Antibiotic Stewardship and One Health:
Acting together to keep antibiotics working in Minnesota

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National Institute of Animal Agriculture Antibiotics Symposium

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The Problem of Antibiotic Resistance

The superbug that doctors have been dreading just reached the U.S.

Are there too many antibiotics in your fast food meat?

Gonorrhea is becoming untreatable, U.N. Health Officials Warn

1 in 3 antibiotic prescriptions given needlessly, CDC says
Fighting Resistance

According to Centers for Disease Control and Prevention, *four core actions* can help fight resistance.

1. Prevent infections
2. Track infections
3. Improve prescribing (stewardship)
4. Develop new drugs and diagnostics

http://www.cdc.gov/drugresistance/about.html
Stewardship in Minnesota Healthcare

- Minnesota Antibiotic Resistance Collaborative (early 2000s)
  - Guidance and activities for outpatient and long-term care
- Antibiotic stewardship conferences held (2012-14)
  - State hospital association and quality improvement organizations
- Minnesota guidance and tools
  - Acute care stewardship toolkit (2012)
  - Long-term care stewardship toolkit (2014)
- Challenges:
  - Connecting facilities with tools, implementation support
  - Poor understanding across human, animal, environmental health
Animal Health Stewardship

- Quality assurance programs
- Producer and veterinary education programs
  - Residue prevention and legal obligations
  - Veterinary accreditation modules
- Antibiotic use guidelines developed by veterinary groups
  - Species-specific
- American Veterinary Medical Association stewardship committee
What About the Environment?

• Antibiotic residues found in groundwater, lakes, and streams
  • Macrolides: erythromycin, clarithromycin, virginiamycin, tylosin
  • Fluoroquinolones: ciprofloxacin, moxifloxacin
  • Sulfamethoxazole, sulfa drugs: 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?
One Health and Antibiotic Resistance

- Recognition that human, animal, and environmental health are interconnected
- Goal is to work collaboratively, across sectors, to improve the health of all
One Health Planning Process

Fall 2015
- Steering committee prepares summit materials
- Prepare participants with homework

January 19, 2016
- SUMMIT
- Develop consensus on strategic plan framework

Winter/Spring 2016
- Disseminate summit outcomes
- Form technical workgroup
- Refine strategic plan and assess resources

Summer/Fall 2016
- Launch strategic plan
- Actively seek out resources
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State Antibiotic Stewardship Summit

• Meeting objectives

  • Understand antibiotic use, antibiotic stewardship, and antibiotic resistance from the human, animal, and environmental perspectives

  • Share best practices and lessons learned

  • Develop strategic priorities to inform a five-year antibiotic stewardship strategic plan in Minnesota
Stewardship Summit Participants

• State agency representatives
  • MN Department of Health
  • MN Department of Agriculture
  • MN Pollution Control Agency
  • Board of Animal Health

• Stakeholders from all fields
  • University academics
  • Human and animal health professional associations and boards
  • Human healthcare systems/organizations including inpatient, outpatient, and long-term care: Professionals from medicine, pharmacy, nursing, infection prevention and control
  • Agriculture associations and cooperatives
  • Human and animal pharmaceuticals
Communicating the Problem

- Human, animal, and environmental health are inseparable
- All antibiotic use leads to resistance
  - There is some contribution 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!
  - Exaggerate harms
  - Fail to acknowledge real benefits
- Behavior change is key

Antibiotics are a shared resource, and optimizing use benefits everyone.
Antibiotic Stewardship

- Process of improving antibiotic use
- Recognizes importance of antibiotics
  - Essential to all aspects of health
  - Shared resource
- Focused on optimizing use, not withholding antibiotics
- Goal is to optimize:
  - **Selection.** Choosing the right antibiotic for the infection and patient
  - **Dose.** Giving the right amount of antibiotic
  - **Duration.** Giving the antibiotic for the right amount of time
### The Stewardship Balancing Act

**Unintended consequences**
- Toxicity, adverse drug effects
- Risk of developing severe infection, e.g., *C. difficile*
- Emergence of resistance
- Cost

**Unintended consequences**
- Untreated, more severe infection
- Disease spread in population
- Diagnostic uncertainty
- Negative patient/client relationships
- Potential litigation
Stewardship Summit Agenda

• Welcome
  • State agency commissioners
  • U.S. Senator Al Franken
  • Representative Collin Peterson (House Committee on Agriculture)

• Overview of perspectives from animal, human, environmental health
  • Followed by Q & A

• Technical talks from scientists
  • Followed by Q & A

• Identifying common goals- fears and wants

• Breakout sessions- how to achieve what we want and avoid what we fear
  • Identify priority activities, outcomes, resources, barriers

