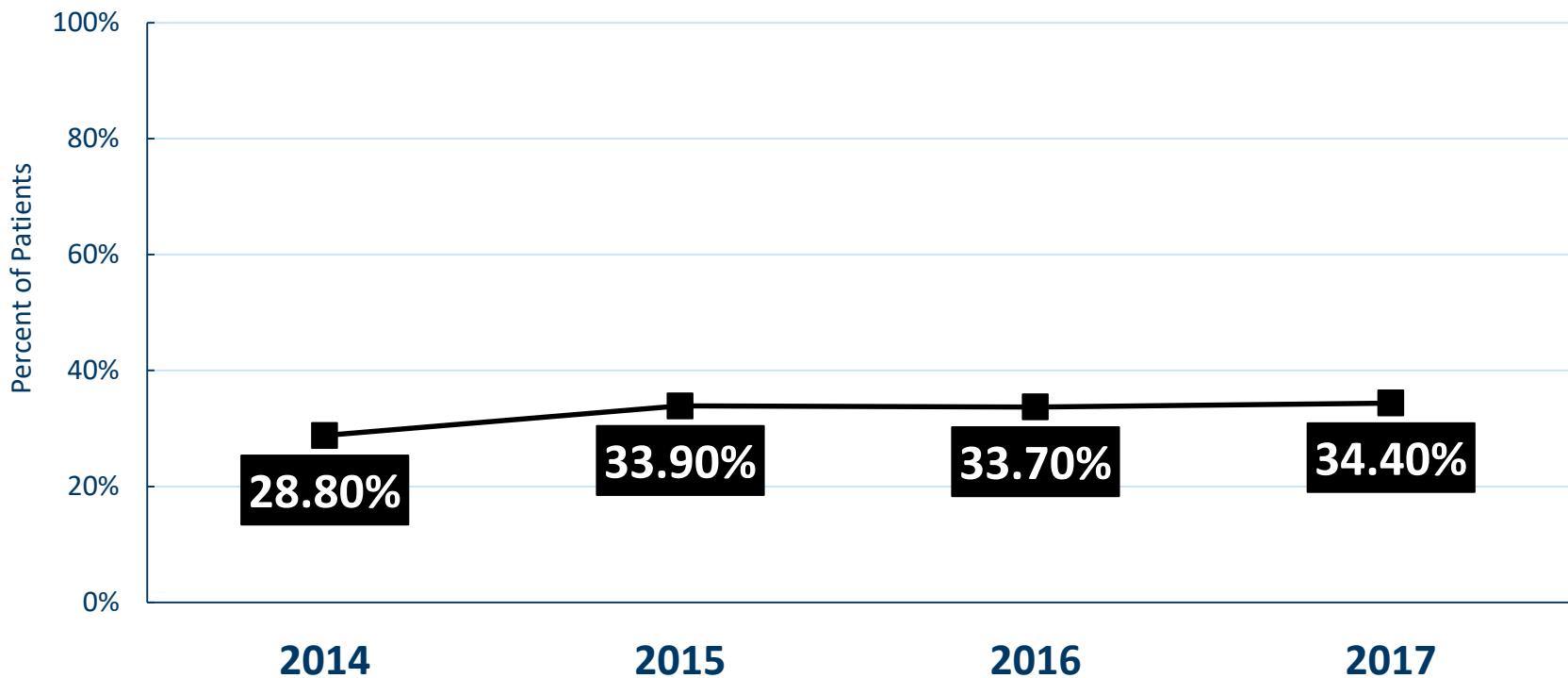
## Proportion of Children with Upper Respiratory Infections Diagnosed Without Antibiotics Prescribed, Minnesota, 2014-2017



Source: Minnesota Community Measurement, HEDIS Measure

one year measurement periods  
ending June 30 of each year

## Proportion of Acute Bronchitis Patients, 18-64 years Without Antibiotics Prescribed, Minnesota, 2014-2017



Source: Minnesota Community Measurement, HEDIS Measure

# National Goal to Reduce Unnecessary Antibiotic Use

**White House National Action Plan to Combat Antibiotic Resistant Bacteria**

**Goal: By 2020, reduce inappropriate outpatient antibiotic use by 50%**

**The necessary reduction in total antibiotic use to reach this goal: 15%**

Pew Report:

<http://www.pewtrusts.org/en/research-and-analysis/reports/2016/05/antibiotic-use-in-outpatient-settings>

