

Changing age structure of human campylobacteriosis in England and Wales: refining hypotheses for infection.



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- Changing age structure

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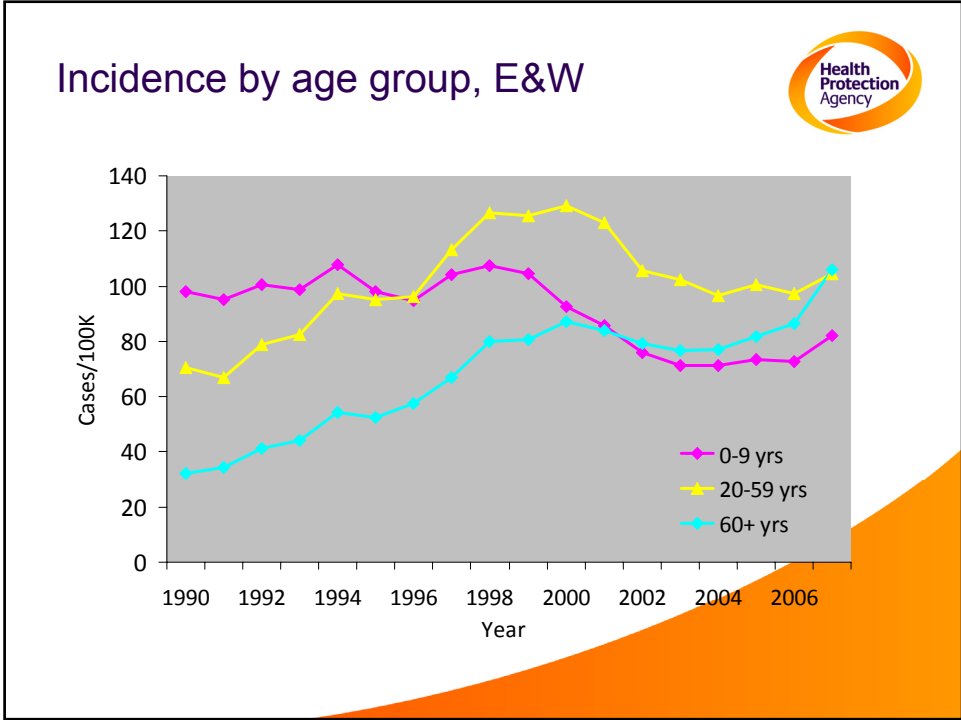
• **Discussion**

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Disease

- **Commonest reported cause of bacterial gastroenteritis**
 - ~56,000 laboratory-confirmed UK cases in 2008
 - ~450,000 community cases
- **Acute enteritis**
 - Diarrhoea, malaise, severe abdominal pain and fever
 - ~10% hospital admission
- **Sequelae**
 - IBS ~25%, ReA 1-7%, GBS one in 5000 cases
 - Death rare



Changes



- **Independent of**

- Gender
- Season
- Geography

- **Not observed for other common GI pathogens**

- Less likely to be a surveillance artefact

→ a sub-set analysis of the recent national case-control study of *Campylobacter* infection in England

National case-control study I



- **1 April 2005 and 30 June 2006**

- **Five Health Protection Units (HPUs) in England**

- **Cases**

- ≥18 years with confirmed *Campylobacter* spp. infection, reported to one of the five HPUs and registered with a general practice.
- Excluded:
 - Foreign travel in the 14 days prior to illness onset
 - Self-reported chronic gastrointestinal symptoms

National case-control study II



- **Controls**

- Frequency-matched to cases based on
 - HPU
 - Age group
 - Gender
 - Month of report
- Selected at random from the local PCT Exeter list

- **Informed consent from both cases and control**

National case-control study III



- **Standard 12 page self-administered questionnaire**

- Demographic, socio-economic and clinical data, as well as exposure to a broad range of risk factors.

