

U.S. Department of Veterans Affairs MRSA Prevention Initiative



› The Veteran’s Administration targeted potentially life-threatening staph infections in hospitalized patients to reduce rates of health care-associated infection with MRSA. The initiative serves as important confirmation that multifaceted intervention strategies can achieve effective and sustained control of MRSA in U.S. hospitals.

A Department of Veterans Affairs (VA) initiative targeting potentially life-threatening staph infections in hospitalized patients has produced significant results. VA’s success in substantially reducing rates of healthcare-associated infection with methicillin-resistant *Staphylococcus aureus* (MRSA) serves as important confirmation that multifaceted intervention strategies can achieve effective and sustained control of MRSA in U.S. hospitals.

Among VA patients in intensive care units (ICU) between 2007 and 2012, healthcare-associated infection (HAI) rates with MRSA dropped 72%—from 1.64 to 0.46 per 1,000 patient days. Infection rates dropped 66%—from 0.47 to 0.16 per 1,000 patient days—for patients treated in non-ICU hospital units.

The MRSA Prevention Initiative consists of a bundle of interventions that have been associated with reductions in MRSA HAIs. These are active surveillance screening programs for MRSA, contact precautions for hospitalized patients found to have MRSA, and emphasis on hand hygiene in common areas, patient wards, and specialty clinics throughout medical centers. Online training, frequent measurement, and continual feedback to medical staff reinforce such practices.

Additionally, VA created a culture that promotes infection prevention and control as everyone’s responsibility. A major part of that commitment is a dedicated employee at each VA medical center, the MDRO Prevention Coordinator, to monitor compliance with MRSA bundle prevention practices, educate staff, and work with Veteran patients and families.

Implementation of elements of the same core prevention strategies in VA’s long-term care facilities, spinal cord injury units, and outpatient clinics provides a coordinated strategy for MRSA control in all venues where patients receive care.

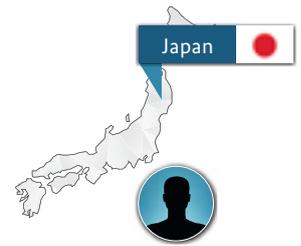
VA operates the largest integrated health care delivery system in the U.S. (8 million Veterans) and these results reflect a large-scale, organized prevention program with documented impact.

Timescale: 2007—present

The owners and organisation involved in the project

<http://www.va.gov/health/>

DOTS in Japan



› **DOTS (Directly Observed Treatment Short-course) prevent development of drug resistant tuberculosis. Due to the comprehensive DOTS program, the proportion of multi-drug resistant TB cases remains quite low at 0.7% among culture-positive cases in Japan.**

In Japan, medical treatment for patients with tuberculosis (TB) is provided by hospitals, clinics and public health centers (PHC) in the prefectural governments. DOTS in Japan is a TB management package of (1) physician's notification, (2) public health nurse's (PHN) visit, (3) inpatient DOTS, (4) outpatient DOTS and (5) coordination through DOTS conferences. Due to the comprehensive DOTS program, the proportion of multi-drug (isoniazid and rifampicin) resistant TB cases, which was reported through the routine surveillance in 2014, remains quite low at 0.7% among culture-positive cases in Japan.

Physicians must report to PHC on the day of a TB diagnosis. Upon receipt of the notification, a PHN visits the patient to inform treatment regimens and laboratory results and collect information on possible contacts. Smear-positive patients are hospitalized at TB hospitals for 2 months and they are treated under daily direct observation as inpatient DOTS. Before being discharged, patient's treatment regimens and problems are communicated with a PHN at the DOTS conference, which is held monthly so that the PHN can closely engage with the patient management.

For non-hospitalized patients, including those with latent TB infection and discharged patients, a PHC coordinates with various actors in the community, such as pharmacists, visiting nurses and the family

to lead patients to continue the treatment under observation as outpatient DOTS. The frequency of PHN's visit depends on the risk of defaulting. Drug intake is assured daily, weekly or monthly by several methods such as direct observation at patient's home, checking the patient's notes and confirming empty blisters.

Several times a year, PHC holds a cohort meeting and discuss the treatment outcomes of all patients in the PHC's responsible area. The discussion records are reported to the hospitals.

Timescale: 2000—present

The owners and organisation involved in the project

- Ministry of Health, Labour and Welfare, Japan
- Local prefectural governments in Japan
- Japan Anti-Tuberculosis Association

German Antimicrobial Resistance Strategy— veterinary issues



- › Reducing the number of antibiotic treatments of fattening animals to the inevitable minimum by improving animal health and strengthening prudent use through legal requirements.

The strategy to minimize the use of antibiotics in animal husbandry implemented with the 16. Revision of the German Drug Law aims at improving animal husbandry and thus, by improving animal health reducing the need for antibiotic treatment.

http://www.bmel.de/SharedDocs/Downloads/EN/Agriculture/AnimalProtection/MedicinalProductsAct-AMG.pdf?__blob=publicationFile

See §§ 58ff of the German medicinal products act:
http://www.bmel.de/SharedDocs/Downloads/EN/Agriculture/AnimalProtection/MedicinalProductsAct-AMG.pdf?__blob=publicationFile

Timescale: Came into force April 1, 2014

The owners and organisation involved in the project

Legislator

Advancing Vaccine Research, Innovation and Development



- › Government of Canada departments and agencies are working together to strengthen security and protection against vaccine-preventable diseases and biological threats, and expand investment and commercialization opportunities for Canada's vaccine industry and research community.

Canada is advancing vaccine research, innovation and development by bringing together 13 federal departments and agencies with interests and responsibilities relevant to these three areas. Most recently, this group established national vaccine priorities for humans and animals that will bring focus to research and development activities.

The priorities were established by assessing the risks for human and animal health, the burden of disease, impacts on immune-compromised individuals, and antimicrobial resistance (AMR). A One Health approach is being taken with both human and animal vaccine priorities identified.

The Government of Canada is encouraging the development of new and/or improved vaccines that target AMR pathogens, such as *Clostridium difficile* and Group A *Streptococcus*. In reducing the overall incidence of the disease and the available reservoir in which the microbe can mutate, the use of antibiotic medications will be reduced, thereby reducing the emergence of AMR.

Ultimately, working toward common vaccine priorities will foster greater coordination of Government of Canada vaccine research and development efforts. This will increase collaboration amongst Canadian researchers, creating an environment that promotes and fosters research

and innovation in Canada leading to new understanding and discoveries in disease prevention and public health.

Timescale: ongoing

The owners and organisation involved in the project

13 federal departments with responsibilities relevant to vaccine development, research and innovation.

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CHAPTER **3**

Promote the responsible use of antibiotics

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Human Health



Animal Health



Human and Animal Health



International studies show that up to 50 per cent of antibiotic treatments in healthcare settings are unnecessary or inappropriate. Apart from posing risks for the individual patient, antibiotic (mis-)use is associated with increasing the pathogens' resistance to antibiotics. Antibiotic stewardship (ABS) programmes tackle these problems by fostering the appropriate use of antibiotics in humans and animals. By means of evidence-based recommendations and guidelines for diagnosis and treatment, Antibiotic stewardship programmes improve patient outcomes and slow down the development of resistance. However, awareness and knowledge about antibiotics has to be increased as well—not only among healthcare professionals but also among the general public. Improvement of animal health will contribute to the reduction of antibiotic treatment in food production.