Pew Infographic:

<http://www.pewtrusts.org/en/multimedia/data-visualizations/2016/national-goals-for-reducing-inappropriate-antibiotic-use-in-outpatient-settings>

## Estimated Potential Reductions in Inappropriate Antibiotic Prescribing

	Total Prescriptions	Estimated Appropriate Prescriptions	Potential Reduction
	Prescriptions per 1000	Percent of Total	Percent of Total
Acute Respiratory Conditions	221	50%	-50%
Other Conditions	284	85%	-15%
Total	506	70%	-30%

Fleming-Dutra KE, et al, JAMA. 2016



# 2015 Dental Survey



# AS in Dental Prescribing

- Dentists are important partners in antibiotic stewardship (AS)
  - Prescribe 10% of antibiotics in US outpatient settings<sup>1</sup>
- Penicillins commonly prescribed, consistent with prescribing guidelines<sup>2</sup>
- Many broad-spectrum antibiotics (macrolides and quinolones) also prescribed, although dental indications are limited<sup>3</sup>

<sup>1</sup>US outpatient antibiotic prescribing variation according to geography, patient population, and provider specialty in 2011. CID 2015;60:1308-1316

<sup>2</sup>Antibiotic prescribing by general dentists in the United States. J Am Dent Assoc 2017;148(3):172-178

<sup>3</sup>2015 study accepted for publication in *General Dentistry*

# 2015 Dental Survey

- Conducted in partnership with MN Dental Association and MN Board of Dentistry
- Response rate = 16% (n=437)
- Dentists prescribe in more situations than recommended by practice guidelines
  - Patient vacations (38%), liability concerns (24%), patient demand (22%)
  - Excessive prophylaxis for cardiac and prosthetic joints prior to invasive procedures (Guidelines revised in 2007 and 2015)
- Challenges: prophylaxis disagreements among specialists, primary care, and dentists; uncertainty about new guidelines
- Needs: information concerning antibiotic selection and risks, including adverse effects, *Clostridium difficile* infection, and antibiotic resistance (AR)



# 2017 Outpatient Clinic Survey



# AS in Outpatient Clinics

- 60% of antibiotics occur in outpatient settings<sup>1</sup>
- 30% of outpatient antibiotics are inappropriately prescribed<sup>2</sup>
- CDC published Core Elements of Outpatient AS in 2016<sup>3</sup>

<sup>1</sup>A national evaluation of antibiotic expenditures by healthcare setting in the United States, 2009. *J Antimicrob Chemother* 2013; 68:715–8.

<sup>2</sup>Fleming-Dutra KE, Hersh AL, Shapiro DJ, et al. Prevalence of Inappropriate Antibiotic Prescriptions Among US Ambulatory Care Visits, 2010-2011. *JAMA*.

<sup>3</sup>Sanchez, G.V., Fleming-Dutra, K.E., Roberts, R.M., Hicks, L.A. Core Elements of Outpatient Antibiotic Stewardship. *MMWR Recomm Rep* 2016;65(No. RR-6):1–12.

# Outpatient Clinic Survey Results: Commitment to AS

- 116 participated in online survey  
(1 responder/clinic)
- Large interest and commitment from providers regarding AS
- 51% of clinics made a formal commitment by leadership to improve and monitor AU
- 14% have developed written AS policy and 12% included AS-related duties in job description

