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New Zealand Public Health Surveillance Report

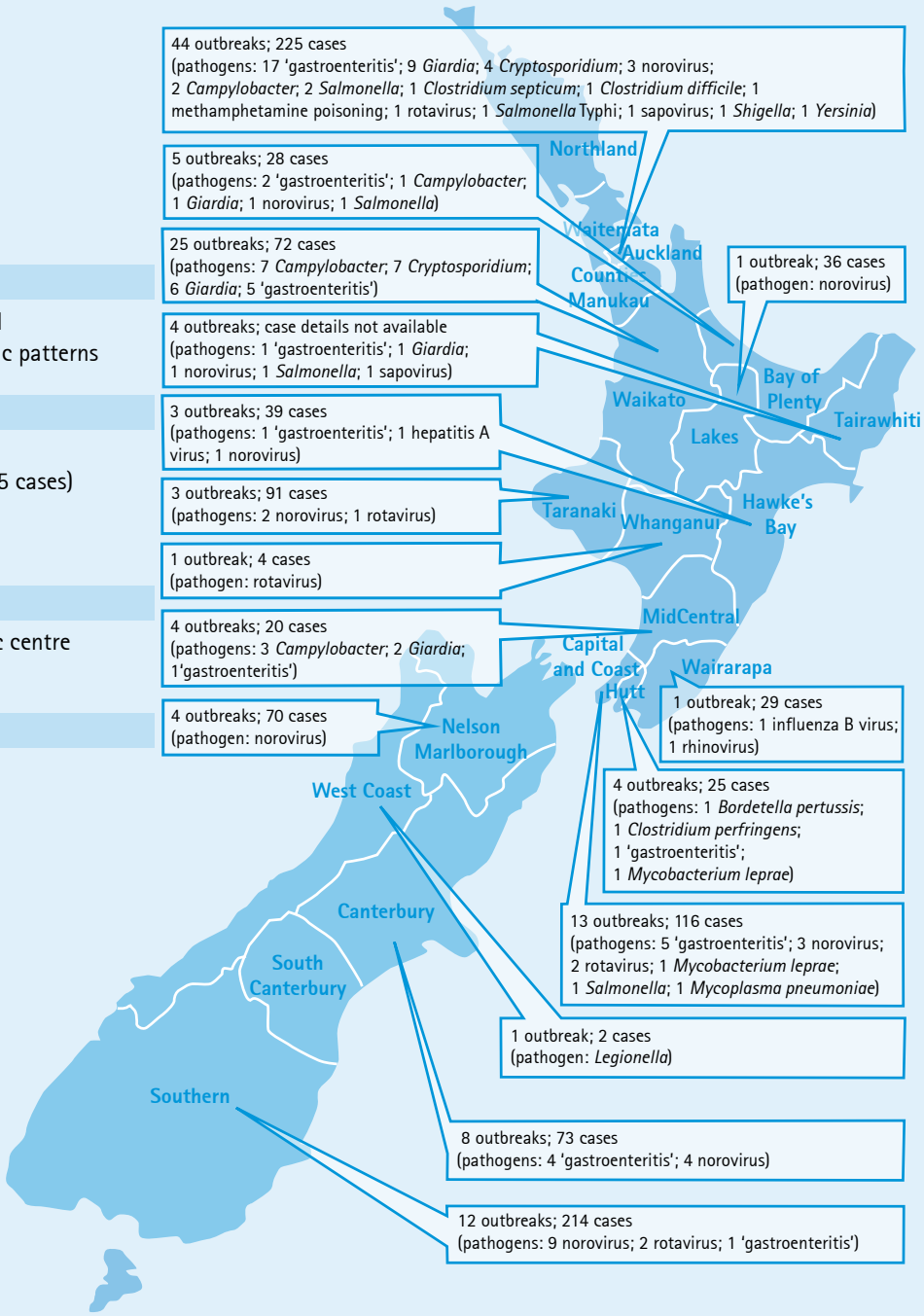
March 2014: Covering October to December 2013

Contents & Highlights

The latest reports from Sexually Transmitted Infections Surveillance, Antimicrobial Resistance, Virology and Enteric Reference Laboratories are available at www.surv.esr.cri.nz

This Quarter's Outbreaks

Notification and outbreak data in this issue are drawn from the October to December quarter of 2013. The outbreak map on this page consists of all outbreak information, final and interim. The total number of outbreaks and cases by region and outbreaks by pathogen are reported, as notified up to 13 January 2014. Outbreaks reporting exposures in more than one geographic location are assigned to the district health board with the most cases. Five outbreaks involved more than one pathogen therefore individual pathogen outbreak numbers may not sum to group totals.



1. Editorial

A metagenomic approach to unsolved gastroenteritis disease outbreaks

Viral metagenomics was applied to a set of 31 anonymous faecal samples from unsolved gastroenteritis outbreaks in New Zealand where no pathogen could be detected. Previous studies have looked at sporadic disease or one or two unsolved outbreaks. This study may reveal new viruses, divergent relatives of known viruses or scenarios that have been overlooked. The research is funded by the Health Research Council and the results will be published in mid-2014.

The ESR Norovirus Reference Laboratory works with the public health authorities to determine the cause of viral gastroenteritis outbreaks in New Zealand. Noroviruses are the most implicated cause, but approximately 20% are unsolved, despite the best efforts of public health authorities and diagnostic laboratories. The reasons for this may include the following: the infection cleared before a sample was submitted, other linked cases were difficult to find, a patient presented with atypical symptoms, or the variations in a pathogen's genome allowed it to evade conventional diagnostic methods. Some gastrointestinal pathogens have simply not been discovered yet. Viruses have generally been more difficult to discover than bacterial or parasitic causes of gastroenteritis, often due to an inability to locate a permissive cell line for viral culture or a lack of sensitivity in clinical samples. Molecular DNA (or RNA) testing using PCR (polymerase chain reaction) now obviates the need for viral culture in many cases and is rapid, specific and highly sensitive. PCR tests do require some prior knowledge about which virus might be present and are not well suited to the discovery of new or divergent viruses.

