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CDI MOVING WITH THE TIMES

As *Communicable Diseases Intelligence* (CDI) enters it 35th year of publication it is time to move with the times. With the majority of subscribers now accessing the journal through the Internet, we are discontinuing publication of the hard copy issue. This move is consistent with the increasing use of on-line publishing around the world.

In conjunction with this change, the aims of CDI and its role have also been reviewed. Over time, CDI has evolved beyond its original intent. We are now seeking to refocus CDI content in accordance with its original purpose. Peer-reviewed articles will no longer be accepted for publication to allow a greater focus on surveillance data and annual reports for a range of surveillance systems.

The last hard copy of CDI will be the June 2011 issue. Future issues will still be published on-line.

The Editorial staff thank the readers and supporters of CDI over the years and hope for your continued support for CDI in its new format.

Annual reports

Surveillance of antibiotic resistance in *Neisseria gonorrhoeae* in the WHO Western Pacific and South East Asian Regions, 2009

The WHO Western Pacific and South East Asian Gonococcal Antimicrobial Surveillance Programmes

Abstract

Long-term surveillance of antimicrobial resistance in *Neisseria gonorrhoeae* has been conducted in the World Health Organization (WHO) Western Pacific Region (WPR) to optimise antibiotic treatment of gonococcal disease since 1992. From 2007, the Gonococcal Antimicrobial Surveillance Programme (GASP) has been enhanced by the inclusion of data from the South East Asian Region (SEAR) and recruitment of additional centres in the WPR. Approximately 8,704 isolates of *N. gonorrhoeae* were examined for their susceptibility to one or more antibiotics used for the treatment of gonorrhoea, incorporating External Quality Assurance controlled methods, from reporting centres in 21 countries and/or jurisdictions. A high proportion of penicillin and/or quinolone resistance was again detected amongst isolates tested in North Asia and the WHO SEAR. In contrast, from the Pacific Island states Fiji reported low penicillin and quinolone resistance, New Caledonia again reported no penicillin resistance and little quinolone resistance, Tonga reported no penicillin resistance and there was a continued absence of quinolone resistance reported in Papua New Guinea in 2009. The proportion of gonococci reported as 'decreased susceptibility' and 'resistant' to the third-generation cephalosporin antibiotic ceftriaxone varied widely but no major changes were evident in cephalosporin minimum inhibitory concentrations (MIC) patterns in 2009. Altered cephalosporin susceptibility has been associated with treatment failures following therapy with oral third-generation cephalosporins. There is a need for revision and clarification of some of the *in vitro* criteria that are currently used to categorise the clinical importance of gonococci with different ceftriaxone and oral cephalosporin MIC levels. The number of instances of spectinomycin resistance remained low. A high proportion of strains tested continued to exhibit high-level plasmid mediated resistance to tetracyclines. The continuing emergence and spread of antibiotic resistant gonococci in and from the WHO WPR and SEAR suggests that surveillance programs such as GASP be maintained and expanded. *Commun Dis Intell* 2011;35(1):2–7.

Introduction

Increasing antimicrobial resistance (AMR) in *Neisseria gonorrhoeae* has, over many years, compromised the treatment and public health management of gonococcal disease in the World Health Organization (WHO) Western Pacific (WPR) and South East Asian Regions (SEAR) where there continues to be a high incidence of this sexually transmitted disease.

The treatment of gonorrhoea by the public sector in the 'Asian' countries of the WHO WPR, and in the WHO SEAR is substantially based on the third-generation cephalosporin agents, most notably the injectable ceftriaxone, although there are a wide range of dosing regimens used.[1] The oral third-generation cephalosporin most commonly used is cefixime, but dosing regimens are more uniform.[1] These antibiotics are employed as single-dose treatments. Other injectable and oral cephalosporins are also used in some jurisdictions.[1]

There is also widespread resistance to penicillins, early generation cephalosporins and quinolones in the 'Asian' group of WPR and in SEAR countries.[2,3] In the 'Pacific Island' or 'Oceania' group of countries within the WHO WPR, the penicillin group of agents continues to be the recommended treatment in a number of settings.[2]

Other antibiotics such as spectinomycin and azithromycin are also recommended and used in some countries, although drug availability and cost limit their wider use. There are few reliable data on antibiotic usage and availability in the private sector in the WHO WPR and SEAR, but anecdotally, a wide variety of antibiotics are used, often in suboptimal doses.[1]

The WHO[4] and others[5,6] recommend that treatment options be refined by data from surveillance of AMR in *N. gonorrhoeae* and that routine use of an antibiotic for treatment be discontinued when therapeutic failure and/or AMR reaches a level of 5%. The WPR Gonococcal Antimicrobial Surveillance Programme (GASP) has documented the emergence and spread of AMR in *N. gonorrhoeae* in the

WHO WPR from 1992[2,7] to provide information for action and to optimise the antibiotic treatment for gonorrhoea. The WHO SEAR GASP has published similar data intermittently.[3] Considerable concerns have been expressed following the appearance and spread of gonococci 'non-susceptible' to the later-generation cephalosporins in the WHO WPR.[8–11] Their recognition followed documentation of treatment failures with several oral third-generation cephalosporins.[8,10,12] The gonococci involved were usually also resistant to other antibiotics, and would be classified as 'multi-drug resistant gonococci' by recently proposed criteria.[4]

This report provides an analysis of antimicrobial resistance in *N. gonorrhoeae* in the WHO WPR derived from the results of the WPR GASP surveillance for the calendar year 2009, and is augmented by equivalent data in a number of centres in the WHO SEAR. The difficulties currently experienced with reliable detection and reporting of gonococci with altered susceptibility to cephalosproins[4] are discussed.

Methods

The methods used by the WHO WPR GASP and more recently by WHO SEAR, have been published[7] and provide full details of the source of isolates, sample populations, laboratory test methods and quality assurance programs (EQA) used to generate data. These general principles were unaltered in 2009. There continues to be expansion of the panel of *N. gonorrhoeae* control strains used in WHO WPR and SEAR EQA programs. This is to monitor the impact of emerging resistance (initially the quinolones and, latterly, the third-generation cephalosporins) and address issues related to the detection of these forms of resistance.[13,14]

Results and discussion

In 2009, there were 8,704 isolates of *N. gonorrhoeae* examined for their susceptibility to one or more antibiotics used for the treatment of gonorrhoea, by EQA controlled methods. These were reported from centres in 21 countries and jurisdictions; 17 in the WHO WPR and 4 from the WHO SEAR.

There are important limitations that apply to data generated from surveys of this kind. Inevitably only low sample numbers were available in some centres. The reasons for this include the absence or abandonment of laboratory-based diagnostic culture where syndromic management is used. More recently, there has been increasing substitution of diagnostic nucleic amplification assays in place of culture based approaches. Additionally, resource restrictions limit the capacity for susceptibility testing based on minimum inhibitory concentrations (MIC) methodology, even when gonococcal isolates are available, so that disc testing procedures remain the only practical means of *in vitro* assessment of gonococcal antibiotic susceptibility in many situations.[14] Despite these limitations, in the absence of other data sources, and when conducted over extended periods under the same conditions, the annual WHO WPR, and more recently SEAR, gonococcal surveillance provides reliable trend data for the region as a whole.

The consistent results that have been obtained over time in similar countries in the WPR reinforce the significance of the findings. Since 2007, these data now include the addition of quality controlled information from the WHO SEAR. This allows inferential extrapolation of the data obtained to those countries that are unable to participate fully in each surveillance period.

Tables 1 and 2 show the patterns of resistance to the quinolone and penicillin groups of antibiotics by jurisdiction for 2009. The WHO recommendation that an antibiotic be removed from standard treatment schedules when the proportion of resistant isolates reaches 5% or more provides guidance for interpretation of these data. The previously described patterns of resistance to these groups of antibiotics across the WHO WPR and SEAR[2,7] were again evident in 2009. A high proportion of both penicillin and/or quinolone resistance was detected amongst isolates tested in most reporting centres. From the Pacific Island states, Fiji reported low penicillin and quinolone resistance, New Caledonia again reported no penicillin resistance and little quinolone resistance, Tonga reported no penicillin resistance; and there was continued absence of quinolone resistance reported in Papua New Guinea.

In 2009, quinolone resistance (QRNG) or reduced susceptibility was in excess of 90% of all *N. gonorrhoeae* isolates examined in Brunei, China, Korea, the Philippines and Vietnam (WHO WPR) and in Bhutan, India, Sri Lanka and Thailand (WHO SEAR) and rates between 75% and 90% of all *N. gonorrhoeae* examined in Japan, Malaysia, Mongolia and Singapore. Lower, but still substantial, proportions of QRNG were present in Australia, Cambodia, Hong Kong SAR and New Zealand. Penicillin resistance rates were lower than those for the quinolone antibiotics, but followed a similar pattern to previous years. Not all jurisdictions monitored penicillin resistance because treatment of gonorrhoea with this group of antibiotics has long been discontinued, and even where this surveillance was performed, it was sometimes limited to detection of beta-lactamase production.

N. gonorrhoeae in the WPR and SEAR has also been shown to have decreased susceptibility to third-generation cephalosporins for a number of

Table 1: Quinolone resistance in 8,704 strains of *Neisseria gonorrhoeae* in the World Health Organization Western Pacific Region and the South East Asia Region, 2009

Country	n	Less susceptible		Resistant		All QRNG	
		n	%	n	%	n	%
Western Pacific Region							
Australia	3,220	23	0.7	1,346	41.8	1,370	42.5
Brunei	387	134	34.6	226	58.4	360	93.0
Cambodia	6	0	0.0	4	66.7	4	66.7
China	1,026	27	2.6	999	97.4	1,026	100.0
Fiji	541	0	0.0	1	0.2	1	0.2
Hong Kong SAR	1,366	14	1.0	699	51.2	713	52.2
Japan	263	3	1.1	207	78.7	210	79.8
Korea	61	6	9.8	50	82.0	56	91.8
Malaysia	10	1	10.0	7	70.0	8	80.0
Mongolia	150	84	56.0	28	18.7	112	74.7
New Caledonia	79	0	0.0	1	1.3	1	1.3
New Zealand	234	0	0.0	82	35.0	82	35.0
Papua New Guinea	54	0	0.0	0	0.0	0	0.0
Philippines	40	0	0.0	39	97.5	39	97.5
Singapore	160	4	2.5	134	83.8	138	86.3
Vietnam	80	1	1.3	79	96.0	80	100.0
South East Asia Region							
Bhutan	181	4	2.2	172	95.0	176	97.2
India	51	2	3.9	49	96.1	51	100.0
Sri Lanka	75	0	0.0	69	92.0	69	92.0
Thailand	720	143	19.9	549	76.3	692	96.1
Total	8,704	446	5.1	4,741	54.5	5,188	59.6

QRNG Quinolone resistant *Neisseria gonorrhoeae*

Tonga Quinolones not tested.

years.[4,7–12] This altered susceptibility was accompanied by treatment failures following therapy with oral third-generation cephalosporins in a significant number of cases,[6,8,10,12] No major changes were evident in these patterns over the 12 months of surveillance reported for 2009. There are however, concerns regarding assessment of the proportion of *N. gonorrhoeae* that display altered susceptibility to the third-generation cephalosporin antibiotics in the WHO WPR and SEAR.

Surveillance of gonococcal susceptibility to 'third-generation' cephalosporins has focused on assessment of ceftriaxone susceptibility (the injectable agent) because of its wide use throughout both regions.[1] The MIC data reported here were based mostly on assessment of the *in vitro* susceptibility of gonococcal isolates to ceftriaxone. However, recent investigations have shown that the mechanisms of resistance to the third-generation cephalosporins are multiple and complex, and involve the aggregation and expression of a number of different genes within *N. gonorrhoeae*.[15–17] The effects of this polygenic involvement on *in vitro* susceptibility of the injectable agents such as ceftriaxone and on the oral cephalosporins such as cefixime and ceftibuten differ considerably, meaning that susceptibility data for ceftriaxone cannot be used to reliably predict the outcomes of treatment with the oral drugs.[4,12] Further, it would also appear that there is a need for revision and clarification of some of the *in vitro* criteria that are currently used to categorise and report on the different MIC levels that arise with both the injectable and oral cephalosporins as the various resistance mechanisms appear in *N. gonorrhoeae*.[4] This process is currently in train through WHO working groups.[4] It is also now known that other important mechanisms of gonococcal cephalosporin resistance also exist, but are yet to be fully elucidated.[16] In 2009, these limitations were again evident in reporting and in EQA data.[14]

In 2009, the revised panel of *N. gonorrhoeae* WHO control strains was further developed and distributed in the WPR and SEAR. It is anticipated that more widespread use of these controls from 2010 onwards

Table 2: Penicillin resistance in 8,703 strains of *Neisseria gonorrhoeae* in the World Health Organisation Western Pacific Region and the South East Asia Region, 2009

		PPNG		CMRP		All penicillin resistance	
Country	n	n	%	n	%	n	%
Western Pacific Region							
Australia	3,220	465	14.4	680	21.1	1,145	35.6
Brunei	384	249	64.8	27	7.0	276	71.9
Cambodia	6					6	100.0
China	1,026	431	42.0	NS	ND	NS	ND
Fiji	541	21	3.9	24	4.4	45	8.3
Hong Kong SAR	1,366	442	32.4	253	18.5	695	50.9
Japan	263	0	0.0	65	24.7	65	24.7
Korea	61	11	18.0	23	37.7	34	55.7
Malaysia	10	3	30.0	2	20.0	5	50.0
Mongolia	105	0	0.0	56	53.3	56	53.3
New Caledonia	133	0	0.0	0	0.0	0	0.0
New Zealand	234	5	2.1	56	23.9	61	26.1
Papua New Guinea	54	33	61.1	1	1.9	34	63.0
Philippines	40	33	82.5	0	0.0	33	82.5
Singapore	160	89	55.6	19	11.9	108	67.5
Tonga	4	0	0.0	0	0.0	0	0.0
Vietnam	80	26	32.5	5	6.3	31	38.8
South East Asia Region							
Bhutan	181					180	99.4
India	51	23	45.1	3	5.9	26	51.0
Sri Lanka	75	51	68.0	9	12.0	60	80.0
Thailand	709	619	87.3	67	9.4	686	96.8
Totals	8,703	2,501	28.7	1,290	14.8	3,546	40.7

PPNG Penicillinase producing Neisseria gonorrhoeae (β-lactamase positive).
CMRP Chromosomally mediated resistance to penicillin.
ND Gonococci in China were examined for penicillinase production only.
NS Not specified.

will better define 'decreased susceptibility' and 'resistance' to the different third-generation cephalosporin antibiotics.[13,14,18] This is not an easy task because of the need to define 'clinical' as opposed to *in vitro* resistance through better and more complete examination of gonococci isolated from documented treatment failures, and also by use in various circumstances of the different treatment doses, especially for ceftriaxone.[1] It is also established that elimination of *N. gonorrhoeae* from some infected sites is also more difficult, e.g. extra-genital tract infections are harder to eradicate.[19] The following data are therefore indicative of a well documented increase in the MIC values of cephalosporins in gonococci found in both regions.

Twenty-one centres examined *N. gonorrhoeae* for cephalosporin susceptibility in 2009. The proportions of gonococci with 'decreased susceptibility' or that were 'resistant' varied widely A large number of centres including Australia, Bhutan, Brunei, Fiji, Hong Kong, India, Japan, New Caledonia, New Zealand, Papua New Guinea, the Philippines, Sri Lanka, Singapore, Thailand and Vietnam reported no or very low proportions of strains with altered ceftriaxone susceptibility when tested in large numbers. Most of these centres tested isolates for susceptibility to ceftriaxone only, and it is not surprising that very few strains exhibited altered susceptibility to this antibiotic. Brunei, China, Korea and Mongolia reported gonococci with 'decreased susceptibility' or that were 'resistant' to ceftriaxone in much larger proportions. The number of strains tested in the countries and jurisdictions mentioned above are as shown in Tables 1 and 2.

Very few isolates were tested separately for their susceptibility to the oral cephalosporin agents. It is

thus not possible at present to interpret the *in vitro* data in terms of likely clinical outcome other than in general terms.

Spectinomycin resistance has been only infrequently found in earlier reports in this series. A form of high-level resistance due to a single-step ribosomal mutation has been described,[20] and there are other reports of unexplained low-level resistance or decreased susceptibility.

As in previous years, only a few sporadic cases of resistance to spectinomycin in a limited number of settings were reported from the 17 centres testing this antibiotic in 2009. Low numbers of isolates (10 or less) with *in vitro* resistance or decreased susceptibility to spectinomycin were found in Bhutan, Brunei, China and Mongolia. The number of strains tested in the countries and jurisdictions mentioned above are shown in Tables 1 and 2. The availability of spectinomycin as a treatment option has been significantly reduced following a lack of reliable supplies of the drug. However, spectinomycin is still used as a first line and second line treatment in a number of WPR jurisdictions. Korea is one such country, and an outbreak of spectinomycin resistant *N. gonorrhoeae* was reported there many years ago. Notably, no spectinomycin resistance has been detected there for many years and overall resistance has remained low to this antibiotic in both regions.

Tetracyclines are not a recommended treatment for gonorrhoea in the WHO WPR or SEAR, but historical data on the spread of high-level plasmid mediated tetracycline resistant *N. gonorrhoeae* (TRNG), continue to be monitored in some countries. Eighteen centres tested gonococci for TRNG in 2009, and up to 70% of gonococci exhibited this form of resistance. The proportion of TRNG has been high in some parts of the WPR for many years, and between 35% and 70% of all strains in Brunei, China, Hong Kong, Malaysia, Singapore and Vietnam were TRNG; with proportions between 10% and 34% in Australia, India, Korea and New Zealand, Papua New Guinea, and the Philippines. The number of strains tested in the countries and jurisdictions mentioned above are shown in Tables 1 and 2.

The need for more and better quality surveillance of gonococcal antibiotic resistance in the WHO WPR and SEAR is evident.[4–6] Increasing surveillance of resistance to include other antibiotics is imperative. As an example, azithromycin is used either as a primary treatment for gonorrhoea or as adjunctive treatment for other pathogens and resistance to this antibiotic is known to occur in the WHO WPR. However, substantive surveillance data are not yet available. There are recent reports elsewhere of high-level azithromycin resistance following widespread use of this antibiotic.[21]

Given the past history of the emergence and spread of antibiotic resistant gonococci from the WHO WPR and SEAR to other parts of the world,[4] there is a high likelihood that, unless better disease control becomes a reality, new forms of resistance will continue to appear and spread well beyond these regions. A suggested approach to the closely related issues of gonococcal disease control and AMR control in *N. gonorrhoeae* has recently been published from WHO sources.[4] Implicit in these recommendations is the availability of reliable and verifiable antibiotic resistance surveillance data.

Acknowledgements

Vale Professor John W Tapsall AM: As this report goes to press we remember our colleague and mentor Professor John Tapsall AM (1945–2010) who contributed greatly to the establishment and maintenance of surveillance in these WHO regions to aid in the control of this disease.

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Obituary

Vale: Associate Professor John W Tapsall AM
25 February 1945 to 15 December 2010

Professor John Tapsall AM, a highly regarded medical microbiologist, sadly passed away on 15 December 2010, after a two year illness. He was a pioneer in recognising the need for laboratory-based surveillance with other measures to monitor disease and its therapeutic treatment as a means of controlling and managing disease. His acheivements included the formation of the National Neisseria Network (NNN), Australia.

Professor John Tapsall – awarded MEMBER (AM) IN THE GENERAL DIVISION OF THE ORDER OF AUSTRALIA in the 2010 Queen's Birthday Honours

As the Director of the World Health Organization (WHO) Collaborating Centre for Sexually Transmitted Diseases (STD), Sydney, he coordinated the Gonococcal Antimicrobial Surveillance Programme (GASP) for the Western Pacific Region (WPR) and South East Asian Region (SEAR). His successful accomplishments with GASP in these regions led him, in 2009 and 2010, to work together with WHO towards a Global GASP.

In 2009 he was admitted as an Honorary Fellow of The Australasian Chapter of Sexual Health Medicine from The Royal Australasian College of Physicians. In recognition of John's lifetime work he received the award of AM, Member in the General Division of the Order of Australia, in the 2010 Queen's Birthday Honours, for service to medicine and to public health microbiology, particularly through contributions to the understanding and control of gonococcal and meningococcal disease.

John graduated from the University of Queensland in 1969 and served as a resident medical officer and pathology registrar in Brisbane before undertaking his specialist training in microbiology. In 1973, he joined the Microbiology Department at the Prince of Wales Hospital in Sydney, where he progressed to senior staff specialist and also formed the Neisseria Reference Laboratory for New South Wales. In 1976, he attained his Fellowship with the Royal College of Pathologists of Australasia (RCPA), and served several terms on the executive and college committees, and for 18 years was the Director of the RCPA Quality Assurance Programmes. He was an active and enthusiastic examiner for the RCPA and during practical and viva voce examinations, John not only invigilated but taught, counselled and mentored.

Professor John Tapsall obtained his Doctorate of Medicine (MD) in 1991 from the University of New South Wales (UNSW) and, holding a conjoint academic position, was appointed Associate Professor in 1993. John's MD thesis topic was diagnostic and public health microbiology, and its contribution to the control of infectious diseases. His studies included the Group B Streptococci and investigating the pathogenesis of streptococcal lung infections, and studies on diagnosis of lower urinary tract infections and the role of auxotrophic bacteria.

Surveillance and the control of antimicrobial resistance in sexually transmitted disease pathogens, most notably *Neisseria gonorrhoeae*, continued to be his major interest throughout his career. As Director of the NNN, he established the Australian Gonococcal Surveillance Programme in 1979 and the Australian Meningococcal Surveillance Programme in 1994. These national laboratory-based surveillance programs examine diagnostic methods, strain subtypes, antibiotic testing data, and more recently, molecular mechanisms of antimicrobial resistance in the pathogenic *Neisseria*. He introduced standardised methods and a quality assurance program and authored the numerous quarterly and annual reports published in *Communicable Diseases Intelligence*. These national reports have been used to signal and implement appropriate disease control interventions.

John was one of the core members of the Public Health Laboratory Network when it began in Australia in 1996. He was an enthusiastic member on STD issues and clinical and public health microbiology in general. As a result of his expertise, he was also a member of the Australian Government's

(National Health and Medical Research Council) Expert Advisory Group on Antimicrobial Resistance (EAGAR). John was an active member of EAGAR, as a member with the Australian Drug Evaluation Committee, strongly supporting better surveillance of antimicrobial resistance, plus comprehensive monitoring of antimicrobial use. John was also a member of the Australian and American Societies for Microbiology, acting as guest editor for the *Australian Microbiologist* for its (separate) issues on antimicrobial resistance and sexually transmitted diseases in 2008.

With the proven success of the NNN Programme in Australia, the WHO invited Professor John Tapsall to establish and co-ordinate a similar program for the WHO GASP WPR and SEAR. He was Director of the WHO Collaborating Centre for STD, in Sydney, and held this position for more than 15 years. Through this WHO GASP program, gonococcal antimicrobial resistance is monitored and currently involves over 20 countries from these regions. Prior to the existence of such a program, STD and antimicrobial resistance data were sporadic, unrepresentative and inaccurate. All laboratories in WHO GASP, including Australia, participate in an external quality assurance and control program to ensure the data reported are valid and comparable.

WHO GASP has achieved its goals through John's commitment, support and his determination to see it succeed. He provided numerous consultancies to the WHO and headed the antimicrobial resistance surveillance unit in Geneva in 2003. In 2008, he travelled to Geneva for three months to prepare an international standards technical document for the global surveillance of gonococcal resistance, against a background of rapidly increasing antimicrobial resistance. John supported initiatives to strengthen surveillance work in other regions in order to enhance the WHO Global GASP network. In 2009 he was invited to the membership of the WHO Expert Advisory Panel on STDs, and despite his ill health he continued to fullfil this role.

Professor John Tapsall published extensively in peer-reviewed journals, mainly in the area of sexually transmitted infections, diagnostics and antimicrobial susceptibility monitoring, emphasising the pivotal role of these processes in disease control. He has presented his research, and advocated for disease control measures and rationales for antimicrobial use at national and international meetings of pathology, microbiology, antibiotic, sexually transmitted infection and pathogenic *Neisseria* societies. He founded the International Collaboration on Gonococci, which focuses on laboratory contributions to gonorrhoea control.