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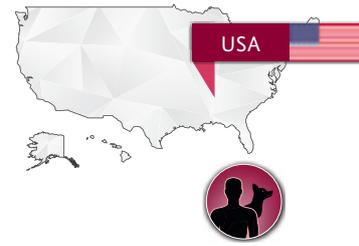
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White House Forum on Antibiotic Stewardship



► To bring together key human and animal health constituencies involved in the development, promotion, and implementation of activities to ensure the responsible use of antibiotics.

At the event, over 150 major food companies, retailers, and human and animal health stakeholders announced commitments to implement changes over a five year period to slow the emergence of resistant bacteria and prevent the spread of resistant infections. One commitment was for clinical societies to identify best practices and practical guidance for antibiotic stewardship efforts in their field. For example, a program developed by the Association of American Medical Colleges (AAMC), Wake Forest School of Medicine, in collaboration with the Centers for Disease Control and Prevention (CDC) to increase understanding of antimicrobial resistance prevention and control among medical students. <http://www.wakehealth.edu/School/CAUSE/Get-Smart-About-Antibiotics.htm> has resulted in an improved curriculum to address best practices in antimicrobial resistance.

Hospitals, health systems, long-term care facilities and pharmacies made commitments to reducing errors in prescribing antibiotics and working to protect the current antibiotics for future use. This includes many agreeing to adopt the Centers for Disease Control's (CDC) Core Elements of Hospital Antibiotic Stewardship Programs, and submit antibiotic use and resistance data to CDC.

Animal pharmaceutical companies committed to aligning their products with Food and Drug Administration policy changes, and investing in vaccines, on-farm hygiene, and innovations

to benefit animal health. Food producers are voluntarily setting standards to phase out affected products, providing responsible use guidelines to meat suppliers, and funding research for antibiotic alternatives. Feed industry organizations and farmers are educating producers about the FDA changes. Veterinary and agriculture associations are developing stewardship guidelines and conducting regional workshops on the new policies. Non-government organizations are developing standards and verification programs for responsible antibiotic use.

Timescale: held June 2, 2015

The owners and organisation involved in the project

<https://www.whitehouse.gov/the-press-office/2015/06/02/fact-sheet-over-150-animal-and-health-stakeholders-join-white-house-effo>

Public Campaigns on responsible use of antibiotics



- **The first national plan on antibiotics in 2002 aimed to raise awareness of the prudent use of antibiotics among the general public. Nationwide mass media campaigns were launched. Global antibiotic consumption fell by 10.7% between 2000 and 2013.**

The National Health Insurance launched several campaigns:

- 2002–2006: to break the reflex “common diseases = antibiotics”. Slogan used: “antibiotics are not automatic”.
- 2007–2009: a focus on a new idea “viral disease = antibiotic cannot heal”. The same slogan was used.
- 2010: focus on good practice, illustrated by diseases for which unnecessary antibiotic prescriptions are common (tonsillitis, bronchitis). New slogan for public awareness raising: “antibiotics, if you use them incorrectly, they will be less strong”.

The public campaigns used a range of tools, including TV and radio spots, information booklets for parents of young children, for a larger public, an exhibition entitled “micro-organisms in questions” touring around France, and press releases giving advice on good antibiotic use for those likely to use them more (young mothers, young workers, old people...).

Several tools were promoted for physicians:

- Guidelines on treating infectious diseases, leaflets on respiratory diseases, specific website with all guidelines ...
- Streptotests: free of charge for physicians (since 2002), but currently hardly used (18% of GPs used them regularly).

- Visits to GPs by local members of the national health insurance, with information on which drugs, and especially antibiotics, the GP has prescribed, compared to the average in the geographic area.

At hospital level, each hospital must have a person responsible for antibiotic treatment (help with prescriptions, distribution of guidelines, follow up, ...). Moreover, guidelines and tools are available online to help count antibiotics. Tools for paediatric professionals were also created and distributed to nursery nurses, and to directors of crèches. These measures led to a decrease in antibiotic consumption in the community: Global antibiotic consumption fell by 10.7% between 2000 and 2013. A 5.9% increase in antibiotic consumption has been observed since 2010.

Timescale: 2002–2013

The owners and organisations involved in the project

- Ministry of Health
- Regional Health Agencies
- National Drugs Agency
- National Health Insurance
- National Institute of Surveillance

Antibiotic Resistance Awareness Campaign



› This campaign aims to raise awareness and knowledge of AMR among Canadian parents of children aged 0–12 years in order to promote appropriate use of antibiotics, and to support health professionals in discussing antibiotic use with their patients.

healthycanadians.gc.ca/antibiotics

The Public Health Agency of Canada implemented a pilot multi-media campaign to raise awareness of AMR. Pre-campaign research indicated that Canadians have low levels of understanding about when antibiotics should and should not be used, and the risks posed by AMR. The campaign materials focused on increasing awareness and knowledge of antibiotic use and AMR among Canadian parents of children aged 0-12 years, and supporting health professionals in discussing antibiotic use and resistance with their patients.

Key organizations contributed to the development of campaign materials and their distribution to healthcare professionals. Campaign messages tailored to audiences were promoted using print, electronic and social media. The Public Health Agency of Canada also collaborated in the November 2014 ECDC-led Global Twitter Chat. The Agency continues to host AMR-related webinars to promote knowledge and awareness products, surveillance reports, guidance and policy documents to healthcare professionals.

The campaign video was shown on 4,483 medical and pharmacy waiting room screens in November 2014, delivering a total of 10,660,626 impressions, and was watched online 108,643 times. A total of

956,407 brochures and 20,871 posters were distributed to family physicians, general practitioners, paediatricians and pharmacists across Canada.

Building on the results of the pilot, the Public Health Agency of Canada plans to develop additional knowledge products in 2015. Effective collaboration and partnerships with key Canadian and international organizations optimized campaign resources, while expanding campaign reach. The pre and post campaign evaluations and the campaign materials may be of use to other jurisdictions wishing to launch similar initiatives.

Timescale: November 2014–March 2015
(pilot campaign)

The owners and organisation involved in the project

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Do Bugs Need Drugs?



- › “Do Bugs Need Drugs?” is a community education program designed to address antibiotic resistance by promoting handwashing, increasing awareness of the differences between viruses and bacteria, and advocating appropriate use of antibiotics.

“Do Bugs Need Drugs?” is an educational program for the community and for healthcare professionals, designed to address AMR by decreasing the inappropriate use of antibiotics. Resources are available for physicians, pharmacists, nurses and the public, including children, their parents and caregivers, teachers, employers and workers and long-term care facilities. Most are available in English and French and are posted on-line. Arising from a pilot project in one community in 1997, it is being used in two of Canada’s largest provinces: Alberta and British Columbia.