- **Double entered into bespoke database**

- **Sample size**

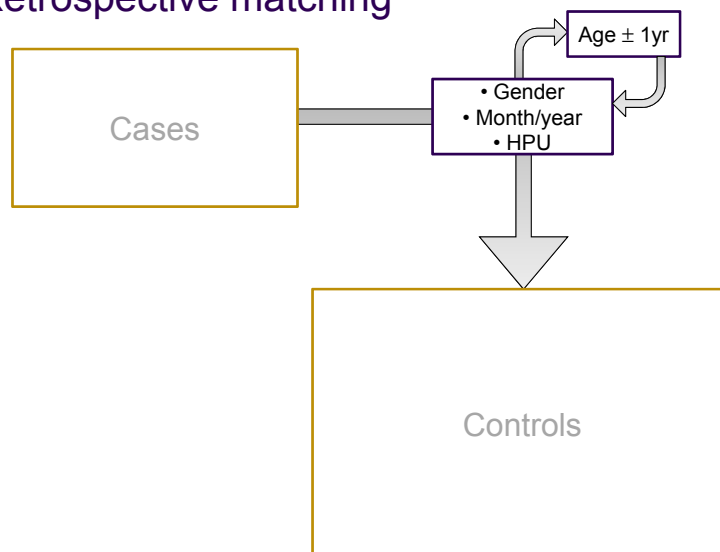
- Assuming 87% of controls ate chicken prior to interview
 - 1,500 cases and 1,500 controls
 - minimum odds ratio of 1.39
 - 0.05 significance level
 - 80% power.

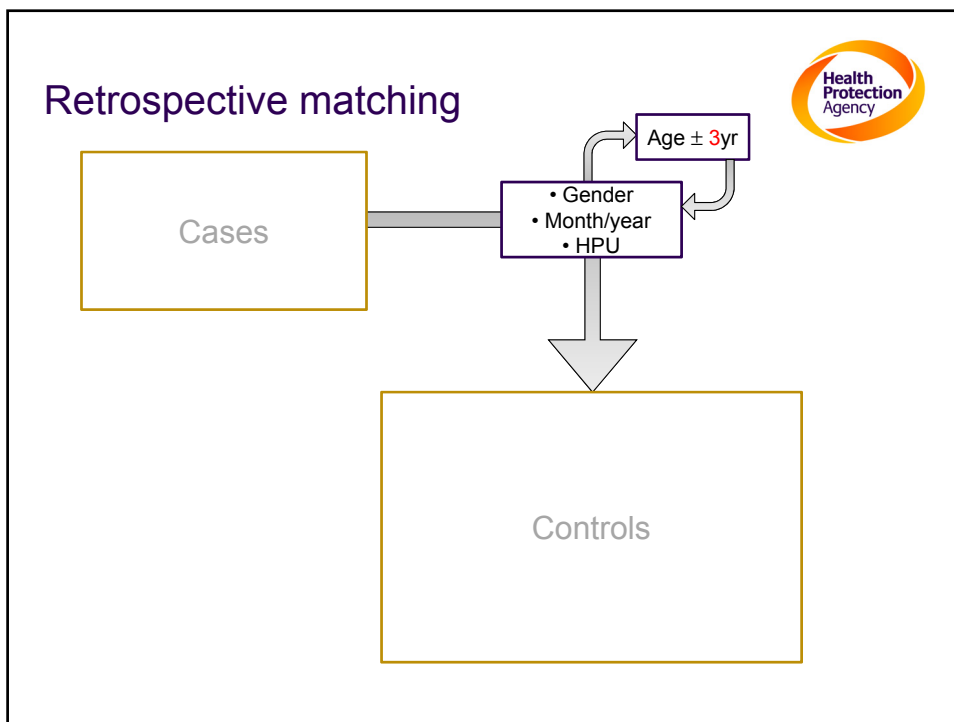
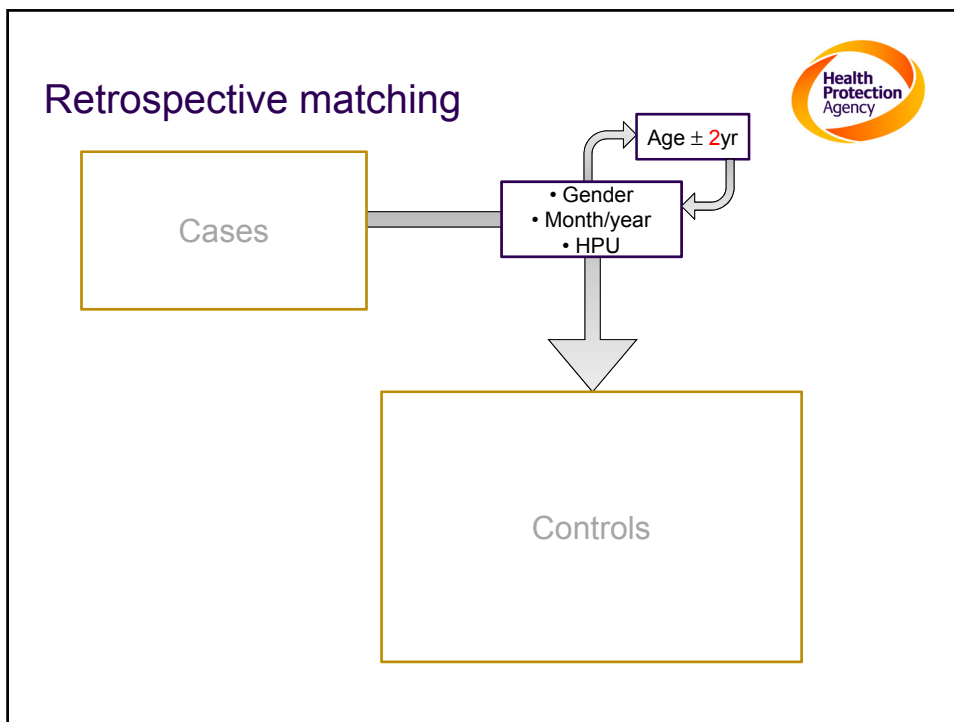
Original data

