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Minnesota ONE HEALTH Antibiotic Stewardship Collaborative

ANIMALS PEOPLE ENVIRONMENT

WORKING TOGETHER TO
PROTECT HEALTH &
PRESERVE ANTIBIOTICS

One Health in Action: Minnesota's Collaborative Approach to the AMR Challenge

May 6, 2026 | MDH Antibiotic Stewardship Conference

Kristen Clark, DVM, MPH, DACVPM | MOHASC Director

What We'll Cover

- Antibiotic Resistance as a One Health Issue
- Antibiotic Stewardship and One Health
- Minnesota Antibiotic Stewardship Collaborative (MOHASC)
- Resources

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Antibiotic Resistance as a One Health Issue

The One Health Concept

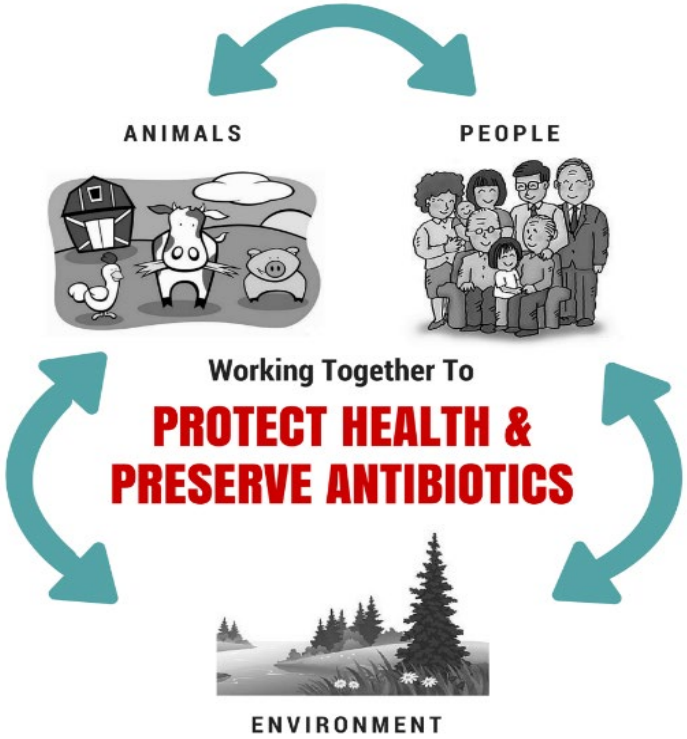
- Recognition that human, animal, and environmental health are interconnected
- Encourages collaboration of multiple disciplines to achieve optimal health for people, animals, and our environment
- Why?
  - 6 out of 10 infectious diseases in humans can be transmitted by animals
  - 3 out of 4 emerging infectious diseases in humans come from animals
  - Food safety for people relies on healthy animals and crops
  - Animals can serve as models of human health and disease
  - We rely on a healthy ecosystem, including water, air, and plants for human health

Word Cloud #1

Name one example of a disease you think is transmitted between animals and humans.

Antibiotic Resistance and Stewardship as One Health Issues

- **All users of antibiotics contribute to resistance**
  - Improvement must occur in all sectors
- **Development of resistance is very complex**
  - Direct linkage of cause and effect is difficult or impossible
- **Exposure to resistant bacteria or genes is not limited only to the sector from which they emerged**
  - Resistant bacteria or resistance genes can persist in varied settings
- **Methods of resistance prevention are similar, regardless of setting**
  - Effective tools and approaches can be shared



Who Uses Antibiotics?

- **Human healthcare**
  - Acute care, critical access hospitals
  - Long-term care facilities
  - Outpatient facilities
  - Ambulatory surgical facilities
  - Dental clinics
- **Veterinary medicine**
  - Companion animal medicine
  - Animal agriculture
  - Aquaculture
  - Honeybee production
- **Plant agriculture**
  - Fruit production
- **Industry**
  - Ethanol
  - Probiotics

Companion Animals

- **Clinically relevant resistance**
- **Bacterial culture and sensitivity often not conducted**
  - Antibiotics not always well-targeted
- **Pets often receive medically important antimicrobials**
  - (e.g., cephalosporins, fluoroquinolones)
- **Potential spread of antimicrobial resistance**
  - Direct and close contact with humans
  - Pet-to-pet transmission

Couples in households with dogs have more similar microbiomes than those living alone because of additional shared microbial sources.

CDC/Dawn Arlotta

Having a dog in the household adds bacterial diversity to adult skin.