There are four key strategies: consistent messaging (e.g. handwashing is the best way to stop the spread of infections); networking (through dedicated committee members who have engaged government ministries, professional organizations, health care organizations, academia, industry and businesses, and community groups); aligning interests (e.g. engaging nursing and medical students to deliver a program on AMR to Grade 2 students as part of their community health curriculum); and containing costs (e.g. partnering with other organizations for distribution of materials and sharing administrative and printing costs between the Do Bugs Need Drugs programs in the two participating provinces).

The success of the program is linked to an increased willingness in the scientific and medical community to discuss the risks associated with antibiotic use and

of growing public awareness that AMR is linked to misuse and overuse of antibiotics. British Columbia has seen reductions in the rate of community prescribing at the population level, especially for respiratory tract infections in children, the major early target of the program. In Alberta, consistent reductions in antibiotic prescribing in long-term care facilities have been achieved with implementation of an antimicrobial stewardship strategy that includes education for staff and feedback on antibiotic prescribing rates.

Timescale: ongoing since 1997

The owners and organisation involved in the project

- Alberta Health Services
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- www.dobugsneeddrugs.org
- www.francais.dobugsneeddrugs.org
- British Columbia Centre for Disease Control

Antibiotic awareness



- › The UK has made use of the latest research to deliver change in prescriber and public behaviours. It has developed a programme of interventions, awareness raising activity and the development of tools and guidance.**

The UK has shown a sustained commitment to increasing public and professional awareness and knowledge of antimicrobial resistance (AMR). In September 2014, Public Health England, in partnership with the Devolved Administrations and professional organisations, launched the Antibiotic Guardian campaign as part of activities to support European Antibiotic Awareness Day.

The purpose of the campaign is to encourage behaviour change strategies to encourage both healthcare professionals and the public to make better use of antibiotics, helping to conserve these vital medicines and to ensure that they are used for the right infection, at the right dose and at the right time.

The UK has also held clinical leaders and diagnostics workshops (November 2014 and July 2015 respectively) to spread the message on AMR to key clinicians and microbiologists.

Public Health England has collaborated with the Royal College of General Practitioners to develop the TARGET Antibiotics Toolkit. The toolkit aims to help influence prescribers' and patients' personal attitudes, social norms and perceived barriers to optimal antibiotic prescribing. It includes a range of resources that can each be used to support prescribers' and patients' responsible antibiotic use, helping to fulfil continuing professional development (CPD) and revalidation requirements.

TARGET has been updated following recent evaluation, and includes the development of a clinical e-learning module to support implementation. (TARGET stands for: Treat Antibiotics Responsibly, Guidance, Education, Tools).

In 2013, the Scottish Reduction of Antimicrobial Prescribing programme launched an educational intervention for changing prescribing behaviours across primary care. Education resources have been developed to support secondary care healthcare staff in delivering stewardship—most recently an electronic workbook specifically aimed at nurses and midwives.

Timescale: ongoing

The owners and organisation involved in the project

Department of Health and Public Health England

Choosing Wisely Canada



› **Choosing Wisely Canada is a physician-led campaign designed to engage physicians and patients in conversations about overuse of unnecessary tests, treatments and procedures. The goal is to improve the quality of health care and to prevent harm from unnecessary care. One of the key recommendations of the campaign is to decrease the use of unnecessary antibiotics.**

Unnecessary tests, treatments and procedures take away from care by potentially exposing patients to harm, leading to more testing to investigate false positives and contributing to stress for patients. It also creates increased strain on the resources of the health care system.

Representing a broad spectrum of physicians, Canadian national specialty societies participating in the campaign have been asked to develop lists of “Five Things Physicians and Patients Should Question.” These lists identify tests, treatments or procedures commonly used in each specialty which are not supported by evidence, and/or could expose patients to unnecessary harm.

Modelled after the Choosing Wisely® campaign in the United States, Choosing Wisely Canada recognizes the importance of educating and engaging patients so that they can make informed choices about their care. It has created patient-friendly materials to help patients learn about the tests, treatments or procedures in question, when they are necessary and when they are not, and what patients can do to improve their health.

Choosing Wisely Canada is working with various stakeholder groups to disseminate the patient materials widely, and with medical schools to

introduce new content into the undergraduate, postgraduate and continuing medical education curricula.

While Choosing Wisely began in North America it has spread to over 17 countries in Europe, Asia and South America. Collaboration with the Organization for Economic Development is beginning to measure the extent of overuse in multiple countries and the use of antibiotics is one of the key indicators.

Timescale: ongoing

The owners and organisation involved in the project

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info@choosingwiselycanada.org

<http://www.choosingwiselycanada.org/>

Good practices in anti-microbial resistance surveillance and control



➤ To promote already existing best practices in the field of antimicrobial-resistance surveillance and control. To transfer good practices to all contexts through the production and the implementation of guidelines at regional and national level.

AMR represents a threat to public health as well as a growing concern all over the world in both human and veterinary health. In Italy for example, the rate of carbapenem-resistant *K. pneumoniae* rose to 35% in 2013. Different Italian regions started up programmes to combat AMR through the creation of AMR and antimicrobial use surveillance networks based on sharing laboratory and drug consumption data. Common strategies and interventions are still needed to better face the problem.

To increase the general capability level, it is necessary:

- to define, highlight and share regional and national best practices in AMR surveillance, antimicrobial use monitoring, guideline implementation, etc.,
- to identify joint minimum standards to make the impact analysis of different contexts easier,
- to streamline the existing national AMR surveillance systems,
- to promote the implementation of common guidelines,
- to implement communication strategies on this topic,
- to foster the relationship between regional and national institutions and all stakeholders involved in the process.

Timescale: July 2015–July 2017

The owners and organisations involved in the project

- Emilia Romagna Region
- Istituto Superiore di Sanità
- Toscana Region
- Campania Region
- Lombardia Region
- INMI L. Spallanzani
- Bambino Gesù Hospital, Rome
- University of Turin
- Mater Domini Hospital, Catanzaro

Hospital antibiotic stewardship (ABS) expert training and network initiative



- To increase the number of physicians and pharmacists with knowledge and skills in rational prescribing and strategic antibiotic stewardship activities in acute care hospitals. To establish a stewardship expert network for exchange of experience, for continuous education, and as forum for cooperative quality improvement projects

In order to increase knowledge and skills in antimicrobial prescriptions at the bedside, we designed a training programme open to hospital physicians and hospital pharmacists. The training curriculum includes 4 training modules (each lasting one week in interdisciplinary groups not exceeding 30 participants) with intensified training in pharmacology and microbiology (module “Basics”), infectious disease practice guidelines (“Fellow”), antibiotic policy, stewardship activities and quality management (“Advanced”) and practical problems and implementation (“Expert”). Each participant must present methods and results of a practical ABS project in her/his hospital and defend it in front of their peers. After completion of the course, the participant is considered a “certified ABS expert”.

During the first 4 years (2010–2013), the programme was financially supported (50%) by the German Ministry of Health and produced >200 certified ABS experts (a total of 46 weekly courses were held). The evaluation of the courses by the participants yielded consistently scores of <2 (scores 1–5, 1=best).