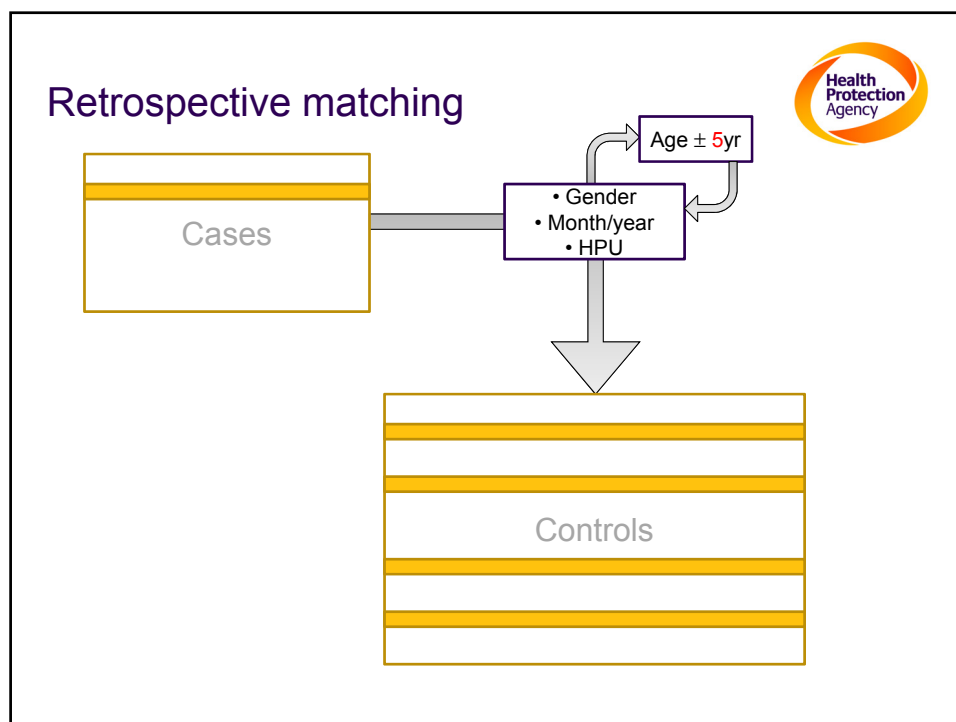
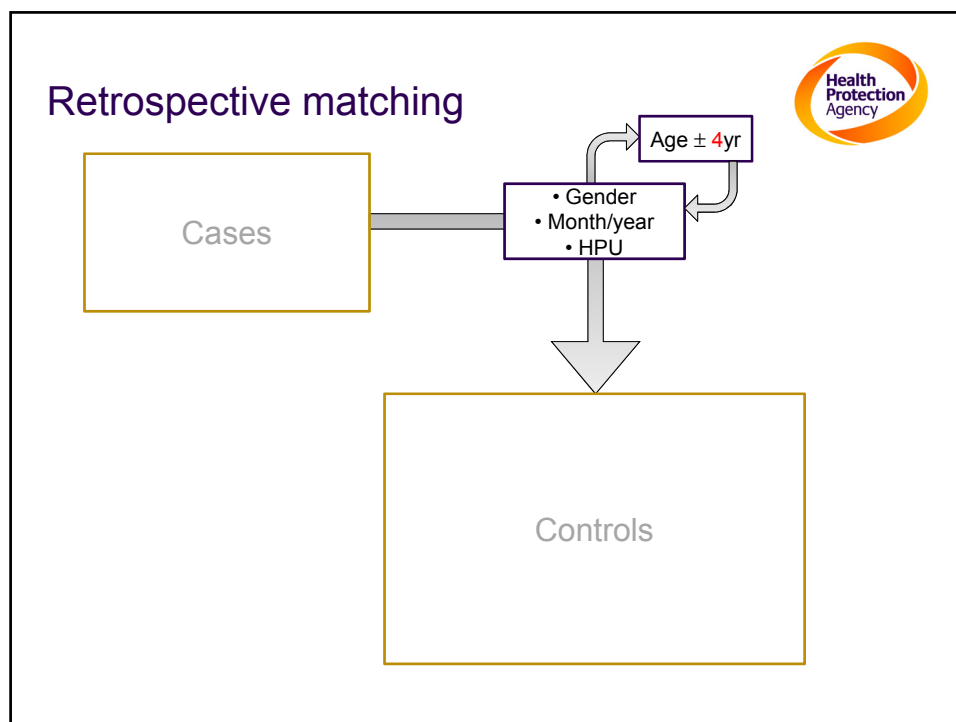


