

Antimicrobial Stewardship Through Food Animal Agriculture Toolkit Module

Guidance for healthcare facilities
and health professionals



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Introduction

INTRODUCTION TO ANTIMICROBIAL RESISTANCE AND ANTIBIOTIC USE IN ANIMAL AGRICULTURE

Evidence has demonstrated that hospital-based Antibiotic Stewardship Programs (ASPs) significantly reduce hospital rates of antibiotic resistant infections,^{1,2} however most existing ASPs fail to address the upstream causes of greater community exposure to antibiotic resistant bacteria through the misuse of antibiotics outside the hospital. According to the Food and Drug Administration (FDA), more kilograms of antibiotics sold in the United States are used for food producing animals than for people. In 2011, 13.8 million kg. of antimicrobials were attributed to sales and distribution in food-producing animals;³ this translates to approximately 70% of the overall tonnage of antimicrobial agents sold in the United States. Despite the widespread use of antibiotics in food animals that these sales data suggest, we actually know very little about which antibiotics are used in what species and for which indications;⁴ this knowledge gap contrasts rather sharply with the data available for human clinical use.

Historically, antibiotics have been used in food animals to enhance animal growth, prevent and control outbreaks of common diseases, and to treat diagnosed disease in sick animals. U.S. Food and Drug Administration ([FDA regulations](#) effective January 2017 will no longer allow the use of antibiotics for growth promotion. However, antibiotic use in agriculture continues to be driven by industrial methods of raising livestock to emphasize efficiency by confining a large number of animals in close quarters. This practice prompts higher risk of outbreaks and of transmission of

antibiotic resistance between animals and from animals to the environment. Widespread application of antibiotics for **therapeutic** (for illnesses diagnosed by a veterinarian) purposes, or for **outbreak control** as a **prophylactic** measure (for which the drugs may be given at sub-therapeutic levels in feed and water)⁵ have raised concern for the selection of antibiotic resistant bacteria within livestock hosts and their waste products; resistant bacteria may then appear in the meat products that reach wholesale and retail settings.⁶

In addition to risks to human health associated with handling and consuming meat products, the surrounding community is at higher risk of exposure to antibiotic residues and resistant bacteria via soil, water, and interaction with farm workers.^{7,8} While the existence of antibiotic residues in meat products is tightly regulated and not a topic of current concern, the U. S. Geological Survey (USGS) reported in March 2002 that antibiotics were present in 48% of the streams tested nationwide; and half of those tested were downstream from agricultural operations.⁹

Research linking the overuse of antibiotics in food animal production to the development of resistant bacterial strains found in humans is mounting. Multidrug-resistant pathogens have been associated with food-related illnesses.¹⁰ For example, a study dating back to April 1999 by the Government Accountability Office concluded that resistant strains of three microorganisms that cause food-borne illnesses in humans (*Salmonella*, *Campylobacter*, and *E. coli*) are linked to the use of antibiotics in animals.

The following strains of antibiotic resistant infections have shown links to the development of the resistant bacteria from on-farm antibiotic use:

Methicillin Resistant *Staphylococcus aureus* (MRSA)

- Ferguson DD, Smith TC, Hanson BM, Wardyn SE, Donham KJ. Detection of Airborne Methicillin-Resistant *Staphylococcus aureus* Inside and Downwind of a Swine Building, and in Animal Feed: Potential Occupational, Animal Health, and Environmental Implications. J Agromedicine. 2016;21(2):149-53. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/26808288>
- Wardyn SE, Forshey BM, Farina SA, Kates AE, Nair R, Quick MK, Wu JY, Hanson BM, O'Malley SM, Shows HW, Heywood EM, Beane-Freeman LE, Lynch CF, Carrel M, Smith TC. Swine Farming Is a Risk Factor for Infection With and High Prevalence of Carriage of Multidrug-Resistant *Staphylococcus aureus*. Clin Infect Dis. 2015 Jul 1;61(1):59-66. doi: 10.1093/cid/civ234. Epub 2015 Apr 29. <https://www.ncbi.nlm.nih.gov/pubmed/25931444>

Extraintestinal *E. coli* infection

- Hammerum AM, Heuer OE. Human Health Hazards from Antimicrobial-Resistant *Escherichia coli* of Animal Origin. Clin Infect Dis. 2009;48:916-21. Doi:10,1086/597292 Available at: <http://tinyurl.com/Extraintestinal-E-coli-infect>

Non-typhoidal *Salmonella* species

5% are now resistant to 5 or more classes of antibiotics

- Antimicrobial Resistance in Nontyphoid *Salmonella* Serotypes: A Global Challenge. Su LH, Chiu CH, Chu C, Ou JT. Clin Infect Dis. (2004) 39 (4): 546-551. DOI: 10/1086/422726 Available at: <http://cid.oxfordjournals.org/content/39/4/546.full>

***Campylobacter* species**

Ciprofloxacin resistance has overall increased from 13% in 1997 to almost 25% in 2011.

- Gupta A, et. al. Antimicrobial Resistance among *Campylobacter* Strains, United States, 1997–2001. Emerg Infect Dis. 2004 Jun; 10(6):1102-1109. doi: 10.3201/eid1006.030635 Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3323172/>

The rise of antimicrobial resistance is a serious threat to public health. It is imperative that antibiotic stewardship programs seeking to preserve the effectiveness of existing antibiotics in human health also consider strategies that reduce overuse of antibiotics in the agricultural sector. This module provides the tools to incorporate this important aspect of stewardship into your program. In addition to bringing this to the forefront of hospital-based care, we aim for this comprehensive approach to translate to the community setting as well, via patient education in ambulatory settings.