In the second period (2014–2017 another 400 ABS experts will be certified (current number of experts [as of 31 July 2015]: 356). The ABS expert network was set up through an independent website (providing online chat and materials) and annual educational

network meetings (on the European Antibiotic Awareness Day in November) with special working groups on: pharmacoepidemiology & surveillance, stewardship tools and quality indicators.

The network has been discussing, evaluating and formally consenting ABS quality indicators (see Thern et al. *Infection* 2014) and facilitating a study assessing the feasibility of using selected process of care quality indicators in the field of antimicrobial prescriptions and stewardship (publication in preparation).

Timescale: 2010–2013 and 2014–2017

The owners and organisation involved in the project

- Abteilung Infektiologie, Universitätsklinikum Freiburg
- Abteilung Infektiologie, Universitätsklinikum Dresden
- DGI
www.dgi-net.de
- ABS-Expertennetzwerk
www.antibiotic-stewardship.de

Antimicrobial Stewardship Program— Province of Ontario



- › The objective is to optimize the appropriate use of antimicrobials in the hospital setting and standardize data collected in the provincial critical-care information system.

Mount Sinai Hospital and University Health Network, two academic health science centres in Toronto, Ontario, jointly established a robust, well-resourced antimicrobial stewardship program (ASP). Over the course of four years, the program was expanded to five intensive care units (ICUs), effective change management practices were identified and the successes of the ICU project were leveraged to other areas of the hospitals. Overall, strong leadership with clear accountability, and valid, reliable data to monitor progress were identified as the two critical success factors.

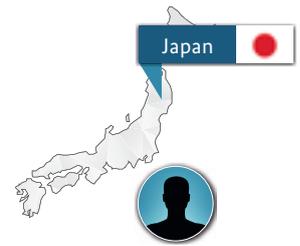
The program has since expanded to 14 academic hospital ICUs, and more recently was leveraged to help community hospitals without in-house infectious diseases specialists to implement ASPs. Three new data fields were introduced into the provincial critical care information system—days of antibacterial therapy, days of antifungal therapy, and ICU-onset *C. difficile*—which will help standardize data collection moving forward. This model—starting with academic health sciences centres, and antimicrobial stewardship experts and leaders who then mentor and develop new experts and leaders—could be copied in other jurisdictions both within and outside of Canada.

Timescale: Since 2009 at Mount Sinai Hospital, and expanding into academic hospitals in the province of Ontario since 2011.

The owners and organisation involved in the project

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Antimicrobial Stewardship



► **Objective:** In the Japanese national fee schedule, incentives are given to promote prudent use of antibiotics. Also, many professional societies have their own certification programmes which contribute to antimicrobial stewardship and human resource development.

A national fee schedule is used to give incentives for prudent use of antibiotics in Japan: healthcare providers must promote the prudent use of broad spectrum of antibiotics and anti-MRSA drugs in order to receive additional reimbursement from insurers. The promotion includes permission for use or notification to an antimicrobial stewardship team or infection control team in each hospital when using antibiotics.

Japan has dedicated the last decade to human resource development to promote antimicrobial stewardship. It is characterised by its interprofessional approach: good collaboration between health professionals is a key to its successful implementation. Pharmacists play an essential role in the stewardship; hence the Japanese Society of Pharmacists started a certification programme and the Japanese Society of Chemotherapy has its own board to train pharmacists.

As for other professionals, the Japanese Society for Clinical Microbiology launched a certification program for “infection control by microbiological technologists.” Infection control doctors and infection control nurses play important roles, too.

An expert panel comprised of members from the government and the Executive Council for Nosocomial Infection issued the “Recommendation on AMR” on April 1st, 2015. It aims at providing

knowledge on AMR to the general public, healthcare providers and policy makers and support the expansion of the stewardship throughout the country. The Japanese government will continue to prevent the proliferation of antimicrobial resistance (AMR).

Timescale: Reimbursement from insurers started in 2012. The establishment of the certification programmes differs among the professional societies.

The owners and organisation involved in the project

- Ministry of Health, Labour and Welfare
- Professional societies

NHSN Patient Safety Component Annual Hospital Survey—Antibiotic Stewardship Practices



- › The National Healthcare Safety Network (NHSN) Patient Safety Component Annual Hospital Survey must be completed by all hospitals upon enrollment and at the beginning of each year. Starting with the 2014 survey, hospitals must answer questions regarding their antibiotic stewardship program. CDC will use this information to better understand the stewardship policies and practices currently used in U.S. hospitals and compare them to CDC’s Core Elements of Hospital Antibiotic Stewardship Programs.**

CDC’s National Healthcare Safety Network (NHSN) is the most widely used healthcare-associated infection (HAI) tracking system within the U.S. NHSN provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate healthcare-associated infections. The NHSN Patient Safety Component Annual Hospital Survey must be completed by all hospitals upon enrollment into NHSN and/or activation of an NHSN component and at the beginning of each calendar year. The survey includes questions designed to gain additional insight on the hospital, including the patient population, size, laboratory practices and capabilities, and infection control practices. This additional information is used by CDC to analyze data reported from the hospital within NHSN in the previous year by estimating the risk of HAIs.

Beginning with the 2014 NHSN Patient Safety Component Annual Hospital Survey completed in early 2015, in an effort to improve antibiotic stewardship practices, U.S. hospitals are also required to answer questions regarding their antibiotic stewardship program. These questions are designed to gain an understanding of the antibiotic stewardship policies

and practices currently used in U.S. hospitals and compare them to CDC’s Core Elements of Hospital Antibiotic Stewardship Programs (<http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html>). CDC plans to continue gathering data from future annual surveys to track the improvement of antibiotic stewardship practices over time.

Timescale: annual survey, ongoing

The owners and organisation involved in the project

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http://www.cdc.gov/nhsn/forms/57.103_PSHospSurv_BLANK.pdf

MRSA-Net and Regional MRSA/MDR Networks (Germany)



- **Reduction of MRS (MDR) load in the ambulatory, hospital and nursing home setting by increasing the implementation of guidelines and communication in stakeholder networks.**

MRSA-Net: As MRSA in hospitals and in the community can be a problem in cross-border health care, the European Union-funded EUREGIO MRSA-net project was established in the bordering regions of Twente/Achterhoek, Netherlands, and Münsterland, Germany. The main aim of the project is the creation of a network of major health care providers in the EUREGIO and the surveillance and prevention of MRSA infections. A spa-typing network was established in order to understand the regional and cross-border dissemination of epidemic and potentially highly virulent MRSA genotypes. As the reduction of differences in health care quality is an important prerequisite for cross-border health care, a transnational quality group comprising hospitals, general practitioners, public health authorities, laboratories, and insurance companies has been established since 2005 to harmonise the quality criteria for the control of MRSA on both sides of the border.

Regional Networks: MRSA-Net served as a model for the establishment of networks in all German regions since 2008. Beside MRSA, they consider other multi-resistant pathogens. Under the coordination of the public health service partners from all sectors (hospitals, practitioners, nursing-homes etc.) in a region aim to agree on consistent measures in the prevention and control of resistant pathogens. In addition, quality seals make the efforts of participating hospitals transparent. Regular Network meetings ensure an exchange of experience.