Professor John Tapsall was a quiet achiever with the extraordinary ability to remain clear-sighted and visionary in the projects he led. He advised with wisdom and kindness, and was always generous with his time and knowledge. He will be warmly remembered for his sense of humour and his chosen anecdotes. Many would remember and chuckle at his phrase 'Sydney is like a lymph node in the groin of Asia' when referring to resistant strains of *Neisseria gonorrhoeae* generally brought into Australia by sex tourists or others who had been sexually active overseas.

John had an infectious enthusiasm for test cricket, a love for travelling and an impressive knowledge of world history. He was motivated by a deep sense of social concern and enjoyed interactions with all staff. Professor John Tapsall was well respected and a mentor to many and strongly believed in the potential of individuals. Consequently, he contributed greatly to the education, encouragement and the professional development of scientists and pathologists.

Professor Tapsall was a devoted husband to Rosemary and a loving and dedicated father to their children, Philip and Jane.

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Peer-reviewed articles

An influenza outbreak among pilgrims sleeping at a school without purpose built overnight accommodation facilities

Michael Staff, Maria I Torres

Abstract

This report describes a respiratory illness outbreak amongst a group of over 700 World Youth Day 2008 pilgrims staying at a basic accommodation venue for 1 week in July 2008. At this venue, 1 group of pilgrims was accommodated as a large group in a gymnasium and another group was sub-divided into smaller groups and accommodated in classrooms. Following confirmation of an influenza B outbreak by influenza point of care testing, control measures were promptly implemented. Isolation of cases, improved hand, respiratory and general hygiene, establishment of a mobile tent health facility at the accommodation venue, and the use of oseltamivir for the treatment of cases and prophylaxis of high risk contacts were implemented and the outbreak was brought under control within the week. Overall, 20% of pilgrims met the case definition for an influenza-like illness and 36% had an onset prior to arrival at the venue. The attack rate for those with onset while at the venue was significantly higher amongst pilgrims accommodated in the gymnasium than those staying in the classrooms. Findings from this study highlight the importance of early detection, the rapid implementation of control measures and appropriate prescribing of antivirals to manage influenza outbreaks. The findings also highlight the benefits of accommodating individuals in smaller groups within basic accommodation venues in the context of mass gatherings. *Commun Dis Intell* 2011;35(1):10–15.

Keywords: influenza, outbreak management, mass gathering, basic group accommodation

Introduction

In July 2008 Sydney was host to the World Youth Day (WYD), a large Catholic youth festival, which has been held every 2 to 3 years since 1986, each time in a different country. Of the 223,000 people who registered as pilgrims for WYD 2008, 110,000 were international pilgrims who came from 170 countries.[1] The majority of WYD 2008 activities occurred between 15 and 20 July. However, pilgrims started congregating in locations all over Australia from the second week in July. During this period, known as Days in the Dioceses, many of the international pilgrims were received by parishes and billeted in the homes of local pilgrims. All pilgrims then travelled to Sydney for the week of WYD 2008 activities. Approximately 100,000 pilgrims stayed at basic accommodation venues such as parish halls or schools.[2]

During the Days in the Dioceses there were unconfirmed reports of several cases of respiratory tract infections occurring among some groups of pilgrims prior to them arriving at their mass accommodation venues in Sydney. This paper aims to describe an outbreak of influenza among pilgrims at a WYD accommodation venue; describe and assess the management of the outbreak; and to determine whether sleeping in small groups in classrooms within the venue reduced the risk of contracting influenza during an established outbreak, in comparison with sleeping in a large hall.

Methods

Description of the facility and the study population

Seven hundred and five Solomon Islander and Australian pilgrims were provided with simple accommodation at a school, which did not have any purpose built facilities for overnight accommodation, from Sunday 13 July to Sunday 20 July 2008. There were 4 accommodation areas; 1 large school gymnasium with toilets and showering facilities and 3 groups of standard classrooms with each classroom housing approximately 8 pilgrims. The pilgrims in the classrooms shared a toilet/shower block that was separate to that accessed by the pilgrims sleeping in the gymnasium. The ratio of toilet/shower facilities to pilgrims met the recommendations that had been provided to the event organisers. Australian pilgrims were assigned to one of the 3 classroom groups based upon their parish of residence, and pilgrims from the Solomon Islands were accommodated in the gymnasium. Breakfast was provided in a communal area at the school while lunch and the evening meal were provided off site at other venues arranged for WYD activities. Pilgrims had been advised to be

vaccinated for influenza prior to attending WYD 2008 but it is not known what level of compliance with this recommendation was achieved.

Outbreak management

On Tuesday 15 July health authorities were notified of a probable respiratory illness outbreak at the venue. Initially, no designated health or medical facilities were available at the school and the 8 pilgrims who presented with a respiratory illness were isolated from the group and accommodated in separate classrooms where they were cared for by school staff. Cases were assessed by public health and ambulance staff with the more seriously ill transported to a local hospital emergency department for further treatment. Five cases with a clinically compatible influenza illness had point of care tests (QuickVue Influenza A+B Test, Quidel Corporation, San Diego, CA, USA) performed on nasal swabs with samples subsequently sent for laboratory immunofluorescence (IF) and polymerase chain reaction (PCR) testing. On Wednesday 16 July an additional 21 cases had nose and throat swabs collected.

When it became apparent that an outbreak was well established among the group, a decision was made to establish a designated mobile tent health facility at the school. This was a 30 bed tent hospital staffed by nurses and medical practitioners from the local Area Health Service and was operational from 16 to 21 July 2008. It had primary care treatment capacity with more serious cases requiring transport to local emergency departments for more complex assessments such as chest x-ray. Treatment guidelines consistent with national guidelines were provided to the clinicians at the facility.[3] The guidelines recommended oseltamivir treatment (75 mg bi-daily for 5 days) for all cases meeting the case definition and whose illness onset was within 48 hours of being seen and oseltamivir prophylaxis (75 mg daily for 10 days) for well pilgrims with predisposing conditions that may have increased their risk of influenza complications.

Individuals diagnosed with suspected influenza were isolated at the mobile health facility or in other suitable rooms at the school whilst infectious (infectious period = 5 days since onset of symptoms or 48 hours after commencing treatment with oseltamivir) or allowed to return home if this was their preference. Information on simple control measures such as hand washing and cough etiquette was distributed among pilgrims, increased hand washing facilities and facial tissues were made available and professional cleaners were engaged to maximise the venue's general cleanliness. Oseltamivir was used at the mobile health facility for influenza treatment and prophylaxis. Public health practitioners also assessed contacts and provided oseltamivir prophylaxis.

Epidemiological investigation

The following case definition, modified from the National case definition for influenza, was used to identify cases:

- self reported or measured (> 38°C) fever, plus
- cough or shortness of breath or coryza or sore throat, plus
- fatigue or myalgia or rigors or headache.

On Wednesday 16 July, a written questionnaire was administered to all pilgrims at the school. For the Solomon Islander group the questionnaire was administered in a single group setting with the assistance of a leader from the group who spoke English and was able to provide translation. The questionnaire asked about the presence and time of onset of influenza-like illness symptoms. For each symptom, respondents were asked to circle the day of onset in the previous 5 days. Age, gender, church group and accommodation site at the school were also recorded.

In the week prior to the WYD the pilgrims from Solomon Islander church groups had been billeted at several of the parishes of the Australian pilgrims who were also at the school during WYD. Church groupings allowed identification of potential exposures between the two nationalities prior to arrival at the school.

The clinical medical records and facility logs from the onsite health facility were used to verify and supplement the information obtained from the self completed questionnaires. Data obtained included medical history, clinical examination findings, medication prescribed, and referral for further treatment. Information was also obtained from public health records of assessments of contacts and antiviral prophylaxis prescription logs.

Data analysis

Data were entered into Epi Info with data analysis conducted using STATA 9.2 (StataCorp, College Station, Texas 77845 USA). Chi-square and Fisher's exact tests of significance were used to test for association between attack rates and accommodation arrangements.

Results

Initial cases and laboratory confirmation of outbreak

Of the 5 initial cases swabbed on 15 July, 2 tested positive for influenza B on point of care testing. Subsequent laboratory influenza B antigen detection by IF was positive for four of this group with

3 cases also PCR positive for influenza B. Of the 21 cases tested on Wednesday 16 July, five tested positive for influenza B on point of care tests, eight were confirmed as influenza B positive by PCR, and an additional three, who had positive influenza B results on IF, returned negative PCR results.

Questionnaire results

Six hundred and ninety-three pilgrims (433 Solomon Islanders and 260 Australians) provided responses to the questionnaire (98% response rate). Of the 693 responses, 653 provided sufficient information to allow a comparison with the case definition. Of these, 132 (20%) reported a recent fever and 233 (36%) complained of having had a cough. Seventeen per cent of pilgrims reported fevers commencing five or more days prior to the date of the questionnaire and 24% reported coughs.

Mobile health facility data

The mobile health facility attended to a total of 119 pilgrims (62 Solomon Islanders and 57 Australians); 5 pilgrims were seen on two occasions. There was sufficient information available to allow a comparison with the case definition for 101 of the pilgrims seen at the mobile health facility. Fifty-six (55%) met the case definition for influenza with 37 having had symptoms commencing in the last 48 hours. Six cases were referred from the mobile health facility to hospital for further assessment and management of their influenza-like illness. Twenty-three of the presentations to the mobile health facility who met the case definition and were identified within 48 hours of onset of symptoms, were treated with oseltamivir (Table 1). A total of 43 pilgrims received prophylactic courses of oseltamivir (13 from public health practitioners and 30 from the mobile health facility). Of those who received prophylactic antivirals, 15 were eligible for prophylaxis, 10 should have received treatment doses and 18 had no indication for receiving antivirals.

Cases meeting case definition

After combining the questionnaire and mobile health facility data 131 or 20% of pilgrims met the case definition for influenza (Table 2). Thirty-six per cent of cases commenced before arrival at the school on Sunday 13 July, with the first case reported to have started on 9 July. The attack rate for the period including both the time prior and following arrival at the school was significantly higher among the Solomon Islanders at 26%, compared with that for the Australians of 11% ($P < 0.01$).

Illness among Solomon Islanders when billeted prior to the World Youth Day

There were 13 church groups from the Solomon Islands who were billeted with parishes in Australia in the week prior to staying at the school. Based upon self-reported questionnaire responses all but two of these groups (both with 6 or less members) had one or more members being unwell with a cough

Table 1: Oseltamivir treatment of presentations to mobile health facility

Received treatment	Eligible to receive treatment		Total
	Yes	No	
Yes	23	5	28
No	14	13	27
Total	37	18	55

Table 2: Attack rates, by period and by accommodation group

Nationality	Number of pilgrims	Pilgrims became unwell over whole period*		Accommodation	Number of pilgrims†	Pilgrims unwell prior to arriving at the school		Pilgrims became unwell whilst at the school‡	
		n	%			n	%	n	%
Solomon Islanders	398	104	26.1	Gymnasium	398	43	10.8	61	17.2
Australians	255	27	10.7	Classrooms A	107	3	2.8	7	6.7
				Classrooms B	54	1	1.9	3	5.7
				Classrooms C	92	0	0	13	14.1
				Classrooms total	253	4	1.6	23	9.2§
Total	653	131	20.1		651	47	7.2	84	13.9

* Whole period i.e. from 9 July to 21 July 2008.

† Accommodation data were not available for 2 pilgrims.

‡ Denominator is well pilgrims as of Sunday 13 July (i.e. 355, 104, 53 and 92 for each accommodation group).

§ *P* value <0.05, comparison of Solomon Islanders and Australians' attack rates whilst at the school.

and/or fever before arrival at the school. Each of the 3 Australian classroom accommodation groups had some members from a parish that had billeted a Solomon Islander church group with an ill member.

Attack rates by accommodation

Table 2 shows the number of cases in each accommodation area broken down by time of onset of symptoms. There were cases of influenza among pilgrims prior to arriving at the school in three of the 4 accommodation groups with the greatest number from the Solomon Islander groups. After arriving at the school, the attack rates among the pilgrims in the Australian groups were 6.7%, 5.7% and 14.1% with no significant statistical difference between groups ($P = 0.1$). Among Solomon Islanders, the attack rate after arriving at the school was 17.2%; this was significantly higher than the attack rate of 9.2% among the Australian pilgrims considered as a single group ($P < 0.01$). The Figure describes the epidemiological curve for the outbreak broken down by nationality of pilgrim, commencing from 13 July, (the commencement of their accommodation in groups at the school).

Discussion

This study describes an influenza outbreak within a group of pilgrims brought together during a week long mass gathering. It highlights the usefulness of point of care tests in confirming the outbreak, the difficulty in administering antivirals despite deploying an onsite health facility and the potential impact of different accommodation arrangements.

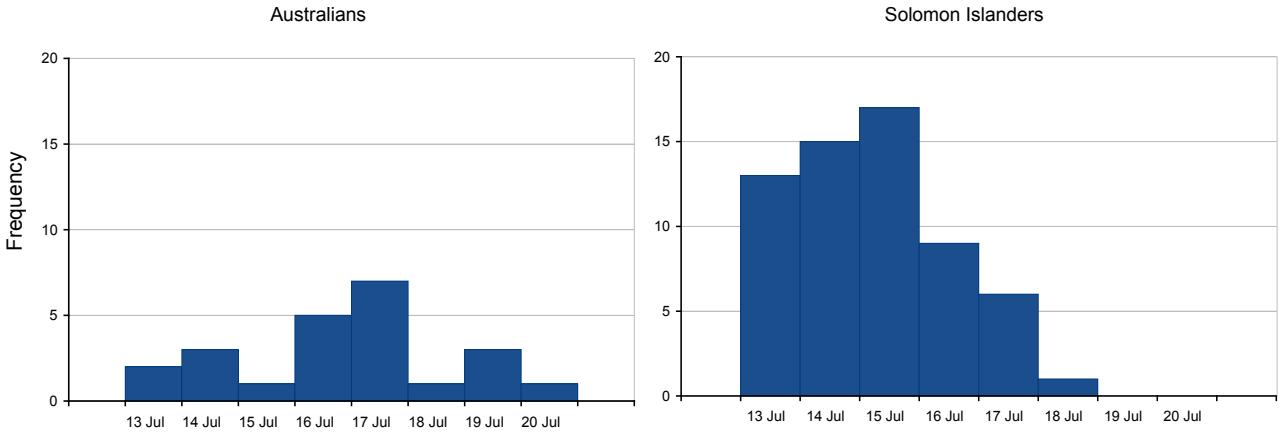
The overall attack rate of 20% observed in this study was within the range of rates reported by outbreak studies conducted during other, somewhat comparable, mass gatherings.[4,5] The setting of this outbreak differs from other group accommodation venues such as military and naval settings or residential aged care facilities, which have been the subject of previous influenza outbreak studies. WYD 2008 pilgrims accommodated at the school were grouped only shortly before or on arrival to the accommodation venue, and while they spent a significant amount of time with their group they also mixed with other pilgrims at and outside the accommodation venue. This was not comparable to military and other confined settings where members remain as part of their groups for extended periods, and where movement in and out of the setting and interaction with the outside environment is controlled.[6,7,8]

It is generally agreed that no single strategy used alone is effective in controlling infectious respiratory outbreaks.[9] As per national and state protocols, in addition to the use of antivirals for treatment and prophylaxis, several other measures including isolation of cases, promotion of sneeze and cough etiquette and hand hygiene were implemented to control the influenza outbreak. It is unknown how compliant sick pilgrims were with these voluntary control measures, but they appear to have had an effect in this population as the data suggest that the outbreak was under control by the end of the surveillance period on Monday 21 July 2008.

Given the anticipated high specificity and positive predictive value of point of care tests, a positive influenza point of care test result is very suggestive of influenza and may be sufficient to trigger an outbreak response.[10–12] The finding of 2 positive influenza B tests on the first day of this investigation gave health authorities grounds to implement control measures at the school very early in the response. Unfortunately, it is likely that their effectiveness to control the outbreak was undermined by the circulation of the virus amongst pilgrims for some time before they arrived at the school.

Establishing a mobile health facility was an exceptional measure implemented to deal with a special

Figure: Epidemiological curve, World Youth Day 2008 pilgrims, by nationality



situation. The implementation of such a measure has its own challenges such as sourcing and deploying appropriate clinical staff, maintaining appropriate documentation and medical records and establishing clear coordination and role definitions for clinicians and public health practitioners participating in the response. These issues need to be considered by all parties involved in an outbreak response to determine if and in what circumstances would such a strategy be used and how to best plan for this eventuality.

The use of oseltamivir for treatment and prophylaxis was one of the strategies considered appropriate to manage influenza outbreaks in the context of the special event that was WYD 2008, and the relevant protocols were available to clinicians and public health practitioners. The finding that only 62% of the cases eligible to be treated with oseltamivir actually received treatment is of some concern. This could be explained by the failure to identify cases, for example as a result of poor history taking by clinicians or poor symptom recall by patients, or by prescribing errors. These could also explain the mismatch between eligibility for prophylaxis and actual prescribing of prophylaxis. Strategies such as just-in-time training should be considered to ensure better clinician compliance with management protocols.

An important aspect of the WYD 2008 outbreak described here is the significantly higher attack rate observed amongst Solomon Islanders than Australian pilgrims, both prior to and after arrival at the school. It is likely that the influenza virus first started to spread amongst Solomon Islanders when they congregated in the Solomon Islands prior to arrival in Australia and continued to spread amongst the group while en-route hence explaining the higher prior to arrival attack rate.

The difference in attack rates observed between the Solomon Islander and the Australian groups whilst at the school, could be attributed to the differences in accommodation used whilst at the school. The Solomon Islander pilgrims, who were accommodated in a single large open plan area, had a significantly higher attack rate. The Australians, who were accommodated in smaller groups in classrooms, had, as a group, a significantly lower attack rate than the Solomon Islanders. The differences in attacks rates observed between the three classroom groups accommodating Australian pilgrims, although not statistically significant, suggest that the spread of illness was contained within discrete accommodation areas to some extent. This finding may have implications for planning future mass gatherings where non-purpose built facilities are used to accommodate participants.

An alternate explanation for the higher attack rate among the Solomon Islanders is that the outbreak was halted prematurely among the Australian pilgrims with the end of WYD 2008 activities. However, if this had been the case, the number of influenza cases among the Australian pilgrims would probably have continued to increase during the period at the school; this was not observed, on the contrary the outbreak appeared to peak among the Australian groups, as well as among the Solomon Islanders, before the end of their stay at the school.

One of the major limitations of this study is the lack of information that was available about symptoms prior to pilgrims arriving at the school. Although it is clear that a respiratory illness was circulating among the Solomon Island pilgrims prior to arrival at the school and that there was a potential for Australian pilgrims from each classroom group to have been exposed to the illness, it is likely that estimates of illness prior to arrival at the school are inaccurate. Furthermore, when looking at attack rates among accommodation groups it was not possible to adjust for the mixing that occurred during the various daytime and evening activities in which pilgrims participated.

This study has highlighted the potential of influenza to cause large outbreaks in a mass gathering setting and the need to consider the physical layout of accommodation facilities to help control the spread of illness. Early detection, rapid implementation of control measures, appropriate prescribing of antivirals and accommodating individuals in smaller groups within an accommodation venue, are all measures that need to be considered in managing and preventing these outbreaks.

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This study was conducted as part of the public health response to the outbreak and did not require approval by an ethics committee.

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Improving surveillance for acute hepatitis C

Rachel M Deacon, Handan Wand, Sacha Stelzer-Braid, Carla Treloar, Lisa Maher

Abstract

Understanding patterns of newly acquired hepatitis C virus (HCV) infection is fundamental to assessing the impact of prevention and treatment interventions. However, identifying newly acquired cases is difficult, usually requiring documented testing before and after exposure. As the proportion of cases identified as newly acquired by current New South Wales surveillance methodologies is significantly lower than that identified nationally, the impact on the identification of newly acquired cases of systematic reporting of past negative HCV test results from notifying laboratories was assessed. HCV notifications data for 2007 from two New South Wales laboratories were analysed. Cases with a negative HCV antibody test within the past 24 months were classified as newly acquired. These were linked to the NSW Department of Health (NSW Health)-identified cases to assess the effectiveness of accessing laboratory data. The laboratories accounted for approximately half of all new HCV notifications in 2007. Of the 2,206 newly diagnosed cases, 21 (1.0%) were newly acquired, 18 of which had not been identified under the current surveillance system, increasing the total number of newly acquired cases to 83 from 65. This increased the yield by 28% and increased the proportion of newly acquired cases from 65/4,192 (1.6%) to 83/4,196 (2.0%). Laboratory-identified cases were significantly more likely than NSW Health-identified cases to be aged 30 years or over. Combined with current reporting mechanisms, laboratory data on previous HCV test results have the potential to increase the number of newly acquired cases identified through the New South Wales surveillance system and to enhance the identification of cases among those aged 30 years or more. *Commun Dis Intell* 2011;35(1):16–20.

Keywords: hepatitis C virus, epidemiology, surveillance

Introduction

Hepatitis C virus (HCV) infection affects approximately 3% of the world's population and is globally a major cause of morbidity and mortality among people who inject drugs.[1–2] In Australia, HCV infection is notifiable in all states and territories. A total of 11,319 notifications of HCV infection were made in 2008, making HCV the fourth most common notifiable disease.[3]

Improved identification of newly acquired cases of HCV infection, demographic characteristics and risk factors have the potential to inform prevention and treatment activities.[4–6] Further, recent data suggest treatment of acute HCV infection results in higher rates of virological clearance than treatment of chronic infections.[7] The National Notifiable Diseases Surveillance System (NNDSS) definition for newly acquired HCV,[8] used by all Australian states and territories, is summarised in the Box. Identifying a positive HCV antibody or RNA test result from a patient as newly acquired requires a documented negative HCV antibody test or clinical evidence of acute hepatitis where other causes have been excluded, within the past 24 months. As acute hepatitis is present only in a minority of cases,[9] newly acquired cases are difficult to identify. However, between 2004 and 2006 the Victorian HCV surveillance system approximately doubled the rate of identification of newly acquired HCV cases (from 3%–5% in 2004–2005, to 6%–8% in 2006–2009)[10–11] by implementing laboratory follow-up for all HCV cases aged less than 30 years.

Of approximately 4,000 cases of newly diagnosed HCV reported in New South Wales each year, current surveillance methodologies identify under 2% (24/3,567 or 0.7% in 2008) as newly acquired, significantly less (χ^2 $P < 0.001$) than the proportion of cases (381/11,303 or 3.4% in 2008) identified as newly acquired nationally.[12] Currently, most public health units (PHUs) in New South Wales do not identify HCV cases as newly acquired unless already reported as such on the notification form. These cases are followed up with patients' doctors by PHU staff to confirm newly acquired status and obtain enhanced surveillance data on clinical history and risk factors. A trial in 2000 of enhanced surveillance of all HCV notifications in New South Wales identified 5.7% (307/5,409) of followed-up notifications as newly acquired, but was discontinued owing to data quality and resource constraints.[13] An alternative methodology to improve identification of newly acquired HCV by the New South Wales surveillance system without increasing the burden on PHUs or being dependent on contact with multiple doctors was developed and tested. This paper presents results and compares the characteristics of newly acquired HCV cases identified from laboratory data with those reported to the NSW Department of Health (NSW Health), for the year 2007.

Methods

All laboratories in New South Wales report all HCV antibody positive test results to NSW Health via the relevant Area Health Service's PHU. Acute symptomatic cases diagnosed by physicians are also reported to local PHUs. For each notification not previously reported to a PHU, details are entered onto the New South Wales Notifiable Diseases Database (NDD).

De-identified data on HCV cases notified in 2007 were provided with permission from the Communicable Diseases Branch, NSW Health (November 2009). This study focussed on notifications during 2007 to allow adequate time for receipt of all notifications and removal of duplicates from the NDD. Cases' ages, gender and date of receipt were provided. Data were also obtained from a public laboratory (Laboratory A), which covers requests from specialists, tertiary clinics and general practitioners within one PHU catchment area, and a private laboratory (Laboratory B), which receives specimens from across the state, primarily from general practitioners.

