Detecting, Managing and Investigating the World's Largest Campylobacter Outbreak

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Acknowledgements

- Health Protection Team HBDHB
- Tiffany Walker – Medical Epidemiologist
- Rachel Eyre, Caroline McElnay
- Many Medical Officers of Health
- Many Health Protection Officers and Drinking Water Assessors
- ESR Health Intelligence Team and Laboratory staff
- Ministry of Health

Overview

- Something’s up
- Managing the outbreak
- On the front line
- Investigating the source
- Restoration of supply and trust
- The way forward in Hawke’s Bay

A Big Storm

Weather bomb drops on Hawke's Bay

6 Aug, 2016 9:08pm

7 minutes to read

Bad weather lashes Hawke's Bay

Hawkes Bay Today
By: Victoria White

A weather bomb has exploded across Hawke's Bay with wild winds, lashing rain and snow to low levels causing road closures, power outages, slips and uprooted trees.

August 12, 2016

Detection of Outbreak- Friday 12th August

- 9.37am Hastings District Council notified Drinking Water Assessor in Public Health Unit by email of indicative E-coli test from a water sample taken on 11 August
- Pharmacy in Havelock North notices increase in people from a rest home with vomiting and diarrhoea
- Three cases of Campylobacter notified by laboratory

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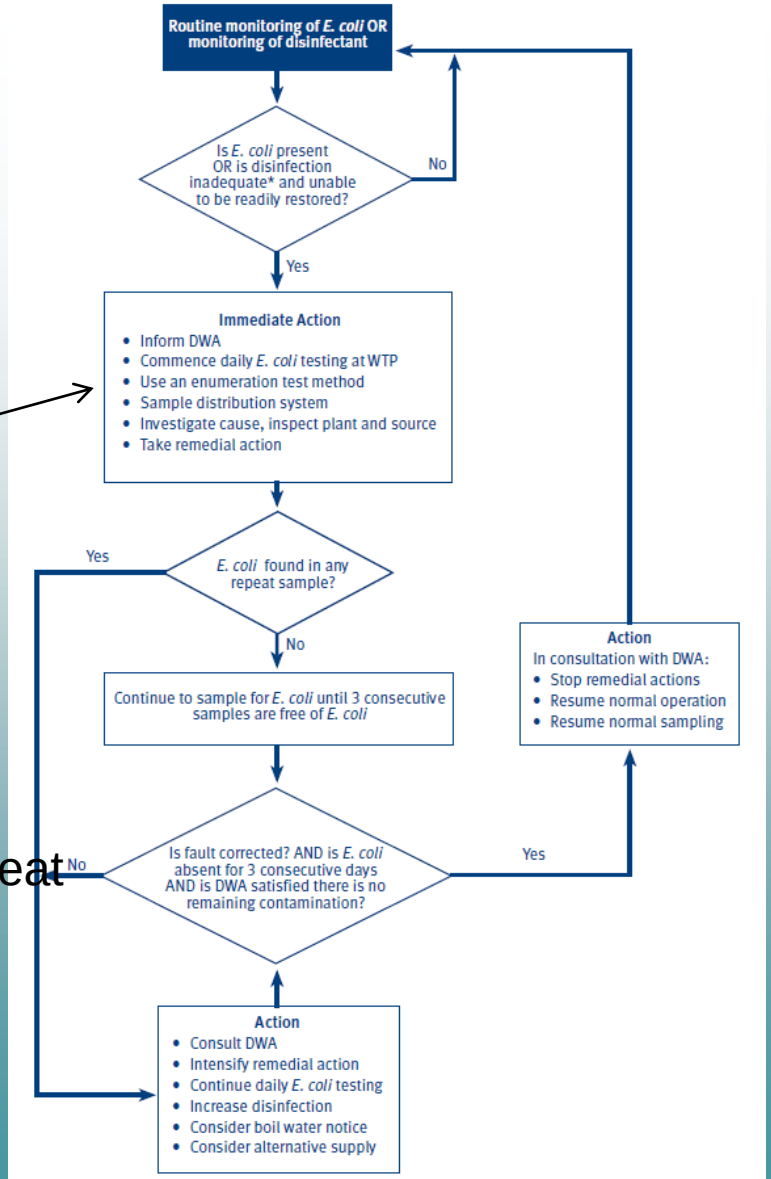
Do more tests if e.coli present

