Volume 15 Issue 4

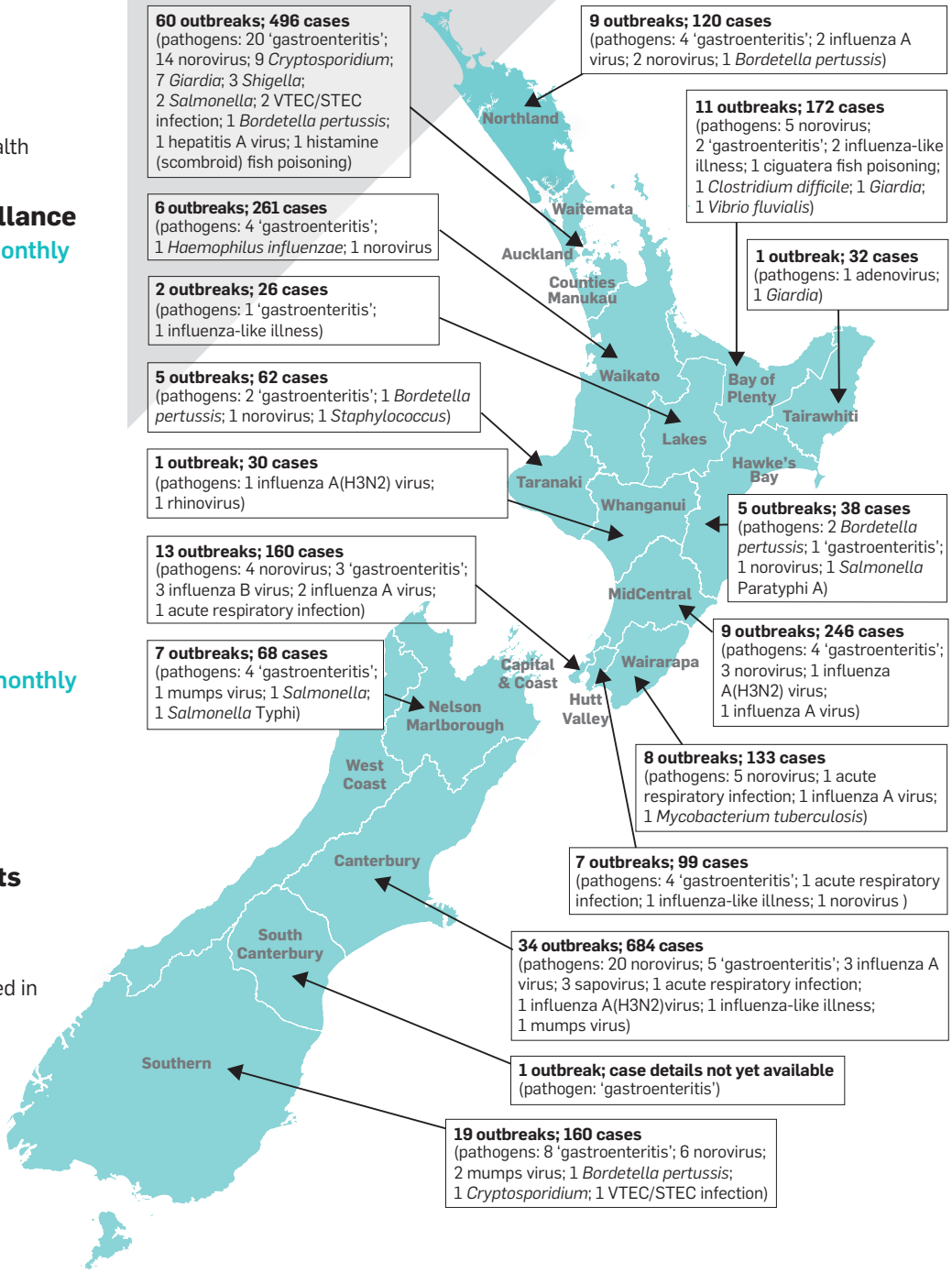
NEW ZEALAND

Public Health Surveillance Report

December 2017: Covering July to September 2017

CONTENTS AND 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 July to September quarter of 2017. 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 4 October 2017. 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.