Song et al. Cohabiting family members share microbiota with one another and dogs. *eLife* 2013
Image from J. Granick

Animal Agriculture

- **Clinically relevant resistance in veterinary medicine**
  - Antibiotics are important to maintaining animal health and welfare
- **Direct contact transmission of resistant organisms from animals to people**
- **Foodborne infections of humans (e.g., *Campylobacter*, *Salmonella*)**
  - For those at risk of systemic or complicated infections, concerns with resistance are considerable

Environment

- Antibiotic residues found in groundwater, lakes, and streams
  - Macrolides: erythromicin, clarithromycin, virginiamycin, tylosin
  - Fluoroquinolones: ciprofloxacin, moxifloxacin
  - Sulfa drugs: sulfamethoxazole, sulfachloropyridazine
  - Others: carbadox, trimethoprim
- Complex mixtures of antibiotics and metabolites
- Urban, agricultural pathways to contamination
- Consideration of disposal is essential
- Outstanding questions
  - How do antibiotics in environment influence overall resistance?
  - How does antibiotic exposure impact ecology and human health?
  - How can we mitigate impact on environment?

MINNESOTA

Global Picture of Resistance

- Once easily separated ecologically and geographically
- Rapid movement of people, animals, products ensures mixing of genes across world
- Risk factors differ for resistant infections
  - In U.S., healthcare exposure is most likely source of many resistant infections, though landscape is changing
  - In other countries, more serious infections can be obtained from healthcare, community, or animal exposure
- International healthcare exposure is a particular risk for U.S. travelers to acquire colonization or infection with resistant bacteria

Open Forum Infect Dis. 2019 Oct; 6(Suppl 2): S852. PMCID: PMC6810010
Published online 2019 Oct 23. doi: 10.1093/ofid/ofz360.2140

2462. Public Health Response to Contain the First Outbreak of New Delhi Metallo-β-Lactamase-Producing *Klebsiella pneumoniae* in Minnesota

Brittany VonBank, MPH,[1] Sean O'Malley, MPH,[1] Paula Snippes Vagnone, MT(ASCP),[2] Mary Ellen Bennett, RN, MPH,[1] Tammy Hale, MSN, RN, CIC,[1] Jacy Walters, PhD,[1] and Ruth Lynfield, MD[1]

Morbidity and Mortality Weekly Report (*MMWR*)

Notes from the Field: Verona Integron-Encoded Metallo-β-Lactamase–Producing Carbapenem-Resistant *Pseudomonas aeruginosa* Infections in U.S. Residents Associated with Invasive Medical Procedures in Mexico, 2015–2018

Weekly / May 24, 2019 / 68(20):463–464

Ian Kracalik, PhD[1,2]; Cal Ham, MD[1]; Amanda R. Smith, PhD[3]; Maureen Vowles, MPH[3]; Kelly Kauber, MPH[4]; Melba Zambrano, MSN[5]; Gretchen Rodriguez, MPH[5]; Kelley Garner, MPH[6]; Kaitlyn Chorbi, MPH[7]; P. Maureen Cassidy, MPH[8]; Shannon McBee, MPH[9]; Rhett Stoney, MPH[10]; Allison C. Brown, PhD[1]; Kathleen Moser, MD[10]; Margarita E. Villarino, MD[10]; Maroya Spalding Walters, PhD[1] (VIEW AUTHOR AFFILIATIONS)

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Antibiotic Stewardship and One Health

Common Wants and Fears Around Stewardship and Resistance

WANTS

- Collaboration, common goals, recognize alignment & differences
- Decisions made on unbiased data, not politics or public perception
- Community understanding and informed participation
- Minimize environmental contamination for safe food and water supply

FEARS

- Ineffective antibiotics, untreatable infections, death, adverse effects
- Reactionary decisions without sound science, incorrect assumptions
- Overregulation replacing careful medical assessment
- Negative impact on environment and ecosystem