Chlorination if repeat E.coli elevated

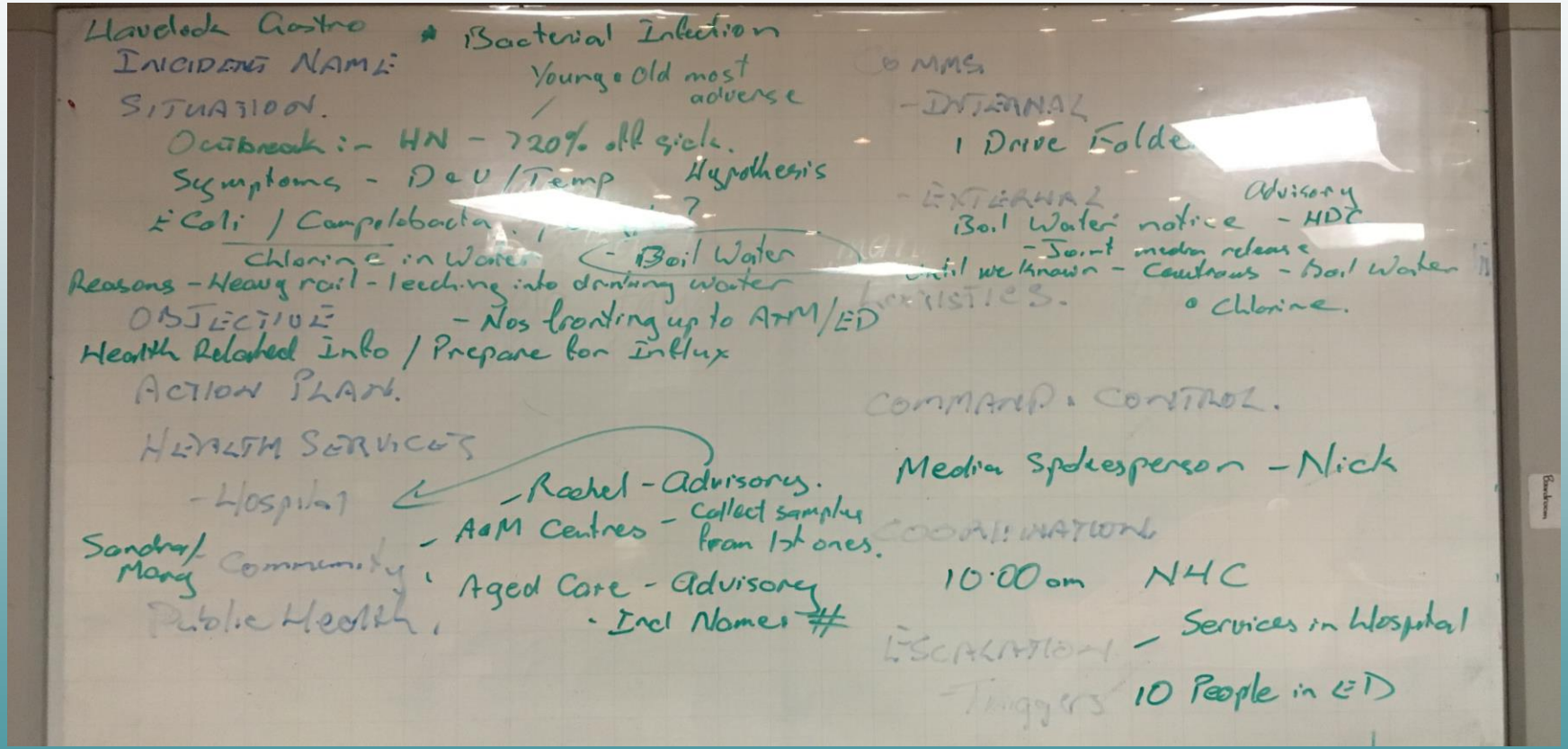


DWSNZ 2005 (revised 2008)

Managing the Outbreak
Friday afternoon and evening

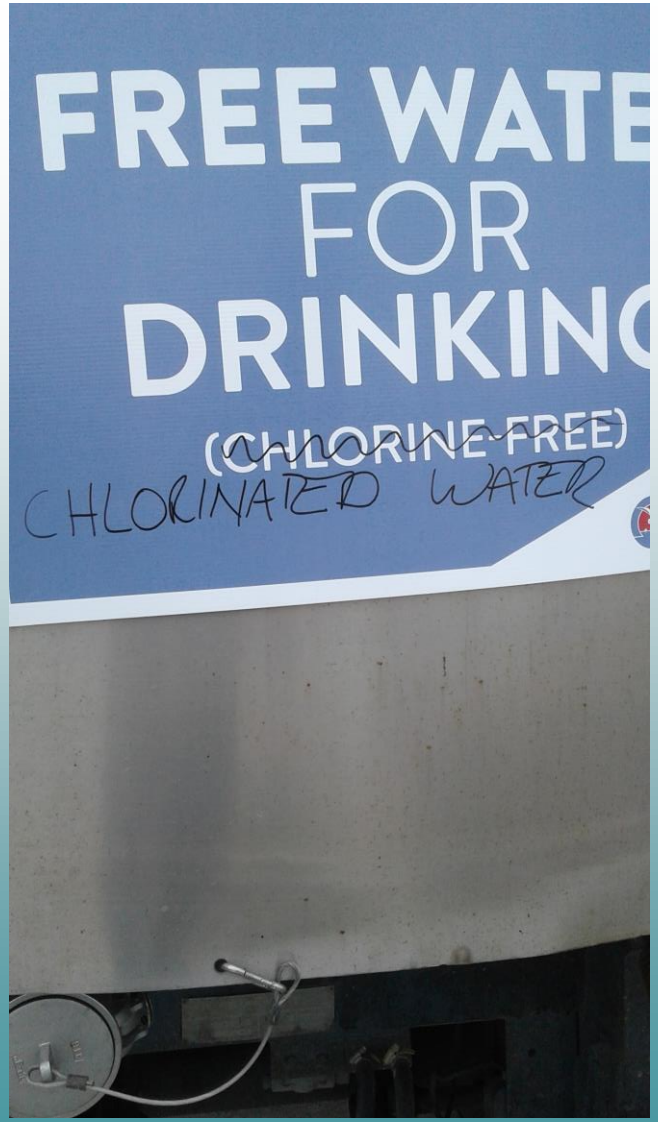
- Meeting between HDC and HBDHB – further calls to schools
- Resample
- Chlorination
- Establish emergency response
- Communication
- Protozoa and Boil Water Notice
- How big is this going to be? (15-20% of population?)

Friday night



Boil Water?

