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New Zealand Public Health Surveillance Report

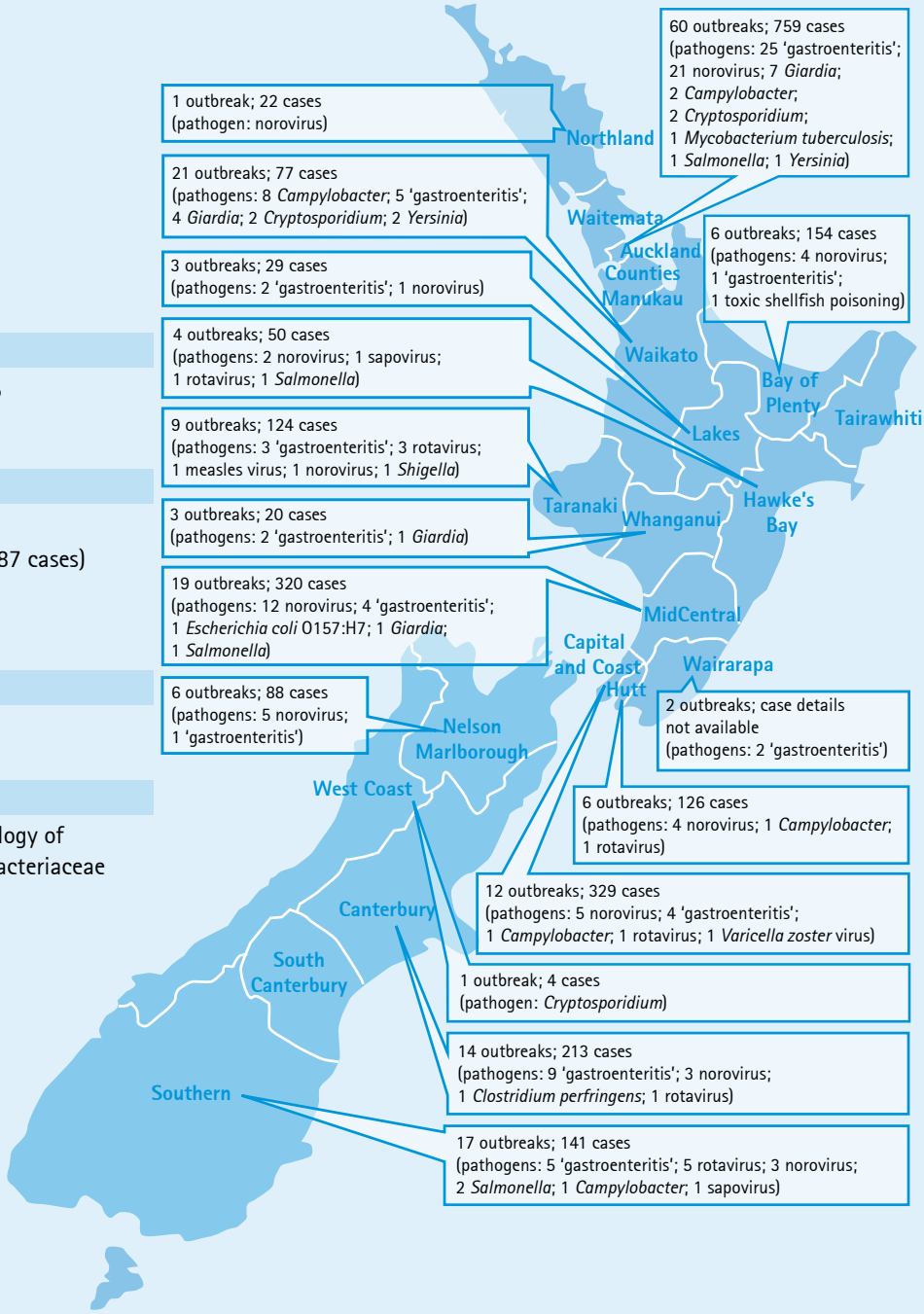
March 2015: Covering October to December 2014

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 2014. 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 20 January 2015. Outbreaks reporting exposures in more than one geographic location are assigned to the district health board with the most cases. One outbreak involved more than one pathogen therefore individual pathogen outbreak numbers may not sum to group totals.



