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New Zealand Public Health Surveillance Report

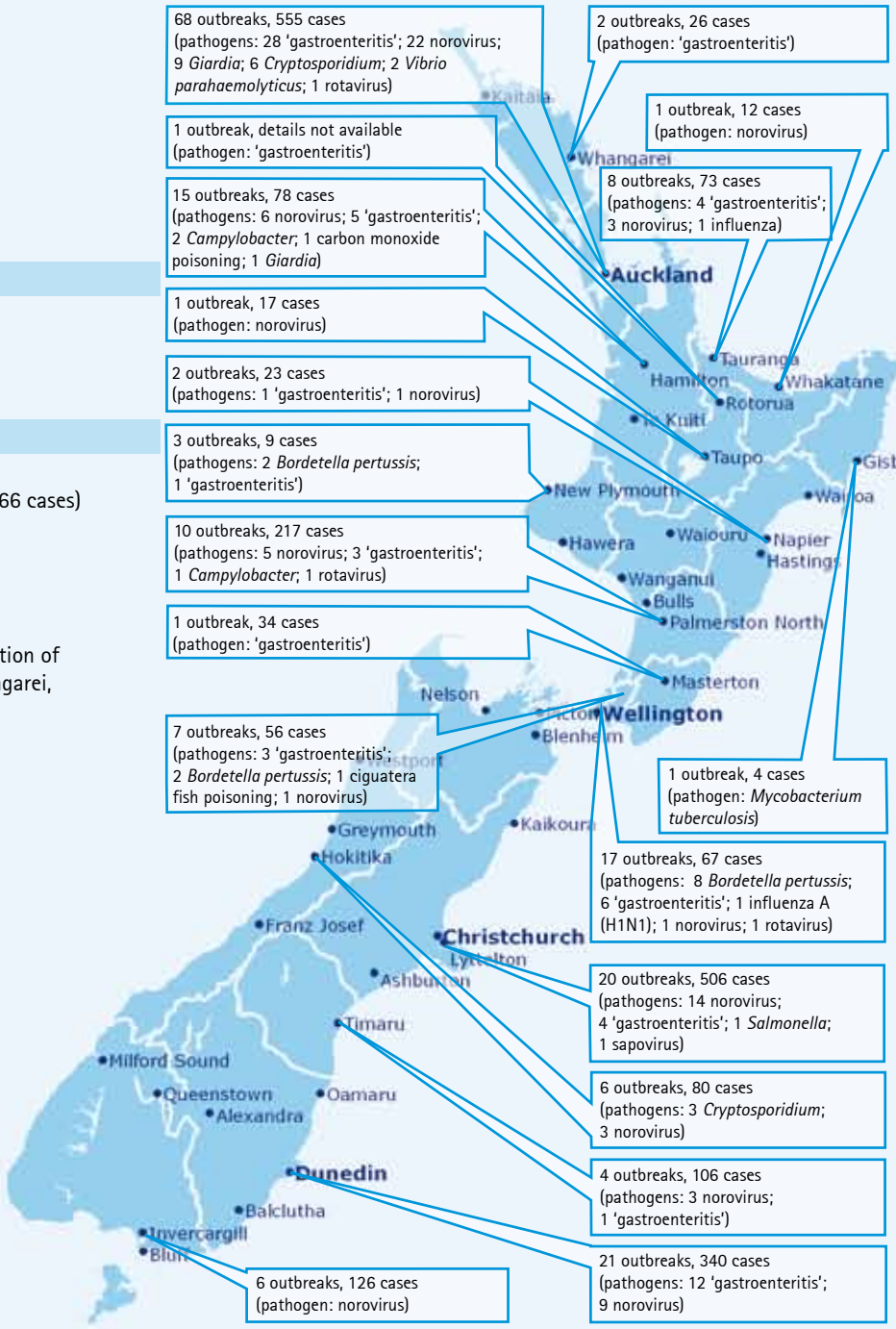
March 2010: Covering October – December 2009

Contents & Highlights

The latest reports from STI Surveillance, Antimicrobial Resistance, Virology and Enteric Reference Laboratory are available at www.surv.esr.cri.nz

This Quarter's Outbreaks

Notification and outbreak data in this issue are drawn from the October – December quarter of 2009. 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 2010.



1. Editorial

Protecting institutions from the emerging threat of norovirus outbreaks

From 1 August to 9 September 2008, a norovirus outbreak at Dunedin hospital affected nine wards and an estimated 140 patients and 383 staff. There was major disruption to service delivery when the hospital was closed for ten days except for acute admissions. This closure affected over 2000 planned procedures and resulted in estimated direct financial costs of $276,000. There was also considerable media interest. Just prior to this outbreak and during it there were other norovirus outbreaks in community settings.

The hospital outbreak started among staff but this was not initially recognised and only inpatient cases were counted. Some ten days later the extent of the outbreak became apparent when three wards were affected concurrently and increasing staff absence impacted on safe staffing levels.

In this outbreak all aspects of infection prevention and control were tested and the impact on the organisation and the many staff who became involved in its management was significant. A comprehensive review aimed at identifying antecedent risk factors and systems issues was undertaken which in itself became a huge undertaking.[1] Partly this was because the existing sentinel event investigation process proved to be unsuitable for this event resulting in ad hoc methodology. The review therefore comprised interviews with over 60 groups and individuals involved with the outbreak, assessing the content of a small number of meeting notes, investigating how policies and health surveillance information had been utilised, along with a literature review. A further problem was in determining who should receive the report and ensure recommendations were implemented.

Some of the key findings were:
1) the attitudes of some staff to, and their failure to comply with, infection prevention and control protocols
2) the lack of integration and functionality of surveillance systems
3) the need for clarification of the roles of various hospital committees and health units in response planning, investigating and managing hospital outbreaks
4) challenges in reviewing large scale adverse events in hospitals.

Discussion

Norovirus outbreaks are an emerging threat for healthcare institutions because of the implications for vulnerable residents and economic impacts. In developed countries norovirus is the most common cause of outbreaks of viral gastrointestinal illness with most outbreaks occurring in winter. Worldwide between 70 and 80% of norovirus outbreaks occur in health care institutions (hospitals and long stay facilities) with semi-closed communities (schools and cruise ships) the next most common settings.[2,3] Outbreaks caused by GII.4 variants predominate in health care settings and are commonly associated with person to person transmission.[4] There is recent evidence that genetic variation occurs at intervals, resulting in increased out of season (spring and summer) activity and increased activity the following winter.[5] Identification of outbreaks within three days of the first case and prompt implementation of control measures is likely to reduce the length of the outbreak by a week.[6,7]

The Ministry of Health guidelines[8] are an important tool for managing norovirus outbreaks in community institutions. However, they were not necessarily intended for managing outbreaks in large acute care hospitals (G Simmons, personal communication 2009) where temporarily closing the institution would create many problems. A further section in these guidelines with advice pertinent to managing outbreaks in this setting along with a possible methodology for conducting reviews of large institutional outbreaks, would be a welcome addition.

