Campylobacter coli - What’s the big deal?

Public Health Laboratory Service
London
United Kingdom
Background

- *Campylobacter* sp. is the most common foodborne bacterial pathogen in the USA. (Mead et al 1999).
- *Campylobacter* sp. is the most common foodborne pathogen in England and Wales. (Adak et al 2002).
Background

- Campylobacters - rarely speciated
- \( C. \textit{jejuni} \approx 90\% : C. \textit{coli} \approx 9\% \)
- Epidemiological studies - \textit{Campylobacter} sp.
  - findings describe the epidemiology of \textit{C. jejuni}
- Epidemiology of \textit{C. coli}
  - poorly described/understood
Do *C. coli* and *C. jejuni* have the same epidemiology?

Case-case comparison

*C. coli* (n=272) vs. *C. jejuni* (n=3489)
**C. coli (n=272) vs. C. jejuni (n=3489)**

<table>
<thead>
<tr>
<th>Exposure</th>
<th>OR</th>
<th>P value</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>0.64</td>
<td>0.029</td>
<td>0.42</td>
<td>0.95</td>
</tr>
<tr>
<td>Summer (50 to 59 yrs)</td>
<td>3.10</td>
<td>0.013</td>
<td>1.27</td>
<td>7.59</td>
</tr>
<tr>
<td>Asians (abroad)</td>
<td>9.70</td>
<td>0.006</td>
<td>1.89</td>
<td>49.73</td>
</tr>
<tr>
<td>Pâté</td>
<td>1.53</td>
<td>0.049</td>
<td>1.00</td>
<td>2.34</td>
</tr>
<tr>
<td>Pâté (50 to 60 yr olds)</td>
<td>0.21</td>
<td>0.05</td>
<td>0.05</td>
<td>1.00</td>
</tr>
<tr>
<td>Meat pies (retired indiv.s)</td>
<td>3.41</td>
<td>0.005</td>
<td>1.45</td>
<td>8.01</td>
</tr>
<tr>
<td>Bottled water</td>
<td>1.45</td>
<td>0.042</td>
<td>1.01</td>
<td>2.08</td>
</tr>
<tr>
<td>Men (abroad)</td>
<td>0.42</td>
<td>0.028</td>
<td>0.19</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Controlling for age & sex
Do *C. coli* and *C. jejuni* have the same epidemiology?

Case-case comparison

*C. coli* (n=272) vs. *C. jejuni* (n=3489)

- Pâté
- Meat pies
- Bottled water
- Ethnicity (travel)
- Seasonality
Aims

To estimate the health impact of indigenous foodborne *C. coli* infection in England and Wales (E&W) in 2000 (population 53M).
Objectives

To derive estimates for the number of:

- Cases of illness due to indigenous foodborne C. coli infection
  - patients presenting to family doctors
  - patients hospitalized
  - patient days spent in hospital
  - deaths
  - patient/healthcare costs
Methods

Laboratory reports of *C. coli* to PHLS/sentinel surveillance data

Data for England and Wales
Methods

- IID (Population) study
- Laboratory reports of *C. coli* to PHLS/sentinel surveillance data
- All illness *C. coli* in England & Wales

Data for England and Wales
Methods

Laboratory reports of *C. coli* to PHLS/sentinel surveillance data

IID (Population) study

Sentinel surveillance data

All illness *C. coli* in England & Wales

All indigenous *C. coli* illness

Data for England and Wales
Methods

- Laboratory reports of *C. coli* to PHLS/sentinel surveillance data
  - IID (Population) study
  - Sentinel surveillance data
  - GSurv Data
- All illness *C. coli* in England & Wales
- All indigenous *C. coli* illness
- Indigenous foodborne *C. coli*
Methods

- Laboratory reports of *C. coli* to PHLS/sentinel surveillance data
- IID (Population) study
- Sentinel surveillance data
- GSurv Data
- IID study
- All illness *C. coli* in England & Wales
- All indigenous *C. coli* illness
- Indigenous foodborne *C. coli*
- Family doctor