1. Editorial

2014 outbreaks of enterovirus D68 in United States and Canada: an alert for New Zealand

During 2014 the United States (US) and Canada reported nationwide outbreaks of enterovirus D68 (EV-D68). The outbreaks followed earlier reports of spikes in severe respiratory illness due to EV-D68 in several children's hospitals in the US beginning in August 2014.[1]

EV-D68 is one of the less commonly identified and reported non-polio enteroviruses. EV-D68 was isolated and identified from four children in California in 1962. It is reported to cause mild to severe respiratory illness and reported deaths have been rare. Outbreaks of EV-D68 in Asia, Europe and the US reported during 2008–2010 had similar clinical characteristics but were not as large or widespread as this current outbreak. It is likely that the full spectrum of EV-D68 illness has not been well-defined because testing for EV-D68 is targeted to the most severe cases, thus resulting in a detection bias of the observed severity of disease. Typically enteroviruses circulate in temperate climates with a summer-fall seasonal pattern, with outbreaks usually occurring in several year cycles. EV-D68 clusters have generally been detected within or later than the typical enterovirus season in the areas from which the cases are reported.[2]

Between mid-August 2014 and 15 January 2015, 1153 cases of EV-D68 were confirmed in the US in the District of Columbia and 49 states. The majority of cases reported were in children, many of whom had asthma or a history of wheezing. Some children required admission to intensive care and mechanical ventilation. The virus was also detected in 14 patients who died but a causal relationship has not been established. The Centers for Disease Control and Prevention (CDC) received more specimens than usual for enterovirus testing during 2014, of which 33% tested positive for EV-D68.[3] Only 79 confirmed EV-D68 cases were reported to the National Enterovirus Surveillance System during 2009–2013.[4]

The current outbreak in Canada was first reported on 15 September 2014, when Alberta Health Services reported 18 cases among hospitalised patients, all aged <18 years. By December, more cases had been reported from most regions of the country, with 214 specimens confirmed in the National Microbiology Laboratory, and further cases reported from provinces that perform their own testing. These include 221 cases confirmed by the British Columbia Centre for Disease Control (BCCDC) and 111 cases confirmed by Alberta Health Services. BCCDC undertook enhanced surveillance between 1 September and 31 December, 2014. Of the 221 cases reported by BCCDC, at least 140 required hospitalisation and two-thirds were in children aged ≤10 years. Cases occurred in all regions of the province, with the majority reported after 1 October 2014. Three deaths associated with EV-D68 have been reported in British Columbia, at least one due to respiratory failure in a person with a prior history of severe asthma, but no causal link has been established.[1,5]

CDC have also reported a number of cases of unexplained neurologic illness in children, some of whom have tested positive for EV-D68. By late October 2014, 64 cases of acute neurologic illness with focal limb weakness in children and unknown aetiology had been reported to CDC from 28 different states.[5] A case definition for acute flaccid myelitis was developed and from 2 August 2014 to 14 January 2015, CDC have verified reports of 107 cases in 34 states that have met this case definition. CDC is looking into possible linkages between these cases and the recent EV-D68 outbreak.[1]

Neurologic illness with paralytic manifestations in cases with confirmed EV-D68 has also been reported in Canada (3 children and 2 adults in British Columbia), however it remains unclear whether there is a causal link. Paralytic cases in several other provinces are also being investigated for association with EV-D68.[1] A case with acute flaccid paralysis following EV-D68 infection was reported in France in September 2014. This case had features in common with cases reported in the US including: (i) respiratory illness preceding the neurological symptoms, (ii) a local cluster of EV-D68 detection in children admitted to hospital for respiratory infections, and (iii) detection of EV-D68 in respiratory samples from the case.[6]

A cluster of cases was reported in New Zealand in 2010. EV-D68 was detected in 15 samples submitted to the National Poliovirus and Enterovirus Identification Reference Laboratory as part of the New Zealand enterovirus surveillance network. The majority of cases were aged less than 2 years, were of Māori or Pacific ethnicity and presented with a range of respiratory symptoms (cough, coryza, stridor, bronchiolitis or asthma).[7] Although further cases have not been identified in New Zealand since 2010, the recent outbreaks overseas are a reminder there is potential for a similar outbreak in this country. The association of EV-D68 with severe respiratory illness and possible link to neurologic illness with paralytic manifestations, means that further clusters of disease in this country would be of concern to New Zealand.

References

1. National Collaborating Centre for Infectious Diseases 2015. Disease debrief: EV-D68. NCCID, Winnipeg, Manitoba. Available at: http://www.nccid.ca/disease-debrief-ev-d68 [accessed 3 February 2015].
2. Centers for Disease Control and Prevention 2011. Clusters of acute respiratory illness associated with human enterovirus 68 – Asia, Europe and United States, 2008–2010. MMWR 60(38):1301–04.
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6. Lang M, Mirand A, Savy N, *et al.* 2014. Acute flaccid paralysis following enterovirus D68 associated pneumonia, France, 2014. Eurosurveillance 19(44):pii=20952.
7. Todd A, Hall R, Wang J, *et al.* 2013. Detection and whole genome sequence analysis of an enterovirus 68 cluster. Virology Journal 10:103.

Reported by Jill Sherwood, Health Intelligence Team, Health Programme, ESR.

