

Minnesota One Health Antibiotic Stewardship Strategic Plan

2023–2027



WORKING TOGETHER TO
**PROTECT HEALTH &
PRESERVE ANTIBIOTICS**

Minnesota One Health Antibiotic Stewardship Strategic Plan, 2023–2027

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Executive summary

The mission of the Minnesota One Health Antibiotic Stewardship Collaborative (MOHASC) is to provide a collaborative environment to promote judicious antibiotic use and antibiotic stewardship and to reduce the impact of antibiotic-resistant pathogens of human, animal, and environmental health importance. MOHASC, supported by several state agencies, was formed in 2016 and has completed one five-year strategic plan period.¹

During 2023–2027, MOHASC will continue to provide a platform for networking, information and experience sharing, and education. Members will meet in person and virtually and will conduct activities to meet the following four broad goals of this strategic plan.

- 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

Activities suggested in this strategic plan focus on public education and experience-sharing across practitioners in human, animal, and environmental health; ensuring that antibiotic stewardship information and MOHASC opportunities are available to everyone across Minnesota; application of antibiotic use data to inform health care goals; recognition of hospital and nursing home antibiotic stewardship programs; support for antibiotic use tracking and antibiotic stewardship implementation in clinical veterinary settings; support for research to understand resistance in the natural environment; and promotion of appropriate pharmaceutical disposal. Over the course of the implementation period, strategic activities might be changed, added, or not pursued, depending on the needs of Minnesota’s health sectors.

A review of [MOHASC strengths, weaknesses, opportunities, and threats](#) was used to inform high-level strategies for action during 2023–2027. [Monitoring and evaluation indicators](#) and processes will include tracking operational logistics and public education efforts. A summary of monitoring indicators and conducted activities will be compiled annually and posted on the MOHASC website.¹

Background

Antimicrobial resistance and antimicrobial use

Antimicrobials are a type of medicine that kills or stops the growth of germs like bacteria, fungi, and viruses. Antimicrobial resistance (AR) is the ability of germs to resist the effects of these medications. Resistance to antibiotics – the drugs used to treat infections caused by bacteria – is a local, national, and global public health problem. Since their first use in the 1930s, antibiotics have saved millions of lives and have played a critical role in the advancement of medical practice. When bacteria are exposed to an antibiotic, genetic changes occur that allow the bacteria to adapt and survive in the face of that stress. For all beings, people and bacteria included, adaptation is critical to survival. Clinically relevant resistance to these important drugs emerged as early as the 1950s. In the decades following antibiotic discovery, robust development of new antibiotic classes and drugs facilitated treatment, even while some antibiotics were losing effectiveness.

We now find ourselves in a situation where resistant infections could compromise modern medicine. The natural process of resistance has continued to allow bacteria to adapt to many of the medications we have readily available. Not only is AR emerging at a more rapid pace, but we are faced with a decline in the development of new antibiotic drugs. In a 2019 report, the Centers for Disease Control and Prevention (CDC) outlined urgent, serious, and concerning resistance threats.² In that report, they estimated that nearly three million people in the U.S. have a resistant infection each year and 35,000 die as a result. Medical scenarios that are complicated by the problem of AR include sepsis, chronic conditions like diabetes, surgery, organ transplants, and cancer therapy.

Because exposure to antibiotics drives the development of resistance among bacteria, improving how antibiotics are used is a critical component of the fight against resistance. Many antibiotics are unnecessary, and even more are selected or prescribed inappropriately. Antibiotic stewardship (AS) is the process of improving how antibiotics are used while ensuring that infections are effectively treated. Better targeting antibiotic use (AU) in situations where they will be effective can help ensure that antibiotics will continue to work for the long term. Antibiotics are used in sectors other than human health care, including companion animal and food animal veterinary medicine, and antibiotics and resistant bacteria end up in the natural environment through wastewater and runoff. Professionals from all these sectors must be engaged to make a meaningful impact on AR. The concept of One Health (OH), the understanding that the health of humans, animals, and the environment is connected, is therefore central to this work.

Minnesota Antibiotic Stewardship Collaborative

To address the need for action based OH AS, in 2016 Minnesota professionals in public health, human and veterinary medicine, agriculture, and environmental protection formed the Minnesota One Health Antibiotic Stewardship Collaborative (MOHASC).³ Outlined in a five-year strategic plan, the mission of MOHASC is to provide a collaborative environment to promote judicious AU and AS and to reduce the impact of antibiotic-resistant pathogens of human, animal, and environmental health importance.³

MOHASC goals include improving AS programs in health care and veterinary medicine, advancing understanding of environmental impacts of AU, and promoting a OH approach to AS. These goals have been accomplished through quarterly meetings of four goal-aligned work groups, professional AS field exchanges, collaborative research, an annual member meeting, and public education events.⁴⁻¹¹ Information about MOHASC accomplishments can be found on the strategic plan webpage.¹

MOHASC strengths, weaknesses, opportunities, and threats

The following table outlines some of the strengths, weaknesses, opportunities, and threats identified during 2016–2022 that have informed this 2023–2027 strategic plan. MOHASC leadership and members should be particularly aware of threats that could impact MOHASC continuity and function and consider mitigation through strategies outlined in the table.