- Protozoa risk?
- How high, how long?
- Getting the message out
- When you can’t boil
- How are you going to know when to stop boiling?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(CHLORINE-FREE)
CHLORINATED WATER


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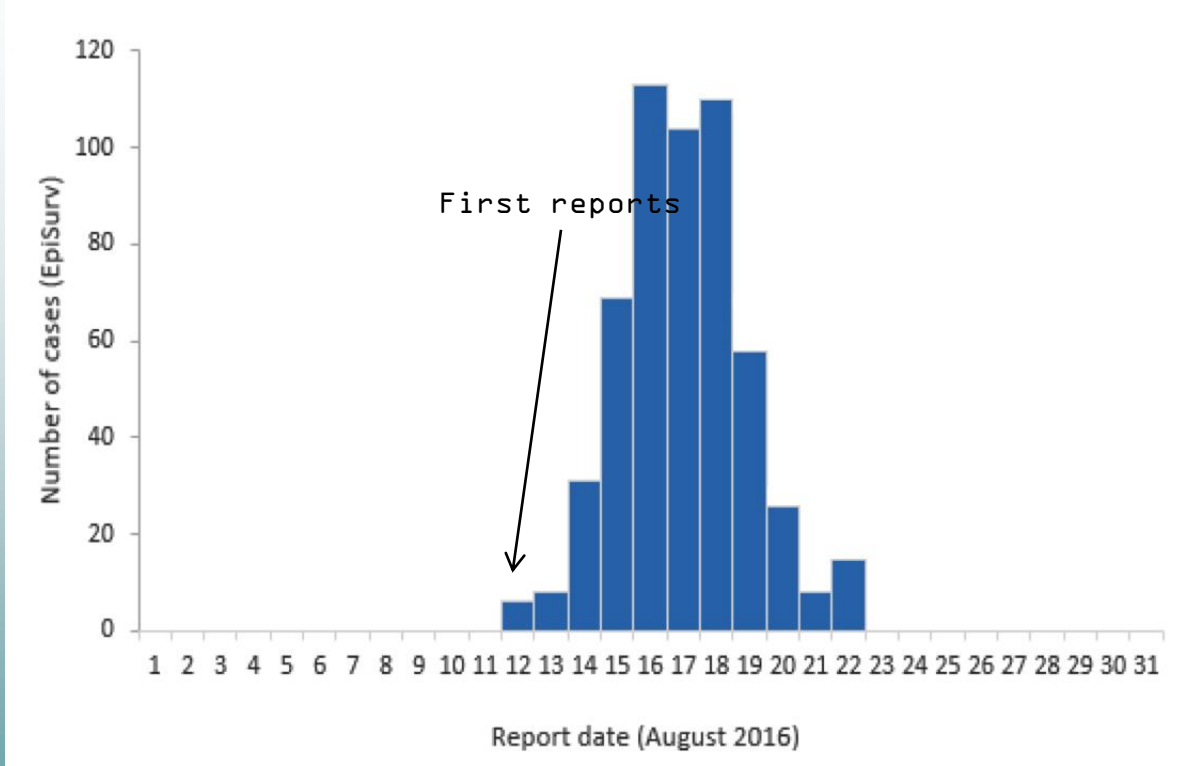
Te Ope Whakaora
EMERGENCY SERVICES.
www.salvationarmy.org.nz
SUPPORT TRAILER
PUMP OPERATION
THE TANK MUST BE
DOWN LETLY FILLED
Turn tap "ON"
water to flo
Please ensure th
turned "OFF" aft

Meanwhile….

Outbreak as we saw it



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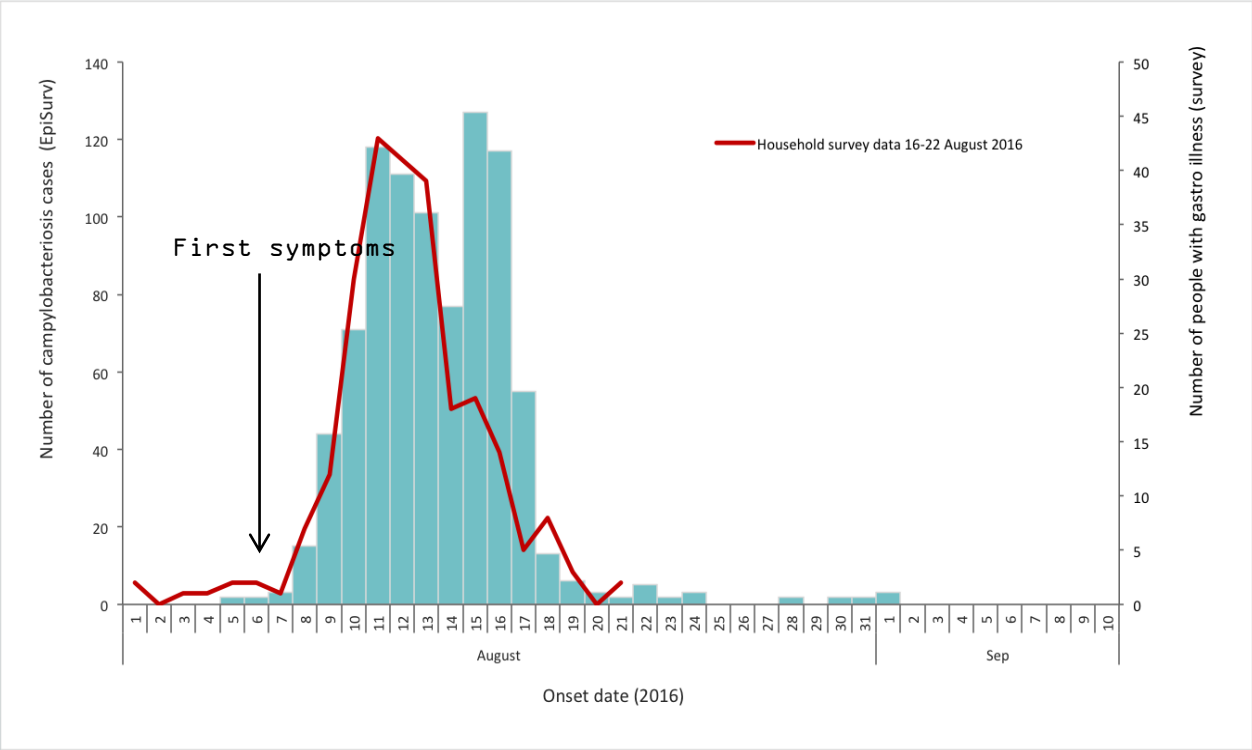
The outbreak as it happened