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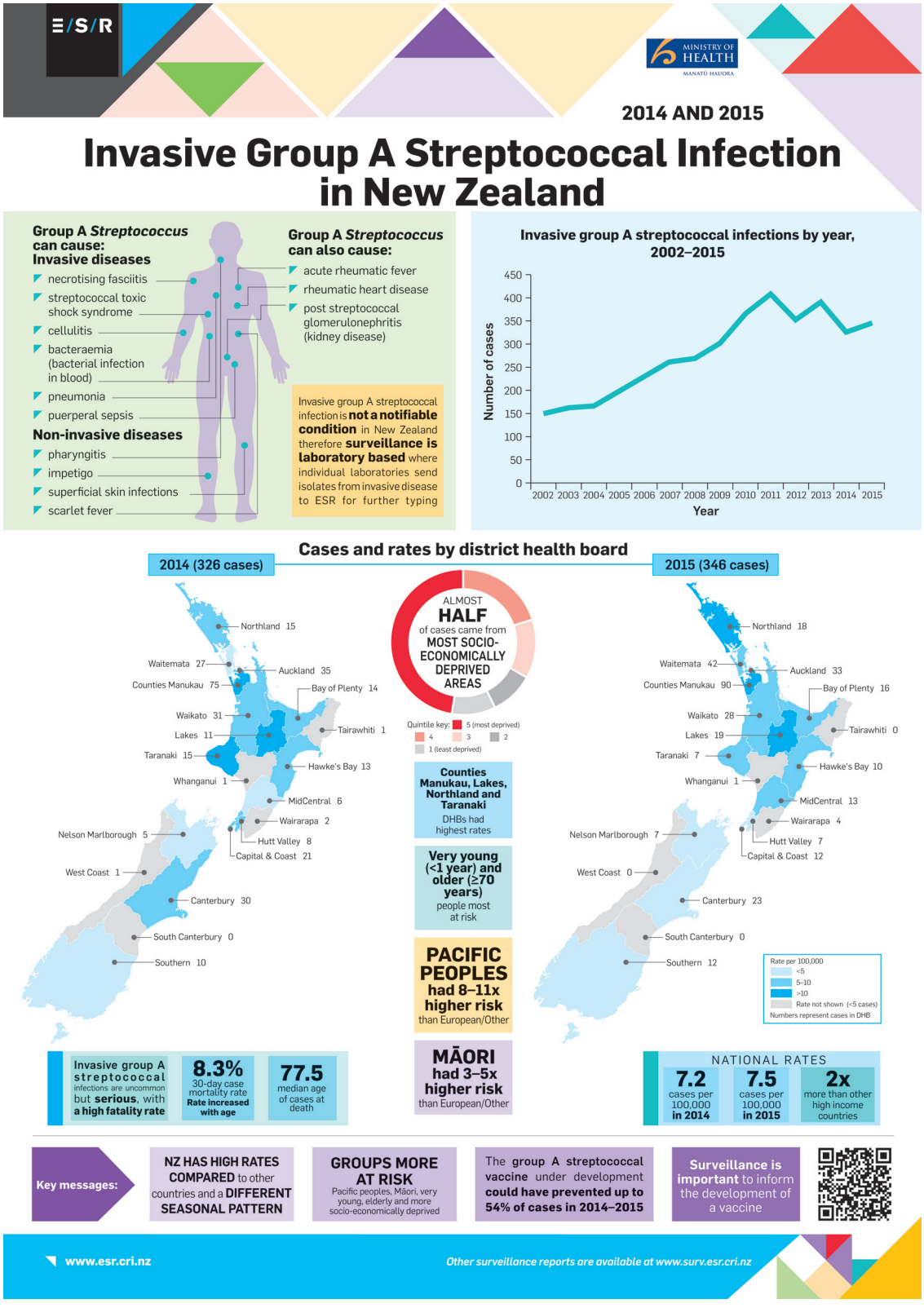
1. EDITORIAL

New ways of reporting for the Health Intelligence Team

The Health Intelligence Team is using new ways of reporting to communicate often complex information to a variety of audiences. To complement our current annual reports we are developing infographics to visually communicate complicated information and key messages in a concise and engaging way. Below is the first publically available example, also available at https://surv.esr.cri.nz/surveillance/InvasiveGAS_Report.php?we_objectID=4630



2. NOTIFIABLE DISEASE SURVEILLANCE

The following is a summary of disease notifications for the July to September quarter of 2017 and cumulative notifications and rates calculated for a 12-month period (October 2016 to September 2017). 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.]. Information in this section is based on data recorded in EpiSurv by public health service staff up to 4 October 2017. As the data may be updated over time, this information should be regarded as provisional.

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

Vaccine preventable disease

Haemophilus influenzae type b

- ***Notifications:*** 10 notifications in the quarter (2016, 1); 10 notifications over the last 12 months (2016, 2), giving a rate of 0.2 cases per 100,000 population, a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (no cases) and from the same quarter last year (1 case). Cases were aged between 3 and 100 years, with 1 case aged <5 years.

Hepatitis B

- ***Notifications:*** 24 notifications in the quarter (2016, 10); 53 notifications over the last 12 months (2016, 31), giving a rate of 1.1 cases per 100,000 population (2016, 0.7), a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (9 cases) and from the same quarter last year (10 cases). Cases were aged between 20 and 71 years.