The following laboratory data were used in the analysis: HCV antibody test records in 2007 (HCV antibody positive records only from Laboratory B); available HCV antibody test records from 2005–2007 for patients testing antibody positive in 2007; and HCV RNA test records in 2007 (Laboratory A only). Data were provided for 12,939 unique patients. Each record contained the date the specimen was received, medical record number (MRN; Laboratory A) or Patient Identification Number (PIN; Laboratory B), residential postcode, gender, date of birth (Laboratory A) or age (Laboratory B), and first and surnames of patient (Laboratory A only). Ethics approval was provided prior to commencement by the South Eastern Sydney and Illawarra Area Health Service Northern Hospital Network (08/163) and the University of New South Wales (08063) Human Research Ethics Committees.

Duplicates were removed and records deleted for patients residing outside New South Wales (n = 239) and where date of birth (n = 136) or test results (n = 151) were missing or inconclusive. Each record was assigned an area health service according to the postcode of residence. HCV RNA negative and indeterminate records from Laboratory A were discarded and the RNA positive records combined with cleaned HCV antibody test records from each laboratory. Records were linked via a combination of first name, surname, date of birth and gender (ID; Laboratory A) or the PIN (Laboratory B). No records had identical MRNs and non-identical IDs.

To identify new diagnoses of HCV in 2007, records were sorted in order of ID, date received and type of test (antibody or RNA). Records that satisfied the following criteria were identified.

a) A positive HCV antibody test result in 2007 where the earlier record did not match ID (new diagnosis). For a patient with multiple positive HCV antibody results, the record indicating a new diagnosis was taken as the earliest result.
b) A positive HCV antibody test in 2007 where the next earliest record matched ID and had a HCV antibody negative result (new diagnosis). If the HCV antibody negative test was within the preceding 24 months this was deemed a newly acquired case (Box, definition 1a).
c) A positive HCV RNA test in 2007 where the next earliest record matched ID and had a HCV antibody negative result (new diagnosis). If the antibody negative test was within the preceding 24 months this was deemed a newly acquired case (Box, definition 1b).

This process resulted in the identification of 2,207 cases of newly diagnosed HCV and 22 newly acquired cases of HCV, including 2 cases fulfilling definition 1b.

The 96 inconclusive test results were compared with newly diagnosed cases to check for combinations of test results that would invalidate the diagnosis, such as an inconclusive test prior to the positive test (with no earlier negative test); none was found. Comparison of age, gender and test dates of the newly acquired cases from each laboratory found no matches, therefore newly acquired cases identified by each laboratory were deemed unique.

The 22 newly acquired HCV cases identified from the laboratory datasets were also compared with those identified by NSW Health in 2007. Cases were linked via name code (first two letters of first and last names, Laboratory A only), postcode, gender, date of birth or age, and date of diagnosis. Earlier records were searched where cases did not match 2007 NSW Health data. In this way, 1 case was found to have been first notified to NSW Health in 1999 and was removed from the dataset. Analyses were conducted using SAS statistical software version 9.2 (SAS Institute Inc. Cary, North Carolina), STATA 10.0 (College Station, Texas) and Microsoft Excel 2007.

Results

Of the 2,206 newly diagnosed HCV cases from the laboratory datasets, 21 newly acquired cases were identified. While 17 (81%) of these cases had also been identified by NSW Health as newly diagnosed, 4 (19%) had not been previously identified (Table 1). Only 3 (14%) of our laboratory-identified

Box:

Definition of newly acquired HCV

- Laboratory definitive evidence, or
- Laboratory suggestive evidence and clinical evidence.

Laboratory definitive evidence

- Detection of anti-HCV antibody from a person who has had a negative anti-HCV antibody test recorded within the past 24 months (Definition 1a), or
- Detection of HCV by nucleic acid testing from a person who has had a negative anti-HCV antibody test result within the past 24 months (Definition 1b), or
- Detection of anti-HCV antibodies in a child aged 18 to 24 months (Definition 1c), or
- Detection of HCV by nucleic acid testing, in a child aged 1 to 24 months (Definition 1d).

Laboratory suggestive evidence

- Detection of anti-HCV antibody or HCV by nucleic acid testing.

Clinical evidence

Clinical hepatitis within the past 24 months (where other causes of acute hepatitis have been excluded) defined as:

- Jaundice, or
- Bilirubin in urine, or
- Alanine transaminase (ALT) seven times upper normal limit.

newly acquired HCV cases were identified as such by NSW Health: the remainder were categorised as newly diagnosed or were unidentified. Our examination of laboratory data from one private and one public laboratory increased the overall proportion of newly acquired HCV cases identified in 2007 in New South Wales from 1.6% (65/4,192) to 2.0% (83/4,196).

Table 2 illustrates the age and gender breakdown of laboratory– and NSW Health-identified newly acquired cases. Laboratory-identified cases (median 34 years) were older than NSW Health cases (median 28 years) although this was not statistically significant. No cases aged less than 20 years were found in the laboratory data. Laboratory-identified cases were significantly more likely than NSW Health-identified cases to be aged 30 or more years (71% vs 45%; c^2 $P = 0.033$). A recent review of the Victorian HCV surveillance system also found that laboratory follow-up identified an older sub-set of cases,[11] thus restricting follow-up to a particular age group may not be advised.

Discussion

The two laboratories selected for this trial accounted for up to half of all newly diagnosed HCV cases in

Table 1: Laboratory-identified newly acquired hepatitis C virus cases matched and unmatched to NSW Health-identified cases

	Laboratory A (n)	Laboratory B (n)	Combined n	Combined %
Laboratory-identified newly acquired HCV cases	9	12	21	100
Matched to NSW Health records				
Newly acquired	1	2	3	14
Newly diagnosed	6	8	14	67
Unmatched to NSW Health records	2	2	4	19

Table 2: Laboratory and NSW Health-identified newly acquired hepatitis C virus cases, by age and gender

	Laboratories		NSW Health	
Median age	34 years		28 years	
Age	n	%	n	%
< 30 years	6	29	36	55
≥30 years	15	71	29	45
Total	21	100	65	100
Male	15	71	36	55

New South Wales in 2007. Of the 2,206 laboratory-identified newly diagnosed cases, a total of 21 newly acquired cases of HCV infection were identified.

The comparison of these 21 cases with the 65 newly acquired HCV cases identified by NSW Health revealed that 18 had not been previously identified by NSW Health as newly acquired, bringing the total number of newly acquired HCV cases for 2007 to 83. This increased the proportion of newly acquired HCV cases for 2007 from 1.6% (65/4,192) to 2.0% (83/4,196) and increased the total yield by 28%. Laboratory follow-up also detected a significantly higher proportion of cases aged 30 years or over, probably owing to older people being less itinerant than younger people and more likely to have repeat pathology tests performed through the same laboratory. This suggests that laboratory follow-up could potentially contribute to more fully characterising newly acquired HCV cases in New South Wales.

This report has a number of limitations. Past testing history could only be reported by the laboratories where previous tests were performed by the same laboratory. No RNA data were available from Laboratory B, therefore cases fulfilling definition 1b could not be identified. For Laboratory A, HCV antibody negative records prior to 2007 were unavailable for HCV antibody negative patients in 2007. This meant newly acquired cases fulfilling definition 1b where the antibody test was conducted in 2005–2006 could not be included.

The last two limitations each potentially reduce the number of newly acquired HCV cases otherwise identifiable. 'Newly diagnosed' means only within each laboratory and thus the number identified is an overestimate; some patients may have previously tested positive through another laboratory. Name variations such as omission of middle names and alternative spellings were not taken into account when matching tests as a standard surveillance system is unlikely to be able to account for this level of detail. It is unknown if any of the 2,206 cases identified in this study as newly diagnosed in 2007 were notified by another laboratory prior to diagnosis by the laboratories in this study. This would affect the date and possibly the year of diagnosis. However, as most laboratory-identified newly acquired HCV cases identified were matched to NSW Health newly diagnosed cases (17/21), and a search for earlier notification dates for the 4 unmatched cases was unsuccessful, this appears unlikely for newly acquired cases identified here. The NDD is expected to be complete for new HCV diagnoses.

While our results indicate 4 of the 21 (19%) newly acquired HCV cases identified from the laboratory datasets were not recorded in the NDD, it is possible these cases were diagnosed at another laboratory where name code and/or date of birth were recorded differently or erroneously. Data linkage between the two laboratories was not possible and is not currently performed by NSW Health. However our results suggest that linkage between two or three large laboratories could potentially significantly increase identification of newly acquired HCV.

Implications

The 28% increase in the number of newly acquired HCV cases identified by this study indicates that, used in conjunction with current reporting mechanisms, laboratory data have the potential to increase both the proportion and the yield of newly acquired cases in New South Wales without requiring contact with multiple doctors for test results. Linkage to laboratory data may also be likely to enhance the identification of newly acquired cases among older people. HCV notifications data for 2008 reveal that the number of newly acquired cases identified in New South Wales dropped to 24/3,916 (0.6%)[14] as one area health service ceased follow up of all HCV notifications. If this trend continues, laboratory data could be even more important in improving the surveillance system for newly acquired HCV cases in New South Wales. A more comprehensive prospective study should be undertaken to determine the likely extent of improvements.

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Surveillance summaries

Supplementary report: surveillance of adverse events following immunisation among children aged less than 7 years in Australia, 1 January to 30 June 2010

Deepika Mahajan, Rob Menzies, Jane Cook, Kristine Macartney, Peter McIntyre

Introduction

This report summarises national passive surveillance data reported to the Therapeutic Goods Administration (TGA) to 31 August 2010 for adverse events following immunisation (AEFI) reported for children aged < 7 years who received vaccines between 1 January and 30 June 2010. The report includes all vaccines administered to children in this age group with a focus on the vaccines included in the funded National Immunisation Program (NIP) schedule.[1]

There were two recent changes to vaccine funding and availability that had impacts on the AEFI surveillance data presented in this report:

i. annual vaccination with seasonal trivalent influenza vaccine (TIV with 3 strains: A/H1N1, A/H3N2 and B), which was introduced as funded under the NIP for at-risk children for the first time in 2010;[2] and
ii. the introduction of pandemic H1N1 (pH1N1) 2009 influenza vaccine (Panvax), which was rolled out across Australia from 30 September 2009 for people aged ≥ 10 years and for children aged 6 months to 10 years from December 2009.[3]

A number of other important changes to vaccine funding and availability also occurred in 2009. The Northern Territory started using a new 10-valent pneumococcal conjugate vaccine (Synflorix®) from October 2009 at 2, 4, 6 and 12 months of age instead of the 3-dose 7-valent pneumococcal conjugate vaccine (Prevenar®). At the same time they also ceased using the 23-valent pneumococcal polysaccharide booster for Indigenous children at 18 months of age. By late 2009, all states and territories had switched to the hexavalent DTPa-IPV-Hib-HepB (Infanrix hexa®) vaccine for all children at 2, 4 and 6 months of age,[4–6] due to an international shortage of *Haemophilus influenzae* type b (Hib) (PedvaxHib® [monovalent] and Comvax® [Hib-HepB]) vaccines.[7]

This report also summarises AEFI reports that were collected and contributed to detection of an unexpected increase in adverse events predominantly fever and febrile convulsions, in young children following the use of one type of 2010 seasonal influenza vaccine (Fluvax® or Fluvax junior® CSL Biotherapies) leading to the suspension of use of seasonal influenza vaccine in children aged 5 years or under.[8]

Methods

Case definition and coding

The data reported here are provisional only. It is important to note that an AEFI is defined as a medical event that is temporally, but not necessarily causally, associated with immunisation. Readers are referred to previous reports for a description of the national AEFI passive surveillance system,[9] methods used to analyse the data and information regarding limitations and interpretation of the data.[9–12] Often, several vaccines and reaction codes are listed in an AEFI record so the number of vaccines and reaction codes will exceed the total number of AEFI records. For the purpose of this report, an AEFI is defined as 'serious' if there is a code of life-threatening severity or an outcome code indicating recovery with sequelae, admission to hospital, prolongation of hospitalisation, or death.

Denominator calculations from Australian Childhood Immunisation Register

Average annual population-based AEFI reporting rates were calculated using mid-2009 population estimates. Reporting rates per 100,000 doses were calculated for 10 vaccines on the NIP schedule for which reliable dosing data were available from the Australian Childhood Immunisation Register (ACIR), for children aged from 2 months to < 7 years. In addition to those vaccines, national dose estimates for pH1N1 and seasonal influenza vaccines were calculated using an adjustment for the known under-reporting of these vaccines to the

ACIR in 2010. Adjustments were based on estimated under-reporting of 55% for seasonal influenza vaccine (personal communication, Gary Dowse, Communicable Disease Control Directorate, Western Australian Department of Health) and 45% for pH1N1 influenza vaccine from March to June 2010 (personal communication, Dr Christine Selvey, Queensland Health). In addition, dose estimates for January to February 2010 for pH1N1 influenza vaccine were taken from an Australian Institute of Health and Welfare survey.[13] Estimates for different seasonal influenza vaccines were not calculated, as ACIR reporting issues differed for some vaccine brands. It should be noted that for influenza vaccines, there is a considerable level of uncertainty around the dose number estimates and the rates per dose should be regarded as only approximate estimates.

Severity score, type of reaction and vaccine type

Severity classification followed previous guidelines.[9] Given the large number of individual vaccines reported, detailed information and type of reaction are not presented for all vaccine types. However, more detailed data for reports following influenza vaccines, whether given alone or with other vaccines are provided.

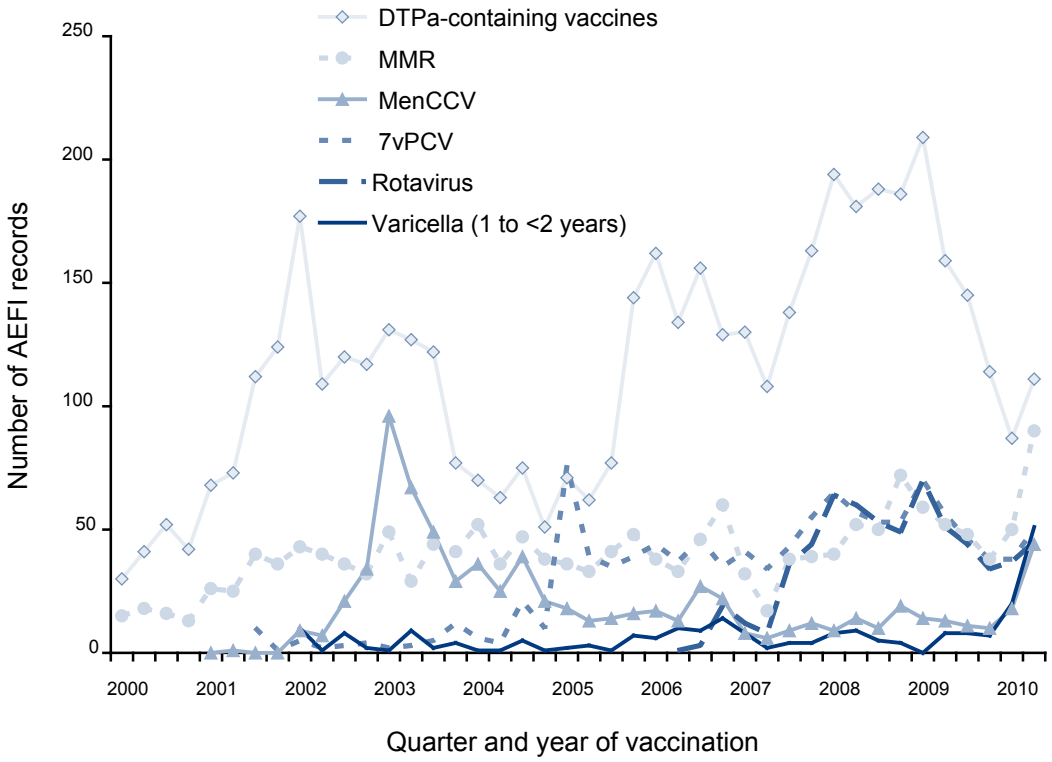
Results

There was a total of 2,225 AEFI records (annualised reporting rate of 227.1 per 100,000 population) for children aged < 7 years for vaccines administered in the first 6 months of 2010. This was a more than 7-fold increase from 305 records (32.0 per 100,000 population) for the corresponding period in 2009.

Overall number of AEFI reports increased for all vaccine types (Figure 1) and jurisdictions in the second quarter of 2010 compared with the first quarter of 2010. Sixty-seven per cent of AEFI (n = 1,498) were reported to the TGA via states and territories and the remainder were reported direct to the TGA: 17% (n = 379) by members of the public, 13% (n = 295) by doctors/health professionals, 2% (n = 44) by hospitals, and 0.4% (n = 8) by pharmaceutical companies. The number of AEFI reports by members of the public was much greater in the first 6 months of 2010 than in 2009 (n = 6, 2%), with 95% of reports by members of the public relating to seasonal influenza and pH1N1 influenza vaccines.

Seventeen per cent (n = 370) of the reported AEFI were for children aged < 1 year, 27% (n = 615) were for those aged 1 to < 2 years, and 56% (n = 1,240) were for the 2 to < 7 year age group. The male to female ratio was 1.1:1, similar to previous years.[10,14]

Figure 1: Reports of adverse events following immunisation for vaccines other than influenza for individuals aged < 7 years, ADRS database, 2000 to 30 June 2010, by quarter of vaccination



Of the 2,225 records, accurate total population dose numbers administered from ACIR were available for 365 records associated with 10 NIP vaccines (Table 1). The overall AEFI rate for those reports was 19.5 per 100,000 doses, with 2.1 per 100,000 classified as 'serious', slightly higher than for the same period in 2009 (overall 14.7 per 100,000 doses and serious 1.8 per 100,000 doses). By age group, reporting rates per 100,000 doses were higher in 2010 for children aged 1 to < 2 years (27.8 vs 7.1) and 2 to < 7 years (42.2 vs 38.3), but not for children aged < 1 year (9.8 vs 11.2). The increase in AEFI reporting rates for children 1 to < 2 and 2 to < 7 are probably related to the fact that these vaccines were often co-administered with either seasonal influenza or pH1N1 influenza vaccine during 2010 (153 of the 365 records had one of the influenza vaccines co-administered with other NIP vaccines) for which increased reporting occurred. There were increases in the reporting rates of some individual vaccines in 2010 (Table 1), which were again probably related to these vaccines being co-administered with the influenza vaccines in 2010.

Adverse events following immunisation reports not including influenza vaccines

There were only 212 AEFI records for children aged < 7 years in the first 6 months of 2010 (reporting rate of 21.7 per 100,000 population), which did not include influenza vaccines or co-administration of influenza with other vaccines, which is less than in 2009 (n = 301; reporting rate 31.0 per 100,000 population).

Table 1: Reporting rates of adverse events following immunisation per 100,000 vaccine doses for vaccines other than influenza vaccines, children aged < 7 years, ADRS database, 1 January to 30 June 2010

	AEFI records* (n)	Vaccine doses† (n)	Reporting rate per 100,000 doses‡		
			Jan–June 2010	Jan–June 2009	Jan–June 2008
Vaccine (NIP vaccines)§					
DTPa-containing vaccines	193	516,284	37.4	39.7	45.1
DTPa-IPV	103	132,037	78.0	76.1	77.6
Pentavalent (DTPa-IPV-HepB)	3	163	1,840.5	46.5	11.2
Hexavalent (DTPa-IPV-HepB-Hib)	86	384,084	22.4	25.9	24.4
Haemophilus influenzae type b	64	129,404	49.5	17.7	17.4
Haemophilus influenzae type b-hepatitis B	1	542	184.5	83.7	40.6
Measles-mumps-rubella	140	265,008	52.8	35.3	33.1
Meningococcal C conjugate	58	136,630	42.5	18.7	15.6
Pneumococcal conjugate	83	380,005	21.8	27.2	28.4
Varicella	76	131,218	57.9	7.5	16.4
Rotavirus	81	314,588	25.7	33.3	37.2
Age group					
< 1 year	107	1,094,919	9.8	11.2	12.8
1 to < 2 years	136	489,499	27.8	7.1	7.4
2 to < 7 years	122	289,261	42.2	38.3	50.5
AEFI category§					
Total	365	1,873,679	19.5	14.7	16.9
'Certain' or 'probable' causality rating	23	1,873,679	1.2	2.2	5.1
'Serious' outcome	40	1,873,679	2.1	1.8	2.3

* Number of adverse events following immunisation (AEFI) records in which the vaccine was coded as 'suspected' of involvement in the reported adverse event and the vaccination was administered between 1 January and 30 June 2010. More than 1 vaccine may be coded as 'suspected' if several were administered at the same time.

† Number of vaccine doses recorded on the Australian Childhood Immunisation Register (ACIR) and administered between 1 January and 30 June 2010.

‡ The estimated AEFI reporting rate per 100,000 vaccine doses recorded on the ACIR.

§ Records where at least one of the 10 vaccines shown in the table was suspected of involvement in the reported adverse event. AEFI category includes all records (i.e. total), those assigned 'certain' or 'probable' causality ratings, and those with outcomes defined as 'serious'. Causality ratings were assigned using the criteria described previously.[9] A 'serious' outcome is defined as recovery with sequelae, hospitalisation, life-threatening event or death. Of the 365 reports contained in this table, 153 reports also included some influenza vaccine co-administered with other National Immunisation Program vaccines.

Nine per cent (n = 20) of the 212 AEFI records had outcomes defined as 'serious' (i.e. recovery with sequelae, hospitalisation, life threatening event or death). Serious AEFI reported included pyrexia (n = 6), diarrhoea (n = 6), injection site reactions (n = 5), intussusception (n = 4), allergic reactions (n = 3), seizure (n = 1) and death (n = 1). There were no reports of life-threatening events and 18 children were admitted to hospital.

One death was recorded as temporally associated with the receipt of vaccines other than influenza vaccine. It was an infant following receipt of hexavalent, 7vPCV and rotavirus vaccines; who had an apnoeic episode and sudden infant death syndrome 5 days post vaccination. The death was investigated by the TGA and while temporally related to vaccination was not classified as causally related to vaccination.

Adverse events following immunisation reports including influenza vaccines

Of the 2,225 records, 1,695 (76%) included receipt of seasonal influenza vaccine and 318 (14%) included pH1N1 influenza vaccine (Table 2, Figure 2), which was a sharp contrast to the first 6 months of 2008 and 2009, where there were only 18 and 20 reports, respectively, for influenza vaccines.

2010 seasonal influenza vaccine

The majority of the reports for seasonal influenza vaccine were for either Fluvax® or Fluvax junior® (CSL Biotherapies) (n = 1,388; 82%) while another 16% did not specify the vaccine brand and were coded only as influenza vaccine (Figure 2). There were 32 adverse event reports following vaccination with Influvac® (Solvay Biosciences), eight with Vaxigrip® (Sanofi Pasteur) and four with Fluarix®(GlaxoSmithKline).

The reporting rate for seasonal influenza vaccine, using a dose administered estimate adjusted for under-reporting to the ACIR, was 3,939 per 100,000 doses, approximately 150-fold higher than the average for non-influenza vaccines. Seventy-one per cent were reported via states and territories. A large proportion of the total number of reports for seasonal influenza vaccine were from Western Australia (41%); compared with only 22% of reports for other vaccine types from that State. The increased proportion of reports from Western Australia is consistent with the greater use of seasonal influenza vaccine in that State due to their vaccine program for children < 5 years of age.[15] Eighty-two per cent of the reports following seasonal influenza vaccine were defined as 'non-serious', 6% (n = 94) were defined as 'serious' and an additional 12% were not categorised because of the non-availability of data on hospitalisation and outcome.

