

# The chicken or the egg?

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Eastern Health

# All in a weekend's work...

**Patient 1:  
Patient under General  
Medicine, Ward 2N:  
Salmonella in stool  
(Fri 4<sup>th</sup> Feb; 1017hrs)**



Call micro on extn  
3474 for urgent  
result please

# Patient 1

- 50 y.o. woman presented 2/2/11
- 24 hr hx of nausea, vomiting and diarrhoea
- Fevers and shivers
- Consumed sushi (tuna California roll)  
from Box Hill area 24 hrs prior to sx onset
- O/E
  - Febrile in ED, temperature 38.3°C
  - Generalised abdominal tenderness; no rebound/guarding
- Rx - Ciprofloxacin
- DoH notified

# All in a weekend's work....

**Patient 1:**  
**Patient under General**  
**Medicine, Ward 2N:**  
**Salmonella in stool**  
**(Fri 4<sup>th</sup> Feb; 1017hrs)**

**Patient 2:**  
**Salmonella in BC and**  
**stool; pt on ward 3N**  
**(Fri 4<sup>th</sup> Feb; 1239hrs)**

# Patient 2

- 18 yo woman presented 2/2/11
- 48 hrs of intermittent epigastric cramps/pain, fevers, and bloody diarrhoea
- Watery stools (hourly) – bloodstained
- Presented to ED with persistent diarrhoea, vomiting and fevers
- Seafood nori and California rolls commercially prepared in Box Hill consumed 8 hours prior to sx onset
- Febrile 38.0°C, severe abdo pain in ED → surgical review
- Rx - Ceftriaxone
- DoH notified

# All in a weekend's work....

**Patient 1:**  
Patient under General  
Medicine, Ward 2N:  
Salmonella in stool  
(Fri 4<sup>th</sup> Feb; 1017hrs)

**Patient 3:**  
Reviewed on post  
take ward round (5<sup>th</sup>  
Feb am); presented  
with D&V

**Patient 2:**  
Salmonella in BC and  
stool; pt on ward 3N  
(Fri 4<sup>th</sup> Feb; 1239hrs)



# Patient 3

- 27 yo woman; PHx SLE – on prednisolone presented 4/2/11
- 3 day hx of cramping abdo pain → bloodstained diarrhoea; followed by nausea and vomiting; no oral intake during this time
- Chicken nori rolls purchased from an outlet in Box Hill; consumed 12 hrs prior to sx onset
- Febrile in ED, temperature 37.8°C
  - Ongoing bloodstained stools during admission
  - Voluntary guarding and rebound tenderness in RIF
    - CT abdomen:
      - Caecal and prox. ascending colon bowel wall thickening
      - Fat streaking surrounding caecum
- Notified of Salmonella in stool 7<sup>th</sup> Feb, 1413hrs
- Rx - Ceftriaxone
- DoH notified

# All in a weekend's work....

**Patient 1:**  
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Medicine, Ward 2N:  
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(Fri 4<sup>th</sup> Feb; 1017hrs)

**Patient 3:**  
Reviewed on post-  
take ward round (5<sup>th</sup>  
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with D&V

**Patient 2:**  
Salmonella in BC and  
stool; pt on ward 3N  
(Fri 4<sup>th</sup> Feb; 1239hrs)

**Patient 4:**  
Reviewed on post-  
take ward round (5<sup>th</sup>  
Feb am) with D&V

# Patient 4

- 25 yo woman, presented 4/2/11
- 24 hr hx of vomiting followed by watery diarrhoea (no blood seen); decreased oral intake
- Opening bowels 6-8 times per day
- Chicken California roll consumed 18 hours before illness onset; again purchased from Box Hill area
- Febrile in ED, temperature 37.9°C
  - Abdomen soft, non-tender
- Notified of Salmonella in stool 8<sup>th</sup> Feb, 1041hrs
- Rx – Ciprofloxacin
- DoH notified

Comments at this stage?