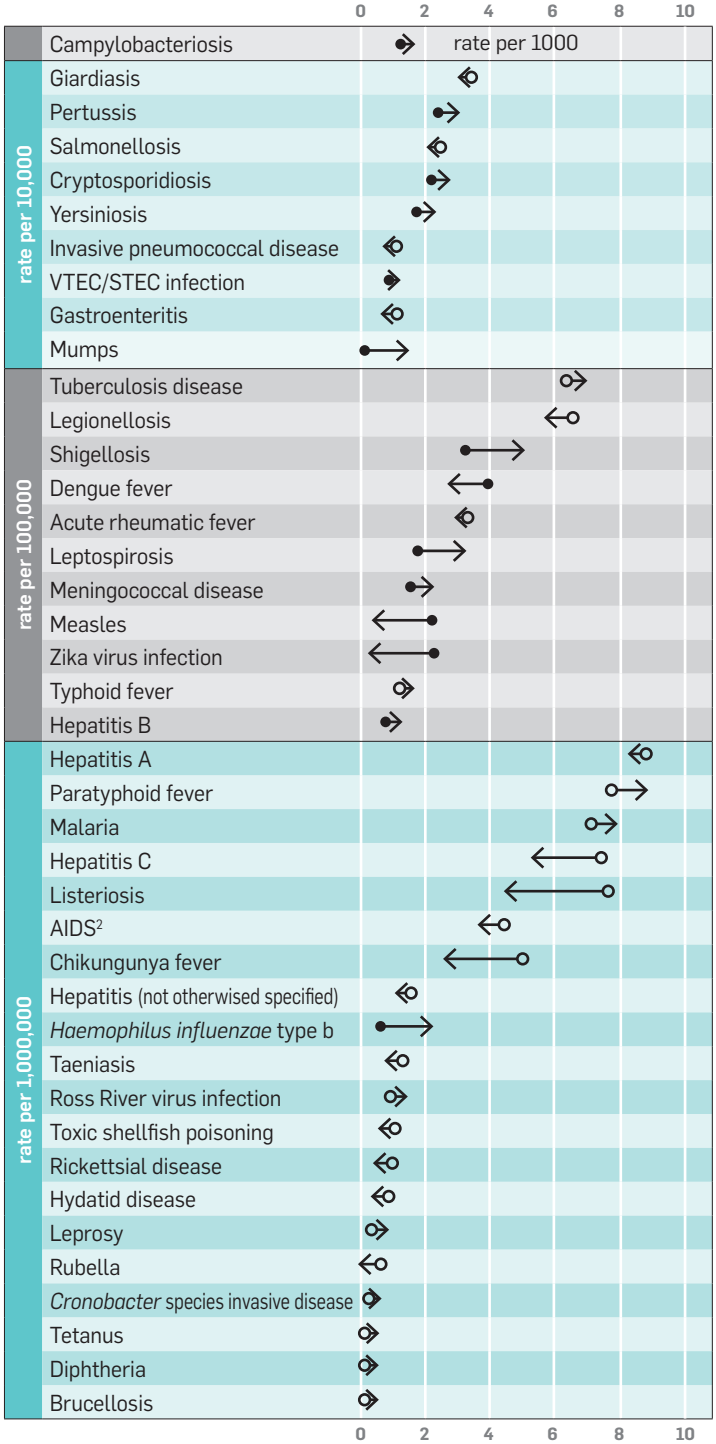
Invasive pneumococcal disease

- ***Notifications:*** 209 notifications in the quarter (2016, 182); 530 notifications over the last 12 months (2016, 488), giving a rate of 11.3 cases per 100,000 population (2016, 10.4), not a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (125 cases). Cases were aged between 5 months and 97 years, with 6 cases aged <2 years.

Measles

- ***Notifications:*** 1 notification in the quarter (2016, 9); 16 notifications over the last 12 months (2016, 103), giving a rate of 0.3 cases per 100,000 population (2016, 2.2), a statistically significant decrease.
- ***Comments:*** there has been a statistically significant quarterly decrease from the same quarter last year (9 cases). The case was still under investigation and has since been made 'not a case'.

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 October 2016 to September 2017 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.

Mumps

- ***Notifications:*** 487 notification in the quarter (2016, 4); 680 notifications over the last 12 months (2016, 9), giving a rate of 14.5 cases per 100,000 population (2016, 0.2), a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (125 cases) and from the same quarter last year (4 cases). 338 cases were confirmed, 89 cases were probable and 60 cases were still under investigation. 4 cases were aged <15 months.

Pertussis

- ***Notifications:*** 435 notifications in the quarter (2016, 258); 1406 notifications over the last 12 months (2016, 1054), giving a rate of 30.0 cases per 100,000 population (2016, 22.5), a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (327 cases) and from the same quarter last year (258 cases).