Timescale: since 2005

The owners and organisation involved in the project

- regional and local health offices
- MRSA-Net
<http://www.mrsa-net.nl/de/>
- Regional MRSA/ MDR Networks (Germany)
http://www.rki.de/DE/Content/Infekt/Krankenhaushygiene/Netzwerke/Netzwerke_node.htm

German Antimicrobial Resistance Strategy— veterinary issues



- › Reducing the number of antibiotic treatments for fattening animals to the inevitable minimum by improving animal health.
Strengthening prudent use through legal requirements.

The strategy to minimise the use of antibiotics in animal husbandry, implemented through the 16th revision of the German Drug Law, aims at improving animal husbandry and reducing the need for antibiotic treatment by improving animal health.

http://www.bmel.de/SharedDocs/Downloads/EN/Agriculture/AnimalProtection/MedicinalProductsAct-AMG.pdf?__blob=publicationFile

See §§ 58ff of the German medicinal products act http://www.bmel.de/SharedDocs/Downloads/EN/Agriculture/AnimalProtection/MedicinalProductsAct-AMG.pdf?__blob=publicationFile

Timescale: coming into force April 2014

The owners and organisation involved in the project

Legislator

Guidelines— Veterinary Medicine



› Reducing the number of antibiotic treatments for fattening animals to the inevitable minimum by improving animal health. Strengthening prudent use through legal requirements.

In Germany, Guidelines for the prudent use of veterinary antimicrobial drugs have been established in 2000 and revised in 2010 and 2014 (http://www.bundestieraerztekammer.de/downloads/btk/leitlinien/Antibiotika-Leitlinien_01-2015.pdf). They describe the ideal approach for using antibiotics. A deviation from this approach should only be considered in rare, well-justified cases. In any event, the legal provisions have to be respected. These guidelines are meant to be concise recommendations for veterinary practitioners on the prudent use of antibiotics in the treatment of sick animals.

Farmers are addressed by a booklet which deals with the drug law for farmers (<http://shop.aid.de/1575/Arzneimittelrecht-fuer-Nutztierhalter>). It provides answers to all relevant question related to veterinary medical devices, covering definitions, approval requirements, directions for use and documentation obligations for livestock owners. It also addresses the legal provisions for the dispersion of drugs by veterinarians and storage of drugs on the farms.

The manual for the oral administration of veterinary medicines in the livestock sector through feed or drinking water has been revised in 2014 (http://www.bmel.de/SharedDocs/Downloads/EN/Agriculture/AnimalProtection/Leitfaden-Orale-Medikation.pdf?__blob=publicationFile). It describes the requirements for facilities that need to be met for the administration of drugs to livestock by food or drinking water and provides a corresponding checklist.

A manual on the control of bovine mastitis was published by the German Association for Veterinary Medicine (Deutsche Veterinärmedizinische Gesellschaft, DVG).

It describes all steps from taking milk samples via the lab analyses to the treatment options for bovine mastitis (<http://www.dvg.net/index.php?id=1286>).

Timescale: recently updated publications

The owners and organisation involved in the project

Federal Ministry of Food and Agriculture and stakeholders

Beef Quality Assurance Guide for Judicious Use



› The BQA program promotes the responsible use of antimicrobial drugs in beef cattle and develops robust antimicrobial stewardship practices while working to minimize the development of antimicrobial resistance.

The Beef Quality Assurance (BQA) Program (<http://www.bqa.org/>), funded by the Beef Checkoff, is a nationally coordinated, state-specific, voluntary program that provides guidelines for beef cattle production practices, helping every segment of the industry to implement proper cattle management techniques and demonstrates a commitment to quality. An area of ongoing focus within BQA is antimicrobial stewardship. In 1987, cattle farmers and ranchers created the Beef Producers Guide for Judicious Use of Antimicrobials in Cattle and this document has evolved as changes in scientific thinking occurred over the years. The current document contains 14 guidelines for judicious antimicrobial use and can be found at: <http://www.bqa.org/CMDocs/bqa/JudiciousMicrobials.pdf>.

Antimicrobial stewards seek to achieve optimal clinical outcomes related to antimicrobial use, minimize toxicity and other adverse events, work to manage their animals to prevent infections, and limit the selection for antimicrobial resistant strains. BQA influences the management practices of more than 90% of the cattle on feed in the U.S.

The most recent Checkoff-funded 2011 National Beef Quality Audit (performed every 5 years to provide benchmarks for the U.S. beef industry) demonstrated that 9 out of 10 of the respondents reported a working relationship with a veterinarian. Moreover, 74% of the respondents (overall) reported that they always/

usually use written records to track animals that have been given an animal health product. Over 93% of cattlemen within each sector of the cattle industry reported that they always/usually verify withdrawal times for cattle that have received an animal health product. BQA continues to educate cattlemen and women on the judicious use of antimicrobial drugs and directs initiatives to improve antimicrobial stewardship practices.

Timescale: Initiated in 1987 with the development of the Beef Producers Guide for Judicious Use of Antimicrobials in Cattle, BQA antibiotic stewardship represents an ongoing quality assurance component of the larger BQA program for the U.S. beef industry.

The owners and organisation involved in the project

National Cattlemen's Beef Association and the Beef Checkoff

Guidelines of responsible and prudent use of antimicrobials in the livestock sector



- To reduce selection of antimicrobial resistant bacteria or resistance determinants because of use of antimicrobials in livestock animals. To minimize transmission of antimicrobial resistant bacteria or resistance determinants from livestock animals to humans. To preserve the effectiveness of antimicrobials for livestock animals and humans.

The Codex Alimentarius Commission (CAC), set up as the international standard setting body in the WTO' SPS Agreement, established the code of practice and guidelines on AMR issues which recommend the application of risk analysis to AMR issues. CAC also developed a number of recommendations and working principles on risk analysis.

In Japan, the Government follows the risk analysis framework. In practice, the Food Safety Commission conducts risk assessment of individual antimicrobial agents used in the livestock sector, while the Ministry of Agriculture, Forestry and Fisheries (MAFF) implements risk management measures based on the risk assessment results in order to reduce the risk caused by antimicrobial resistant bacteria.

One of the risk management measures is the prudent use of antimicrobials. MAFF published the Prudent Use Guidelines to achieve the objectives mentioned above. The Guidelines point out the following:

1. To keep animals healthy by observing the standards of rearing hygiene management based on the Animal Infectious Diseases Control Law and to prevent infectious diseases by vaccinations or other means.
2. To determine treatment measures based on an appropriate diagnosis by veterinarians including identification of pathogenic bacteria.

3. To choose appropriate antimicrobials with the help of a microbial sensitivity test.
4. To use critically important antimicrobials such as fluoroquinolones only when the primary treatment has been ineffective.
5. To evaluate the efficacy of the antimicrobial treatment within an appropriate period of time and to change antimicrobials if necessary.
6. To share information regarding antimicrobial resistance among all stakeholders.