# Cases

- Case 1 - *Salmonella typhimurium* cultured from blood and faeces
- Case 2 - *Salmonella typhimurium* cultured from blood and faeces
- Case 3 - *Salmonella typhimurium* cultured from faeces
- Case 4 - *Salmonella typhimurium* cultured from faeces

# *S. typhimurium* type 9 cases



Location	Sex	Age	Suburb	History	Date admitted	Days in hospital
MH	M	10	Ringwood	Fever; D; headache	30/1	2
BHH	M	40	Surrey Hills	2/7 D&V	1/2	2
BHH	F	7	Surrey Hills	2/7 D&V	1/2	0
BHH	M	69	Mont Albert	D&V	1/2	0
BHH (case 1)	F	50	Blackburn	D; fever; +ve BC	2/2	8
BHH (case 2)	F	18	Box Hill	D&V; +ve BC	2/2	8
BHH (case 3)	F	27	Doncaster	Bloody diarrhoea; fever	4/2	7
BHH	F	14	Blackburn North	Collapse; seizure	3/2	4
BHH (case 4)	F	25	Templestowe	D&V; fever	4/2	5
GP	F	20	Box Hill	5/7 D	5/2	0
AH	F	39	Bayswater	D&V	5/2	1
BHH	M	37	Nunawading	D&V	5/2	3
AH	F	27	Boronia	D&V	5/2	2

*BHH* – Box Hill Hospital, *AH* – Angliss Hospital, *MH* – Maroondah Hospital, **Eastern Health**;

*GP* – General Practitioner

# *S. typhimurium* type 9 cases (cont.)

Location	Sex	Age	Suburb	History	Date admitted	Days in hospital
GP	F	42	Balwyn North	D	7/2	0
BHH	M	43	Box Hill	D&V	10/2	1
BHH	F	58	Surrey Hills	D&V	10/2	2
BHH	F	17	Doncaster	Abdo pain	10/2	2
AH	F	76	Forest Hill	Fever; SOB	11/2	7
BHH	F	10	Box Hill	Abdo pain	13/2	4
BHH	F	18	Templestowe	Fever; D; focal neurology	13/2	5
AH	F	18	Ferntree Gully	Fever; D&V; headache	14/2	2
BHH	F	35	Balwyn	Abdo pain	18/2	5

*BHH – Box Hill Hospital, AH – Angliss Hospital, MH – Maroondah Hospital, Eastern Health;  
GP – General Practitioner*

# Salmonella cluster – EH perspective

- 22 people affected (probably more undiagnosed)
- 5 male, 17 female
- Age range 7 – 76, average age 32 years
- 2 documented cases of bacteraemia
- All had *Salmonella typhimurium* 9
- *Total 66 days in hospital!*
- All in-patients referred to ID unit (5) had eaten sushi locally!
- Time delay in case presentations/lab diagnosis may have affected diagnosis of cluster

# Discussion with DoH

- Over 60 cases of salmonellosis reported to DoH in previous 3 weeks, ~50% linked to Box Hill area
- No associations identified
- At this stage sushi venues in Box Hill area remained open

Sushi delivered at lunchtime BHH  
microbiology lab staff meeting  
***Would you eat it?***



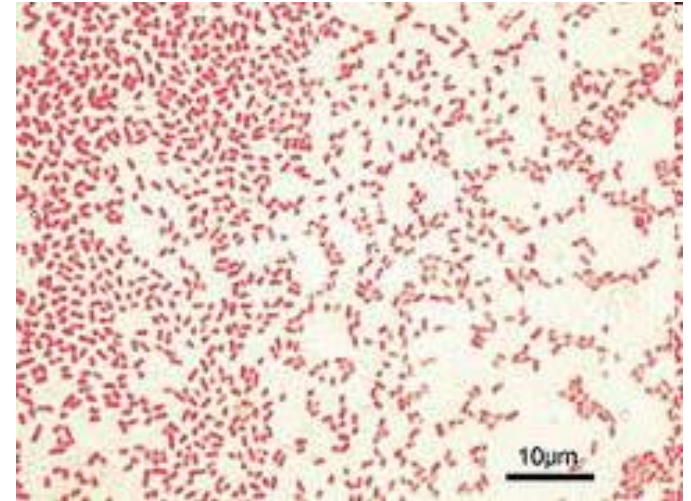
Any questions?