The cost and burden of healthcare associated infections including outbreaks, is of growing concern. In New Zealand this was estimated at $136 million for medical and surgical admissions for 1999.[9] Systematic programmes of action based on quality improvement principles will be required to improve this aspect of patient safety in hospitals, with involvement of all staff from cleaner to consultant. The contribution from public health could be through a hospital epidemiology service to assist with the collection of high quality data, monitoring trends, identifying risk factors and evaluating outcomes. This increasingly important sub discipline exists in many developed countries and needs to be seriously considered in New Zealand if the impact of healthcare associated infections is to be reduced.[10,11]

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

Reported by Marion Poore, Medical Officer of Health, Public Health South

Comment

In New Zealand the occurrence of norovirus outbreaks is the same as in developed countries except there is no winter seasonal peak. The outbreaks are mainly caused by GII.4 variants and occur predominantly in rest homes and hospitals. In 2009 the Norovirus Reference Laboratory recorded a large increase in outbreaks (254) compared with 2008 (159) of which rest homes (155) and hospitals (31) were the most common settings. GII.4 strains were responsible for 194 (76.4%) outbreaks, with a new GII.4 variant, GII.4 2008, causing 181 (71.2%) of the total outbreaks.

Reported by Gail Greening, Norovirus Reference Laboratory, ESR

2. Notifiable Disease Surveillance

The following is a summary of disease notifications for the October - December quarter of 2009 and cumulative notifications and rates calculated for a 12-month period (January – December 2009). 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, R. G. and D. G. Altman. Proportions and their differences. In: *Statistics with Confidence.* 2000. BMJ Books. Bristol]. Data contained within this report are based on information recorded in EpiSurv by public health service staff up to 13 January 2010. As this information may be updated over time, these data should be regarded as provisional.

National surveillance data tables are available online (www.surv.esr.cri.nz).

VACCINE PREVENTABLE DISEASE

Haemophilus influenzae type b

- *Notifications:* 6 notifications in the quarter (2008, 2); 11 over the last 12 months (2008, 9) giving a rate of 0.3 cases per 100,000 population (2008, 0.2); not a statistically significant increase
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (0 cases); 2 cases were aged under 5 years and were both not immunised

Hepatitis B

- *Notifications:* 12 notifications in the quarter (2008, 6); 58 over the last 12 months (2008, 38) giving a rate of 1.3 cases per 100,000 population (2008, 0.9); a statistically significant increase
- *Comments:* cases were aged between 21 and 63 years, with no cases under the age of 16 years

Invasive Pneumococcal Disease

- *Notifications:* 161 notifications in the quarter
- *Comments:* cases were aged between 2 days and 99 years, with 12 cases under the age of two years
- *Note:* Invasive pneumococcal disease became notifiable on 17 October 2008 therefore comparisons between quarters and 12-month rates are not valid

Measles

- *Notifications:* 18 notifications in the quarter (2008, 3); 255 in the last 12 months (2008, 12) giving a rate of 5.9 cases per 100,000 population (2008, 0.3); a statistically significant increase

- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (197 cases) and a statistically significant increase from the same quarter last year (3 cases); 10 notifications were laboratory confirmed

Meningococcal Disease

- *Notifications:* 26 notifications in the quarter (2008, 29); 133 notifications over the last 12 months (2008, 122) giving a rate of 3.1 cases per 100,000 population (2008, 2.9); not a statistically significant increase
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (62 cases) reflecting the expected seasonal trough of cases in spring/summer. Cases were distributed by age as follows: 7 (less than 1 year), 6 (1-4 years), 3 (5-9 years), 10 (15 years and over); 6 cases were the epidemic strain

Pertussis

- *Notifications:* 403 notifications in the quarter (2008, 181); 1,396 notifications over the last 12 months (2008, 417) giving a rate of 32.3 cases per 100,000 population (2008, 9.8); a statistically significant increase
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (340 cases) and from the same quarter last year (181 cases)

INFECTIOUS RESPIRATORY DISEASES

Acute Rheumatic Fever

- *Notifications:* 18 notifications in the quarter (2008, 27); 140 notifications over the last 12 months (2008, 153) giving a rate of 3.2 cases per 100,000 population (2008, 3.6); not a statistically significant decrease
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (41 cases). Cases were distributed by age as follows: 5 (5-9 years), 7 (10-14 years), 2 (15-19 years), and 4 (greater than 20 years); 15 cases were initial attack of acute rheumatic fever and 3 cases were recurrent attacks

Non Seasonal Influenza A (H1N1)

- *Notifications:* 44 notifications in the quarter
- *Comments:* cases were distributed by age as follows: 2 (less than 1 year), 4 (1-4 years), 12 (5-14 years), 7 (15-24 years), 11 (25-44 years), 6 (45-64 years), 2 (65 years and over); all cases were laboratory confirmed
- *Note:* non seasonal influenza became notifiable on 29 April 2009 therefore comparisons between quarters and 12-month rates are not valid

ENTERIC INFECTIONS

Campylobacteriosis

- *Notifications:* 2,491 notifications in the quarter (2008, 2,349); 7,178 notifications over the last 12 months (2008, 6,694) giving a rate of 166.3 cases per 100,000 population (2008, 156.8); a statistically significant increase
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (1,549 cases)