## CDC Core Elements of Outpatient AS



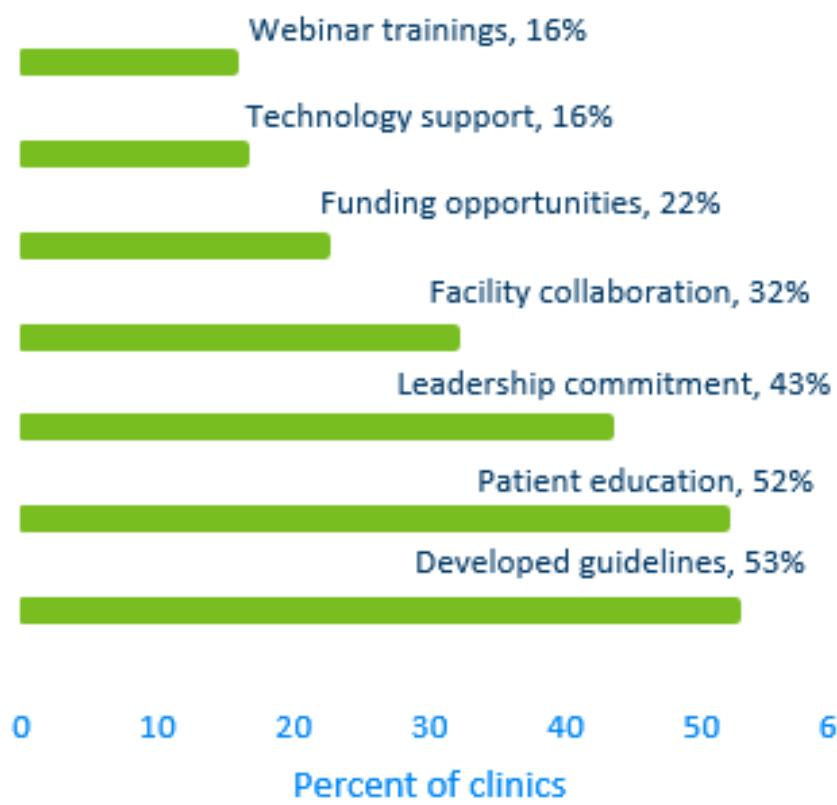
<http://www.health.state.mn.us/onehealthabx/outsurvey.pdf>

Sanchez, G.V., Fleming-Dutra, K.E., Roberts, R.M., Hicks, L.A. Core Elements of Outpatient Antibiotic Stewardship. MMWR Recomm Rep 2016;65(No. RR-6):1–12.

## Barriers to Stewardship



## Facilitators to Stewardship





# Outpatient Clinic Survey Results: AS Actions

- Delayed prescribing/watchful waiting (60%)
- Syndrome treatment guidelines (42%)
- Eliminate standing orders for antibiotics (21%)
- Use antibiogram as a prescribing reference (20%)
- Symptom relief prescription pad (15%)
- Facility tracking antibiotic use (7%)



# 2018 Community Pharmacy Survey



# Community Pharmacy Survey Results: Role in AS

- Conducted in partnership with MN Board of Pharmacy and MN Pharmacists Association
  - Response rate = 7% (n=177)
- >80% believe community pharmacists are important to AS and AR prevention
- >40% of pharmacies provide AS and AR education to staff
- 10% of pharmacies have written AS policy
- 25% of pharmacists educate patients about AS and AR
- During influenza season: on average suspected 9.5 prescriptions/month inappropriate
- Discuss/clarify/offer alternative to prescriber: 2 prescriptions/week



# Community Pharmacy Survey Results: AS Actions and Barriers

Actions	Barriers
<ul style="list-style-type: none"><li>• Use clinical guidelines (33%)</li><li>• Display information about medication disposal (30%)</li><li>• Confirm antibiotic need and dose with prescriber (19%)</li><li>• Request indication or diagnosis (11%)</li><li>• Engage with local prescribers/clinics to review antibiotic use (10%)</li><li>• Track pharmacy antibiotic dispensing data (7%)</li><li>• Publically display commitment to AS (5%)</li></ul>	<ul style="list-style-type: none"><li>• Not enough time to review prescriptions or educate patients</li><li>• No compensation for time spent on AS</li><li>• Prescriber resistance to questioning from pharmacists</li><li>• Insufficient information to assess appropriateness (lack of indication or diagnosis)</li><li>• Patients expect antibiotics and consider them a cure-all</li></ul>



# Resources and Tools

How is MDH using the survey data?

# Commitment Posters

## I PLEDGE to use antibiotics responsibly!



Your name  
Your title  


- ✓ I will never take antibiotics for a virus, such as flu or a cold.
- ✓ I will never skip doses or stop an antibiotic early unless directed by my health care provider.
- ✓ I will wash my hands, cover my cough, and stay home when I feel ill.
- ✓ I will discard any leftover medications appropriately.
- ✓ I will get recommended vaccines.

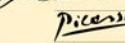
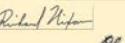


more about antibiotic resistance and stewardship at:  
[www.health.state.mn.us/onehealthabx](http://www.health.state.mn.us/onehealthabx)

### We Can Do It!

All of us at  
YOUR ORGANIZATION  
are committed to appropriate antibiotic prescribing.  
We're doing our part in the fight against antibiotic resistance.




Ask your health care provider about your role  
in responsible antibiotic use.