Strengths

1. Partner expertise
2. Multidisciplinary membership
3. Member networks outside MOHASC

Opportunities

1. AU and AS data are increasingly available
2. Expectations for AS in all sectors is growing
3. Interest in the MOHASC approach growing from other states and federal agencies

Weaknesses

1. Broad OH scope of work strains capacity
2. Initiatives might not reach those not already highly engaged

Threats

1. Competing partner priorities
2. Lack of dedicated leadership funding
3. Lack of funding for activities, outreach

	Strengths (S)	Weaknesses (W)
Opportunities (O)	<p>O-S Strategies</p> <ul style="list-style-type: none"> ▪ Collaborative data review to assess baseline, set goals, measure progress ▪ Highlight AS in sectors less commonly considered through AS field exchanges or virtual engagement ▪ Share experiences through networks, publications 	<p>O-W Strategies</p> <ul style="list-style-type: none"> ▪ Make data more accessible to those with less time or who are less engaged ▪ Expansion of MOHASC activities to less-supported professionals, settings ▪ Consider opportunities for technical assistance beyond passive education
Threats (T)	<p>T-S Strategies</p> <ul style="list-style-type: none"> ▪ Consider realities of capacity when selecting activities to carry out ▪ Use a member database to facilitate communication and partnership development among members ▪ Engage with allied organizations 	<p>T-W Strategies</p> <ul style="list-style-type: none"> ▪ Ensure availability of short time commitment and virtual engagement opportunities ▪ Pursue funds to support leadership salary, staff, and activities ▪ Explore new communication strategies and venues to reach additional audiences

Strategic approach for 2023–2027

The Minnesota One Health Antibiotic Stewardship Strategic Plan for 2023–2027 applies the mission, vision, and goals developed by statewide collaborators in 2016. The plan highlights strategic objectives for each of the four goals, intended to be discussed, enriched, and carried out by members of the four MOHASC work groups.

Mission

Provide a collaborative environment to promote judicious AU and stewardship and to reduce the 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.

Summary of goals

The 2023–2027 strategic plan includes four goals. Goals, strategic objectives, and proposed activities are summarized in the following sections. Over the course of the implementation period, strategic activities might be changed, added, or not pursued, depending on the needs of Minnesota’s OH sectors. Areas of focus in this five-year plan include incorporating health equity into design of initiatives and interpretation of data, provision of AS technical assistance to veterinary clinics, and review of AU data from the last strategic plan period to inform goals for progress. The four goals are:

1. [Promote understanding of One Health antibiotic stewardship across disciplines](#)
2. [Improve human antibiotic stewardship efforts](#)
3. [Improve animal antibiotic stewardship efforts](#)
4. [Explore the role of the natural environment in antimicrobial resistance](#)

MOHASC operational logistics

MOHASC is a group largely comprised of volunteer members from human, animal, and environmental health sectors with coordination of meetings, calls, professional field AS exchanges, and public-facing events by Minnesota Department of Health (MDH) staff. The first strategic plan implementation period demonstrated that the most important function of MOHASC is as professional network and platform for engagement and learning across health sectors. When human and financial resources are constrained (e.g., public health response, personnel reductions), efforts should be made to carry out the essential MOHASC functions listed below, even if additional activities, outlined in subsequent tables, are not conducted.

Essential functions

MOHASC network is supported through a database of member contact information.

- MOHASC serves as a network for professionals across health sectors working to improve antibiotic use. Members can pose inquiries, ask for feedback, request subject matter expertise, identify others interested in collaboration through a contact list maintained by MDH.
- MDH, Minnesota Department of Agriculture (MDA), and other organizations will leverage the MOHASC network to inform programmatic activities (e.g., continuing education).

MOHASC provides a platform for interaction among professionals within and across health sectors.

- Annual meetings of all MOHASC members will be held to share updated scientific and programmatic information related to AU, AS, and AR.
- Quarterly calls of the four work groups will be held to provide routine opportunities for sector-specific information sharing and to ensure continuity of essential MOHASC functions.
- Professional AS field exchanges will be held up to three times annually, offering in-person opportunities for MOHASC members to learn about unique settings where antibiotics are used and approaches to AS.

MOHASC works with partners to engage directly with the public and to deliver meaningful learning experiences.

- Information about AU and responsible pharmaceutical disposal will be shared each year at the Minnesota State Fair as part of the Minnesota Pollution Control Agency (MPCA) Eco Experience. When possible, MOHASC volunteers will be at the booth to directly engage with fair attendees. If in-person participation is not possible (e.g., pandemic surge, funding constraints), a tabletop display will be used.
- Throughout the year, a tabletop display will be made available to libraries interested in sharing information about AU with patrons. MOHASC members can help to identify interested libraries and deliver materials, as needed.