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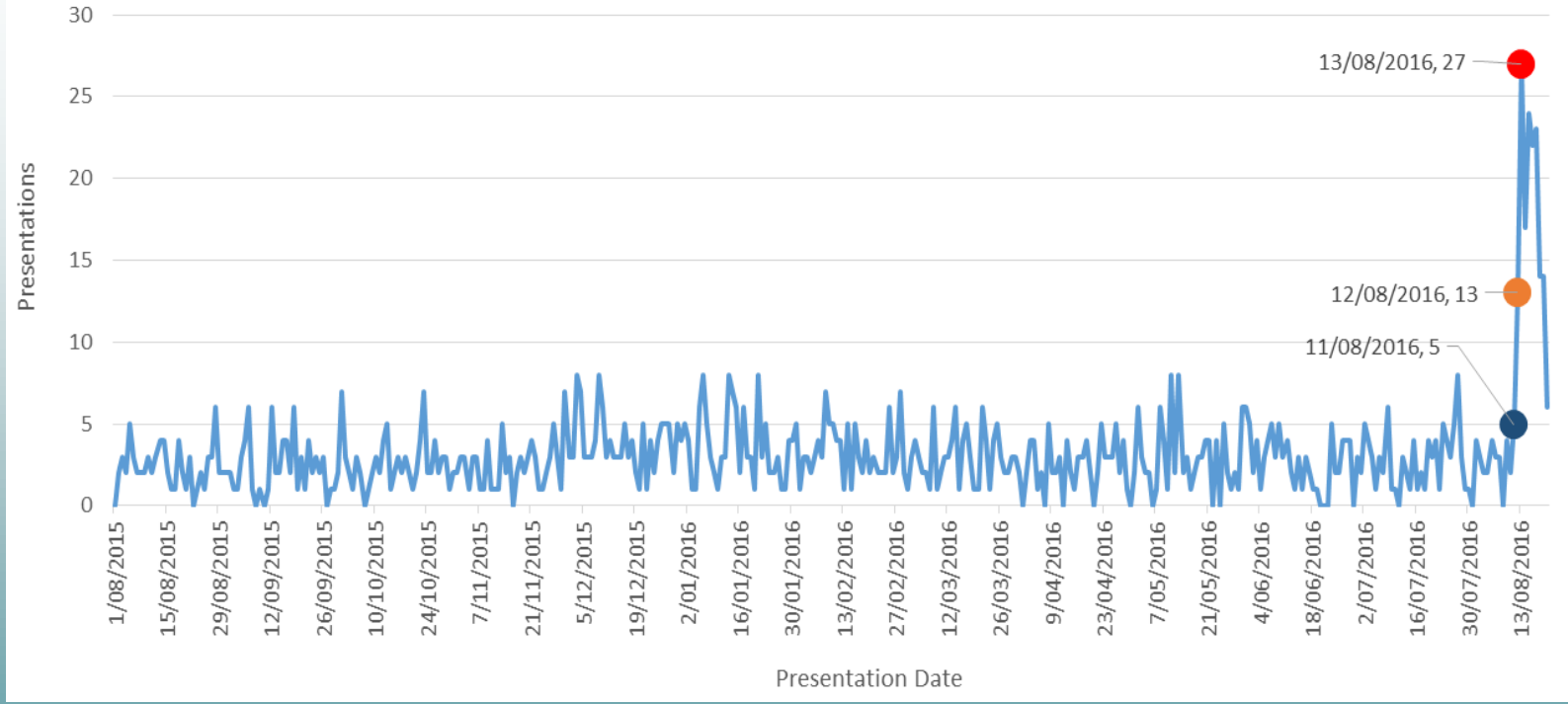
Daily ED Presentations to Hawke's Bay Fallen Soldiers' Memorial Hospital
Event Reason – Nausea/Vomiting/Diarrhoea
1 August 2015 to 18 August 2016 – Midnight to Midnight



