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Ten years of *Staphylococcus aureus* bloodstream and cerebrospinal fluid isolates in Victoria: reports to the Victorian Hospital Pathogen Surveillance Scheme, 1999–2008

Marion Easton and Mark Veitch, Microbiological Diagnostic Unit – Public Health Laboratory, The University of Melbourne

We reviewed reports of *Staphylococcus aureus* (*S. aureus*) bloodstream and cerebrospinal fluid isolates to the Victorian Hospital Pathogen Surveillance Scheme (VHPSS) from 1999 to 2008, and describe the changing epidemiology of *S. aureus* through this period.

An average of 917 *S. aureus* isolates were reported each year. The majority of reports (73 per cent) were of methicillin-sensitive *S. aureus* (MSSA), typically of community onset, numbers of which were relatively stable over the 10 years. Numbers of reports of methicillin-resistant *S. aureus* (MRSA) declined from 2003; the prevalence of methicillin resistance among *S. aureus* declining from 30 per cent in 1999–2003 to 24 per cent in 2004–2008. This decline was mainly attributable to fewer nosocomial infections among adults aged 60 years or more. The proportion of MRSA that were non-multiresistant methicillin-resistant MRSA (nmMRSA) increased in number, from eight per cent of MRSA in 1999–2003 to 28 per cent in 2004–2008. These infections appeared typically to have onset in the community.

These changes suggest a favourable outcome from intensive strategies that aim to reduce nosocomial acquisition of MRSA. However MSSA bacteraemia remains common and the emergence of community nmMRSA warrants clinical vigilance and microbiological surveillance.

**Introduction**

Both methicillin-sensitive *Staphylococcus aureus* (MSSA) and methicillin-resistant *S. aureus* (MRSA) contribute significantly to the burden of nosocomial and community-acquired bacteraemic sepsis in Australia.1 Hand hygiene programs in Victorian hospitals have been associated with a reduction in MRSA bacteraemia in participating centres,2 although the complex ecologies of these infections suggest that ongoing multifaceted surveillance and interventions will be required for sustained control.3

In recent years there have been reports of serious skin and soft tissue infections and bacteraemia caused by methicillin-resistant *S. aureus* strains that are susceptible to a range of non-beta-lactam antibiotics (non-multiresistant MRSA, nmMRSA), and which may carry the toxin-producing Panton-Valentine leukocidin (PVL) gene. Many of these nmMRSA infections appear to be community-acquired, and they may affect persons with no risk factors or healthcare-association. They have become more common in Australia since 2000.4

We looked at ten years of Victorian Hospital Pathogen Surveillance Scheme (VHPSS) bloodstream and cerebrospinal fluid (CSF) isolate data to review trends in reports of MSSA and MRSA and their epidemiological associations. We used the antimicrobial susceptibility patterns of MRSA isolates to identify isolates with phenotypic characteristics of nmMRSA strains.

**Methods**

VHPSS provides voluntary, laboratory-based surveillance of bacteria and fungi isolated from the bloodstream and CSF of humans in Victoria, encompassing infections acquired in both community and healthcare settings. Data include demographic characteristics (anonymous identifier, age, sex), dates of admission to hospital and collection of the diagnostic specimen, and the identity and antimicrobial susceptibilities of the bacterium or fungus.

We recently assessed the contribution of Victorian health agencies to VHPSS using a comprehensive list of Victorian hospitals and comparing contributing and non-contributing hospitals while taking account of hospital category, bed-numbers and case-mix. We estimated that VHPSS captures approximately 60 per cent of Victorian bloodstream and CSF isolates. Contributing laboratories were associated with a range of public and private, metropolitan and regional hospitals as well as outpatient clinics, such that VHPSS data were likely to be drawn from broad and representative sectors of the Victorian population.

We reviewed reports of *S. aureus* to the VHPSS from January 1999 to December 2008 and described their epidemiology and antimicrobial susceptibility. Cases were defined as the first isolate of a *S. aureus* from the bloodstream or CSF of a person in a 14-day period. For the years 1999 to 2002, an earlier database used a slightly different definition: the first isolate in a 10-day period. A second isolate from the same person outside these time-frames was counted as a second episode.

We used patient admission dates to calculate the duration of hospitalisation prior to the diagnostic specimen being collected. Isolates from specimens collected before the third day of hospitalisation we classified as community-onset infections. *S. aureus* isolates from specimens collected three or more days after hospitalisation we classified as nosocomial infections.

To identify nmMRSA we reviewed reports of MRSA that included data on six key non-beta lactam antimicrobial agents:
ciprofloxacin, erythromycin, fusidic acid, gentamicin, rifampicin and tetracycline. Isolates resistant to meticillin and to no more than two of these antimicrobial agents were classified as nmMRSA.

We used Australian Bureau of Statistics mid-year population data to calculate rates. We calculated 95 per cent confidence intervals (CI) for proportions using Wilson’s method, and used OpenEpi Version 2.37 to calculate CI for rates (using the Mid-P exact test or Taylor series) and for rate ratios (RR, using Byar’s method).

Results

There were 9,166 reports of *S. aureus* to the VHPSS from 1999 to 2008; 9,141 isolates from blood cultures and 25 from CSF; an average of 917 reports per year, range 837 to 935 (figure 1). The overall average annual rate per 100,000 population of *S. aureus* reports to VHPSS was 18.5 (CI 18.1–18.8). We divided the data into two five year periods, 1999–2003 and 2004–2008 to describe trends in the data from earlier and later years. The average annual rate of reports declined from 19.5 in 1999–2003 to 17.5 in 2004–2008 (RR 0.90, CI 0.86–0.94). Almost all (99 per cent) reports included meticillin susceptibility data. The overall prevalence of meticillin resistance among *S. aureus* was 27 per cent (CI 26–28 per cent). The number of reports of MSSA fluctuated over the ten years; however, the number of reports of MRSA declined steadily from 2003 onwards. The prevalence of meticillin resistance among *S. aureus* declined from a peak of 32 per cent in 2003 to 19 per cent in 2008, averaging 30 per cent (CI 28–31 per cent) in the years 1999–2003 and 24 per cent (CI 22–25 per cent) in 2004–2008. The average annual rate per 100,000 population of MRSA reports to VHPSS declined from 5.7 in 1999–2003 to 4.1 in 2004–2008 (RR 0.73, CI 0.67–0.79).

**Age and sex distribution**

The average annual rate of *S. aureus* reports to VHPSS was highest among infants aged less than one month, 380 per 100,000 population. The rate dropped to 88 among infants aged one month, then continued to decline during the first year of life. From the second year of life, reports were rare and rates similar to those of other, older children (around 11 per 100,000 among all children aged less than 10 years). The rate remained low until the fifth decade of life, then increased steadily with age, reaching 105 among adults aged 80 years or more (figure 2).

The overall average annual rate per 100,000 population of MRSA reports to VHPSS was 4.9. Among children aged less than 10 years the rate was 0.8; highest among those aged less than one year (5.7), 19.6 among infants aged less than one month. However, the absolute number of reports of MRSA among these young children was small (36 aged less than 10 years, 10 of whom were aged less than one month). The rate of MRSA reports becomes substantial after middle-age, increasing with age to 29 per 100,000 among those aged 80 years or more (figure 2).
There were statistically significant decreases in the age-specific rates of MRSA reports from the period 1999–2003 to 2004–2008 for all age groups except zero to nine, 10 to 19, and 30 to 39 years (figure 3, rate ratios not shown).