Key personnel and resources

Activity director/coordinator. MDH staff will coordinate the essential functions listed above, including maintaining the member database and scheduling meetings and calls. The director/coordinator will work with the four work group chairpersons to inform planning and agendas.

Work group chairpersons. Each work group will have a chairperson who works with the coordinator to inform MOHASC essential functions over the course of one year. Identification of vice chairpersons who will serve as chairperson the following year could facilitate a smooth transition.

Monitoring and evaluation

Progress reports summarizing [monitoring and evaluation indicators](#) and a narrative summary of strategic activities will be prepared and posted on the MOHASC website annually. Evaluation of strategic plan initiatives is intended to describe progress, identify opportunities to improve program logistics or objectives, and highlight human resource gaps or other resource needs. A review of strengths, weaknesses, opportunities, and threats will also be conducted at the end of the five-year implementation period. That information and potential strategies stemming from the review will inform ongoing planning and next steps.

Resources

Experiences during the last implementation period demonstrate that resources are needed to support activity and human resource capacity. The following are examples of resources that could be utilized during the 2023–2027 implementation period.

Organizational and logistical resources

- Direction/coordination by MDH staff
- MOHASC member volunteer chairpersons for each work group
- State agency AS program support (e.g., MDH, Minnesota Department of Agriculture)
- Communications support (e.g., state agencies, University of Minnesota)
- Public engagement opportunities (e.g., state agencies, Minnesota State Fair, libraries)
- Students and professional trainees

Professional expertise

- MOHASC member expertise and professional networks
- State agencies and boards
- State professional societies (e.g., Minnesota Veterinary Medical Association, Minnesota Hospital Association, Minnesota Medical Association, Minnesota Dental Association)
- State livestock commodity groups (e.g., Minnesota Milk, Minnesota Pork, Minnesota Turkey Growers, Minnesota Cattleman’s Association, Minnesota Beef Council)
- National organizations (e.g., Infectious Diseases Society of America, Society of Infectious Diseases Pharmacists, Society for Healthcare Epidemiology of America, American Veterinary Medical Association, Pew Charitable Trusts)
- Federal agencies (e.g., Centers for Disease Control and Prevention, Food and Drug Administration, National Institutes of Health, U.S. Department of Agriculture)
- Existing data and literature

Funding resources

- State: State General Funds via legislative proposal, Environment and Natural Resources Trust Fund
- Federal: Centers for Disease Control and Prevention (e.g., existing cooperative agreements, broad agency announcements), Food and Drug Administration, U.S. Department of Agriculture, National Institutes of Health, National Science Foundation, Agency for Healthcare Research and Quality
- Private: Health care organizations, food corporations, pharmaceutical companies, private foundations (e.g., American Kennel Club, McKnight Foundation’s vibrant and equitable communities grants, Robert Wood Johnson Foundation’s health systems, communities, and equity grants)

Goals, strategic objectives, and potential activities

The following points can be used to guide interpretation of the following strategic objectives and potential activities.

- Each strategic objective has been classified into a type: information sharing, AS implementation, AS advocacy, convening, and collaborative research. Completion of activities listed for each objective will be dependent upon capacity and, in some cases, funding.
- During the five-year strategic plan period, MOHASC members should strive to complete at least one activity in relevant strategic objective categories.
- Because the practice of AS and needs of clinical partners are not static, MOHASC leadership and members might choose to prioritize new activities that align with strategic objectives but are not listed here.
- The need to change or add strategic objectives could also arise. MOHASC should exercise flexibility in adapting to changing needs.
- Potential short-term activities are intended to be conducted during years 1–2, and long-term activities are expected to be conducted during years 3–5.

Promote understanding of One Health antibiotic stewardship across disciplines

Activities focus on public education and experience-sharing across practitioners in human, animal, and environmental health, ensuring that AS information and MOHASC opportunities are available to everyone across Minnesota.

Strategic objective list

- **AS implementation:** Incorporate equity considerations into MOHASC operations
- **Convening:** Facilitate MOHASC member interaction
- **Information sharing:** Maintain the MOHASC website
- **Information sharing:** Implement a communications plan
- **Information sharing:** Support public engagement
- **Information sharing:** Support AS education in Minnesota health professions curricula

