Antimicrobial resistance II: Situation and strategies in Korea

Food Microbiology division, NIFDS, MFDS

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   1. History of the national AMR management program
   2. Major outcomes of national AMR programs
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II. Resistance rate in retail meats
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Threats of antimicrobial-resistance

Livestock animals
Antibiotic drugs
Infection of AMR
Human

Antibiotic Resistance
from the farm to the table

RESISTANCE All animals carry bacteria in their intestines
Antibiotics are given to animals
Antibiotics kill most bacteria, but resistant bacteria survive and multiply

SPREAD Resistant bacteria can spread to:
- Animal products
- Produce through contaminated water or soil
- Prepared food through contaminated surfaces
- The environment when animals poop

No action today, no cure tomorrow
World Health Day 2011
Threats of antimicrobial-resistance

Origins and channels of contagion

Ministry of Health & Welfare (KCDC)

MAFRA / Ministry of Oceans and Fisheries

Min. Food & Drug Safety

Resistant bacteria

Misuse

Antibiotics

Direct contact

Improper handling or cooking

Horticulture/farming/fishery products

Feces, fertilizers

Food

Environment

People

Feces, disposal of medicines

Medical institutions

Local community

Spreading within medical institutions

Ministry of Environment
History of the national AMR management program
National Antimicrobial-resistance Management Program
(2003-2007)

NVRQS (Ministry of agriculture)
- Monitoring of antimicrobial resistance on the food-animals and meats

Asia Pacific Foundation for Infectious Disease (Samsung Medical Center)
- Control of antimicrobial resistance in hospitals through integrated antimicrobial stewardship program

NFRDI Ministry of marine affairs and fisheries
- Monitoring of antimicrobial resistance for aquaculture and introduction of organic marine production system

Korea Food and Drug Administration
- General management & budget allocation
- Development of network for integrated antimicrobial resistance management
- Construction of information share portal
- Management of expert committee for antimicrobial resistance
- Public relation and education
- Invitation of Codex AMR TF
- Research for foodborne antimicrobial resistant bacteria

Drug resistance Division (KCDC)
- Surveillance of antimicrobial resistant pathogens in community

Seoul National University / Korea University
- Risk analysis of critically important veterinary antimicrobials
- Risk analysis of antimicrobial resistant bacteria

Enterobacteria Division (KCDC)
- 8 Regional Research institute of public health and environment
- Establishment for national FoodNet for antimicrobial resistance

Korea consumer agency
- Antibiotic resistance monitoring for animal farm environment and impact assessment
- Surveillance of antimicrobial resistant bacteria from animal farm environment

Yonsei University (21 University hospital)
- Devising strategies to reduce antibiotic resistance in clinical medicine

Korea consumer affairs institute / Yonsei University
- Survey for awareness of antimicrobial resistance
- Evaluation of the effect of public relation and contents development

Yonsei University / Culture collection of antimicrobial resistant microbes
- Construction of Culture collection of antimicrobial resistant microbes

Kosin University
- Analysis of antimicrobial resistance gene
Non-clinical discussion bodies (2013~2016)

- Monitoring of antimicrobial-resistance in each sector
  after the end of “National Antibiotics-resistance Safety Management Program”
• WHO presented a global action plan and urged national-level actions (2015).

• Developed and implemented the National Action Plan on AMR
One health approach fight AMR (2017~)

- Surveillance of Antimicrobial drug usage
- Interaction and translocation of among Human-animal-environment
- Research on Multi-drug resistance
- Control and treatment
- One health approach to AMR surveillance

Ministry of Environment
Ministry of Health & Welfare
Ministry of Science & ICT
Ministry of Oceans & Fisheries
Ministry of Food & Drug Safety
Ministry of Agriculture, Food & Rural Affairs
Major outcomes of national AMR management programs
Major outcomes of National programs