Figure 2: Reports of adverse events following immunisation for influenza-related vaccines for individuals aged < 7 years, ADRS database, 2007 to 30 June 2010, by year of vaccination

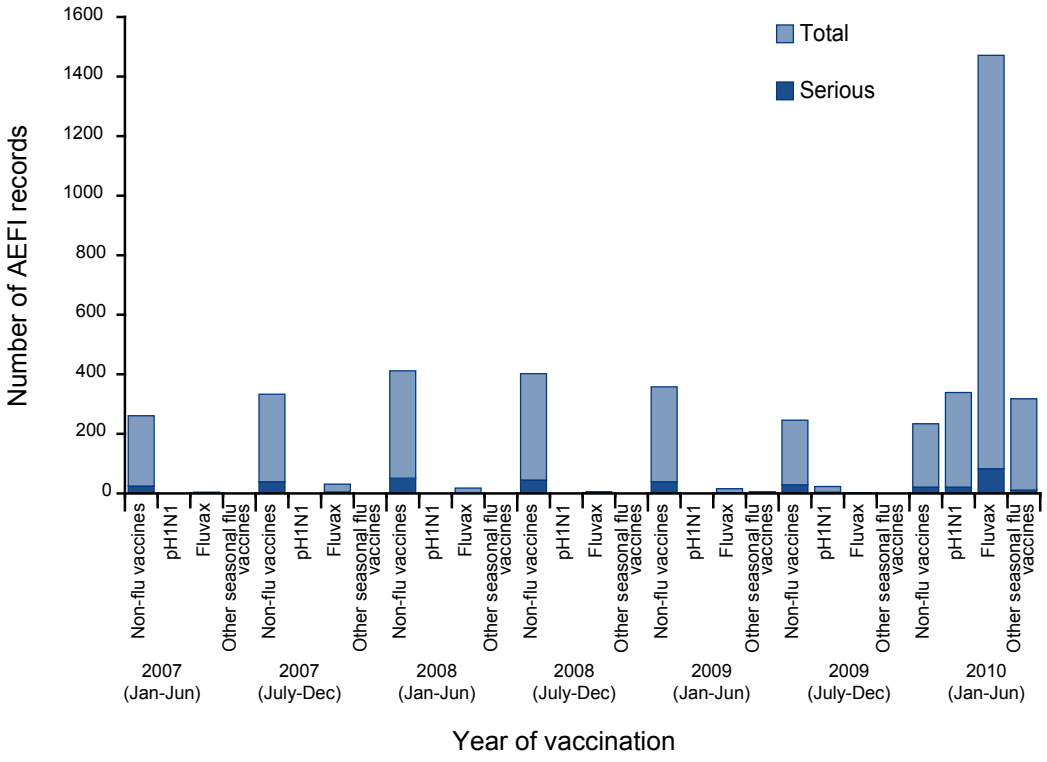


Table 2: Reporting rates of adverse events following immunisation (AEFI) per 100,000 vaccine doses for influenza-containing vaccines, children aged < 7 years, ADRS database, 1 January to 30 June 2010

	AEFI records* (n)	Vaccine doses† (n)	Reporting rate per 100,000 doses‡ Jan–June 2010
Age group			
<1 year			
Trivalent seasonal influenza vaccine	244	3,745	6,515.0
Fluvax or Fluvax junior only	204	na	na
Other seasonal influenza vaccines§	4	na	na
Influenza vaccines not specified	36	na	na
pH1N1 influenza vaccine	53	36,154	155.2
1 to <2 years			
Trivalent seasonal influenza vaccine	461	7,908	5,830.0
Fluvaxor Fluvax junior only	385	na	na
Other seasonal influenza vaccines§	14	na	na
Influenza vaccines not specified	62	na	na
pH1N1 influenza vaccine	109	73,325	148.7
2 to <7 years			
Trivalent seasonal influenza vaccine	990	30,729	3,222.0
Fluvax or Fluvax junior only	799	na	na
Other seasonal influenza vaccines§	26	na	na
Influenza vaccines not specified	165	na	na
pH1N1 influenza vaccine	156	299,710	52.1
AEFI category‖			
Total			
Trivalent seasonal influenza vaccine	1,695	42,384	3,999.0
Fluvax or Fluvax junior only	1,388	na	na
Other seasonal influenza vaccines§	44	na	na
Influenza vaccines not specified	263	na	na
pH1N1 influenza vaccine	318	407,189	78.1
'Certain' or 'probable' causality rating			
Trivalent seasonal influenza vaccine	21	42,384	49.5
Fluvax or Fluvax junior only	12	na	na
Other seasonal influenza vaccines§	0	na	na
Influenza vaccines not specified	0	na	na
pH1N1 influenza vaccine	9	407,189	2.2
'Serious' outcome			
Trivalent seasonal influenza vaccine	94	42,384	221.8
Fluvax or Fluvax junior only	83	na	na
Other seasonal influenza vaccines§	3	na	na
Influenza vaccines not specified	8	na	na
pH1N1 influenza vaccine	21	407,189	5.2

* The number of adverse events following immunisation (AEFI) records in which the vaccine was coded as 'suspected' of involvement in the reported adverse event and the vaccination was administered between 1 January and 30 June 2010. More than 1 vaccine may be coded as 'suspected' if several were administered at the same time.

† Number of vaccine doses were estimated using an adjustment for the known under-reporting of these vaccines to the Australian Childhood Immunisation Register (ACIR) in 2010 as explained in the text.

‡ The estimated AEFI reporting rate per 100,000 vaccine doses. Should be regarded as approximate only, due to uncertainty about the level of under-reporting to the ACIR.

§ Includes all non CSL influenza vaccine types where vaccine type is specified.

‖ Records where the vaccine shown in the table was suspected of involvement in the reported adverse event. AEFI category includes all records (i.e. total), those assigned 'certain' or 'probable' causality ratings, and those with outcomes defined as 'serious'. Causality ratings were assigned using the criteria described previously.[9] A 'serious' outcome is defined as recovery with sequelae, hospitalisation, life-threatening event or death.

The spectrum of reactions for seasonal influenza vaccine was similar to that for non-influenza vaccines (Table 3), with the exception of a substantially higher proportion with fever (94% compared to 54% for non-influenza vaccines), allergic reaction (54% vs 29%) and malaise (15% vs 10%). A higher proportion of reports following seasonal influenza vaccine came from members of the public (14% compared with 5% for non-influenza vaccines).

One death was recorded as temporally associated with the receipt of seasonal influenza vaccine. A 2-year-old child was found deceased on the morning following receipt of seasonal influenza vaccine (Fluvax junior®, CSL Biotherapies). A post-mortem determined that a causal relationship between vaccination and death was not established.

Monovalent pH1N1 vaccine

There were 318 reports following pH1N1 influenza vaccine, a rate of 78 per 100,000 doses using a dose administered estimate adjusted for under-reporting to the ACIR. This was more than 4-fold greater than the reporting rate for non-influenza vaccines. Thirty-four per cent of the cases were reported by Queensland, 25% by New South Wales and 12% by Western Australia. Forty-four per cent were reported by members of the public (compared with 14% for TIV and 5% for non-influenza) and 40% by states

Table 3: Reaction categories of interest* mentioned in records of adverse events following immunisation, ADRS database, 2009

Reaction category*	Fluvax ± other vaccines	pH1N1 ± other vaccines	Other seasonal influenza ± other vaccines	Influenza vaccine not specified ± other vaccines
Fever	1,309	249	34	248
Allergic reaction†	753	170	15	136
Malaise	214	49	2	32
Nerve/psychological	203	42	7	30
Headache	112	19	2	20
Seizure	105	37	1	9
Tremor	84	21	1	15
Abnormal crying	85	20	1	9
Nausea	34	6	2	15
Myalgia	41	8	0	8
Abdominal pain	33	7	0	14
Injection site reaction	42	18	0	5
Pain	28	7	0	8
Rash‡	33	19	0	4
Dizziness	9	4	0	1
Vision impaired	4	0	0	2
Weakness	5	0	0	1
Syncope	4	6	0	0
Arthralgia	4	0	0	0
Anaphylaxis	2	1	0	0
Death	1	0	0	0
HHE§	1	3	0	0
Total‖	1,388	318	44	263

* Reaction categories were created for the adverse events following immunisation (AEFI) of interest listed and defined in *The Australian Immunisation Handbook,* 9th edition, pp 58–65 and 360–363.[1]

† Allergic reaction includes skin reactions including pruritus, urticaria, periorbital oedema, facial oedema, erythema multiforme, etc, and/or gastrointestinal (e.g. diarrhoea, vomiting) symptoms and signs (excludes other abdominal symptoms like abdominal pain, nausea, flatulence, abnormal faeces, haematochesia, etc.). Does not include anaphylaxis.

‡ Includes general terms of rash but does not include pruritic rash.

§ Hypotonic-hyporesponsive episode.

‖ Total number of AEFI records analysed, not the total in each column as categories are not mutually exclusive and an AEFI record may list more than 1 reaction term.

and territories. Only 7% of the reports following pH1N1 influenza vaccine were coded as serious compared with 11% following non-influenza vaccines. Distribution of reaction types for pH1N1 influenza vaccine is presented in Table 3. The spectrum of reactions for the pH1N1 influenza vaccine was similar to that for seasonal influenza vaccine, showing higher rates than non-influenza vaccines for fever (78% vs 54%), allergic reaction (53% vs 29%) and malaise (15% vs 10%).

Discussion

There was a more than 7-fold increase in both the number of AEFI report and population-based reporting rates for specific AEFI in the first 6 months of 2010. This was due to the substantial increase in reporting of adverse events following vaccination with the two available influenza vaccines: seasonal trivalent influenza vaccines and the pandemic (pH1N1) influenza vaccine. Forty-one per cent of the adverse events following seasonal influenza vaccine were reported by Western Australia. Western Australia has had a funded state-based seasonal influenza vaccination program for all children aged 6 months to < 5 years since 2008, and in 2010 Western Australia had the highest number of children aged 6 months to < 5 years vaccinated with CSL's 2010 seasonal trivalent influenza vaccine. This State was the first to detect the safety signal related to the 2010 seasonal influenza vaccine of substantially higher rates of fever and febrile convulsions.[8,16,17]

AEFI reporting rates for non-influenza vaccines were slightly higher in the first 6 months of 2010 compared with previous years (Table 1). However, after excluding reports where influenza vaccines were co-administered, the rate was 30% lower in the first 6 months of 2010 compared with 2009. The majority of these (68%) were reported by states and territories and only 3% were reported by members of the public. Decreases were seen in all jurisdictions and in all age groups.

The large number of reports from members of the public in comparison with previous years indicates a high level of public interest in both the pH1N1 and seasonal influenza vaccines. This was for at least two reasons: 1) the pandemic H1N1 influenza vaccination program used strategies to encourage consumers and health professionals to report adverse events to the TGA to monitor the vaccine safety[18] and 2) the public announcement of the suspension of the use of seasonal influenza vaccine in April 2010 due to high rates of fever.

The safety of pH1N1 influenza vaccines has been examined closely both nationally and internationally. The World Health Organization reports that approximately 30 different pH1N1 vaccines have been developed using a range of methods.[19] All progressed successfully through vaccine trials to licensure, showing satisfactory safety profiles. However, these clinical trials were not powered to detect rare adverse vaccine reactions, which occur with a frequency of less than 1 in 1,000. In general, the safety profile, including that for the Australian vaccine, have been similar to that of other vaccines, with predominantly mild transient events and a small number of serious reactions reported.[20,21]

The investigation that occurred when increased reports of AEFI in young children following 2010 seasonal TIV (predominantly fever and febrile convulsions) has been described in detail in two reports from the TGA.[16,17] The number of AEFI reports presented here may vary slightly from published TGA reports[16–18,21] due to differences in age groups and time frames for reporting.

Epidemiological studies determined that the 2010 seasonal influenza vaccine produced by CSL Biotherapies (Fluvax® and Fluvax junior®) was associated with unexpected and excessively increased rate of febrile convulsions within 24 hours of administration (incidence rate 500–700 febrile convulsions per 100,000 doses). The use of the 2010 seasonal TIV in children < 5 years of age was suspended in April 2010,[8] after which reporting of AEFI from seasonal influenza vaccine were observed to decline. The recommendation to resume the use of seasonal influenza vaccine in children aged 6 months to 5 years (using brands other than Fluvax® and Fluvax junior®) was subsequently made in August.[22]

Conclusion

In the first half of 2010, the overall AEFI reporting rate per 100,000 doses for children aged < 7 years was much higher than for the same period in 2009. This was entirely attributable to reports arising from the 2010 seasonal trivalent influenza vaccine as well as the pH1N1 influenza vaccine. There was a substantial increase in the number of reports received from members of the public compared with 2009. The majority of AEFI reports were of mild, transient and well-recognised vaccine side-effects, however, the occurrence of an increased number of serious AEFI, predominantly febrile convulsions and fever post 2010 seasonal TIV from CSL Biotherapies led to the suspension of use of that vaccine in children < 5 years of age.

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Quarterly reports

OzFoodNet quarterly report, 1 October to 31 December 2010

The OzFoodNet Working Group

Introduction

The Australian Government Department of Health and Ageing established the OzFoodNet network in 2000 to collaborate nationally to investigate foodborne disease. OzFoodNet conducts studies on the burden of illness and coordinates national investigations into outbreaks of foodborne disease. This quarterly report documents investigations of outbreaks of gastrointestinal illness and clusters of disease potentially related to food, occurring in Australia from 1 October to 31 December 2010.

Data were received from OzFoodNet epidemiologists in all Australian states and territories. The data in this report are provisional and subject to change, as the results of outbreak investigations can take months to finalise.

During the 4th quarter of 2010, OzFoodNet sites reported 346 outbreaks of enteric illness, including those transmitted by contaminated food. Outbreaks of gastroenteritis are often not reported to health agencies or the reports may be delayed, meaning that these figures under-represent the true burden of enteric illness. In total, these outbreaks affected 5,329 people, of whom 153 were hospitalised. There were 20 deaths reported during these outbreaks. The majority of outbreaks (71%, n = 246) were due to person-to-person transmission (Table 1).

Table 1: Mode of transmission for outbreaks and clusters of gastrointestinal illness reported by OzFoodNet, 1 October to 31 December 2010

Transmission mode	Number of outbreaks and clusters	Per cent of total
Foodborne and suspected foodborne	37	11
Person-to-person	246	71
Unknown (*Salmonella* cluster)	9	3
Unknown (Other pathogen cluster)	4	1
Unknown	49	14
Animal-to-person	1	
Total	346	100

Foodborne and suspected foodborne disease outbreaks

There were 37 outbreaks during this quarter where consumption of contaminated food was suspected or confirmed as the primary mode of transmission (Table 2). These outbreaks affected 437 people and resulted in 31 hospitalisations. There were 4 reported deaths during these outbreaks. This compares with 35 outbreaks for the 3rd quarter of 2010[1] and a 5-year mean of 34 outbreaks for the 4th quarter between 2005 and 2009.

Salmonella was the aetiological agent for 12 outbreaks during this quarter, with *S.* Typhimurium the infecting serotype for all 12 outbreaks (Table 2.)

Of the remaining 25 outbreaks, five were due to foodborne toxins, including 2 ciguatera fish poisonings, and 1 outbreak each of *Clostridium perfringens, Bacillus cereus* and *Staphylococcus aureus.* There were 4 outbreaks due to *Campylobacter* infection and two due to norovirus. Fourteen outbreaks were of unknown aetiology.

Seventeen outbreaks (46% of foodborne outbreaks) reported in this quarter were associated with food prepared in restaurants, 5 (14%) outbreaks in aged care facilities, 4 (11%) in other institutions, 4 (11%) in takeaways, and 3 (8%) in private residences. Single outbreaks (3% each) were associated with foods prepared in a range of other or unknown settings.

To investigate these outbreaks, sites conducted 4 cohort studies and collected descriptive case series data for 28 investigations. In 5 outbreaks, no individual case data were collected. As evidence for the implicated food vehicle, investigators collected microbiological evidence in 2 outbreaks and analytical epidemiological evidence in 2 outbreaks, and both descriptive and analytical evidence for 2 outbreaks. Descriptive evidence only was obtained in 31 outbreaks.

The following jurisdictional summaries describe key outbreaks and public health actions that occurred in this quarter.

Australian Capital Territory

There was 1 reported outbreak of foodborne or suspected foodborne disease reported during the quarter.

Public health staff identified a link between cases and a local takeaway salad bar after investigating a higher than expected number of *Salmonella* infections, including hospitalised cases. Investigators identified 47 outbreak cases, 41 of which were laboratory confirmed cases of *S.* Typhimurium phage type 170 infection (multi-locus variable number of tandem repeat analysis [MLVA] 3-9-7-13-523 or MLVA 3-9-7-14-523). Cases reported eating a variety of salads purchased from the salad bar, including tandoori chicken, chicken and avocado, chicken pesto, roast pumpkin fetta and baby spinach, green beans and asparagus, and Caesar and Greek salads. *Salmonella* was isolated from 2 food samples; a chicken pesto salad and a Greek salad. Environmental swabs yielded *Klebsiella oxytoca* and *Enterobacter cloacae* and an environmental health inspection identified issues including inadequate cleaning and disinfection, and ready-to-eat foods being held at inappropriate temperatures. Cross contamination of ready-to-eat foods from an unknown source was the suspected cause.

New South Wales

There were 12 reported outbreaks of foodborne or suspected foodborne illness during the quarter.

The NSW Department of Health (NSW Health) identified an outbreak of *S.* Typhimurium MLVA 3-9-7-13-523 following the investigation of a cluster of infections with this subtype in the Parramatta area. Nine people reported eating at the same bakery, seven of whom ate Vietnamese pork rolls. A further 6 probable outbreak cases, who had also eaten Vietnamese pork rolls from the premises, were identified amongst family members and friends of 2 confirmed cases. All food and environmental samples taken by the New South Wales Food Authority (NSWFA) were negative for *Salmonella,* except a drag swab of a dry food bin that was positive for *S.* Typhimurium MLVA 3-9-7-13-523, but staff were observed to have undertaken some cleaning and disinfecting prior to sampling. An improvement notice was issued in regard to observed hygiene issues. No further *S.* Typhimurium MLVA type 3-9-7-13-523 infections were identified in the Parramatta area after the investigation.

Two of four people became ill with nausea, diarrhoea and vomiting 24 hours after eating salmon patties, salad and vegetables at a sports club bistro, and 1 person was hospitalised for 6 days. Blood cultures confirmed both cases as having *S.* Typhimurium MLVA 3-9-8-13-523 infection. The NSWFA identified minor hygiene issues and issued an improvement notice. The salmon patties were prepared 2–3 times per week with egg used to bind the pattie mixture, held in a cool room, and then deep-fried for about 3–4 minutes prior to serving. No leftover patties were available for testing.

Two cases with *S.* Typhimurium MLVA 3-14-8-14-523 infection were found to have attended the same 2-day conference in a hotel. About 37 people attended the 1st day and 25 attended the 2nd day of the conference. Active case-finding identified a further 2 people who had gastroenteritis-like symptoms but did not see a doctor, and there were reports of 3 others who were not interviewed. Interviewed cases (4/7) reported eating the lunch provided on both days, which included egg, chicken and salad sandwiches. The NSWFA and the local council environmental health officer found no issues during the inspection of the kitchen. No food samples were available and no environmental samples were taken.

Eight people became ill after eating foods from the same bakery. All members of a group of 4 people reported abdominal cramps, diarrhoea, nausea and vomiting 36 hours after eating Vietnamese pork rolls. The NSWFA was subsequently notified of illness amongst 2 other families after eating at the same bakery. No clinical samples were taken. The NSWFA collected food and environmental samples, which were all positive for *S.* Typhimurium phage type 170/108. A prohibition order was issued based on these results and the premises remains closed until it passes a further inspection and a warning letter was issued to the proprietors about the unsafe use of raw egg products.

All 6 people from one group developed abdominal cramps, diarrhoea, nausea, vomiting and headache 12 hours after consuming a range of takeaway dishes from a Thai restaurant. This was the only common meal amongst the group and the dishes were not shared. Investigators were unable to determine the likely source of the reported illness and there was no evidence of any particular food storage or handling practice that could have contributed to the illness. The cause of the outbreak remains unknown.

A group of 3 friends all developed vomiting, nausea and diarrhoea 7½–13 hours after eating at a Thai restaurant. The group had shared several meals together at different restaurants on the same weekend. A NSWFA inspection found the Thai restaurant to be visually clean. No common pathogens were detected in samples of food taken from the restaurant or from leftovers held by the complain-

ant. An improvement notice was issued for some defects in kitchen practices, including temperature abuse. The aetiology remains unknown.

All 5 members of a group became ill with nausea, abdominal cramps, vomiting and diarrhoea 12 hours after eating at a pizza restaurant. The group was a mix of work mates and friends and this was the only meal they shared. No stool samples were provided and the aetiology remains unknown.

All members of a group of 3 people developed vomiting, fever, abdominal cramps and diarrhoea 4 hours after eating lunch at a Japanese restaurant. None of the cases sought medical advice and no stool samples were collected. The aetiology of the outbreak remains unknown. Records of previous council inspections showed only low level risks, and the NSWFA requested that the council bring forward their next inspection.

Five people from a group of 10 developed diarrhoea, fever, abdominal cramps and vomiting after eating a range of seafood and desserts at a seafood restaurant. An improvement notice was issued to address some hygiene issues but no food or environmental samples were obtained. The aetiology of the outbreak remains unknown.

The first of 2 outbreaks associated with one commercial food premises occurred at a wedding held in late October. A retrospective cohort study was conducted involving all people who had attended the wedding and reception (n = 113). Twenty-eight people (25%) were interviewed or completed an online questionnaire, with 5 people fitting the outbreak case definition. No specimens were collected. No exposures were found to have a significant association with illness, but risk ratios for a lamb dish and a chicken Kiev dish could not be calculated as all cases had consumed both dishes. The NSWFA conducted an environmental investigation of the premises following the outbreak and guest complaints that undercooked chicken was served, and made minor recommendations about kitchen practices and equipment. The aetiology of the outbreak remains unknown.

The 2nd outbreak associated with the same premises as reported above was investigated in December. Six people reported symptoms of gastroenteritis following a school formal attended by 150 people. No specimens were collected and no formal epidemiological investigation was conducted, but of the 5 cases interviewed, all had consumed a chicken Kiev dish. A NSWFA decision on whether to take further action against the implicated premises is pending.

Five of 25 residents of a single unit in a care facility for people with disabilities became unwell with diarrhoeal illness, with onset times of illness clustered over a short time period. Onset times and symptom profiles were suggestive of illness due to *C. perfringens*, but no stool specimens were collected and the aetiology remains unknown. Meals were prepared off-site but plated and heated within each unit of the care facility and it is suspected factors contributing to bacterial growth occurred in the kitchen of the unit associated with the outbreak.

Northern Territory

There were 3 reported outbreaks of foodborne or suspected foodborne illness during this quarter.

An outbreak of gastrointestinal illness was investigated amongst 13 detainees in a detention centre. Investigations were hampered by a lack of access to the facility, no direct contact or communication with the cases and needing to communicate through an interpreter. The detention centre had health professionals on staff and food histories were obtained only from cases. The short duration of illness and symptom profile were suggestive of a foodborne toxin. An inspection of food preparation facilities and practices revealed that rice was prepared, stored and reheated for use on the following day. Kitchen staff were advised to cook in smaller batches for each meal (e.g. lunch and dinner) and not to re-use leftover rice. No stool specimens or food samples were collected and the aetiological agent and food vehicle remains unknown.

An outbreak of gastrointestinal illness was investigated amongst 12 colleagues following a work luncheon. Investigations revealed that the foods for the luncheon were a mix of home-prepared meals from the participants and some from commercial premises. A cohort study revealed that there had been an index case that was sick prior to the function. Norovirus was detected in 2 of 3 stool samples. No specific food vehicle could be identified, and cross contamination of a range of items served at the luncheon was thought possible.

An outbreak of gastrointestinal illness was reported amongst 45 of 60 people following a wedding reception. Investigations were difficult due to the remote location of the premises, reluctance of cases to participate and provide information (only 7 people could be interviewed) and lack of co-operation from management of the premises. An inspection of the premises was conducted and numerous issues relating to general maintenance (including unsealed floors, poor condition of shelving) and a lack of hand washing facilities in the kitchen were identified. No stool samples were submitted and no food samples obtained. No particular vehicle could be identified, but a viral agent was suspected to be responsible for this outbreak.

Queensland

There were 7 reported outbreaks of foodborne or suspected foodborne illness during this quarter.

Four cases of suspected ciguatera fish poisoning were reported following the consumption of a passionfruit trout in November that was privately caught from Lodestone Reef located off the coast of Townsville. Illness was reported between 8 and 22 hours after consuming the fish with symptoms including numbness or tingling of skin, diarrhoea and reversed temperature sensation.