To overcome the lack of discovery tools, and in line with a number of other research laboratories around the world, we have developed capability in the area of virus metagenomics. This method can essentially provide an unbiased report on all the organisms present in any given sample. In a faecal sample for example, bacteria are the most abundant organisms, but sequences from dietary material such as wheat, grapes, shellfish and coffee are also observed.

In the technique, nucleic acid is extracted from a sample (eg, faecal, throat swab, blood, environmental or tissue) and sequenced on a high-throughput sequencer (next-generation sequencer) to produce a dataset of approximately five million sequences. Each sequence is then compared with the known sequence database, GenBank (curated by the National Center for Biotechnology Information in the United States), and assigned to a taxonomic group. The analysis can take many months and requires sophisticated software and substantial computing power. When an interesting virus sequence is found, the identity of any putative pathogen in the sample is confirmed with an independent test, such as a PCR assay adapted from the scientific literature or developed in-house. This reduces the risk of relying on metagenomics alone, as it is still a new technique.

The technology was introduced as a commercial platform around 2005 and has advanced significantly in recent years. In our laboratory at ESR, we commonly use the Illumina MiSeq platform via New Zealand Genomics Limited (NZGL).

Our group has already applied metagenomics in diverse settings: we have uncovered rare enteroviruses involved in human disease in New Zealand,[1,2] detected viruses in the bioaerosol of animal slaughterhouses[3] and discovered a new coronavirus in New Zealand bats.[4] Viral metagenomics is applicable in human and animal health, and at the zoonotic intersection of these fields.

Metagenomics is unlikely to be utilised in clinical diagnostic laboratories in the near future. Although the cost of an instrument is within reach of many laboratories, the analysis requires specialist knowledge (bioinformatics), there is a lack of standardisation in protocols, and the turn-around time for a result can be many weeks. There are also significant ethical considerations, especially regarding the technique's potential for incidental diagnosis. At present, high-throughput sequencing will be most useful for obtaining the whole genome of known bacteria, but the use of metagenomics to search for new viruses is likely to stay in a research setting. Robust discussion amongst clinicians and scientists must be promoted to enable the careful and judicious use of this promising technology.

We acknowledge the support of the Health Research Council of New Zealand in this project.
For list of references see – www.surv.esr.cri.nz/surveillance/NZPHSR.php
Reported by Richard Hall, Joanne Hewitt, Nicole Moore and Jing Wang, Health Programme, ESR.

2. Notifiable Disease Surveillance

The following is a summary of disease notifications for the October to December quarter of 2013 and cumulative notifications and rates calculated for a 12-month period (January to December 2013). For comparative purposes notification numbers and rates are presented in brackets for the same periods in the previous year. A robust method of constructing 95% confidence intervals is used to determine 'statistically significant differences' throughout this report unless otherwise stated [see Newcombe RG and Altman DG 2000. Proportions and their differences. In: Statistics with Confidence. BMJ Books, Bristol.]. Data contained within this report are based on information recorded in EpiSurv by public health service staff up to 13 January 2014. As this information may be updated over time, these data should be regarded as provisional.

National surveillance data tables are available at www.surv.esr.cri.nz

VACCINE PREVENTABLE DISEASE

Invasive Pneumococcal Disease

- *Notifications:* 119 notifications in the quarter (2012, 102); 483 notifications over the last 12 months (2012, 489), giving a rate of 10.9 cases per 100,000 population (2012, 11.0), not a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (182 cases). Cases were aged between 8 days and 92 years, with 4 cases aged less than 2 years.

Measles

- *Notifications:* 9 notifications in the quarter (2012, 0); 10 notifications over the last 12 months (2012, 68), giving a rate of 0.2 cases per 100,000 population (2012, 1.5), a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (no cases) and from the same quarter last year (no cases). Two cases were laboratory confirmed.

Pertussis

- *Notifications:* 614 notifications in the quarter (2012, 1708); 3545 notifications over the last 12 months (2012, 5899), giving a rate of 80.0 cases per 100,000 population (2012, 133.1), a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (822 cases) and from the same quarter last year (1708 cases).

ENTERIC INFECTIONS

Campylobacteriosis

- *Notifications:* 2284 notifications in the quarter (2012, 2077); 6835 notifications over the last 12 months (2012, 7016), giving a rate of 154.2 cases per 100,000 population (2012, 158.3), not a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (1824 cases) and from the same quarter last year (2077 cases).

Gastroenteritis (acute)

- *Notifications:* 140 notifications in the quarter (2012, 286); 562 notifications over the last 12 months (2012, 735), giving a rate of 12.7 cases per 100,000 population (2012, 16.6), a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (183 cases) and from the same quarter last year (286 cases).
- *Note:* this is not a notifiable disease per se except in persons with a suspected common source or with a high risk occupation. The term 'gastroenteritis' provides a catch-all category for enteric diseases that are not notifiable and for syndromic reports that come through public health units, including direct reports from the public where the causative pathogen may never be known.

VTEC Infections

- *Notifications:* 22 notifications in the quarter (2012, 37); 211 notifications over the last 12 months (2012, 147), giving a rate of 4.8 cases per 100,000 population (2012, 3.3), a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (40 cases).