2. Notifiable Disease Surveillance

The following is a summary of disease notifications for the October to December quarter of 2014 and cumulative notifications and rates calculated for a 12-month period (January to December 2014). 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 20 January 2015. 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:* 135 notifications in the quarter (2013, 118); 513 notifications over the last 12 months (2013, 479), giving a rate of 11.5 cases per 100,000 population (2013, 10.7), not a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (173 cases). Cases were aged between 3 days and 94 years, with 14 cases aged less than 2 years.

Measles

- *Notifications:* 5 notifications in the quarter (2013, 7); 281 notifications over the last 12 months (2013, 8), giving a rate of 6.3 cases per 100,000 population (2013, 0.2), a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (46 cases). No cases were aged less than 15 months. 4 cases were confirmed.

Pertussis

- *Notifications:* 264 notifications in the quarter (2013, 610); 1133 notifications over the last 12 months (2013, 3540), giving a rate of 25.3 cases per 100,000 population (2013, 79.2), a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly decrease from the same quarter last year (610 cases).

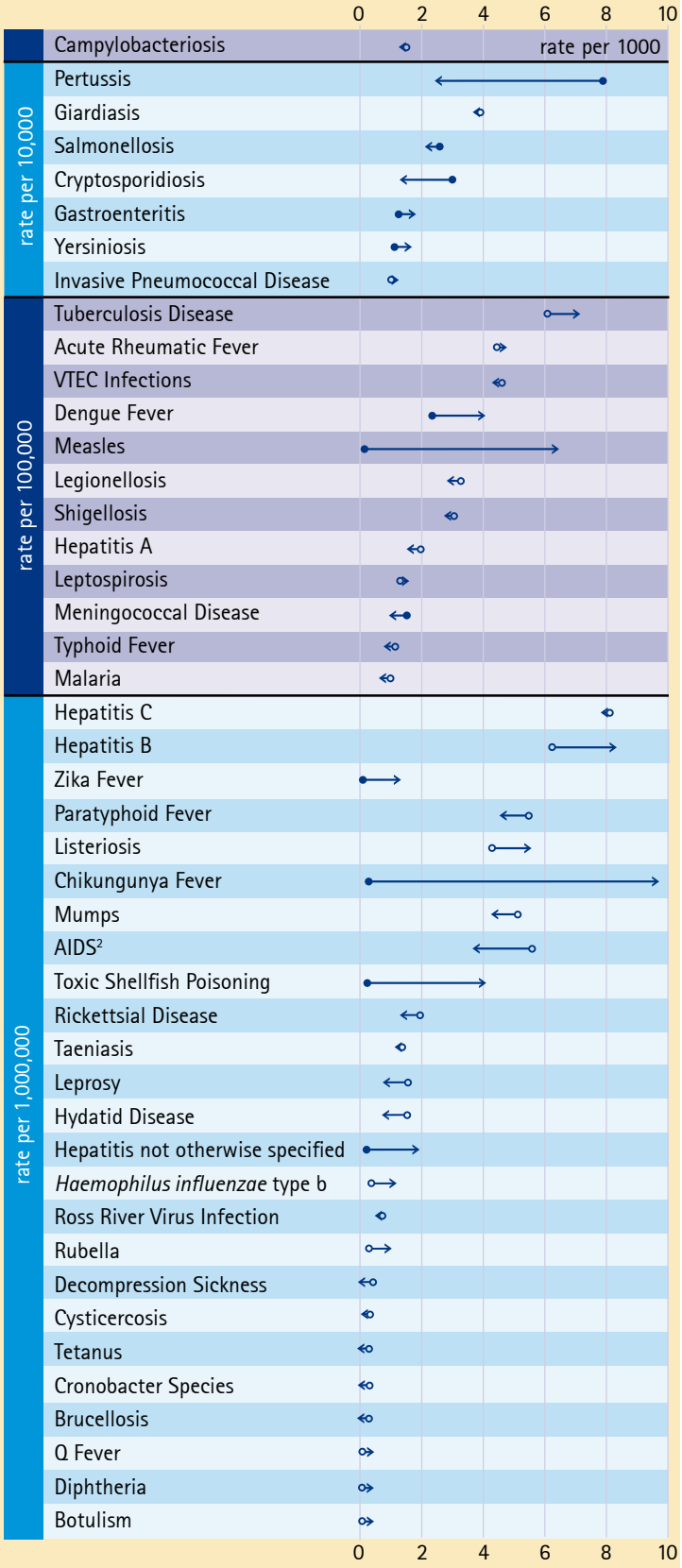
ENTERIC INFECTIONS

Campylobacteriosis

- *Notifications:* 2339 notifications in the quarter (2013, 2286); 6770 notifications over the last 12 months (2013, 6837), giving a rate of 151.4 cases per 100,000 population (2013, 152.9), not a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (1431 cases).