Two separate cases of suspected ciguatera fish poisoning were notified on consecutive days. The first was an 18-year-old female and the second a 22-year-old male. Both cases reported the consumption of Mangrove Jack fish that had been purchased from the same local seafood retailer. Symptoms reported included reversed temperature sensation, vomiting, diarrhoea as well as numbness and tingling of extremities between 2.5 and 6 hours after consuming the fish. The source of the fish to the retailer could not be determined.

An outbreak of *S. aureus* was reported among 3 adults and 3 children who had consumed milkshakes or thick shakes made using soft serve ice cream from the same food outlet on a single day in December. All 6 cases presented to the same emergency department and 1 person required overnight hospitalisation. An environmental health inspection identified that a soft serve ice cream machine had malfunctioned over the weekend prior to the outbreak. It subsequently failed to undergo its automatic heat sterilisation process and there had been inadequate cleaning and disinfection of the internal parts of the machine after it was repaired. Heavy growth of *S. aureus* was detected in 1 sample of vomitus and 4 stool samples. *Staphylococcus* enterotoxin was detected in the vomitus sample only. *S. aureus* (10^2–10^3 org/g) and *Staphylococcus* enterotoxin were detected in soft serve ice cream samples taken from the machine. The organism was also detected in a mixing bucket that was used for preparing the ice cream prior to being added into the machine and this was considered to have been the likely source of the contamination.

An outbreak of gastrointestinal illness was reported amongst 17 inmates at a correctional centre in October. One case was hospitalised. Symptoms included diarrhoea, abdominal cramps, vomiting and fever. *C. jejuni* was detected in 8 faecal specimens. No food vehicle or source of infection was identified.

An outbreak of *C. jejuni* was investigated among residents and staff of an aged care facility in November, with 23 cases over a 6-day period. Four cases were laboratory confirmed. One elderly case was hospitalised due to severe dehydration and subsequently died. No leftover food was available for testing and no source of infection was identified.

Four cases of *S.* Typhimurium MLVA 1-13-3-21-3 infection amongst 4 children aged between 2 and 9 years from 2 related families were investigated in December. Cases had consumed home-prepared banana flavoured milkshakes made using raw egg on during a visit to a relative and became ill the following day. Two cases were subsequently hospitalised overnight. No samples were available for testing and the source of the eggs could not be determined.

Nine cases of gastrointestinal illness were reported among several guests who had attended a dinner function for 400 people held at a restaurant in October. Cases were aged between 38 and 73 years with symptoms of diarrhoea, vomiting and abdominal cramps. Onset of symptoms were between 4 and 12 hours (median 8 hours) after consuming a smorgasbord meal. One stool specimen was collected during the investigation but no pathogens were detected and no food samples were available for testing. An environmental investigation suggested that the number of people attending the dinner had exceeded expectations and capacity and that temperature abuse of food may have occurred. No source of illness was identified.

South Australia

There was 1 reported outbreak of foodborne or suspected foodborne illness during this quarter.

An outbreak of norovirus was investigated amongst people who ate lunch at a restaurant in early December, with 1 confirmed case and a further 18 probable cases. Illness was characterised by vomiting and diarrhoea with a rapid onset and lasting 24–48 hours. Three cases required hospitalisation. An environmental health officer inspected the premises and found that one of the food handlers was symptomatic while preparing the lunch. An education session on food hygiene was conducted at the establishment.

Tasmania

There were 2 reported outbreaks of foodborne or suspected foodborne illness during this quarter.

An outbreak of *S.* Typhimurium 170 was linked to the consumption of restaurant prepared ice cream containing raw eggs. In initial interviews, 38 of 70 people reported symptoms, of which 19 cases were confirmed. At least 2 people were hospitalised. Approximately 400 diners ate at the restaurant over

the 5-day period when the contaminated product was served, and many consumed ice cream. A sample of the ice cream tested positive for *S.* Typhimurium 170. The restaurant sourced eggs from several suppliers during the period of interest and detailed trace back was not possible.

A cluster of short-lived illnesses was reported by 6 of 25 people after an evening function at a restaurant. No stool samples were collected to identify the pathogen and an inspection of the food premises found no obvious flaws.

Victoria

There were 10 reported outbreaks of foodborne or suspected foodborne illness during this quarter.

An outbreak of diarrhoea affecting residents of an aged care facility was notified to the Communicable Disease Prevention and Control Unit (CDPCU) in October. Onsets for cases ranged over 19 days and the outbreak affected 19 residents, which included 9 residents who were counted twice as they experienced a second episode of diarrhoea a median of 5 days after the first episode. Eight faecal specimens were collected and three were positive for *C. perfringens* enterotoxin. Investigators were unable to identify a particular food source for this outbreak.

An outbreak of *S.* Typhimurium 9 was detected through routine surveillance in October. Initially, investigations showed that 4 cases were associated with the same café in the southern suburbs of Melbourne. All cases had eaten a meal of eggs Benedict for breakfast on the same morning in September 2010. Active case finding identified an additional 6 cases (3 confirmed *S.* Typhimurium 9) who had also eaten eggs Benedict at the café on the same morning. Eggs sampled from the restaurant were negative for *Salmonella* and no *Salmonella* was detected in any of the environmental or egg samples taken during the investigation of the egg farm that was found through trace back to have supplied the eggs. Despite negative results, this outbreak was almost certainly caused by the use of raw eggs in a minimally cooked food (Hollandaise sauce). The department recommends the use of pasteurised eggs in foods that will be eaten uncooked (e.g. aioli, mayonnaise) or minimally cooked.

Active case finding amongst cases of *S.* Typhimurium 9 was conducted in October to determine if they were associated with the point source outbreak at the café mentioned above. Two cases were subsequently linked to a Vietnamese restaurant. Cases ate at the restaurant on consecutive days with their onsets 1 day apart, and both cases had eaten the same dish – 'broken rice'. The premises received eggs through the same distributor as the café in outbreak above.

Through active case finding in October, a second cluster of 4 cases of *S.* Typhimurium 9 was linked to another Asian restaurant in the same geographical area as the Vietnamese restaurant reported above. Three cases ate on the same day with the 4th case unsure of the exact date, however, onsets of illness were all within 5 days of each other. Cases ate a variety of foods indicating there may have been sporadic contamination of several foods.

An outbreak of diarrhoea affecting 10 residents of an aged care facility was notified to the CDPCU in October. Onsets ranged over a 12-day period, with the majority clustered over a 3-day period. One of 4 faecal specimens collected was positive for *C. perfringens* enterotoxin. Investigation revealed inadequate temperature recording and temporary staffing at the time of the outbreak. A food source could not be identified in this outbreak.

In October, the CDPCU was notified of an outbreak of gastroenteritis amongst a group of people who attended a work function at a hotel restaurant. Of 92 attendees, 47 were interviewed and 24 reported illness consisting of diarrhoea (96%) and abdominal pain (88%). Only 13% reported vomiting. The median incubation period was 11.5 hours and 2 faecal specimens were culture positive for *B. cereus*. A cohort study revealed associations between several foods and illness, with beef curry (relative risk [RR] 4.0; 95% confidence interval [CI] 1.6–9.8) and steamed rice (RR 3.0; 95% CI 1.4–6.7) most strongly associated with illness, accounting for 83% and 79% of cases respectively. Rice is often associated with *B. cereus* food poisoning however, identification of the rice as the likely source is likely to have been confounded by the beef curry. No deficiencies in food preparation for the implicated dishes were identified on investigation.

An outbreak of diarrhoea, affecting 10 residents and 1 staff member of an aged care facility, was notified to the CDPCU in late October. Onsets ranged over a 4-day period and *C. perfringens* enterotoxin was detected in 2 faecal specimens. A source for the outbreak could not be determined.

In November, the local council notified the CDPCU of an outbreak of gastroenteritis amongst a group of 12 people who had eaten together at a restaurant. Three members of the group reported symptoms of predominantly diarrhoea and abdominal pain, with a median duration of 5 days. Two cases reported blood in their stools and stool specimens for both cases were culture positive for *C. jejuni*. The restaurant was unlikely to have been the source of illness

due to the short period of time between meals at the restaurant and onset (7 hours). The cases worked together and the 2 confirmed cases had shared other food together during their incubation period and it was suspected that there was another unidentified source for their illness.

An outbreak of gastroenteritis amongst residents of an aged care facility was notified to the CDPCU in early December. Eighteen residents became ill with onsets over a 6-day period and six were subsequently confirmed with *S.* Typhimurium 170. Although illness appeared to be mild in the majority of residents (median duration of 2 days), 3 residents died during the outbreak period. The source of this outbreak could not be determined.

In December, the CDPCU was notified of an outbreak of diarrhoea affecting 5 of 6 residents of a Supported Services Accommodation. Two faecal specimens were collected and both were culture positive for *C. jejuni*. Investigations founds that chicken meals were served on the 2 consecutive days prior to the onset of illness in the index case and undercooking or cross-contamination of chicken were considered possible causes of this outbreak. Council provided advice and education to the food handlers at the facility regarding food preparation, cleaning and sanitising of food surfaces and equipment and personal hygiene.

Western Australia

There was 1 reported outbreak of foodborne or suspected foodborne illness during this quarter.

In December, 10 cases of gastroenteritis were associated with a café, with six confirmed as *S.* Typhimurium pulsed-field gel electrophoresis (PFGE) type 0011 infections. One case was a chef at the café who became ill 2 days prior to the earliest onsets amongst patrons, but did not work at the café after becoming ill. Exposures amongst patrons were spread across a 5-day period, with 3 cases becoming ill the day after eating eggs Benedict and 1 case becoming ill the day after eating a roast beef sandwich. The remaining 5 cases ate a buffet lunch supplied by the café, with foods including beetroot dip, Turkish bread, roast vegetable salad and potato salad. The café occasionally purchased eggs from a store supplied by a single producer who was implicated in a number of egg-associated outbreaks of *S.* Typhimurium PFGE type 0011 in the State in 2009 and 2010. However, there was no conclusive evidence that the café used this brand at the time of the outbreak. Swabs and samples from the café were negative for *Salmonella* and the source and mechanism of contamination leading to this outbreak could not be determined.

Multi-jurisdictional outbreak investigations

No multi-jurisdictional outbreaks were investigated during the quarter.

Cluster investigations

During the 4th quarter of 2010, OzFoodNet sites investigated a number of clusters with five due to *S.* Typhimurium, three due to other *Salmonella* serotypes, three due to *Campylobacter* and one cluster of hepatitis A.

A multi-jurisdictional cluster of the unusual serotype *S.* Seftenberg was investigated amongst travellers who had returned from Dubai in September and October. Follow-up of cases was initially prompted by a consumer level recall of a brand of tahini that was imported from Egypt. The recall was conducted in October in Victoria and was due to contamination with *S.* Seftenberg. The cluster included 4 confirmed cases (2 from Queensland and 2 from Victoria) and 2 additional cases of gastrointestinal illness amongst travellers who participated in four-wheel drive safaris. A number of cases reported eating foods at a 'desert banquet' whilst on the safaris, where a range of typical Middle Eastern dishes were served. Australia informed Dubai about the cases under the *International Health Regulations* (2005) via a national focal point, to enable any local investigation and follow-up with the tour company.

Comments

The number of foodborne outbreaks reported during the quarter (n = 37) was similar to the average number during the same quarter over the past 5 years (n = 34) and similar to the number reported during the previous quarter (n = 35).[1]

Egg-associated outbreaks of foodborne illness, particularly in food service settings, but also in private homes, are of continuing concern this quarter. In 8% (3/37) of foodborne outbreaks, eggs were confirmed as being the source of infection and in another 14% (5/37) of outbreaks, eggs or foods commonly known to contain raw egg (such as Vietnamese pork rolls) were the suspected source. The food service sector should be actively encouraged to use pasteurised eggs in any dish that contains raw or lightly cooked eggs (such as Hollandaise sauce). The outbreak of salmonellosis associated with banana milkshakes containing raw egg in Queensland highlights the risks of preparing and serving such foods in the home, particularly for children.

Four outbreaks (2 from Victoria and 2 from Queensland) and 3 clusters (2 in South Australia and 1 in New South Wales) of *Campylobacter* were

investigated during the quarter. This increase in investigations coincided with increased notifications of *Campylobacter* in Victoria, with 2,218 cases notified during the 4th quarter compared with 1,660 notifications received during the same period last year and a 39% increase on the 5-year mean for this quarter (1,351 notifications). Lesser increases in the number of notifications for the quarter were reported in all other states and territories except the Northern Territory, and in New South Wales, where *Campylobacter* infection is not notifiable.

Increased notifications of *Salmonella* infection continued nationally during the quarter, with a 29% increase during the 4th quarter of 2010 (2,904) compared with the 5-year mean for the same quarter (2,252). OzFoodNet is investigating this increase. The proportion of *S.* Typhimurium that can be phage typed in a timely way has decreased in recent years in some jurisdictions. While jurisdictions have adopted other subtyping methods for outbreak and cluster detection, which work extremely well locally (e.g. PFGE in Western Australia and MLVA in Queensland and New South Wales), results cannot be easily compared across jurisdictions and this decreases the ability to detect multi-jurisdictional outbreaks of *S.* Typhimurium in a timely fashion.

In December 2010, OzFoodNet conducted a structured audit of the May 2010 multi-jurisdictional investigation into an outbreak of listeriosis associated with melons. Outcomes of the debrief included that OzFoodNet was to engage with the incident response working group of the National Food Incident Response Protocol (NFIRP), which details the response to national food incidents by agencies responsible for food safety. Through this group, OzFoodNet will help to refine and clarify the weight of evidence required to activate or escalate NFIRP. In addition, it was noted that the National Surveillance Plan for human cases of *Listeria monocytogenes* infection, which commenced in January 2010, may have facilitated earlier detection of the outbreak. It was recommended that the surveillance plan be formally evaluated at the end of 2 years of surveillance (December 2011). Structured audits continue to be a vital part of identifying and resolving issues that may have arisen during outbreak investigation, and provide a useful way of refining protocols and practices for future investigations.

A limitation of the outbreak data provided by OzFoodNet sites for this report was the potential for variation in categorisation of the features of outbreaks depending on investigator interpretation and circumstances. OzFoodNet continues to standardise and improve practices through its Outbreak Register Working Group and workshops. The National Surveillance Committee, OzFoodNet and the Public Health Laboratory Network continue to work toward harmonisation of *Salmonella* typing practices between jurisdictions, which will aid the identification of outbreaks. Changes in the incidence of foodborne outbreaks should be interpreted with caution due to the small numbers each quarter.

Acknowledgements

OzFoodNet thanks the investigators in the public health units and state and territory departments of health, as well as public health laboratories and local government environmental health officers who provided data used in this report. We would particularly like to thank reference laboratories for conducting sub-typing of *Salmonella, Listeria* and other enteric pathogens for their continuing work and for their advice during the quarter.

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References

1. OzFoodNet Working Group. OzFoodNet Quarterly Report, 1 July to 330 September 2010. *Commun Dis Intell* 2010;34(4):450–458.

Table 2: Outbreaks of foodborne disease reported by OzFoodNet sites, 1 October to 31 December 2010 (n = 37)

State	Month of outbreak	Setting prepared	Agent responsible	Number affected	Hospitalised	Evidence	Responsible vehicle
ACT	October	Takeaway	*Salmonella* Typhimurium phage type 170	47	5	M	Chicken pesto salad, Greek salad
NSW	October	Takeaway	*Salmonella* Typhimurium 170	15	3	A	Suspected Vietnamese pork rolls
	October	Restaurant	Unknown	5	0	D	Unknown
	October	Takeaway	Unknown	6	0	D	Unknown
	November	Restaurant	*Salmonella* Typhimurium	2	1	D	Suspected salmon patties made with egg
	November	Commercial caterer	*Salmonella* Typhimurium	7	2	D	Unknown
	November	Restaurant	Unknown	6	0	D	Unknown
	November	Restaurant	Unknown	3	0	D	Unknown
	December	Takeaway	Suspected *Salmonella* Typhimurium	8	Unknown	AM	Suspected Vietnamese pork rolls
	December	Institution - other	Unknown	5	0	D	Unknown
	December	Restaurant	Unknown	5	0	D	Unknown
	December	Restaurant	Unknown	3	0	D	Unknown
	December	Restaurant	Unknown	5	0	D	Unknown
NT	September	Institution – other	Unknown	13	0	D	Unknown
	November	Private residence	Norovirus	9	0	D	Unknown
	November	Restaurant	Unknown	45	0	D	Unknown
Qld	October	Institution – other	*Campylobacter jejuni*	17	1	D	Unknown
	October	Restaurant	Unknown	9	0	D	Unknown
	November	Primary produce	Ciguatera fish poisoning	4	0	D	Passionfruit trout
	November	Aged care	*Campylobacter jejuni*	23	1	D	Unknown
	December	Private residence	*Salmonella* Typhimurium	4	2	D	Banana milkshake containing raw egg
	December	Private residence	Ciguatera fish poisoning	2	0	D	Mangrove Jack fish
	December	National franchised fast food	*Staphylococcus aureus*	6	1	M	Milkshake
SA	December	Restaurant	Norovirus	19	3	D	Unknown
Tas	December	Restaurant	*Salmonella* Typhimurium 170	38	2	AM	Homemade ice cream containing raw egg
	December	Restaurant	Unknown	6	Unknown	D	Unknown

Table 2 *continued*: Outbreaks of foodborne disease reported by OzFoodNet sites, 1 October to 31 December 2010 (n = 37)

State	Month of outbreak	Setting prepared	Agent responsible	Number affected	Hospitalised	Evidence	Responsible vehicle
Vic	October	Restaurant	*Bacillus cereus*	24	0	A	Beef curry and rice
	October	Restaurant	*Salmonella* Typhimurium 9	2	2	D	Broken rice
	October	Restaurant	*Salmonella* Typhimurium 9	10	1	D	Hollandaise sauce
	October	Aged care	*Clostridium perfringens*	28	0	D	Unknown
	October	Aged care	Unknown	11	0	D	Unknown
	October	Aged care	Unknown	10	0	D	Unknown
	October	Restaurant	*Salmonella* Typhimurium 9	4	2	D	Various dishes
	November	Unknown	*Campylobacter jejuni*	3	0	D	Unknown
	December	Institution – other	*Campylobacter jejuni*	5	0	D	Chicken meal
	December	Aged care	*Salmonella* Typhimurium 170	18	3	D	Unknown
WA	December	Restaurant	*Salmonella* Typhimurium 170	10	2	D	Unknown

A Analytical epidemiological association between illness and one or more foods.

D Descriptive evidence implicating the suspected vehicle or suggesting foodborne transmission.

M Microbiological confirmation of agent in the suspected vehicle and cases.

Erratum

The OzFoodNet quarterly report, 1 July to 30 September 2010, published in the last issue of CDI, contained an error in Table 2. The table incorrectly stated that 36 persons were hospitalised due to a foodborne disease outbreak. The number hospitalised was actually unknown. The correct portion of the table is republished below.

Table 2: Outbreaks of foodborne disease reported, 1 July to 30 September 2010 (n = 34), by OzFoodNet sites

State or territory	Month of outbreak	Setting prepared	Agent responsible	Number affected	Hospitalised	Evidence	Responsible vehicles
Tas	July	Aged care facility	Norovirus	76	Unknown	A	Suspected pork sausage and gravy meal

Communicable diseases surveillance

Tables

National Notifiable Diseases Surveillance System

A summary of diseases currently being reported by each jurisdiction is provided in Table 1. There were 60,526 notifications to the National Notifiable Diseases Surveillance System (NNDSS) with a notification received date between 1 October and 31 December 2010 (Table 2). The notification rate of diseases per 100,000 population for each state or territory is presented in Table 3.

The date of diagnosis is the onset date or where the date of onset was not known, the earliest of the specimen collection date, the notification date, or the notification receive date. As considerable time may have elapsed between the onset and diagnosis dates for hepatitis B (unspecified), hepatitis C (unspecified) and tuberculosis, the earliest of specimen date, health professional notification date or public health unit notification receive date was used for these conditions.

Totals comprise data from all states and territories. Cumulative figures are subject to retrospective revision so there may be discrepancies between the number of new notifications and the increment in the cumulative figure from the previous period.

Table 1: Reporting of notifiable diseases by jurisdiction

Disease	Data received from:
Bloodborne diseases	
Hepatitis (NEC)	All jurisdictions
Hepatitis B (newly acquired)	All jurisdictions
Hepatitis B (unspecified)	All jurisdictions
Hepatitis C (newly acquired)	All jurisdictions except Queensland
Hepatitis C (unspecified)	All jurisdictions
Hepatitis D	All jurisdictions
Gastrointestinal diseases	
Botulism	All jurisdictions
Campylobacteriosis	All jurisdictions except New South Wales
Cryptosporidiosis	All jurisdictions
Haemolytic uraemic syndrome	All jurisdictions
Hepatitis A	All jurisdictions
Hepatitis E	All jurisdictions
Listeriosis	All jurisdictions
STEC, VTEC	All jurisdictions
Salmonellosis	All jurisdictions
Shigellosis	All jurisdictions
Typhoid	All jurisdictions
Quarantinable diseases	
Cholera	All jurisdictions
Highly pathogenic avian influenza in humans	All jurisdictions
Plague	All jurisdictions
Rabies	All jurisdictions
Severe acute respiratory syndrome	All jurisdictions
Smallpox	All jurisdictions
Viral haemorrhagic fever	All jurisdictions
Yellow fever	All jurisdictions

Table 1 *continued*: Reporting of notifiable diseases by jurisdiction

Disease	Data received from:
Sexually transmissible infections	
Chlamydial infection	All jurisdictions
Donovanosis	All jurisdictions
Gonococcal infection	All jurisdictions
Syphilis < 2 years duration	All jurisdictions
Syphilis > 2 years or unspecified duration	All jurisdictions except South Australia
Syphilis - congenital	All jurisdictions
Vaccine preventable diseases	
Diphtheria	All jurisdictions
Haemophilus influenzae type b	All jurisdictions
Influenza (laboratory confirmed)	All jurisdictions
Measles	All jurisdictions
Mumps	All jurisdictions
Pertussis	All jurisdictions
Pneumococcal disease (invasive)	All jurisdictions
Poliomyelitis	All jurisdictions
Rubella	All jurisdictions
Rubella - congenital	All jurisdictions
Tetanus	All jurisdictions
Varicella zoster (chickenpox)	All jurisdictions except New South Wales
Varicella zoster (shingles)	All jurisdictions except New South Wales
Varicella zoster (unspecified)	All jurisdictions except New South Wales
Vectorborne diseases	
Arbovirus infection (NEC)	All jurisdictions
Barmah Forest virus infection	All jurisdictions
Dengue virus infection	All jurisdictions
Japanese encephalitis virus infection	All jurisdictions
Kunjin virus infection	All jurisdictions
Malaria	All jurisdictions
Murray Valley encephalitis virus infection	All jurisdictions
Ross River virus infection	All jurisdictions
Zoonoses	
Anthrax	All jurisdictions
Australian bat lyssavirus	All jurisdictions
Brucellosis	All jurisdictions
Leptospirosis	All jurisdictions
Lyssavirus (NEC)	All jurisdictions
Ornithosis	All jurisdictions
Q fever	All jurisdictions
Tularaemia	All jurisdictions
Other bacterial infections	
Legionellosis	All jurisdictions
Leprosy	All jurisdictions
Meningococcal infection	All jurisdictions
Tuberculosis	All jurisdictions

Table 2: Notifications of diseases received by state and territory health authorities, 1 October to 31 December 2010, by date of diagnosis

