Antimicrobial Resistance in Community in Viet Nam: Situation and Pilot Solutions

Submitted by: National Institute of Nutrition
AMR in community in Viet Nam: Situation and Pilot solutions

Project for “Determining the Outbreak Mechanisms and Development of a Surveillance Model for Multi-Drug Resistant Bacteria.”

Bui Thi Mai Huong
National Institute of Nutrition, Viet Nam
The Project super goal
The spread of multi-drug resistant bacteria is prevented in Vietnam.

The Project purpose
Research capacity to continuously monitor the multi-drug resistant bacteria is strengthen.

Output 1
The widespread mechanisms of multi-drug resistant bacteria in Vietnam are clarified microbiologically, pharmacologically and anthropologically.

Output 2
A comprehensive monitoring system for antibiotics residues and antibiotic-resistant bacteria over the process from food production to intake is developed.

Output 3
Researchers and technical staffs related to food safety monitoring at the member institutes are trained.
Organization of the project

Joint Coordinating Committee (JCC)

Osaka Univ. (PI)

Joint Coordinating Committee (JCC)

National Institute of Nutrition (PI)

Regional Modules

National Institute of Nutrition

Thai Binh Univ. of Medicine & Pharmacy

Nha Trang Pasteur Institute

Institute of Public Health HCMC

Binh Dien Wholesale Market Com.

Can Tho Univ.

Functional Working Group

Microbiology WG

Pharmacology WG

Anthropology WG

Human Resource Dev. WG
1) To assess actual situations of multi-drug resistant bacteria in targeted area in Viet Nam.

2) To clarify the wide spread mechanisms of multi-drug resistant bacteria.

3) To prevent multi-drug resistant bacteria from spreading in local communities with a public health population approach.

4) To develop a model of monitoring multi-drug resistant bacteria/antibiotic residues in foods.

5) To develop research capacity of researchers related to food safety monitoring in Viet Nam.
Findings
Wide dissemination of drug-resistant bacteria in the community of Vietnam

1. More than 60% of the residents are colonized with ESBL-producing bacteria.

2. More than 50% of the livestock and aquatic food products are contaminated with ESBL-producing bacteria.

3. Most of ESBL-producing bacteria are multi-drug resistant.

4. Residual antibiotics have been found in more than 10% of the food.

5. In rural areas, β-lactam and colistin antibiotics are supplied for treatment of human and backyard chicken, respectively.
Dissemination mechanisms of resistant bacteria

1. Clonal expansion of resistant bacteria is occurred in food/humans and food/patients.
2. Similar resistant plasmids are found in resistant bacteria isolates from different sources.
3. Resistant genes, including CTX-M-55, CTX-M-14 and CTX-M-27, are frequently found in resistant bacteria isolates from different sources, such as food, human and patients.
Solutions
Public health interventions -population approach-

Communication interventions to reduce risk factors of outbreak and spread of antibiotic-resistant bacteria in the community are significantly reduced the prevalence of ESBL-producing bacteria in residents of the community.
Public health intervention to reduce risk factors of outbreak and spread of antibiotic resistant bacteria in the community

**Study site:** Trai hamlet, Chu Minh comm., Ba Vi Dist., Hanoi

Population Bavi district: 265,000; Chu Minh commune: 7,918; Trai Hamlet: 1,000 people

Targeted population: 52 households
1 commune health station
Intervention research protocol

- Epidemiology research
- Risk factors:
  - Improper in washing dish and cooking utensils
  - Not use separately cutting boards and knife
  - Improper in handwashing
  - Using chemicals/drugs for livestock and for human
- KAP research
- Communication Intervention Plan
- Ex/An evaluation
Epidemiology research

Finding the risk factors

1. Improper in washing disk and cooking utensils
2. Not use separately cutting boards and knife
3. Improper in handwashing
4. Using chemicals / drugs for livestock and for human
Result of initial KAP survey

1. KAP about handwashing
2. KAP about using knife / cutting board
3. KAP about washing dish
4. KAP about management / use of livestock manure
5. KAP about management / use human excrement
6. KAP about the use of antibiotics for people
7. KAP about the use of antibiotics for livestock
8. Communication channels available and eager of people to participate with intervention activities.
Communication intervention plan

1. Organize 4 training courses for target groups: household; community leader; stakeholder and 1 TOT course for teacher.
2. Demonstration for hand washing practice, with the supportive from microbiology laboratory staff (NIN).
3. Develop IEC material: Leaflet; In-door poster; Out-door poster; CD/VCD (Audio/Video);
4. Organize the Knowledge / Practice contest about antibiotic resistant bacteria, personal hygiene, environmental sanitation, to use antibiotics properly (for all community and for 2 schools: primary school; secondary school)
5. Socio mobilization: Advocacy meeting; Group discussion and Register participating to the project activities by signing to Commitment Letter.
6. Monitoring/Evaluation: Home visit by health worker using the check list (weekly); Monitoring by NIN and District Health Center (monthly)
Out-door and in-door posters to promote proper hygiene practices

Through public speaker systems, messages from the audio disk has been disseminated to all remaining households in the commune.

