Antimicrobial Resistance: Challenges for Agriculture and Health

"Infectious Disease, Human Health, and Agriculture"

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Objectives

Quick Review – Complex and “Wicked” Problem

Where are we today?

A landscape of change and opportunity

Summary of PCAST Report – “Combating Antimicrobial Resistance”

Issues pertinent to agriculture

One Health framework; linking animal health/public health

Where should we be tomorrow? A Plausible Future

Conclusion: Recommendations to “Bridge the Gap Between Today and Tomorrow”

Where Are We Today

- A crisis – WHO and CDC proclamations
- Antimicrobial resistance is a complex, multifaceted, and “wicked” problem
- CDC estimates of the consequences
- Antimicrobial resistance includes social, political, economic dimensions in addition to health
- Antimicrobial resistant pathogens considered as new emerging-infectious diseases (1940-2000) 20.9% of 335 EID identified as AMR pathogens)

Where Are We Today

- Lack of good data – use, understanding, linkage
- A growing global health issue
- A topic that can be controversial and polarizing based on the concept of attributable risk
- An inadequate pipeline of discovery and approval of new antibiotics
- Lack of a national integrated and holistic strategy
- Federal investments not commensurate with serious nature of the problem

A Landscape of Change and Opportunity

- FDA Guidances – voluntary elimination of medically-important antibiotics in growth promotion
- FDA changes to Veterinary Feed Directive and increased oversight by veterinarians – prevent, control and treat
- Compliance by almost all animal health pharma
- Significant changes and implication at farm and producer level; a new emphasis on Stewardship and disease prevention
- PCAST Report – Combating antimicrobial resistance
- Executive Order
- Agency's action plans
- Agriculture is a full and necessary partner to achieve success

President's Council of Advisors on Science and Technology (PCAST)

Report on Combatting Antibiotic Resistance

PCAST is an advisory group of the Nation's leading scientists and engineers, appointed by the President to augment the science and technology advice available to him. PCAST often makes policy recommendations to the President on a full range of issues pertaining to the domains of science, technology, and innovation.


Recommendations To Combat Antibiotic Resistance
Appropriate Use of Antibiotics in Animal Agriculture
Effective Global Coordination
Strong Federal Leadership
Effective Surveillance and Response
Improving Stewardship Programs
Economic Incentives to Develop Antibiotics
New Antibiotics
Fundamental Research

Executive Order

- Establish new interagency taskforce to submit a national Action Plan for AMR (2015)
- Create a non-governmental advisory council
- Preserve antibiotic effectiveness
- Strengthen surveillance
- Advance rapid diagnostics and diagnosis
- Advance research for new treatments
- Develop alternative interventions
- Improve global coordination

PCAST Report – Animal Agriculture

- Support FDA guidelines and VFD changes
- Develop and implement effective stewardship programs for both food and companion animals
- Create and deliver educational programs
- Establish a research portfolio and integrated agenda
- Improve surveillance, response, and prevention strategies as part of the national plan
- Develop public-private partnerships and Innovation Centers
- Collaborate and integrate with government agency's AMR plans
- Help lead global AMR plans and programs; OIE, WHO, and FAO collaboration and leadership

PCAST Report – Animal Agriculture (cont)

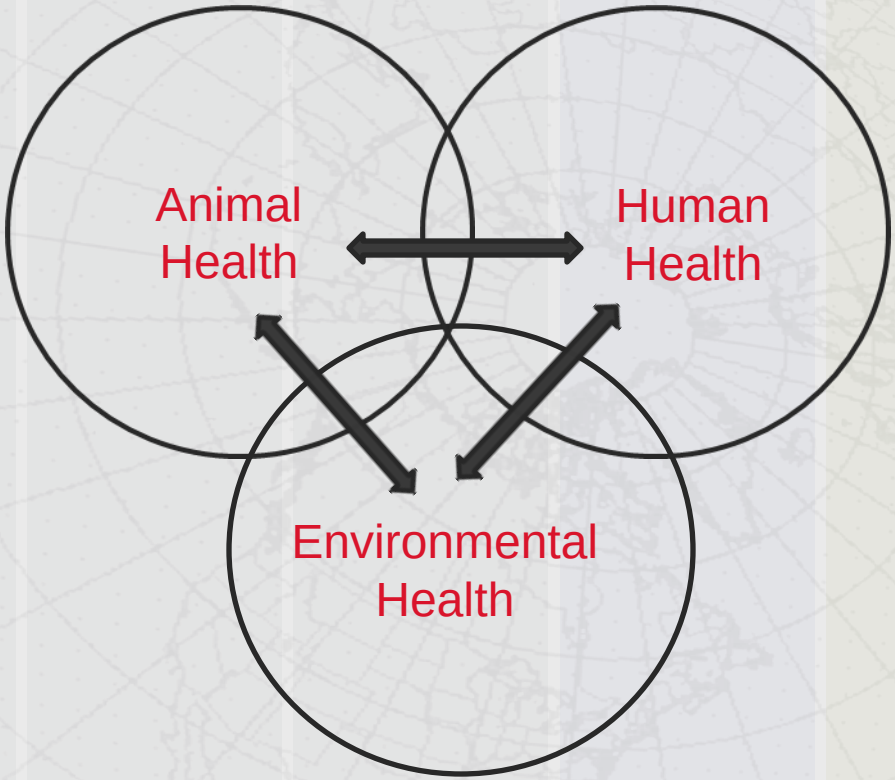
- Emphasize on-farm health management and disease prevention
- Incorporate animal health diagnostic network with public health network
- Improve animal health and infrastructure at the state and local level
- Advocate for new antibiotic development; re-purpose human antibiotics, and develop non-antibiotic interventions to combat bacterial diseases
- Actions and plans need metrics that define success
- Actively participate as a strategic partner in developing and implementing a National Plan of Action