# Discussion

1. *S. typhimurium*
  - Microbiology/lab diagnosis
  - Clinical presentations
  - Foodstuffs/sources implicated in previous local/international outbreaks
  - Rx and resistance
2. Health Service and DoH responses

# *S. typhimurium* - microbiology

- Gram negative bacillus
  - Aerobic; non spore-forming
  - Non lactose fermenter
  - Motile with peritrichous flagellae
- 
- Full serotype determination is used for public health surveillance



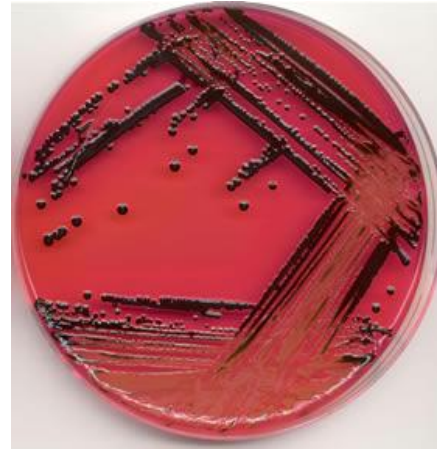
# *S. typhimurium* – lab diagnosis

- Faeces cultured on selective media:



*Salmonella typhimurium*

MacConkey's agar



XLD (Xylose Lysine Deoxycholate) -  
black colonies due to H<sub>2</sub>S production



DCA (Deoxycholate Citrate Agar)

# *S. typhimurium* – clinical presentations

- Median incubation period: ~24 hrs (1)
- Symptom prevalence:

Symptom	Frequency (1-5)
Diarrhoea	70-100%
Lethargy	48-96%
Abdominal pain	82-90%
Fever	41-89%
Nausea	59-71%
Vomiting	32-57%

- Duration of diarrhoea 1-21 days (median 6 days) (3, 5)

1. Communicable Diseases Intelligence; 2010; Vol 34 (3): 329-33
2. Epidemiology And Infection; 2009; Vol. 137 (3): 434-40
3. CDI; 2006; Vol. 30 (4), pp. 449-55
4. Canada Communicable Disease Report; 2000; Vol. 26 (4): 25-8
5. Australian And New Zealand Journal Of Public Health; 1998 Apr; Vol. 22 (2): 243-6

# Implicated foodstuffs/sources

- Local data:
  - Raw egg (inc raw egg mayonnaise and raw egg containing tiramisu) (1-8)
  - Poultry (2)
  - Red meat (2,3,9)
  - Salami (2)
  - Bagged carrots (3)
  - Bakery products (3)
  - Pork buns (3)
  - Commercial fruit juice (3)
  - Milk and milk products (10)
  - Fruit salad (5)
  - Water from rainwater tanks (2)