The overall average annual rate per 100,000 population of MSSA reports to VHPSS was 13.4. The age-specific rates of MSSA reports varied only slightly in these two time periods.

The prevalence of methicillin resistance among \textit{S. aureus} isolates increased with age. Eight per cent of \textit{S. aureus} isolates among children less than 10 years were MRSA; nine per cent among those aged less than one year and five per cent among babies in the first month of life. The prevalence among 10 to 19 year-olds was 11 per cent; thereafter, among adults, the prevalence of methicillin resistance ranged from 24 per cent among 20 to 29 year-olds to 31 per cent among 70 to 79 year-olds.

The average annual rate per 100,000 population of \textit{S. aureus} reports was higher among males (23.7) than females (13.5; RR 1.76, CI 1.69–1.84). This approximately two-fold rate difference was apparent across all age groups beyond the first decade of life.

### Duration of hospitalisation prior to specimen collection

Dates of admission were available for 7,720 (84.2 per cent) reports. Overall, 37 per cent (CI 36–38 per cent) of \textit{S. aureus} isolates were from specimens collected three or more days after hospitalisation, suggesting nosocomial infection. The prevalence of such reports declined from an average of 42 per cent (CI 41–44 per cent) in 1999–2003 to 33 per cent (CI 31–34 per cent) in 2004–2008.

Both date of admission and methicillin susceptibility data were available for 7,679 (83.8 per cent) reports. The prevalence of methicillin resistance among isolates from specimens collected before the third day of hospitalisation was 17 per cent (CI 16–18 per cent). The prevalence of methicillin resistance among isolates from early hospitalisation declined modestly from 19 per cent (CI 17–21 per cent) in 1999–2003 to 16 per cent (CI 15–17 per cent) in 2004–2008.

The prevalence of methicillin resistance among isolates from specimens collected three or more days after hospitalisation was 45 per cent (CI 43–47 per cent). The prevalence of methicillin resistance among these nosocomial isolates declined from 49 per cent (CI 47–52 per cent) in 1999–2003 to 41 per cent (CI 38–43 per cent) in 2004–2008. Among nosocomial isolates, the prevalence of methicillin resistance increased with the duration of hospitalisation prior to specimen collection; from 25 per cent (CI 22–27 per cent) among specimens collected between three and seven days, to 59 per cent (CI 57–61 per cent) after seven days.

### Non-multiresistant methicillin resistant \textit{S. aureus} (nmMRSA)

Half of all 2,422 reports of MRSA included susceptibility data for the six key non-beta lactam antimicrobial agents that we used to identify nmMRSA. The proportion of reports including these data increased from 42 per cent in 1999–2003 to 62 per cent in 2004–2008. The number and proportion of MRSA isolates that were nmMRSA increased from 47 of 574 isolates (eight per cent, CI 6–11 per cent) in 1999–2003 to 181 of 655 isolates (28 per cent, CI 24–31 per cent) in 2004–2008. The age distribution of nmMRSA cases was similar to that of MRSA as a whole.

Overall 1,112 (46 per cent) reports of MRSA included dates of hospitalisation and key antimicrobial susceptibility data. Twenty-eight per cent (CI 24–32 per cent) of MRSA isolates from specimens collected before the third day of hospitalisation (community-onset) were nmMRSA. The number and proportion of community-onset MRSA infections that were nmMRSA increased from 23 of 159 isolates (14 per cent, CI 10–21 per cent) in 1999–2003 to 101 of 283 isolates (36 per cent, CI 30–41 per cent) in 2004–2008.

Twelve per cent of nosocomial MRSA isolates were nmMRSA. These also increased, from 15 of 332 isolates (four per cent, CI 3–7 per cent) in 1999–2003 to 90 of 544 isolates (17 per cent, CI 14–20 per cent) in 2004–2008.

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**Figure 3: Age-specific average annual rate of MRSA reports to VHPSS, 1999–2003 and 2004–2008**

<table>
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<th>Age group (years)</th>
<th>1999–2003</th>
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<td>80+</td>
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to 70 of 338 isolates (21 per cent, CI 17–25 per cent) in 2004–2008. A quarter of the nmMRSA isolates were sensitive to all six antimicrobials. Thirty-seven per cent were resistant to ciprofloxacin, 30 per cent to erythromycin, eight per cent to gentamicin, six per cent to tetracycline, three per cent to fusidic acid and no isolates were reported to be resistant to rifampicin. 

Cerebrospinal fluid isolates
There were 25 reports of S. aureus from CSF specimens from 1999 to 2008 (annual range 0–7 isolates). Nine isolates were from cases aged less than 10 years of age, four of whom were aged less than one year; five cases were aged 70 years or more. Nine isolates were MRSA, two from cases less than one month old and seven from adult cases. Twelve S. aureus CSF isolates appeared to be nosocomial, half of which were MRSA. Of the nine apparently community-onset cases, three were MRSA.

Discussion
Mortality from S. aureus bacteraemia (SAB) has been estimated to be around 20 per cent, regardless of the methicillin susceptibility of the isolate, and is considerably higher in the elderly. Measurement of SAB has been widely adopted by healthcare agencies as a clinical performance indicator. Debate surrounds the most appropriate methodology for calculating the incidence of SAB in various settings and populations.

Data from VHPSS from 1999 to 2008 provide an overview of the population-wide epidemiology of S. aureus bacteraemia in Victoria. Taking our estimate of under-reporting into account, the rate in Victoria is likely to be around 31 cases per 100,000 persons per year, consistent with previous estimates of this burden.6

These data bear several familiar messages. The sector of the population that experiences the greatest burden of S. aureus bacteraemia comprises middle-aged and elderly persons, particularly men. The most common category of S. aureus bacteraemia in Victoria remains methicillin-sensitive S. aureus (MSSA) infection, usually with onset in the community (but sometimes with healthcare-associations not identified by VHPSS). Neonates experience very high rates of S. aureus bacteraemia, mostly due to sensitive strains. Consistent with other accounts are our observations that the number of reports of methicillin-resistant S. aureus (MRSA) isolates, and the prevalence of methicillin resistance among S. aureus isolates, have both declined since 2003, through a time when various interventions directed at the surveillance and prevention of nosocomial infections were implemented in many of the hospitals that contribute data to VHPSS. Older hospitalised adults appear to have benefited most. The epidemiology of MSSA has changed much less.

VHPSS is a longstanding, pragmatic and largely stable surveillance system. There was a change in the case definition early in the period covered by this report. This resulted in the inclusion of a relatively small number of additional methicillin sensitive and resistant S. aureus isolates in the earlier time period, but had little effect on the significance of the overall decline in MRSA from 2003 onwards. All but two of the contributing laboratories contributed consistently throughout the period of this review. Two laboratories dropped out early in the time period; however amalgamation of other laboratories and improved efficiency of reporting during the period of this review diminished the modest effect of the missing contributors. A proportion of isolates that we classified as community-onset infections will have been associated with various forms of healthcare before hospitalisation with S. aureus sepsis, but we were unable to get at this detail through VHPSS. Understanding the contribution of infections associated with settings such as long-term care facilities, short-stay procedures, and dialysis, requires surveillance that incorporates active enquiry about the circumstances preceding diagnosis of the infection.