Challenges to Stewardship in All Fields

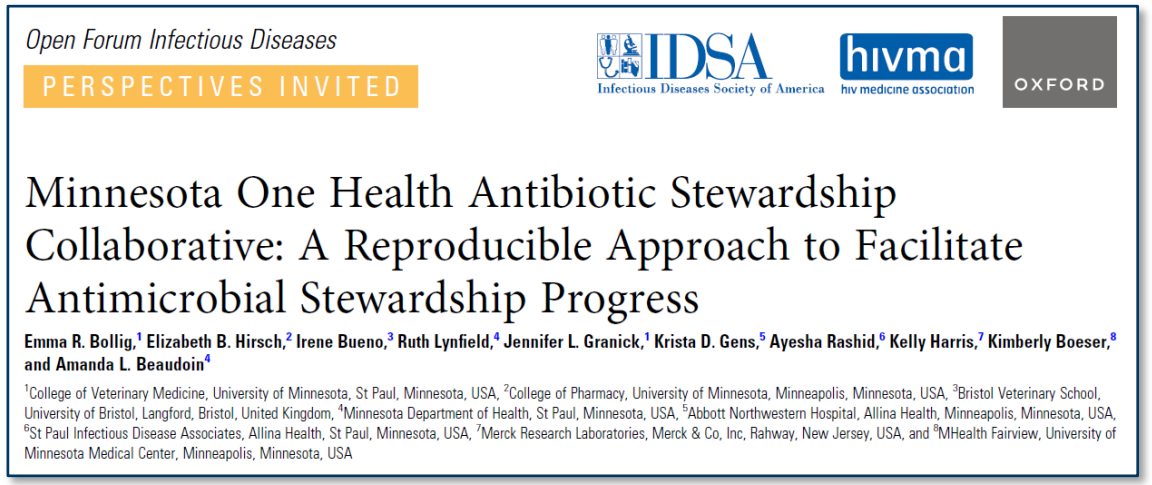
- **Competing priorities**
  - How to consider the good of the whole rather than individual patients, animals?
- **Definition of "optimal", "judicious", "appropriate"**
  - How do we define this in an evidence-based way?
  - What are the "low-hanging fruit" for stewardship in each field?
- **Lack of data**
  - How can we set goals and identify progress without data?
  - How can we share data comfortably?
- **Association does not equal causation**
  - How can we design meaningful research?
- **Communication**
  - Across fields
  - With public and policy makers

Minnesota ONE HEALTH Antibiotic Stewardship Collaborative

WORKING TOGETHER TO PROTECT HEALTH & PRESERVE ANTIBIOTICS

What Does a One Health Approach to AMR & Stewardship Actually Look Like?

- Centered around building trust and relationships
- All sectors come to the table with a shared understanding and collaborative communication approach
- A learner mindset is key to success
- It takes time!



Open Forum Infectious Diseases

PERSPECTIVES INVITED

IDSA Infectious Diseases Society of America | hivma hiv medicine association | OXFORD

Minnesota One Health Antibiotic Stewardship Collaborative: A Reproducible Approach to Facilitate Antimicrobial Stewardship Progress

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Minnesota One Health Antibiotic Stewardship Collaborative: A Reproducible Approach to Facilitate Antimicrobial Stewardship Progress (https://pmc.ncbi.nlm.nih.gov/articles/PMC9757673/)

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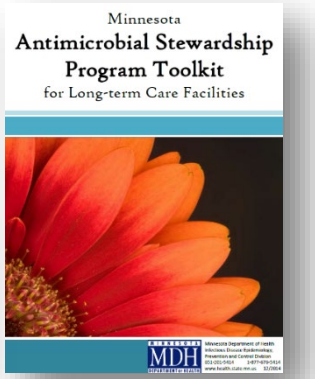
Minnesota One Health Antibiotic Stewardship Collaborative (MOHASC)

History of Stewardship in Minnesota

- Healthcare
  - Minnesota Antibiotic Resistance Collaborative (early 2000s)
  - Antibiotic stewardship conferences held (2012-14)
  - Minnesota guidance and toolkits
- Animal health
  - Quality assurance programs
  - Producer and veterinary education programs
    - Residue prevention and legal obligations
    - Veterinary accreditation modules
  - Antibiotic use guidelines developed by veterinary groups
  - Participation in AVMA stewardship committee



Challenges to Stewardship in MN

- Connecting facilities with tools, implementation support
- Poor understanding across human, animal, environmental health

Collaborative One Health approach

One Health Planning Process

FALL 2015

- Steering committee gathered
- Prepare for Antibiotic Summit

JANUARY 19, 2016

- **Minnesota Antibiotic Summit**
- Reach consensus on strategic plan framework

WINTER/SPRING 2016

- Disseminate Summit outcomes
- Form technical workgroups
- Refine strategic plan, assess resources

SUMMER/FALL 2016

- Launch 5-year strategic plan
- Identify resources
- Implement: 4 technical work groups

MN One Health Antibiotic Stewardship Collaborative

- **State agency representatives**
  - MN Department of Health
  - MN Department of Agriculture
  - MN Pollution Control Agency
  - Boards of Animal Health, Vet Med, Pharmacy, Dentistry

- **Stakeholders from all fields**
  - University researchers
  - Human and animal health professional and industry associations
  - Clinical professionals from healthcare systems, including inpatient, outpatient, long-term care
  - Veterinary professionals from large and small animal clinical practice
  - Human and animal pharmaceutical companies

Communicating Collaboratively

MOHASC Vision

Minnesota leaders in human, animal, and environment health will work together to raise awareness and change behaviors to preserve antibiotics and treat infections effectively.