1. CDI; 2010; Vol 34(3): 329-33

3. CDI; 2006; Vol. 30(4):449-55

5. CDI; 2002; Vol. 26(1): 32-76.

7. Canada Communicable Disease Report; 2000; Vol. 26 (4): 25-8

9. Australian And New Zealand Journal Of Public Health; 1998; Vol. 22(2): 243-6

2. Epidemiology And Infection; 2009; Vol. 137(3): 434-40

4. CDI; 2002; Vol. 26(2): 285-7

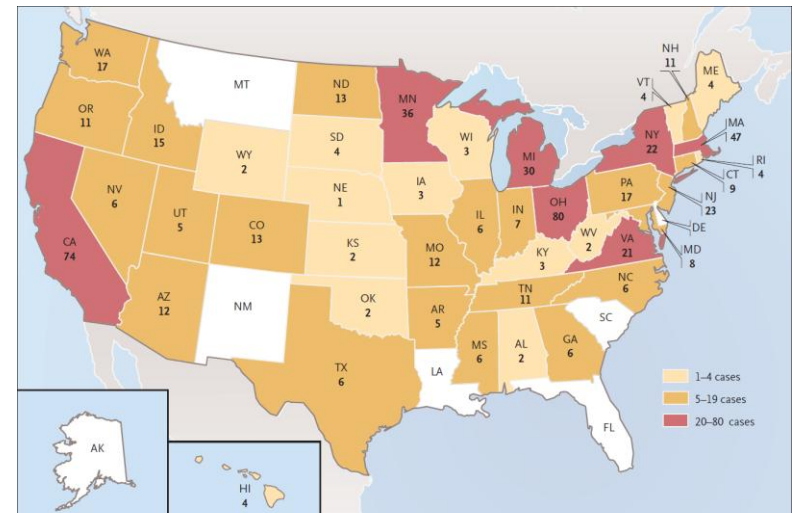
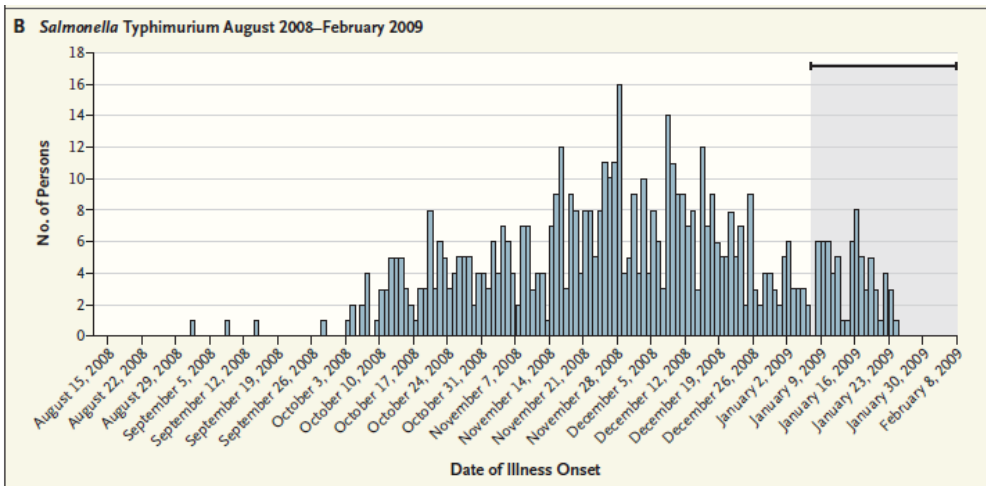
6. CDI; 2002; Vol. 26 (1): 38-9

8. CDI, 2010; Vol. 34 (1): 41-8.

10. Journal of Clinical Microbiology; 2004; Vol. 42(5): 2314-6

# Implicated foodstuffs/sources

- International data:
  - Peanut butter



# Treatment and emerging resistance

- Emergence of resistant strains of *Salmonella* well described
- Resistance to Ciprofloxacin becoming a global concern
  - India – 5.6% resistance rates (1)
  - Taiwan – 2.7% resistance rates (2)
  - Saudi Arabia – 2.3% resistance rates (3)
  - UK – 20% Nalidixic acid resistance (4)
  - Many case studies globally and locally
- Ciprofloxacin may be associated with increased failure rates in overseas-acquired infections, although Ceftriaxone resistance also increasingly described

1. IJMM; 2008; 26(1): 50-53
2. Emerg Infect Dis. 2004; 10(1): 60-68
3. Ann Saudi Med 2004; 24(5): 332-336
4. Emerg Infect Dis. 2011 (epub ahead of print)

# Health Service response

- Isolation of cases in single rooms + contact precautions
- Close liaison with DoH
- Dissemination of information to Eastern Health clinicians
  - ED
  - Gastroenterology
  - General Medicine
  - Infectious Diseases & Infection Control
- Removal of sushi from hospital cafeteria  
*(not implicated in cluster)*
- Phage typing performed at MDU, Melbourne University