INFECTIOUS RESPIRATORY DISEASES

Acute Rheumatic Fever

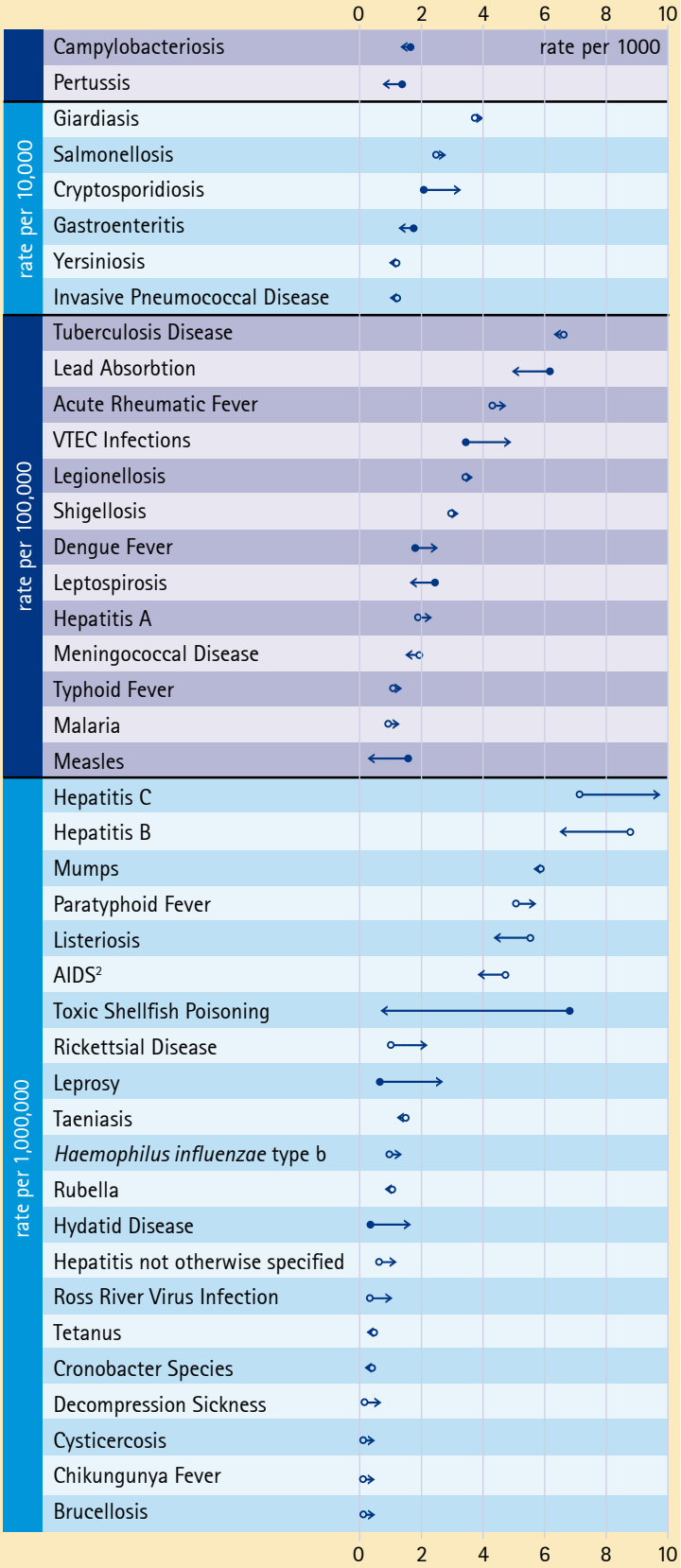
- *Notifications:* 59 notifications in the quarter (2012, 15); 205 notifications over the last 12 months (2012, 185), giving a rate of 4.6 cases per 100,000 population (2012, 4.2), not a statistically significant increase.
- *Comments:* there was a statistically significant quarterly increase from the same quarter last year (15 cases). Cases were distributed by age as follows: 41 (5–14 years) and 18 (15 years and over). 55 cases were an initial attack of acute rheumatic fever and 4 cases were recurrent attacks.

Meningococcal Disease

- *Notifications:* 11 notifications in the quarter (2012, 23); 69 notifications over the last 12 months (2012, 85), giving a rate of 1.6 cases per 100,000 population (2012, 1.9), not a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (31 cases) and from the same quarter last year (23 cases). Cases were distributed by age as follows: 1 (<1 year), 2 (1–4 years), 1 (5–14 years), and 7 (15 years

National Surveillance Data

12-Monthly Notification Rate Changes[1]



Notifications per 1000 or 10,000 or 100,000 or 1,000,000 population

Rate Change Symbol Key:

- > Rate increase from the previous 12-month period
- < Rate decrease from the previous 12-month period
- ● Statistically significant rate change
- ○ Statistically non-significant rate change

[1] Rates are calculated for the 12-month period January to December 2013 and compared to previous 12-month rates.

[2] Data provided by the AIDS Epidemiology Group, University of Otago. Note: changes in the 12-month notification rate should be interpreted with caution as this often reflects late notifications.

and over). 8 cases were laboratory confirmed. Of these, the strain group was identified for 7 cases: B (3 cases), C (3 cases), and W135 (1 case).

ENVIRONMENTAL EXPOSURES & INFECTIONS

Cryptosporidiosis

- *Notifications:* 284 notifications in the quarter (2012, 317); 1348 notifications over the last 12 months (2012, 877), giving a rate of 30.4 cases per 100,000 population (2012, 19.8), a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (349 cases).

Legionellosis

- *Notifications:* 61 notifications in the quarter (2012, 48); 158 notifications over the last 12 months (2012, 150), giving a rate of 3.6 cases per 100,000 population (2012, 3.4), not a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (33 cases).

Leptospirosis

- *Notifications:* 20 notifications in the quarter (2012, 21); 71 notifications over the last 12 months (2012, 108), giving a rate of 1.6 cases per 100,000 population (2012, 2.4), a statistically significant decrease.
- *Comments:* there were 17 male and 3 female cases. 18 cases were recorded as having an occupation identified as high risk for exposure. The most commonly recorded occupations were meat process worker (12 cases) and farm worker (6 cases).

Toxic Shellfish Poisoning

- *Notifications:* 1 notifications in the quarter (2012, 30); 3 notifications over the last 12 months (2012, 30), a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly decrease from the same quarter last year (30 cases).