Data on nmMRSA from VHPSS are less readily extrapolated to the wider Victorian population because of both under-reporting to VHPSS, and incompleteness of reporting of the antimicrobial susceptibilities needed to classify an isolate as nmMRSA. Reporting of antimicrobial susceptibilities was more complete during the latter years of this account and we estimate that an annual average of between 50 and 100 episodes of bacteraemia due to phenotypic nmMRSA isolates may have occurred in the years 2003 to 2008. Awareness of the possibility of community-acquired nmMRSA sepsis may promote timely and appropriate therapy of this life-threatening infection. More clinically and epidemiologically detailed surveillance may identify clues that provide an early indication that an episode of sepsis could be due to nmMRSA.

Enhanced surveillance should encompass host risk factors (particularly those amenable to intervention), and
phenotypic and genotypic characteristics of *S. aureus* isolates (particularly molecular markers of MRSA and nmMRSA, including the PVL gene). This surveillance should be accompanied by measures of the application and outcome of the various interventions currently being directed at these important pathogens.

**Acknowledgements**

We gratefully acknowledge the confidential contributions of Victorian laboratories to VHPSS, the support provided by the Department of Health, and data management by Wendy Siryj. Data are subject to revision.

**References**


Introduction

The Victorian Infectious Diseases Bulletin (VIDB) was initiated in 1997 by the then Department of Human Services, the Victorian Infectious Diseases Reference Laboratory, the Microbiological Diagnostic Unit, and the Macfarlane Burnet Institute. Since its inception, 42 issues have been published on a quarterly basis, and it continues to be distributed free of charge to persons with an interest in the epidemiology and control of infectious diseases including clinicians, laboratory staff, researchers, service providers and the general public.

Over the years, VIDB has maintained its objective in providing its readers with up-to-date information on infectious diseases, including summaries of infectious disease surveillance data; outbreak investigations; clinical case reports; and brief reports on original research.

In 2000, the VIDB editorial committee undertook a readership survey to better understand the profile of our subscribers. A decade on, we are now examining VIDB’s subscribership.

Methods

We reviewed VIDB’s subscriber database to examine subscribers: 1) state/territory and country of mailing address; 2) self-described professional type; and 3) accessibility preferences. Website statistics for the webpage on which VIDB issues are located (www.health.vic.gov.au/ideas/surveillance/vidb) were also reviewed for the period 1 January 2009–31 December 2009. We report the number of unique visitors to the site and number of issues downloaded during 2009.

Results

Subscribers

By the end of 2009, a total of 1,925 people or organisations were subscribers to VIDB. A majority of subscribers had their subscriptions sent to Victorian addresses (n=1,817, 94 per cent) (table 1). Twenty-one subscriptions were from overseas locations including at least one subscriber from the following locations: United States, Fiji, Pakistan, Norway, Japan, New Caledonia, the Netherlands, Thailand, Switzerland, Singapore and Nigeria.

Information about subscribers’ professional type was available for 1,529 (79 per cent) subscribers (table 2). The single greatest proportion of subscribers were from general practice (n=425, 28 per cent). This represents nearly seven per cent of the 6,229 Victorian general practitioners (data based on the headcount of all general practitioners who provided at least one Medicare service during the 2008/2009 financial year). Subscribers from hospitals, hospices and nursing homes also comprised a large proportion of VIDB’s subscribers (n=372, 24 per cent). The category of ‘Other specialist services’ included refugee health (n=12), maternal and child health (n=17), drug and alcohol services (n=5), dentists (n=4), and pharmacists (n=7).

Accessibility

Subscribers to VIDB can receive the publication in hardcopy, which is mailed to subscribers’ preferred address, and/or they can receive an email announcing the release of each issue. The email directs subscribers to download the issue as a portable document format (PDF) from the Department of Health’s Infectious Disease Surveillance and Epidemiology website: www.health.vic.gov.au/ideas/surveillance/vidb. Almost all subscribers (n=1,898, 99 per cent) received the hardcopy publication in 2009, with only 26 subscribers opting to receive it by email alone.

Table 1: Number of VIDB subscribers by Australian state/territory or overseas location

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Table 2: VIDB subscribers’ professional type

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A review of the traffic to the dedicated VIDB web page demonstrated that, during 2009, there were 146 viewers of the webpage in which VIDB is located. This means that 146 unique visitors clicked on that page; however, these 146 visitors may have visited the site more than once over the reporting period (multiple visits are not included in the statistic). In contrast, the number of times issues of VIDB were downloaded during the same period was markedly higher. Fourteen different issues of VIDB were downloaded between seven and 375 times, totalling 1,570 downloads. The download history for the top six most frequently downloaded issues in 2009 is shown in table 3.

It is not possible to distinguish subscribers from non-subscribers among those who access VIDB via the website.

### Conclusion

The review of VIDB’s subscriber base demonstrated that subscribers to VIDB encompass people from a variety of health and policy-making sectors, as well as geographical locations from within and outside the state of Victoria. These findings are consistent with the publication’s original target audience of local clinicians and other health service providers.

Accessibility has shifted from exclusively hardcopy distribution to include online access, although hardcopy remains the primary method of access for most subscribers. A subscriber survey is required to determine whether this continues to be the preferred method of access, as well as interest in other options such as online publishing ahead of hardcopy.

We were surprised at the relatively few number of visitors to the VIDB web page: only 146 unique visitors, compared to the large number of downloads in the same reporting period of 1,570. This may be explained by people accessing the PDFs of VIDB directly via links or bookmarks from other websites, including access via search engine results (which are not included in the web site statistics and therefore in addition to the 146 unique visitors).

The editorial committee strongly supports early career writers, and we actively encourage contributions to VIDB be that of short reports, clinical vignettes, letters or reports from case series investigations. Articles, which may be subject to peer review, are also encouraged. For those wishing to contribute, we offer the following as a guide: Lead articles should be no more 2,500 words with a 200 word abstract. Non-peer reviewed articles should be 2,000 words, and short reports and letters, 1,000 words.

The VIDB editorial committee would like to thank all contributors, past and present, and subscribers for their continuing support. In particular, we wish to thank the clinicians and laboratories without whom surveillance of infectious diseases of public health importance would not be possible.

Finally, in the interest of continually improving VIDB, we welcome feedback from our readers at any time. People wishing to subscribe or provide feedback can contact the Editor via email on vidb@health.vic.gov.au or contact the Communicable Disease Prevention and Control Unit on 1300 651 160.

### References

### Table 3: Download history for the top six most frequently downloaded VIDB issues, 2009

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* Volume 12 issue 2 was the most recent available issue at the time data were accessed.
Introduction

Men who have sex with men (MSM) are known to be at high risk of HIV and other sexually transmitted infections (STIs). In Victoria, overall new diagnoses of HIV grew from 204 in 2003 to 263 in 2007, a 29 per cent increase,1 with a further 261 new diagnoses in 2008.2 In 2008 72 per cent of new HIV diagnoses were among MSM.2 Notifications of infectious syphilis also increased sharply, from 27 cases in 2002 to a peak of 434 cases in 2007, falling to 369 in 2008.3 Chlamydia was the most commonly notified infection in Victoria, with over 5,000 notifications in males in 2008; although a large number of notifications were attributed to heterosexual contact, male-male sexual contact accounted for 22 per cent of male cases for which enhanced surveillance was performed.2

To gain more information about populations at risk testing for blood borne viruses (BBVs) and STIs the Victorian Primary Care Network for Sentinel Surveillance on BBVs and STIs (VPCNSS) was established in 2006. Regular reports from the four networks of the VPCNSS can be found at http://www.health.vic.gov.au/ideas/surveillance/descriptive_reports. This report focuses on MSM tested in the HIV, syphilis and chlamydia networks of the VPCNSS in 2008.