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 2014 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.

Gastroenteritis (acute)

- *Notifications:* 223 notifications in the quarter (2013, 138); 756 notifications over the last 12 months (2013, 558), giving a rate of 16.9 cases per 100,000 population (2013, 12.5), a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly increase from the same quarter last year (138 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 unless they meet the criteria above and for syndromic reports that come through public health units, including direct reports from the public where the causative pathogen may never be known.

Salmonellosis

- *Notifications:* 235 notifications in the quarter (2013, 292); 961 notifications over the last 12 months (2013, 1143), giving a rate of 21.5 cases per 100,000 population (2013, 25.6), a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly decrease from the same quarter last year (292 cases).

VTEC Infections

- *Notifications:* 42 notifications in the quarter (2013, 17); 200 notifications over the last 12 months (2013, 205), giving a rate of 4.5 cases per 100,000 population (2013, 4.6), not a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly increase from the same quarter last year (17 cases).

Yersiniosis

- *Notifications:* 277 notifications in the quarter (2013, 142); 720 notifications over the last 12 months (2013, 484), giving a rate of 16.1 cases per 100,000 population (2013, 10.8), a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly increase from the same quarter last year (142 cases).

INFECTIOUS RESPIRATORY DISEASES

Acute Rheumatic Fever

- *Notifications:* 31 notifications in the quarter (2013, 55); 208 notifications over the last 12 months (2013, 200), giving a rate of 4.7 cases per 100,000 population (2013, 4.5), not a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (75 cases) and from the same quarter last year (55 cases). Age was recorded for 30 cases. They were distributed by age as follows: 9 (5–9 years), 9 (10–14 years), and 12 (15 years and over). 27 cases were an initial attack of acute rheumatic fever and 4 cases were recurrent attacks.
- *Note:* this information is based on report date and for rheumatic fever is not a good indicator of disease onset due to the high proportion of notifications with substantial reporting delays.

Meningococcal Disease

- *Notifications:* 8 notifications in the quarter (2013, 10); 46 notifications over the last 12 months (2013, 68) giving a rate of 1.0 per 100,000 population (2013, 1.5), a statistically significant decrease.
- *Comments:* Cases were distributed by age as follows: 2 (1–4 years) and 6 (15 years and over). 6 cases were laboratory confirmed. The strain group was identified for all cases: group B (5 cases, including 3 group B:P1.7-2,4) and group C (1 case, group C:P1.22,14). Strain type B:P1.7-2,4 was previously known as the 'NZ epidemic strain'.

ENVIRONMENTAL EXPOSURES & INFECTIONS

Cryptosporidiosis

- *Notifications:* 238 notifications in the quarter (2013, 284); 584 notifications over the last 12 months (2013, 1348), giving a rate of 13.1 cases per 100,000 population (2013, 30.1), a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (194 cases) and a statistically significant decrease from the same quarter last year (284 cases).

Giardiasis

- *Notifications:* 345 notifications in the quarter (2013, 405); 1709 notifications over the last 12 months (2013, 1729), giving a rate of 38.2 cases per 100,000 population (2013, 38.7), not a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (423 cases) and from the same quarter last year (405 cases).

Legionellosis

- *Notifications:* 54 notifications in the quarter (2013, 55); 132 notifications over the last 12 months (2013, 151), giving a rate of 3.0 cases per 100,000 population (2013, 3.4), not a statistically significant decrease.
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (29 cases). 9 notifications remain under investigation, a proportion of these will fail to meet the case definition and be classified 'not a case'.

Toxic Shellfish Poisoning

- *Notifications:* 14 notifications in the quarter (2013, 0); 18 notifications over the last 12 months (2013, 1), a statistically significant increase.
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (2 cases) and from the same quarter last year (no cases).

NEW, EXOTIC & IMPORTED INFECTIONS

Chikungunya Fever

- *Notifications:* 29 notifications in the quarter (2013, 1); 43 notifications over the last 12 months (2013, 1), giving a rate of 1.0 cases per 100,000 population, a statistically significant increase.

- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (3 cases) and the same quarter last year (1 case). 25 cases were laboratory confirmed. All cases had travelled overseas during the incubation period of the disease. The most commonly visited countries were Samoa (22 cases) and French Polynesia (2 cases).

Dengue Fever

- *Notifications:* 37 notifications in the quarter (2013, 32); 187 notifications over the last 12 months (2013, 106), giving a rate of 4.2 cases per 100,000 population (2013, 2.4), a statistically significant increase.
- *Comments:* 33 cases were laboratory confirmed. All cases had travelled overseas during the incubation period of the disease. The most commonly visited countries were French Polynesia (5 cases), India (5 cases), Indonesia (4 cases), and Tonga (4 cases).