Using the Module

This toolkit follows the [core elements](#) of successful hospital Antibiotic Stewardship Programs outlined by the Centers for Disease Control and Prevention (CDC) and informed by existing guidelines from organizations including the Infectious Diseases Society of America in conjunction with the Society for Healthcare Epidemiology of America (SHEA), American Society of Health System Pharmacists, and The Joint Commission.^{11, 12, 13}

Consistency in approach and education of all parties involved in designing and implementing the ASP is essential for cross-departmental and cross-facility learning and evaluation. The core element of education is called out as a cross-cutting component that we recommend integrating throughout the other elements. Currently, there exist multiple guidance resources to developing a ASP including:

- [Infection Control Worksheet](#)
- [The Joint Commission Antibiotic Stewardship Toolkit](#)
- [SHEA Antimicrobial Stewardship Toolkit](#)
- [APIC Toolkit](#)
- [ReACT Toolkit](#)

What most of these resources have yet to address, however, are the challenges and opportunities for stewardship of antibiotics used in agricultural settings. This module, then, will specifically address the role for health care facilities and clinicians in promoting comprehensive stewardship of antibiotics in clinical practice and food production alike, to protect the public against rising rates of antibiotic resistant infections.

In 1998, the National Academy of Sciences noted that antibiotic-resistant bacteria generate a minimum of \$4-5 billion dollars in costs to United States society and individuals yearly. In 2009, Cook County Hospital and the Alliance for Prudent Use of Antibiotics estimated that the total health care cost of antibiotic resistant infections in the United States was between \$16.6 and \$26 billion dollars annually. It is important to note that costs associated with purchasing meat raised without routine antibiotics will likely not directly reduce the per patient cost of treating antibiotic resistant infections but rather reduce the risk of community exposure to and the development of resistant bacteria strains overall. Therefore, the full cost of an Antibiotic Stewardship Program (ASP) should include the cost of transitioning food purchases to meat raised without routine antibiotics.

Core Elements of Antimicrobial Stewardship

Core Element: LEADERSHIP COMMITMENT

In order to gather commitment to phase out the purchase of meat raised without routine antibiotics in your facility, it is essential to gather commitment from leadership to do so. This will entail presenting the case, financial implications, and proposed strategies to your hospital Chief Financial Officer and Chief Operating Officer to pursue the development of a purchasing policy that will solidify this commitment. The role of the clinician is to lay out the clinical relevance of antimicrobial use in animal agriculture and the importance of food stewardship to the overall mission of the institution. In preparation for this presentation, activate the facility food services team to conduct a cost assessment and plan cost mitigation strategies to implementation. Here are a few presentations used by hospitals to make the case to their administration.

- [University Hospitals presentation](#)
- [University Hospitals letter to administration](#)
- [Hospital presentation to state hospital association](#)
- [University of Washington Medical Center proposal](#)
- [Advocate SBAR \(Situation, Background, Assessment, Recommendation\)](#)

Cost Assessment

Changes in purchasing of both food and pharmaceuticals in addition to adjustments in clinical protocol can have positive and negative cost implications. As of 2016, meat raised without routine antibiotics can be 0-50% higher in cost per pound. As demand and subsequently production increases for these meat products, prices should become more competitive with conventional meat prices. In the interim, it is important to estimate these costs and articulate cost mitigation strategies to hospital leadership to gain support. The following steps will assist in conducting a cost assessment and mitigation approach.

- I. Cost assessment of phasing out meat raised with routine antibiotics from the hospital food service.
 1. Establish your meat purchasing baseline
 - 1.1. Review monthly food invoices and compile a list of meat products purchased including product category (beef, chicken, pork, other), brand, volume (if packaged by case, specify how many pounds per case), and price. This [purchasing tracking tool](#) from HCWH may be used to compile your purchases.

The CCCAS Collaborative recommends including the following comprehensive policy statement: *Whereas our facility ASP will articulate a timeline for phasing out the purchase of meat raised with routine antibiotics and a reporting process to ensure benchmarks are met.*

Examples of policy language and other written commitments

- [University of California San Francisco resolution](#)
- [University of Washington Medical Center purchasing policy press release](#)
- [Advocate Health System Press Release](#)
- Greening University Hospitals [website](#) statement of progress