Exposure	OR [95% CI]	P value
Spring	1	
Summer	1.75 [1.48-2.07]	<0.001
Autumn	1.66 [1.40-1.97]	<0.001
Winter	1.55 [1.27-1.89]	<0.001
HPU1	1	
HPU2	0.81 [0.69-0.95]	0.011
HPU3	0.63 [0.49-0.80]	<0.001
HPU4	3.38 [2.43-4.71]	<0.001
HPU5	2.64 [2.20-3.17]	<0.001
Female	1	
Male	1.18 [1.05-1.34]	0.006
<25 yrs	1	<0.001
25-34 yrs	0.80 [0.61-1.05]	0.102
35-44 yrs	0.68 [0.53-0.88]	0.004
45-54 yrs	0.65 [0.50-0.84]	0.001
55-64 yrs	0.76 [0.59-0.98]	0.032
65+ yrs	0.82 [0.64-1.05]	0.121

Retrospective matching







Analysis

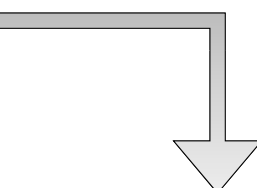


- Stata version 10
- Variables were created or grouped, as required
- Matched Odds Ratios, 95% confidence intervals (CIs) and significance tests calculated using conditional logistic regression controlling for age.