Hepatitis (not otherwise specified)

- *Notifications:* 1 notification in the quarter (2013, 0); 8 notifications over the last 12 months (2013, 1), giving a rate of 0.2 per 100,000 population, a statistically significant increase.

Zika Fever

- *Notifications:* no notifications in the quarter (2013, 0); 55 notifications over the last 12 months (2013, 0), giving a rate of 1.2 per 100,000 population, a statistically significant increase.

3. Other Surveillance Reports

Hospital-based rotavirus surveillance begins in 2015

Rotavirus is not a notifiable disease in New Zealand. However, with the introduction of the rotavirus vaccine *RotaTeq* to the National Immunisation Schedule on 1 July 2014, the Ministry of Health has contracted ESR to implement hospital-based surveillance in order to monitor the impact of the vaccine on disease rates and genotypes. ESR is currently setting up surveillance at three sentinel hospital sites and a pilot is underway at Kidz First Children's Hospital in Counties Manukau DHB.

Rotaviruses are the most common cause of severe gastroenteritis in young children worldwide. Compared with illness caused by other enteric pathogens, the diarrhoea is particularly severe and often associated with dehydration. A 2006 study of New Zealand children estimated that 1 in 52 are hospitalised with rotavirus gastroenteritis by 3 years of age.[1] Disease rates for rotavirus peak in the second year of life and during winter and spring.

Immunisation against rotavirus is expected to be most effective against severe disease therefore surveillance will focus on severe outcomes such as hospitalisations and deaths. Initially rotavirus will be monitored in children under 5 years of age for the pilot (over summer) but this is likely to be reduced to children under 2 or 3 years of age during the peak season.

A stool sample from every eligible child who presents at an emergency department, or is admitted to a participating hospital with acute gastroenteritis is tested for the presence of rotavirus. All rotavirus-positive samples are referred to ESR for typing. Children who are readmitted within 14 days are excluded from the surveillance in order to prevent cases being counted more than once for the same episode.

A minimal set of data is collected during the child's hospital stay. Nurses check the medical records and complete a case report form which includes demographic information, clinical symptoms and immunisation details. The information is entered into a secure website daily. Laboratory results are uploaded to ESR weekly via a secure portal.

The pilot study runs until February 2015 when the surveillance will be extended to two additional hospitals. ESR will produce a surveillance report in the second half of 2015. The report will characterise rotavirus hospitalisations by person, place and time. The distribution by genotype will also be described.

Reference

1. Grimwood K, Huang Q, Cohet C, Gosling I, Hook S, Teele D, *et al.* 2006. Rotavirus hospitalisation in New Zealand children under 3 years of age. J Paediatr Child Health 42(4):196–203.

Reported by Yvonne Galloway, Health Intelligence Team, Health Programme, ESR.

Tuberculosis epidemiology, 2013

The notification rate for tuberculosis (TB) in New Zealand in 2013 remained the same as in 2012 at 6.6 cases per 100,000 population - the lowest observed in the past 30 years. Although rates have been relatively stable since 2007, TB is one of a number of infectious diseases that play a major role in ethnic and socioeconomic inequalities in New Zealand.

The majority (95.7%) of notifications were for new disease. A high proportion (78.3%) of cases were positive culture for *Mycobacterium tuberculosis* complex.

As in previous years, there were demographic differences in rates of new TB disease. Rates were highest in males, especially in the older age groups. The Asian and the Middle Eastern/Latin American/African (MELAA) ethnic groups consistently experience the highest notification rates, although the absolute number of MELAA cases remains relatively low. As in previous years, higher rates of TB occurred in socioeconomically deprived areas.

The rates in Auckland, Capital & Coast and Counties Manukau District Health Boards (DHBs) were above the national rate. These three DHBs have large urban populations and the higher incidence may reflect the ethnic makeup of these communities, settlement patterns of migrants from high endemicity countries, and housing issues such as overcrowding.

Being born outside New Zealand and current or recent residence with a person born outside New Zealand have consistently been dominant risk factors. Exposure in a healthcare setting or current or recent residence in an institution were reported for comparatively few new TB cases.

The pattern of disease detection for new TB cases has been consistent over the past 5 years, with more than two thirds of TB cases diagnosed when they presented with symptoms to a health practitioner. Around 9% of cases were identified through immigrant/refugee screening.

Pulmonary disease was more common among new TB cases born in New Zealand than in cases born overseas. No cases of miliary TB in children aged <5 years were reported in 2013 and only one case has been reported in the last 5 years. There have been no cases of tuberculous meningitis in this age group over the last 5 years.

None of the new TB cases in 2013 were reported to have HIV co-infection, compared with the three co-infections in 2012.