• Wrap-up, next steps, adjournment
## Summit Discussions

<table>
<thead>
<tr>
<th>WANTS</th>
<th>FEARS</th>
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<tr>
<td>Collaboration, common goals, recognize alignment &amp; differences</td>
<td>Ineffective antibiotics, untreatable infections, death, adverse effects</td>
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<tr>
<td>Decisions made on unbiased data, not politics or public perceptions</td>
<td>Reactionary decisions without sound science, incorrect assumptions</td>
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<tr>
<td>Minimize environmental contamination for safe food and water supply</td>
<td>Overregulation replaces careful medical assessment</td>
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<tr>
<td>No concerns about resistance, infections, adverse effects</td>
<td>Negative impact on environment and ecosystem</td>
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<td>Community understanding and informed participation</td>
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Summit Lessons Learned

• Significant preparation prior to meeting
  • Steering committee enabled ownership by multiple partners
  • Collaborative design of agenda, language used, invitees
  • Pre-summit homework engaged participants and prepared facilitators

• Range of meeting techniques
  • Mixed table assignments
  • “Our Perspective” presentations
  • TED-like scientific talks
  • Regular report-outs while typing on screen to affirm with large group
  • Dynamic expert facilitator
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One Health Stewardship 5-Year Strategic Plan

Mission
• Provide a collaborative environment to:
  • Promote judicious antibiotic use
  • Reduce impact of antibiotic-resistant pathogens of human, animal, and environmental health importance

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
Strategic Plan: Four Goals

• Promote understanding of one health antibiotic stewardship across disciplines

• Improve human antibiotic stewardship

• Improve animal antibiotic stewardship

• Develop an antibiotic footprint tool and improve understanding of environmental impact on resistance
Goal 1: Promote understanding of one health antibiotic stewardship across disciplines...

One Health Activities

• Create online source for targeted resources and current data
• Develop one health antibiotic stewardship communications plan
• Hold in-person exchanges among human, animal, environmental practitioners
• Support public engagement on one health antibiotic stewardship
• Support one health antibiotic stewardship curriculum
Goal 2: Improve human antibiotic stewardship efforts...

*Human Stewardship Activities*

• Make stewardship and antibiotic-use tracking tools available across continuum of care
• Identify healthcare facility needs for tracking data, benchmarking, and antibiotic-use policies
• Develop state human health antibiotic goals specific to syndromes and settings
• Utilize honor roll recognition system for healthcare facilities
Goal 3: Improve animal antibiotic stewardship efforts...

**Animal Stewardship Activities**

- Support veterinary feed directive and capacity building for feed distributors
- Participate in and communicate progress on national antibiotic-use data collection for livestock
- Promote producer quality certification program best practices
- Facilitate public engagement on animal antibiotic stewardship
- Increase capacity of veterinary diagnostic laboratory
- Improve access to stewardship resources for companion animal and equine veterinarians
Goal 4: Develop an “antibiotic footprint” tool and improve understanding of environmental considerations...

**Environmental Stewardship Activities**

- Develop an antibiotic footprint
  - Understand use across disciplines
  - Risk map for antibiotics in environment
- Target antibiotic disposal needs and improve adherence to disposal guidelines
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Minnesota officials create program to combat inappropriate antibiotic use

Minnesota Health Commissioner Dr. Ed Ehlinger announces Friday, July 1, 2016, that four state agencies are working together on the problem of overuse of antibiotics. (Forum News Service photo by Don Davis)
One Health Antibiotic Stewardship Website
http://www.health.state.mn.us/onehealthabx

Minnesota One Health Antibiotic Stewardship Collaborative

WORKING TOGETHER TO
PROTECT HEALTH &
PREVERSE ANTIBIOTICS

What is One Health Antibiotic Stewardship?
Antibiotics are powerful tools for fighting and preventing infections. However, widespread use of antibiotics has resulted in an alarming increase in antibiotic-resistant infections. Antibiotic stewardship consists of coordinated interventions that promote judicious antibiotic use and reduce the impact of antibiotic resistant pathogens. A One Health approach recognizes that human, agricultural and companion animal, and environmental health are interconnected, and issues such as antibiotic stewardship require a collaborative effort across multiple disciplines. We believe that a One Health approach will create an informed public and professionals that can communicate, and practice a more holistic approach to antibiotic stewardship.