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PRESERVE ANTIBIOTICS

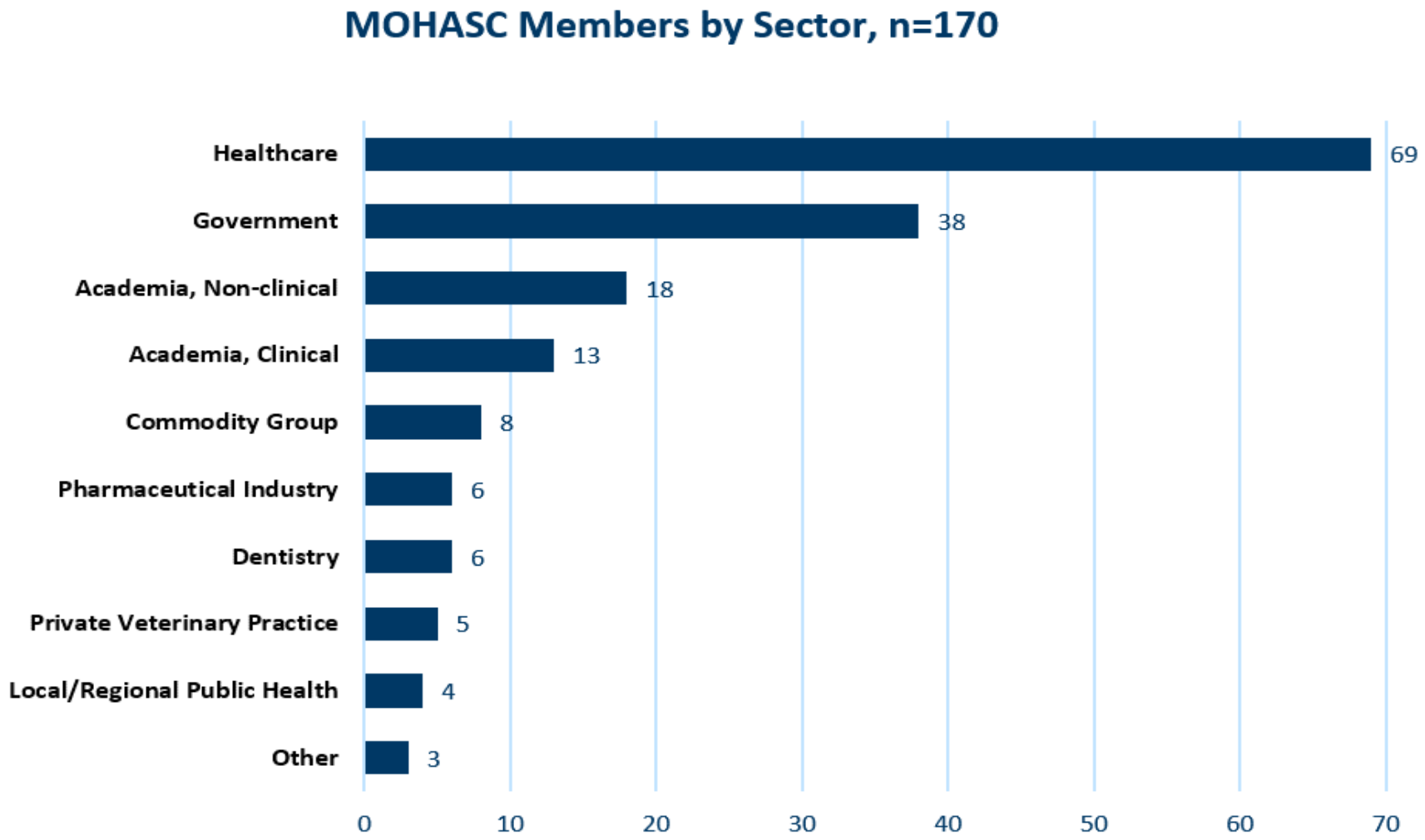
Communication Approach:

- Human, animal, and environmental health are inseparable.
- All antibiotic use can lead to resistance.
- There is some contribution to resistance from every sector using antibiotics
- Lack of “proof” of harm is not an argument for irresponsible use.
- Greater abuse in other disciplines is not an argument for injudicious use in yours.
- There are unreasonable critics.
- Behavior change is key.