- 1.2. Establish the total cost and volume of meat purchased monthly per product category.
 - 1.3. Identify if any current sources are raised without routine antibiotics
 - 1.4. Establish total cost and volume of meat purchased monthly per product category.
2. Identify sources of meat raised without routine antibiotics for potential purchase.
 - 2.1. Ask current food vendors if they supply sources of meat raised without routine antibiotics. If so, request a list including product specs and prices to ensure you can compare to current products.
 - 2.2. Explore sources of meat raised without routine antibiotics available through other sources including local farms using a U.S. Department of Agriculture (USDA) certified processing center. You may consider asking other local institutions like K-12 schools, college and universities if they have recommendations for other vendors or product sources. This [meat and poultry product list](#) from HCWH offers products currently available through national institutional purchasing channels.
 3. Compare cost of replacing identified products raised without routine antibiotics with products currently purchased to identify those items that indicate minimal cost implications for early transitions and other items with greater cost implications that may require a phased in approach over time.
 4. Compile a report of findings with a recommendation for a timeline to phase in new products noting the cost implications of a direct swap.
 5. In order to show a full impact analysis, include a summary of annual costs associated with treating antibiotic resistant infections in the hospital, specifically calling out which infections were community acquired. These costs may include the cost of extended hospital days, readmission penalties, cost of multiple antibiotic and probiotic prescriptions, hydration treatment due to associated GI complications.
- II. Cost mitigation strategies for purchasing meat raised without routine antibiotics – Once you establish your baseline, it is helpful to investigate and plan strategies to mitigate costs prior to presenting the cost assessment to your administration. Some successful strategies for cost mitigation include:
 - Reducing meat portions on existing menu items and complementing with protein alternatives to meat such as legumes. See [Blended Burger Project™](#) by the culinary experts at the James Beard foundation for ideas.
 - Review current menus to reduce meat options and add plant-based options. See [HCWH Balanced Menus Recipe Toolkit](#) and [Meatless Mondays Recipe Database](#).
 - Consider increasing the cost of unhealthy options offered in retail and catering services.
- Future innovation** – Once your comprehensive stewardship program is underway you may consider utilizing monies saved from other ASP interventions for sustainable meat purchasing.

Facility Policy Development

The process of developing policies or resolutions differs between facilities. Regardless of where the process originates multiple-disciplines and departments should be involved and held responsible. Securing a statement of support for an Antimicrobial Stewardship Program (ASP) that includes phasing out meat raised with routine antibiotics from leadership will go a long way in expediting the policy development process. Review the resource [Passing Food Purchasing Resolutions](#) for

guidance on the development, implementation of a resolution including sample policy language. Additional components of an effective policy statement;

- Requirements for prescribers, education of patients/community, and food service purchasing.
- Details of a process to track and benchmark annual progress towards transitioning all meat and poultry products to sources raised without routine antibiotics.

Core Element: ACCOUNTABILITY

Development of Antibiotic Stewardship Program Team

Identify a chairperson to oversee the Antibiotic Stewardship Program (ASP) team. In addition to including representatives from the medical staff, infection control, and pharmacy as part of the ASP, it is important to include a representative from food service management and the clinical nutrition department. While your chairperson oversees the ASP efforts overall, a shared leadership approach to implementation is often helpful. All representatives need not be permanent members of a stewardship committee, but could serve on an ad hoc basis around certain initiatives:

1. Physician leader and pharmacist leader can provide education and orientation on the clinical importance;
2. Food service leader provides planning and implementation of purchasing and menuing;
3. Executive sponsor includes administrative leaders whose budgets are impacted by any changes in food purchasing or other ASP strategies.
4. Dietitian/nutritionist
5. Food services management leader
6. Operations leader
7. Nursing leader
8. Infectious diseases specialist

Should your facility host a Sustainability Team or Wellness Committee it is important to identify a representative that will bridge the conversation so as not to duplicate efforts. The ASP team may include working groups that focus on different aspects of a comprehensive stewardship program including inpatient or outpatient care or food service. A comprehensive evaluation process is held by all members of the ASP committee. These workgroups should report regularly to the ASP team chairperson who will report progress to hospital leadership. The following roles are suggested to ensure a comprehensive stewardship approach is implemented and includes stewardship through food purchasing.

Physician Leader(s)

The Center for Disease Control and Prevention emphasizes the importance of a physician leader of overall antimicrobial stewardship efforts. The single leader is necessary as a “buck stops here” measure to ensure accountability rests in a single, clear place. The institutional experience and expert opinion of physician leaders position this role as ideal to hold the ASP team accountable for stewardship efforts regarding animal agriculture use. Physicians are on the clinical front lines, experiencing the real impact that inappropriate antibiotic use in all settings can have. Food purchasing outcomes should be included in the evaluation of the ASP programs. A physician leader should work with food purchaser to actualize the impact of changes in

purchasing with clinical care and outcomes. This [primer](#) is helpful to summarize the role of physicians in an effective comprehensive stewardship program.

In order to properly lead in this arena, the physician leader must educate themselves on the scope of the problem and possible solutions using any or all of the resources provided in this toolkit. Physician leaders must also learn how decisions on the issues of antibiotic use on the farm are made on a local and federal level particularly if advocacy is planned as an intervention.

- [National Antimicrobial Resistance Monitoring System \(NARMS\)](#)
- [Food and Drug Administration \(FDA\)](#)
- [Center for Veterinary Medicine \(CVM\)](#)
- [Centers for Disease Control and Prevention \(CDC\)](#)
- [U.S. Department of Agriculture \(USDA\)](#)

Finally, one of the primary tasks of the physician leader may be to interface with food services, which carries with it a need to understand what the structure of food purchasing and services are within their institution.

See this set of questions to [identify your hospital's procurement system](#).

- Is there a single food service provider for the hospital? Are there multiple?
- Is your hospital one of many others in a system where decisions regarding purchasing of food may go beyond just this facility?
- Learn if there are other institutional initiatives that this could dovetail with including but not limited to: sustainable food education and promotion, purchasing organic foods, meat-reduction or plant-based menu initiatives, hospital gardens or other nutritional objectives. Here are some case studies where efforts to purchase meat raised without routine antibiotics are integrated into a broader priority within the hospital - [Sustainable Food Purchasing in Hospitals Case Studies](#).