# DoH Investigation

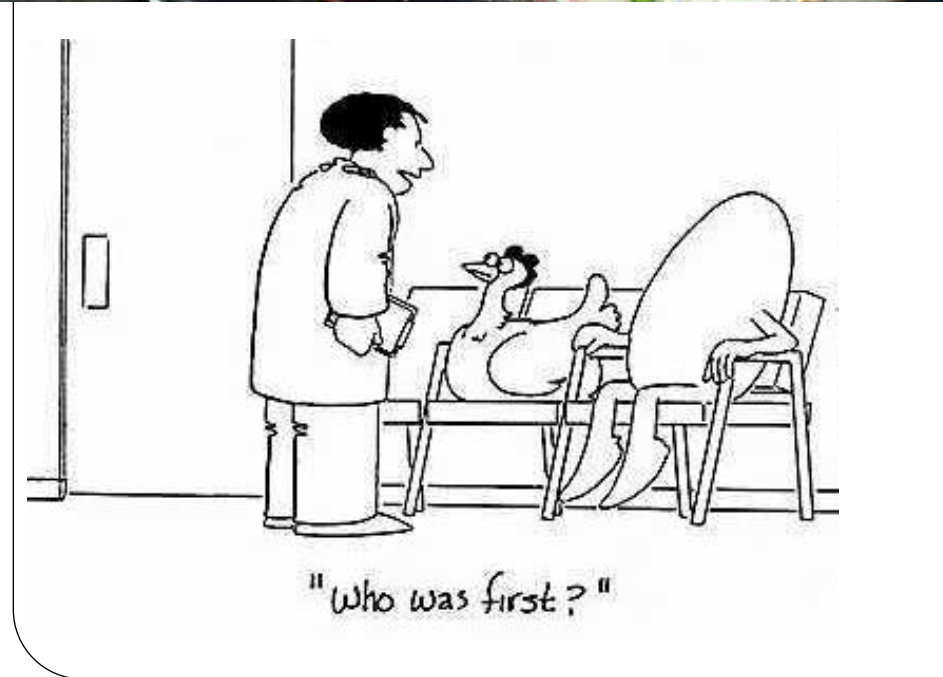
- 1 sushi venue in Box Hill area implicated:
  - Food Safety Supervisor absent due to pregnancy
  - Significant cleanliness issues at venue
  - Council sampling:
    - S.typhimurium 9
      - cultured from most food samples
      - cultured from equipment, inc food processor and sesame seed container
      - Wasabi piping bag -ve
  - Raw egg mayonnaise implicated as likely primary source:
    - Made in 12kg batches; same batch used for up to 7 days
    - Eggs tested (later batch): -ve for S.t9
    - Higher concentration of mayo' in tuna hand rolls and California rolls (mayonnaise-covered gloved hands pushed into rice)

# DoH Investigation (cont.)

- Suspected case: consumed sushi from implicated outlet b/w 27/1 and 7/2
- Confirmed case: above criteria + S.t9 isolated from stool  $\pm$  blood
- Linked to this outlet:
  - 83 ill persons (1<sup>st</sup> case illness onset: 27/1; last case: 9/2 (sushi consumed 7/2))
  - 58 S.t9 cases
  - 18 hospitalised
  - 106 interviewed
  - 2 staff from implicated venue became unwell
- Outlet closed by council (8/2 am); re-opened 1/12 later:
  - New food safety supervisor employed
  - Further staff training
  - Close council observation in initial re-opening period
  - Change of practice

# We're not alone...

- ProMED mail post (April 5<sup>th</sup>):
  - Several egg crates taken from a bakery in Rhode Island have tested positive for salmonella
  - The Rhode Island Department of Public Health tested the crates after 56 people became ill from salmonella. Two persons is believed to have died as a result.
  - All of the people ate zeppoles made by a bakery in Johnston, RI. The bakery stored the pastries in the egg crates.
  - This appears to be another example of how poor kitchen hygiene can spread disease: here the baked pastries were stored in egg crates where raw eggs had been stored



# Acknowledgements

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  - Fiona Devenish
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