Timescale: since 2013

The owners and organisation involved in the project

Ministry of Agriculture, Forestry and Fisheries (MAFF)
http://www.maff.go.jp/j/syouan/tikusui/yakuzi/pdf/prudent_use.pdf
 (Available in Japanese)

National Chicken Council Judicious Use of Antibiotics



› The objective of the national chicken council’s statement is to provide a unified position on the judicious use of antibiotics in the United States broiler chicken industry.

The National Chicken Council (NCC), based in Washington, D.C., is the national, non-profit trade association representing the U.S. chicken industry. Our members, consisting of chicken processors, poultry distributors, and allied industry firms, provide approximately 95 percent of the chickens produced in the United States. The chicken industry shares the concern and desire to preserve antibiotics’ effectiveness in both humans and animals. The National Chicken Council supports FDA Guidances #209 and #213, and recognises the responsibility of the industry to implement the recommendations to phase out the use of medically important antibiotics in food animals for growth promotion.

Use of antibiotics in poultry production is low, with administration focused primarily on disease prevention and treatment. One-third of broiler chicken companies currently produce “No-Antibiotics Ever” and/or organic chicken products. All companies are eliminating the use of antibiotics for growth promotion, and most have already voluntarily eliminated antibiotics for this use. Companies are additionally investing in research and development of antibiotic alternatives and husbandry methods to further mitigate antibiotic use on farms.

NCC also supports the FDA’s Veterinary Feed Directive, which will ensure that all antibiotics administered to food producing animals are only done so under the care and prescription of

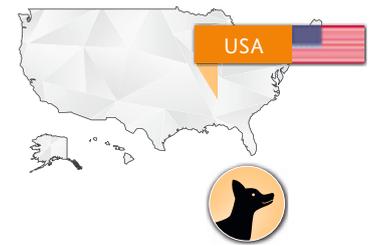
a licensed veterinarian. Proper animal care is under the stewardship of the producer and the veterinarian whom together share the responsibility to carefully protect the effectiveness of all antibiotics. Our core principles are based upon responsible use, transparency, and validation of treatment practices to assure consumers that the greatest care is taken in raising and producing broiler chickens.

Timescale: 3 years (End date: December 2016)

The owners and organisation involved in the project

National Chicken Council
www.nationalchickencouncil.org

TM Drug Residue Avoidance and Best Practice Guide



- › The milk and dairy beef residue avoidance manual is a concise resource to review those antibiotics approved for dairy animals and is also an educational tool and resource for farm managers as they develop their on-farm best management practices necessary to assure responsible and judicious use of antibiotics. Dairy farmers use this manual with their veterinarians and employees to assure antibiotic stewardship as their responsibility to combat antimicrobial resistance.

The National Milk Producers Federation (NMPF), based in Arlington, VA, develops and carries out policies that advance the well-being of dairy producers and the cooperatives they own. The members of NMPF's cooperatives produce the majority of the U.S. milk supply, making NMPF the voice of more than 32,000 dairy producers on Capitol Hill and with government agencies.

Among the measures available to treat and prevent the outbreak and spread of animal diseases among the nation's dairy cattle, the judicious and responsible use of antimicrobial drugs has a positive impact on animal health and well-being while maintaining a safe milk supply for the public.

For more than 20 years, the U.S. dairy industry has focused educational efforts on the judicious use of antimicrobial drugs through the annual publication of a Best Practices Manual. The 2015 edition of the National Dairy FARM Program: Farmers Assuring Responsible Management™ Milk and Dairy Beef Drug Residue Prevention Manual (published in October 2014) developed by NMPF is the primary educational tool for dairy farm managers throughout the country on the judicious and responsible use of antibiotics including avoidance of drug residues in milk and meat. Additionally, the 2015 edition of

the Residue Prevention Manual provides dairy farm managers guidance about the implementation of the federal Food and Drug Administration Guidances for Industry #209 and #213 and the revised Veterinary Feed Directive Rule.

Through the 2016 edition of the Residue Prevention Manual (to be published October 2015), NMPF and the U.S. dairy industry will continue our commitment to the judicious and responsible use of antimicrobials. Additionally, the 2016 edition will include a focus on antimicrobial stewardship.

Timescale: ongoing

The owners and organisation involved in the project

- National Milk Producers Federation
2101 Wilson Blvd, Suite 400
Arlington, VA 22201
www.nmpf.org
- National Dairy FARM Program
www.nationaldairyfarm.com

National Pork Board Antibiotic Stewardship Plan



› The pork industry will continue to support stewardship outreach to our pork producers, veterinarians and consumers to augment our Pork Quality Assurance® Plus program; we will continue to define additional methods to maintain the highest swine herd health status possible to minimize the need for antibiotic use; we will measure success through conducting new research and collecting data to improve our understanding of the optimum role of antibiotics in raising a safe and healthy pork supply.

1. EDUCATION—The National Pork Board will collaborate with allied partners to develop educational materials about the new FDA regulations and antibiotic stewardship. The Pork Board will revise and give added emphasis to antibiotic stewardship in the industry's Pork Quality Assurance® Plus program. This action will ensure that America's pork producers understand the importance of the veterinarian-client-patient relationship and are prepared to implement the FDA regulations.

2. RESEARCH—The Pork Board will make antibiotic use and resistance a top research priority. Since 2000, the Pork Checkoff has invested \$5.3 million in research on the epidemiology of antibiotic resistance, as well as efforts to define alternatives to antibiotic use. The board will invest close to a million dollars of new money in additional research and educational programming in 2016. The Pork Board will work with an advisory group of subject matter experts to objectively review and provide recommendations on Pork Checkoff policies and programs in the area of antibiotic use and resistance. The Pork Board will continue to work closely with federal agencies and other commodity group partners to research and identify models and metrics that will provide value to the pork industry for continual improvement of antibiotic use.

3. COMMUNICATION OUTREACH—Communication regarding antibiotics to all segments of the pork chain will continue to be a main emphasis for the Pork Board, with special emphasis on pig farmers and the new FDA rules. Collaboration with all state pork associations, the American Association of Swine Veterinarians, the National Pork Producers Council, the American Feed Industry Association, land-grant universities and others will coordinate and amplify the National Pork Board's communications efforts.

Timescale: The work coincides with our 5 year strategic plan of which we are now nearing the end of the first year under this plan.

The owners and organisation involved in the project

National Pork Board
 Phone: (515) 223-2600
 Email: info@pork.org
 Web: <http://www.pork.org>
<http://www.pork.org/antibiotics>

Use of Antibiotics in Animals Training Module



- ▶ To promote education and outreach on judicious use of antibiotics in animals through supporting training requirements for accredited veterinarians.

USDA's Animal and Plant Health Inspection (APHIS) Service undertook the creation of a training module, Use of Antibiotics in Animals, through a cooperative agreement with Iowa State University's Center for Food Security and Public Health (CFSPH) in FY 2011 to support training requirements for accredited veterinarians. USDA assembled a broad range of contributors/reviewers from multiple areas of the veterinary and public health world to collaborate on the online and PowerPoint training module.