NEW, EXOTIC & IMPORTED INFECTIONS

Dengue Fever

- *Notifications:* 32 notifications in the quarter (2012, 11); 107 notifications over the last 12 months (2012, 76), giving a rate of 2.4 cases per 100,000 population (2012, 1.7), a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly increase from the same quarter last year (11 cases). 30 cases were laboratory confirmed. All 32 cases had travelled or resided overseas during the incubation period of the disease. The most commonly visited countries were India (10 cases), Indonesia (4 cases), and Malaysia and Thailand (3 cases each).

Hepatitis A

- *Notifications:* 20 notifications in the quarter (2012, 7); 93 notifications over the last 12 months (2012, 82), giving a rate of 2.1 cases per 100,000 population (2012, 1.8), not a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly increase from the same quarter last year (7 cases). Cases were aged between 5 and 83 years, with 9 cases aged less than 16 years. Overseas travel information was recorded for 18 (90.0%) cases. Of these, 11 (61.1%) cases had not travelled overseas during the incubation period of the disease.

Hydatid Disease

- Notifications: 2 notifications in the quarter (2012, 0); 7 notifications over the last 12 months (2012, 1), a statistically significant increase.

Leprosy

- Notifications: 6 notifications in the quarter (2012, 1); 11 notifications over the last 12 months (2012, 2), a statistically significant increase.
- Comments: overseas travel information was recorded for 5 (83.3%) cases. Of these, one case had not travelled overseas during the incubation period.

Typhoid Fever

- Notifications: 11 notifications in the quarter (2012, 15); 50 notifications over the last 12 months (2012, 44), giving a rate of 1.1 cases per 100,000 population (2012, 1.0), not a statistically significant increase.
- Comments: there has been a statistically significant quarterly increase from the previous quarter (3 cases). Overseas travel information was recorded for all cases. Of these, 4 (36.4%) cases had not travelled overseas during the incubation period.

3. Other Surveillance Reports

Influenza-associated primary care consultations and hospitalisations show contrasting socio-demographic patterns

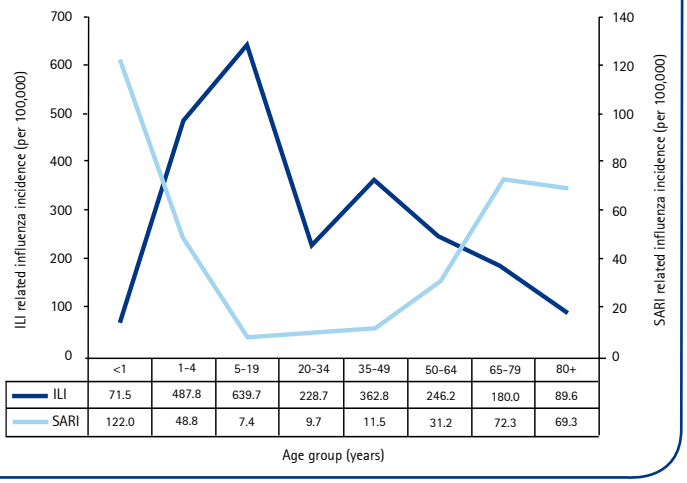
In its second year, the SHIVERS (Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance) project, operating in the Auckland and Counties Manukau District Health Board areas, was extended to include sentinel general practice based surveillance for influenza-like illnesses (ILI) from 29 April to 29 September 2013. Together with the ongoing hospital-based surveillance for severe acute respiratory infections (SARI)[1], this creates a unique opportunity to understand and compare the incidence, risk factors, clinical spectrum, respiratory pathogens, immune responses and vaccine effectiveness of severe and less severe cases of respiratory disease and the role of influenza.

In the sentinel practices, general practitioners (GPs) and/or practice nurses screened every patient who was seeking medical attention for an ILI. The case definition was "an acute respiratory illness with a history of fever or measured fever of ≥38°C, AND cough, AND onset within the past 10 days, AND requiring a GP consultation". If a consultation-seeking patient met this definition, a respiratory specimen (nasopharyngeal or throat swab) was collected, to test for influenza and other respiratory pathogens. Information on the patient's demography, clinical history, co-morbidities, vaccination history, regular medication and pregnancy status was also collected. Obesity was determined by visual assessment.

During the five-month period, 181,603 consultations took place in the sentinel practices and 2016 patients (1.1%) met the ILI case definition. Of these, 1802 patients (89.4%) provided a specimen for testing and influenza viruses were detected in 448 specimens (24.9%).

Rates of influenza-associated GP consultations and hospitalisations varied markedly by age (Figure 1). Influenza-associated hospitalisation rates were highest in the very young (0–4 years) and the elderly (≥65 years), resulting in a U-shaped curve. However, influenza-associated GP consultation rates showed the opposite pattern, with a higher rate in pre-schoolers, school-aged children and adults, but a lower rate in infants (<1 year) and the elderly (≥65 years).

Figure 1. Age-specific influenza-associated primary care consultations and hospitalisation rates, 29 April–29 September 2013



	<1	1-4	5-19	20-34	35-49	50-64	65-79	80+
ILI	71.5	487.8	639.7	228.7	362.8	246.2	180.0	89.6
SARI	122.0	48.8	7.4	9.7	11.5	31.2	72.3	69.3

Age group (years)

A preliminary analysis of influenza rates by ethnicity, found that Māori and Pacific Peoples experienced the highest rates of influenza-associated hospitalisations but the lowest rates of influenza-associated GP consultations; while conversely the Asian ethnic group showed the opposite trend. When socio-economic status (SES) groups were considered, the most deprived populations (NZDep 9–10) were found to have the highest rates of influenza-associated hospitalisations but the lowest rates of influenza-associated GP consultations.