Disease	State or territory								Total 4th quarter 2010[†]	Total 3rd quarter 2010	Total 4th quarter 2009	Last 5 years mean 4th quarter	Ratio	Year to date 2010	Last 5 years YTD mean
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA							
Bloodborne diseases															
Hepatitis (NEC)	0	0	0	0	0	0	0	0	0	0	0	0.2	0.0	0	0.4
Hepatitis B (newly acquired)*	0	5	0	8	5	0	16	6	40	65	63	64.6	0.6	251	267.0
Hepatitis B (unspecified)[†]	22	629	37	238	90	13	462	268	1,759	2,045	1,804	1,626.4	1.1	7,821	6,594.6
Hepatitis C (newly acquired)*[‡]	2	6	0	NN	6	5	30	24	73	72	111	97.2	0.8	334	388.2
Hepatitis C (unspecified)[†]	51	946	73	665	107	59	594	253	2,748	3,036	2,638	2,818.0	1.0	11,851	11,551.4
Hepatitis D	0	0	0	8	0	0	1	0	9	13	7	6.2	1.5	33	34.4
Gastrointestinal diseases															
Botulism	0	0	0	0	0	0	0	0	0	0	0	0.2	0.0	0	1.2
Campylobacteriosis[§]	157	NN	43	1,249	687	189	2,264	740	5,329	4,198	4,210	4,473.8	1.2	16,991	16,086.4
Cryptosporidiosis	3	76	28	48	11	19	83	39	307	248	346	567.4	0.5	1,480	3,169.8
Haemolytic uraemic syndrome	0	0	0	0	0	0	1	0	1	3	3	7.6	0.1	8	19.4
Hepatitis A	2	19	0	11	0	0	8	11	51	63	241	89.8	0.6	262	322.6
Hepatitis E	0	1	0	2	0	0	2	0	5	10	1	4.0	1.3	37	29.8
Listeriosis	1	7	0	3	0	2	3	1	17	8	20	15.4	1.1	72	64.8
STEC, VTEC[‖]	0	1	0	4	6	0	4	3	18	17	52	35.4	0.5	81	104.6
Salmonellosis	82	891	129	679	175	62	559	333	2,910	2,064	2,411	2,254.6	1.3	11,916	8,806.6
Shigellosis	4	35	17	10	15	2	16	29	128	133	118	153.4	0.8	548	665.2
Typhoid	0	5	0	2	2	0	6	1	16	18	34	20.2	0.8	95	88.0
Quarantinable diseases															
Cholera	0	0	0	0	0	0	0	0	0	3	0	1.8	0.0	3	3.6
Highly pathogenic avian influenza in humans	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Plague	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Rabies	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Severe acute respiratory syndrome	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Smallpox	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Viral haemorrhagic fever	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Yellow fever	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0

Table 2 *continued*: Notifications of diseases received by state and territory health authorities, 1 October to 31 December 2010, by date of diagnosis

Disease	State or territory								Total 4th quarter 2010†	Total 3rd quarter 2010	Total 4th quarter 2009	Last 5 years mean 4th quarter	Ratio	Year to date 2010	Last 5 years YTD mean
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA							
Sexually transmissible infections															
Chlamydial infection¶,**	296	4,454	628	4,611	1,026	447	3,691	3,684	18,837	19,486	15,344	12,827.0	1.5	78,302	52,392.6
Donovanosis	0	0	0	0	0	0	0	0	0	1	0	0.8	0.0	1	5.0
Gonococcal infection**	18	534	493	651	122	3	413	475	2,709	2,615	1,925	1,894.8	1.4	10,512	8,004.4
Syphilis < 2 years duration**	2	82	11	40	2	2	60	36	235	242	285	267.6	0.9	1,060	1,114.8
Syphilis > 2 years or unspecified duration**	5	32	22	30	NDP	0	139	17	245	320	333	329.6	0.7	1,192	1,343.2
Syphilis – congenital**	0	0	0	0	0	0	0	0	0	1	1	2.2	0.0	3	9.2
Vaccine preventable diseases															
Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Haemophilus influenzae type b	0	0	1	2	0	0	3	2	8	8	1	4.8	1.7	25	20.0
Influenza (laboratory confirmed)	17	500	229	1,377	1,085	27	348	651	4,234	7,947	827	790.2	5.4	13,414	17,297.6
Measles	0	0	0	5	1	0	3	1	10	30	10	4.8	2.1	69	63.4
Mumps	0	9	1	8	0	0	3	8	29	17	30	89.4	0.3	89	310.2
Pertussis	482	4,935	98	2,810	2,659	93	2,867	624	14,568	9,026	7,031	3,964.0	3.7	34,407	13,971.0
Pneumococcal disease (invasive)	5	114	20	66	39	14	84	55	397	616	336	329.0	1.2	1,653	1,575.4
Poliomyelitis	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.3
Rubella	0	2	0	0	0	0	1	0	3	12	3	6.2	0.5	42	37.0
Rubella – congenital	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.6
Tetanus	0	0	0	0	0	0	0	0	0	1	0	0.8	0.0	2	3.0
Varicella zoster (chickenpox)††	0	NN	29	101	110	5	124	135	504	500	421	605.8	0.8	1,588	1,692.0
Varicella zoster (shingles)††	12	NN	34	14	301	56	144	232	793	626	632	543.5	1.5	2,868	1,919.3
Varicella zoster (unspecified)††	20	NN	0	1,019	80	17	549	247	1,932	1,824	1,820	1,324.8	1.5	7,182	4,788.5
Vectorborne diseases															
Arbovirus infection (NEC)	0	1	7	7	0	0	5	0	20	4	3	4.6	4.3	30	27.4
Barmah Forest virus infection	1	70	15	227	24	0	48	17	402	222	293	351.6	1.1	1,461	1,745.4
Dengue virus infection	2	73	9	99	11	3	47	206	450	313	108	96.0	4.7	1,171	538.4
Japanese encephalitis virus infection	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.2
Kunjin virus infection‡‡	0	0	0	0	0	0	0	0	0	0	0	0.2	0.0	2	1.6
Malaria	0	31	2	47	0	3	8	17	108	105	94	130.2	0.8	409	642.0
Murray Valley encephalitis virus infection‡‡	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	1.8
Ross River virus infection	2	141	71	344	192	3	64	179	996	570	794	839.8	1.2	5,089	4,539.8

Table 2 *continued*: Notifications of diseases received by state and territory health authorities, 1 October to 31 December 2010, by date of diagnosis

Disease	State or territory								Total 4th quarter 2010†	Total 3rd quarter 2010	Total 4th quarter 2009	Last 5 years mean 4th quarter	Ratio	Year to date 2010	Last 5 years YTD mean
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA							
Zoonoses															
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	1	0.4
Australian bat lyssavirus	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Brucellosis	0	0	0	5	0	0	0	0	5	7	9	12.2	0.4	22	41.6
Leptospirosis	0	2	0	20	1	1	6	2	32	30	14	20.6	1.6	125	128.0
Lyssavirus (NEC)	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Ornithosis	0	4	0	0	0	0	21	1	26	8	13	25.8	1.0	53	117.8
Q fever	0	23	1	38	1	0	2	1	66	71	70	92.6	0.7	306	379.6
Tularaemia	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Other bacterial infections															
Legionellosis	0	20	1	7	11	4	9	28	80	66	63	82.4	1.0	288	312.0
Leprosy	0	0	0	0	0	0	1	1	2	2	2	2.0	1.0	9	9.0
Meningococcal infection§§	0	20	1	11	6	2	11	5	56	72	63	75.2	0.7	229	312.0
Tuberculosis	3	101	11	55	18	2	148	30	368	338	443	355.8	1.0	1,283	1,195.2
Total	1,189	13,769	2,011	14,521	6,793	1,033	12,848	8,362	60,526	57,076	43,027			214,670	

* Newly acquired hepatitis includes cases where the infection was determined to be acquired within 24 months prior to diagnosis.

† Unspecified hepatitis and syphilis includes cases where the duration of infection could not be determined.

‡ In Queensland, includes incident hepatitis cases.

§ Not reported for New South Wales where it is only notifiable as 'foodborne disease' or 'gastroenteritis in an institution'.

|| Infections with Shiga-like toxin (verotoxin) producing *Escherichia coli* (STEC/VTEC).

¶ Includes *Chlamydia trachomatis* identified from cervical, rectal, urine, urethral, throat and eye samples, except for South Australia, which reports only genital tract specimens. The Northern Territory and Western Australia, exclude ocular infections.

** In the national case definitions for chlamydial, gonococcal and syphilis infections the mode of transmission cannot be inferred from the site of infection. Transmission (especially in children) may be by a non-sexual mode (e.g. perinatal infections, epidemic gonococcal conjunctivitis).

†† Ratio of current quarter total to the mean of last 5 years for the same quarter. Ratios for varicella zoster (chickenpox), varicella zoster (shingles) and varicella zoster (unspecified) are based on 3 years of data.

‡‡ In the Australian Capital Territory, Murray Valley encephalitis virus infection and Kunjin virus infection are combined under Murray Valley encephalitis virus infection.

§§ Only invasive meningococcal disease is nationally notifiable. However, New South Wales, the Australian Capital Territory and South Australia also report conjunctival cases.

NN Not notifiable.

NEC Not elsewhere classified.

NDP No data provided.

Table 3: Notification rates of diseases, 1 October to 31 December 2010, by state or territory. (Annualised rate per 100,000 population)

Disease	State or territory								Aust
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	
Bloodborne diseases									
Hepatitis (NEC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hepatitis B (newly acquired)*	0.0	0.3	0.0	0.7	1.2	0.0	1.2	1.1	0.7
Hepatitis B (unspecified)†	25.1	35.4	65.8	21.6	22.2	10.3	34.0	47.9	32.2
Hepatitis C (newly acquired)*,‡	2.3	0.3	0.0	NN	1.5	4.0	2.2	4.3	1.7
Hepatitis C (unspecified)†	58.1	53.3	129.9	60.4	26.4	47.0	43.8	45.2	50.2
Hepatitis D	0.0	0.0	0.0	0.7	0.0	0.0	0.1	0.0	0.2
Gastrointestinal diseases									
Botulism	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Campylobacteriosis§	178.8	NN	76.5	113.4	169.3	150.4	166.8	132.3	144.3
Cryptosporidiosis	3.4	4.3	49.8	4.4	2.7	15.1	6.1	7.0	5.6
Haemolytic uraemic syndrome	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Hepatitis A	2.3	1.1	0.0	1.0	0.0	0.0	0.6	2.0	0.9
Hepatitis E	0.0	0.1	0.0	0.2	0.0	0.0	0.1	0.0	0.1
Listeriosis	1.1	0.4	0.0	0.3	0.0	1.6	0.2	0.2	0.3
STEC, VTEC‖	0.0	0.1	0.0	0.4	1.5	0.0	0.3	0.5	0.3
Salmonellosis	93.4	50.2	229.5	61.6	43.1	49.3	41.2	59.5	53.2
Shigellosis	4.6	2.0	30.2	0.9	3.7	1.6	1.2	5.2	2.3
Typhoid	0.0	0.3	0.0	0.2	0.5	0.0	0.4	0.2	0.3
Quarantinable diseases									
Cholera	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Highly pathogenic avian influenza in humans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plague	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rabies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Severe acute respiratory syndrome	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Smallpox	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Viral haemorrhagic fever	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow fever	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sexually transmissible infections									
Chlamydial infection¶,**	337.1	250.9	1,117.2	418.5	252.9	355.7	272.0	658.8	344.4
Donovanosis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gonococcal infection**	20.5	30.1	877.0	59.1	30.1	2.4	30.4	84.9	49.5
Syphilis < 2 years duration**	2.3	4.6	19.6	3.6	0.5	1.6	4.4	6.4	4.3
Syphilis > 2 years or unspecified duration**	5.7	1.8	39.1	2.7	-	0.0	10.2	3.0	4.8
Syphilis – congenital**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vaccine preventable diseases									
Diphtheria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Haemophilus influenzae type b	0.0	0.0	1.8	0.2	0.0	0.0	0.2	0.4	0.1
Influenza (laboratory confirmed)	19.4	28.2	407.4	125.0	267.5	21.5	25.6	116.4	77.4
Measles	0.0	0.0	0.0	0.5	0.2	0.0	0.2	0.2	0.2
Mumps	0.0	0.5	1.8	0.7	0.0	0.0	0.2	1.4	0.5
Pertussis	549.0	278.0	174.3	255.1	655.4	74.0	211.3	111.6	266.4
Pneumococcal disease (invasive)	5.7	6.4	35.6	6.0	9.6	11.1	6.2	9.8	7.3
Poliomyelitis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubella	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Rubella - congenital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 3 *continued*: Notification rates of diseases, 1 October to 31 December 2010, by state or territory. (Annualised rate per 100,000 population)

Disease	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Vaccine preventable diseases, *continued*									
Tetanus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Varicella zoster (chickenpox)††	0.0	NN	51.6	9.2	27.1	4.0	9.1	24.1	13.6
Varicella zoster (shingles) ††	13.7	NN	60.5	1.3	74.2	44.6	10.6	41.5	21.5
Varicella zoster (unspecified) ††	22.8	NN	0.0	92.5	19.7	13.5	40.5	44.2	52.3
Vectorborne diseases									
Arbovirus infection (NEC)	0.0	0.1	12.5	0.6	0.0	0.0	0.4	0.0	0.4
Barmah Forest virus infection	1.1	3.9	26.7	20.6	5.9	0.0	3.5	3.0	7.4
Dengue virus infection	2.3	4.1	16.0	9.0	2.7	2.4	3.5	36.8	8.2
Japanese encephalitis virus infection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kunjin virus infection‡‡	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malaria	0.0	1.7	3.6	4.3	0.0	2.4	0.6	3.0	2.0
Murray Valley encephalitis virus infection‡‡	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ross River virus infection	2.3	7.9	126.3	31.2	47.3	2.4	4.7	32.0	18.2
Zoonoses									
Anthrax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Australian bat lyssavirus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brucellosis	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.1
Leptospirosis	0.0	0.1	0.0	1.8	0.2	0.8	0.4	0.4	0.6
Lyssavirus (NEC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ornithosis	0.0	0.2	0.0	0.0	0.0	0.0	1.5	0.2	0.5
Q fever	0.0	1.3	1.8	3.4	0.2	0.0	0.1	0.2	1.2
Tularaemia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other bacterial infections									
Legionellosis	0.0	1.1	1.8	0.6	2.7	3.2	0.7	5.0	1.5
Leprosy	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0
Meningococcal infection§§	0.0	1.1	1.8	1.0	1.5	1.6	0.8	0.9	1.0
Tuberculosis	3.4	5.7	19.6	5.0	4.4	1.6	10.9	5.4	6.7

* Newly acquired hepatitis includes cases where the infection was determined to be acquired within 24 months prior to diagnosis.

† Unspecified hepatitis and syphilis includes cases where the duration of infection could not be determined.

‡ In Queensland, includes incident hepatitis cases.

§ Not reported for New South Wales where it is only notifiable as 'foodborne disease' or 'gastroenteritis in an institution'.

|| Infections with Shiga-like toxin (verotoxin) producing *Escherichia coli* (STEC/VTEC).

¶ Includes *Chlamydia trachomatis* identified from cervical, rectal, urine, urethral, throat and eye samples, except for South Australia, which reports only genital tract specimens. The Northern Territory and Western Australia, exclude ocular infections.

** In the national case definitions for chlamydial, gonococcal and syphilis infections the mode of transmission cannot be inferred from the site of infection. Transmission (especially in children) may be by a non-sexual mode (e.g. perinatal infections, epidemic gonococcal conjunctivitis).

†† Ratio of current quarter total to the mean of last 5 years for the same quarter. Ratios for varicella zoster (chickenpox), varicella zoster (shingles) and varicella zoster (unspecified) are based on 3 years of data.

‡‡ In the Australian Capital Territory, Murray Valley encephalitis virus infection and Kunjin virus infection are combined under Murray Valley encephalitis virus infection.

§§ Only invasive meningococcal disease is nationally notifiable. However, New South Wales, the Australian Capital Territory and South Australia also report conjunctival cases.

NN Not notifiable.

NEC Not elsewhere classified.

NDP No data provided.

Laboratory Serology and Virology Reporting Scheme

There were 15,999 reports received by the Laboratory Virology and Serology Reporting Scheme (LabVISE) in the reporting period, 1 October to 31 December 2010 (Tables 4 and 5).

Table 4: Laboratory Virology and Serology reports, 1 October to 31 December 2010 and total reports for the year,* by state or territory†

	State or territory								This period 2010	This period 2009	Year to date 2010	Year to date 2009
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA				
Measles, mumps, rubella												
Measles virus	–	–	–	4	1	–	2	1	8	4	39	51
Mumps virus	–	–	–	3	–	–	3	8	14	11	32	50
Rubella virus	–	–	–	2	1	–	–	2	5	8	28	21
Hepatitis viruses												
Hepatitis A virus	–	2	–	12	1	–	–	9	24	28	69	67
Hepatitis D virus	–	–	–	3	4	–	–	3	10	6	23	20
Hepatitis E virus	–	–	–	2	–	–	–	–	2	1	6	6
Arboviruses												
Ross River virus	–	5	12	70	91	–	–	20	198	205	1,290	1,042
Barmah Forest virus	–	1	–	61	9	–	–	4	75	53	263	232
Alphavirus (unspecified)	–	–	3	–	–	–	–	3	6	–	6	–
Dengue type 1	–	–	1	–	–	–	–	60	61	1	93	1
Dengue type 2	–	1	3	–	–	–	2	37	43	4	81	4
Dengue type 3	–	–	1	–	–	–	–	37	38	–	49	–
Dengue type 4	–	–	–	–	–	–	–	11	11	1	19	1
Dengue not typed	–	1	10	–	–	–	2	176	189	17	319	17
Flavivirus (unspecified)	–	26	–	35	1	–	17	1	80	38	263	245
Adenoviruses												
Adenovirus type 40	–	–	–	–	–	–	–	7	7	7	17	7
Adenovirus type 41	–	–	–	–	–	–	–	30	30	5	42	5
Adenovirus not typed/ pending	4	137	19	150	395	2	3	92	802	328	2,182	1,490
Herpesviruses												
Herpes virus type 6	–	1	–	–	–	–	1	1	3	2	7	4
Cytomegalovirus	–	62	–	154	112	4	16	–	348	280	1,476	1,114
Varicella-zoster virus	–	57	2	578	156	2	14	160	969	914	3,786	2,853
Epstein-Barr virus	1	14	36	367	170	5	11	106	710	853	3,043	2,437
Other DNA viruses												
Vaccinia virus	–	1	–	–	–	–	–	–	1	–	1	–
Molluscum contagiosum	–	–	–	–	–	–	1	8	9	6	20	6
Parvovirus	3	2	–	33	11	–	18	10	77	104	364	274
Picornavirus family												
Rhinovirus (all types)	2	131	–	–	1,146	–	–	52	1,331	130	3,217	234
Enterovirus not typed/ pending	–	39	–	1	9	2	–	3	54	63	191	135
Picornavirus not typed	–	–	22	–	–	1	–	165	188	6	405	17
Ortho/paramyxoviruses												
Influenza A virus	5	52	13	159	238	–	44	80	591	255	3,932	6,434
Influenza A virus H1N1	–	–	–	1	–	2	–	8	11	1	18	97
Influenza A virus H3N2	–	–	18	–	–	–	1	53	72	4	110	8
Influenza B virus	3	14	72	38	55	–	3	203	388	26	813	294

Table 4 *continued*: Laboratory Virology and Serology reports, 1 October to 31 December 2010, and total reports for the year,* by state or territory†

	State or territory								This period 2010	This period 2009	Year to date 2010	Year to date 2009
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA				
Ortho/paramyxoviruses, *continued*												
Newcastle disease virus	–	2	–	–	–	–	–	–	2	–	21	–
Parainfluenza virus type 1	2	3	–	3	5	–	–	–	13	47	190	70
Parainfluenza virus type 2	1	5	–	4	10	–	–	4	24	7	115	88
Parainfluenza virus type 3	1	120	10	152	301	–	3	116	703	299	1,292	619
Parainfluenza virus typing pending	–	–	–	–	–	3	–	–	3	1	4	3
Respiratory syncytial virus	–	41	4	62	73	5	2	73	260	209	3,359	2,725
Paramyxovirus (unspecified)	–	23	–	–	–	–	–	–	23	–	65	–
Other RNA viruses												
HTLV–1	–	–	–	–	20	–	–	1	21	31	88	173
Rotavirus	3	123	–	–	34	15	–	134	309	57	1,200	242
Calicivirus	–	1	1	–	–	–	–	290	292	570	523	570
Norwalk agent	–	28	–	–	176	–	–	1	205	267	1,129	345
Coronavirus	–	–	–	–	–	1	–	–	1	–	1	–
Other												
Chlamydia trachomatis not typed	4	321	4	1,916	487	21	3	673	3,429	2,695	13,513	9,087
Chlamydia pneumoniae	–	–	1	–	–	–	–	–	1	4	34	13
Chlamydia psittaci	1	1	–	1	–	–	28	2	33	11	58	67
Chlamydia spp typing pending	–	11	–	–	–	–	–	–	11	6	42	22
Mycoplasma pneumoniae	–	6	10	44	191	1	109	220	581	433	1,790	1,256
Coxiella burnetii (Q fever)	1	16	–	16	6	–	12	1	52	74	235	246
Rickettsia – spotted fever group	–	9	–	19	1	–	2	–	31	23	92	122
Rickettsia spp – other	1	3	–	–	–	–	1	2	7	2	11	2
Streptococcus group A	–	8	–	200	–	–	29	–	237	175	877	654
Yersinia enterocolitica	–	–	–	–	–	–	–	1	1	–	1	1
Brucella species	–	–	–	6	–	–	–	–	6	2	21	13
Bordetella pertussis	1	152	1	948	1,463	1	138	150	2,854	1,358	8,631	4,912
Bordetella parapertussis	–	1	–	–	–	–	–	–	1	–	1	–
Legionella pneumophila	–	–	–	–	1	2	7	–	10	11	39	37
Legionella longbeachae	–	–	–	–	2	–	–	14	16	7	33	18
Legionella species	1	4	–	8	–	–	3	–	16	7	49	29
Cryptococcus species	–	–	–	6	2	–	–	–	8	6	47	34
Leptospira species	–	2	–	8	1	–	–	2	13	5	46	38
Treponema pallidum	–	38	4	278	103	–	12	18	453	430	1,951	1,725
Entamoeba histolytica	–	–	–	–	–	–	–	3	3	2	13	8
Toxoplasma gondii	–	–	–	2	11	2	2	5	22	8	59	23
Echinococcus granulosus	–	–	–	–	1	–	1	1	3	3	18	17
Total	34	1,464	247	5,346	5,288	69	490	3,061	15,999	10,111	57,752	40,325

* Data presented are for reports with report dates in the current period.

† State or territory of postcode, if reported, otherwise state or territory of reporting laboratory.

– No data received this period.

Table 5: Laboratory Virology and Serology reports, 1 October to 31 December 2010,* by laboratory

State or territory	Laboratory	October 2010	November 2010	December 2010	Total
Australian Capital Territory	The Canberra Hospital	–	–	–	–
New South Wales	Institute of Clinical Pathology and Medical Research, Westmead	507	135	6	648
	New Children's Hospital, Westmead	115	57	83	255
	Repatriation General Hospital, Concord	–	–	–	–
	Royal Prince Alfred Hospital, Camperdown	15	27	15	57
	South West Area Pathology Service, Liverpool	106	49	23	178
Queensland	Queensland Medical Laboratory, West End	2,030	2,043	1,673	5,746
	Townsville General Hospital	–	–	–	–
South Australia	Institute of Medical and Veterinary Science, Adelaide	143	3,017	2,119	5,279
Tasmania	Northern Tasmanian Pathology Service, Launceston	22	19	17	58
	Royal Hobart Hospital, Hobart	–	–	–	–
Victoria	Australian Rickettsial Reference Laboratory	8	3	31	42
	Monash Medical Centre, Melbourne	–	–	–	–
	Royal Children's Hospital, Melbourne	22	67	101	190
	Victorian Infectious Diseases Reference Laboratory	92	68	77	237
Western Australia	PathWest Virology, Perth	1,235	1,023	886	3,144
	Princess Margaret Hospital, Perth	–	–	–	–
	Western Diagnostic Pathology	21	117	27	165
Total		4,316	6,625	5,058	15,999

* The complete list of laboratories reporting for the 12 months, January to December 2010, will appear in every report regardless of whether reports were received in this reporting period. Reports are not always received from all laboratories.

– No data received this period.

Additional reports

Australian childhood immunisation coverage

Tables 1, 2 and 3 provide the latest quarterly report on childhood immunisation coverage from the Australian Childhood Immunisation Register (ACIR).

The data show the percentage of children 'fully immunised' at 12 months, 24 months and 5 years of age, for 3-month birth cohorts of children at the stated ages between 1 July and 30 September 2010. 'Fully immunised' refers to vaccines on the National Immunisation Program Schedule, but excludes rotavirus, pneumococcal conjugate, varicella, or meningococcal C conjugate vaccines, and is outlined in more detail below.