Results



1592 cases:
• 518 (33%) 60+ yrs
• 349 (67%) matched



3983 controls:
• 1184 (30%) 60+ yrs
• 1067 (90%) match

Included cases and controls



Factor	Cases (%)	Controls (%)
<i>Age group*</i>		
55-64	100 (29)	328 (31)
65+	249 (71)	739 (69)
<i>Gender</i>		
Male	183 (52)	578 (54)
Female	166 (48)	489 (46)
<i>Study quarter</i>		
1	110 (32)	302 (28)
2	102 (29)	265 (25)
3	79 (23)	298 (28)
4	58 (17)	202 (19)
<i>Study area</i>		
1	187 (54)	614 (58)
2	96 (28)	277 (26)
3	22 (6)	64 (6)
4	8 (2)	13 (1)
5	36 (10)	99 (9)

*paired t test for Ha: mean#0 P<0.001

Risk factors I



Exposure	mOR [95% CI]	P value
<i>Health Factors:</i>		
Diarrhoeal illness in the previous 12 months	3.1 [1.9-5.2]	<0.001
Omeprazole, Cimetidine or Ranitidine	3.0 [2.0-4.4]	<0.001
IBD/diabetes	1.8 [1.2-2.7]	0.01

Risk factors II



Exposure	mOR [95% CI]	P value
<i>Food, dairy, water or environmental exposures:</i>		
None	-	-

Risk factors III



Exposure	mOR [95% CI]	P value
<i>Food safety practices:</i>		
Chopping board used in the home to hold/cut/process raw chicken	1.4 [1.1-1.9]	0.02
Knife or other utensil used in the home for cutting raw chicken	1.6 [1.2-2.3]	<0.001
After handling raw chicken:		
- wash their hands with soap and water	1	
- rinse their hands with water	1.0 [0.7-1.4]	0.96
- wipe their hands with a cloth/apron	1.7 [0.9-3.2]	0.11
- continue cooking as normal	3.3 [1.5-7.0]	<0.001

Risk factors IV



Exposure	mOR [95% CI]	P value
<i>Food safety practices:</i>		
After using a cutting board for raw chicken:		
- use a separate chopping board	1	
- wash the chopping board with detergent	1.7 [1.1-2.6]	0.01
- rinse the chopping board with water	2.4 [1.3-4.4]	<0.001
- wipe the chopping board with a cloth	2.9 [1.5-5.6]	<0.001
- continue using the chopping board	2.8 [0.7-11.4]	0.15
After using a knife for cutting raw chicken:		
- use a separate knife	1	
- wash the knife with detergent	1.4 [0.9-2.0]	0.13
- rinse the knife with water	2.1 [1.2-3.7]	0.01
- wash the knife with detergent	1.7 [0.8-3.7]	0.19
- continue using the knife as normal	3.6 [1.0-13.1]	0.05

Risk factors V



Exposure	mOR [95% CI]	P value
<i>Communal living:</i>		
People sharing house:		
- single person	1	
- couple	1.0 [0.7-1.4]	0.93
- >2 people	1.7 [1.1-2.7]	0.03

Caveats



- Subset analysis
 - insufficient statistical power

Exposure	Power
Any poultry or poultry products	10%
- chicken	26%
- at home	43%
- at someone else's home	3%*
- at a barbecue	5%*
- outside the home	NE
- restaurant	7%*
- takeaway	7%*
- poultry other than chicken	3%*