Three (1.4%) of the 216 culture-positive cases reported in 2013 were multidrug-resistant TB (MDR-TB), defined as resistance to at least isoniazid and rifampicin. Resistance to all antimicrobials except pyrazinamide was higher in isolates from cases born overseas than in isolates from New Zealand-born cases, although none of the differences were significant. All isoniazid-resistant, rifampicin-resistant, ethambutol-resistant and MDR-TB isolates were from cases of Asian ethnicity.

Between 2004 and 2013, there was a significant trend of decreasing pyrazinamide resistance, but no significant changes in resistance to isoniazid, rifampicin, ethambutol or streptomycin. Over the same 10 years, an average of 1.3% of TB cases were MDR-TB.

Approximately one third of the *M. tuberculosis* isolates that underwent molecular typing between 2009 and 2013 had results that matched other typed isolates (ie, were non-unique and could be assigned to a cluster). Most clusters contained less than five cases. Four new clusters were identified in 2013 with two cases in each.

Several indicators may be used to assess TB transmission in low endemicity countries such as New Zealand. The 2013 rate of new TB in New Zealand-born children <5 years of age was 1.6 per 100,000, a decline from 3.6 in 2009. The child-to-adult ratio (<15 years to ≥15 years) of rates of new TB was 0.16 in 2013 and this ratio has shown a sustained decline over the last 5 years. Both these indicators suggest decreasing transmission within New Zealand and support the premise that most cases of TB diagnosed in New Zealand result from infection acquired overseas.

For a more detailed report see https://surv.esr.cri.nz/surveillance/AnnualTBReports.php

Reported by Ange Bissielo, Helen Heffernan, and Jill Sherwood, Health Programme, ESR.

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 2014). Comparisons are made to the previous quarter (July to September 2014), and to the same quarter in the previous year (October to December 2013). Data contained within this section are based on information recorded in EpiSurv by public health service staff up to 20 January 2015. As this information may be updated over time, these data should be regarded as provisional.

General

- 184 outbreaks notified in this quarter (2456 cases).
- 146 are final reports (2169 cases); 38 are interim reports (287 cases) that have yet to be finalised and closed.

All data that follow relate to final reports only.

- 14.9 cases on average per outbreak, compared with 14.6 cases per outbreak in the previous quarter (9.5 cases per outbreak in the same quarter of last year).
- 17 hospitalisations: rotavirus (7 cases), *Campylobacter* (3 cases), measles virus (3 cases), norovirus (2 cases), *Shigella* (1 case), and *Yersinia* (1 case).
- 3 deaths: norovirus (3 cases).
- One outbreak involved more than one pathogen therefore individual pathogen outbreak numbers may not sum to group totals.

Pathogens

- 57 norovirus outbreaks (1458 cases).
- 37 'gastroenteritis' outbreaks (332 cases).
- 13 *Giardia* outbreaks (45 cases).
- 12 *Campylobacter* outbreaks (100 cases).
- 9 rotavirus outbreaks (121 cases).
- 5 *Cryptosporidium* outbreaks (14 cases).
- 4 *Salmonella* outbreaks (13 cases).
- 3 *Yersinia* outbreaks (6 cases).
- 2 sapovirus outbreaks (35 cases).
- 1 *Clostridium perfringens* outbreak (17 cases).
- 1 *Escherichia coli* O157:H7 infection outbreak (5 cases).
- 1 measles virus outbreak (3 cases).
- 1 *Shigella* outbreak (21 cases).
- 1 *Varicella zoster* virus outbreak (24 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.

- 123 person-to-person, from (non-sexual) contact with an infected person (including droplets): 55 norovirus (1430 cases), 28 'gastroenteritis' (280 cases), 12 *Giardia* (42 cases), 9 rotavirus (121 cases), 5 *Cryptosporidium* (14 cases), 4 *Campylobacter* (14 cases), 4 *Salmonella* (13 cases), 2 sapovirus (35 cases), 2 *Yersinia* (4 cases), 1 *E. coli* O157:H7 (5 cases), 1 measles virus (3 cases), and 1 *V. zoster* virus (24 cases).
- 33 environmental, from contact with an environmental source (eg, swimming): 16 norovirus (414 cases), 7 'gastroenteritis' (70 cases), 3 *Giardia* (9 cases), 3 rotavirus (35 cases), 1 *Campylobacter* (4 cases), 1 *Cryptosporidium* (2 cases), 1 *Salmonella* (4 cases), and 1 sapovirus (10 cases).
- 14 foodborne, from consumption of contaminated food or drink (excluding water): 7 'gastroenteritis' (30 cases), 3 norovirus (40 cases), 2 *Campylobacter* (70 cases), 1 *C. perfringens* (17 cases), and 1 *Shigella* (21 cases).