Gastroenteritis

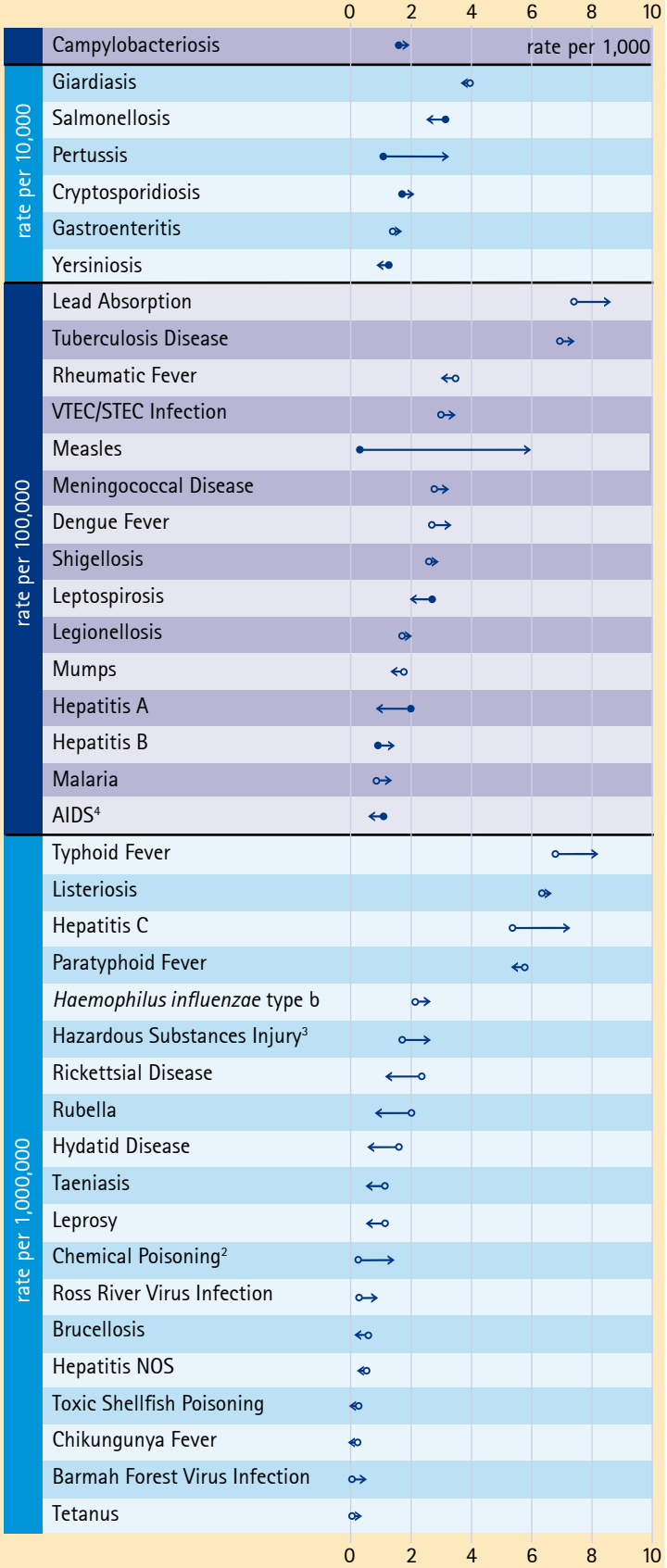
- *Notifications:* 167 notifications in the quarter (2008, 251); 716 notifications over the last 12 months (2008, 687) giving a rate of 16.6 cases per 100,000 population (2008, 16.1); not a statistically significant increase
- *Comments:* there has been a statistically significant quarterly decrease from the previous quarter (253 cases) and from the same quarter last year (251 cases). Note that this is not a notifiable disease per se except in persons with a suspected common source or with a high risk occupation, and 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

Salmonellosis

- *Notifications:* 248 notifications in the quarter (2008, 336); 1,131 notifications over the last 12 months (2008, 1,345) giving a rate of 26.2 cases per 100,000 population (2008, 31.5); a statistically significant decrease

National Surveillance Data

12-Monthly Notification Rate Changes[1]



Notifications per 1,000 or 10,000 or 100,000 or 1,000,000 persons

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 2009 – December 2009 and compared to previous 12-month rates

[2] From the environment

[3] Hazardous Substances Injury became notifiable in EpiSurv as of 19 September 2007

[4] 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

- *Comments:* there has been a statistically significant quarterly decrease from the same quarter last year (336 cases)

ENVIRONMENTAL EXPOSURES & INFECTIONS

Cryptosporidiosis

- *Notifications:* 323 notifications in the quarter (2008, 233); 853 notifications over the last 12 months (2008, 764) giving a rate of 19.8 cases per 100,000 population (2008, 17.9); a statistically significant increase
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (233 cases)

Hepatitis A

- *Notifications:* 14 notifications in the quarter (2008, 18); 44 over the last 12 months (2008, 89) giving a rate of 1.0 cases per 100,000 population (2008, 2.1); a statistically significant decrease
- *Comments:* cases were aged between 4 and 67 years, with two cases under the age of 16 years

Legionellosis

- *Notifications:* 29 notifications in the quarter (2008, 30); 81 notifications over the last 12 months (2008, 73) giving a rate of 1.9 cases per 100,000 population (2008, 1.7); not a statistically significant increase
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (9 cases)

Leptospirosis

- *Notifications:* 37 notifications in the quarter (2008, 35); 86 notifications over the last 12 months (2008, 118) giving a rate of 2.0 cases per 100,000 population (2008, 2.8); a statistically significant decrease
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (15 cases). There were 30 male cases, and 7 female cases; 11 farmers/farm workers, 3 construction workers, 3 meat process workers, and an electrician, homemaker (lives on a lifestyle block that has cows), horticulture worker, stock agent, truck driver and a veterinary nurse (each 1 case). The remaining 14 cases did not have an occupation stated or did not participate in a high risk occupation for leptospirosis exposure

Yersiniosis

- *Notifications:* 112 notifications in the quarter (2008, 105); 435 over the last 12 months (2008, 509) giving a rate of 10.1 cases per 100,000 population (2008, 11.9); a statistically significant decrease
- *Comments:* there has been a statistically significant quarterly increase from the previous quarter (84 cases)

NEW, EXOTIC & IMPORTED INFECTIONS

Dengue Fever

- *Notifications:* 14 notifications in the quarter (2008, 33); 141 notifications over the last 12 months (2008, 113) giving a rate of 3.3 cases per 100,000 population (2008, 2.6); not a statistically significant increase
- *Comments:* there has been a statistically significant quarterly decrease from the same quarter last year (33 cases); all notifications were laboratory confirmed; all cases were overseas during the incubation period. Places visited were India (6), Indonesia (2), Jamaica (1), Vietnam (2), Australia (1), Cambodia (1), Fiji (1), Hong Kong (1), Laos (1), Malaysia (1), Singapore (1), Thailand (1), United States of America (1) and Central Asia (1)

3. Other Surveillance Reports

Legionella in a Canterbury rest home, June 2009

On 19 June 2009 Community and Public Health (C&PH) was notified of a legionellosis case involving an 89 year old male resident of a rest home with multiple underlying medical conditions. *Legionella pneumophila* serogroup 6 had been isolated from the case's sputum sample.