Core Element: DRUG EXPERTISE

The Role of a Pharmacist Leader

The CDC Core Elements of Hospital Antibiotic Stewardship Programs make clear the need for a pharmacist leader on the ASP team. On clinical aspects, this leader can offer expertise on dosing, pharmacokinetic/pharmacodynamic modeling (PK/PD), or side effects of antibiotics administered. On aspects related to on-farm or food use, a pharmacist leader, similar to a [physician leader](#), can add useful perspectives and expertise; however, as for physician leaders, pharmacist leaders may require additional education and tools.

Pharmacist leaders should familiarize themselves with the scope of the problem of routine on-farm antibiotic use, the rationales for they are used, as well as the rationales against routine use, as laid out in the [education section](#) in this toolkit.

The drugs used in animals on a farm include classes medically important for human medicine including: Aminoglycosides, Diaminopyrimidines, Lincosamides, Macrolides, Penicillins, Streptogramins, Sulfas, and Tetracyclines. See [full list of affected applications](#). In the case of these medically important classes, these drugs are often dosed and utilized very differently in animal medicine than in human medicine; within animal medicine, utilization also differs between prophylaxis and treatment indications.

In addition, classes of antibiotics routinely used in animal agriculture that are not used in human medicine are a cause for cautionary concern due to bacterial sharing of **resistance plasmids** which may link together multiple genes encoding resistance to different antibiotics (and even heavy metals) on a single ring of DNA. See the following excerpt for an explanation of this process.

Many of the plasmids responsible for antibiotic resistance, R-plasmids, carry genes that code for resistance to more than one antibiotic. From enteric bacteria one can readily isolate R-plasmids that determine resistance to five or more antibiotics. Consequently, even when a particular antibiotic is not

used, the plasmid that encodes resistance to that antibiotic can be favored owing to the use of other antibiotic for which that plasmid also codes for resistance. In addition to this antibiotic-mediated associated linkage selection, R-plasmids often carry genes for other characteristics, like resistance to ultraviolet light, mercury, and other heavy metals; fermentation of carbon energy sources; and virulence. Associated linkage selection for these other plasmid-encoded characteristics could also contribute to the persistence of plasmid-borne antibiotic resistance, even when antibiotics are not used.¹⁴

Knowledge of antibiotics is a natural area for pharmacy expertise and leadership. Knowledge of which specific agents and which classes of agents are used in both veterinary and human medicine is a useful area of focus for a pharmacist leader.

Key Resources

- U.S. Department of Health and Human Services – FDA/CVM. Guidance for Industry # 152: Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to Their Microbiological Effects on Bacteria of Human Health Concern. Oct 2003. Available at: <https://docs.google.com/viewer?url=http%3A%2F%2Fwww.fda.gov%2Fdownloads%2FAnimalVeterinary%2FGuidanceComplianceEnforcement%2FGuidanceforIndustry%2FUCM052519.pdf>
- Reid C.J. et al. (2015) Tn6026 and Tn6029 are found in complex resistance regions mobilised by diverse plasmids and chromosomal islands in multiple antibiotic resistant Enterobacteriaceae. *Plasmid* 80:127-137. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/25917547>

Finally, in pursuing interventions on an institutional level regarding purchasing of meat or poultry raised without routine use of antibiotics, the pharmacist leader should help in all efforts to make the case to hospital leadership and educate those involved (including patients).

Core Element: ACTION

Education

Education is a key action of the ASP when working to address the issue of antibiotic overuse in food animal production. Because it is a lesser known component affecting antimicrobial resistance in humans, further actions by [ASPs](#) generally require a sound understanding of the topic's importance by key stakeholders, including ASP leaders, hospital administrators, and food service and clinical nutrition leaders. Recommended education and resources for these stakeholders, as well as for other hospital staff members, patients, and the public, are available in the [Education section](#) of the toolkit.

Advocacy

Clinicians are often faced with the impact of antibiotic resistance which challenges their ability to provide effective care. The respected voice of clinicians is a powerful vehicle for motivating local and national legislative action in favor of public health. Clinicians have long demonstrated their capacity to shape health through initiating or changing policy proposals, and substantially influencing the implementation of health policy. This type of advocacy necessitates stepping beyond the clinical practice setting and into the less familiar world of policy and politics, an area in which many clinicians feel vulnerable or ill prepared to operate effectively. Any clinician who has an interest in influencing the policy process, even one with limited time and resources, can become a confident advocate. The following are some important strategies to becoming an effective policy advocate:

1. IDENTIFY ALLIED ORGANIZATIONS TO ADD WEIGHT TO YOUR VOICE

Many issues are too big or complex to be easily resolved by one advocate. It often takes the concerted efforts of many advocates to bring about a common goal. Consider seeking support from professional associations or from a reputable advocacy organization. Through these affiliations you may stay abreast of policy action opportunities such as

opportunities to sign on to letters of support for policy reform, opportunities to visit your legislator, and when to submit formal comments to policy rulings.