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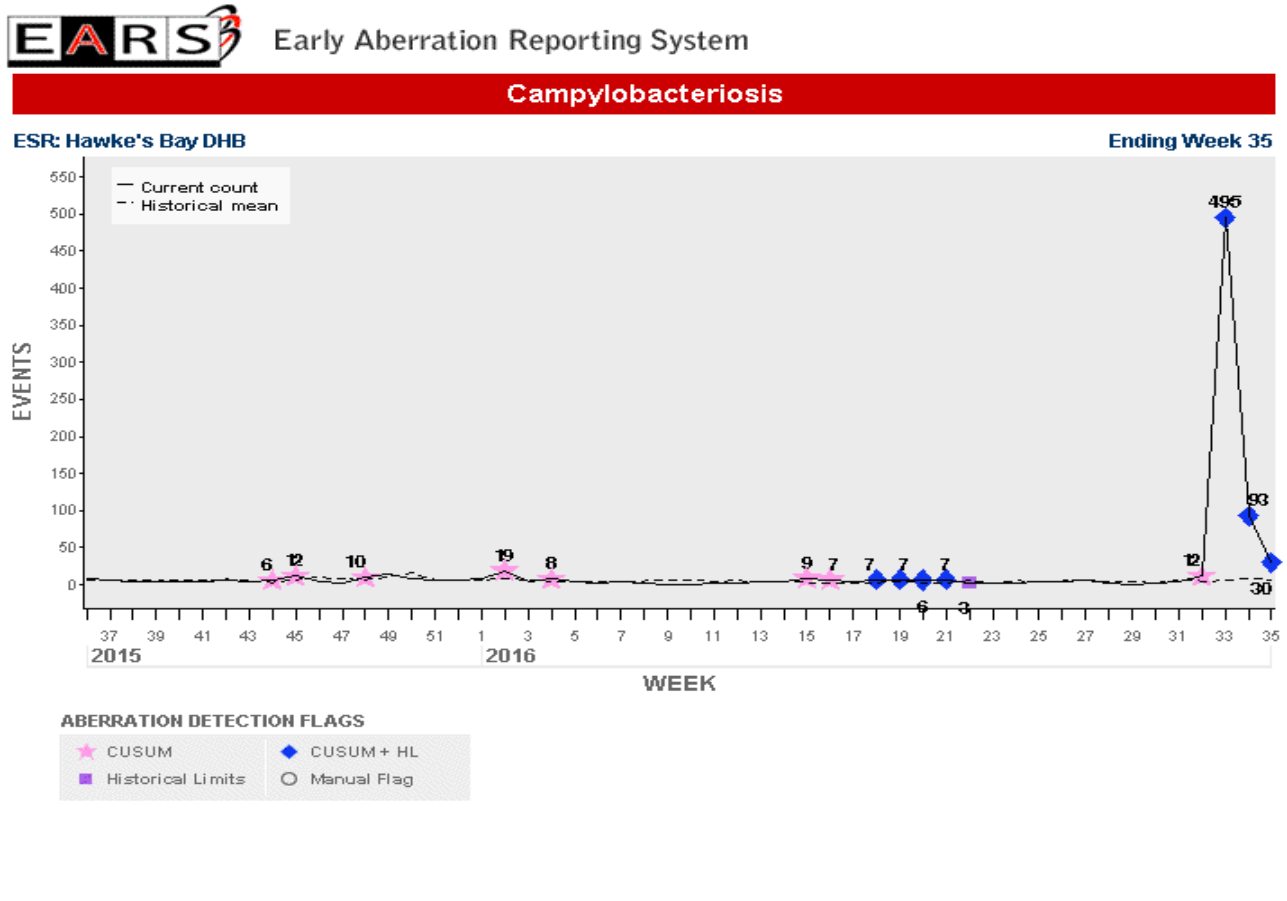
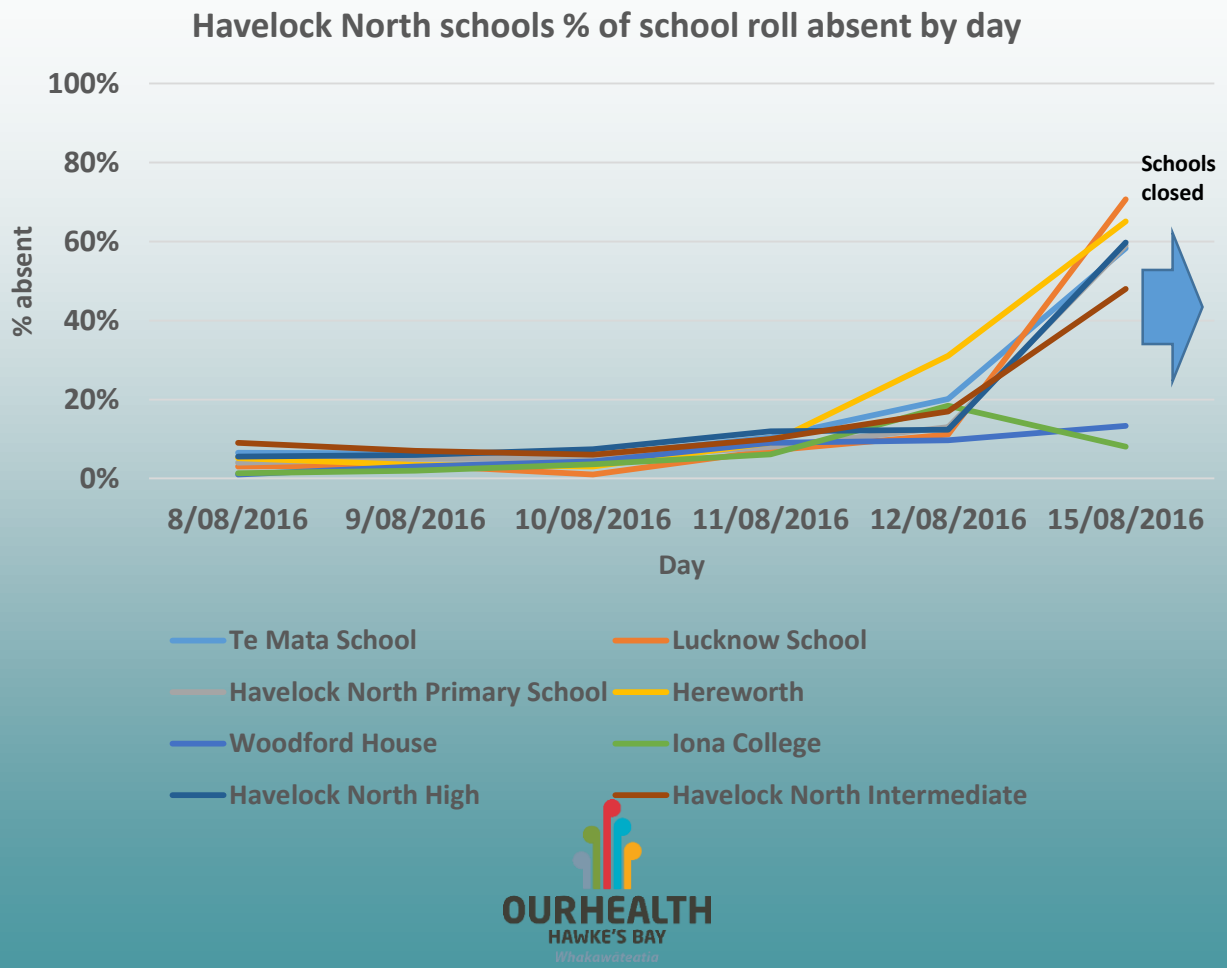
Campylobacter notifications from Hawke's Bay DHB over previous 12 months