In summary, higher rates of influenza-associated GP consultations occurred in school age children, pre-schoolers and adults, those of Asian ethnicity and those from least deprived SES groups. Whereas, influenza-associated hospitalisations were more frequent in the very young, the elderly, Māori and Pacific Peoples and those from most deprived SES groups.

The differences in rates of hospitalisations and GP consultations by age are well documented.[2,3] These are likely to result from multiple influences including differences in host immune response, virus pathogenesis, clinical severity, and health seeking behaviour among different age groups (and their parents/caregivers).

Higher hospitalisation rates from seasonal and pandemic influenza have been reported in indigenous groups in the United States, New Zealand and Australia.[4,5] However, it is difficult to explain why Māori and Pacific Peoples had the highest rates of influenza-associated hospitalisations but the lowest rates of influenza-associated GP consultations. It remains unclear if these patterns are due to genetic susceptibility, differences in baseline health status and co-morbidities, or a host of possible contributory factors such as socio-economic status and healthcare access, unfavourable environmental conditions, health seeking patterns and health literacy. Further analysis is required to understand the independent effects of these factors.

Surveillance for influenza-associated GP consultations has traditionally been a corner-stone of global influenza surveillance programmes. The information derived from it is used for vaccine strain selection, public health prevention policy and health resource decisions. However GP consultation surveillance alone is not sufficient to fully represent the overall burden and distribution of influenza in the population. There are significant advantages in being able to collect data from both general practice and hospital-based surveillance on the same population to better understand the burden and distribution of influenza.

For list of references see – www.surv.esr.cri.nz/surveillance/NZPHSR.php

Reported by Sue Huang, Nikki Turner, John Cameron, Michael Baker, Bruce Adlam, Gary Reynolds, Barbara McArdle, Ruth Seeds, Ange Bissielo, Tim Wood, Sarah Radke, Don Bandaranayake, Graham Mackereth, Deborah Williamson, Colin McArthur, Sally Roberts, Cameron Grant, Debbie Aley, Adrian Trenholme, Conroy Wong, Susan Taylor, Kirstin Davey, Tracey Poole, Rosemary Gordon, Sam Wong, Leane Els, Marion Howie, Gillian Davies, Nevil Pierse, Paul Thomas, Richard Webby, Mark Thompson, Diane Gross, Jazmin Duque, Marc-Alain Widdowson.

4. Outbreak Surveillance

The following information is a summary of the outbreak trends for New Zealand from data collected in the last quarter (October to December 2013). Comparisons are made to the previous quarter (July to September 2013), and to the same quarter in the previous year (October to December 2012). Note that the outbreak data in this section are notified to ESR by the Public Health Services.

General

- 133 outbreaks notified in this quarter (1050 cases).
- 104 are final reports (915 cases); 29 are interim reports (135 cases) that have yet to be finalised and closed.

All data that follow relate to final reports only.

- 8.8 cases on average per outbreak, compared with 12.1 cases per outbreak in the previous quarter (16.2 cases per outbreak in the same quarter of last year).
- 24 hospitalisations: rotavirus (5 cases), *Clostridium difficile* (3 cases), *Salmonella* (3 cases), *Legionella* (2 cases), *Mycoplasma pneumoniae* (2 cases), *Salmonella* Typhi (2 cases), *Shigella* (2 cases), *Campylobacter* (1 case), *Campylobacter/Clostridium septicum* (1 case), *Cryptosporidium* (1 case), *Giardia* (1 case), and *Yersinia* (1 case).
- No deaths.
- Five outbreaks involved more than one pathogen therefore individual pathogen outbreak numbers may not sum to group totals.

Pathogens

- 24 norovirus outbreaks (487 cases).
- 23 'gastroenteritis' outbreaks (145 cases).
- 16 *Giardia* outbreaks (46 cases).
- 12 *Campylobacter* outbreaks (41 cases).
- 10 *Cryptosporidium* outbreaks (27 cases).
- 6 rotavirus outbreaks (91 cases).
- 3 *Salmonella* outbreaks (18 cases).
- 2 *Mycobacterium leprae* (6 cases).
- 1 *Bordetella pertussis* outbreak (4 cases).
- 1 *Clostridium perfringens* outbreak (11 cases).
- 1 *C. difficile* outbreak (3 cases).
- 1 *C. septicum* outbreak (6 cases).
- 1 hepatitis A virus outbreak (3 cases).
- 1 influenza B virus outbreak (29 cases).
- 1 *Legionella* outbreak (2 cases).
- 1 *M. pneumoniae* outbreak (2 cases).
- 1 rhinovirus outbreak (29 cases).
- 1 *S.* Typhi outbreak (3 cases).
- 1 sapovirus outbreak (2 cases).
- 1 *Shigella* outbreak (2 cases).
- 1 *Yersinia* outbreak (2 cases).

Modes of Transmission

Note that reporting allows for multiple modes of transmission to be selected. In some instances no modes of transmission are selected for outbreaks notified to ESR.

- 79 person-to-person, from (non-sexual) contact with an infected person (including droplets): 22 norovirus (477 cases), 15 *Giardia* (44 cases), 12 'gastroenteritis' (99 cases), 8 *Cryptosporidium* (22 cases), 6 rotavirus (91 cases), 5 *Campylobacter* (17 cases),

3 *Salmonella* (18 cases), 2 *M. leprae* (6 cases), 1 *B. pertussis* (4 cases), 1 *C. difficile* (3 cases), 1 hepatitis A virus (3 cases), 1 influenza B virus (29 cases), 1 rhinovirus (29 cases), 1 *S.* Typhi (3 cases), 1 sapovirus (2 cases), and 1 *Shigella* (2 cases).