'Fully immunised' at 12 months of age is defined as a child having a record on the ACIR of 3 doses of a diphtheria (D), tetanus (T) and pertussis-containing (P) vaccine, 3 doses of polio vaccine, 2 or 3 doses of PRP-OMP containing Haemophilus influenzae *type b (Hib) vaccine or 3 doses of any other Hib vaccine, and 2 or 3 doses of Comvax hepatitis B vaccine or 3 doses of all other hepatitis B vaccines. 'Fully immunised' at 24 months of age is defined as a child having a record on the ACIR of 3 or 4 doses of a DTP-containing vaccine, 3 doses of polio vaccine, 3 or 4 doses of PRP-OMP containing Hib vaccine or 4 doses of any other Hib vaccine, 3 or 4 doses of Comvax hepatitis B vaccine or 4 doses of all other hepatitis B vaccines, and 1 dose of a measles, mumps and rubella-containing (MMR) vaccine. 'Fully immunised' at 5 years of age is defined as a child having a record on the ACIR of 4 or 5 doses of a DTP-containing vaccine, 4 doses of polio vaccine, and 2 doses of an MMR-containing vaccine.*

A full description of the basic methodology used can be found in Commun Dis Intell *1998;22:36–37.*

The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS) provides commentary on the trends in ACIR data. For further information please contact NCIRS at: telephone +61 2 9845 1435, E-mail: brynleyh@chw.edu.au

The percentage of children 'fully immunised' at 12 months of age for Australia decreased slightly by 0.3 percentage points to 91.4% (Table 1). There were no important changes in coverage for any individual vaccines due at 12 months of age or by jurisdiction except for a 2.1 percentage point reduction in coverage for *Haemophilus influenzae* type b (Hib) vaccine in the Northern Territory.

The percentage of children 'fully immunised' at 24 months of age for Australia decreased by 0.1 percentage points to 92.5 (Table 2). There were no important changes in coverage for any individual vaccines due at 24 months of age or by jurisdiction except for a surprising 8.7 percentage point reduction in coverage for Hib vaccine in the Northern Territory. This is possibly due to the change in the Northern Territory immunisation schedule that occurred in late 2009. This 24-months age cohort is the first cohort to be assessed under the new schedule, which changed from using Infanrix Penta vaccine at 2, 4 and 6 months of age plus Pedvax Hib vaccine at 2, 4 and 12 months of age, to Infanrix Hexa vaccine at 2, 4 and 6 months of age plus 1 dose of Hiberix at 12 months of age. Possible confusion over the new schedule amongst some immunisation providers and technical errors with data transfer are possible explanations for the reduction in Hib coverage. The Centre For Disease Control in Darwin is currently investigating this matter.

The percentage of children 'fully immunised' at 5 years of age for Australia increased slightly by 0.3 percentage points, to sit currently at 89.4%

Table 1. Percentage of children immunised at 1 year of age, preliminary results by disease and state or territory for the birth cohort 1 July to 30 September 2009; assessment date 31 December 2010

Vaccine	State or territory								Aust
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	
Total number of children	1,292	25,086	928	15,608	4,929	1,627	18,246	7,817	75,533
Diphtheria, tetanus, pertussis (%)	94.4	91.8	90.0	91.8	91.8	91.5	92.3	90.4	91.8
Poliomyelitis (%)	94.4	91.8	89.9	91.8	91.9	91.5	92.3	90.3	91.8
Haemophilus influenzae type b (%)	94.3	91.7	89.7	91.7	91.7	91.5	92.2	90.2	91.7
Hepatitis B (%)	93.9	91.6	89.8	91.5	91.6	91.3	91.9	89.9	91.5
Fully immunised (%)	93.9	91.4	89.7	91.4	91.5	91.3	91.8	89.8	91.4
Change in fully immunised since last quarter (%)	–0.3	+0.0	–0.8	–0.6	–0.2	–1.5	–0.4	–0.5	–0.3

(Table 3). There were no important changes in coverage for any individual vaccines due at 5 years of age or by jurisdiction.

The Figure shows the trends in vaccination coverage from the first ACIR-derived published coverage estimates in 1997 to the current estimates. There is a clear trend of increasing vaccination coverage over time for children aged 12 months, 24 months and 6 years (till December 2007). This trend continued when the age of coverage calculation was changed from 6 to 5 years in March 2008, and then increased further in the previous quarter as outlined in the previous report.

Figure: Trends in vaccination coverage, Australia, 1997 to 30 September 2010, by age cohorts

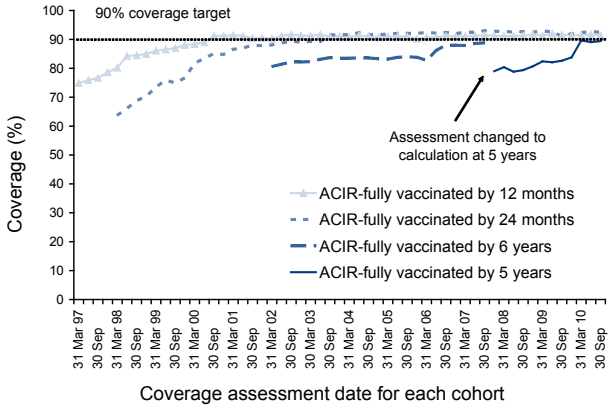


Table 2. Percentage of children immunised at 2 years of age, preliminary results by disease and state or territory for the birth cohort 1 July to 30 September 2008; assessment date 31 December 2010*

	State or territory								
Vaccine	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Total number of children	1,280	25,311	954	15,985	5,141	1,665	18,581	7,922	76,839
Diphtheria, tetanus, pertussis (%)	95.6	94.9	96.2	94.6	94.7	95.9	95.7	93.7	94.9
Poliomyelitis (%)	95.6	94.8	96.2	94.6	94.7	95.9	95.7	93.6	94.9
Haemophilus influenzae type b (%)	95.6	95.0	84.0	94.5	94.5	95.9	95.5	93.2	94.7
Measles, mumps, rubella (%)	94.3	93.7	95.1	94.1	93.9	94.8	94.8	92.7	94.0
Hepatitis B (%)	95.2	94.4	95.8	94.2	94.3	95.7	95.1	92.9	94.4
Fully immunised (%)	93.4	92.4	82.7	92.8	92.5	94.3	93.5	90.1	92.5
Change in fully immunised since last quarter (%)	–1.6	–0.0	–9.3	+0.0	+0.0	+0.5	+0.1	–0.1	–0.1

* The 12 months age data for this cohort were published in *Commun Dis Intell* 2009;34(1):77.

Table 3. Percentage of children immunised at 5 years of age, preliminary results by disease and state or territory for the birth cohort 1 July to 30 September 2005; assessment date 31 December 2010

	State or territory								
Vaccine	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Total number of children	1,173	24,156	932	15,561	4,819	1,614	17,288	7,495	73,038
Diphtheria, tetanus, pertussis (%)	92.2	89.2	87.9	90.3	87.8	92.6	91.8	87.5	89.9
Poliomyelitis (%)	92.0	89.1	87.8	90.3	87.8	92.4	91.8	87.5	89.8
Measles, mumps, rubella (%)	92.1	89.0	87.7	90.4	87.6	92.9	91.6	87.3	89.8
Fully immunised (%)	91.7	88.7	86.8	89.8	87.3	92.2	91.4	86.9	89.4
Change in fully immunised since last quarter (%)	+1.0	–0.3	+1.4	–0.3	+0.5	–0.5	+0.9	+1.5	+0.3

Gonococcal surveillance

(Dr Monica M Lahra, The Prince of Wales Hospital, Randwick, NSW, 2031 for the Australian Gonococcal Surveillance Programme)

The Australian Gonococcal Surveillance Programme (AGSP) reference laboratories in the various States and Territories report data on sensitivity to an agreed 'core' group of antimicrobial agents quarterly. The antibiotics that are currently surveyed routinely are penicillin, ceftriaxone, ciprofloxacin and spectinomycin, all of which are administered as single dose regimens and currently used in Australia to treat gonorrhoea. When in vitro resistance to a recommended agent is demonstrated in 5% or more of isolates from a general population, it is usual to remove that agent from the list of recommended treatments.[1] *Additional data are also provided on other antibiotics from time to time. At present all laboratories also test isolates for the presence of high level (plasmid-mediated) resistance to the tetracyclines, known as TRNG. Tetracyclines are however not a recommended therapy for gonorrhoea in Australia. Comparability of data is achieved by means of a standardised system of testing and a programme-specific quality assurance process. Because of the substantial geographic differences in susceptibility patterns in Australia, regional as well as aggregated data are presented. For more information see* Commun Dis Intell *2011;35(1):53–54.*

Reporting period 1 July to 30 September 2010

The AGSP laboratories received a total of 1,014 gonococcal isolates of which 995 remained viable for susceptibility testing. This was a 30% increase from the 713 gonococci reported in the same quarter of 2009. About 32% of this total was from New South Wales, 23% from Victoria, 22% from Queensland, 11% from the Northern Territory; 9% from Western Australia; 2% from South Australia; 0.8% from the Australian Capital Territory; and 0.2% from Tasmania.

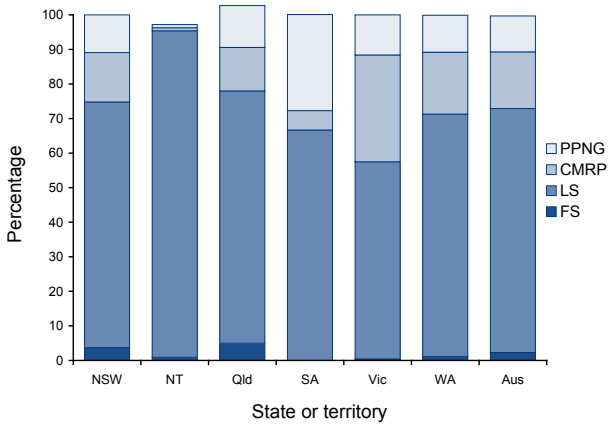
Penicillins

Two hundred and sixty-seven (27%) of the 995 isolates examined were penicillin resistant by one or more mechanisms, 104 (10%) were penicillinase producing *Neisseria gonorrhoeae* (PPNG) and 163 (16%) were chromosomally mediated resistant to penicillin (CMRP). This represents a decrease in proportion from the same quarter of 2009, of both PPNG isolates and CMRP, which were 14.5% and 22% respectively. The proportion of all strains resistant to penicillins by any mechanism ranged from 1.9% in the Northern Territory to 43% in Victoria. The penicillin resistance rate in South Australia was 33%; in Western Australia 29% and 25% in New South Wales and Queensland. There were no penicillin resistant gonococci reported from the Australian Capital Territory or from Tasmania.

Figure 1 shows the proportion of gonococci fully sensitive (FS) (MIC ≤ 0.03 mg/L); less sensitive (LS) (MIC 0.06–0.5 mg/L); CMRP (MIC ≥ 1 mg/L) and PPNG by state and territory and as aggregated for Australia. A high proportion of strains classified as PPNG or CMRP fail to respond to treatment with penicillins (penicillin, amoxycillin, ampicillin) and early generation cephalosporins.

Penicillin resistance by CMRP predominated over PPNG in Victoria (31% CMRP and 12% PPNG); New South Wales (14% CMRP and 11% PPNG); Western Australia (18% CMRP and 11% PPNG); and Queensland (13% CMRP and 12% PPNG). There were 5 PPNG and 1 CMRP in South Australia. The Northern Territory had 1 PPNG and 1 CMRP.

Figure 1: Categorisation of gonococci isolated in Australia, 1 July to 30 September 2010, by penicillin susceptibility and state or territory



FS	Fully sensitive to penicillin, MIC ≤0.03 mg/L.
LS	Less sensitive to penicillin, MIC 0.06–0.5 mg/L.
CMRP	Chromosomally mediated resistant to penicillin, MIC ≥ 1 mg/L.
PPNG	Penicillinase producing *Neisseria gonorrhoeae*.

Ceftriaxone

In previous reports the criteria for 'decreased susceptibility' to ceftriaxone was defined as the MIC range 0.06–0.12 mg/L. New criteria for 'decreased susceptibility' to ceftriaxone (MIC range 0.03–0.12 mg/L) was introduced and reported in the second quarter of 2010. The rationale for this change in MIC range was to improve the detection of gonococci with decreased susceptibility to ceftriaxone.

In this quarter, data for ceftriaxone MIC ≥ 0.03 mg/L were contributed by all jurisdictions with 995 isolates examined. Using this new criteria (MIC range 0.03–0.12 mg/L), 152 isolates (15% of 995 gonococci)

were reported in Australia as having 'decreased susceptibility' to ceftriaxone. There were 52/233 (22%) reported from Victoria; 59/322 (18%) in New South Wales; 14/84 (17%) in Western Australia; 24/222 (11%) in Queensland and 2/18 (11%) in Queensland. There was 1 isolate in the Australian Capital Territory and none in the Northern Territory or Tasmania.

Spectinomycin

All isolates were susceptible to this injectable agent.

Quinolone antibiotics

Nationally, the 324 quinolone resistant *N. gonorrhoeae* (QRNG) detected in this quarter represented 33% of all isolates tested. This represents a continuing decrease in proportion of QRNG from the 291 (41.3%) in the same quarter of 2009; 368 (50.6%) QRNG recorded in the 3rd quarter of 2008 and the 321 QRNG (50.5%) seen in 2007. QRNG are defined as those isolates with an MIC to ciprofloxacin equal to or greater than 0.06 mg/L. QRNG are further subdivided into less sensitive (ciprofloxacin MICs 0.06–0.5 mg/L) or resistant (MIC ≥ 1 mg/L) groups.

The majority of QRNG (313/324, 97%) had higher-level resistance to ciprofloxacin: MIC 1 mg/L or more.

QRNG were detected in high proportions in South Australia 9/18 (50% of isolates); Victoria 94/233 (40%); Western Australia 34/84 (40%); New South Wales 124/322 (39%); and Queensland 57/222 (26%) (Figure 2). There were 4 QRNG detected in the Australian Capital Territory, two in the Northern Territory, and none in Tasmania.

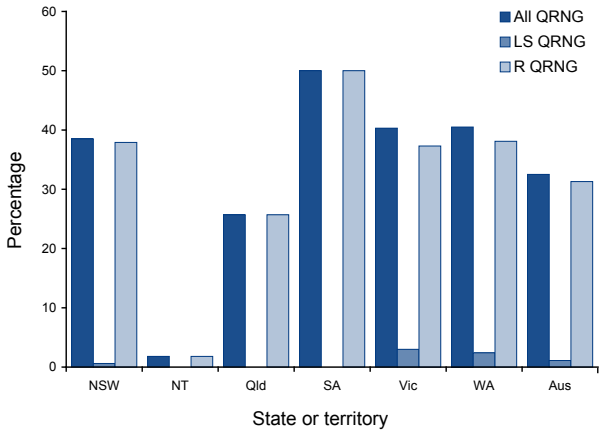
High level tetracycline resistance

The proportion (204/998, 20.4%) of high level tetracycline resistance (TRNG) detected was unchanged from that recorded in the same quarter of 2009 (20.6%). TRNG were found in all states and territories except for Tasmania and the Australian Capital Territory and represented between 16% (Victoria) and 45% (South Australia) of all isolates tested.

Reference

1. Management of sexually transmitted diseases. World Health Organization 1997; Document WHO/GPA/TEM94.1 Rev.1 p 37.

Figure 2: The distribution of quinolone resistant isolates of *Neisseria gonorrhoeae* in Australia, 1 July to 30 September 2010, by state or territory



LS QRNG Ciprofloxacin MICs 0.06–0.5 mg/L.
R QRNG Ciprofloxacin MICs ≥ 1 mg/L.

Australian Sentinel Practices Research Network

The Australian Sentinel Practices Research Network (ASPREN) is a national surveillance system that is funded by the Commonwealth's Department of Health and Ageing, owned and operated by the Royal Australian College of General Practitioners and directed through the Discipline of General Practice at the University of Adelaide.

The network consists of general practitioners who report presentations on a number of defined medical conditions each week. ASPREN was established in 1991 to provide a rapid monitoring scheme for infectious diseases that can alert public health officials of epidemics in their early stages as well as play a role in the evaluation of public health campaigns and research of conditions commonly seen in general practice. Electronic, web-based data collection was established in 2006.

In June 2010, ASPREN's laboratory ILI testing was implemented, allowing for viral testing of 25% of ILI patients for a range of respiratory viruses including influenza A, influenza B and H1N1(2009).

The list of conditions is reviewed annually by the ASPREN management committee. In 2010, 4 conditions are being monitored. They include influenza-like illness (ILI), gastroenteritis and varicella infections (chickenpox and shingles). Definitions of these conditions are described in Surveillance systems reported in CDI, *published in* Commun Dis Intell *2011;35(1):54–55.*

Reporting period 1 October to 31 December 2010

Sentinel practices contributing to ASPREN were located in all 8 jurisdictions in Australia. A total of 107 general practitioners contributed data to ASPREN in the 4th quarter of 2010. Each week an average of 94 general practitioners provided information to ASPREN at an average of 9,350 (range 7,681 to 9,946) consultations per week and an average of 143 (range 117 to 199) notifications per week.

ILI rates reported from 1 October to 31 December 2010 averaged 15 cases per 1,000 consultations (range 12–22 cases per 1,000 consultations) (Figure 1). The reported rates in October, November and December 2010 (15–22 cases per 1,000 consultations, 12–17 cases per 1,000 consultations and 12–15 cases per 1,000 consultations respectively) were significantly higher compared with rates in the same reporting period in 2009 (7–11 cases per 1,000 consultations, 5–8 cases per 1,000 consultations and 2–6 cases per 1,000 consultations, respectively).

ILI swab testing commenced at the beginning of June 2010. The most commonly reported virus during this reporting period was rhinovirus (16% of all swabs performed), the second most common virus was influenza A H1N1(2009) (13% of all swabs performed) (Figure 2).

For the whole of 2010 to the end of week 52, 344 cases of influenza have been detected, the majority of these being H1N1(2009) (17% of all swabs performed) and the remainder were influenza B (6% of all swabs performed) and influenza A untyped or other (2% of all swabs performed).

During this reporting period, consultation rates for gastroenteritis averaged 5.5 cases per 1,000 consultations (range 4–7 cases per 1,000, Figure 3). This was

Figure 1: Consultation rates for influenza-like illness, ASPREN, 1 January 2009 to 31 December 2010, by week of report

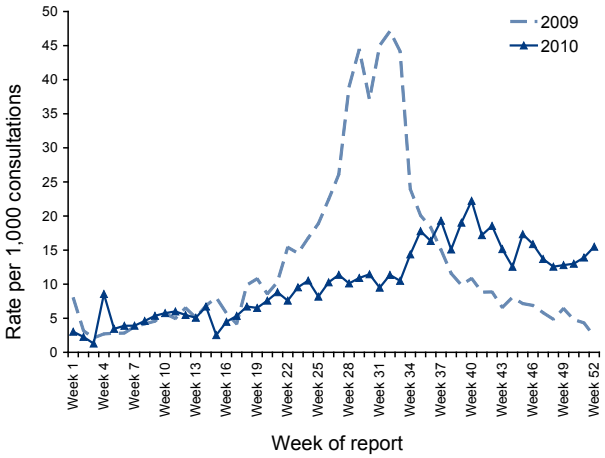
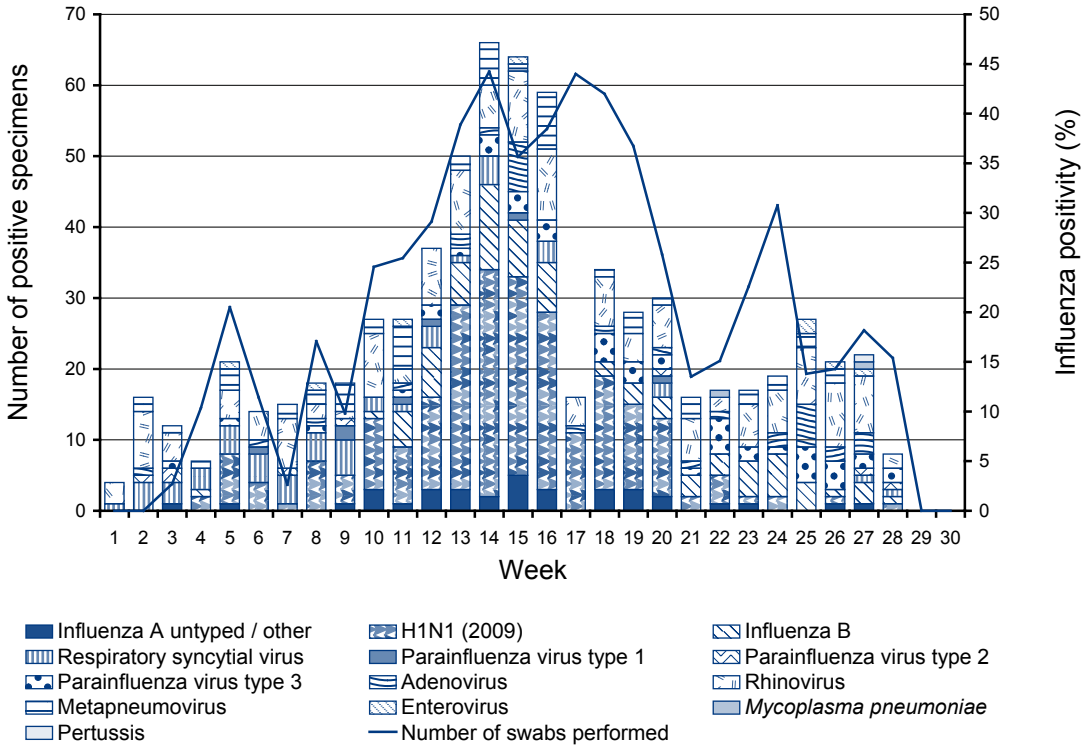
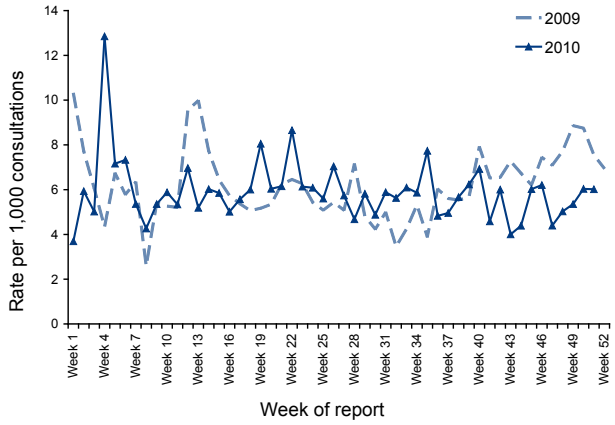


Figure 2: Influenza-like illness swab testing results, ASPREN, 1 January 2009 to 31 December 2010, by week of report



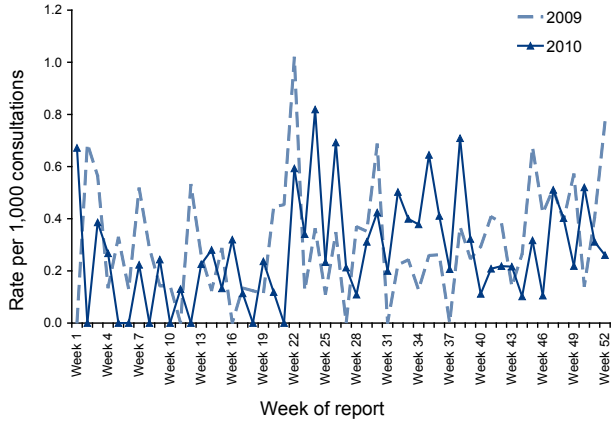
slightly lower compared with the same reporting period in 2009 where the average was 7.3 cases per 1,000 consultations (range 6–9 cases per 1,000).