Havelock North Schools % of School Roll Absent by School Day



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The Operations Centre

Managing

1. Responding to media and public inquiry
2. Surveillance of illness and sequelae – collecting and testing samples – human
3. Health services and welfare response
4. Restoration of water supply and preparation for further water supply measures
5. Preparation for a Government Inquiry - review of water supply history and regulatory oversight
6. Interagency source investigation and genomic linkage studies

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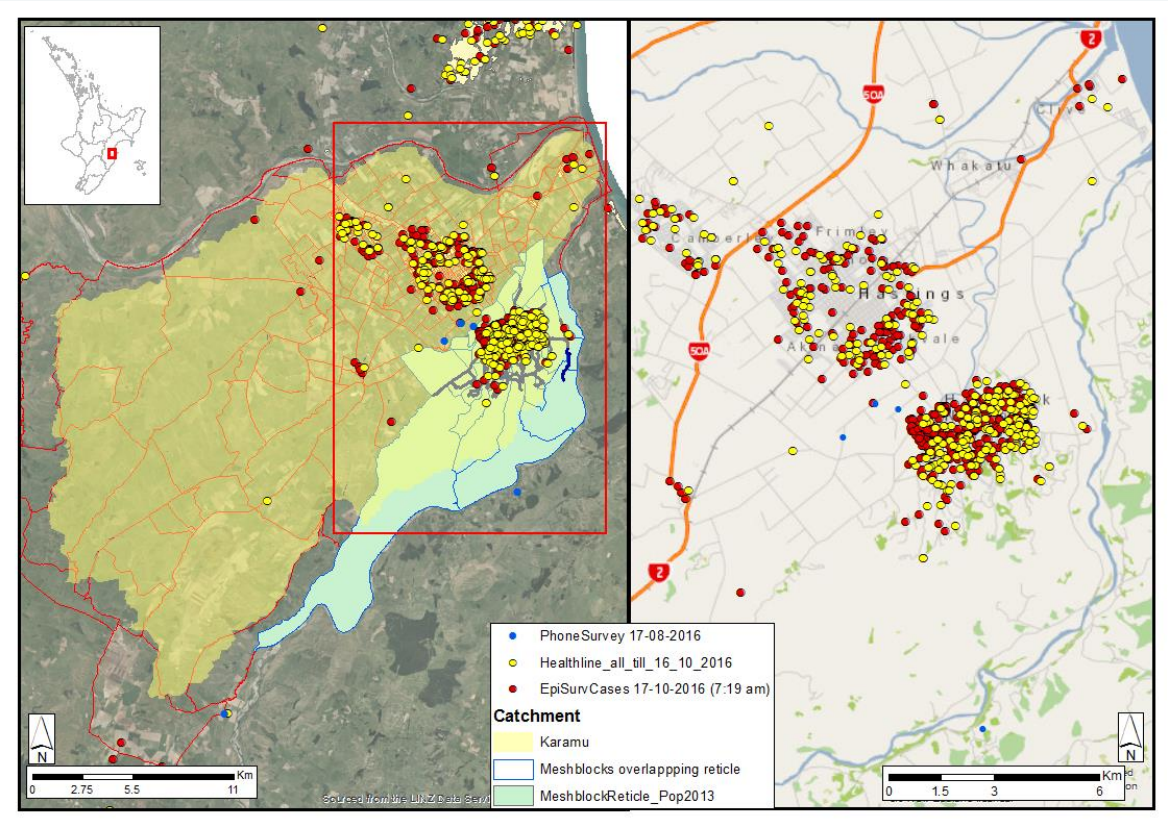
Campylobacter Outbreak case locations



last updated 17/10/16 Case location points randomly shifted to preserve privacy

Key numbers*

- Estimated cases (age standardized)
  - 55% of HN households affected
  - 5,540 (39%) of 14,118 HN residents affected
- Relapse
  - 64% of people had one episode of diarrhoea
  - 32% had a recurrence of diarrhoea
  - 4% had ongoing diarrhoea
- Reported cases – 964
- 45 Hospitalisations
  - 33 Confirmed cases
  - 12 Probable cases
- 4 Deaths linked

As at 16 February, 2017

Campylobacter - longer term health effects

- Kidney and bowel problems
- 3 Guillain-Barré Syndrome (GBS) cases
  - 1 Severe
  - 2 Mild
- Reactive arthritis (ReA) (household survey)

Adjusting for LTFU

	Min ReA Rate	Max ReA Rate
Confirmed notified cases	7%	23%
Non-notified cases (phone survey)	2%	14%
Controls (phone survey)	0.5%	2%

- Ongoing research eg Frailty, Inflamatory Bowel Disease,

Source Investigation

- Epidemiology, drinking water and environmental investigations
  - What did the epi tell us about when contamination occurred?
- Campylobacter isolates from humans, drinking water and environment
- Field survey of possible sources and pathways
- Hydrogeological study – ground water samples, surface samples and dye testing