Methods

Data collection

Data collection for the VPCNSS commenced in April 2006 at 17 sentinel sites. The sites were selected to cover the main populations at risk of HIV, chlamydia, hepatitis C and syphilis. The VPCNSS links demographic and sexual behaviour information of clients presenting for testing with their BBV/STI test results. More detailed description of the methods used in the VPCNSS can be found at http://www.burnet.edu.au/home/cph/current/sentinelsurveillance. Five sites – two sexual health clinics and three general practice clinics specialising in gay men’s health – are included in this analysis.

Data analysis

Data for MSM tested for HIV, syphilis and chlamydia at the five sites during 2008 were analysed and compared to results for 2007. Only tests and matching demographic and sexual behaviour information from MSM were included in the analysis. Where behavioural data were unavailable, individuals were considered MSM if they were known to be HIV positive and were presenting for STI testing or if they’d had an anal or pharyngeal swab when tested for chlamydia.

Test records with an HIV indeterminate or syphilis inactive infection, and repeat positive chlamydia or syphilis tests (within 30 days) were excluded from analysis, as were MSM of unknown HIV status. Chlamydia tests from multiple anatomical sites on the same day were collapsed together as one testing record. Data from one general practice clinic that ceased completing questionnaires in 2007 were excluded from the HIV network as testing data were incomplete, but included in testing data for syphilis and chlamydia networks. Where an individual was found to be newly infected with HIV but had not completed a questionnaire, demographic and exposure information was sought from the HIV passive surveillance system.

As individuals may have presented multiple times for testing, only the first test for each individual in each calendar year was included in analyses of the characteristics of those tested and the proportion positive (number of positive tests as a percentage of the total number of tests) for each infection.

Behavioural data collection at sexual health clinics is performed as part of routine clinical service and differs slightly from data collected at the general practice clinics so is not directly comparable. Only data from general practice clinics are presented in analyses related to sexual behaviour. Behavioural data collection from HIV positive MSM tested for chlamydia and/or syphilis was infrequently completed, limiting analyses among HIV positive MSM to frequency of testing and age group only.

Key Findings

• The number of tests conducted increased in 2008 compared to 2007 while the average number of tests per individuals remained stable, suggesting more individuals are presenting for testing
• The proportion positive for all infections remained steady among HIV negative MSM, and decreased among HIV positive MSM
• The proportion positive for STIs remains high among MSM aged 16-29 years and those born outside of Australia
Results

HIV negative MSM

Testing among HIV negative MSM over time is presented in figure 1.

HIV Testing

In 2008 there were 5,573 HIV tests conducted among MSM. The average number of HIV tests conducted per quarter in 2008 was 1,393 (range 1,368–1,420) compared to 1,193 tests per quarter (range 1,158–1,212) in 2007. In 2008 1.8 per cent of HIV tests were positive, similar to the 2007 proportion of 1.7 per cent. Individuals included within the system were tested for HIV an average of 1.4 times in 2008, compared to 1.3 times in 2007.

Chlamydia testing

In 2008 there were 5,742 chlamydia tests conducted among HIV negative MSM. There was an increase in the average number of chlamydia tests conducted in 2008 (average 1,436 tests per quarter, range 1,402–1,478) compared to 2007 (average 1,272 tests per quarter, range 1,212–1,300) although the number of tests conducted in each individual remained the same (average 1.3 tests per individual per year in 2007 and 2008). Fewer than two per cent (1.9 per cent) of chlamydia tests in HIV negative MSM were positive in 2008, compared to two per cent in 2007.

Syphilis testing

In 2008 there were 5,267 syphilis tests conducted among HIV negative MSM. There was an increase in the average number of syphilis tests conducted in 2008 (average 1,317 tests per quarter, range 1,291–1,342) compared to 2007 (average 1,141 tests per quarter, range 1,210–1,156) although the number of tests conducted in each individual remained the same (average 1.3 tests per individual per year in 2007 and 2008). Fewer than two per cent (1.9 per cent) of syphilis tests in HIV negative MSM were positive in 2008, compared to two per cent in 2007.

Characteristics of individuals tested

Table 1 presents the characteristics of MSM tested for HIV with matched demographic and behaviour information at four sentinel sites from 2006 to 2008.1 A majority of those tested in 2008 were born in Australia (67 per cent) and had been previously tested for HIV (86 per cent). Four per cent of MSM reported a history of injecting drug use. The median age of those tested for HIV in 2008 was 32.9 years (range 16.5–83.4 years).

Among individuals tested at general practice clinics, for which more detailed behavioural information was available, 21 per cent reported six or more anal sex partners and over a third (39 per cent) reported six or more oral sex partners in the past six months in 2008. A majority reported casual (70 per cent) and regular (61 per cent) sex partners in the past six months. Just over half (54 per cent) did not always use condoms with regular partners and around a third (32 per cent) did not always use condoms with casual partners. Almost half (45 per cent) reported meeting sex partners on the internet or at sex on premises venues. A small minority (seven per cent) reported having a current regular partner who was known to be HIV positive.

Characteristics of individuals tested in 2008 were similar to those tested in 2007, with the exception of country of birth: 67 per cent of those tested in 2008 were born in Australia compared to 72 per cent in 2007.

Proportion positive for HIV

In 2008, the proportion positive for HIV was 2.0 per cent among MSM with matched demographic and behavioural information, compared to 2.1 per cent in 2007 (Table 2). In 2008 the proportion positive was highest among individuals aged 30–39 years (2.6 per cent), individuals who had never previously been tested for HIV (3.2 per cent), did not always use condoms with casual (2.3 per cent) and/or regular (2.3 per cent)

* One general practice clinic is excluded from the HIV testing data. See methods for more details

1 Most of the HIV negative men tested for chlamydia and/or syphilis were also tested for HIV, thus only the characteristics of those tested for HIV are presented.
partners or reported a current HIV positive regular partner (4.9 per cent).

Although the overall proportion positive did not increase in 2008 compared to 2007, there were rises in the proportion positive among those aged 30 to 39 years (2.6 per cent compared to 2.1 per cent), individuals reporting never having had an HIV test (3.2 per cent compared to 2.8 per cent) and individuals presenting at general practice clinics (2.0 per cent compared to 1.7 per cent). There were decreases in the proportion positive in 2008 compared to 2007 among individuals aged 40 years and older (2.0 per cent compared to 2.7 per cent) and those tested at sexual health centres (2.0 per cent compared to 2.3 per cent).

### Proportion positive for Syphilis

In 2008, the proportion positive for syphilis was 2.1 per cent among HIV negative MSM with matched demographic and behavioural information, compared to 2.2 per cent in 2007 (Table 2). The proportion positive was highest among individuals aged 16–29 years (2.2 per cent) and 40 years and older (2.2 per cent), those born outside of Australia (2.1 per cent) and tested at sexual health centres (2.2 per cent). Among those with more detailed behavioural information available, the proportion positive was highest among those with six or more anal sex partners in the past six months (2.5 per cent) and those who did not always use condoms with casual (2.4 per cent) or regular (2.8 per cent) partners.

Between 2007 and 2008 there was an increase in the proportion positive for syphilis among individuals aged 16–29 years (2.2 per cent in 2008 compared to 1.7 per cent in 2007) and those born outside of Australia (2.1 per cent compared to 1.8 per cent). The proportion positive decreased among those aged 30–39 years (1.8 per cent in 2008 compared to 2.1 per cent in 2007) and 40 years and older (2.2 per cent compared to 3.0 per cent), individuals born in Australia (1.8 per cent compared to 2.0 per cent) and among those tested at sexual health centres (2.2 per cent compared to 2.6 per cent). Among those who did not always use condoms with casual partners the proportion positive was 2.4 per cent, compared to 2.0 per cent in 2007, while among those who did not always use condoms with regular partners the proportion was 2.8 per cent (compared to 2.4 per cent in 2007).