The objectives of the module include describing how antimicrobial drugs are currently used and providing resources on responsible antimicrobial drug use available to veterinarians. To date, 6,465 hours of training have been logged for accredited veterinarians since 2012 with the module being completed 10,208 times online since 2012. Of USDA's suite of 25 training modules, Use of Antibiotics in Animals is the 8th most popular module. All of USDA's training modules are open to the public without a user name or password, and according to Google Analytics the traffic the online module sustains exceeds that which can be attributed to accredited veterinarians alone.

The module is available at <http://aast.cfsph.iastate.edu/ABX/index.htm> as well as through PowerPoint presentations conducted at multiple veterinary meetings each year. A thumb-drive pdf version of the module is also available for purchase by accredited veterinarians from Iowa State University's Center for Food Security and Public Health (CFSPH) for a nominal cost of production and shipping.

Timescale: ongoing

The owners and organisation involved in the project

USDA

http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/animalhealth?urlile=wcm%3apath%3a%2Faphis_content_library%2Fsa_our_focus%2Fsa_animal_health%2Fsa_vet_accreditation%2Fct_aast

Rules for oral medication of livestock



- › **Strengthening prudent use through legal requirements. In 2015, provisions of the manual for the oral administration of veterinary medicines in the livestock sector through feed or drinking water have become legally binding.**

A recently adopted regulation obliges farmers to ensure that only sick animals are treated with oral medication. Technical dosing devices have to be technically up to current standard and placed as closely as possible to the animals being treated. After the treatment, all technical installations involved in the treatment have to be cleaned.

With the adoption of this regulation the above-mentioned provisions, which are part of the manual for the oral administration of veterinary drugs in the livestock sector through feed or drinking water, have become legally binding.

Timescale: coming into force July 2015

The owners and organisation involved in the project

Legislator

Prescription only for antibiotics in veterinary medicine



- › Reducing the amount of antibiotic treatment of fattening animals to the inevitable minimum by improving animal health. Strengthening prudent use through legal requirements.

In Germany, all antimicrobial veterinary medicinal products are available only on prescription by a veterinary surgeon who in turn is only permitted to hand out prescriptions to owners of animals under his or her care. Over-the-counter sale is prohibited.

The details are laid down in section 56 (medicated feed), section 56a (prescription, dispersion and administration by veterinarians) and section 57 (acquisition and possession by animal owners) of the German drug law (http://www.gesetze-im-internet.de/englisch_amg/medicinal_products_act.pdf) and in the Regulation on veterinary pharmacies (http://www.gesetze-im-internet.de/bundesrecht/t_hav/gesamt.pdf). These legal provisions also refer to the guidelines for the prudent use of veterinary antimicrobial drugs. In short, drugs can only be prescribed for animal species and indications for which they have been approved. Off-label use is possible within the legal provisions.

There is an EU-wide ban on the use of antimicrobial veterinary medicinal products as growth promoters since 2006. Their use as routine prophylaxis when bringing in new animals is not considered as state of the art.

Timescale: ongoing since many years

The owners and organisation involved in the project

Legislator

CHAPTER **4**

Strengthening the surveillance system

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Pages 65, 86 

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-  Human Health
-  Animal Health
-  Human and Animal Health

When addressing specific interventions of infection prevention and control, it is essential to know the extent of antimicrobial resistance as well as how it emerges and spreads. Surveillance systems have been set up in many (industrialized) countries, monitoring antibiotic resistance and antibiotic use, nosocomial infections, and animal health. The data show the dimension of the problem. Together with detailed information obtained by national reference centers, the data also permit an early detection of resistant strains that might pose a threat to public health, and timely interventions. Strengthening these surveillance systems and enabling them to provide timely, accurate, representative and comparable data are a major step in combating AMR.

Pages 68, 77, 81



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Page 67



Pages 70, 71, 72, 73, 74, 75, 76



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Surveillance



› **The UK has made significant progress in improving the quality of the available data to better measure antibiotic use and trends in resistance across the health sector. In 2014, Public Health England Published prescribing data for both secondary and primary care in England for the very first time.**

Building on the adoption of the Global Action Plan on AMR, the UK announced the establishment of the Fleming Fund, a £195m Fund to support the development of surveillance networks and laboratory capacity in low and middle income countries.

The work includes the provision of £3m funding for WHO to sustain and develop momentum around AMR as a global health threat, support countries to develop high quality action plans; develop norms and standards for AMR; and links with agriculture and animal husbandry.

The UK has also strengthened surveillance through a comprehensive surveillance programme in England—the English surveillance programme for antimicrobial utilisation and resistance or ESPAUR, and the Electronic Communication of Surveillance in Scotland (ECOSS)) which tracks prescribing and resistance trends in UK agreed drug/bug combinations and publishes the results.

In the veterinary sector, a report which combines veterinary antimicrobial sales and antibiotic susceptibility of veterinary pathogens was first published in November 2013: the UK Veterinary Antibiotic Resistance and Sales Surveillance report, (UK-VARSS). It is updated and published annually in November. Sales data give an indication of the pattern of use of veterinary antimicrobial

products in the UK and have been published since 1993; Resistance data provides an estimate of the level of resistance in both veterinary and zoonotic pathogens since they have been added to the report in 2013.

UK veterinary surveillance incorporates antibiotic sensitivity testing of bacteria from healthy animals (since 2014) and from clinical veterinary cases (since 1998), and reports the total quantity of antibiotics sold by veterinary pharmaceutical companies (since 2005). These data have been reported together since 2013 in the annual Veterinary Antibiotic Resistance and Sales Surveillance report, (UK-VARSS). The UK is currently working to establish systems for surveillance of antibiotic consumption in animals.

Timescale: Some of the work has been completed. Ongoing work is indicated.

The owners and organisation involved in the project

Department of Health/Public Health England/
Veterinary Medicines Directorate

Canadian Antimicrobial Resistance Surveillance System (CARSS)



- ▶ **CARSS will strengthen the coordination and reporting of AMR and AMU data from animal, agri-food, human health care and community settings to support informed decisions and concrete action on the prudent use of antimicrobials to mitigate diseases.**

The Canadian Antimicrobial Resistance Surveillance System (CARSS) was established by the Public Health Agency of Canada in 2014 to provide a national picture on AMU and AMR and strengthen the coordination of AMR/AMU activities and information on animal and human health held by many stakeholders. Building on existing animal and human health surveillance systems, CARSS represents an important step in the evolution of AMR/AMU surveillance that will use accurate, relevant and timely data to provide an annual, comprehensive, integrated picture of AMR in Canada.

The first CARSS report released in March 2015 included human health data and animal and food AMR/AMU data that is currently produced through the Public Health Agency of Canada's surveillance systems. The second report to be released in March 2016 will enhance the analysis and knowledge translation, while over time more comprehensive animal surveillance information will be incorporated to better reflect a One Health approach.

From a system perspective, the first phase of CARSS focuses on incorporating comprehensive AMR/AMU human health information, while the second phase will incorporate more comprehensive animal AMR/AMU surveillance information. In addition to reporting on the state of AMR and AMU in Canada, CARSS reports will inform the expansion of

surveillance activities to areas of greatest need, and provide useful and relevant information to stakeholders and the public in support of antimicrobial stewardship interventions to further protect the health of Canadians.

