

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

**Combating Antimicrobial Resistance:
A One Health Approach to a Global Threat – A Workshop**

Agenda

JUNE 20-21, 2017

The National Academies Keck Building
500 Fifth Street NW - Room 100
Washington, DC 20001

Statement of Task:

Through a One Health approach,¹ this workshop will discuss gaps in human, animal, and environmental areas and present the complexities of bridging different sectors and disciplines to address antimicrobial resistance (AMR). A key focus of the workshop will be to explore immediate and short term actions and research needs that will have the greatest impact on reducing AMR. This workshop will feature invited presentations and discussions on topics including:

- The implications and impact on human health of the movement of resistance genes across different ecosystems.
- The AMR burden in humans attributed to: human healthcare practices; the use of antimicrobials in livestock; and, the impact of environmental sources.
- The expected impact of the implementation of FDA guidances 209, 213, and changes to the existing veterinary feed directive (VFD)² that were rolled out in January 2017 and the exploration of key measures determining the future success of these actions.
- The role and effectiveness of stewardship programs in reducing and preventing AMR through changes in the use, prescription, sales, regulation, and manufacturing of antimicrobials.
- The importance of data availability and data sharing to monitor and evaluate strategies' implementation and progress; to maintain the effectiveness of existing drugs; to develop new drugs and diagnostics; and to implement disease prevention strategies including vaccine use and the adoption of alternatives to antibiotics to better understand the clinical value and patient outcomes.
- The need of collaboration and coordination mechanisms across the One Health domains for prevention, control, and research and development of new antimicrobials, other therapeutics, diagnostics, and disease prevention strategies to combat AMR.

Workshop speakers and discussants will contribute perspectives from government, academia, private, and nonprofit sectors.

¹ One Health is a collaborative approach of multiple disciplines—working locally, nationally, and globally—for strengthening systems to prevent, prepare, and respond to infectious diseases and related issues, such as antimicrobial resistance that threaten human health, animal health, and environmental health, collectively, with an endpoint of improving global health security and achieving gains in development.

² Information on FDA guidance and directives can be accessed at:
www.fda.gov/AnimalVeterinary/SafetyHealth/AntimicrobialResistance/JudiciousUseofAntimicrobials/default.htm.

DAY 1 - TUESDAY, June 20, 2017

9:00 am ET **Opening Remarks**
VICTOR DZAU
President
National Academy of Medicine

The Global Momentum for AMR – Moving from Knowledge to Action
KEIJI FUKUDA
Director and Clinical Professor
School of Public Health, University of Hong Kong

Devising and Prioritizing a Strategy for Immediate Action and Implementation to Combat AMR
DAME SALLY DAVIES
Chief Medical Officer
UK Department of Health

Workshop Overview and Goals
LONNIE KING, *Workshop Chair*
Professor and Dean Emeritus
College of Veterinary Medicine, The Ohio State University

Session I: Key Gaps and Needs in Our Understanding of the Microbial and Genetic Movements Across the One Health Domains

10:00 am **PART A: Strengthening the Knowledge and Evidence Base**

Objectives:

- Review current global and national AMR surveillance programs that incorporate a One Health approach
- Discuss data gaps and quality issues that need to be addressed to leverage, share, and use surveillance data to set quality targets and monitor for:
 - drug resistance in humans and animals; are surveillance systems in place?
 - antimicrobial residues, antimicrobial resistant organisms (AROs), and antimicrobial resistance genes (ARGs) in the environment; and
 - methods and processes for gene transfer across different domains and ecosystems
- Suggest immediate actions based on the evidence to combat AMR

Moderator: Rima Khabbaz, U.S. Centers for Disease Control & Prevention

**20 Years of the National Antimicrobial Resistance Monitoring System (NARMS) –
What Have We Learned So Far and What Is Next?**

PATRICK MCDERMOTT

Director of NARMS

U.S. Food and Drug Administration

**Quality and Gaps in Surveillance across the One Health Domains – Critical and
Immediate Actions**

PAULA J.F. CRAY

Professor and Head of Population Health and Pathobiology

North Carolina State University

Global Perspectives and Challenges for AMR Surveillance in the Environment

JAMES M. TIEDJE

University Distinguished Professor and Director of Center for Microbial Ecology

Michigan State University

11:10 am **Break**

11:20 am **PART B: The Impact of Antimicrobials in the Environment – The Neglected Link**

Objectives:

- Understand the sources and persistence of AROs, ARGs, and antimicrobials in soil, water (including municipal waste systems and pharmaceutical plants), manure, milk from treated cows, and mechanisms of degradation
- Explore techniques to detect AROs and ARGs and measure antimicrobials, assess their risk, and evaluate their impacts on the environment
- Examine the potential impact of AROs, ARGs, and antimicrobials in production processes and waste management on the environment and on human and animal health
- Discuss data needs for policy and minimum standards for regulating run-off and the treatment of residuals
- Explore the feasibility and cost/benefit of environmental monitoring of AROs, ARGs, and residual antimicrobials