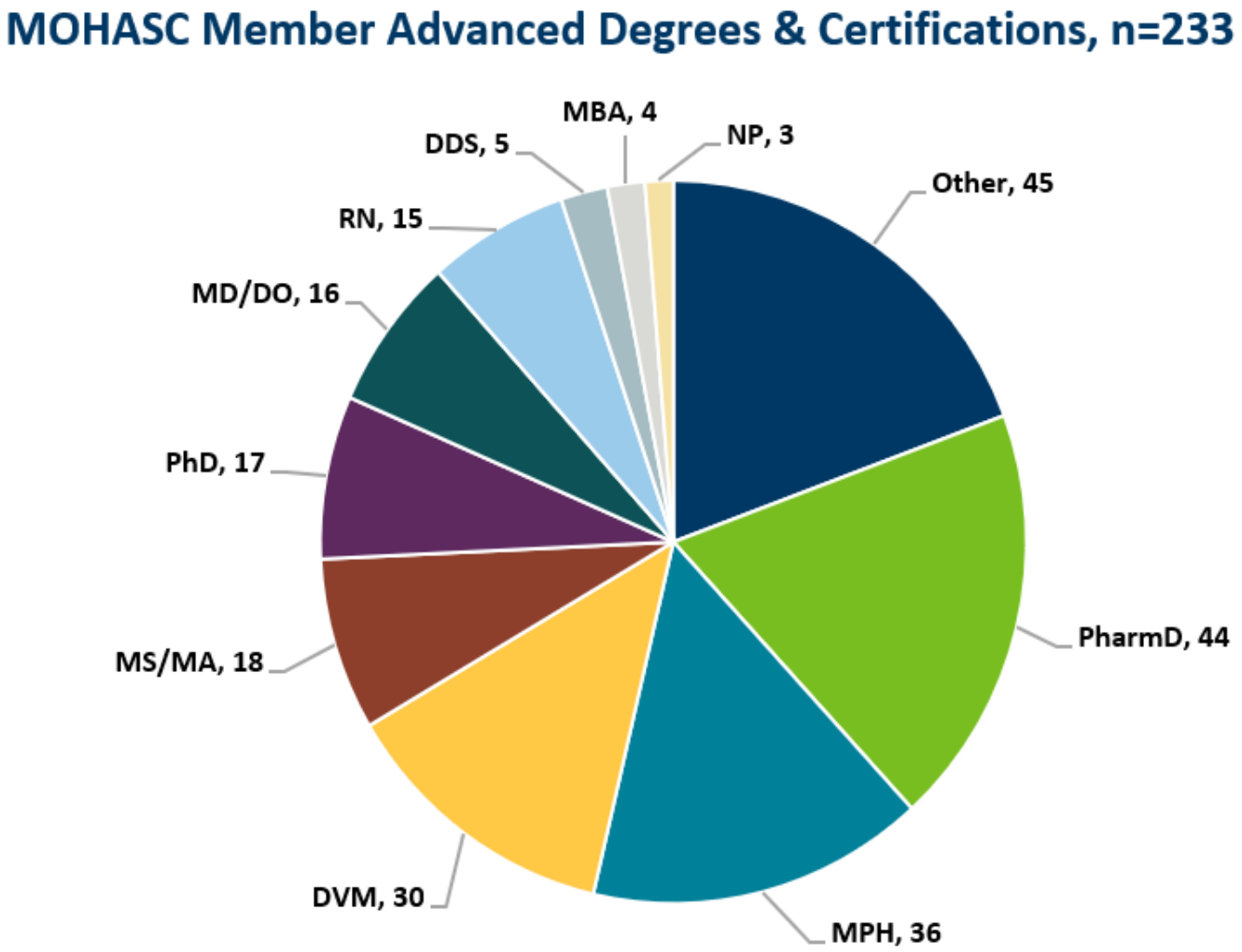
MOHASC By the Numbers

- Growing membership with significant increases seen in the fields of dentistry and infectious disease pharmacists
- Currently ~170 members from >60 organizations
- One Health e-newsletter relaunched with >5,800 subscribers
- MOHASC and MDH Antimicrobial Stewardship websites and resources continually updated with over 42,000 pageviews annually
- Social media messaging on One Health, AMR, and AS reached over 71,000 people during One Health Day and USAAW