Field survey

Tour of water source

Under the lid

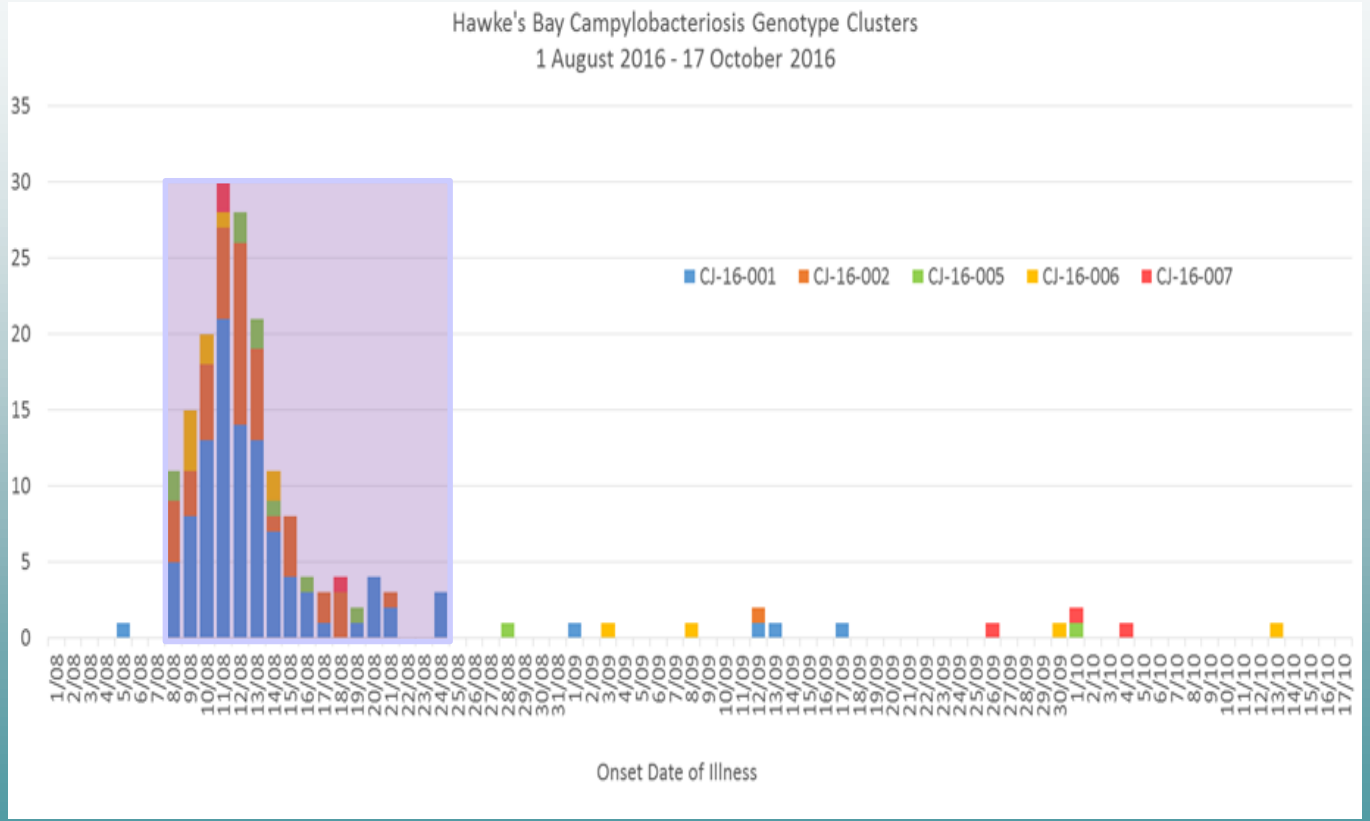
Campylobacter Genotypes

Genotype Cluster	Human	Retic Water	Bore Source	Sheep faeces	Environment
16-001	49%	11(5)*	Bore 1: 2 (1)	Paddock 2: 5 (2)	Drain - 3 (1)
16-002	23%	-	-	Paddock 2: 8 (3)	Drain - 4 (1)
16-003	-	-	-		Drain and pit - 8 (2)
16-005	4%	5 (1)	Bore 1: 11 (1)		
16-006	4%	-	-	-Paddock 1: 1 (1)	
16-007	2%	6 (2)	-		

* Count is number analyzed by MBiT, in brackets number analyzed by whole genome sequencing