- 8 zoonotic, from contact with an infected animal: 3 *Giardia* (7 cases), 2 *Cryptosporidium* (7 cases), 2 *Salmonella* (6 cases), and 1 *Campylobacter* (4 cases).
- 6 waterborne, from consumption of contaminated drinking water: 2 *Campylobacter* (6 cases), 2 *Cryptosporidium* (6 cases), and 2 *Giardia* (5 cases).
- 1 'other' mode: *Campylobacter* (2 cases).
- 11 mode of transmission unknown: 4 'gastroenteritis' (28 cases), 3 *Campylobacter* (8 cases), 2 norovirus (28 cases), 1 *Giardia* (3 cases), and 1 *Yersinia* (2 cases).

Circumstances of Exposure

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

- 51 long term care facility: 35 norovirus (1005 cases), 13 'gastroenteritis' (113 cases), 2 rotavirus (13 cases), and 1 sapovirus (10 cases).
- 27 home: 9 *Giardia* (36 cases), 7 *Campylobacter* (22 cases), 3 *Salmonella* (11 cases), 2 *Cryptosporidium* (5 cases), 2 norovirus (12 cases), 2 *Yersinia* (4 cases), 1 *E. coli* O157:H7 (5 cases), and 1 measles virus (3 cases).
- 23 childcare centre: 8 'gastroenteritis' (111 cases), 7 rotavirus (108 cases), 4 norovirus (73 cases), 1 *Cryptosporidium* (4 cases), 1 *Giardia* (5 cases), 1 *V. zoster* virus (24 cases), and 1 *Yersinia* (2 cases).
- 14 restaurant/café/bakery: 6 'gastroenteritis' (16 cases), 5 norovirus (47 cases), 2 *Campylobacter* (70 cases), and 1 *C. perfringens* (17 cases).
- 7 hospital (acute care): 5 norovirus (156 cases) and 2 'gastroenteritis' (11 cases).
- 3 takeaways: 3 'gastroenteritis' (18 cases).
- 3 workplace: 2 'gastroenteritis' (17 cases) and 1 norovirus (23 cases).
- 2 farm: 1 *Cryptosporidium* (3 cases) and 1 *Salmonella* (4 cases).
- 2 other institution: 1 'gastroenteritis' (4 cases), 1 norovirus (25 cases), and 1 sapovirus (25 cases).
- 2 school: 1 'gastroenteritis' (34 cases) and 1 norovirus (7 cases).
- 1 cruise ship: norovirus (89 cases).
- 1 hotel/motel: *Shigella* (21 cases).
- 1 other food outlet: norovirus (17 cases).
- 1 petting zoo: *Giardia* (2 cases).
- 2 'other setting': 1 *Cryptosporidium* (2 cases) and 1 norovirus (6 cases).
- 5 outbreaks had two or more exposure settings recorded.
- 10 outbreaks had no exposure settings recorded.

Common 'settings' where preparations occurred in foodborne outbreaks are identified below.

- 9 restaurant/café/bakery: 4 'gastroenteritis' (10 cases), 3 norovirus (40 cases), 1 *Campylobacter* (34 cases), and 1 *C. perfringens* (17 cases).
- 2 takeaways: 2 'gastroenteritis' (15 cases).
- 1 caterers: *Campylobacter* (36 cases).
- 1 hotel/motel: *Shigella* (21 cases).
- 1 workplace: 'gastroenteritis' (5 cases).

5. Outbreak Case Reports

No reports this quarter.

6. Laboratory Surveillance

Antimicrobial susceptibility and molecular epidemiology of extended-spectrum β-lactamase producing Enterobacteriaceae

Over the past decade, the prevalence of antimicrobial-resistant Enterobacteriaceae, such as *Escherichia coli* and *Klebsiella pneumoniae*, has increased considerably in many parts of the world.[1] Most notably, resistance to third-generation cephalosporins (eg, ceftriaxone, ceftazidime), particularly due to extended-spectrum β-lactamase (ESBL) production, has become endemic in several regions. A recent World Health Organization report described resistance rates of over 50% to third-generation cephalosporins among *E. coli* from several countries in the Southeast Asian and Western Pacific regions.[1] Each year ESR conducts a national survey to monitor the prevalence and epidemiology of ESBL-producing Enterobacteriaceae (ESBL-E) in New Zealand (NZ). While the incidence of ESBL-E is relatively low in NZ, rates are increasing.[2]

A study using a random sample of 352 clinical ESBL-E isolates, referred to ESR as part of the 2013 annual ESBL-E survey, was undertaken to provide further information on the antimicrobial susceptibility and molecular epidemiology of ESBL-E in NZ. Basic patient demographic and hospitalisation history data was provided by the referring laboratories or obtained from the Ministry of Health's National Minimum Dataset. Antimicrobial susceptibility was determined by agar dilution, the ESBL type identified by polymerase chain reaction (PCR) and sequencing, and molecular typing of *E. coli* and *K. pneumoniae* was performed by multiple-locus variable tandem repeat analysis (MLVA). *E. coli* were further characterised to identify phylogenetic groups and isolates belonging to multilocus sequence type 131 (ST131).