- 23 foodborne, from consumption of contaminated food or drink (excluding water): 9 'gastroenteritis' (29 cases), 6 *Campylobacter* (22 cases), 3 norovirus (24 cases), 1 *C. perfringens* (11 cases), 1 *C. septicum* (6 cases), 1 *Giardia* (2 cases), 1 *Salmonella* (12 cases), 1 *S.* Typhi (3 cases), 1 sapovirus (2 cases), and 1 *Yersinia* (2 cases).
- 13 environmental, from contact with an environmental source (eg, swimming): 4 *Giardia* (12 cases), 3 'gastroenteritis' (30 cases), 2 norovirus (19 cases), 2 *Campylobacter* (6 cases), 1 *Cryptosporidium* (3 cases), 1 *Legionella* (2 cases), and 1 rotavirus (19 cases).
- 12 zoonotic, from contact with an infected animal: 5 *Cryptosporidium* (14 cases), 5 *Giardia* (15 cases), and 3 *Campylobacter* (8 cases).
- 7 waterborne, from consumption of contaminated drinking water: 3 *Campylobacter* (11 cases), 2 *Cryptosporidium* (6 cases), 2 *Giardia* (6 cases), and 1 'gastroenteritis' (6 cases).
- 3 'other' modes: 1 *Campylobacter* (2 cases), 1 *Giardia* (2 cases), 1 norovirus (25 cases), and 1 *Salmonella* (2 cases).
- 4 mode of transmission unknown: 3 'gastroenteritis' (19 cases) and 1 *M. pneumoniae* (2 cases).

Circumstances of Exposure

Common 'settings' where the exposures occurred are identified below.

- 41 home: 14 *Giardia* (41 cases), 7 *Cryptosporidium* (19 cases), 6 *Campylobacter* (20 cases), 4 'gastroenteritis' (15 cases), 2 *M. leprae* (6 cases), 2 norovirus (17 cases), 2 *Salmonella* (6 cases), 1 *C. difficile* (3 cases), 1 hepatitis A virus (3 cases), 1 *S.* Typhi (3 cases), 1 sapovirus (2 cases), and 1 *Shigella* (2 cases).
- 19 long term care facility: 10 norovirus (270 cases) and 9 'gastroenteritis' (90 cases).
- 13 restaurant/café/bakery: 5 'gastroenteritis' (18 cases), 3 norovirus (24 cases), 2 *Campylobacter* (7 cases), 1 *C. perfringens* (11 cases), 1 *Salmonella* (12 cases), 1 sapovirus (2 cases), and 1 *Yersinia* (2 cases).
- 10 childcare centre: 5 rotavirus (87 cases), 3 norovirus (55 cases), 1 *B. pertussis* (4 cases), and 1 'gastroenteritis' (10 cases).
- 5 farm: 3 *Cryptosporidium* (8 cases), 1 *Campylobacter* (4 cases), and 1 *Giardia* (2 cases).
- 3 workplace: 2 'gastroenteritis' (12 cases) and 1 *Salmonella* (12 cases).
- 2 hospital (acute care): 2 norovirus (14 cases).
- 2 school: 1 *Campylobacter* (2 cases), 1 influenza B virus (29 cases), and 1 rhinovirus (29 cases).
- 2 takeaways: 2 'gastroenteritis' (5 cases).
- 1 airline: norovirus (25 cases).
- 1 caterer: 'gastroenteritis' (4 cases).
- 1 hostel/boarding house: norovirus (38 cases).
- 1 hotel/motel: *Legionella* (2 cases).
- 1 other food outlet: 'gastroenteritis' (3 cases).
- 1 other institution: norovirus (36 cases).
- 1 temporary or mobile food service: 1 *Campylobacter* (6 cases) and *C. septicum* (6 cases).
- 1 tour bus: norovirus (8 cases).
- 7 'other setting': 2 norovirus (27 cases), 1 'gastroenteritis' (2 cases), 1 *Giardia* (5 cases), 1 hepatitis A (3 cases), 1 rotavirus (4 cases), and 1 *Salmonella* (2 cases).
- 13 outbreaks had two or more exposure settings recorded.
- 5 outbreaks had no exposure settings recorded.

Common 'settings' where the food was prepared in foodborne outbreaks are identified below.

- 9 restaurant/café/bakery: 3 'gastroenteritis' (9 cases), 2 *Campylobacter* (7 cases), 2 norovirus (19 cases), 1 *C. perfringens* (11 cases), 1 sapovirus (2 cases), and 1 *Yersinia* (2 cases).
- 3 takeaways: 3 'gastroenteritis' (9 cases).
- 2 home: 1 'gastroenteritis' (3 cases) and 1 *S.* Typhi (3 cases).
- 1 caterer: 1 *Campylobacter* (6 cases) and 1 *C. septicum* (6 cases).
- 1 farm: *Campylobacter* (4 cases).
- 7 outbreaks had no food preparation settings recorded.

5. Outbreak Case Reports

An outbreak of giardiasis associated with an aquatic centre

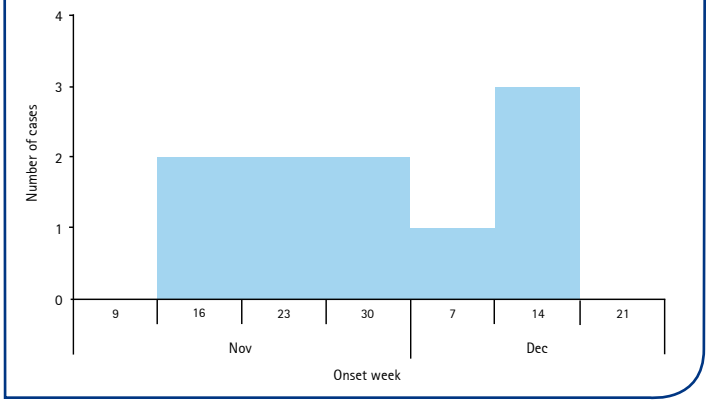
A cluster of 10 giardiasis cases was notified to Toi Te Ora – Public Health Service during November and December 2012. An investigation confirmed that nine of the people affected had been swimming at a local aquatic centre at the time of a faecal accident. The exception was a secondary case from the same household as a primary case.