Moderator: Jeff Silverstein, U.S. Department of Agriculture

The Interface and Pathways of Gene Transfer Across the One Health Domains

LANCE PRICE

Professor, Department of Environmental and Occupational Health

George Washington University

Environmental Compartments of AMR and Antibiotic Metabolites

ED TOPP

Principal Research Scientist

Agriculture and Agri-Food Canada

WORKSHOP ON ANTIMICROBIAL RESISTANCE

Management Options for Reducing the Transfer of Antimicrobials to the Environment and Ameliorating the Risk

LISA DURSO

Research Microbiologist

Agricultural Research Service, U.S. Department of Agriculture

Pharmaceutical Industry Roadmap to Reduce Environmental Impact from Production of Antimicrobials – What Can Be Done?

STEPHEN BROOKS

Vice President of Global Environment, Health & Safety

Pfizer Inc.

12:45 pm **Lunch Break**

Session II: Social and Behavioral Sciences and Antimicrobial Resistance – Modifying Behavior and Choices

1:30 pm **Part A: Reducing the Use – Achieving Desired Behavior Change through Stewardship Programs, Incentives, and Policy for Responsible Use of Antimicrobials**

Objectives:

- Present exemplars across several stakeholder groups (food producers, hospital workers, consumers, etc.) that have been able to achieve systematic change in reducing the use of antimicrobials and change the prescriptive culture
- Examine strategies and social incentives to improve awareness, acceptability, and behavior change related to antimicrobial use in human and animal health sectors
- Explore alternative options to make responsible use of antimicrobials more desirable than the status quo for food producers
- Review the new FDA policies for conditions of use of medically important antibiotics in food animals
- Discuss stewardship programs in the context of policy and behavior change:
 - Assessment of success for existing stewardship programs in hospital settings

Moderator: Franck Berthe, The World Bank

Pathways to Effective Guidance for Reducing the Use of Antimicrobials in Healthcare Settings

HELEN W. BOUCHER

Professor of Medicine and Director, Infectious Diseases Fellowship Program

Tufts Medical Center

**Animal Health and Welfare Programs and Guidelines for Antimicrobial Usage –
The Gap Between Knowledge and Practice Behavior**

DAVID SJEKLOCHA

Operations Manager of Animal Health and Welfare

Cattle Empire, LLC

**The Changing Paradigm of Antimicrobial Use in Veterinary Medicine – Implications of
the FDA Guidance on Growth Promotion and Changes to the Veterinary Feed Directive**

RANDALL SINGER

Professor of Epidemiology

College of Veterinary Medicine and School of Public Health, University of Minnesota

**Consumer and Retailers Perspectives in the Food Industry –The New Social Value of
Food**

BRUCE STEWART-BROWN

Senior Vice President of Food Safety, Quality, and Live Operations

Perdue Farms, Inc.

3:00 pm

Break

3:15 pm

**Part B: Reducing the Need – Achieving Desired Behavior Change through Prevention
Measures and Education**

Objectives:

- Examine strategies and social incentives to improve awareness, acceptability, and behavior change related to infection control measures in human and animal health sectors
- Discuss professional education and curriculum and determine how to best shape appropriate behaviors in new practitioners and change behaviors in established practitioners
- Explore how the social sciences and implementation research can be better incorporated into a strategy to combat AMR

Moderator: Mary Wilson, University of California, San Francisco

**Enhancing Practitioner Knowledge and Adoption of Infection Prevention and Control
Measures for Both Food and Companion Animal Veterinarians**

H. MORGAN SCOTT

Professor of Epidemiology, Department of Veterinary Pathobiology

Texas A&M University

**Leveraging Behavioral Interventions to Achieve Appropriate Antibiotic Prescribing
Practices in Healthcare Settings**

JEFFREY A. LINDER

Professor of Medicine and Chief, General Internal Medicine and Geriatrics

Northwestern Feinberg School of Medicine

WORKSHOP ON ANTIMICROBIAL RESISTANCE

Educating the Next Generation of Health Professionals – How Will Opportunities for Inter-Professional Education and Learning Make a Difference?