### Proportion positive for Chlamydia

In 2008, the proportion positive for chlamydia was 5.4 per cent among HIV negative MSM with matched demographic and behavioural information, compared to 5.5 per cent in 2007. The proportion positive was highest among individuals aged 16 to 29 years (6.8 per cent), those born outside of Australia (6.4 per cent) and those tested at sexual health centres (6.4 per cent). Among those with more detailed behavioural information available, the proportion positive was highest among those with six or more anal sex partners in the past six months (7.5 per cent) and individuals who do not always use condoms with casual (7.0 per cent) or regular (5.2 per cent) partners.

### Table 1: Characteristics of HIV negative MSM surveyed and tested for HIV*

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>All matched records</td>
<td>3565</td>
<td>100</td>
</tr>
<tr>
<td>Aged 16–29 years</td>
<td>1357</td>
<td>38.1</td>
</tr>
<tr>
<td>Aged 30–39 years</td>
<td>1169</td>
<td>32.8</td>
</tr>
<tr>
<td>Aged 40+ years</td>
<td>1039</td>
<td>29.1</td>
</tr>
<tr>
<td>Known Aboriginal/Torres Strait Islander origin</td>
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<tr>
<td>Born in Australia</td>
<td>2563</td>
<td>71.9</td>
</tr>
<tr>
<td>Had a previous test for HIV</td>
<td>3023</td>
<td>84.8</td>
</tr>
<tr>
<td>Known sex worker</td>
<td>83</td>
<td>2.3</td>
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<tr>
<td>History of injecting drug use</td>
<td>184</td>
<td>5.2</td>
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Matched records from general practice clinics

<table>
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<tr>
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<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
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<tr>
<td>Six or more oral sex partners in past six months</td>
<td>682</td>
<td>40.6</td>
</tr>
<tr>
<td>Six or more anal sex partners in past six months</td>
<td>394</td>
<td>23.4</td>
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<tr>
<td>Had casual sex partner/s, last six months</td>
<td>1147</td>
<td>68.2</td>
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<tr>
<td>Did not always use condoms with casual partner, last six months†</td>
<td>391</td>
<td>34.1</td>
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<tr>
<td>Had regular sex partner/s, last six months</td>
<td>973</td>
<td>57.9</td>
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<tr>
<td>Did not always use condoms with regular partner, last six months†</td>
<td>545</td>
<td>56.0</td>
</tr>
<tr>
<td>Has current regular sex partner who is HIV positive</td>
<td>112</td>
<td>6.7</td>
</tr>
<tr>
<td>Meets sex partners at high risk venues~</td>
<td>783</td>
<td>44.7</td>
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</tbody>
</table>

* Includes the first test for each individual in each calendar year
~ Sex on premises venues and on internet. Not collected in 2007
† Includes those who never used condoms
Table 2: Proportion positive for HIV, syphilis and chlamydia among HIV negative MSM by selected characteristics (unknowns excluded), 2007 and 2008*

<table>
<thead>
<tr>
<th></th>
<th>HIV</th>
<th>Syphilis</th>
<th>Chlamydia</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2008 n</td>
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<td>188</td>
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<tr>
<td>16–29</td>
<td>20</td>
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<td>30–39</td>
<td>25</td>
<td>2.1</td>
<td>32</td>
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<td>40+</td>
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<td>23</td>
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<tr>
<td></td>
<td>69</td>
<td>5.1</td>
<td>106</td>
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<td>47</td>
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<td>Yes</td>
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<td>Born in Australia</td>
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<td>Site tested at</td>
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<td>45</td>
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<td></td>
<td>29</td>
<td>1.7</td>
<td>35</td>
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<td></td>
</tr>
<tr>
<td>Number tested</td>
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<tr>
<td>Number of male oral sex partners, last six months</td>
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<tr>
<td>None</td>
<td>3</td>
<td>6.5</td>
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<tr>
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<td>16</td>
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<tr>
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<td>11</td>
<td>2.8</td>
<td>7</td>
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</tr>
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<td>2.1</td>
<td>9</td>
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<td>Casual sex partner/s and condom use, past six months</td>
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<tr>
<td>No casual partner/s</td>
<td>1</td>
<td>0.2</td>
<td>8</td>
</tr>
<tr>
<td>Did not always use condoms</td>
<td>8</td>
<td>2.1</td>
<td>9</td>
</tr>
<tr>
<td>Always used condoms</td>
<td>10</td>
<td>1.3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Regular sex partner/s and condom use, past six months</td>
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<td></td>
</tr>
<tr>
<td>No regular partner/s</td>
<td>8</td>
<td>1.4</td>
<td>6</td>
</tr>
<tr>
<td>Did not always use condoms</td>
<td>6</td>
<td>1.1</td>
<td>13</td>
</tr>
<tr>
<td>Always used condoms</td>
<td>5</td>
<td>1.7</td>
<td>6</td>
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<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HIV status of current regular partner</td>
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<tr>
<td>No regular partner</td>
<td>10</td>
<td>1.4</td>
<td>7</td>
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<tr>
<td>Negative</td>
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<td>Positive</td>
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<td>0.9</td>
<td>6</td>
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<td>Don’t know/haven’t had a test</td>
<td>0</td>
<td>0.0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meets partners at high risk venues ~</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>1.9</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>1.2</td>
<td>14</td>
</tr>
</tbody>
</table>

* Includes the first test for each individual in each calendar year for each infection
~ Sex on premises venues and on internet. Not collected in 2007
Although the overall proportion positive did not increase in 2008 compared to 2007, there were rises in the proportion positive among those aged 16 to 29 years (6.8 per cent in 2008 compared to 5.1 per cent in 2007), and among those tested at sexual health centres (6.3 per cent compared to 6.0 per cent). There were decreases in the proportion positive in 2008 compared to 2007 among individuals aged 30–39 years (5.5 per cent compared to 6.5 per cent) and those aged 40 years and older (4.3 per cent compared to 5.0 per cent).

**HIV positive MSM**

Figure 2 presents testing for syphilis and chlamydia among HIV positive MSM over time.

**Chlamydia testing**

In 2008 there were 972 chlamydia tests performed in HIV positive MSM. An average of 243 (range 222–258) chlamydia tests were conducted per quarter in 2007, an increase on the average of 198 (range 184–208) tests conducted per quarter in 2008. The average number of tests conducted annually in each individual was 1.5 in 2008 compared to 1.4 in 2007, just under ten per cent (9.8 per cent) of chlamydia tests among HIV positive MSM were positive in 2008, compared to 10.6 per cent in 2007.

**Syphilis testing**

In 2008 there were 8,035 syphilis tests performed in HIV positive MSM. There was an increase in the average number of syphilis tests conducted each quarter (880, range 847–936) in 2007 compared to 2007 (781, range 756–814). The average number of tests conducted annually in each individual remained similar in 2008 (2.1) compared to 2007 (2.0). Just over two per cent (2.1 per cent) of syphilis tests among HIV positive MSM were positive in 2008, compared to 2.9 per cent in 2007.