Video/audio materials to disseminate knowledge about bacteria, antibiotic resistant bacteria, personal hygiene, environmental sanitation for residents.
Raising awareness of the community through direct communication

- For school pupils, hold a contest about knowledge, practice about antibiotic resistant bacteria, personal hygiene, environmental sanitation, to use antibiotics properly.

- For adults, demonstrate a right hand washing practice (to show and explain what is dirty hand and cleaning hand)
# Evaluation survey after 7 months intervention

## Knowledge on washing hand

<table>
<thead>
<tr>
<th>When should we washing hand (N=52)</th>
<th>Before intervention (%)</th>
<th>After intervention (%)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>After using the toilet (WC)</td>
<td>65.4</td>
<td>86.5</td>
<td></td>
</tr>
<tr>
<td>Before meal</td>
<td>78.8</td>
<td>84.6</td>
<td></td>
</tr>
<tr>
<td>After meal</td>
<td>19.2</td>
<td>25.0</td>
<td></td>
</tr>
<tr>
<td>Before cooking</td>
<td>19.2</td>
<td>51.9</td>
<td></td>
</tr>
<tr>
<td>After cooking</td>
<td>9.6</td>
<td>36.5</td>
<td></td>
</tr>
<tr>
<td>At any time feel hand dirty</td>
<td>61.5</td>
<td>75.0</td>
<td></td>
</tr>
<tr>
<td>After gardening</td>
<td>80.8</td>
<td>57.7</td>
<td></td>
</tr>
<tr>
<td>After cleaning the cage (animal lodging place), houses</td>
<td>38.5</td>
<td>42.3</td>
<td></td>
</tr>
</tbody>
</table>
Prevalence (%) of ESBL- *E. coli* (+) sample

<table>
<thead>
<tr>
<th>Site</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand</td>
<td>2.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Cutting utensils</td>
<td>2.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Cooking bench</td>
<td>2.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Sink*</td>
<td>14.9</td>
<td>34.0</td>
</tr>
<tr>
<td>Toilet</td>
<td></td>
<td>30.4</td>
</tr>
<tr>
<td>Mop</td>
<td>10.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Mean</td>
<td>11.0</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Prevalence of ESBL-*E. coli* at each sampling site was assessed by swab-sampling method.

*p* < 0.05
Reduction of ESBL-\textit{E. coli} carriers

## Prevalence of ESBL-\textit{E. coli} in residents

<table>
<thead>
<tr>
<th></th>
<th>Number of participants</th>
<th>ESBL-\textit{E. coli} positive samples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Pre- intervention**</td>
<td>197</td>
<td>118</td>
</tr>
<tr>
<td>Post- intervention***</td>
<td>193</td>
<td>68</td>
</tr>
</tbody>
</table>

*, Identified by double disc diffusion test, confirmed by PCR

**, as June 2014

***, as Feb 2016
A model surveillance system of antibiotic resistant bacteria for food administration

1. The surveillance system of ESBL-producing *E. coli* and residual ampicillin in food has been established at 3 domestic institutes, including National Institute of Nutrition, Pasteur Institute Nha Trang, and Institute of Public Health, Ho Chi Minh city, as a model system.

2. The system is ready to expand a full-scale system covered multidrug resistant foodborne bacteria in food administration.
A food monitoring system on multi-drug resistant bacteria/antibiotics residues

Responsible institutions

- National Institute of Nutrition, Hanoi
- Pasteur Institute, Nha Trang
- Institute of Public Health, HCMC

Quarterly sampling (4 times per a year) chicken, pork, fish and shrimp from wholesale markets, supermarkets and retail markets.

Check ESBL-producing *E. coli* and antibiotic residues (ampicillin) in foods.
Multi-drug resistant bacteria surveillance model

- Sampling quarterly
  - Manual and worksheets
    - Manual
    - Checklist
    - Data sheets
- Sample preparation
- Analysis
- Result
  - Data entering/summarization
  - Laboratory of Microbiology
  - Laboratory of Chemistry
Prevalence (%) of ESBL producing *E. coli* in food

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All samples</td>
<td></td>
<td>77.8</td>
<td></td>
<td>77.8</td>
</tr>
<tr>
<td>Shrimp</td>
<td>75.0</td>
<td>63.9</td>
<td>44.4</td>
<td>63.9</td>
</tr>
<tr>
<td>Fish</td>
<td>30.6</td>
<td>44.4</td>
<td>55.6</td>
<td>52.8</td>
</tr>
<tr>
<td>Chicken</td>
<td>11.1</td>
<td>11.1</td>
<td>44.4</td>
<td>33.3</td>
</tr>
<tr>
<td>Pork</td>
<td>33.3</td>
<td>0.0</td>
<td>55.6</td>
<td>55.6</td>
</tr>
</tbody>
</table>

Legend:
- *Ha Noi*
- *Nha Trang*
- *Ho Chi Minh city*
Research capacity development

Long term training in Japan

Four Vietnamese PhD students studying in Osaka Univ., Osaka Prefecture Univ. and Tokushima Univ.

Short term training in Japan

Total 34 Vietnamese researchers/technicians completed 13 training courses held in Japan since 2012.

Local training in Viet Nam

Total 120 Vietnamese completed 7 courses held in Viet Nam since 2012.
Thank you for your kind attention!