ANDREW T. MACCABE

Chief Executive Officer

Association of American Veterinary Medical Colleges

DARRELL G. KIRCH

President and Chief Executive Officer

Association of American Medical Colleges

4:50 pm

Wrap-up

LONNIE KING, *Chair of Workshop*

The Ohio State University

5:00 pm

Adjourn

5:05 pm

Reception

DAY 2 - WEDNESDAY, June 21, 2017

8:30 am ET

Welcome

LONNIE KING, *Chair of Workshop*

The Ohio State University

**Session III: Reducing the Need for Antimicrobials –
Critical Research and Development Actions**

8:35 am

Objectives:

- Present immediate strategies to accelerate and prioritize basic and applied R&D for vaccines and diagnostics
- Examine products and tools needed to transition from reducing use of to reducing need for antimicrobials in human, animal, and environmental domains
- Explore funding mechanisms and incentives to promote such investment in R&D
- Understand approaches to accelerating innovations

Moderator: Kent Kester, Sanofi Pasteur

Effective Scientific Advances and Promising Research to Reduce the Need for Antimicrobials

Human Health Perspective:

L. CLIFFORD MCDONALD

Associate Director for Science, Division of Healthcare Quality Promotion
U.S. Centers for Disease Control & Prevention

Animal Health Perspective:

TIM JOHNSON

Associate Professor
College of Veterinary Medicine, University of Minnesota

Vaccination to Reduce AMR Burden – How Should We Use Existing Vaccines? What Vaccines Might We Seek to Develop?

KEITH KLUGMAN

Director for Pneumonia
Bill & Melinda Gates Foundation

The Value of Diagnostic Tools to Combat AMR – What Type of Tools Should Be Prioritized?

ELLEN JO BARON

Professor Emerita of Pathology, Stanford University Medical Center
Executive Director of Medical Affairs, Cepheid

Critical Incentive Strategies for Accelerating R&D to Fight Against AMR

GREGORY DANIEL

Deputy Director and Clinical Professor
Duke-Margolis Center for Health Policy, Duke University

10:30 am **Break**

Session IV: Strengthening Partnerships and International Cooperation

10:45 am Objectives:

- Discuss approaches to strengthen partnership and coordination among various sectors and stakeholders and examine how international organizations are working to articulate their own mandates
- Explore financing mechanisms and incentives that have boosted and sustained investments in AMR surveillance and R&D at state and/or country levels
- Explore examples of successful global and national AMR programs and discuss issues and barriers in development and implementation of national action plans
- Review and examine AMR issues in the developing world

Moderator: Peter Sands, Harvard University

WORKSHOP ON ANTIMICROBIAL RESISTANCE

Implementation of the Global Action Plan on AMR at the Country Level – To What Extent Is the Integration with the IHR Core Capacity Building Efforts Possible?

EVELYN WESANGULA

National Focal Point, Antimicrobial Resistance

Ministry of Health, Kenya

Immediate Strategies to Develop or Refine Partnerships:

Partnerships in the Age of Bedaquiline: Successes, Challenges, and the Beginning of the End of Tuberculosis

ROBERT NEWMAN

Vice President and Global Head of Tuberculosis Program

Johnson & Johnson, Global Public Health

Integrating Food Safety, Animal Health, and Plant Health to Improve the Integrity of the Food Supply Chain

ANGELA SIEMENS

Vice President, Food Safety, Quality, and Regulatory

Cargill Protein Group

Regulatory and Policy Frameworks

KATHY TALKINGTON

Project Director, Antibiotic Resistance Project

The Pew Charitable Trusts

Partnerships to Combat AMR

JOHN REX

Chief Strategy Officer

CARB-X

12:45 pm

Lunch Break

**Session V: Moving Knowledge to Action –
Devising and Prioritizing a Strategy for Immediate Action and Implementation**

1:30 pm

Introduction to Session

JAMES HUGHES

Professor of Medicine and Public Health
Emory University

1:40 pm

Group Discussion: Focus on the most impactful, feasible, and immediate actions across the One Health domains

- Purpose to address the critical question: What are the top 3 immediate or short term actions within each of these themes that could result in the biggest impact that is feasible and cost-effective?

Group 1: Surveillance (room 100)

Moderator: Jeffrey Duchin, Public Health, Seattle & King County

Rapporteur: Eeshan Khandekar

Group 2: Stewardship, Infection Prevention & Behavior Modification (room 105)

Moderator: John Rex, CARB-X

Rapporteur: Ayano Ogawa

Group 3: Current Basic & Applied Research & Development (room 101)

Moderator: Emily Erbelding, National Institute of Allergy and Infectious Diseases

Rapporteur: Audrey Thevenon

Group 4: Global Policy & Coordination (room 100)

Moderator: Suerie Moon, The Graduate Institute, Geneva

Rapporteur: Rachel Taylor

2:30 pm

Synthesis and General Discussion

JAMES HUGHES

Emory University

3:20 pm

Closing Remarks

LONNIE KING, *Workshop Chair*

The Ohio State University

DAVID RELMAN, *Chair of the Forum on Microbial Threats*

Professor of Medicine and of Microbiology and Immunology
Stanford University

3:30 pm

Adjourn