Environmental sampling was carried out from the shower in the case's ensuite bathroom at the rest home on 23 June (first and second catch water and rose head biofilm swab). No other risk factors for the case were identified at the rest home or in the surrounding area.

On 29 June ESR's Environmental Microbiology Laboratory advised C&PH that all samples had returned high positive results for *Legionella pneumophila* (first catch 2,500 cfu/L; second catch 5,400 cfu/L) which later confirmed to be serogroup 6. The rest home was notified immediately and advised to cease using the showers until disinfection of the hot system was completed. A copy of ESR's *Guidelines for the remediation of potable water reticulation systems culture-positive for Legionella bacteria*[1] was provided to the rest home.

The following day, 30 June, the rest home's contract plumber advised that the hot water cylinder was 450 litres with a gas fired temperature of 70°C. This cylinder had been replaced in February 2008. A tempering valve was fitted post the hot water cylinder with a ring main supplying the 88 residents water at a temperature below 45°C. On 1 July a meeting was held with the rest home's manager, health and safety officer and plumber. The two treatment options were outlined. The risk to the residents of scalding using thermal shock was considered to be too high and whilst there were concerns for the pipe work being further corroded on top of the existing pin hole corrosion it was decided to go ahead with superchlorination in consultation with ESR.

An additional six samples were taken pre-superchlorination to determine the extent of the *Legionella* contamination, with four returning positive *L. pneumophila* serogroup 6 results (ranging 600 cfu/L – 5,000 cfu/L) and represented widespread contamination to all parts of the rest home. A pump to dose the system was unavailable in Christchurch requiring one to be hired from Auckland and arrived the following day, 2 July. A Health Protection Officer visited to observe the superchlorination. As it was unknown how much water the ring mains held in order to calculate the dosage of sodium hypochlorite, the plumber carried out frequent tests to ensure that 20 ppm was maintained throughout the duration of the procedure. All showerheads and taps were removed or locked with cable ties to prevent residents from using water. Those showerheads that could not be removed had the superchlorinated solution flushed through them.

Post-remediation sampling was carried out on 7 July from all previous sampling points to check the efficacy of the remediation process. All samples were culture-negative for *Legionella* bacteria indicating successful remedial action. Advice sought from ESR recommended that future monitoring sampling and chlorination be carried out every six months.

No other cases of legionellosis were identified. Had the remedial action not been taken further cases would have occurred given the high levels of contamination and the vulnerable population within the rest home. This case has highlighted the need to communicate the risks of *Legionella* bacteria in residential facilities.

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

Reported by Debbie Smith, Health Protection Officer, Paul Schoolderman, Health Protection Officer, Community and Public Health

Comment

This case has identified a number of issues that require further attention when managing the *Legionella* risk in potable hot water systems.

In this rest home the hot water is delivered to all outlets from a central hot water heater on a pumped ring main system. The water heater heats the water to 70°C and a tempering valve installed at the hot water outlet from the water heater ensures hot water is delivered at 45°C to all outlets. This is a requirement under the Building Act 2004 to prevent scald injuries. The tempering valve controls the temperature of the hot water by mixing mains supply cold water directly with the heated water from the water heater before it enters the ring main.

Although heating the water to 70°C prevents growth of *Legionella* in the water heater, this is not the case in the ring main. Any bactericidal action from heating the water to 70°C is negated by introducing non-chlorinated mains supply cold water. This is the most likely source for the *Legionella* bacteria. The water in the ring main is maintained at 45°C, the ideal temperature for *Legionella* growth and proliferation. In the attempt to remove the scald risk, unknowingly another risk has been created.

It is difficult to eradicate *Legionella* bacteria from a water system once contamination is established. Heat disinfection and silver-copper ionisation are two methods that help reduce the *Legionella* risk in contaminated hot and cold-water systems and both methods are also suitable for use in potable water systems.

Whenever the *Legionella* decontamination process is carried out using chemical or heat disinfection, recolonisation can occur when either the infection source has not been completely removed or there is no adequate biocide residual. This necessitates ongoing periodic testing for *Legionella* and further shock disinfection of the hot water system when the bacterium reoccurs. This is both costly and inconvenient.

To avoid *Legionella* recolonisation, the hot water needs to be maintained at >55°C in the ring main, requiring the removal of the tempering valve. To address the scald risk, tempering valves should be placed at each outlet. Placement of tempering valves at the outlet eliminates any hold volume that can harbour *Legionella* and the pipe-work is flushed each time the outlet is opened.

Reported by David Harte, Environmental Microbiology Laboratory, ESR

Pandemic influenza 09 – how we coped

Ropata Community Primary Health Organisation (RCPHO) is a single practice PHO with over 19,000 patients, 9.7 full time equivalent (FTE) general practitioners, 13.6 FTE nurses and 18 reception and support staff. There are three electronically linked practice sites making it possible physically to separate patients who are potentially infectious and require consultations in an influenza epidemic or pandemic.

In 2006, when fears of pandemic H5N1 influenza heightened, we decided to establish a pandemic plan for our practice.[1] The plan has been regularly updated and was activated when influenza like illness (ILI) caused by H1N1 09 started to occur in the Hutt Valley early in June 2009.

On 12 June, when 20 patients with a possible ILI were assessed at the practice, we increased nursing hours and commenced nurse triage of patients with respiratory illness. All patients were asked to use alcohol gel on arrival and departure and those with respiratory symptoms were masked. We briefed all staff on infection control practices and personal protective equipment (PPE) was made available to all clinical staff.[2]

By 19 June, with the rapid increase in numbers requiring assessment, a separate "Flu clinic" was established at one of our smaller practice sites. This clinic was open week days and staffed by one doctor (experienced General Practitioners without children) and one nurse on a rotational basis. The majority of patients with ILI were assessed at this site. A count was kept of the number who required nurse telephone triage, the number seen at the flu clinic and the number diagnosed with ILI. Prescriptions of oseltamivir, antibiotic prescriptions and referral for hospital admission for those with ILI were recorded. Nasal swabs for influenza PCR were taken from selected patients at the flu clinic.