Strategic objective details

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Incorporate equity considerations into MOHASC operations</p>	<p>Type: Information sharing</p> <p>Inputs:</p> <ul style="list-style-type: none"> Subgroup for promotion GovDelivery MOHASC member speakers MDH AS physician, pharmacist leader email addresses MDH data on prescribing for all Minnesota populations New relationships with MDH Center for Health Equity, Office of American Indian Health, Office of Rural Health 	<p>Activities</p> <ol style="list-style-type: none"> 1. Provide platform for members to share experiences in facility, state, and national (e.g., CDC, SIDP, SHEA, IDSA) conversations on health equity in antibiotic prescribing, representation in AS programs (annually) 2. Share data available to describe antibiotic prescribing differences across populations (annually) 3. Establish relationships with MDH Center for Health Equity, Office of American Indian Health, Office of Rural Health to identify opportunities for collaboration, alignment 4. Promote MOHASC participation in underrepresented geographic areas, health care sectors (e.g., critical access hospitals, Indian Health Services); ensure meeting logistics are accommodating (annually) 5. Promote GovDelivery participation broadly (annually) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Ensure MOHASC participation, communications available to all interested ▪ Share activities related to health equity and representation in Minnesota health care organizations 	<p>Activities</p> <ol style="list-style-type: none"> 1. Conduct survey of GovDelivery recipients to understand reach 2. Survey state AS leaders about use of AU data to explore prescribing inequities, diversity, equity, and inclusion within AS program 3. Short-term activities continue <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Understanding of MOHASC communication reach ▪ Baseline record of AS program data and practices related to health equity and representation
<p>Facilitate MOHASC member interaction</p>	<p>Type: Convening</p> <p>Inputs:</p> <ul style="list-style-type: none"> Membership management database AS field exchange hosts 	<p>Activities</p> <ol style="list-style-type: none"> 1. Ensure annual meeting participation is accessible to all members, regardless of geographic location 2. Update, share MOHASC member names, affiliations, email addresses internally (annually) 3. Hold professional AS field exchanges three times each year <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Members can contact each other to share expertise, collaborate ▪ Members learn how antibiotics are used, AS practiced in varied settings, through multidisciplinary onsite events 	<p>Short-term activities continue</p>

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
Maintain the MOHASC website	<p>Type: Information sharing</p> <p>Inputs:</p> <ul style="list-style-type: none"> Website metrics MDH communications team MDH epidemiologists 	<p>Activities</p> <ol style="list-style-type: none"> 1. Work with MDH communications team to create visually simple, intuitive web interface 2. Review website content, ensure resources are up to date (annually) 3. Review website metrics (e.g., traffic from other websites; visitor clicks on links, downloads) (annually) 4. Encourage partners to link to MOHASC pages (annually) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ MOHASC maintains a website that offers professionals and public valuable information about AU and AS 	<p>Activities</p> <ol style="list-style-type: none"> 1. Work with MDH HAI-AR Section to develop dynamic (e.g., Tableau) AU website data display <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Public and professionals interact with data collected by MDH and others
Implement a communications plan	<p>Type: Information sharing</p> <p>Inputs:</p> <ul style="list-style-type: none"> MDH communications team MDA, MPCA, MBAH, other partners MOHASC social media toolkit MDH GovDelivery account Allied organizations 	<p>Activities</p> <ol style="list-style-type: none"> 1. Send GovDelivery bulletins, post on social media (monthly) 2. Explore development of shared calendar to plan social media, other communications across MOHASC 3. Update social media toolkit (annually) <p>Outcomes:</p> <ul style="list-style-type: none"> ▪ Public and professionals receive routine communications about AU and AS, events, education, and more 	<p>Activities</p> <ol style="list-style-type: none"> 1. Collaborate with allied organizations on communications and content to expand audience and reach 2. Short-term activities continue

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Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
Support public engagement	<p>Type: Information sharing</p> <p>Inputs:</p> <ul style="list-style-type: none"> MPCA Eco Experience State Fair partnership MOHASC member existing community relationships Support for translation Tribal and community liaisons 	<p>Activities</p> <ol style="list-style-type: none"> 1. Host Minnesota State Fair booth 2. Explore education projects with youth-focused organizations (e.g., 4H, FFA, STEM groups, scouts, Science Olympiad) through existing MOHASC member relationships 3. Translate MOHASC’s most popular public resources into major MN languages 4. Make content culturally accessible for Minnesota communities <p>Outcomes</p> <ul style="list-style-type: none"> ▪ MOHASC members interact with public ▪ More Minnesotans learn that antibiotics should be used only when needed 	<p>Short-term activities continue</p>
Support AS education in Minnesota health professions curricula	<p>Type: Information sharing</p> <p>Inputs:</p> <ul style="list-style-type: none"> Subgroup Graduate student List of Minnesota schools with health preprofessional curricula (e.g., nursing, medicine, pharmacy, dentistry, veterinary medicine) 	<p>Activities</p> <ol style="list-style-type: none"> 1. Identify MPH or health professions student interested in survey project as part of graduate degree, other training; use subgroup to identify goals, provide input on existing survey draft 2. Host rotations at MDH for pharmacy residents, graduate students, fellows, and other trainees <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Curriculum survey content identified ▪ Student identified to lead survey finalization, distribution, analysis 	<p>Activities</p> <ol style="list-style-type: none"> 1. Draft, conduct, summarize Minnesota survey on preprofessional AS education 2. Develop OH AS slide set and script for use in health professions curricula. 3. Host clinical rotations at MDH for pharmacy residents <p>Outcomes</p> <ul style="list-style-type: none"> ▪ AS curriculum contacts identified for health professional schools ▪ MOHASC and academic institutions identify gaps, opportunities in AS education