Learn more about antibiotic resistance and stewardship at:  
[www.health.state.mn.us/onehealthabx](http://www.health.state.mn.us/onehealthabx)



Your logo here

# KEEP CALM AND PRESCRIBE ANTIBIOTICS APPROPRIATELY



I promise to do my part in combatting the development of antibiotic resistance.

✓ Your name, Your title  
Your Organization  
How about you?

Find out how you have a role in antibiotic stewardship:  
[www.health.state.mn.us/onehealthabx](http://www.health.state.mn.us/onehealthabx)



Your logo here

## I made a commitment to responsible antibiotic prescribing!



✓ Your name, Your title  
Your Organization  


Antibiotics are used to treat infections caused by bacteria.

Antibiotics won't help for some common bacterial infections including most cases of bronchitis, many sinus infections, and some ear infections.

When not needed, antibiotics will not help you, and they might cause you harm.

Learn more about antibiotic resistance and stewardship at:  
[www.health.state.mn.us/onehealthabx](http://www.health.state.mn.us/onehealthabx)



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# Factsheets

## Community Pharmacists: Essential Partners in Minnesota Antibiotic Stewardship

### Minnesota Community Pharmacists See a Role in Stewardship

- Over 80% of Minnesota community pharmacists responding to a 2018 Minnesota Department of Health survey believe they play an important role in antibiotic stewardship.<sup>1</sup>
- More than 60% of U.S. health care antibiotic use occurs in the outpatient setting.<sup>2</sup>
- Community pharmacists are some of the most accessible health care professionals and represent the final link in the health care chain before drugs are used in the community.
- Although community pharmacists make up 58% of the pharmacy profession, to date, antibiotic stewardship resources have been largely targeted to hospital pharmacists.<sup>3</sup>

### Antibiotic Resistance

- Antibiotic resistance is one of our most serious health threats.
- CDC estimates that each year in the U.S., 2 million people develop infections from antibiotic-resistant bacteria and 23,000 die from associated causes.
- The major driver of antibiotic resistance is widespread antibiotic use.
- An estimated 30% of outpatient antibiotics are inappropriate.<sup>4</sup>
- Antibiotic stewardship, or the improvement of antibiotic use while effectively treating infections, is essential to combatting resistance.

### Other Consequences of Antibiotic Use

- Antibiotics carry a risk of side effects, including allergies and organ damage.
- Because of increasing resistance, some of the only antibiotics available to treat infections caused by resistant bacteria come with a risk of toxic effects.
- Antibiotics have an effect on healthy gastrointestinal bacteria that can last after patients have finished a prescription. This leaves patients at risk for *Clostridium difficile* disease, a toxin-associated illness caused by the *C. difficile* bacterium which is able to thrive after antibiotic exposure.
- C. difficile* can be acquired in the community and in health care settings.

## Antibiotic Resistance and Stewardship for Minnesota's Dental Professionals

### Room for Improvement in Dental Antibiotic Prescribing

- Dentists prescribe approximately 10% of all antibiotics in U.S. outpatient settings<sup>5</sup>.
- Dentists most commonly prescribe penicillins. This is consistent with dental prescribing guidelines<sup>6</sup>. However, dentists also prescribe a large amount of more broad-spectrum antibiotics, including macrolides (e.g. azithromycin) and quinolones (e.g. ciprofloxacin). Some of these have limited indications in dentistry.
- A 2015 survey conducted in Minnesota revealed dentists prescribe in more situations than recommended practice guidelines<sup>7</sup>.

### Antibiotic Resistance

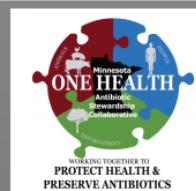
- Antibiotic resistance is one of our most serious health threats.
- CDC estimates that each year in the U.S., 2 million people develop infections from antibiotic-resistant bacteria and 23,000 die from associated causes.
- The major driver of antibiotic resistance is our use.
- An essential part of modern medical care, antibiotic use routinely to prevent and treat bacterial disease. The effectiveness of these important drugs is declining due to resistance to antibiotics.

### Other Consequences of Antibiotic Use

- Antibiotics have an effect on healthy gastrointestinal bacteria that can last after patients have finished the prescription. This leaves patients at risk for *Clostridium difficile* disease, a toxin-associated illness caused by the *C. difficile* bacterium which is able to thrive after antibiotic exposure.
- C. difficile* can be acquired in health care settings and the community.
- Antibiotics also carry a risk of side effects, including organ damage.
- Because of increasing resistance, some of the only antibiotics available to treat infections caused by resistant bacteria come with a risk of toxic effects.

to be smart about antibiotic use and preventing antibiotic resistance!