During the 30 days of the operation of the flu clinic, 1,199 patients with possible ILI were triaged and approximately 50% of them were seen at the flu clinic (Table 1). Of the 281 individuals diagnosed with an ILI, 32 were seen twice, 10 were prescribed oseltamivir, 113 antibiotics and two were referred to hospital for admission. The median age of patients diagnosed with ILI was 22 years. Of the 10 patients prescribed oseltamivir, eight had significant co-morbidity and two were offered self-funded oseltamivir. Both patients referred to hospital had pneumonia, were given intravenous antibiotics and discharged after a short stay. One had a positive seasonal influenza A PCR.

Twenty patients had nasal swabs taken for influenza PCR. Twelve swabs were negative, four indicated novel influenza H1N1, three seasonal influenza A, one both novel influenza H1N1 and seasonal influenza A, and one influenza B.

100% of doctors, 64% of nurses and 84% of reception and administrative staff received seasonal influenza vaccine in 2009. During the four week period of the flu clinic, a total of three staff were absent because of an ILI. Two of these staff were not involved in seeing patients with possible ILI and both had family members with ILI. The single staff member with ILI, who was involved in the flu clinic, had a nasal swab taken and did not have influenza virus detected by PCR.

The combination of nurse triage and a separate flu clinic was highly successful, and we would use this approach again for any similar illness. We operated one afternoon flu clinic per day and have at least double that capacity.

Only 46% of those triaged were seen and 54% of those were diagnosed with ILI, testament to the efficiency of the nurse triage. We felt that the emphasis we had on PPE and the use of alcohol gel and masking for both patients and clinical staff enabled us to have so few staff absent with ILI during this pandemic.

We suggest that this approach should be used by PHOs instead of establishing Community Based Assessment Centres (CBAC) for an influenza pandemic of similar severity. It worked extremely well at no additional cost to the health service with the advantage that full clinical records were available. Patients seen did have a standard consultation charge to pay.

It may be appropriate to retain the concept of CBAC to be used only if the pandemic virus was of high mortality requiring a very high level of PPE. The concept of CBAC requires further debate in light of this year's experience.

A more detailed version of this article is available from jsreid@ropata.net.nz.

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

Reported by Stewart Reid, General Practitioner, Michelle Day, Practice Nurse Manager, Ropata Medical Centre, Lower Hutt

Table 1. Numbers of patients assessed for ILI from 23 June to 22 July 2009 by RCPHO

	Number
Nurse telephone triage	1199
Flu Clinic	557
Diagnosed with ILI	281[a]
Prescribed oseltamivir	10 [b]
Prescribed antibiotic	113
Referred to hospital	2

[a]32 seen twice

[b]8 with co-morbidity

Pandemic influenza A (H1N1) 09 seroprevalence study

A national seroprevalence study, commissioned by the Ministry of Health, is now underway to determine immunity to pandemic influenza A (H1N1) 09 in the general population and to identify the groups at higher risk of infection. The survey will also reveal the level of subclinical infection in the community. The results, which are expected to be published in mid-2010, will form a comprehensive dossier of information to inform planning for any future H1N1 pandemic waves. Community sero-prevalence status will be determined by a cross-sectional study of a random stratified sample of registered and enrolled patients in selected general practices (GPs)/primary health organisations (PHOs). A further study of primary and secondary health care workers (HCW) focuses on a stratified random cross-sectional sample of secondary HCWs, and of primary HCWs from the GP/PHO practices participating in the community based study.

In total, 2000 participants are expected to be tested across the country. During 2009, pandemic H1N1 influenza spread rapidly within New Zealand and placed considerable pressure on the health system. It became a notifiable and quarantineable disease on 30 April 2009.

Reported by Ange Bissielo, Health Information Analyst, Virginia Hope, Programme Leader, ESR

Antimicrobial susceptibility among *Salmonella*, 2008

Each year a representative sample of non-typhoidal *Salmonella*, chosen from isolates routinely referred to ESR for serotyping, is tested for antimicrobial susceptibility. In addition, all isolates of *S.* Typhi, *S.* Paratyphi A and *S.* Paratyphi B are tested. More detailed information is available at http://www.surv.esr.cri.nz/PDF_surveillance/Antimicrobial/SAL/SALM_2008.pdf

Antimicrobial resistance among *Salmonella* remains relatively uncommon in New Zealand. Among the 554 non-typhoidal *Salmonella* tested in 2008, 90% were fully susceptible to all 12 antimicrobials tested. Three percent of isolates were ampicillin resistant, 0.5% were co-amoxiclav resistant, and

1% were co-trimoxazole resistant. All isolates were susceptible to ciprofloxacin. None of the *Salmonella* produced extended-spectrum β-lactamase (ESBL), but one isolate produced plasmid-mediated AmpC β-lactamase and therefore would be considered resistant to 3rd-generation cephalosporins.

Although only one (3.5%) of the 29 *S.* Typhi and none of the 15 *S.* Paratyphi isolates tested were resistant to ciprofloxacin, 24% of the *S.* Typhi and 80% of the *S.* Paratyphi were resistant to nalidixic acid. Fluoroquinolone (ciprofloxacin)-susceptible strains of *Salmonella* that are resistant to the older-generation quinolone, nalidixic acid, may be associated with clinical failure or delayed response when fluoroquinolones are used to treat extra-intestinal salmonella infections. All typhoidal *Salmonella* were susceptible to third-generation cephalosporins.

Reported by Helen Heffernan, Communicable Disease Programme, ESR

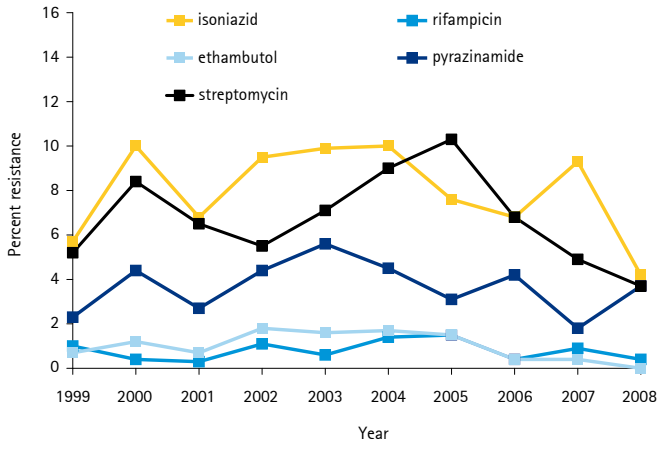
Antituberculosis-drug resistance, 2008

The national surveillance of antituberculosis-drug resistance is based on the results of susceptibility testing of isolates in the Mycobacteriology Reference Laboratories at Auckland City, Wellington and Waikato Hospitals. Susceptibility to five antituberculosis drugs (isoniazid, rifampicin, ethambutol, pyrazinamide and streptomycin) is routinely tested.