Enteric infections

Campylobacteriosis

- ***Notifications:*** 1600 notifications in the quarter (2016, 2022); 7117 notifications over the last 12 months (2016, 6817), giving a rate of 151.7 cases per 100,000 population (2016, 145.3), a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (1167 cases) and a statistically significant decrease from the same quarter last year (2022 cases).

Gastroenteritis (acute)

- ***Notifications:*** 60 notifications in the quarter (2016, 169); 340 notifications over the last 12 months (2016, 559), giving a rate of 7.2 cases per 100,000 population (2016, 11.9), a statistically significant decrease.
- ***Comments:*** there has been a statistically significant quarterly decrease from previous quarter (95 cases) and from the same quarter last year (169 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.

VTEC/STEC infection

- ***Notifications:*** 119 notifications in the quarter (2016, 64); 518 notifications over the last 12 months (2016, 432), giving a rate of 11.0 cases per 100,000 population (2016, 9.2), a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly decrease from previous quarter (152 cases) and a statistically significant increase from the same quarter last year (64 cases).

Yersiniosis

- ***Notifications:*** 279 notifications in the quarter (2016, 220); 976 notifications over the last 12 months (2016, 791), giving a rate of 20.8 cases per 100,000 population (2016, 16.9), a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (188 cases) and from the same quarter last year (220 cases).

Infectious respiratory diseases

Meningococcal disease

- ***Notifications:*** 44 notifications in the quarter (2016, 29); 101 notifications over the last 12 months (2016, 68), giving a rate of 2.2 cases per 100,000 population (2016, 1.4), a statistically significant increase.
- ***Comments:*** has been a statistically significant quarterly increase from the previous quarter (22 cases). Cases were distributed by age as follows: 4 (<1 year), 7 (1–4 years), 5 (5–14 years) and 28 (≥15 years). 42 cases were laboratory confirmed and 40 had the strain group identified: group B (27 cases, including NZB:P1.7-2,4 (11 cases)), group W (6 cases), group Y (4 cases), and group C (3 cases). Strain type B:P1.7-2.4 was previously known as the 'NZ epidemic strain'.

Tuberculosis disease

- ***Notifications:*** 83 notifications in the quarter (2016, 54); 322 notifications over the last 12 months (2016, 283) giving a rate of 6.9 per 100,000 population (2016, 6.0), not a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the same quarter last year (54 cases). 63 cases were laboratory confirmed; 80 cases were new cases and 3 cases were a relapse or reactivation.

Environmental exposures & infections

Giardiasis

- ***Notifications:*** 388 notifications in the quarter (2016, 353); 1625 notifications over the last 12 months (2016, 1614), giving a rate of 34.6 cases per 100,000 population (2016, 34.4), not a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly decrease from the previous quarter (443 cases).

Cryptosporidiosis

- ***Notifications:*** 434 notifications in the quarter (2016, 393); 1141 notifications over the last 12 months (2016, 978), giving a rate of 24.3 cases per 100,000 population (2016, 20.8), a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (221 cases).

Leptospirosis

- ***Notifications:*** 35 notifications in the quarter (2016, 27); 149 notifications over the last 12 months (2016, 76), giving a rate of 3.2 cases per 100,000 population (2016, 1.6), a statistically significant increase.

- ***Comments:*** there has been a statistically significant quarterly decrease from the previous quarter (56 cases). 17 cases were confirmed, 1 was probable and 17 were still under investigation. There were 31 male cases and 4 female cases. 18 cases were recorded as engaged in occupations identified as high risk for exposure. The most commonly recorded occupation for these cases was farmer/farm worker (12 cases).

New, exotic & imported infections

Dengue fever

- ***Notifications:*** 26 notifications in the quarter (2016, 37); 126 notifications over the last 12 months (2016, 181), giving a rate of 2.7 cases per 100,000 population (2016, 3.9), a statistically significant decrease.
- ***Comments:*** 21 cases were laboratory confirmed. All cases had travelled overseas during the incubation period of the disease. Countries most commonly visited were India (5 cases), Fiji, Samoa and Thailand (4 cases each).

Malaria

- ***Notifications:*** 16 notifications in the quarter (2016, 5); 36 notifications over the last 12 months (2016, 32), giving a rate of 0.8 per 100,000 population (2016, 0.7), not a statistically significant increase.
- ***Comments:*** all cases were laboratory confirmed. Overseas travel or prior travel information was known for 15 (93.8%) cases. The most commonly visited country was India (6 cases).