*, Inaccurate; NE, Not Estimatable

Caveats



- Subset analysis
 - insufficient statistical power
- Enquiry period
 - five days preceding interview
 - minimises differential recall bias
 - infection-causing exposures in the 5d before illness but not interview will be missed
- Participation rate amongst cases
 - low (46.5%)

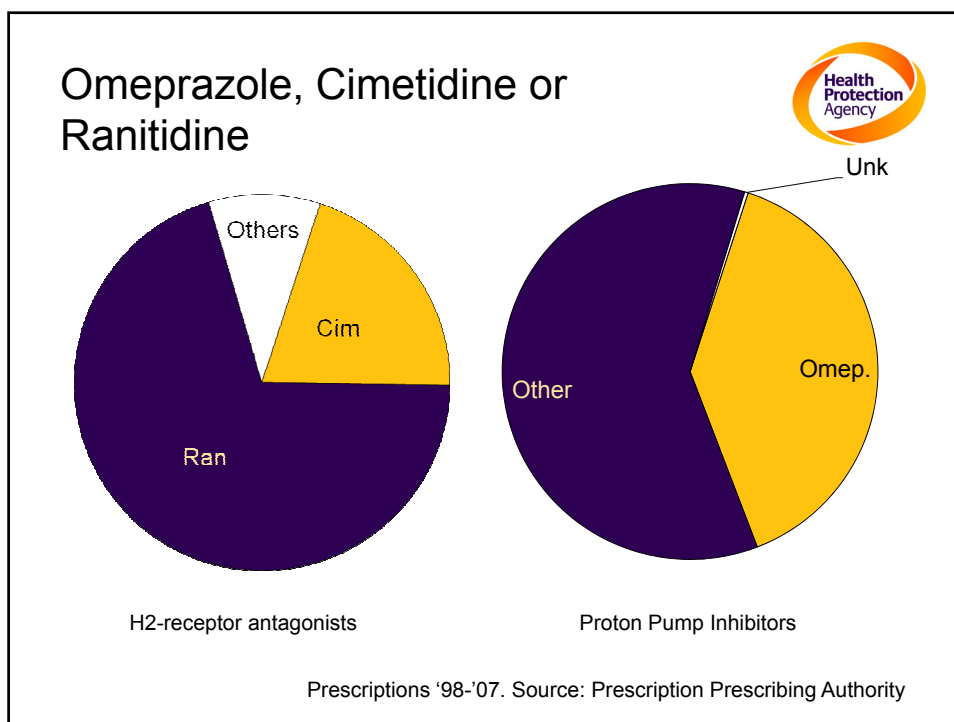
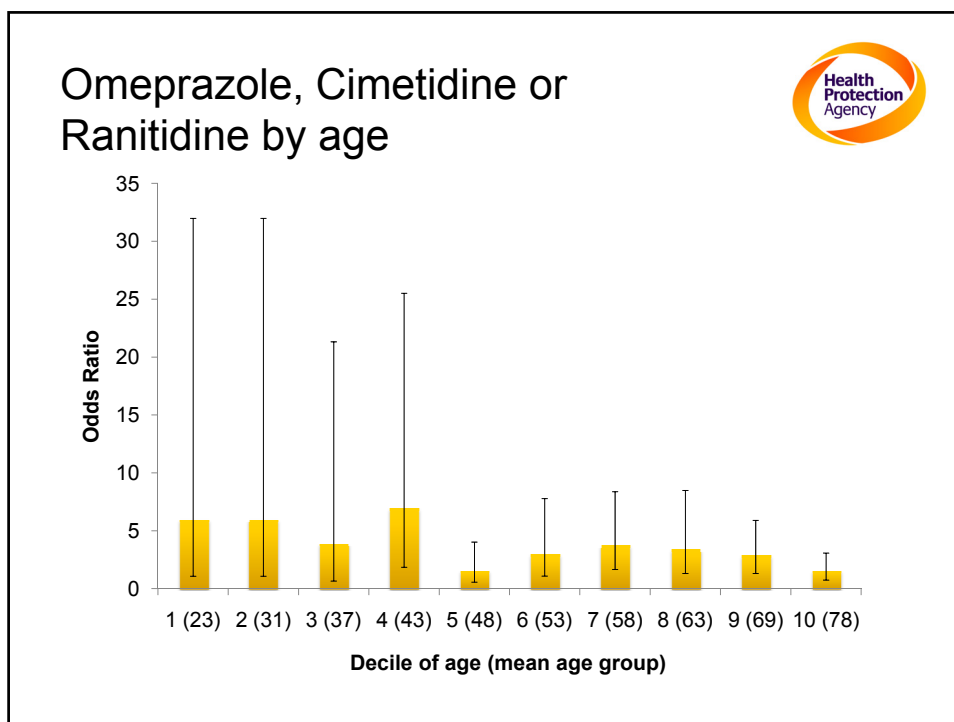
Conclusions