See this testimony provided by clinicians at a legislative hearing in 2015 on antibiotic resistance.
<http://www.pewtrusts.org/en/about/events/2015/briefing-the-public-health-threat-of-antibiotic-resistance>

Health Professional Associations

Most health professional associations or medical societies have a policy advocacy component whose priorities are guided by the voice of their members. They may sponsor annual state legislative days, offer policy internships or fellowships and conduct policy workshops to orient you to the legislative process. They may provide easy access to experienced clinician advocates willing to serve as mentors. Seek out whether your professional association has a position statement on antibiotic resistance.

If an association policy or position statement does not exist, alert your professional society policy leader to the issue of antibiotic resistance and volunteer to seek opportunities for bringing the voice of the association into the policy arena on this topic.

Reputable Advocacy Organizations

Historically health professional organizations have not prioritized agricultural policy due to a lack of understanding of the connection it plays in the health and accessibility of food to the patients of their constituents. Making this connection is an important step in engaging your professional association. Consider connecting with reputable advocacy groups whose expertise lies at the intersection of agriculture and health policy. To ensure an organization is reputable, consider the following:

- Who sits on the board of the organization?
- How is the organization funded? Are there any conflicts of interest that may sway their position?

- What is the level of scientific rigor in their materials?
- Do they use language in their communications that would be well received by the medical or legislative community?
- Do they have a proven track record of success?

2. USE YOUR OWN EXPERIENCE TO COMPEL ACTION

Your personal experiences as a clinician witnessing the challenges of treating a patient with an antibiotic resistant infection can illustrate the problem in a compelling way that leads to action.

This [resource guides clinicians and provides additional resources for sharing your personal story](#) alongside reputable research to compel action on policy governing antibiotic use.

3. STAY ABREAST ON THE ISSUE AND THE STATUS OF PERTINENT POLICY

Follow reputable organizations by signing up for emailing options or via social media. Most government agencies have a twitter handle that will keep you abreast of the current state of policy and education opportunities.

4. ADVOCATE THROUGH YOUR OWN PERSONAL CHOICES

Clinicians are models of health guidance for the broader public and therefore your personal actions matter. Consider purchasing meat raised without routine antibiotics from [suppliers with verified label claims](#) or avoid [restaurants that have yet to take action](#) by shifting their meat sourcing.

Food Procurement Resolutions

Forward-thinking hospitals are expanding their roles as stewards of antibiotics by using their purchasing power to support ranchers and farmers who use antibiotics judiciously only for diagnosed illness and at appropriate therapeutic doses. Once you have gathered buy in from [administration](#) and members of the [ASP team](#) - next steps for instituting a food procurement resolution include:

1. **Drafting and passing a resolution** – Find guidance and sample resolution or policy language in this resource: [Passing Food Purchasing Resolutions](#).
2. **Implementing resolution** – It is important to plan out the implementation of your resolution with your multidisciplinary ASP team. This resource offers some guidance for consideration. [Health Care Procurement: Sustainable Meat and Poultry Guide](#). When aiming to change products purchased, it is important to work directly with the group purchasing organization and/or food service management company representatives to articulate the changes you aim to make. These entities will then work directly with supplier and distributors that are under contract to supply products to the organization. Should there be a limited number of available products through this avenue, you may then explore Identifying meat and poultry products available through institutional purchasing pathways outside of your GPO or management company's purview – See HCWH's [meat and poultry product list](#) for some ideas. Ensure your Chief Financial Officer is amenable to this as there may be contractual or financial implications.

3. Promotion of new menu items and educating the public at point of sale

- Webinar: [Marketing and Promotion to Support Purchasing Strategies](#)
- Guide: Promoting and Marketing Antibiotic Stewardship Through Food Services.
- Find additional guidance in the [Reporting section](#).

Tracking

Tracking progress towards transitioning purchases to meat sources raised without routine antibiotics in addition to the financial impacts of cost mitigation strategies is a key action to ensuring the imple-

mentation of ASP team strategies and celebrate successes through reporting and broader communication efforts. Guidance on metrics, developing a tracking process, and how to identify products is included in the [Tracking section](#) of the toolkit.

Reporting

Effective reporting of implementation strategies and subsequent impacts on hospital operations both internally and externally is an essential action to ensuring the longevity of the efforts and achieving your goal of phasing out the purchase of meat raised with routine antibiotics. Guidance on what, where, and how to report is included in the [Reporting section](#) of the toolkit.

Core Element: TRACKING

Tracking progress towards transitioning purchases to meat sources raised without routine antibiotics in addition to the financial impacts of cost mitigation strategies is important to report effectively on the implementation of ASP team strategies and celebrate successes through reporting and broader communication efforts.

Suggested Meat Purchasing Metrics

- Overall annual volume (weight) of 1) total meat and 2) meat raised without routine antibiotics purchased by facility
- Overall annual cost of 1) total meat and 2) meat raised without routine antibiotics purchased by facility
- Average amount of meat per meal served at facility annually (e.g., 1.5 oz. per meal)
- Product specifications currently purchased: whole-muscle meats, luncheon deli meats, pre-cooked, fajita strips, precooked breaded nuggets, tenderloins and patties; excluded: convenience foods (e.g., pre-made lasagna with sausage)

Definition of meat and poultry raised without the routine use of antibiotics.

Determine which label claims and standards the facility will use. Current food label certifications mean different things with regards to antibiotic use. This resource offers guidance on [understanding meat and poultry certifications](#).