While there have been several reports of cryptosporidiosis outbreaks associated with public swimming pools in New Zealand, this is the first published record of an outbreak of giardiasis being linked to a specific public pool.[1]

At a toddlers' swim group lesson on the morning of 26 October 2012, one of the toddlers had an episode of diarrhoea in the learners' pool of the aquatic centre. The incident went unreported for about two minutes until a parent in the group noticed faecal material floating past her. At the time of the faecal accident there were approximately 26 people in the learners' pool, which was immediately closed to all patrons. Staff then initiated cleaning and disinfection protocols.

Public health follow-up led to nine individuals meeting the case definition for a primary case, which was any person who had been swimming at the aquatic centre on 26 October 2012 and who became unwell within 10 days with symptoms of diarrhoea and/or vomiting. The last case was a secondary case that was notified 49 days after the faecal accident (Figure 2).

Figure 2. Epidemic curve of giardiasis cases by onset week, November to December 2012



Several operational deficiencies were noted at the pool complex during the public health investigation, including:

- The sick child and caregiver were allowed to re-enter another pool almost immediately.
- The aquatic centre had no documented record of the faecal accident.
- There was no signage at the centre advising patrons with existing or recent diarrhoea not to enter the pools.
- The entry and reception area was cluttered with a range of notices and promotions, so any health messages would be competing with the other signs for public attention.

The following recommendations were subsequently made to the aquatic centre:

- Verbally screen at-risk groups to ensure anyone suffering from vomiting and/or diarrhoea does not enter a pool.
- Display conspicuous public health signage at the main entrance to the facility as well as in all changing rooms and near nappy change stations.
- Conduct regular training for all pool staff regarding the correct response to a faecal accident.
- Document and report all faecal accidents to the local public health unit.

A visit to the aquatic centre some months later confirmed that management had acted on all of the recommendations, including:

- The provision of free swim nappies to babies and toddlers.
- Verbal screening of at-risk groups. (Regrettably some patrons reported that they found the screening culturally offensive and felt they were being unfairly targeted. As a result, pool management had revised their communications strategy to maintain positive customer relations).

The investigation of this outbreak was a timely reminder to the aquatic centre to improve the quality of their operational management. They were encouraged to actively promote health and hygiene messages to prevent faecal accidents and to respond appropriately when an accident did happen. Faecal accidents involving diarrhoea require a prompt and effective response to minimise exposure to other pool users.[2,3]

The Ministry of Health's Communicable Disease Control Manual confirms that people with giardiasis should not use public swimming pools for two weeks after their symptoms have resolved.[4]

For list of references see – www.surv.esr.cri.nz/surveillance/NZPHSR.php

Reported by Vijay Patel, Health Protection Officer, Phil Shoemack, Medical Officer of Health, and Stephen Layne, Team Leader Health Protection, Toi Te Ora – Public Health Service.

Norovirus outbreak at an indoor playground

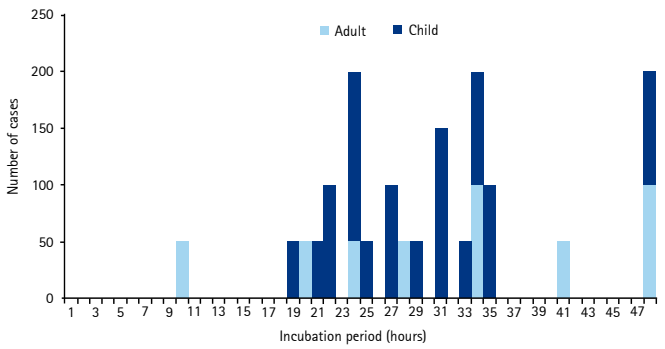
An outbreak of gastroenteritis occurred among adults and children who attended birthday parties at an indoor play facility. The playground caters for children aged 0–11 years.

Regional Public Health interviewed the organisers of all birthday parties held during the weekend under investigation to determine the number of visitors and how many had experienced gastroenteritis symptoms. A symptom and exposure questionnaire was completed for ill people.

A site investigation with Wellington City Council Environmental Health staff identified that the facility was clean, but noted that there was limited ventilation and the cleaning cupboard adjoined the kitchen. The team had no concerns about food hygiene. There was no policy regarding faecal or vomit incidents and whether their clean-up was the responsibility of the child's parents or facility staff. Visitors were not advised to exclude those who had recently been unwell with diarrhoea or vomiting. Play equipment was cleaned twice a week using a cleaning product with unspecified active ingredients.

On the Saturday of the weekend in question, the organisers of eight of the ten booked parties and two casual parties were contacted. All groups had been affected and 71 cases were identified. Of these, 30 people who had experienced symptoms of vomiting and/or diarrhoea 10–50 hours after visiting the playground were interviewed (Figure 3). Forty one probable cases, with vomiting, diarrhoea and/or abdominal pain within 10–50 hours of visiting the playground, were reported by someone else and were not interviewed. The overall case attack rate was 60% among children and 21% among adults. No cases were found among booked party groups who visited the playground on the Sunday.

Figure 3. Epidemic curve showing the incubation period of clinical cases by age, in a norovirus outbreak at an indoor playground



In case interviews, a parent reported noticing faecal marks on her child's trousers after using a slide. The timing of this event was consistent with the exposure of all booked parties. An adult supervising children on the slide became unwell. His daughter who avoided the slide remained well, while her friends who had played on the slide did not.

Two faecal samples from different party groups confirmed the presence of norovirus genotype II, but all environmental swabs were negative. Clinical and epidemiological data was also characteristic of norovirus. The source of the outbreak appears to have been environmental contamination via a faecal incident. The scale of the outbreak at the facility highlights the importance of public health control measures in this environment, which is akin to an early childhood centre.