In 2008, 297 cases of tuberculosis were notified, 241 (81.1%) of which were reported by the Mycobacteriology Reference Laboratories as culture positive. The 241 isolates from the culture-positive cases included 233 *Mycobacterium tuberculosis* and 8 *M. bovis* isolates.

Trends in resistance to the five antimicrobials are shown in Figure 1. Overall, during the last 10 years, 1999-2008, there has been no significant change in resistance to any of the five antimicrobials.

Figure 1. Antituberculosis-drug resistance, 1999–2008



The majority (88.0%) of the isolates in 2008 were susceptible to all five antimicrobials tested. There were no cases of multidrug-resistant TB (MDR-TB, resistant to at least isoniazid and rifampicin), and all resistant isolates were resistant to only one antimicrobial. MDR-TB remains rare in New Zealand, with an average annual incidence among culture-positive TB cases of 0.7% and a total of 18 cases recorded in the last 10 years. No extensively drug-resistant TB (XDR-TB) isolates have been identified in New Zealand. XDR-TB is defined as resistance to isoniazid and rifampicin (ie, MDR-TB) with additional resistance to any fluoroquinolone and either aminoglycosides (amikacin, kanamycin) or capreomycin.

Compared with New Zealand-born cases, cases born overseas were more resistant to each of the antimicrobials except pyrazinamide, although the differences were not significant ($p \geq 0.05$). Resistance among the different ethnic groups is shown in Table 2. Ninety percent (9/10) of all isoniazid-resistant isolates, and 77.8% (7/9) of all streptomycin-resistant isolates, were from cases of Asian ethnicity, while the majority (5/9) of pyrazinamide-resistant isolates were from Europeans.

Table 2. Antituberculosis-drug resistance by case's ethnicity, 2008[1]

	Number (%)					
	Maori n=41	Pacific Peoples n=40	Asian n=119	European n=23	Other n=9	Total n=241
Fully susceptible	39 (95.1)	37 (92.5)	103 (86.6)	17 (73.9)	8 (88.9)	212 (88.0)
Resistant to:						
Isoniazid	0	0	9 (7.6)	1 (4.4)	0	10 (4.2)
Rifampicin	0	0	0	0	0	1 (0.4)
Ethambutol	0	0	0	0	0	0
Pyrazinamide	1 (2.4)	3 (7.5)	0	5 (21.7)	0	9 (3.7)
Streptomycin	1 (2.4)	0	7 (5.9)	0	1 (11.1)	9 (3.7)

[1] Ethnicity was unknown or not reported for nine cases, one of which was rifampicin resistant

More information about antituberculosis-drug resistance in 2008 is published in the *Tuberculosis in New Zealand Annual Report 2008* available at http://www.surv.esr.cri.nz/surveillance/AnnualTBReports.php.

Reported by Helen Heffernan, Communicable Disease Programme, ESR, on behalf of the Mycobacteriology Reference Laboratories

4. Outbreak Surveillance

The following information is a summary of the outbreak trends for New Zealand, from data collected in the last quarter (October - December 2009). Comparisons are made to the previous quarter (July – September 2009), and to the same quarter in the previous year (October – December 2008). Note that the outbreak data in this section are notified to ESR by the Public Health Services.

General

- 194 outbreaks notified in this quarter (2,329 cases)
- 127 are 'final' reports (1,863 cases); 67 are 'interim' reports (466 cases) that have yet to be finalised and closed

All data following are pertaining to final reports only.

- 14.7 cases on average per outbreak, compared with 17.0 cases per outbreak in the previous quarter (14.8 cases per outbreak in the same quarter of last year)
- 66 hospitalisations: norovirus (61), *Bordetella pertussis* (2), rotavirus (2), and gastroenteritis (1)
- No deaths

Pathogens

- 63 norovirus outbreaks (1,326 cases) during this quarter
- 26 'gastroenteritis' outbreaks (326 cases)
- 11 *Bordetella pertussis* outbreaks (33 cases)
- 10 *Giardia* outbreaks (29 cases)
- 8 *Cryptosporidium* outbreaks (34 cases)
- 3 *Campylobacter* outbreaks (13 cases)
- 2 rotavirus outbreaks (55 cases)
- 2 *Vibrio parahaemolyticus* outbreaks (7 cases)
- 1 influenza outbreak (11 cases)
- 1 sapovirus outbreak (29 cases)

Modes of Transmission

Note that reporting allows for multiple modes of transmission to be selected. In many instances no mode of transmission is selected for outbreaks notified to ESR, consequently, numbers may not add up to the total number of outbreaks reported.

- 105 person-to-person, from (non-sexual) contact with an infected person (including droplets): 54 norovirus (1262 cases), 19 gastroenteritis (252 cases), 11 *B. pertussis* (33 cases), 9 *Giardia* (26 cases), 6 *Cryptosporidium* (29 cases), 2 rotavirus (55 cases), 1 *Campylobacter* (8 cases), 1 influenza (11 cases), 1 sapovirus (29 cases), and 1 *V. parahaemolyticus* (3 cases)

- 30 environmental, from contact with an environmental source (e.g. swimming): 22 norovirus (501 cases), 4 gastroenteritis (71 cases), 1 *Campylobacter* (3 cases), 1 *Cryptosporidium* (3 cases), 1 rotavirus (47 cases), and 1 sapovirus (29 cases)
- 14 foodborne, from consumption of contaminated food or drink (excluding water): 8 norovirus (33 cases), 3 gastroenteritis (24 cases), 2 *V. parahaemolyticus* (7 cases), and 1 *Campylobacter* (8 cases)
- 5 zoonotic: 4 *Cryptosporidium* (12 cases) and 1 *Campylobacter* (2 cases)
- 4 waterborne, from consumption of contaminated drinking water: 2 gastroenteritis (17 cases), 1 *Cryptosporidium* (13 cases), and 1 *Giardia* (2 cases)
- 3 Other mode of transmission: 2 norovirus (16 cases) and 1 *Campylobacter* (3 cases)
- 7 mode of transmission unknown: 3 norovirus (47 cases), 3 gastroenteritis (48 cases), and 1 *Giardia* (3 cases)

Circumstances of Exposure/Transmission

Common 'settings' where exposure/transmission occurred or contaminated food/beverage was prepared for consumption are identified below. Note that multiple settings can be selected and in many instances no settings are selected in outbreaks notified to ESR.