[www.health.state.mn.us/onehealthabx/](http://www.health.state.mn.us/onehealthabx/)



### Antibiotic Stewardship

Antibiotic stewardship is the process of improving how we use antibiotics. Key

## Antibiotics and the Environment:

### What You Should Know

#### How do antibiotics enter the environment?

- Most antibiotics and other pharmaceuticals enter our natural environment after use for human and animal health purposes.
- When a person or animal is given an antibiotic, not all of the medication is used up inside the body. Some antibiotic, either in original form or slightly changed, is released in urine and/or stool.
- Via toilets, wastewater, and runoff water
  - Unused antibiotics and antibiotic-containing waste, flushed down drains or toilets, can enter the environment.
  - Antibiotics in manure and other waste-based fertilizers enter waterways along with runoff from crop and grazing fields.
  - Antibiotics applied to fruit trees as treatment for bacterial infections can end up in field runoff destined for waterways.

- Via landfills, yards
  - Antibiotic-containing waste from our pets ends up in landfills and in neighborhood sewer runoff.
  - Unused antibiotics thrown in the trash end up in landfills.

- Via industrial discharges
  - Some industrial processes generate antibiotic-containing waste that might enter the environment.

#### How might environmental antibiotics contribute to resistance?

- There is much to learn about the influence of environmental antibiotics on health and the problem of antibiotic resistance.
- This is what we do know:
  - In any setting (natural, hospital, or within our bodies), bacteria in the presence of an antibiotic try to change to survive. These changes can lead to antibiotic resistance.
  - Bacteria can also transfer the ability to resist antibiotic effects by sharing antibiotic-resistance genes with other bacteria in water and soil.
  - Pharmaceutical products can have a negative impact on aquatic species.

## Antibiotic Use and Antibiotic Resistance: Answers for patients

### Why are antibiotics used in health care?

- Antibiotics are used to treat bacterial infections by killing bacteria or by preventing bacteria from multiplying.
- Antibiotics do not work for viral infections, such as the common cold and influenza.
- Unfortunately, it is not uncommon for antibiotics to be prescribed when they aren't needed, especially for respiratory tract infections and urinary tract conditions.
- The Centers for Disease Control and Prevention (CDC) report that up to 50% of antibiotics in hospitals, clinics, and nursing homes are unnecessary or incorrectly prescribed.<sup>1,2</sup>

### What is antibiotic resistance, and how does it happen?

- Bacteria that are not killed or controlled by antibiotics are considered "resistant."
- Antibiotic use, both appropriate and inappropriate, can contribute to antibiotic resistance.
- When antibiotics are used, bacteria develop defenses against them. Bacteria that can withstand antibiotic effects survive, multiply, and can be transferred among people.
- Resistance genes are sometimes shared among bacteria, providing instructions for withstanding antibiotics.

### Why should we care about antibiotic resistance?

- The growing problem of antibiotic resistance means that more infections are difficult, and sometimes impossible, to treat.
- CDC estimates that 2 million people acquire resistant infections yearly in the U.S., and 23,000 die as a result.
- This problem impacts every area of health care, from general practice (e.g., routine outpatient infections) to advanced medical procedures, such as surgery and cancer treatment, in which patients are at high risk for infection.
- In addition to targeting bad bacteria, antibiotics can affect a person's helpful gut bacteria, leaving patients at risk for other serious infections, such as *Clostridium difficile* infection (CDI).



### Glossary of Terms

- Antibiotics are medicines used to treat infections caused by bacteria
- Antibiotic resistance is the ability of bacteria to withstand antibiotic effects
- Antibiotic stewardship is the process of improving antibiotic use
- Common colds and influenza are caused by viruses and cannot be treated with antibiotics.
- Clostridium difficile* infection (CDI) is a gut bacterial infection that can cause symptoms from diarrhea to serious colon inflammation. Severe CDI can be fatal.
- Infection surveillance. Tracking of infections that occurs in health care facilities, state health departments, nationally, and globally.



Minnesota One Health Antibiotic Stewardship Collaborative

Minnesotans from animal, human, and environmental health are working together to be smart about antibiotic use and preventing antibiotic resistance!