Stewardship

Stewardship is a commitment to always use antibiotics only when necessary to prevent or treat disease, to choose the right antibiotic, and to administer them with the right dose, for the right period of time, and using the right route of administration in every case.

The result is optimizing clinical outcomes while minimizing unintended consequences such as toxicity, selection of pathogens and emergence of resistance. Past efforts implementing stewardship programs inn hospitals have been shown to be effective, improve results and reduce health costs.

Dynamics of One Health Domains



Newton's 3rd Law of Motion: in essence, for every action, there is an equal and opposite reaction.

Antimicrobial Resistance and a One Health Framework

- “Context” – understanding inter-relationships
- Microbial ecology
- Few boundaries exist among 3 domains
- Food as vehicle of dissemination
- Environmental contaminants – water as vehicle
- National surveillance must involve all domains
- Premise: shift up stream to points of origins; new emphasis on prevention; changing interventions


The Future
NEXT EXIT

A New Sense of Urgency

If not now, when?

It not us, who?

What are the consequences of failing to act?

What is the right thing to do?

Where Do We Want to Be

- Successful elimination of medically important antibiotics for use in growth promotion
- Proven on-farm disease prevention strategies being broadly implemented
- Well designed and scientifically-valid stewardship program being implemented across animal agricultural settings and companion animal sites
- A rigorous and integrated R&D agenda focusing on both basic and applied research that incorporates government, university, and private entities
- A significant reduction in the inappropriate and unnecessary use of antibiotics in human, animal, and environmental domains.

Where Do We Want to Be

- Incentives to ensure that new antibiotics and/or alternatives are being developed for public health and animal agriculture
- U.S. officials and experts engaged in global strategies to combat antimicrobial resistance
- Full engagement and participation of agriculture in Executive Order/PCAST recommendations
- Metrics for goals and defining success, adequate funding and a bias toward action and execution are in place
- Build in opportunities for assessment and adjustments
- Proof of Concept: what works and what doesn't?

Recommendations

Reduce – reduce the usage of antibiotics using effective stewardship and educational/awareness programs

Replace – develop alternatives to antibiotics: vaccines; immuno-modulations; hygiene and on-farm disease prevention; R&D agenda

Refine – implement voluntary FDA ban on medically-important antibiotics for growth promotion; veterinary oversight; monitoring/surveillance with new diagnostics; preserve effective antibiotics

Respond – act on PCAST recommendations and agency plans; need for coordination and leadership

Recommendations

Rethink – re-perceive possibilities, roles, and responsibilities, use of One Health framework; common interests vs. old positions – no finger pointing

Relationships- a new bridge between animal and public health; full and respected partnership; expand NARMS, and NAHMS into broader, national activities

Relevant – antimicrobial resistance is a critical national and global health crisis; it cannot be addressed successfully without agriculture; its **BOTH** a human and animal health imperative

Recommit – Effective communications; data sharing; continuous dialogues and improvement; science and evidence-based actions; accountability

Recommendations

Resources – must have adequate funding ($1.2 B in the President's budget)

Roadmap – strategy map from today to a plausible and successful future; objectives, time frames, metrics, leadership and responsible entities, and most importantly Execution - several decades of reports lining our bookcases!

Caveat: "When all is said and done, more always gets said than done."