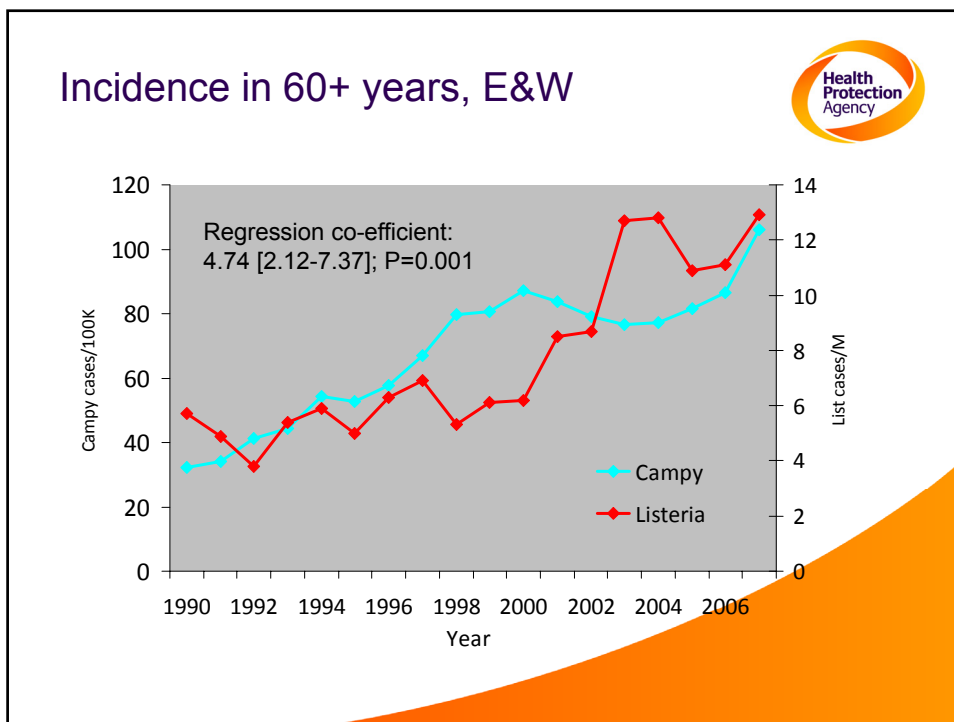
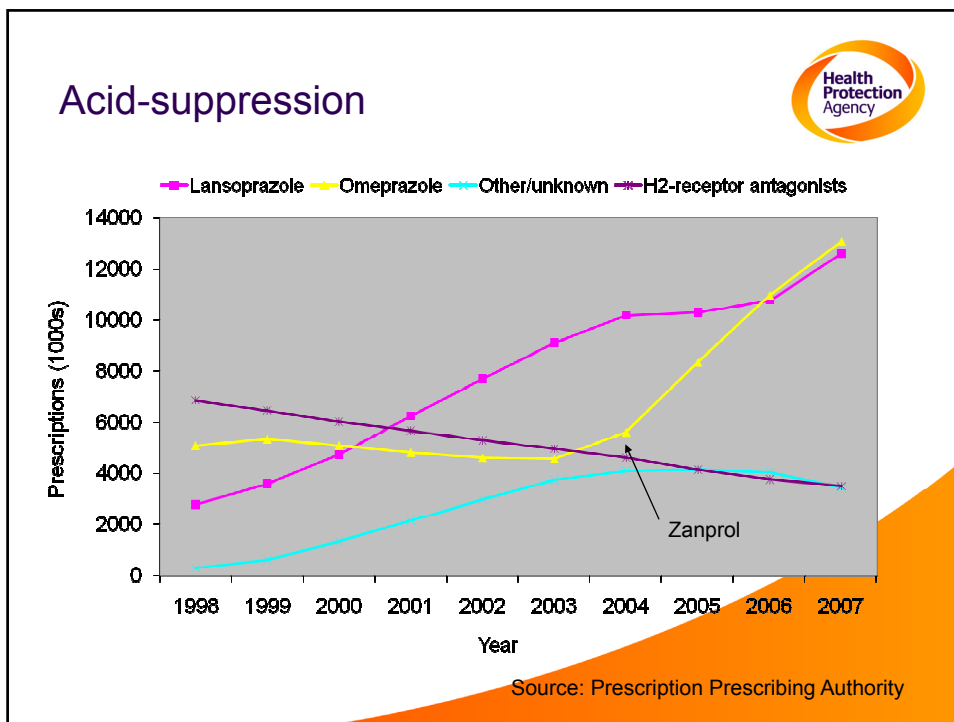