MOHASC Members



MOHASC Member Advanced Degrees & Certifications



Sharing Stewardship Approaches Across Facilities, Settings, Disciplines

- **Antibiotic Stewardship Honor Roll Program**
  - Three levels provide incentive to improve stewardship over time
  - Acute Care, Critical Access, and Long-term Care Facilities
  - Renewable every two years
- **Antibiotic use measurement with point prevalence**
  - Healthcare antibiotic use and stewardship annual report
  - Point prevalence surveys ongoing at veterinary hospitals
- **Commitment materials and clinical resources shared among care settings**
  - Posters associated with improved prescribing behavior
  - Tools help facilities to implement antibiotic stewardship core elements/principles specific to their setting

MOHASC Member Events

Metro Wastewater Treatment Plant Tour

Honey Bee Medicine Webinar

Zollman Zoo One Health Exchange

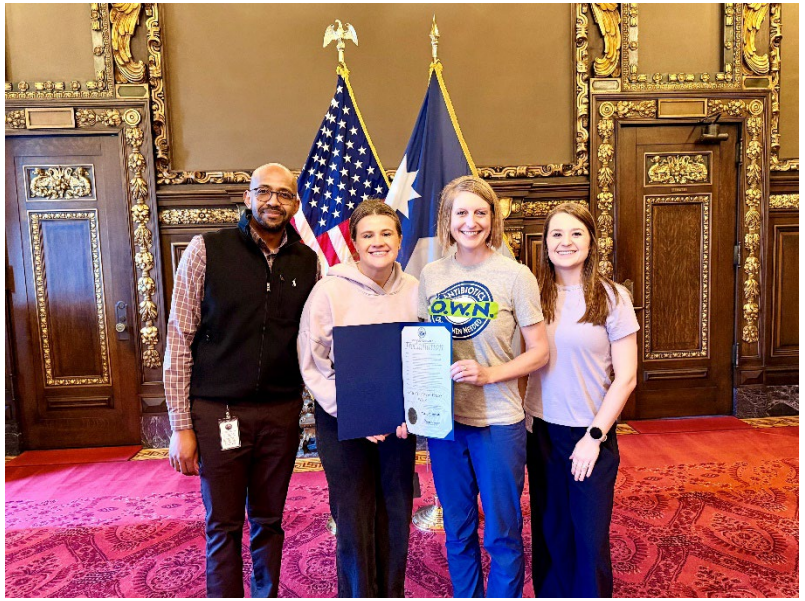
Library Display Program

- Relaunched October 2024
- ~30 MN libraries already participating
- Promotes stewardship to diverse audiences through a low-cost method
- Expanded reach, particularly rural areas and greater MN