Paratyphoid fever

- ***Notifications:*** 20 notifications in the quarter (2016, 6); 41 notifications over the last 12 months (2016, 35), giving a rate of 0.9 per 100,000 population (2016, 0.7), not a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the previous quarter (5 cases) and the same quarter last year (6 cases). Overseas travel or prior travel information was known for 18 (90.0%) cases. Of these, 14 (77.8%) cases had not travelled overseas during the incubation period and had no travel history that could account for their infection.

Shigellosis

- ***Notifications:*** 68 notifications in the quarter (2016, 46); 234 notifications over the last 12 months (2016, 142), giving a rate of 5.0 per 100,000 population (2016, 3.0), a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly increase from the same quarter last year (46 cases). Overseas travel or prior travel information was known for 55 (80.9%) cases. Of these, 17 (30.9%) cases had not travelled overseas during the incubation period and had no travel history that could account for their infection.

Typhoid fever

- ***Notifications:*** 8 notifications in the quarter (2016, 4); 63 notifications over the last 12 months (2016, 50), giving a rate of 1.3 per 100,000 population (2016, 1.1), not a statistically significant increase.
- ***Comments:*** there has been a statistically significant quarterly decrease from the previous quarter (25 cases). Overseas travel or prior travel information was known for 6 (75.0%) cases. Of these, 1 (16.7%) case had not travelled overseas during the incubation period and had no travel history that could account for their infection.

Zika virus infection

- ***Notifications:*** 2 notifications in the quarter (2016, 4); 13 notifications over the last 12 months (2016, 104), giving a rate of 0.3 per 100,000 population (2016, 2.2), a statistically significant decrease.
- ***Comments:*** 1 case was laboratory confirmed and 1 case was still under investigation (and has since been made 'not a case'). The confirmed case had travelled overseas to the Philippines during the incubation period of the disease.

3. OTHER SURVEILLANCE REPORTS

Mumps in three immunised siblings. Chance alone?

Northland Public Health Unit was notified on the 26 July 2017 of a case of mumps in a 20-year-old. By mid-August, their two siblings had also been notified with mumps. All had illnesses consistent with mumps, and had polymerase chain reaction positive buccal swabs. Two of the three cases had two documented doses of measles, mumps and rubella (MMR) vaccine, and the other had one documented dose of MMR vaccine. All MMR vaccine doses were given in New Zealand at the age-appropriate times.

What are the chances of three immunised people in the same family being infected with mumps? Does this suggest vaccine failure to mumps immunisation runs in families?

The effectiveness of the mumps component of the MMR vaccine is known to be lower than for many other vaccines. According to The Immunisation Handbook[1] mumps immunisation is 64–66% effective against laboratory-confirmed mumps after one dose, and 83–88% after two vaccine doses. The Immunisation Handbook[1] also quotes a study from Finland that demonstrated only 74% of people were seropositive for mumps at 20 years after immunisation[2], approximately the amount of time since these siblings were immunised. Using the 74% seropositivity from this study, and assuming all three cases had been fully immunised (one was only partially immunised) the probability of any one person having lost immunity by this time (if lack of seropositivity equates to lack of immunity), which it may not) would be 26.0% (1.0 - 0.74 = 0.26). The probability of any two unrelated people having lost immunity by this time would be 6.8% (0.26 x 0.26 = 0.068). The probability of any three unrelated people having lost immunity by this time would be 1.8% (0.26 x 0.26 x 0.26 = 0.018), so while it is unusual, we shouldn't be too surprised that this happened.

But is there any evidence that vaccine failure to mumps immunisation runs in families? The Immunisation Handbook has no information on this.[1] A brief literature review revealed no studies on this subject related to mumps immunisation, and few studies on this related to any immunisation. However, some studies suggest that there is evidence that lack of responsiveness to measles immunisation is mediated by genetic variation in receptors such as CD46 and TLR3, (ie, that is genetically

determined).[3–5] It therefore makes sense that a 'defective' expression of these genes would be more common in related individuals, and result in vaccine failure to immunisation to run in families.

Are there any public health implications to this finding? These are probably limited, although one might need to have a lower index of suspicion for secondary cases of disease within a family, even in immunised individuals, and perhaps a lower threshold for public health interventions such as chemoprophylaxis, or additional immunisation. On the other hand, we might just conclude that if we predict that events like this will happen occasionally, we shouldn't be too surprised that they do, in fact, happen occasionally.

Acknowledgement: Thanks to Helen Pertousis-Harris for reviewing the first draft of this article.

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

Reported by Simon Baker, Locum Medical Officer of Health, Northland District Health Board.

4. OUTBREAK SURVEILLANCE

The following is a summary of the outbreak trends for the July to September 2017. Comparisons are made to the previous quarter (April to June 2017), and to the same quarter in the previous year (July to September 2016). Information in this section is based on data recorded in EpiSurv by public health service staff up to 4 October 2017. As the data may be updated over time, this information should be regarded as provisional.