**Characteristics of individuals tested**

The age breakdown of HIV positive MSM tested for chlamydia and syphilis in 2007 and 2008 are presented in table 3. Individuals aged 40 years and older accounted for a majority of those tested for chlamydia (55 per cent) and syphilis (61 per cent) in 2008. The age of those tested for both infections did not change markedly between 2007 and 2008. The proportion positive for both chlamydia and syphilis in 2008 was highest among HIV positive individuals aged 16 to 29 years (15.9 per cent for chlamydia and 7.6 per cent for syphilis). Among this age group, the proportion positive for chlamydia remained stable between 2007 and 2008, but rose for syphilis (7.6 per cent in 2008 compared to 5.8 per cent in 2007). There was a decline in the proportion of 30 to 39 year olds found to be positive for chlamydia in 2008 (10.8 per cent) compared to 2007 (6.8 per cent).
Discussion
The VPCNSS is able to provide unique, ongoing data about MSM presenting for testing for BBVs and other STIs in Victoria. In 2008 the system captured over half of new HIV (97/188, 52 per cent) and infectious syphilis (171/316, 54 per cent) notifications reported in MSM in Victoria, indicating the success of the system in capturing surveillance information on men most at risk of these infections. The demographics and sexual behaviour of MSM tested in the VPCNSS are similar to MSM surveyed in the 2008 Melbourne Gay Periodic Survey, suggesting this clinic-based population has a similar risk profile to a wider sample. In addition to coverage and representation, key strengths of the system are its ability to monitor testing in both HIV negative and HIV positive MSM and to measure the proportion of positive tests among those tested.

In 2008 there was an increase in the number of HIV, syphilis and chlamydia tests conducted among HIV negative MSM compared to 2007. As the average number of tests conducted in each individual remained relatively steady, this result suggests an increased number of men presenting for testing. Further analysis could be performed to assess whether this increase may be a result of recent health promotion campaigns targeting MSM.

Almost half of HIV negative MSM presenting for testing at general practice reported recently meeting sex partners at ‘high risk’ venues (internet or sex on premises venues) and just under a third reported unprotected sex with casual partners, reflecting the high risk nature of the population served. This result also suggests the need to further encourage regular testing among MSM reporting these behaviours, consistent with guidelines recommending testing every three to six months in this group.

Although in 2008 notifications for HIV levelled and declined for syphilis, the proportion of positive HIV and syphilis tests among HIV negative MSM tested in the VPCNSS remained relatively steady from 2007 to 2008. This unchanging positivity rate occurred in the context of increasing testing for both infections; coupled with risk behaviour data, this suggests that high risk individuals are continuing to present for testing at these sentinel sites.

Among HIV negative MSM tested, individuals aged 16 to 29 years, and those born outside of Australia remain priority sub-populations, as demonstrated by the high proportion of positive chlamydia and syphilis tests. In addition, the proportion positive for chlamydia and syphilis in these two groups increased in 2008 compared to 2007, despite the overall proportion positive for chlamydia and syphilis remaining steady.

Among HIV positive MSM, the number of chlamydia and syphilis tests also increased between 2007 and 2008, while the average number of tests conducted in each individual remained relatively steady. Far more syphilis tests were conducted than chlamydia tests, possibly indicating the increasingly common practice of testing HIV positive MSM for syphilis during quarterly HIV monitoring visits.

Individuals aged 40 years and older accounted for the majority of HIV positive MSM tested for chlamydia and syphilis, while those aged 16–29 years reported the highest proportion positive for these infections. As with HIV negative MSM, this result highlights the need to specifically target this younger age group for prevention and testing health promotion campaigns.

This analysis has some limitations. The VPCNSS only includes individuals seeking health services and the results cannot be assumed to be representative of all MSM in the community. Among records from general practice where sexual behaviour information was available, there was a lower proportion positive compared to overall results, indicating a potential difference in risk in those attending general practice clinics compared to sexual health centres.

In summary, in 2008 there were increasing numbers of tests for HIV, syphilis and chlamydia among both HIV positive and HIV negative MSM. The average number of tests conducted in each individual remained steady, suggesting increased numbers of MSM presenting for testing rather than increased frequency of the testing among individuals. The characteristics of those tested remained stable compared to 2007, with the exception of an increasing proportion of tests among individuals born outside of Australia. A majority of persons tested reported high risk behaviour, indicating that the system is monitoring an appropriate at-risk population. Between 2007 and 2008 the proportion positive for all infections remained stable among HIV negative MSM, and decreased among HIV positive MSM. MSM aged 16–29 years and those born outside of Australia are sub-populations requiring specific attention, as the proportion positive for STIs remains high.

The VPCNSS is able to provide detailed and accurate information about a key high risk population presenting for testing, aiding the interpretation of trends in
notifications and allowing the identification of sub-populations at higher risk. The system will provide a valuable resource to monitor trends and inform prevention and policy over time.

References
Following its emergence and identification in Mexico in March 2009, pandemic (H1N1) 2009 influenza spread rapidly around the globe. The public health response in Victoria was undertaken in accordance with the Australian Health Management Plan for Pandemic Influenza and the Victorian Health Management Plan for Pandemic Influenza and is described in a previous issue of the Bulletin.

Surveillance for laboratory confirmed influenza in Victoria is passive, whereby diagnosing medical practitioners and laboratories must notify laboratory confirmed influenza cases in writing within five days of diagnosis in accordance with the Public Health and Wellbeing Act 2009.

Influenza activity in Victoria from January to April 2009 was at baseline levels with up to four cases notified per week. A distinct increase in notified cases was observed in May with 18 cases (11 type A) notified between 1–10 May. The first case of confirmed pandemic (H1N1) 2009 influenza in Victoria was notified to the department on 20 May 2009 in a child who had returned from travel to the USA. The number of notified cases of laboratory confirmed influenza rose sharply in the following days and weeks, with the highest weekly total of 1120 cases notified for the week ending 3 June 2009 (figure 1). A majority of the cases notified up to that point were typed as pandemic (H1N1) 2009 influenza.

During the Delay and Contain phases all suspected cases were encouraged to seek testing from their treating doctor. The Modified Sustain phase, in which the Victorian Government recommended focussing testing on those with moderate to severe disease or those with symptoms in vulnerable populations, was announced on 3 June and was accompanied by a decline in the number of notified influenza cases. A secondary peak in cases was observed in late June (figure 1).

A total of 6,988 laboratory confirmed cases of influenza were notified to the department in 2009 which was more than four times the previous highest annual total of 1,591 cases in 2007 (table 1).

Of the total influenza notifications, nearly all were influenza type A, (n= 6,954, 99.5 per cent), 29 cases were influenza type B (0.4 per cent) and five cases were influenza not further typed (0.1 per cent).

Among the influenza type A virus cases, 3,089 (44.4 per cent) were confirmed as pandemic (H1N1) 2009 influenza. Other influenza A serotypes reported in 2009 included H3 (n=8), H3N2/ Brisbane/10/2007 (LR) (n=3), H1N1/Brisbane/59/2007 (n=2) and H3N2/Brisbane/10/2007 (n=2).

Of the remaining 3,850 influenza A cases, 573 were tested and negative for pandemic (H1N1) 2009 influenza. Data from the Victorian general practitioner sentinel surveillance scheme indicated that 97 per cent of the influenza A viruses typed in 2009 were the pandemic (H1N1) 2009 influenza strain.

Males comprised just over half (51 per cent) of the total pandemic (H1N1) 2009 influenza notified cases. The age range of those notified with this strain was five months to 89 years with a median age of 18 years. The modal age group was 15 to 19 years for males and 10 to 14 years for females (figure 2). Forty-six per cent of the total notifications were in the five to 19 year age group and school aged children comprised 40 per cent of the total notified cases.