Adapted from ESR Report: Analysis of water, sediment and animal faecal

Estimated Campylobacter Outbreak Duration



Genetic analysis courtesy of ESR

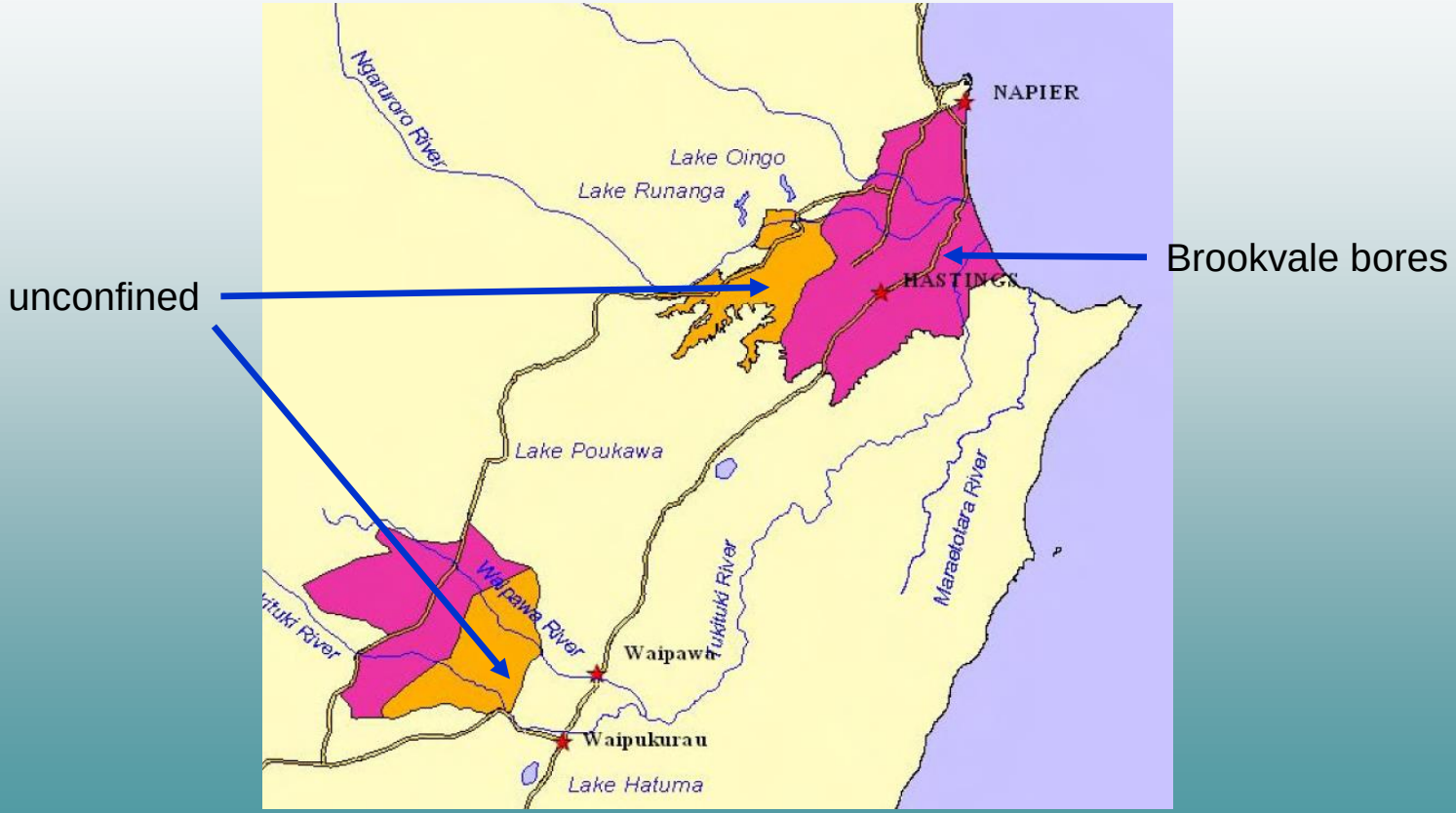
Bore 1 chamber

Brookvale Road

Pathway

- Most likely – stream to bore 1 screen underground
- Less likely – bore head flooding

The “confined aquifers” in HBRC RRMP



Source Water Protection

- Controls primarily limted to unconfined aquifer
- Discharge to ground – permitted
- Dairy effluent discharge – controlled (consent must be granted)

- TANK
  - Land use – farm management plans
  - Chemical use
  - Stock exclusion
  - Discharges to ground
  - Discharges to water
  - Hazardous substances and contaminated land
  - Sensitive Receiving Environments – source water capture zone

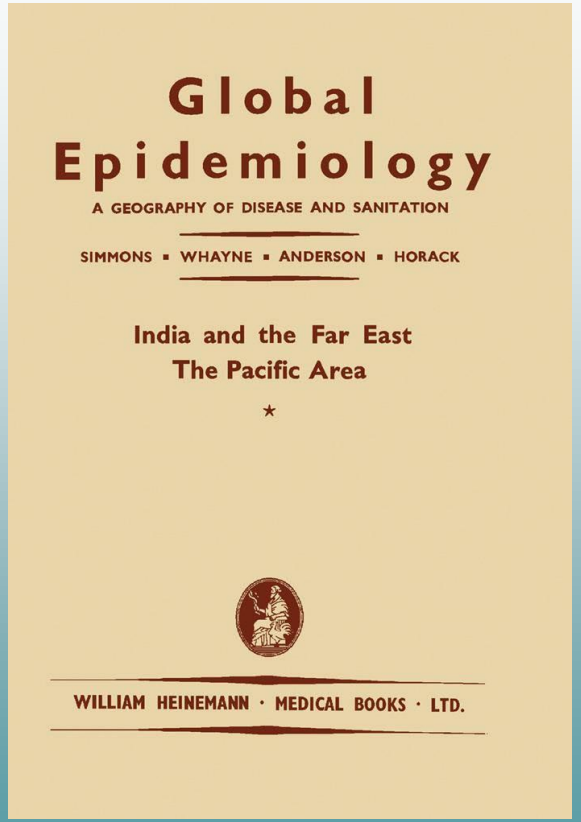
Queen Street 1860s

Source: teara.govt.nz

Backyard Well

Rembering

Typhoid Fever and Paratyphoid Fevers. These diseases occur sporadically throughout New Zealand. Outbreaks in areas in which population is congested have been traced to contamination of milk and water supplies. Water-borne epidemics have occurred most often in the low-lying areas along the eastern coast, especially in the vicinity of Hawke Bay, where overcrowding and pollution of the soil and water are common. In 1941 the mortality rate for typhoid fever and paratyphoid fevers in the white population was 0.5 per 100,000. This rate is about the average rate for the past eight years. In the white population the morbidity rate for these two diseases has varied between 3 and 5 per 100,000. Morbidity and mortality rates for typhoid fever and paratyphoid fevers—as well as bacillary dysentery—are higher among the Maoris than among the white people.



Thanks