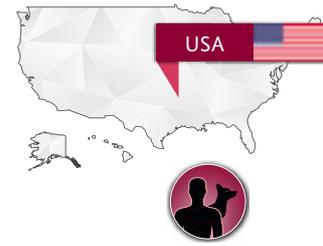
This integrated approach requires significant internal and external review, consultation and planning in order to arrive at a system that reflects valid and credible data to provide an accurate national picture. The work being done by the Public Health Agency of Canada in this area can inform other jurisdictions wishing to enhance AMR and AMU surveillance over multiple sectors.

Timescale: 2014–2017

The owners and organisation involved in the project

Lead: Public Health Agency of Canada,
Dr. Chris Archibald
carss-scsra@phac-aspc.gc.ca
<http://healthycanadians.gc.ca/publications/drugs-products-medi>

The National Anti-microbial Resistance Monitoring System



- ▶ To provide meaningful data to help identify antimicrobial drug resistance in humans and animals, and to provide timely updates to veterinarians and physicians on patterns of resistance, in part through monitoring trends in antimicrobial resistance among foodborne bacteria from humans, retail meats, and animals.

The National Antimicrobial Resistance Monitoring System (NARMS) was established in 1996. NARMS is a collaborative project of state and local public health departments, the FDA, the Centers for Disease Control and Prevention (CDC), and the U.S. Department of Agriculture (USDA). This national public health surveillance system tracks changes in the antimicrobial susceptibility of enteric (intestinal) bacteria found in ill people (CDC), retail meats (FDA), and food animals (USDA) in the United States.

The NARMS program helps promote and protect public health by providing information about emerging bacterial resistance, how resistant infections differ from susceptible infections, and the impact of interventions designed to limit the spread of resistance. NARMS monitors antibiotic resistance among the following four major foodborne bacteria: Salmonella, Campylobacter, Escherichia coli, and Enterococcus. NARMS data are used by FDA to make regulatory decisions designed to preserve the effectiveness of antibiotics for humans and animals. This provides a one health approach to surveillance resulting in information critical for the assessment of resistant bacteria in humans and the food supply.

In December 2013, the FDA announced plans to end the long-term practice of administering medically

important antibiotics to food producing animals for promoting animal growth and increasing feed efficiency, practices based on economic efficiency rather than medical necessity. This judicious use strategy is part of the agency's multipronged approach to preserving the power of antibiotics for treating infectious diseases in humans and animals. By tracking resistance to the antimicrobial compounds affected by this policy, NARMS will play a role in measuring the strategy's impact on overall resistance in foodborne bacteria.

<http://www.fda.gov/AnimalVeterinary/SafetyHealth/AntimicrobialResistance/NationalAntimicrobialResistanceMonitoringSystem/>
<http://www.cdc.gov/narms/>

Timescale: ongoing

The owners and organisation involved in the project

State and local public health departments, the FDA, CDC, and the USDA

EU surveillance of AMR in bacteria from humans and animals



- › The European Union legislation on AMR in the food chain ensures harmonised monitoring systems in the EU, fosters comparability between the member states and facilitates the monitoring of patterns of multi-drug resistance. Through coordination with surveillance in human health, it allows for comparisons between the human and veterinary sectors.**

EU Surveillance of AMR in bacteria from humans:
The European Antimicrobial Resistance Network (EARS-Net) is an EU-wide network of national surveillance systems coordinated by the European Centre for Disease Prevention and Control (ECDC). AMR data in 7 bacterial pathogens are collected by national networks from 900 public-health laboratories serving over 1,400 hospitals. Publication is via an interactive database with maps, graphs and tables, and an annual report. The Food and Waterborne Diseases and Zoonoses Network (FWD-Net) coordinated by ECDC collects data on AMR in Salmonella and Campylobacter infections in humans. Results are presented in the annual “EU Summary Report on AMR in zoonotic and indicator bacteria from humans, animals and food” published by the European Food Safety Authority (EFSA) and ECDC.

EU Surveillance of AMR in bacteria from farmed animals and food:
A revised union legislation, which entered into force on 1 Jan. 2014, lays down minimum requirements for harmonised monitoring of AMR from a public health perspective, combinations of bacterial species/food producing animal populations/food and includes rules for sampling, analysis of the isolates and interpretations of the results. The legislation also includes requirements for harmonised monitoring

and reporting of ESBL-, AmpC- and carbapenemase-producing bacteria in certain animal populations and food types. Reliable and comparable data are essential to assess the sources of AMR, conduct risk assessments and evaluate the impact of the mitigation measures in place. They provide EU reference data on AMR for public health purposes. The network is coordinated by EFSA and results published in the “EU Summary Report”.

Joint Interagency Antimicrobial Consumption and Resistance Analysis (JIACRA):
In 2015, ECDC, EFSA and the European Medicines Agency (EMA) published the first integrated analysis of EU data combined with data on antimicrobial use in animals and humans.

Timescale: multi-annual

The owners and organisation involved in the project

European Commission, DG Health and Food Safety
<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013D0652>

Antimicrobial Resistance Surveillance (ARS)



› **Antimicrobial Resistance Surveillance (ARS) is a laboratory-based sentinel surveillance system with continuous collection of data on antimicrobial resistance for the entire spectrum of clinically relevant bacterial pathogens for both inpatient and outpatient care at national level. The major objective is to provide reference data for public use and specific feedback for participating laboratories.**

Antimicrobial Resistance Surveillance (ARS) was established in 2008 by the Robert Koch Institute (RKI) with funding of the MoH; since 2010 it is a permanent task of the RKI. As a national surveillance system, ARS takes part in the European Antimicrobial Resistance Surveillance Network (EARS-Net).

ARS was designed as a laboratory-based sentinel surveillance system with continuous data collection. Laboratories conducting microbiology testing of samples from medical care institutions participate voluntarily in ARS. They forward results of susceptibility testing as performed during routine diagnostics in standardized format via an electronic interface to the RKI where, after plausibility testing, they are stored in a central database. For participating laboratories ARS provides feedback for individual hospitals as well as an alert system for rare resistance phenotypes.

Proportions of resistance for the 16 most common and clinically relevant bacteria are computed on a yearly basis and made accessible to the public on the ARS website via an interactive database. These data can and should be used as reference data for evaluation on local, regional and national level.

Since 2008 the number of laboratories participating in ARS has increased every year resulting in growing

numbers of healthcare institutions under surveillance (coverage 2014: 346 hospitals which corresponds to 17 percent of all German hospitals; approx. 7,000 practices corresponding to 8.5 practices per 100,000 inhabitants). Participation is voluntary.

The innovative feature of ARS is the completely electronic data flow from laboratory to the central database and widely automated data processing that reduces workload in the laboratory and at the RKI thus allowing for large numbers of participants which is crucial for a country with thousands of health care institutions that should be monitored.

Timescale: ongoing

The owners and organisation involved in the project

Robert Koch Institute
<https://ars.rki.de/>