Figure 3: Consultation rates for gastroenteritis, ASPREN, 1 January 2009 to 31 December 2010, by week of report



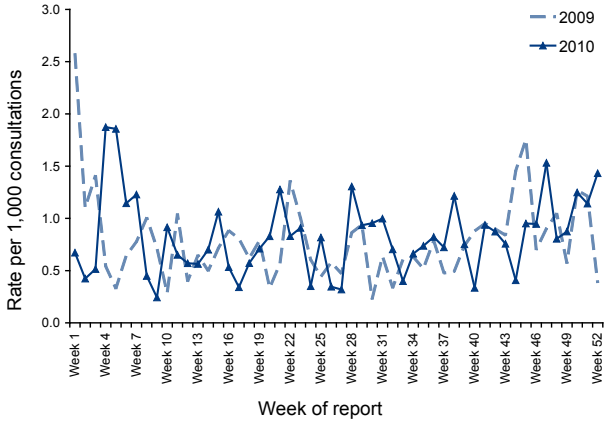
Varicella infections were reported at a slightly lower rate for the 4th quarter of 2010 compared with the same period in 2009. From 1 October to 31 December 2010, recorded rates for chickenpox averaged 0.3 cases per 1,000 consultations (range 0.1–0.5 cases per 1,000 consultations, Figure 4).

Figure 4: Consultation rates for chickenpox, ASPREN, 1 January 2009 to 31 December 2010, by week of report



In the 4th quarter of 2010, reported rates for shingles averaged 0.9 cases per 1,000 consultations (range 0.3–1.4 cases per 1,000 consultations, Figure 5), remaining the same as the reporting period in 2009 where the average singles rate was 0.9 cases per 1,000 consultations (0.3–1.7 cases per 1,000 consultations).

Figure 5: Consultation rates for shingles, ASPREN, 1 January 2009 to 31 December 2010, by week of report



HIV and AIDS surveillance

National surveillance for HIV disease is coordinated by the National Centre in HIV Epidemiology and Clinical Research (NCHECR), in collaboration with State and Territory health authorities and the Commonwealth of Australia. Cases of HIV infection are notified to the National HIV Registry on the first occasion of diagnosis in Australia, by either the diagnosing laboratory (Australian Capital Territory, New South Wales, Tasmania, Victoria) or by a combination of laboratory and doctor sources (Northern Territory, Queensland, South Australia, Western Australia). Cases of AIDS are notified through the State and Territory health authorities to the National AIDS Registry. Diagnoses of both HIV infection and AIDS are notified with the person's date of birth and name code, to minimise duplicate notifications while maintaining confidentiality.

Tabulations of diagnoses of HIV infection and AIDS are based on data available three months after the end of the reporting interval indicated, to allow for reporting delay and to incorporate newly available information. More detailed information on diagnoses of HIV infection and AIDS is published in the quarterly Australian HIV Surveillance Report, and annually in 'HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia, annual surveillance report'. The reports are available from the National Centre in HIV Epidemiology and Clinical Research, CFI Building, Cnr Boundary and West Streets, Darlinghurst NSW 2010. Internet: www.nchecr.unsw.edu.au Telephone: +61 2 9385 0900. Facsimile: +61 2 9385 0920. For more information see Commun Dis Intell *2011;35(1):55.*

HIV and AIDS diagnoses and deaths following AIDS reported for 1 January to 31 March 2010, are included in this issue of Communicable Diseases Intelligence *(Tables 1 and 2).*

Table 1: New diagnoses of HIV infection, new diagnoses of AIDS and deaths following AIDS occurring in the period 1 January to 31 March 2010, by sex and state or territory of diagnosis

		State or territory								Totals for Australia			
	Sex	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	This period 2010	This period 2009	YTD 2010	YTD 2009
HIV diagnoses	Female	0	8	0	19	2	0	7	0	36	41	36	41
	Male	0	87	4	48	12	0	55	5	211	211	211	211
	Not reported	0	1	0	0	0	0	2	0	3	0	3	0
	Total*	0	97	4	67	14	0	64	5	251	252	251	252
AIDS diagnoses†	Female	0	--	0	1	0	0	1	0	2	6	2	6
	Male	0	--	2	3	1	0	8	0	14	21	14	21
	Total*	0	--	2	4	1	0	9	0	16	27	16	27
AIDS deaths†	Female	0	--	0	0	0	0	0	0	0	0	0	0
	Male	0	--	0	1	1	0	3	0	5	3	5	3
	Total*	0	--	0	1	1	0	3	0	5	3	5	3

* Totals include people whose sex was reported as transgender.

† AIDS cases and deaths following AIDS occurring in New South Wales from January 2008 are not included.

Table 2: Number of new diagnoses of HIV infection since the introduction of HIV antibody testing 1985, and number of new diagnoses of AIDS and deaths following AIDS since 1981, cumulative to 31 March 2010, by sex and state or territory

		State or territory								
	Sex	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
HIV diagnoses	Female	37	1,018	30	374	127	17	472	266	2,341
	Male	283	14,573	162	3,299	1,078	127	6,067	1,405	26,994
	Not reported	0	229	0	0	0	0	22	0	251
	Total*	320	15,853	192	3,682	1,206	144	6,585	1,678	29,660
AIDS diagnoses†	Female	10	265	6	78	32	4	127	48	570
	Male	95	5,513	50	1,101	427	55	2,162	458	9,861
	Total*	105	5,796	56	1,181	460	59	2,302	508	10,467
AIDS deaths†	Female	7	138	1	43	20	2	66	30	307
	Male	73	3,597	33	682	281	34	1,452	301	6,453
	Total*	80	3,746	34	727	301	36	1,527	332	6,783

* Totals include people whose sex was reported as transgender.

† AIDS cases and deaths following AIDS occurring in New South Wales from January 2008 are not included.

Administration

Surveillance systems reported in *CDI*, 2011

This article describes the surveillance schemes that are routinely reported on in *Communicable Diseases Intelligence* (*CDI*).

Communicable disease surveillance in Australia operates at the national, state and local levels. Primary responsibility for public health action lies with the state and territory health departments. The role of communicable disease surveillance at a national level includes:

- detecting outbreaks and identifying national trends;
- guidance for policy development and resource allocation at a national level;
- monitoring the need for and impact of national disease control programs;
- coordination of response to national or multi-jurisdictional outbreaks;
- description of the epidemiology of rare diseases, that occur infrequently at state and territory levels;
- meeting various international reporting requirements, such as providing disease statistics to the World Health Organization; and
- support for quarantine activities, which are the responsibility of the national government.

State and territory health departments collect notifications of communicable diseases under their public health legislation. In September 2007, the *National Health Security Act 2007* (*National Health Security Act,* No 174) received royal assent. This Act provides a legislative basis for and authorises the exchange of health information, including personal information, between jurisdictions and the Commonwealth. The Act provides for the establishment of the *National Notifiable Diseases List* (NNDL), which specifies the diseases about which personal information can be provided. The *National Health Security Agreement,* which was drafted in 2007 and signed by Health Ministers in April 2008, establishes operational arrangements to formalise and enhance existing surveillance and reporting systems, an important objective of the Act. States and territories voluntarily forward de-identified data on a nationally agreed set of communicable diseases to the Department of Health and Ageing for the purposes of national communicable disease surveillance.

Surveillance has been defined by the World Health Organization as the 'continuing scrutiny of all aspects of the occurrence and spread of disease that are pertinent to effective control.' It is characterised by 'methods distinguished by their practicability, uniformity, and frequently by their rapidity, rather than complete accuracy.'[1] Although some surveillance schemes aim for complete case ascertainment, others include only a proportion of all cases of the conditions under surveillance, and these samples are subject to systematic and other biases. Results generated from surveillance schemes must be interpreted with caution, particularly when comparing results between schemes, between different geographical areas or jurisdictions and over time. Surveillance data may also differ from data on communicable diseases gathered in other settings.

The major features of the surveillance schemes for which *CDI* publishes regular reports are described below.

Other surveillance schemes for which *CDI* publishes annual reports include tuberculosis notifications (*Commun Dis Intell* 2008;32:1–11), the Australian Mycobacterium Reference Laboratory Network (*Commun Dis Intell* 2008;32:12–17), invasive pneumococcal disease surveillance (*Commun Dis Intell* 2008;32:18–30), the National Arbovirus and Malaria Advisory Committee (*Commun Dis Intell* 2010;34(3):225–240), and the Australian Rotavirus Surveillance Program (*Commun Dis Intell* 2010;34(4):427–434).

National Notifiable Diseases Surveillance System

National compilations of notifiable diseases have been published intermittently in a number of publications since 1917.[2] The National Notifiable Diseases Surveillance System (NNDSS) was established in 1990 under the auspices of the Communicable Diseases Network Australia (CDNA).

Sixty-five communicable diseases agreed upon nationally are reported to NNDSS, although not all 65 are notifiable in each jurisdiction. Data are sent electronically from states and territories daily or several times a week. The system is complemented by other surveillance systems, which provide information on various diseases, including four that are not reported to NNDSS (AIDS, HIV, and the classical and variant forms of Creutzfeldt-Jakob disease).

The NNDSS core dataset includes data fields for a unique record reference number; notifying state or territory; disease code; age; sex; Indigenous status; postcode of residence; date of onset of the disease; death, date of report to the state or territory health

department and outbreak reference (to identify cases linked to an outbreak). Where relevant, information on the species, serogroups/subtypes and phage types of organisms isolated, and on the vaccination status of the case is collected. Data quality is monitored by DoHA and the National Surveillance Committee (NSC) and there is a continual process of improving the national consistency of communicable disease surveillance.

While not included in the core national dataset, enhanced surveillance information for some diseases (hepatitis B [newly acquired], hepatitis C [newly acquired], invasive pneumococcal disease and tuberculosis) is obtained from states and territories.

Aggregated data are presented on the department's Internet site under *Communicable Diseases Surveillance* and updated daily (www.health.gov.au/nndssdata). A summary report and data table are also published on the Internet each fortnight (www.health.gov.au/cdnareport).

Data are published in CDI every quarter and in an annual report. The reports include numbers of notifications for each disease by state and territory, and totals for Australia for the current period, the year to date, and for the corresponding period of the previous year. The national total for each disease is compared with the average number of notifications over the previous 5 years in the same period. A commentary on the notification data is included with the tables in each issue of CDI and graphs are used to illustrate important aspects of the data.

Australian Childhood Immunisation Register

Accurate information on the immunisation status of children is needed at the community level for program management and targeted immunisation efforts. A population-based immunisation register can provide this need. The Australian Childhood Immunisation Register (ACIR) commenced operation on 1 January 1996 and is now an important component of the *Immunise Australia Program.* It is administered and operated by Medicare Australia. The Register was established by transferring data on all children under the age of 7 years enrolled with Medicare to the ACIR. This constitutes a nearly complete population register, as approximately 99% of children are registered with Medicare by 12 months of age. Children who are not enrolled in Medicare are added to the Register when a recognised immunisation provider supplies details of an eligible immunisation. Immunisations are generally notified to Medicare Australia either by electronic means, the Internet or by paper ACIR notification forms. Immunisations recorded on the Register must have been given in accordance with the guidelines for immunisation determined by the National Health and Medical Research Council.

From the data finally entered onto the ACIR, Medicare Australia provides regular quarterly coverage reports at the national and state level. Coverage for these reports is calculated using the cohort method described in *Commun Dis Intell* 1998;22:36–37. With this method, a cohort of children is defined by date of birth in 3-month groups. This birth cohort has the immunisation status of its members assessed at the 3 key milestones of 12 months, 24 months and 5 years of age. Analysis of coverage is undertaken 3 months after the due date for completion of each milestone, so that time is available for processing notifications and the impact on coverage estimates of delayed notification to the ACIR is minimised. Only children enrolled with Medicare are included in order to minimise inaccuracies in coverage estimates due to duplicate records.

Medicare Australia coverage reports for the 3 milestones are published in *CDI* each quarter. Coverage estimates are provided for each state and territory and Australia as a whole and for each individual vaccine assessed at each milestone. Changes in 'fully immunised' coverage from the previous quarter are also included in the tables.

A commentary on ACIR immunisation coverage estimates is included with the tables in each issue and graphs are used to provide trends in immunisation coverage.

An Immunisation Coverage Report is also published in *CDI* on an annual basis and provides more detailed data on immunisation coverage for all recommended vaccines by age group which are funded by the Immunise Australia Program, timeliness of immunisation, small area coverage estimates and data on conscientious objection to immunisation.

Australian Gonococcal Surveillance Programme

The Australian Gonococcal Surveillance Programme (AGSP) is a continuing program to monitor antimicrobial resistance in *Neisseria gonorrhoeae* and includes the reference laboratories in all states and territories. These laboratories report data on sensitivity to an agreed core group of antimicrobial agents on a quarterly basis and provide an expanded analysis as an annual report in *CDI* (*Commun Dis Intell* 2010;34(2):89–95). The antibiotics that are currently routinely surveyed are the penicillins, ceftriaxone, ciprofloxacin and spectinomycin, all of which are administered as single dose regimens. One main purpose of the AGSP is to help define standard protocols for antibiotic treatment of gonococcal infection. When *in vitro* resistance to a recommended agent is demonstrated in 5% or more of isolates, it is usual to reconsider the inclusion of that agent in current treatment schedules. Additional data are also provided

on other antibiotics from time to time. At present all laboratories also test isolates for the presence of high level resistance to the tetracyclines and intermittent surveys of azithromycin resistance are conducted. Comparability of data is achieved by means of a standardised system of MIC testing and a program-specific quality assurance process.

Australian Meningococcal Surveillance Programme

The reference laboratories of the Australian Meningococcal Surveillance Programme report data of laboratory-confirmed cases confirmed either by culture or by non-culture techniques. Culture-positive cases where a *Neisseria meningitidis* is grown from a normally sterile site or skin, and non-culture based diagnoses, derived from results of nucleic acid amplification assays and serological techniques are defined as invasive meningococcal disease (IMD) according to Public Health Laboratory Network definitions.

Data are reported annually and quarterly in *CDI*. Data in the quarterly reports are restricted to a description of the number of cases per jurisdiction, and serogroup where known. A full analysis of laboratory-confirmed cases of IMD, including phenotyping and antibiotic susceptibility data are published annually (*Commun Dis Intell* 2010;33(3):291–302).

Australian Paediatric Surveillance Unit

The Australian Paediatric Surveillance Unit (APSU) is an active surveillance mechanism for prospective, national identification and study of children (< 15 years) with uncommon conditions of childhood, including rare infectious and vaccine preventable diseases, genetic disorders, child mental health problems, and rare injuries. Each month the APSU sends an e-mail or paper report card to approximately 1,330 paediatricians and other child health clinicians. Clinicians are asked to indicate whether or not they have seen a child newly diagnosed with any of the listed conditions listed. Clinicians reporting cases are asked to provide details about demographics, diagnosis, treatments and short-term outcomes. All negative and positive reports are logged into a database and the report card return rate has been maintained at over 90% over the last 17 years.

Communicable diseases currently under surveillance include: acute flaccid paralysis (to identify potential cases of poliovirus infection); congenital cytomegalovirus infection; congenital rubella; perinatal exposure to HIV and HIV infection, neonatal herpes simplex virus infection; neonatal varicella, congenital varicella, severe complications of varicella.

After demonstrating feasibility in 2007, APSU has conducted surveillance for severe complications of influenza during the influenza season each year. In 2009 APSU contributed to the national surveillance effort during the Influenza H1N1 09 pandemic.

APSU is a unit of the Royal Australasian College of Physicians, Paediatrics and Child Health Division and its activities are supported by the Department of Health and Ageing; Sydney Medical School, The University of Sydney; NHMRC Enabling Grant No: 402784, Practitioner Fellowship No: 457084, E. Elliott, and H1N1 Grant no: 633028; the Creswick Foundation Fellowship (Y Zurynski), and Kids Research Institute at the Children's Hospital at Westmead.

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Australian National Creutzfeldt-Jakob Disease Registry

The surveillance for CJD in Australia is conducted through the Australian National Creutzfeldt-Jakob Disease Registry (ANCJDR). CJD has been scheduled as a notifiable disease in all Australian states and territories. The ANCJDR is under contract to the Commonwealth to identify and investigate all suspect cases of transmissible spongiform encephalopathies (TSE) in Australia. An annual update is published in *CDI (Commun Dis Intell* 2010;34(1):96–101).

Australian Sentinel Practice Research Network

The Royal Australian College of General Practitioners and the Department of General Practice at the University of Adelaide operate the Australian Sentinel Practices Research Network (ASPREN). ASPREN is a national network of general practitioners who report presentations of defined medical conditions each week. The main aims of ASPREN are to provide an indicator of the burden of disease in the primary health care setting and to act as an early warning indicator in the event of an influenza pandemic.

The list of conditions is reviewed annually by the ASPREN management committee and an annual report is published. In 2011, 4 conditions are being monitored; all of which are related to communicable diseases. These include influenza like illness, gastroenteritis, chickenpox and shingles.

Laboratory testing of ILI cases was implemented in 2010, allowing for viral testing of 25% of ILI patients for a range of respiratory viruses including influenza A, influenza B and H1N1(2009).

There are currently 170 general practitioners registered the network from all jurisdictions. Sixty-one per cent of these are in metropolitan areas, 29% in rural and 10% in remote areas of Australia. Approximately 9,000 consultations are recorded each week.

Data for communicable diseases are published in *CDI* every quarter. Data are presented in graphic format as the rate of reporting per 1,000 consultations per week. The conditions are defined as follows:

Influenza-like illness – record once only per patient

Must have the following: fever, cough and fatigue

Gastroenteritis – record once only per patient

Three or more loose stools, and/or 2 vomits in a 24 hour period excluding cases who have a known cause, for example bowel disease, alcohol, pregnancy.

Chickenpox – record once only per patient

An acute, generalised viral disease with a sudden onset of slight fever, mild constitutional symptoms and a skin eruption which is maculopapular for a few hours, vesicular for three to 4 days and leaves a granular scab.

Shingles – record once only per patient

Recurrence, recrudescence or re-activation of chickenpox infection. Vesicles with any erythematous base restricted to skin areas supplied by sensory nerves of a single or associated group of dorsal root ganglia. Lesions may appear in crops in irregular fashion along nerve pathways, are usually unilateral, deeper seated and more closely aggregated than those of chickenpox.

Note: Those conditions which show 'record once only per patient' are to have each occurrence of the condition only recorded on 1 occasion no matter how many patient contacts are made for this condition. If the condition occurs a second or subsequent time, it is to be recorded again. Conversely, for other conditions each attendance at which they are addressed in some way is to be recorded.

HIV and AIDS surveillance

National surveillance for HIV and AIDS is coordinated by the National Centre in HIV Epidemiology and Clinical Research (NCHECR), in collaboration with state and territory health authorities, the Australian Government Department of Health and Ageing, the Australian Institute of Health and Welfare and other collaborating networks in surveillance for HIV/AIDS.

Cases of HIV infection are notified to the National HIV Registry on the first occasion of diagnosis in Australia, either by the diagnosing laboratory (Australian Capital Territory and Tasmania), by doctor notification (Western Australia) or by a combination of laboratory and doctor sources (New South Wales, Northern Territory, Queensland, South Australia and Victoria). Cases of AIDS are notified through the state and territory health authorities to the National AIDS Registry. Diagnoses of both HIV infection and AIDS are notified with the person's date of birth and name code, to minimise duplicate notifications while maintaining confidentiality.

Currently, 2 tables presenting the number of new diagnoses of HIV infection, AIDS and deaths following AIDS are published in each issue of *CDI*. The tabulations are based on data available 3 months after the end of the reporting period, to allow for reporting delay and to incorporate newly available information.

Each year from 1997, the NCHECR has published the *HIV/AIDS, Viral Hepatitis and Sexually Transmissible Infections in Australia Annual Surveillance Report*. The annual surveillance report, available through www.nchecr.unsw.edu.au, provides a comprehensive analysis and interpretation of surveillance data on HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia. The report *Bloodborne viral and sexually transmitted infections in Aboriginal and Torres Strait Islander people: Surveillance and Evaluation Report* has been published from 2007, as an accompanying document to the *Annual Surveillance Report*. The *Surveillance and Evaluation Report* provides detailed analysis and interpretation of the occurrence of these infections in Aboriginal and Torres Strait Islander communities in Australia.

Laboratory Virology and Serology Reporting Scheme

The Laboratory Virology and Serology Reporting Scheme (LabVISE) began operating in 1977. The scheme currently comprises 17 laboratories from all states and the Australian Capital Territory. Contributors submit data fortnightly on the laboratory identification of viruses and other organisms. Each record includes mandatory data fields (laboratory, specimen collection date, a patient identifier code and organism), and optional fields (patient's sex, date of birth or age, postcode of residence, specimen source, clinical diagnosis and the method of diagnosis). Reports are collated, analysed and published quarterly in *CDI*. Each report includes summary tables of total numbers of organisms identified by state or territory and numbers of reports by month and participating laboratory. Monthly updates of LabVISE data are also published on the *Communicable Diseases Surveillance* website.

LabVISE data should be interpreted with caution. The number and type of reports received are subject to a number of biases. These include the number of participating laboratories, which has varied over time. The locations of participating laboratories also create bias, as some jurisdictions are better represented than others. Also changes in diagnostic practices, particularly the introduction of new testing methodologies, may affect laboratory reports. The ability of laboratory tests to distinguish acute from chronic or past infection must also be considered in interpretation of the data. Although changes in incidence cannot be determined with precision from this data, general trends can be observed, for example with respect to seasonality and the age-sex distribution of patients. (Review in *Commun Dis Intell* 2002;26(4):323–374).

National Influenza Surveillance Scheme

Influenza surveillance in Australia is based on several schemes collecting a range of data that can be used to measure influenza activity.

- Since 2001, laboratory-confirmed influenza has been a notifiable disease in all Australian states and territories (except South Australia) and reported in the National Notifiable Diseases Surveillance System.
- In 2009, 6 sentinel general practitioner schemes contribute reports of influenza-like illness: the Australian Sentinel Practice Research Network, the Tropical Influenza Surveillance from the Northern Territory, the New South Wales Sentinel General Practice Scheme, the Victorian Sentinel General Practice Scheme, Queensland and Western Australian sentinel general practices.
- The Laboratory Virology and Serology Reporting Scheme laboratory reports of influenza diagnoses including virus type.
- The results of each of the schemes are published together fortnightly throughout the influenza season (May to October) on the department's web site as the Australian Influenza Report.

Annual reports on influenza in Australia are published in *CDI* each year (*Commun Dis Intell* 2010;34(1):8–22). These reports include the above data as well as absenteeism data from a major national employer, hospitalisation and mortality data and influenza typing data from the WHO Collaborating Centre for Influenza Reference and Research.

OzFoodNet: enhanced foodborne disease surveillance

The Australian Government Department of Health and Ageing established the OzFoodNet network in 2000 to collaborate nationally in the investigation of foodborne disease. OzFoodNet conducts studies on the burden of illness and coordinates national investigations into outbreaks of foodborne disease.

OzFoodNet reports quarterly on investigations of gastroenteritis outbreaks and clusters of disease potentially related to food. Annual reports have been produced and published in *CDI* (*Commun Dis Intell* 2010;34(4):396–426) since 2001. Data are reported from all Australian jurisdictions.

Sentinel Chicken Surveillance Programme

The Sentinel Chicken Surveillance Programme is used to provide an early warning of increased flavivirus activity in Australia. The main viruses of concern are Murray Valley encephalitis (MVEV) and Kunjin viruses. MVEV causes the disease Murray Valley encephalitis (formerly known as Australian encephalitis), a potentially fatal disease in humans. Encephalitis is less frequent in cases of Kunjin virus infection and these encephalitis cases have a lower rate of severe sequelae.

These viruses are enzootic in parts of the north-east Kimberley region of Western Australia and the Top End of the Northern Territory but are epizootic in other areas of the Kimberley, Pilbara, Gascoyne Murchison and Mid-west regions of Western Australia, in north Queensland and in Central Australia. MVEV is also responsible for occasional epidemics of encephalitis in eastern Australia. Since 1974, a number of sentinel chicken flocks have been established in Australia to provide an early warning of increased MVEV activity. These programs are supported by individual state health departments. Each state has a contingency plan that will be implemented if one or more chickens in a flock seroconverts to MVEV.

Currently, flocks are maintained in the north of Western Australia, the Northern Territory, New South Wales and in Victoria. The flocks in Western Australia and the Northern Territory are tested all year round but those in New South Wales and Victoria are tested only in the summer months, during the main MVEV risk season. Results are posted on the National Arbovirus Surveillance Website by state representatives. A yearly summary is presented in *CDI* (*Commun Dis Intell* 2010;34(3):225–240).

References

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