Abbreviations: AS-antibiotic stewardship; CDC-Centers for Disease Control and Prevention; FFA-Future Farmers of America; HAI-AR-Healthcare-associated infections-antimicrobial resistance; IDSA-Infectious Diseases Society of America; MDAH- Minnesota Board of Animal Health; MDA-Minnesota Department of Agriculture; MDH-Minnesota Department of Health; MPCA-Minnesota Pollution Control Agency; MOHASC-Minnesota One Health Antibiotic Stewardship Collaborative; OH-One Health; SHEA-Society for Healthcare Epidemiology of America; SIDP-Society of Infectious Diseases Pharmacists; STEM-science, technology engineering, math

Improve human antibiotic stewardship efforts

Activities focus on AU goal setting and recognition of AS programs.

Strategic objective list

- **Information sharing:** Facilitate patient, family, and public education
- **Information sharing:** Use Minnesota AU and AS data to establish state goals and track progress
- **Information sharing:** Provide access to AU and AS resources
- **AS advocacy:** Facilitate collection and use of antibiotic prescribing data by supporting advancement of data tracking solutions; application of data to drive practice change
- **AS advocacy:** Host tiered AS honor roll recognition program for Minnesota hospitals and nursing homes

Strategic objective details

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Facilitate patient, family, and public education</p>	<p>Type: Information sharing</p> <p>Inputs: USAAW resources from MDH, CDC MDH communications team MOHASC organizations communications teams Funding for community listening sessions</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Participate in USAAW to raise patient and family awareness (annually) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Public hears AU messaging from trusted health care organizations and MDH 	<p>Activities</p> <ol style="list-style-type: none"> 1. Facilitate listening sessions with members of public, trusted messengers, health care community to capture knowledge, attitudes and practices, promising practices <p>Outcomes</p> <ul style="list-style-type: none"> ▪ MOHASC has improved awareness of community perceptions of AU which can inform message development, deployment objectives

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Use Minnesota AU, AS, and AR data to establish state goals and track progress</p>	<p>Type: Information sharing</p> <p>Inputs: Subgroup MDH AU and AS data report Annual statewide hospital antibiograms</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Review state-level AU, AS, AR data in work group, at annual meeting (annually) 2. Describe state-level AU changes during pandemic 3. MOHASC members summarize goals for strategic plan period, incorporate into annual AU and AS reports 4. MDH and other MOHASC members identify opportunities to communicate data, goals (e.g., CE, professional associations, quality improvement meetings) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ State-level AU data are available to MOHASC members ▪ MOHASC sets suggested goals for improvements in AU 	<p>Activities</p> <ol style="list-style-type: none"> 1. Measure awareness among health care organizations of state goals, progress 2. Develop 5-year summary of progress <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Understanding of MOHASC reach, influence of goal setting to inform next strategic plan period ▪ MOHASC summarizes progress on AU for all Minnesotans
<p>Provide access to AU and AS resources and education</p>	<p>Type: Information sharing</p> <p>Inputs: Subgroup Website MDH communications team</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Draft Minnesota-specific AS program recommendations (e.g., allocation of financial resources for staffing, IT; AU data elements, use for action; access to dedicated infectious diseases expertise) 2. Contribute to MOHASC website review of updated and refined resources for all care settings (annually) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ MOHASC drives state progress by defining best practices for AS ▪ Current resources are readily available to health care professionals 	<p>Short-term activities continue</p>

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Facilitate collection and use of antibiotic prescribing data by supporting advancement of data tracking solutions; application of data to drive practice change</p>	<p>Type: AS advocacy</p> <p>Inputs: Subgroup Volunteers to provide CE New relationships (e.g., MDH Office for Rural Health and Stratis Health)</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Support setting-specific CE on why, how to track AU and use data (annually) 2. Cosign, with MDH, awareness letters to top 10% of prescribers by volume in Medicare public use files (annually) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Minnesota health care facilities are better positioned to collect and use AU data for practice change 	<p>Short-term activities continue</p>
<p>Host tiered AS honor roll recognition program for Minnesota hospitals and nursing homes</p>	<p>Type: AS advocacy</p> <p>Inputs: Subgroup Website</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Review, post hospital, nursing home honor roll recipients for recognition renewable every 2 years (quarterly) 2. Promote program to facilities in geographic areas underrepresented on honor roll (annually) 3. Review criteria to ensure program drives AS progress, incorporates health equity considerations (annually) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Organizations are recognized for AS ▪ AS collaboration is fostered ▪ Health equity is prioritized for AS 	<p>Activities</p> <ol style="list-style-type: none"> 1. Measure honor roll awareness, influence among hospitals, nursing homes 2. Consider honor roll program for other care settings 3. Short-term activities continue <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Objective assessment of the impacts of the honor roll program

Abbreviations: AR-antimicrobial resistance; AS-antibiotic stewardship; AU-antibiotic use; CDC-Centers for Disease Control and Prevention; IT-information technology; MDH-Minnesota Department of Health; MOHASC-Minnesota One Health Antibiotic Stewardship Collaborative; USAAW-U.S. Antibiotic Awareness Week

Improve animal antibiotic stewardship efforts

Activities focus on AU tracking and expansion of AS implementation in a variety of clinical veterinary settings.