The national Healthier Hospitals Program utilizes the following definition: Approved to carry one or more of the following:

- **Third-party certified labels:** USDA Certified Organic, Food Alliance Certified, Certified Humane Raised and Handled, Animal Welfare Approved, American Grass-fed Certified, Global Animal Partnership or Certified Responsible Antibiotic Use (CRAU) chicken standard
- **Label claims allowed by USDA:** "Raised without antibiotics," "No antibiotics administered," "Never-Ever 3," "Raised with therapeutic antibiotics only." Look for "USDA Process Verified" shield along with these label claims

Methodology

Tracking food purchases takes a considerable amount of time, though can eventually be somewhat automated with collaboration from food distributors, if purchasing reports

can include a “flag” to easily sort data based on criteria including meat raised without routine antibiotics. Your facility must have the capacity and/or the will to gather and aggregate the data required to calculate and track metrics. This is where Administrative support is helpful.

First it is important to establish your [meat purchasing baseline](#). Then identify a point person and set a schedule for regular tracking of purchases to report back to the ASP team. Often it is the food service management leader or clinical nutrition representative that is well poised for this role. Tracking should become part of performance expectations for the nutrition services department or provider. If nutrition services are outsourced it’s critical that when contract renegotiations arise, tracking and reporting are built into performance expectations for the vendor.

Core Element: REPORTING

Effective reporting of implementation strategies and subsequent impact on hospital operations both internally and externally is essential to ensuring the longevity of the efforts to phase out the purchase of meat raised with routine antibiotics.

What to Report

- [A summary of meat purchasing metrics](#) including a comparison of total meat purchases to the percent of products that are raised without routine antibiotics. You may provide additional detail by noting the same comparison within each meat product category. If your ASP team has set a goal such as number of products transitioned or a percent of total meat purchases, provide that in a visually appealing graph. For example: a 20% reduction in meat and poultry purchases by 2020.
- [Progress on cost mitigation strategies](#)
- **Obstacles realized through implementation** – These will vary from one institution to another but

You may consider engaging a student intern or medical resident to assist should additional capacity be needed to complete the task.

Consider where food is provided by hospital food service including patient meals, cafeteria (retail), and catering. Gather a list of current vendors providing meat via these sources. Existing relationships between food vendors/suppliers and your hospital staff may be critical in obtaining reports on items purchased on a routine basis to assist in the tracking process.

Guidance on tracking meat purchases can be found within the Healthier Hospitals Program Less Meat Better Meat goal:

- <http://www.healthierhospitals.org/hi-challenges/healthier-food>
- [Healthier Hospitals Less Meat Better Meat Toolkit](#)

may include: increases in purchasing costs (actual and perceived, by hospital operations or customers); lack of options through existing vendors/suppliers; lack of vendors capable of supplying adequate volume. Outline the plan for addressing these obstacles over a designated time frame.

- **Successful strategies realized through implementation** – As important as critiquing your challenges, is to celebrate strategies that have been successful or key staff who have excelled in their designated tasks.

Where to Report

There are multiple internal and external channels for reporting progress in procurement of meat raised without routine use of antibiotics.

Internal - Within the healthcare facility or health system

- To the Antimicrobial Stewardship Program (ASP) team to track progress towards identified benchmarks and as a part of the overall ASP.

- To hospital leadership as part of a comprehensive report on your ASP team efforts to encourage continued support for time and financial resources.
- To foodservice leadership and vendors to encourage continued support and participation for shifts in procurement
- To relevant internal hospital teams such as “green teams,” wellness committees or sustainability teams who may have synergistic efforts around food provision underway.
- To patients – On menu descriptions, via educational traycards, by educating clinical and foodservice staff for opportunities when they interact with patients.
- To clinical staff thorough grand rounds or other educational events.
- To hospital staff by developing a summary of successes for the hospital websites and in the hospital newsletter.

External - To the community at large

- Through foodservice venues on hospital grounds including signs at cafeteria entrance or food counters
- Via an annual hospital operations report
- Via external media outlets by engaging your hospital marketing department to plan celebratory announcement and or outreach to local and national media venues
- Through synergistic regional or national sector benchmarking programs such as the Healthier Hospitals program - www.Healthierhospitals.org

How to Report

Depending upon the internal or external channel you are directing your reporting to, crafting a variety of formats for displaying the data will assist in ensuring multiple groups capture the depth and impact of the efforts of the ASP team. When reporting, it is important to provide messaging that aligns food procurement work with other health care priorities such as broader antimicro-

bial stewardship efforts or the broader mission of the hospital to promote public and community health.

When possible, provide graphic visualizations of data, including impact on food purchasing budgets, retail price points and revenue. You may also consider compiling data that translates your efforts into the amount of antibiotics reduced through both food procurement and clinical use. One such metric is the measure of the amount of antibiotic used per kilogram of animal raised for food—[this is used routinely](#) by both animal husbandry groups in industry as well as by those working to reduce animal antibiotic use. You could provide an estimate measure of change from baseline by gathering the total amount of meat purchased by the institution in addition to the total amount of meat purchased that is produced with reduced or no antibiotics.