- Risk for older residents of England:
 - general wellbeing
 - food safety practices within the home
- Both amenable to intervention through education

National Food Safety Week, 2009







Bacteraemia (571) vs. CNS (207)



Factor	Odds Ratio (95% CI)
No underlying condition	1
Underlying condition	3.1 (2.0-4.9)
- Malignancy	1.8 (1.3-2.6)
- Digestive Organs	5.6 (1.3-23.9)
- Respiratory and intrathoracic	1.1 (0.4-2.9)
- Lymphoid, haematopoietic & related	0.6 (0.3-1.1)
- Breast	0.7 (0.3-1.9)
- Other known	0.7 (0.3-1.6)
- Uncertain or unknown behaviour	1.7 (0.6-4.4)

Single variable analysis controlling for age

Gillespie et al. *J. Clin Micro.* 2009, in press

Bacteraemia (573) vs. CNS (207)



Factor	Odds Ratio (95% CI)
Immunosuppressives	1.3 (0.8-2.1)
Cytotoxics	2.1 (1.2-3.6)
Steroids	1.0 (0.7-1.5)
Reduced acid secretion	1.7 (1.03-2.8)

Single variable analysis controlling for age

Gillespie et al. *J. Clin Micro.* 2009, in press

Final model



Underlying condition	Red. Acid secretion	Odds Ratio (95% CI)
None	-	1
Non-malig underlying condition	No	1.6 (0.9-2.8)
	Yes	2.9 (1.5-5.9)
Known non-digestive malig	No	3.2 (1.5-6.7)
	Yes	2.6 (1.1-6.0)
Malig of the digestive organs	All	17.5 (4.0-76.7)

Gillespie et al. *J. Clin Micro.* 2009, in press

Conclusions



Increasing life expectancy in the UK

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Increasing 'healthy' life expectancy

→ individuals may spend a greater part of their retirement in poor health

(ONS. Pension Trends, 2009)

→ Tailored and targeted food safety advice is required for older age groups

Thanks



HPUs:

- **Cheshire & Merseyside**
- **Essex**
- **Lancashire**
- **London**
- **Nottingham**