The higher attack rates observed in the children, reflects the differences between children and adults in their exposure to play equipment. The type and intensity of playground equipment use should be considered in future outbreak investigations as risk factors for infection.

We recommend that adults and children with diarrhoea or vomiting are excluded from facilities such as this, and that this advice is provided to parents in advance of a visit. A response to faecal and vomiting incidents should include incident documentation and a clean-up procedure that identifies the disinfectants which should be used (such as hypochlorite 1000ppm). Increased thoroughness, frequency and documentation of cleaning were also recommended, as was the importance of adequate ventilation.

The facility and the franchise head office were very cooperative and implemented all these recommendations. Franchise-wide solutions were created, including the use of cue cards to spell out the process for responding to faecal and vomit incidents.

Indoor playgrounds have a high risk of spreading infection but the recommendations made following this outbreak have led to widespread improvements. These measures are relevant to indoor playgrounds nationally and will help minimise the risk and scale of future outbreaks.

Reported by Andrea McDonald, Public Health Medicine Registrar, Sally Giles, Senior Health Protection Officer, and Annette Nesdale, Medical Officer of Health, Regional Public Health.

6. Laboratory Surveillance

The *Clostridium botulinum* story – ESR's role

The dairy company *Fonterra* issued a warning regarding the potential contamination of milk whey protein with the harmful botulism-causing bacterium *Clostridium botulinum* on 3 August 2013.[1] The Ministry for Primary Industries (MPI) also issued a warning against using certain brands of infant formula. The contaminant was subsequently found to be *C. sporogenes*, which poses no health risk.

Clostridium botulinum is a gram-positive, obligate anaerobic, spore-forming bacterium, commonly found in soils and marine sediments. It produces a neurotoxin that causes botulism, a sometimes-fatal illness characterised by flaccid paralysis, which can also cause nausea, vomiting, abdominal cramps, diarrhoea, constipation, dry mouth, blurred vision and diplopia.

An initial diagnosis of botulism should be made on the basis of history and symptoms, as confirmatory test results may take several days. The mouse inoculation test is the most reliable confirmatory test and is regarded by many as the gold standard. Recent advances include molecular methods, such as polymerase chain reaction (PCR), that allow the genes encoding different types of clostridial neurotoxins (toxin types A, B, C, D, E, F, G and H) to be detected. Human botulism is primarily caused by *C. botulinum* toxin types A, B, E and F, whereas types C and D cause botulism in non-human species.

Following the contamination warning, ESR provided information and advice to MPI about the characteristics of *C. botulinum* – specifically the effect of ultra-heat treatment (UHT) on its viability, since UHT had been used in the manufacture of other products from the contaminated batch of whey powder. ESR was also invited to serve on the Technical Advisory Group convened by MPI to provide expert advice on the issue.

On Monday 5 August, the Enteric Reference Laboratory (ERL) and the Public Health Laboratory (PHL) at ESR received inquiries regarding confirmatory testing of *C. botulinum* from clinical samples. At the time, no laboratory in New Zealand was routinely testing for *C. botulinum*, so ESR approached the Microbiological Diagnostic Unit Public Health Laboratory (MDUPHL) in Melbourne. MDUPHL agreed to provide support for any *C. botulinum* testing required, until ESR's PHL had validated the molecular methods (PCR) allowing the detection of each of the toxin genes. In addition, MDUPHL was accredited to perform the mouse neutralisation assay if required.

ESR provided a guide to the collection and submission of specimens, noting: the type of specimen required (faecal and/or serum samples for adult botulism, and faecal samples for infant botulism); that samples should be sent to ERL chilled; and that ERL would be forwarding the samples to MDUPHL for analysis.

On Tuesday 6 August, the email network NZBug sent an email asking what the national testing strategy for *C. botulinum* was. Information for laboratories and clinicians was then compiled by the Ministry of Health, ESR and Paediatric Infectious Disease consultants from Auckland. This document provided guidance for the diagnosis and management of possible cases of infant botulism. In addition, it emphasised that only samples from clinically suspected cases should be sent to ESR, and that any concerns about potentially contaminated batches of infant formula were to be directed to the Food Safety Laboratory at ESR. Information was also provided via the Ministry of Health website, NZBug Network and Public Health Aide, and daily updates were given by the Ministry of Health.

ESR called upon key international institutions for advice and help with resources, including leading researchers in the field based at the Institute of Food Research (UK) and Public Health England (UK). They graciously and quickly provided advice on the new rapid PCR tests they had recently developed, as well as the critical reference materials that enabled ESR to establish molecular assays for *C. botulinum*.

MPI commissioned additional overseas testing on the whey protein isolates and confirmed the identity of the contaminant as *C. sporogenes* on 28 August. *C. sporogenes* is a closely-related but benign bacterium. Although the crisis was over, the impacts remained.

During the *C. botulinum* scare, ESR demonstrated its expertise, specialised services and knowledge. Food safety and health staff provided timely data and information, as well as assurance regarding ESR's capability to identify the bacterium in infant formula and clinical specimens. The scare should serve as a reminder to industry and policy-makers that food safety is of paramount importance in an export-dependent nation like New Zealand.

For list of references see – www.surv.esr.cri.nz/surveillance/NZPHSR.php

Reported by Muriel Dufour, Enteric Reference Laboratory, Maurice Wilson and Angela Cornelius, Public Health Laboratory, ESR.

Mycology

Tables detailing the biannual summary of opportunistic mycoses and aerobic actinomycetes in New Zealand are available at www.surv.esr.cri.nz/surveillance/NZPHSR.php

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Contributions to this publication are invited in the form of concise reports on surveillance issues or outbreak investigations.

Please send contributions and feedback to:
Scientific Editor,
New Zealand Public Health Surveillance Report, ESR,
PO Box 50-348, Porirua, Wellington, New Zealand.
Phone: (04) 914 0700; Fax (04) 914 0770;
Email: survqueries@esr.cri.nz

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