Strategic objective list

- **Information sharing:** Participate in, advocate for, and communicate progress on national and regional AU data collection for veterinary medicine, including large and small animal
- **Convening, information sharing:** Facilitate veterinary-health care interactions to discuss use of evidence-based approaches and electronic medical record (EMR) systems for AS
- **AS implementation:** Identify opportunities for on-farm support to optimize AU and implement AS practices
- **AS implementation:** Improve access to AR, AS, and infection prevention and control (IPC) resources for companion animal and equine veterinarians
- **AS advocacy:** Influence AS standards for veterinary teaching hospital accreditation
- **AS advocacy:** Advocate for standardized, comprehensive veterinary AST and methods for communicating critical results to veterinarians

Strategic objective details

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Participate in, advocate for, and communicate progress on national and regional AU data collection for veterinary medicine, including large and small animal</p>	<p>Type: Information sharing</p> <p>Inputs:</p> <p>Individual members</p> <p>Data Sources</p> <ul style="list-style-type: none"> ▪ Companion Animal Veterinary Surveillance Network (CAVSNET) ▪ FDA sales data ▪ Special studies, publications <p>Funding</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Describe how MOHASC members and MN institutions have contributed to data collection and advocacy during annual meeting (annually) 2. Share available animal AU data (food animal, companion animal) at annual meeting and/or through other routes (annually) 3. Share AU data with professionals and public, describe collection, challenges (e.g., GovDelivery, social media, public education) (ongoing) 4. Support acquisition of sustainable funding (e.g., long-term grants, industry partnerships) for MN-driven animal AU data collection (ongoing) 	<p>Activities</p> <ol style="list-style-type: none"> 1. Continue short-term activities (annually) 2. Provide 5-year summary of animal AU data (year 5) 3. Summarize remaining gaps, challenges, opportunities for state and national animal AU data collection (year 5) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ CAVSNET is a sustainable source of companion animal AU data ▪ Over the 5-year strategic plan period, MOHASC has meaningfully contributed to the body of AU data, championed sustainable collection of data, and communicated findings to professionals and public

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
		<p>Outcomes</p> <ul style="list-style-type: none"> ▪ Minnesotans have accurate and current source of animal AU data for reference and communication 	
<p>Facilitate veterinary-health care interactions to discuss use of evidence-based approaches and electronic medical record (EMR) systems for AS</p>	<p>Type: Convening, information sharing</p> <p>Inputs:</p> <p>Subgroups</p> <p>Companion animal veterinarian and pharmacist leaders</p> <p>Pharmacist and physician leaders</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Facilitate a convening for AS leaders from veterinary and human hospitals to discuss approaches (e.g., pharmacy-driven, EMR-based) to AS implementation <ul style="list-style-type: none"> ▪ Document planning and implementation process, including pre-meeting preparation, agenda, location, onsite hands-on components ▪ Share experience with public health partners, veterinary hospitals 2. Identify (e.g., through literature review, surveys, interviews) barriers to implementation of evidence-based practices in companion animal settings and opportunities for AS innovation and advocacy, including: <ul style="list-style-type: none"> ▪ Role of clinician, pharmacist ▪ Role defined in job description ▪ IT infrastructure; availability, use of data ▪ External drivers (e.g., accreditation) ▪ Social-behavioral factors <p>Outcomes</p> <ul style="list-style-type: none"> ▪ “How-to” document to facilitate veterinary-health care collaboration on companion animal AS program implementation ▪ Brief report(s) describing known barriers and value of veterinary-health care collaboration (e.g., convening, information shared, practice-change outcomes) 	<p>Activities</p> <ol style="list-style-type: none"> 1. UMN Veterinary Medical Center leaders facilitate (new or existing) Vet View EMR user group <ul style="list-style-type: none"> ▪ Discuss EMR capability needed to support AS activities ▪ Consider EMR-based solutions ▪ Advocate to manufacturer for AS solutions development 2. Publish brief report on user-group process to empower advocacy among users of other EMR systems <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Publish brief report on EMR user-group advocacy ▪ Summarize gaps in AS implementation in companion animal settings to inform next 5-year plan

