Public Health Field Experience

Kansas State University

Mindi Russell, MS, MPH
Overview

- MPH/EID Fellowship
- FDA Experience
Investigation of Intestinal Parasitism Among Hispanic Migrant and Seasonal Farm Workers in Eastern North Carolina

APHL/CDC Emerging Infectious Diseases Training Fellowship
MPH Field Experience

EID Mentor: Dr. Julie Ann Kase
Major Professor: Dr. Daniel Y.C. Fung

North Carolina State Laboratory of Public Health, Raleigh, NC 27601
Kansas State University, Manhattan, KS 66506
Background

DHHS – OMH:
- U.S. 4.2 million
- N.C. 108,900 (CDC, 2007)

Farm workers
- Majority foreign-born

Intestinal Parasites
- Endemic in many developing countries

1992 study in NC:
- 20-80% parasitic burden (Ciesielski, 1992)
Research Objectives

Conduct an epidemiological survey of the prevalence of intestinal parasites among:

– Adult Hispanic populations
– Migrant and seasonal farm workers
– Eastern North Carolina
– 2007 planting and harvesting season
Materials and Methods
Collaborators

- NCSLPH — Dr. Julie Ann Kase
- NCSU — Dr. Maria Correa
- NC Community Health Centers (3)
Questionnaires

Administered
  – Verbally
  – Spanish and English

Information
  – Demographics
  – Medical history
  – Working conditions
  – Living conditions
  – Lifestyle / hygiene
Stool Specimen

- Complete questionnaire
- Explanation of stool collection procedure
- Submission of stool specimen
- Parasitic Screening
- Reporting
Ova & Parasite Examinations
Parasites

- Cryptosporidium
- Cyclospora
- Giardiasis
- Taenia
- Entamoeba histolytica
- Ascaria lumbricoides
- Blastocystis hominis
- Ancyclostoma duodenale
Results and Discussion
Of the 71 participants:

- 100% born in Mexico
- 86% male
- 81% between 20-40 years

- Occupations:
  - Tobacco (73%)
  - Fruits / Vegetables (51%)
Medical History: Parasitism

- Mexico
  - Childhood prevalence: 38%

- US
  - Adult prevalence: 3%

- Self-medication
  - Previous: 69%
  - Current: 7%
  - Most common medication: Vormex
Bathroom Facility Availability

At home:
- 78% private toilet
- 7% latrine
- 7% portable

At work:
- 29% private toilet
- 12% latrine
- 44% portable
Living Conditions and Hygiene

Quarters:
- 4-6 people

Hand-washing frequency after bathroom use:
- 96% at home
- 78% at work
- 92% before cooking

Food Service:
- 1% jobs in food service industry while in US
O & P Examinations

Of 16 stool specimens submitted

- Two Positive
  - *Giardia spp.* (1)
  - *Entamoeba coli* (1)

- H2A workers
- Risk of transmission of foodborne parasites
Significance of Research

- Documents prevalence of intestinal parasitism among target population

- Addresses emerging public health concern and threat to food-to-fork continuum: food safety

- Gain better understanding of health and hygiene of farm workers to assess safety and risk of transmission of foodborne parasites from ag commodities to consumers
Detection of *Salmonella* in Foods: Methods Development and Validation

Mindi Russell
Microbiologist

*Office of Regulatory Science*
*Division of Microbiology*
*Microbial Methods Development Branch*
**Salmonella**

- Up to 1.4 million cases per year.
- Infectious dose can be less than 10 cfu.
- Symptoms range from diarrhea to death, with a case fatality rate of 0.6%.
- Up to 2% of culture confirmed cases can develop reactive arthritis (formerly known as Reiter’s syndrome).
Transmission

- Transmitted in foods and through person-to-person contact.

- Meat and eggs are most commonly implicated.

- Outbreaks have been associated with fruit and fruit juices.

- Orange juice, cantaloupes, mangoes, mamey, and tomatoes have all been implicated in *Salmonella* outbreaks.
The Organism
**Salmonella enterica**

<table>
<thead>
<tr>
<th>Serovar</th>
<th>Number of Serovars</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>S. enterica</em> subsp. <em>enterica</em> (I)</td>
<td>1,531</td>
</tr>
<tr>
<td><em>S. enterica</em> subsp. <em>salamae</em> (II)</td>
<td>505</td>
</tr>
<tr>
<td><em>S. enterica</em> subsp. <em>arizonae</em> (IIIa)</td>
<td>99</td>
</tr>
<tr>
<td><em>S. enterica</em> subsp. <em>diarizonae</em> (IIIb)</td>
<td>336</td>
</tr>
<tr>
<td><em>S. enterica</em> subsp. <em>boutenae</em> (IV)</td>
<td>73</td>
</tr>
<tr>
<td><em>S. enterica</em> subsp. <em>indica</em> (VI)</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total (2007)</strong></td>
<td><strong>2557</strong></td>
</tr>
</tbody>
</table>
BAM Culture Method
Salmonella Culture Method

1. Homogenize Food
2. Preenrichment 24 h, 35ºC
3. Selective enrichment 24 h, 35ºC, and 42ºC
4. Selective plating 24 h, 35ºC
Tomatoes
Impact

- 13 Tomato-related outbreaks from 1997-2008
- Thousands of people sickened
- Implicated in 2008 Outbreak
  - may have had involvement early on
Culture Methods

Found that a soak method was significantly more productive than a rinse method

ORA was not finding positive tomatoes even with a better method

Studies to address issue
Inoculation by Injection

- Tomatoes Injected into the Stem Scar
- Tomatoes Injected into the Side
- Two different Serotypes
Inoculation by Immersion

- Tomatoes warmed to ca. 42°C
- Immersed in an inoculum bath at ca. 21°C
- Stirred intermittently for 15 min
- Air dried
- Washed in ethanol
- Stored for 4 days
- Washed in ethanol a second time immediately before analysis
Inoculated Tomatoes
Ethanol Wash
Analysis & Plating
Conclusion

- Additional experiments needed using *S*. Saintpaul and *S*. Weltevreden

- Use fluorescent *S*. Typhimurium to determine the distribution of the pathogen after inoculation
Future

- Continue working in applied microbiology
- Improvement in food safety
Acknowledgements & Thanks

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Barta Stevenson
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