[www.health.state.mn.us/onehealthabx/](http://www.health.state.mn.us/onehealthabx/)



# One Health Antibiotic Stewardship Website

One Health Antibiotic Stewardship  
One Health Antibiotic Stewardship Home  
About Us  
News and Events  
Honor Rolls  
State Plan and Data  
Antibiotic Footprint  
Stories  
Resource Library:  
Everyone  
Human Health  
Animal Health  
Environment  
Print Materials  
Contact Us



## WORKING TOGETHER TO PROTECT HEALTH & PRESERVE ANTIBIOTICS

### Minnesota One Health Antibiotic Stewardship Collaborative

A One Health approach recognizes that the health of humans, animals, and the environment is interconnected. Issues like antibiotic stewardship require a collaborative effort across multiple disciplines. By using One Health-oriented communication, Minnesota's public and professionals will have the awareness needed to think innovatively and responsibly about approaches to optimizing antibiotic use within each health field.

#### About One Health Antibiotic Stewardship

Learn what antibiotic resistance is, its effect on humans, animals, and the environment, and why One Health Antibiotic Stewardship is important.

#### News and Events

Information about conferences, presentations, news releases, awards, and contests from Minnesota One Health Antibiotic Stewardship and our partners.

#### Honor Rolls

The Minnesota Antibiotic Stewardship Honor Rolls encourage commitment to antibiotic stewardship across the state.

#### Current State Plan Progress and Data

Review the state plan and track its progress. Find the latest Minnesota antibiograms (antimicrobial susceptibilities of pathogens) and surveillance data.

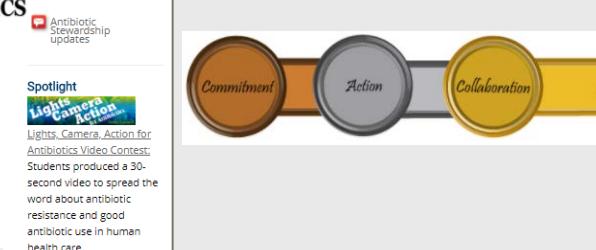
#### Antibiotic Footprint

Our collective use leads to antibiotics in the environment. By understanding our antibiotic footprint, we can identify and support wise antibiotic choices.

#### Stories of Antibiotic Use and Resistance

Read stories of antibiotic use and resistance.

## One Health Minnesota Antibiotic Stewardship Collaborative Five-Year Strategic Plan



## One Health Resource Library: Human Health

Antibiotic stewardship is a national and state health care priority. In 2015, the US government released the National Action Plan for Combating Antibiotic-Resistant Bacteria and in 2016, Minnesota released its One Health Minnesota Antibiotic Stewardship Strategic Plan. Stewardship interventions have been proven to improve individual patient outcomes, reduce the burden of antibiotic resistance, and save health care dollars. We have compiled a library of resources for health care facilities and clinicians to promote the effective implementation of antibiotic stewardship in human health care.

On this page:

[Health care facilities](#)  
[Clinicians](#)  
[Learn more about antibiotic stewardship](#)

### For health care facilities

- ▶ [CDC: Print Materials for Antibiotic Stewardship](#)  
CDC materials you can download and print.
- ▶ [Minnesota Antibiotic Stewardship Commitment Toolkit](#)  
Show your commitment to antibiotic stewardship! We have created templates that you can download and use.

[Inpatient facilities](#)

[Outpatient facilities](#)

[Long-term care facilities](#)

[Dental clinics](#)

Search “MDH One Health”

or

[health.state.mn.us/onehealthabx](http://health.state.mn.us/onehealthabx)



# Additional and Upcoming Resources

## Additional Resources and Tools

- HAI/AR and One Health AS newsletters – sign up online!
- Today's AS conference and similar events
- MDH staff:
  - HAI/AR unit; Infection Control Assessment and Response (ICAR) team
  - 651-201-5414
  - [health.stewardship@state.mn.us](mailto:health.stewardship@state.mn.us)

## Upcoming Resources and Tools

- Pharmacy and dental commitment posters
- Medication disposal documents
- Antibiotic use tracking tool
- How-to guide for making cough and cold care kits
- Outpatient advisory group
  - Interested in joining? Contact me! [emma.leof@state.mn.us](mailto:emma.leof@state.mn.us)

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# Thank you!

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