- 48 rest home: 34 norovirus (990 cases), 11 gastroenteritis (134 cases), 1 *Campylobacter* (8 cases), 1 influenza (11 cases), and 1 sapovirus (29 cases)
- 26 home: 10 *Giardia* (29 cases), 5 *Cryptosporidium* (16 cases), 5 norovirus (18 cases), 2 *B. pertussis* (4 cases), 2 gastroenteritis (6 cases), and 2 *V. parahaemolyticus* (7 cases)
- 16 hospital (continuing care): 11 norovirus (274 cases), 4 gastroenteritis (54 cases), and 1 *Campylobacter* (8 cases)
- 13 hospital (acute care): 10 norovirus (167 cases) and 3 gastroenteritis (41 cases)
- 13 café: 10 norovirus (30 cases) and 3 gastroenteritis (16 cases)
- 10 childcare: 4 *B. pertussis* (11 cases), 3 norovirus (71 cases), 2 rotavirus (55 cases), and 1 gastroenteritis (8 cases)
- 5 farm: 3 *Cryptosporidium* (10 cases), 1 *Campylobacter* (3 cases), and 1 gastroenteritis (2 cases)
- 2 prison: 1 *Campylobacter* (2 cases) and 1 norovirus (12 cases)
- 2 school: 1 *B. pertussis* (4 cases) and 1 *Cryptosporidium* (13 cases)
- 1 community: gastroenteritis (15 cases)
- 1 swimming/spa pool: *Cryptosporidium* (13 cases)
- 9 'other setting': 4 gastroenteritis (78 cases), 3 *B. pertussis* (9 cases), and 2 norovirus (44 cases)
- 2 outbreaks with no setting selected: 1 *B. pertussis* (5 cases) and 1 gastroenteritis (20 cases)

5. Outbreak Case Reports

Campylobacteriosis outbreak associated with consumption of unpasteurised milk by primary school children in Whangarei, August 2009

Drinking raw milk is a well known risk factor for a number of enteric diseases but it is still often considered an important part of a visit to a dairy farm in New Zealand. On 31 August 2009, the Northland Public Health Unit was notified of an outbreak of campylobacteriosis in 14 children and a parent who had visited a dairy farm near Whangarei on 19 August as part of a school trip.

An outbreak investigation was carried out and all the students and parents who attended the dairy farm visit were interviewed by telephone or at school about activities on the visit. Stool samples from four people were submitted for microbiological analysis. Milk samples were taken on 1 September from the vat and the calf feeding tank at the farm, and a potable water sample was also taken at the school.

A total of 64 students aged between five and seven years plus 25 parents and three teachers visited the dairy farm. Fifteen people subsequently developed a gastrointestinal illness with vomiting, diarrhoea and abdominal pain with a median incubation period of four days.

All the students had touched calves but washed their hands with hand sanitiser gel before eating their own individually prepared lunches at the dairy farm. It was found that all the cases had also sipped small amounts of raw milk from the processing outlet before it entered the milk vat. The attack rate for drinking raw milk was 56%, while the attack rate for those who did not drink raw milk was 1.6% (X^2=34.23, P ≤0.001).

Campylobacter species were isolated from all four stool specimens and from both milk samples. However, *Campylobacter* was not detected in the school drinking water. Further comparison of the *Campylobacter* isolates using Pulsed Field Gel Electrophoresis from one of the patient stool specimens and the two milk specimens showed that the *C. jejuni* serotypes were not identical.

It seems very likely that the raw milk consumed during the school trip to a dairy farm was the cause of this outbreak of campylobacteriosis. Outbreaks associated with drinking raw milk are documented from many parts of the world.[1] The *Campylobacter* organisms found in raw milk are usually caused by contamination from bovine faecal matter.[2] The different strains of *C. jejuni* found in the human faecal specimen and the milk samples in this outbreak does not exclude the possibility that different or multiple strains were present and may have been caused by the time delay of 13 days between the farm visit and sampling.

Farm visits are fun way for children to learn where their food originates from. However, it is important for schools to consider the risks of transmission of enteric pathogens from farm animals to humans and to design strategies for the prevention of such transmission prior to the visit. The Public Health Unit has developed a simple advice sheet for schools planning farm field trips in conjunction with the affected school based on the 2001 MMWR guidelines[3] which will be circulated to other schools in Northland. An important part of this advice is that "raw milk should not be served".

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

Reported by Steven Bai, Health Protection Officer, Jonathan Jarman, Medical Officer of Health, Gavin de Klerk, Health Protection Officer, Paul Reid, Health Protection Officer, Public Health Unit, Northland District Health Board

6. Laboratory Surveillance

Laboratory surveillance of invasive pathogens

Surveillance of invasive pathogens by the Invasive Pathogens Laboratory at ESR involves the monitoring and characterisation of bacteria that cause invasive diseases and for which humans are the natural host. These bacteria are:
Neisseria meningitidis (meningococcus)
Group A *Streptococcus*
Group B *Streptococcus*
Streptococcus pneumoniae (pneumococcus)
Haemophilus influenzae type b (Hib)
Bordetella pertussis (whooping cough bacterium)

Infections generally follow acquisition of the bacterium from an asymptomatic carrier or a symptomatic person. Public health measures taken at the time of a new case require prompt laboratory identification to ensure appropriate prophylaxis. For the invasive pathogens listed above, with the exception of Group B *Streptococcus*, the transfer of droplets shed from the upper respiratory tract is the most likely means by which bacteria are spread from person to person. Pathogen-containing particles are frequently emitted either by coughing or sneezing. Airborne particles may impinge on the mucus-covered surfaces of the oropharynx where they adhere to the membranes and can establish a population. Transfer of bacteria can easily occur in crowded parties, bars, and households. Furthermore, the sharing of drinks, cigarettes and utensils can enable oro-pharyngeal bacterial transfer leading to infection. Our studies at ESR have shown that meningococcal bacteria are able to survive drying on glass and plastic surfaces although survival on glass was significantly better than on plastic (p<0.0001).

Isolates from each of the invasive pathogens listed above are sent to ESR to monitor trends and patterns of disease occurring in New Zealand. Information on disease type, site of infection, age of case, date of occurrence, and geographical location are provided with the specimen. ESR laboratory staff

provide confirmation of the identity of the bacteria and undertake typing and sub-typing to further characterise the organism. Shifts in disease patterns or frequencies, and changes in, or occurrence of, unusual strain types are all investigated.