Additional data such as Indigenous status, travel history and hospitalisations were poorly reported as not all cases were followed up. Of the 3,089 cases where
additional information was available, nine were reported as being of Aboriginal and/or Torres Strait Islander origin. Fourteen per cent of the pandemic H1N1 cases (n=431) were hospitalised and 26 deaths were reported. Less than 10 per cent of the total pandemic H1N1 cases reported overseas travel history (n=22). Nearly 90 per cent of all confirmed cases were residents of Melbourne metropolitan or suburbs bordering the Melbourne metropolitan area (figure 3).

Figure 2: Notified cases of pandemic (H1N1) 2009 influenza by sex and five year age group, Victoria, 2009

Figure 3: Notified cases of pandemic (H1N1) 2009 influenza, by local government area, Victoria, 2009
The surveillance data indicated that 2009 was unprecedented in terms of notified cases of laboratory confirmed influenza and dominated by the pandemic (H1N1) 2009 strain. However, influenza-like illness rates recorded by the general practitioner sentinel surveillance indicated a seasonal severity approximately equivalent to that of 2007 and 2003. This suggests that increased influenza awareness and testing was responsible for much of the increase in notified cases of laboratory confirmed influenza in 2009 compared to previous years. It should also be noted that surveillance data reported for 2009 are not representative given the different testing regimes during the various response phases; those notified after the commencement of the Modified Sustain phase are biased towards those with moderate to severe illness or those in vulnerable settings, rather than cases at broader community level.

Additional epidemiological data and analyses describing the 2009 influenza season in Victoria have been published elsewhere.6,11

References
This account describes reports of blood stream infections and meningitis to the Victorian Hospital Pathogen Surveillance Scheme (VHPSS) for the second half of 2009, and provides a brief summary of 2009 data and comparison with recent years. The VHPSS provides voluntary, laboratory-based surveillance of bacterial and fungal agents of blood stream infections and meningitis in Victoria. Although not all laboratories participate, we estimate VHPSS captures approximately 60 per cent of Victorian bloodstream and CSF isolates. Contributors are stable. The data are broadly representative and readily interpretable to provide insights into the wider population.

**Surveillance case definitions**

Data presented in this report are based on a case definition in which a case of bacteraemia or meningitis is defined as the first isolation of a clinically significant bacterium or fungus from the blood or cerebrospinal fluid (CSF) of a person in a 14-day period. Episodes with more than one species of bacteria/fungi isolated are counted as separate cases. We include recent historical counts for comparison. An organism may sometimes be identified and reported by the diagnostic laboratory only to the level of genus or may be incompletely speciated (where definitive identification is unnecessary for patient care).

**Summary of the important agents of bloodstream infection and meningitis, July–December 2009**

Cases reported to the VHPSS during this six month period were diagnosed by 23 laboratories and were associated with 103 Victorian hospitals. There were 3,123 reports (3,108 bloodstream isolates, 15 from CSF) of 216 species/types of bacteria and fungi. The 20 most common organisms accounted for 80 per cent of reports (table 1).

The number of reports to VHPSS this period was higher than the average of the July to December periods for the previous five years, but similar to isolate numbers reported for the first half of 2009. The ranking of the 20 most common isolate types remain relatively stable. *E. coli* and *S. aureus* comprised 40 per cent of all reports for this period.

The most conspicuous recent change has been an increase in reports of *Clostridium perfringens*. The number of reports of *C. perfringens* increased from an average of seven for the July to December periods of 2003 to 2007, to 14 reports in July to December 2008 and 19 in July to December 2009. There did not appear to be any notable geographic or temporal clustering of these isolates.

**Table 1: Twenty most common isolates reported to VHPSS, July–December 2009**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>771</td>
<td>613</td>
<td>1556</td>
<td>1228</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>489</td>
<td>445</td>
<td>943</td>
<td>898</td>
</tr>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
<td>216</td>
<td>178</td>
<td>356</td>
<td>313</td>
</tr>
<tr>
<td>Coagulase negative <em>Staphylococcus</em></td>
<td>134</td>
<td>166</td>
<td>243</td>
<td>330</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>132</td>
<td>87</td>
<td>241</td>
<td>171</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>129</td>
<td>107</td>
<td>277</td>
<td>235</td>
</tr>
<tr>
<td><em>Staphylococcus epidermidis</em></td>
<td>79</td>
<td>66</td>
<td>149</td>
<td>131</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>75</td>
<td>80</td>
<td>149</td>
<td>164</td>
</tr>
<tr>
<td><em>Enterococcus faecium</em></td>
<td>74</td>
<td>47</td>
<td>152</td>
<td>82</td>
</tr>
<tr>
<td><em>Klebsiella oxytoca</em></td>
<td>58</td>
<td>46</td>
<td>118</td>
<td>84</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>53</td>
<td>41</td>
<td>117</td>
<td>99</td>
</tr>
<tr>
<td>Group B <em>Streptococcus</em></td>
<td>48</td>
<td>44</td>
<td>87</td>
<td>84</td>
</tr>
<tr>
<td><em>Candida albicans</em></td>
<td>47</td>
<td>36</td>
<td>80</td>
<td>65</td>
</tr>
<tr>
<td>Group A <em>Streptococcus</em></td>
<td>43</td>
<td>49</td>
<td>89</td>
<td>88</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>38</td>
<td>40</td>
<td>88</td>
<td>78</td>
</tr>
<tr>
<td>Group G <em>Streptococcus</em></td>
<td>34</td>
<td>25</td>
<td>55</td>
<td>52</td>
</tr>
<tr>
<td><em>Bacteroides fragilis</em></td>
<td>25</td>
<td>20</td>
<td>49</td>
<td>37</td>
</tr>
<tr>
<td><em>Haemophilus influenzae</em></td>
<td>25</td>
<td>24</td>
<td>39</td>
<td>37</td>
</tr>
<tr>
<td><em>Streptococcus mitis</em></td>
<td>24</td>
<td>27</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td><em>Clostridium perfringens</em></td>
<td>19</td>
<td>8</td>
<td>34</td>
<td>16</td>
</tr>
</tbody>
</table>

| Total of top 20 for 2009    | 2513               | -                        | 4872       | -                       |
| Total of other isolate types| 610                | -                        | -          | -                       |
| Total of all isolates       | 3123               | 2668                     | 6087       | 5312                    |
| Total isolate types         | 216                | 289                      | -          | -                       |
Reported antimicrobial resistance of some invasive bacterial pathogens, July–December 2009

During the period July to December 2009, as for the last several years, a relatively lower proportion of isolates of S. aureus isolates were methicillin-resistant (table 2). S. aureus isolates from specimens collected before the third day of hospitalisation remain less likely (11 per cent) to be methicillin-resistant, compared with isolates from specimens collected between three and seven days (23 per cent) or more than seven days into hospitalisation (31 per cent). There were no S. aureus isolates with reduced susceptibility to vancomycin reported to VPHSS during this period.