Data for England and Wales
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Family doctor

Hospitalizations

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Family doctor

Hospitalizations

Hospital occupancy

Data for England and Wales
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- Laboratory reports of *C. coli* to PHLS/sentinel surveillance data
  - IID (Population) study
  - Sentinel surveillance data
  - GSurv Data
  - IID study
- All illness *C. coli* in England & Wales
- All indigenous *C. coli* illness
- Indigenous foodborne *C. coli*
- Family doctor
- Hospitalizations
- Hospital occupancy
- Deaths
- GSurv Data
- Data for England and Wales
Methods

Laboratory reports of *C. coli* to PHLS/sentinel surveillance data

IID Study

Indigenous foodborne *C. coli*

All illness *C. coli* in England & Wales

Sentinel surveillance data

All indigenous *C. coli* illness

GSurv Data

Family doctor

Hospitalizations

 IID Study

Deaths

HES

Hospital occupancy

Costs

GSurv Data

Data for England and Wales
Results

C. coli infection England and Wales 2000

- 24,560 cases of disease (indigenous foodborne)
- 11,695 patients presenting to family doctors
- 990 hospitalizations (acute phase)
- 5,500 patient days in hospital (acute phase)
- 6 deaths
- Cost $5.25M (acute phase: 1995 prices)
Results - Illness due to IFD

Pathogen: STEC O157, Listeria, NLV, Cl. perfringens, Salmonella, Campylobacter

Cases: 0, 50000, 100000, 150000, 200000, 250000, 300000, 350000, 400000
Results - Illness due to IFD

Pathogen

STEC O157
Listeria
NLV
Cl. perfringens
Salmonella
Campylobacter

Cases

0 50000 100000 150000 200000 250000 300000 350000 400000

C. coli

41600

24600
Results - Illness due to IFD

- Campylobacter
- Salmonella
- Cl. perfringens
- NLV
- Listeria
- STEC O157

Cases

- Campylobacter: 350,000 cases
- Salmonella: 24,600 cases
- Cl. perfringens: 10,000 cases
- NLV: 5,000 cases
- Listeria: 2,460 cases
- STEC O157: 710 cases

S. Typhimurium: 7100 cases
C. coli: 24600 cases
Results - Presentations due to IFD

Pathogen

- STEC O157
- Listeria
- NLV
- Cl. perfringens
- Salmonella
- Campylobacter

Presentations

- S. Typhimurium
- C. coli
Results - Hospitalizations due to IFD

Pathogen

- Campylobacter
- Salmonella
- Cl. perfringens
- NLV
- Listeria
- STEC O157

Hospitalizations

- S. Typhimurium
- C. coli
Results - Hospital occupancy due to IFD

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>S. Typhimurium</th>
<th>C. coli</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEC O157</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listeria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NLV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cl. perfringens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonella</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campylobacter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Days in hospital

0 10000 20000 30000 40000 50000 60000 70000
Results - Deaths due to IFD

Pathogen                  | Deaths
--------------------------|--------
STEC O157                 | 20     
Listeria                  | 60     
NLV                       | 10     
Cl. perfringens           | 90     
Salmonella                | 120    
Campylobacter             | 100    

S. Typhimurium and C. coli
Conclusions

• *C. coli* is a common foodborne pathogen in E&W
• Foodborne *C. coli* infection gives rise to:
  – severe illness
  – high levels of demand for family doctor services
  – high levels of demand for hospital services
  – considerable financial costs to:
    • the families of individuals infected
    • the National Health Service
Conclusions

What we don’t know!

- Risk factors
  - What
  - How many
  - Population attributable risks

- How do we design effective interventions?
Conclusions

We need:

Creative, targeted EPIDEMIOLOGY & MICROBIOLOGY