Please note that the data provided for the diseases listed below are the number of isolates received by the laboratory for strain typing during 2009. Information on the strain types and disease rates will be available later in 2010.

Neisseria meningitidis (Meningococcus)

Meningococci are carried in the nasopharynx of humans only and many individuals can carry the bacterium asymptomatically. A small minority of those who carry the meningococcus will progress to disease. The disease manifests itself as an acute infection characterised by a petechial rash followed by the sudden onset of fever, headache, nausea, vomiting and a stiff neck. Destruction of tissue can result in amputation of limbs. Meningococcal disease can be rapidly fatal. Based on the nature of the capsular polysaccharide meningococci are divided into groups, the most prominent being B and C. Additional typing of meningococci is based on the expression of the PorB and the PorA proteins.

New Zealand had relatively few meningococcal disease cases prior to the introduction in 1991 of the B strain (B:4:P1.7-2,4) which caused an epidemic of disease. During the course of the epidemic the notification rate of all meningococcal disease rose from 1.5 per 100,000 population to a peak of 17.4 per 100,000 (650 cases) in 2001. From 1995-2003 the epidemic strain accounted for more than 85% of notified cases of meningococcal disease. Introduction of a strain-specific vaccine enabled control of the epidemic from 2004. Over three million doses of the MeNZB OMV vaccine were administered during the vaccine campaign in New Zealand. A number of studies have been published which provide consistent evidence that the MeNZB vaccine had a significant effect in controlling the epidemic. Cases of meningococcal disease notified in 2008 numbered 122, a rate of 2.9 per 100,000 population. In 2009, 106 meningococcal isolates were referred to ESR for confirmation and typing and 71 samples for PCR testing were also received. Further analysis is in progress.

Group A *Streptococcus* (*Streptococcus pyogenes*)

The Group A *Streptococcus* cause a wide range of infections from acute pharyngitis and impetigo to more severe diseases including rheumatic fever, and toxic shock syndrome. Characterisation of Group A streptococci previously involved the recognition of M-types using M type-specific sera. In order to make Group A streptococcal characterisation more accessible molecular methods using the *emm* gene sequence have been used as a replacement to M protein typing. *emm* types are now divided into an increasing number of subtypes based on minor sequence variations. Regardless of the method of strain typing the system allows distinctions to be made between isolates such that recognition of different strain types causing most infections, or specific diseases such as rheumatic fever, can be monitored. A total of 441 isolates were received for strain typing in 2009 compared with 342 isolates received in 2008. Isolates from rheumatic fever cases numbered five in 2009 (four in 2008).

Group B *Streptococcus* (*Streptococcus agalactiae*)

The Group B *Streptococcus* is of concern for newborn infants. There are two forms of the disease namely early-onset and late-onset. Early onset infection is acquired *in utero* or during delivery and late-onset occurs a few weeks or months after birth and is acquired by person-to-person contact. Early onset disease is characterised by sepsis, respiratory distress, pneumonia and meningitis. It has a case-fatality rate of ~50%. Late onset disease usually involves sepsis and meningitis. Survivors of late onset disease may have impairment of speech, hearing or vision. The case-fatality rate is lower than for early onset disease. Women who are found to be colonised with Group B streptococci and who are therefore at risk of delivering an infected baby are advised to accept prophylaxis to decrease the risk of infection. Of the total of 150 Group B streptococci strain typed in 2009 serotypes Ia and III were the most common. These results were consistent with those of 2008 when 152 isolates were tested and serotypes Ia and III were most common.

Streptococcus pneumoniae (Pneumococcus)

Pneumonia due to pneumococcal infection is characterised by the sudden onset of fever, accompanied by chills, pleural pain and production of rusty-looking sputum among other features. In infants fever, vomiting and convulsions are characteristic. The case fatality-rate for infants and the elderly can be high. Gram-positive diplococci together with polymorphonuclear leukocytes found in sputum indicate infection which can be confirmed by isolation of the organism from blood or from aspirates. It is estimated that around 90% of pneumococcal infections involve 23 of the 83 strain-types. Of these, strain types 4, 6B, 9V, 14, 18C, 19A, 19F and 23F predominate among paediatric cases in New Zealand. All except 19A are represented in the 7-valent vaccine (Prevenar) which was introduced in June 2008 in New Zealand for infant protection. A more extensive range of strain types is incorporated in the adult 23-valent vaccine that has been licensed for some years. A total of 663 pneumococcal isolates were identified by strain typing in 2009 compared with 630 in 2008. Analysis of the strain types circulating after the introduction of Prevenar is in progress and will provide important information on the impact of the vaccine.

Bordetella pertussis

Whooping cough is a disease that largely affects children and older adults. In 2009, the highest rate was in infants less than one year of age (183.9 per 100,000 population, 116 cases). The Invasive Pathogens Laboratory receives a limited number of isolates for strain typing. The strain type involved has been consistent over a number of years with most isolates typing as strain type 1,3. Of the 37 cases sent for confirmation in 2008, 29 (78.4%) were strain type 1,3. A total of 120 isolates were sent for testing in 2009. Consistent with 2008 strain type 1,3 continued to dominate.

Haemophilus influenzae type b

Since the introduction of the Hib vaccine cases of Hib disease have diminished radically. Few cases of Hib disease in children are now identified. In 2009 there were eight cases of Hib infection including four children, aged 4 months, 9 months (two cases) and 10 months and four adult cases aged 37, 41, 43 and 65 years. In 2008 nine case isolates were referred involving four cases aged less than five years. A total of 58 case isolates of *H. influenzae* non-type b were sent for analysis in 2009 compared with 55 in 2008.

Comment:

The numbers of isolates referred to the Invasive Pathogens Laboratory for strain typing does not represent the complete number of cases of invasive disease that occur in a given year. However, the monitoring of invasive disease is important for recognising when increases in disease numbers and/or specific geographical locations occur. The sudden increase in meningococcal disease in New Zealand that was recognised and finally dealt to using a strain-specific vaccine is a case in point. *H. influenzae* is an example of a disease that is now well contained in infants, again largely as a result of immunisation. The introduction of Prevenar into the childhood schedule during 2008 should result in a decrease in pneumococcal infection rates particularly in young children. A fall in infant disease numbers should become apparent in the coming months. Monitoring of disease numbers will identify the impact of the vaccine.

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