General

- 198 outbreaks notified in this quarter (2787 cases).
- 127 are final reports (2336 cases); 71 are interim reports (451 cases) that have yet to be finalised and closed.

All data that follow relate to final reports only.

- 18.4 cases on average per outbreak, compared with 15.4 cases per outbreak in the previous quarter (24.9 cases per outbreak in the same quarter of last year).
- 31 hospitalisations: influenza A virus (12), norovirus (7), influenza B virus (4), *Haemophilus influenzae* (2), influenza A(H3N2) virus (2), 'gastroenteritis' (1), *Giardia* (1), *Giardia*/adenovirus (1), and *Shigella* (1).
- 14 deaths: influenza A virus (5), norovirus (4), influenza A(H3N2) (3), and influenza-like illness (ILI) (2).
- 5 outbreaks involved more than one pathogen therefore pathogen outbreak numbers may not sum to group totals.

Pathogens

- 44 norovirus outbreaks (1251 cases).
- 30 'gastroenteritis' outbreaks (378 cases).
- 10 *Cryptosporidium* outbreaks (60 cases).
- 9 *Giardia* outbreaks (66 cases).
- 8 influenza A virus outbreaks (218 cases).
- 5 ILI outbreaks (73 cases).
- 3 influenza A(H3N2) virus outbreaks (98 cases).
- 3 *Shigella* outbreaks (11 cases).
- 3 sapovirus outbreaks (44 cases).
- 2 acute respiratory infection outbreaks (40 cases).
- 2 *Bordetella pertussis* outbreaks (9 cases).
- 2 influenza B virus outbreaks (27 cases)
- 2 mumps virus outbreaks (4 cases).
- 1 adenovirus outbreak (32 cases).
- 1 ciguatera fish poisoning outbreak (27 cases).
- 1 *Clostridium difficile* outbreak (13 cases).
- 1 *Haemophilus influenzae* outbreak (34 cases).
- 1 *Mycobacterium tuberculosis* outbreak (2 cases).
- 1 rhinovirus outbreak (30 cases).
- 1 *Salmonella* outbreak (3 cases).
- 1 *Vibrio fluvialis* outbreak (27 cases).
- 1 VTEC/STEC infection 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.

- 107 person-to-person, from (non-sexual) contact with an infected person (including droplets): 40 norovirus (1142 cases), 20 'gastroenteritis' (218 cases), 8 *Cryptosporidium* (52 cases), 9 *Giardia* (66 cases), 8 influenza A virus (218 cases), 5 ILI (73 cases), 3 influenza A(H3N2) virus (98 cases), 3 sapovirus (44 cases), 2 acute respiratory infection (40 cases), 2 *B. pertussis* (9 cases), 2 influenza B virus (27 cases), 2 mumps virus (4 cases), 2 *Shigella* (9 cases), 1 *C. difficile* (13 cases), 1 adenovirus (32 cases), 1 *Haemophilus influenzae* (34 cases), 1 rhinovirus (30 cases), and 1 *M. tuberculosis* (2 cases).
- 6 environmental, from contact with an environmental source (eg, swimming): 3 norovirus (46 cases), 1 *Cryptosporidium* (4 cases), 1 influenza A(H3N2) virus (43 cases) and 1 influenza A virus (42 cases).
- 10 foodborne, from consumption of contaminated food or drink (excluding water): 5 'gastroenteritis' (54 cases), 1 ciguatera fish poisoning outbreak (27 cases), 1 *Giardia* (3 cases), 1 norovirus (23 cases), 1 *Salmonella* (3 cases), 1 *Shigella* (4 cases), and 1 *V. fluvialis* (27 cases).
- 4 waterborne, from consumption of contaminated drinking water: 2 *Giardia* (6 cases), 1 *Cryptosporidium* (4 cases) and 1 *Shigella* (4 cases).
- 1 zoonotic: *Cryptosporidium* (3 cases).
- 3 other mode: 2 'gastroenteritis' (86 cases) and 1 *Giardia* (4 cases).
- 10 mode of transmission unknown: 4 norovirus (109 cases), 3 'gastroenteritis' (20 cases), 1 *Cryptosporidium* (4 cases), 1 *Shigella* (2 cases) and 1 VTEC/STEC infection (2 cases).

Circumstances of Exposure

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

- 63 long term care facility: 31 norovirus (974 cases), 11 'gastroenteritis' (114 cases), 7 influenza A virus (162 cases), 5 ILI (73 cases), 3 influenza A(H3N2) virus

(98 cases), 3 sapovirus (44 cases), 2 influenza B virus (27 cases), 1 acute respiratory infection (26 cases), 1 *C. difficile* (13 cases), 1 *H. influenzae* (34 cases), and 1 rhinovirus (30 cases).