Minnesota State Fair Booth

- Interacted with >7,000 attendees!
- >350 stewardship pledges made

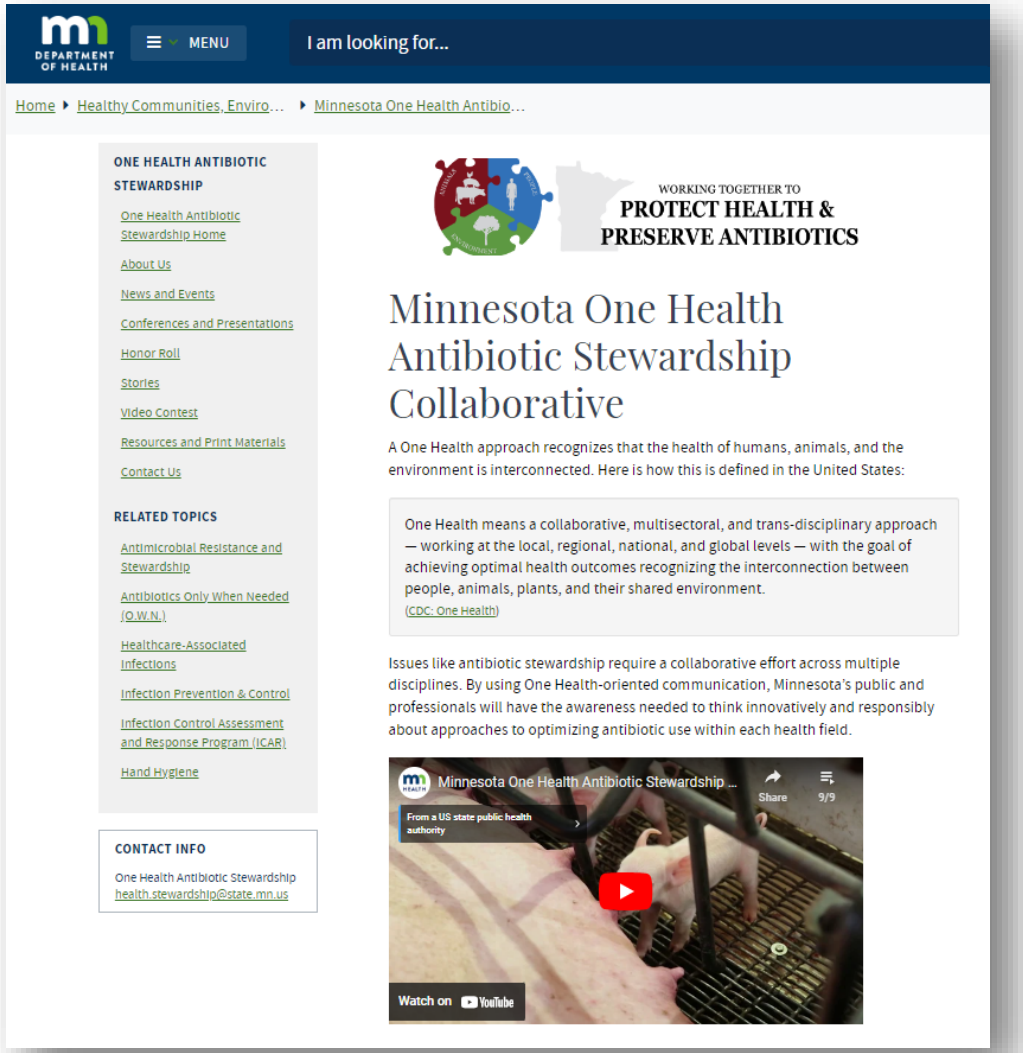
U.S. Antibiotic Awareness Week

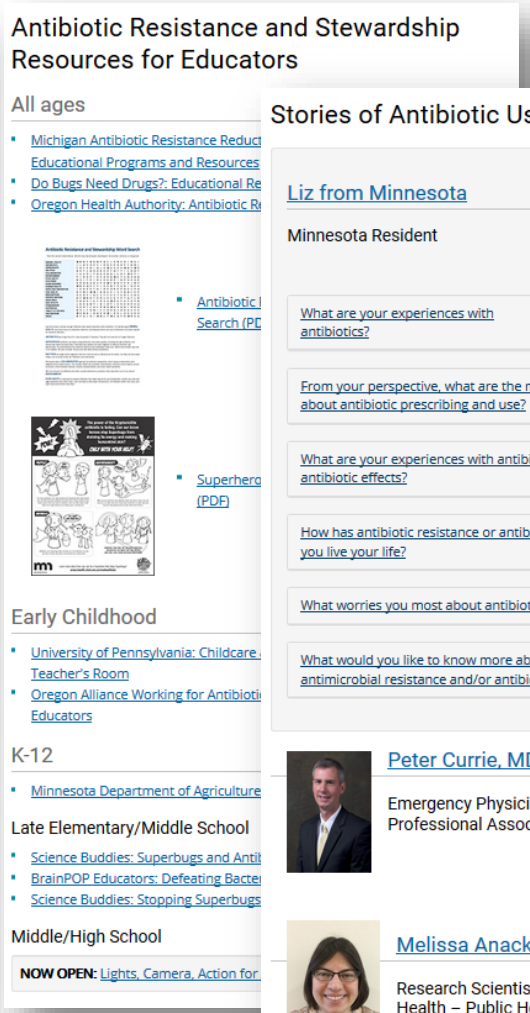


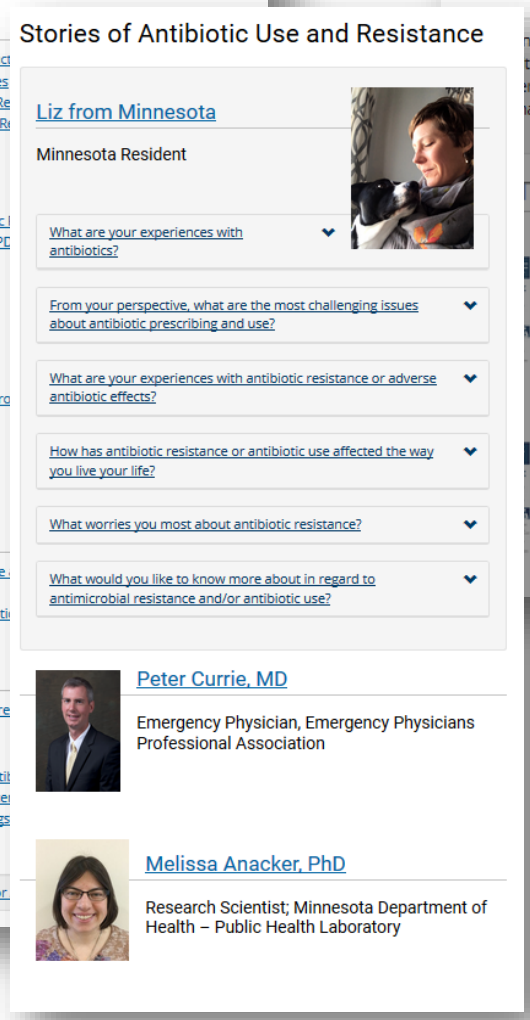
2023–2027 Strategic Approach

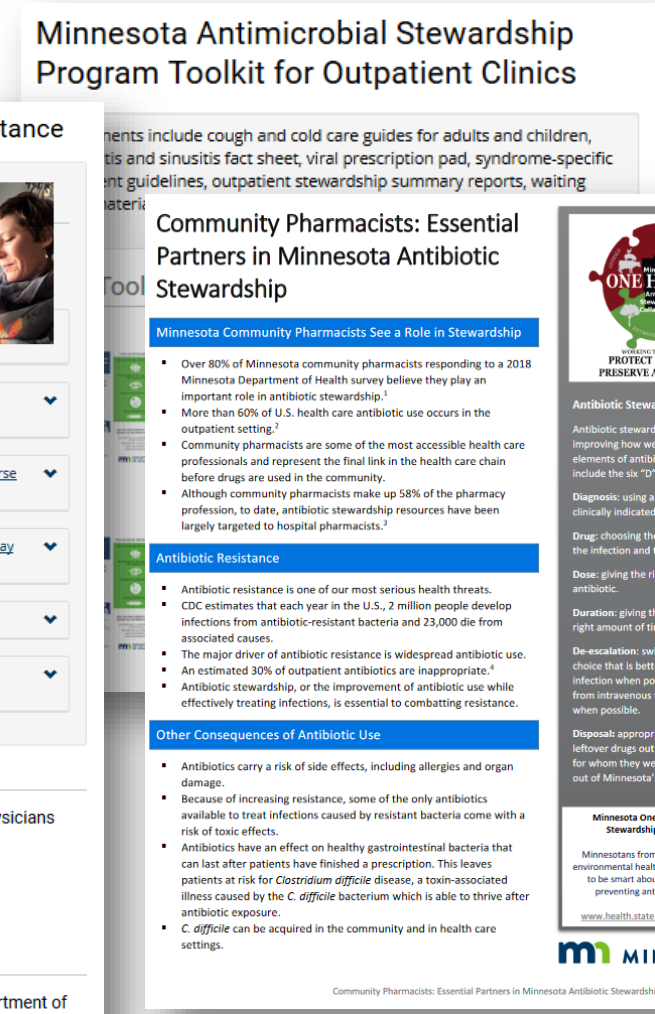
- Summary of Goals:
  - Promote understanding of One Health antibiotic stewardship across disciplines
  - Improve human antibiotic stewardship efforts
  - Improve animal antibiotic stewardship efforts
  - Explore the role of the natural environment in antimicrobial resistance
- Current Priorities:
  - Meaningfully engage with practitioners in human, animal, environmental health
  - Continue to expand reach to Greater Minnesota
  - Translate resources into multiple languages
  - Update MOHASC website

MOHASC Website
https://www.health.state.mn.us/onehealthabx









Only When Needed: O.W.N.

- Public awareness theme for use by partners
- Graphic elements available on MDH website

[Antibiotics Only When Needed (O.W.N.) (https://www.health.state.mn.us/diseases/antibioticresistance/own/index.html)]

Antibiotic Use and Stewardship in Minnesota Report

Antibiotic Use and Stewardship in Minnesota

2025 UPDATE ON PROGRESS AND OPPORTUNITIES

[Antibiotic Use and Stewardship in Minnesota 2025 Update on Progress and Opportunities (www.health.state.mn.us/diseases/antibioticresistance/auas25.pdf)]

Interested in joining MOHASC?

- MOHASC's mission is to provide a collaborative environment to **promote judicious antibiotic use and stewardship and to reduce the impact of antibiotic-resistant pathogens** of human, animal, and environmental health importance.
- MOHASC is made up of four working groups: Animal, Healthcare, Environment, and One Health Engagement
- Benefits of Joining
  - No membership fees
  - Expand your network
  - Participate in quarterly work group meetings
  - Attend annual in-person meeting and professional exchanges
  - Share your work and/or research!
- Scan the QR code with a smartphone camera or visit **bit.ly/joinmohasc** to fill out the MOHASC Partner Information Form!

Word Cloud #2

What word or short phrase would you use to describe how your work contributes to antimicrobial stewardship from a One Health perspective?

Thank you!

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