Sample reports

- [UCSF Sustainable Foodservice Annual Report: “Health Environment, Sustainable Future”](#)

Core Element: EDUCATION

Education is a key action of the ASP when working to address the issue of antibiotic overuse in food animal production. Because it is a lesser known component affecting antimicrobial resistance in humans, further actions by [ASPs](#) require a sound understanding of the topic by key stakeholders, including ASP leaders, hospital administrators, and food service and clinical nutrition leaders. This section provides education and resources for these stakeholders, as well as for other hospital staff members, patients, and the public.

Ideally, education regarding stewardship in animal agriculture is provided in conjunction with clinical stewardship education in order to highlight its contributing role in stemming antibiotic resistance and its connection to an overall, comprehensive stewardship program. Practical strategies could include a focus on antibiotics in agriculture during one day of CDC’s [Get Smart About Antibiotics Week](#), or serving samples of meat raised without antibiotics when providing clinical stewardship education to highlight the connection.

TABLE 1. KEY EDUCATIONAL RESOURCES RELEVANT TO KEY AUDIENCES IN THE HEALTH CARE ENVIRONMENT

SUGGESTED EDUCATIONAL RESOURCES	STEWARDS	ADMINISTRATION	CLINICAL STAFF	FOOD SERVICE	GENERAL STAFF	PATIENTS / PUBLIC
American Academy of Pediatrics, Technical Report. Nontherapeutic Use of Antimicrobial Agents in Animal Agriculture: Implications for Pediatrics . Pediatrics. 2015; 136, 6.	X	X	X			
Centers for Disease Control and Prevention. Antibiotic Resistance Threats in the United States, 2013 . Atlanta, GA: U.S Department of Health and Human Services, CDC. 2013; p.7, 36-7.	X					
Centers for Disease Control and Prevention. Antibiotic Resistance Threats in the United States, 2013 [infographic].		X		X	X	X
Centers for Disease Control and Prevention. Antibiotic Resistance from the Farm to the Table .			X			
Centers for Disease Control and Prevention. Antibiotic Resistance from the Farm to the Table [infographic].		X		X	X	X
Centers for Disease Control and Prevention. National Antimicrobial Resistance Monitoring System – Enteric Bacteria (NARMS): Antibiotics in Food-Producing Animals .	X	X	X	X	X	X
Health Care Without Harm. Healthy Food in Health Care Webinar Series (3-part series) : How the Health Care Sector Can Help Prevent Antibiotic Overuse in Animal Agriculture	X		X	X		
Clinician Champions for Comprehensive Antimicrobial Stewardship (CCCAS) Collaborative : A joint committee of Health Care Without Harm, the Pediatric Infectious Diseases Society and the Sharing Antimicrobial Reports for Pediatric Stewardship group	X					
Health Care Without Harm. Healthier Hospitals Less Meat Better Meat Toolkit .	X			X		
Health Care Without Harm. Expanding Antibiotic Stewardship: The Role of Health Care in Eliminating Antibiotic Overuse in Animal Agriculture . 2014.		X	X	X		
Health Care Without Harm. Understanding Labels: Meat and Poultry .			X	X	X	X
Health Care Without Harm. Promoting and Marketing Antibiotic Stewardship Through Food Services				X		
Health Care Without Harm. Marketing and Promotion to Support Purchasing Strategies [webinar]				X		

Antibiotic Stewards

As experts in antimicrobial resistance and stewardship, the ASP team will become key educators of other hospital staff members including administrators, clinicians, food and nutrition staff, and others. A detailed understanding of the problem and key strategies to address is necessary to enable delivery of such education with authority on the subject.

Suggested contexts: self-directed learning (webinars, articles, etc), presentation at ASP meetings

Educational objectives may include:

- Review the scope of and indications for antimicrobial use in agriculture
- Review of agents used in agriculture and their relation to human medicine
- Understand the role of antibiotic use in agriculture on the emergence of antibiotic resistance and transmission to humans
- Understanding of the individual and institutional actions that support the judicious use of antimicrobial agents in agriculture

[See Table 1](#) for suggested resources.

Administration

As key leaders in organizational strategy and finance, hospital administrators are valuable partners in moving forward stewardship actions that may require additional resources (purchasing meat raised without nontherapeutic antibiotics, hosting educational programs, etc).

Suggested context: instructor-led presentation by ASP leader.

Educational objectives may include:

- Describe how antibiotics are used in agriculture and how it affects human health through transmission of antimicrobial resistant bacteria and infections to humans.
- Describe the role of the health sector's expertise and moral authority to affect change.

- [Describe key individual and institutional strategies and actions that support the judicious use of antimicrobial agents in agriculture.](#)
- [Describe cost implications—include potential to save money via less meat purchasing or clinical stewardship to reinvest in shifting the supply chain toward meat raised without routine antibiotics.](#)

Clinical Staff

Clinical staff (physicians, nurses, pharmacists) have both a keen understanding of the effects of antibiotic resistant infections on their patients and the technical background to be excellent advocates on the topic. They are key contacts for patients and visitors, as well as the trusted experts in their communities.

Suggested contexts: Departmental grand rounds (infectious diseases, internal medicine, pharmacy, nursing, etc), self-directed learning, posters and handouts.

Educational objectives may include:

- Review the scope of and indications for antimicrobial use in agriculture.
- Describe how antimicrobial use in agriculture impacts the emergence of antibiotic resistance and transmission to humans.
- Describe Individual and institutional actions that support the judicious use of antimicrobial agents in agriculture.