Of the 352 ESBL-E isolates, 63.6% (224) were *E. coli*, 31.5% (111) were *Klebsiella* spp., and the remaining 4.8% (17) were other Enterobacteriaceae spp. Most (88.6%) of the isolates were from urine, 75.6% were from female patients, and 64.1% were from patients ≥65 years of age. Patients with ESBL-producing *E. coli* (ESBL-*E. coli*) were almost evenly split between community patients and those in a healthcare facility, whereas 83.3% of patients with ESBL-producing *Klebsiella* spp. (ESBL-*Klebsiella* spp.) were healthcare facility patients.

The majority (86.1%) of ESBL-E were multiresistant (ie, resistant to ≥3 antibiotic classes), with the most common pattern being resistance to amoxicillin-clavulanate, ciprofloxacin, co-trimoxazole/trimethoprim and gentamicin. 93.3% of ESBL-*E. coli* were susceptible to nitrofurantoin, but most ESBL-*Klebsiella* spp. were resistant. 84.9% and 96.3% of ESBL-E were susceptible to the oral agents mecillinam and fosfomycin, respectively. All ESBL-E were susceptible to meropenem, 98.9% were ertapenem susceptible, 94.9% piperacillin-tazobactam susceptible, and 98.0% tigecycline susceptible. Generally, ESBL-*Klebsiella* spp. were less susceptible to most antimicrobials than ESBL-*E. coli*.

CTX-M-type ESBLs were very predominant, with 97.2% of isolates having a CTX-M ESBL. A similar predominance of CTX-M ESBLs was reported in a 2006 study of ESBL-E in NZ.[3] Based on amino-acid sequence similarity, CTX-M ESBLs cluster into five main groups, with most belonging to CTX-M groups 1 and 9. Both group 1 and group 9 CTX-M ESBLs were common in ESBL-*E. coli*, but group 1 CTX-Ms were predominant in ESBL-*Klebsiella* spp. There were no clear associations between patient ethnicity and CTX-M type, a finding which contrasts with an earlier NZ study which described an association between CTX-M-15 (a group 1 CTX-M) and Indian ethnicity, and CTX-M-14 (a group 9 CTX-M) and Chinese or Southeast Asian ethnicity.[4]

Phylogenetic analyses show that *E. coli* fall into four major phylogroups: A, B1, B2 and D. Strains responsible for extra-intestinal infections usually belong to group B2 and, to a lesser extent, group D.[5] Consistent with these associations, 71.4% of the clinical ESBL-*E. coli* belonged to phylogenetic group B2, 20.1% belonged to group D, 6.3% to group A, and 2.2% to group B1. The globally disseminated ST131 *E. coli* clone, which belongs to phylogenetic group B2, accounted for 76.3% of group B2 ESBL-*E. coli* and an estimated 54.4% of all ESBL-*E. coli*. The group 1 CTX-M type, CTX-M-15, is the most commonly described ESBL type associated with the ST131 clone,[6] however, group 1 and group 9 CTX-M types were evenly distributed among the ST131 isolates (49.2% and 50.8%, respectively).

Based on MLVA typing, there was considerable strain diversity among both the 224 ESBL-*E. coli*, with 62 MLVA types identified, and the 107 ESBL-producing *K. pneumoniae* (ESBL-*K. pneumoniae*), with 36 MLVA types identified. However, the Simpson's index of diversity suggested that the ESBL-*K. pneumoniae* were less clonally diverse than the ESBL-*E. coli*. The greater clonality among ESBL-*K. pneumoniae* is in keeping with the finding that 83.3% of ESBL-*Klebsiella* spp. were isolated from patients associated with healthcare facilities. It is also consistent with the notion of differential transmission patterns between the two species, with ESBL-*E. coli* circulating both in hospital and community settings, and ESBL-*Klebsiella* spp. largely restricted to healthcare facilities.[7]

In summary, this study showed that ESBL-E in NZ are usually multiresistant but generally retain susceptibility to several antimicrobial classes including carbapenems, piperacillin-tazobactam, tigecycline, the oral agents mecillinam and fosfomycin, and in the case of ESBL-*E. coli*, also nitrofurantoin. In line with global trends, CTX-M-type ESBLs are dominant in NZ and the pandemic *E. coli* ST131 clone accounted for just over half of the ESBL-*E. coli*.

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For a more detailed report see https://surv.esr.cri.nz/antimicrobial/esbl.php

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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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