Workgroup member affiliations
Abbott Northwestern Hospital
Allina Health
Blue Cross Blue Shield
Children's Hospital
Emergency Physicians Professors Association - Minnesota HealthEast
HealthPartners
Hennepin County Medical Center
Land O'Lakes
Leading Age Minnesota
M Health
Mayo Clinic
Merck Research Labs
Metropolitan Council
Minnesota Association of Phy Assistants
Minnesota Beef Council
Minnesota Board of Animal Health
Minnesota Board of Medical Practice
Minnesota Board of Veterinary Medicine Department of Agribusiness
Minnesota Department of Health
Minnesota Dairy Bureau
Minnesota Farmers Union
Minnesota Medical Association
Minnesota Milk Producers Association
Minnesota Department of Environmental Science

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.

Current State Plan Progress and Data
Review the state plan and track its progress. Find the latest Minnesota antibigrams (antimicrobial susceptibilities of pathogens) and surveillance data.

Footprint Model
An antibiotic footprint is a tool to communicate magnitude of antibiotic usage to environmental loading of antibiotics via the antibiotic lifecycle.

News and Events
Upcoming meetings, and recognized individuals or facilities from stewardship honor roll.

Resource Library
Mobile
Human Healthcare
Animal Healthcare
Environmental Science

Stay Informed:
• Subscribe to Minnesota One Health Antibiotic Stewardship Collaborative Updates
• Contact Us
One Health Resource Library: for Animal Healthcare and Agriculture

Antibiotic stewardship is important to animal health and the safety of food produced. Although antibiotics remain a necessary tool to manage infectious disease in animals and livestock, using antibiotics responsibly is essential to reducing antibiotic resistant bacteria and protecting the health and well-being of animals and humans. Use of best animal management practices such as vaccine use, parasite control, stress reduction, environmental management, and proper nutritional management can also reduce the need for antibiotics. To promote the effective implementation of antibiotic stewardship, we have compiled a library of resources for veterinarians, producers, and others in animal health care and agriculture according to: companion animals, equine, beef or dairy, poultry and pork.

All animals

- OIE: Fighting Antibiotic Resistance (PNG)
- Antimicrobial Resistance Learning Site for Veterinarians

Companion animal

- AVMA: Antimicrobial Use in Companion Animal Practice
- AVMA: Antimicrobial Use Guidelines for Companion Animal Practice
- AAFP-AAHA: Basic Guidelines of Judicious Therapeutic Use of Antimicrobials in Cats and Dogs
- Overview presentation: Antibiotic Stewardship for Companion Animal Practice (PDF)

Equine

- AAFP: Prudent Drug Usage Guidelines of Antimicrobials in Equine

Beef/Dairy

- BOA certification program:
  - BOA: Antibiotic Stewardship for Beef Producers (PDF)
  - BOA: Beef Quality Assurance National Manual (PDF)
  - BOA: Feedyard Assessment (PDF)
  - BOA: Guidelines for Responsible Antibiotic Use (PDF)
  - BOA: Standard Operating Procedures
  - Farmers Assuring Responsible Management (FARM) Program for Dairy Farmers: FARM Milk and Dairy Beef Drug Residue Prevention Manual (PDF)
  - AAFP/AVMA: Judicious Use of Antimicrobials in Cattle
  - MDA: MDA's Role in Preventing Antibiotic Resistance

Poultry
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?
  • 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
Next Steps

• Identify and describe data sources in all fields
  • Gaps, new collection methods, goal setting
  • Use, disposal, dispersal of antibiotic-containing waste

• Support health sectors through federal rule changes

• Develop honor roll recognition system

• Engage public on one health, antibiotic use, resistance topics
  • “Myth buster” messaging
  • Producer, veterinarian, physician, patient stories
  • In-person exchanges

• Refine methodology for antibiotic footprint

• Collaborative lab-based research by public health and veterinary laboratories
  • Whole genome sequencing, other advanced techniques

• Edit strategic plan as needed to reflect new data, regulatory environment
Thank you!

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Ayesha Rashid, Saint Paul ID Physicians
Beth Thompson, Board of Animal Health
Sarah Vetter, MDH Public Health Laboratory
Core Elements of Hospital Stewardship

- **Leadership Commitment**: Dedicating resources
- **Accountability**: Single leader
- **Drug Expertise**: Single pharmacist leader
- **Action**: Implementing at least one recommended action
  - Systematic evaluation of ongoing treatment need after 48hr (“antibiotic time out”)
  - Pharmacy-driven interventions (e.g., authorization, automatic dose adjustment)
  - Infection-specific interventions (e.g., community-acquired pneumonia, UTI)
- **Tracking**: Monitoring antibiotic prescribing and resistance patterns
- **Reporting**: Regular reporting on antibiotic use and resistance
  - For doctors, nurses, relevant staff
- **Education**: Informing clinicians about resistance, optimal prescribing