- 15 private home: 7 *Giardia* (30 cases), 4 *Cryptosporidium* (15 cases), 2 *B. pertussis* (9 cases), 1 'gastroenteritis' (4 cases), and 1 *Shigella* (5 cases).
- 14 childcare centre: 8 'gastroenteritis' (110 cases), 2 norovirus (30 cases), 2 *Cryptosporidium* (31 cases), 1 acute respiratory infection (14 cases), 1 adenovirus (32 cases), and 1 *Giardia* (32 cases).
- 7 hospital (acute care): 7 norovirus (72 cases).
- 4 school: 1 *Cryptosporidium* (3 cases), 1 'gastroenteritis' (84 cases), 1 mumps virus (2 cases), and 1 norovirus (23 cases).
- 3 restaurant/café/bakery: 1 ciguatera fish poisoning (27 cases), 1 'gastroenteritis' (3 cases), 1 *Salmonella* (3 cases), and 1 *V. fluvialis* (27 cases).
- 2 hotel/motel: 1 ciguatera fish poisoning (27 cases), 1 'gastroenteritis' (23 cases), and 1 *V. fluvialis* (27 cases).
- 2 hostel/boarding house: 1 influenza A virus (56 cases) and 1 norovirus (24 cases).
- 2 takeaways: 2 'gastroenteritis' (4 cases).
- 1 caterers: 'gastroenteritis' (22 cases).
- 1 farm: *Cryptosporidium* (4 cases).
- 1 fast food restaurant: 'gastroenteritis' (2 cases).
- 1 other food outlet: 'gastroenteritis' (2 cases).
- 1 prison: 'gastroenteritis' (5 cases).
- 6 other setting: 2 *Shigella* (6 cases), 1 *Cryptosporidium* (4 cases), 1 'gastroenteritis' (5 cases), 1 mumps virus (2 cases), and 1 *M. tuberculosis* (2 cases).
- 2 outbreaks had two or more exposure settings recorded.
- 6 outbreaks had no exposure settings recorded.

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

- 1 fast food restaurant: 'gastroenteritis' (2 cases).
- 1 home: *Giardia* (3 cases).
- 1 hotel/motel: 'gastroenteritis' (23 cases).
- 1 long term care facility: norovirus (23 cases).
- 1 other food outlet: 'gastroenteritis' (22 cases).
- 1 takeaways: 'gastroenteritis' (2 cases).
- 4 outbreaks had no preparation settings recorded.

5. OUTBREAK CASE REPORTS

School gastroenteritis outbreak, August 2017

Community & Public Health was notified of an outbreak of acute gastroenteritis by a local Christchurch school on Wednesday 9 August 2017 (more than a week after the first known case). No formal notification from a health professional was received. In the previous week (1–8 August) approximately 88 members of the school (including staff) had been affected by vomiting and/or diarrhoea. The majority of cases were students, with a high proportion among boarders. A large number of students had become unwell over the weekend of 5–6 August, prompting the school to seek health advice from the school nurse and laboratory staff, neither of whom appeared to be aware of their responsibility under the latest amendment of the Health Act 1956 for any health practitioner to notify promptly.

Once notified (by the school principal), Community & Public Health implemented a comprehensive outbreak control strategy, in addition to infection control advice already provided. The strategy included:

- Providing a viral gastroenteritis factsheet for the school and parents.
- Providing cleaning and infection control advice.
- Collecting faecal specimens from staff and students to confirm the causative organism.
- Excluding symptomatic students and staff from classes for 48 hours after last symptoms.
- Cancelling interschool sports and social events.
- Distributing a foodborne outbreak questionnaire to students and staff to collect information on the number of people affected and potential source.
- Involving the Ministry for Primary Industries with food supply matters.

Despite these measures the number of new cases initially remained high. The short incubation period and symptoms were suggestive of norovirus. The school was advised that a period of closure and thorough decontamination was recommended to break the chain of infection and that, if necessary, s92L of the Health Act 1956 could be invoked to close the school. The school board elected to close for four days (12–15 August) after which the number of new cases rapidly decreased.

Of the 365 students at the school, approximately 111 became unwell; an infection rate of 30%. Additionally, at least 6 staff (including 2 food handlers) became unwell (Figure 1 supplementary material). Five faecal specimens were collected and referred to ESR for analysis, with specimens from three cases testing positive for norovirus GI.

One suspected pathway of transmission was through infected food handlers in the school kitchen, therefore the Ministry for Primary Industries was contacted to assess the food safety practices in the boarding house kitchen. Following the assessment the school implemented a Food Control Plan in cooperation with Christchurch City Council.