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Identify opportunities for on-farm and other support to optimize AU and implement AS practices</p>	<p>Type: AS implementation</p> <p>Inputs: MDA DRPP MBAH Commodity groups Funding</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Support pursuit of sustainable funding for DRPP and/or other programs providing direct assistance to producers and veterinarians (with and without documented milk and tissue residues) (annually) 2. Support MDA, MBAH, commodity groups, other partners in outreach and education efforts on AU, including in-person and virtual (e.g., fairs, podcasts) (annually) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Technical assistance provided to producers and veterinarians after residue detection ▪ Education on AU, AS, and residue prevention provided to veterinarians and producers ▪ Residue rates for milk and meat decrease year to year 	<p>Short-term activities continue</p>
<p>Improve access to AR, AS, and IPC resources for companion animal and equine veterinarians</p>	<p>Type: AS implementation</p> <p>Inputs: Subgroup Subject matter expertise Funds for education products Funds for direct support Veterinary clinics</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Assess (e.g., literature review, web searches, interviews) resource and education needs for companion animal, equine veterinarians 2. Develop one high-quality resource each for companion animal, equine <p>Outcomes</p> <ul style="list-style-type: none"> ▪ High-quality education resources available to MN clinicians and beyond 	<p>Activities</p> <ol style="list-style-type: none"> 1. Identify clinics (e.g., 3) to receive direct support in AS and/or IPC implementation and share outcomes (e.g., model clinics) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Individual clinics receive IPC and AS technical assistance ▪ Model clinic experience informs resource development

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Influence clinical AS standards for veterinary teaching hospital accreditation</p>	<p>Type: AS Advocacy</p> <p>Inputs:</p> <p>Subgroup</p> <p>External partners (e.g., veterinary teaching hospitals, AAVMC)</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Identify major accrediting body(ies) of veterinary teaching hospitals (e.g., AAVMC) 2. Draft potential clinical AS standards based on AVMA core principles, using health care examples by collaborating with veterinary AS partners across U.S. 3. Develop comprehensive argument for AS standards (e.g., cost-benefit, patient safety) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Collaboratively developed example of AS accreditation standards that might be incorporated into clinical standards for U.S. veterinary teaching hospitals ▪ Business case for financially supported AS programs in veterinary teaching hospitals 	<p>Activities</p> <ol style="list-style-type: none"> 1. Conduct meeting(s) with accrediting body(ies) to share justification and draft standards, explore potential for incorporation 2. Summarize process and outcomes to share with appropriate audiences (e.g., at annual meeting, brief published report) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ MOHASC has informed and advocated for meaningful clinical AS accreditation standards for veterinary teaching hospitals
<p>Advocate for standardized, comprehensive veterinary AST and methods for communicating critical results to veterinarians</p>	<p>Type: AS advocacy</p> <p>Inputs:</p> <p>Subgroup</p> <p>MOHASC partners participate in:</p> <ul style="list-style-type: none"> ▪ CLSI Vet09 Group ▪ CDC-funded projects through MDH ▪ FDA Vet-LIRN 	<p>Activities</p> <ol style="list-style-type: none"> 1. MOHASC members participate in CLSI and other conversations about gaps in veterinary AST (e.g., AST panel drugs, breakpoints) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ MOHASC gains awareness and contributes to national discussions on veterinary AST 	<p>Activities</p> <ol style="list-style-type: none"> 1. Draft suggested laboratory footnotes about AR profiles and reporting requirements to be included in AST reports for MN veterinarians 2. Provide footnote content to UMN VDL, other laboratories for consideration <p>Outcomes</p> <ul style="list-style-type: none"> ▪ MOHASC supports clinician education by recommending additional of actionable information on AST reports

Abbreviations: AAVMC-American Association of Veterinary Medical Colleges; AS-antibiotic stewardship; AU-antibiotic use; AVMA-American Veterinary Medical Association; CDC-Centers for Disease Control and Prevention; CLSI-Clinical Laboratory Standards Institute; DRPP-drug residue prevention program; EMR-electronic medical record; FDA-Food and Drug Administration; IPC-infection prevention and control; MDAH- Minnesota Board of Animal Health; MDA-Minnesota Department of Agriculture; MDH-Minnesota Department of Health; MOHASC-Minnesota One Health Antibiotic Stewardship Collaborative; OH-One Health; UMN-University of Minnesota; Vet-LIRN-Veterinary Laboratory Investigation and Response Network

Explore the role of the natural environment in antimicrobial resistance

Activities focus on supporting research to understand AR in the natural environment and promote appropriate drug disposal.

Strategic objective list

- **Collaborative research:** Support research to understand the distribution and implications of antibiotics and antibiotic-resistance (AR) genes in the natural environment
- **Information sharing:** Develop a resource to communicate antibiotic impact concept to public
- **Information sharing:** Educate professionals and professional students in all health sectors on requirements and importance of pharmaceutical disposal
- **Information sharing:** Promote pharmaceutical take-back to Minnesota public

Strategic objective details

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Support research to understand the distribution and implications of antibiotics and resistance genes in the natural environment</p>	<p>Type: Collaborative research</p> <p>Inputs: Research funding acquired by MOHASC members in home institutions Work group member knowledge State-level AU data State-level AR data</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Seek funding from LCCMR to continue collaborative research by University of Minnesota, University of Saint Thomas, MDH, and others 2. Converse and collaborate with others doing similar work to enhance impact of research (e.g., share data, methodologies) <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Awareness of existing gaps in understanding risk associated with findings in environment ▪ Minnesota continues to harness collaboration and interdisciplinary knowledge ▪ Research outputs and publications on antibiotics and resistance genes in the natural environment 	<p>Short-term activities continue</p>