Food Service Staff

Department managers and food purchasers bare the impact of cost implications on their departmental budget unless a comprehensive budgetary approach is taken to explore reduced clinical costs associated with these purchasing changes. In addition, the same team is responsible with incorporating and promoting these products into menus which affords them the opportunity to educate staff, patients, and visitors on the issue and the commitment by the hospital on a daily basis.

Suggested contexts: self-directed learning (webinars, articles, etc), presentation at professional meetings, peer-to-peer best practice sharing.

Educational objectives may include:

- Describe the overall ASP approach of the facility
- Develop a primer on antibiotic usage in agriculture and how it affects human health through transmission of antimicrobial resistant bacteria and infections to humans.
- Describe the role of antimicrobial use in agriculture on the emergence of antibiotic resistance and transmission to humans.
- Describe Individual and institutional actions that support the judicious use of antimicrobial agents in agriculture.
- Provide guidance on institutional purchase of meat without antibiotics including identifying meat raised without routine antibiotics in the food marketplace.
- Implement [cost mitigation strategies](#) including guidance on menu revisions.
- Describe [promotion strategies](#) for new menu items and educating the public at point of sale.

General Staff

In order to institutionalize the priority for purchasing meat and other food products raised without routine antibiotics, it is important to orient hospital staff to the issue and the proactive steps the facility is taking to address this. This education may also assist with mitigating staff concerns about changes in cafeteria menus and associated costs. It may also arm them with strategies for taking action in their own personal food purchases.

See this sample [FAQ to staff from Advocate Health System](#).

Suggested contexts: staff orientation packets, all staff newsletters, hospital internet/intranet pages, on-demand computer-based training.

Educational objectives may include:

- Develop a primer on antibiotic usage in agriculture and how it affects human health through transmission of antimicrobial resistant bacteria and infections to humans.
- Describe the health care sector's expertise and moral authority to affect change.
- Describe the hospital ASP goals including procurement of meat raised without routine antibiotics.
- Describe tips for identifying meat raised without routine antibiotics in the grocery store or other food outlets.

Patients and the Public

Patients, visitors, and the public play a vital role in transforming the market to use antibiotics in agriculture judiciously through their own meat purchasing habits. By educating this group, they may serve to advocate for greater availability of these products in the marketplace.

Suggested contexts: patient education television channels, internet sites, handouts, posters, menus/menu boards, table tents, other cafeteria-related material.

Educational objectives may include:

- Describe the scope of antimicrobial use in agriculture.
- Provide a high level summary of risk to human health through antibiotic resistance.
- Describe Individual and institutional actions that support the judicious use of antimicrobial agents in agriculture, including further education, advocacy, and purchasing.
 - Example [University of Washington cafeteria education signage](#)
- Describe tips for identifying meat raised without routine antibiotics in the grocery store or other food outlets and making cost effective changes to food purchases.

Consideration for Ambulatory Settings

Ambulatory settings have a role to play in stewardship related to animal agriculture as well, and actions can be tailored depending on the attributes and services of the ambulatory setting. Whether they function as stand-alone centers, or within a network of facilities, discussion with foodservice leaders at these sites should not be overlooked.

For outpatient centers with hot food service operation, opportunities are consistent with those mentioned for an acute care setting. For those without food service, if a full service cafeteria with options for cooked meat are not present, educational and advocacy opportunities exist (see Education and Advocacy Sections). This education may include:

- Highlighting what the organization is doing to encourage less antibiotic use in meat production through purchasing, creating menus, or clinicians personal choices.
- Acknowledging that there are not antibiotics or antibiotic residues physically in the meat rather than the use in production contributes to broader exposure to antibiotic resistant bacteria.
- Guide on the purchase of meat raised without routine antibiotics if appropriate for the patient's financial status or consider sharing with them the names of restaurants and stores that champion the provision of meat raised without routine antibiotics for them to support. See the [Chain Reaction report card](#) or this [Fact Sheet](#) for more information.

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The Pediatric Infectious Diseases Society

The Pediatric Infectious Diseases Society is the world's largest organization of professionals dedicated to the treatment, control and eradication of infectious diseases affecting children. Membership is comprised of physicians, doctoral-level scientists and others who have trained or are in training in infectious diseases or its related disciplines, and who are identified with the discipline of pediatric infectious diseases or related disciplines through clinical practice, research, teaching and/or administration activities.

Learn more at <https://www.pids.org/>

Sharing Antimicrobial Reports for Pediatric Stewardship

Sharing Antimicrobial Reports for Pediatric Stewardship collaborative focuses on establishing best practices for the use of antimicrobials among hospitalized children. Our mission is to utilize prescribing data to develop interventions that improve the safety of children receiving antimicrobials, improve the clinical outcomes of children, and decrease the rate at which resistance develops. The mission will be accomplished with the "all teach, all learn" philosophy.

Learn more at www.sharpsgroup.org/

Health Care Without Harm

Health Care Without Harm seeks to transform the health sector worldwide, without compromising patient safety or care, so that it becomes ecologically sustainable and a leading advocate for environmental health and justice.

Health Care Without Harm's national Healthy Food in Health Care program harnesses the purchasing power and expertise of the health care sector to advance the development of a sustainable food system.

Learn more at www.healthyfoodinhealthcare.org