Norovirus is highly contagious and this outbreak spread quickly through the boarders, day students, teaching and kitchen staff and then to their families. The earliest case know to be associated with the outbreak occurred on 1 August and incidence peaked on the 7 August. Person-to-person spread and contaminated surfaces were considered to be the main transmission routes, with contaminated food possibly amplifying the outbreak. Although not a legal requirement, school kitchens should ideally have a Food Control Plan.[1]

Schools should also have protocols for managing acute gastroenteritis outbreaks including recognising and reporting possible outbreaks to the local public health service. With amendments to the Health Act 1956 in force since January 2017, all registered health practitioners (not just doctors) now have an obligation to notify without delay.

For list of references and supplementary material see www.surv.esr.cri.nz/surveillance/NZPHSR.php

Reported by Alistair Humphrey, Medical Officer of Health, Andrew Crowley, Public Health Registrar, Tara Rahdar, Health Protection Officer, Community & Public Health, Canterbury and Shevaun Paine, Senior Analyst, Health Intelligence Team, ESR.

6. LABORATORY SURVEILLANCE

The evolution of meningococcal laboratory surveillance

Surveillance of meningococcal disease at ESR is based on a combination of both direct notification to EpiSurv and laboratory data. This data helps to:

- inform the public health response,
- identify possible outbreaks,
- determine vaccine effectiveness, and
- identify circulating strains of *Neisseria meningitidis*.

Laboratory surveillance data is generated through strain characterisation of both meningococcal isolates and DNA samples submitted to the Meningococcal Reference Laboratory (MRL) by diagnostic laboratories. Until recently, routine strain characterisation of meningococcal isolates was performed by grouping (A, B, C, W, Y, E), serotyping and determining the PorA, fHbp and FetA types through a combination of serological and molecular techniques. Meningococcal DNA samples from clinical specimens are also submitted to MRL for surveillance however, strain characterisation for these samples is limited to molecular methods and can only reliably provide results for grouping and PorA type.

The introduction of next generation sequencing to public health laboratories in recent years has enhanced laboratory surveillance capability for a number of notifiable diseases. For *N. meningitidis* the information generated from whole genome sequencing (WGS) is invaluable and provides a greater degree of pathogen characterisation than can be achieved using traditional characterisation methods.

Meningococcal WGS data can provide strain characterisation information which can directly replace traditional molecular typing methods for PorA, fHbp and FetA meaning that little adjustment is required to analyse and compare historical surveillance data with prospective data. However, current infrastructure at ESR means turnaround time for WGS is slower than existing methods for determining the group and PorA type required to inform the immediate public health response. Therefore, the current capability for determining the group and PorA type will be maintained until WGS throughput becomes as fast as the existing methods. Some traditional methods such as enzyme-linked immunosorbent assay-based serotyping will no longer be performed as the information generated does not add value to the surveillance or the public health intervention. The remainder of data which is valuable for surveillance, but not essential for acute public health intervention such as fHbp and FetA type, will be batch-processed with the typing data defined using WGS.

The development of methodologies to perform WGS directly from clinical specimens for organisms such as *N. meningitidis* are more important than ever. Diagnostic laboratories are increasingly adopting culture independent diagnostic testing (CIDT) methods to improve patient outcomes by providing rapid results to confirm suspected cases using real-time polymerase chain reaction methods. Reliance on CIDT alone directly impacts on surveillance of *N. meningitidis* and can distort surveillance data particularly for cases that are culture negative. Until WGS is able to amplify the genome from small numbers of organisms within a clinical specimen, strain characterisation from a cultured isolate remains the gold standard for *N. meningitidis*.

WGS data is not only limited to simple strain characterisation as previously mentioned. Core genome single nucleotide polymorphisms (SNP) analysis can be used to compare isolates within New Zealand as well as with other publicly available meningococcal sequences. Visual aids like phylogeny trees constructed from core genome SNP analysis are able to show the variability of isolates that are present within a country as well as demonstrating similarities to strains found overseas. For example, in 2015–2016 three of the New Zealand group W ST-11 isolates were shown to share core genome similarities with the emerging hypervirulent 2013 UK W ST-11 variant.[1] Prior to the introduction of WGS, classical strain characterisation would have been unable to provide sufficient resolution to allow for this level of differentiation.

WGS has been an instrumental addition to the public health surveillance tool kit because of the versatility of information which can be generated from sequencing data. This information will unequivocally continue to improve our understanding and management of meningococcal disease.

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

Reported by Audrey Tiong, Meningococcal Reference Laboratory, Health Group, ESR.

New Zealand Public Health Surveillance Report is produced quarterly by ESR for the Ministry of Health and may be downloaded in PDF format from www.surv.esr.cri.nz

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, 5240, Wellington, New Zealand. Phone: (04) 914 0700; Fax (04) 914 0770; Email: survqueries@esr.cri.nz