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Develop a resource to communicate antibiotic impact concept to public</p>	<p>Type: Information sharing</p> <p>Inputs:</p> <p>Subgroup</p> <p>State communications staff</p>	<p>Activities</p> <p>Describe the impacts of AU on life across the OH spectrum, including, but not limited to:</p> <ul style="list-style-type: none"> ▪ <i>Positive (green):</i> Life-saving treatment for individual infection; ability to conduct elective procedures, all aspects of human, veterinary medicine ▪ <i>Yet to be defined (yellow):</i> microbiome; environmental contamination impacts on health; ecosystem impact ▪ <i>Negative (red):</i> Risk for AR infection/colonization at individual, facility, community, global scales; <i>C. difficile</i>; individual adverse events ▪ Image of human, animal, environment cycle to depict “footprint” generally <p>Outcomes</p> <ul style="list-style-type: none"> ▪ MOHASC has clear public communication tool about antibiotic impact 	<p>Updates, refinement of short-term activity</p>
<p>Educate professionals and professional students in all health sectors on requirements and importance of pharmaceutical disposal</p>	<p>Type: Information sharing</p> <p>Inputs:</p> <p>MPCA staff</p> <p>State communications staff (e.g., webinars, email communication)</p>	<p>Activities</p> <ol style="list-style-type: none"> 1. Review MOHASC web content to ensure disposal resources are current <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Current disposal guidelines, regulations, and sites for disposal are easily accessed on MOHASC website 	<p>Activities</p> <ol style="list-style-type: none"> 1. Provide one virtual education (e.g., standalone webinars, part of CE conference) opportunity to each of the following sectors: hospital and outpatient and dental, nursing homes, veterinary 2. Assess curriculum incorporation of disposal concepts professional education; incorporate as needed <p>Outcomes</p> <ul style="list-style-type: none"> ▪ Current disposal guidelines and regulations are easily accessed on MOHASC website ▪ Major health sectors are offered education on pharmaceutical disposal regulations

Strategic Objectives	Objective Type and Inputs	Potential Short-term (Years 1 and 2) Activities and Outcomes	Potential Long-term (Years 3–5) Activities and Outcomes
<p>Promote pharmaceutical take-back to Minnesota public</p>	<p>Type: Information sharing</p> <p>Inputs: MDH and MPCA environmental health staff</p> <p>Funding for recognition and promotion materials</p> <p>MDH communications staff</p>	<p>Activities</p> <ol style="list-style-type: none"> Publicly recognize pharmacies and other locations that have a drug take-back box by sending each window stickers (in English and Spanish) and recognition letter Promote National Drug Take-Back Days on social media and by email Communicate to the public about pharmaceutical disposal through library display program, Minnesota State Fair booth <p>Outcomes</p> <ul style="list-style-type: none"> Organizations hosting a take-back box receive thanks and recognition Public has multiple opportunities to learn about appropriate disposal 	<p>Activities</p> <ol style="list-style-type: none"> Short-term activities continue Quantify uptake of window sticker promotion (e.g., through observation and short survey) <p>Outcomes</p> <ul style="list-style-type: none"> MDH and MPCA assess impact of take-back recognition efforts

Abbreviations: AR-antimicrobial resistance; AU-antibiotic use; LCCMR- Legislative-Citizen Commission on Minnesota Resources; MDH-Minnesota Department of Health; MPCA-Minnesota Pollution Control Agency; MOHASC-Minnesota One Health Antibiotic Stewardship Collaborative; OH-One Health

Monitoring and evaluation indicators

The following monitoring and evaluation indicators can be used to inform annual summary reports. Activity-specific evaluation indicators can also be developed.

	Performance Measure	Type	Source
MOHASC Operations	Number of individual members and organizations represented	Quantity	Routine activity tracking
	Annual meeting completed each year, number of attendees	Quantity, Quality	Routine activity tracking, meeting evaluation
	Quarterly calls for four work groups	Quantity	Routine activity tracking
	Participation in One Health field exchanges	Quantity, Quality	Routine activity tracking, event evaluations
	Indian Health Services, tribal health partners engaged in MOHASC, consulted to ensure reach	Result	MOHASC member list
	MDH Office of Rural Health and Primary Care, Center for Health Equity, other community partners engaged in MOHASC, consulted to ensure reach	Result	MOHASC member list
Public Engagement	Number of messages posted (e.g., social media, GovDelivery email)	Quantity	Routine activity tracking
	Estimated number of visitors to State Fair booth	Quantity, Quality	Routine activity tracking, volunteer evaluations
	Number of users on the MPCA pharmaceutical take-back website before, during, after State Fair	Quantity	MPCA web data
	Annual website metrics, including number of visitors, time on page, number of downloads	Quantity	MDH web data
	Downloads of translated materials	Quantity	MDH web data

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