- **Ban** of adding antimicrobials in **animal feed** *(MAFRA, 2011)*
- Provide **government subsidies** for **organic** live stock farms *(2008)*
- Expansion of **HACCP** certified farms
- Adoption of **seafood traceability** system *(Ministry of Oceans and Fisheries, 2008)*
- Adoption of **mandatory prescription by veterinarians** *(MAFRA, 2013)*
- **Public relation and education** *(2003~)*
- Medicinal waste recovery system *(MoE, 2010)*
Major outcomes of National projects
Major outcomes of public relation & education

- Guidelines for public education

- Educations on animal and aqua farms for prudent use of antimicrobials
Major outcomes of public relation & education

- Public educations (TV shows)

- Public educations (leaflets)
Major outcomes of public relation & education

• Collection and dispose of unused drugs
Future directions

• Establish and implement national antibiotics-resistance management action plan (2016~)

Vision
Reduce the use of antibiotics, use a proper amount, and prevent distribution of resistant bacteria
⇒ Protect the public from antibiotic-resistance.

Target

[Human] - Compared to 2015, by 2020

- Reduce the volume of antibiotics usage by 20%
- Reduce the volume of antibiotics prescription for upper airway infection by 50%.
- Reduce the volume of antibiotics prescription for respiratory diseases by 20%.
- Reduce the resistance of *Staphylococcus aureus* against methicillin by 20%

[Non-human]

- Increase the number of antibiotics items for prescription by veterinarians by two folds
- Chicken: Reduce the resistance to fluoro-quinolone against colon bacteria by 10%
• The Codex *ad hoc* Intergovernmental Task Force on **Antimicrobial Resistance (TFAMR)** established in the Codex Alimentarius Commission (CAC) in 2006

• The 1*st* through 4*th* Codex TFAMR held in Korea (2007~2010)
  – Guidelines on **risk assessment of foodborne antimicrobial resistance**

• The 5*th* Codex TFAMR holding in Jeju, Korea in 2017
  – Revision of **the Code of Practice to Minimize and Contain Antimicrobial Resistance** (CAC-PCP 61-2005)
  – Propose draft **Guidelines on integrated surveillance of antimicrobial resistance**
Resistance rate in retail meats
Domestic vs. Imported (y2017)

E. coli

**Beef**

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**Pork**

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**Chicken**

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Domestic vs. Imported (y2017)

S. aureus

Domestic (n=17)  Imported (n=37)

Resistance rate (%)

Beef

Pork

Chicken

National (n=17)  Imported (n=52)

Domestic (n=31)  Imported (n=52)

Domestic (n=51)  Import (n=41)
Resistance in *E. coli* (domestic beef)
Resistance in *E. coli* (domestic pork)
Resistance in *E. coli* (domestic chicken)
Resistance in *S. aureus* (domestic beef)
Resistance in *S. aureus* (domestic pork)
Resistance in *S. aureus* (domestic chicken)

![Resistance rate (%) over years](chart.png)
Monitoring outcome reporting

- Published integrated, non-clinical national antibiotics usage and resistance statistics report (livestock, farm products, and fishery products)
- Published *via* the website (www.mfds.go.kr)
Conclusion

- Korean government tried to slow down the spread of resistance by “national antimicrobial-resistance management program” started since 2003.

- **National Action Plan on Antimicrobial Residence** in accordance with WHO’s global action plan propositions since 2016 engaged in clinical and non-clinical national programs as part of the **ONE-HEALTH** approach.

- Major outcomes of last 15 yrs of National AMR management Programs include banning addition of antibiotics to animal feeds and introduction of mandatory prescription by vets.

- Due to the ban on mixing in the feed, which resulted in a significant reduction in the usage of **tetracycline**, it turned out that the resistance against this drug reduced significantly.

- MFDS (NIFDS) is planning to continue its role of AMR management, including overseeing non-clinical areas such as livestock, fishery, environment, and foods, to reduce the AMR and ensure proper use of antibiotics.
Thank you!