Twenty-one penicillin non-susceptible S. pneumoniae isolates (PNSP) isolates were reported for this period. Twenty PNSP reports included minimum inhibitory concentration (MIC) data for penicillin, with MIC values ranging between 0.12 \( \mu \)g/ml and 2.0 \( \mu \)g/ml. Six PNSP cases were children aged less than five years. These six isolates were all serotypes not included in the 7-valent conjugate vaccine (five 19A and one 10A). Of the older cases with PNSP, three were aged over 64 years. Of these, two isolates were serotypes included in the 23-valent polysaccharide vaccine (both 19A) and the third isolate was a non-vaccine strain (23A). Most S. pneumoniae reports (97 per cent) included susceptibilities for either cefotaxime or ceftriaxone. Five PNSP isolates had reduced sensitivity to either cefotaxime and/or ceftriaxone.

Invasive infections due to E. faecalis were more common than those due to E. faecium. In the second half of 2009 two isolates of E. faecalis were reported to be vancomycin-resistant. Both isolates were reported to contain the vanB gene. Reports of E. faecium have increased since 2006 and the prevalence of vancomycin resistance continues to increase slightly. Thirty-eight of the 41 reports of vancomycin-resistant E. faecium included van gene testing of the isolates, 37 were vanB and one was vanA.

Reports of the susceptibility of E. coli to amoxicillin, cefazidime, gentamicin and ciprofloxacin were available for 99 per cent, 66 per cent, 99 per cent and 94 per cent of isolates respectively. Among E. coli isolates with susceptibility data, 49 per cent were resistant to amoxicillin, nine per cent to ciprofloxacin, six per cent to gentamicin and six per cent to cefazidime. Forty-seven isolates were resistant to both amoxicillin and gentamicin and 13 were resistant to all four of these antimicrobial agents.

Summary of the important agents of bloodstream infection and meningitis in 2009

Cases reported to the VHPSS during 2009 were diagnosed by 23 laboratories and were associated with 121 Victorian hospitals. In 2009 there were 6,087 reports (6,055 bloodstream isolates, 32 from CSF) of 289 species/types of bacteria and fungi.

The 20 most common organisms reported for 2009 were the same as those reported in the second half of the year (see table 1 above), with the exception of Clostridium perfringens which was the twenty-fifth most common in 2009 while Enterobacter aerogenes was the nineteenth most common with 45 isolates reported in 2009. The ranking of some of the other most common organisms was also slightly different. The 20 most common organisms accounted for 80 per cent of all reports to VHPSS in 2009. The contribution that most major pathogens made to the overall burden of bloodstream infections and meningitis remained relatively stable, with E. coli comprising 26 per cent of reports and S. aureus 15 per cent. Counts of some of the moderately common, typically healthcare-associated, Gram-negative isolates fluctuate; these may reflect clusters of cases in particular settings.

<table>
<thead>
<tr>
<th>Period</th>
<th>Staphylococcus aureus</th>
<th>Streptococcus pneumoniae</th>
<th>Enterococcus faecalis</th>
<th>Enterococcus faecium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Methicillin resistant (%)</td>
<td>Isolates tested (n)</td>
<td>Penicillin non-susceptible (%)</td>
<td>Isolates tested (n)</td>
</tr>
<tr>
<td>Jul–Dec 2009</td>
<td>16%</td>
<td>489</td>
<td>10%</td>
<td>214</td>
</tr>
<tr>
<td>Mean Jul–Dec (2004–2008)</td>
<td>23%</td>
<td>443</td>
<td>12%</td>
<td>176</td>
</tr>
</tbody>
</table>
The number of reports of *S. pneumoniae* to VHPSS in 2009 was similar to that of 2008 (350 isolates). The number of isolates that were serotypes in the 7-valent conjugate vaccine declined further, and has fallen from 188 in 2005 to 56 in 2009. Reports of non 7-valent serotypes (including serotypes in the 23-valent polysaccharide vaccine and serotypes not in either vaccine) continued to increase; 103 in 2005 and 298 in 2009. This increase occurred within all age groups. The most notable increase was of serotype 19A (which is included in the 23-valent vaccine) which has steadily increased from 17 in 2005 to 89 in 2009.

In 2009 there were 41 reports of invasive pneumococcal disease from children aged less than five years. Thirty-nine (95 per cent) of the isolates in these young children were serotypes not included in the 7-valent conjugate vaccine. Of these, serotype 19A was the predominant non-vaccine strain; increasing from five in 2005 to 26 in 2009. The two reports of isolates with 7-valent serotypes in children aged less than five years were due to serotype 19F.

The proportion of isolates of *S. aureus* manifesting methicillin resistance continued to decline in 2009 (table 3). One hundred and twenty-three (80 per cent) reports of MRSA included data on six key antimicrobial agents (ciprofloxacin, erythromycin, fusidic acid, gentamicin, rifampicin and tetracycline). Seventy-four (60 per cent) of these isolates were non-multiresistant MRSA (nmMRSA – resistant to methicillin and agents from no more than two other antimicrobial agents). This is an increase in prevalence from 43 per cent of MRSA isolates with data on these antimicrobial agents in 2008 and appears to reflect a real increase in the incidence of nmMRSA. Thirty-four of 68 bacteraemic nmMRSA isolates with reported case admission dates were from specimens collected less than three days into hospitalisation and therefore suggestive of community-acquired MRSA. Thirty-three isolates of penicillin non-susceptible *S. pneumoniae* (PNSP) were reported to VHPSS in 2009 with MIC values between 0.125μg/ml and 2.0μg/ml. Twenty of the 33 isolates were serotype 19A (22 per cent of serotype 19A were PNSP).

In 2009 all nine PNSP from children aged less than five years were non-7v vaccine serotypes (eight 19A and one 10A). Of the six PNSP isolates from adults aged greater than 64 years four were serotype 19A (included in the 23-valent vaccine) and two were non-vaccine serotypes (one each of 15A and 23A).

There were five reports to VHPSS of bloodstream isolates of vancomycin-resistant *E. faecalis* in 2009. Reports of bloodstream isolates of vancomycin-resistant *E. faecium* have continued to increase from an average of 12 annually from 2004 to 2006, to 32 in 2007, 45 in 2008 and 73 in 2009. In 2009 one vancomycin-resistant *E. faecium* was in a child aged less than five years and 47 were in adults aged 60 or more years. The four isolates of vancomycin-resistant *E. faecalis* with reported van gene PCR results were vanB. Forty-three vancomycin-resistant *E. faecium* were vanB isolates and one was reported to have the vanA gene. Fifty-eight per cent of vancomycin-resistant enterococci were isolated from samples collected seven or more days into hospitalisation.

### Acknowledgments
We gratefully acknowledge the confidential contributions of Victorian laboratories to VHPSS, the support provided by the Department of Health, and data management by Wendy Siryj. Data include reports received by 28 February 2009, and are subject to revision.

**Table 3: Prevalence of key antimicrobial resistances in *S. aureus*, *S. pneumoniae* and enterococci, 2005–2009**

<table>
<thead>
<tr>
<th>Period</th>
<th><em>Staphylococcus aureus</em></th>
<th><em>Streptococcus Pneumoniae</em></th>
<th><em>Enterococcus faecalis</em></th>
<th><em>Enterococcus faecium</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Methicillin resistant (%)</td>
<td>Isolates tested (n)</td>
<td>Penicillin non-susceptible (%)</td>
<td>Isolates tested (n)</td>
</tr>
<tr>
<td>2005</td>
<td>27%</td>
<td>892</td>
<td>13%</td>
<td>295</td>
</tr>
<tr>
<td>2006</td>
<td>23%</td>
<td>876</td>
<td>10%</td>
<td>275</td>
</tr>
<tr>
<td>2007</td>
<td>23%</td>
<td>841</td>
<td>7%</td>
<td>280</td>
</tr>
<tr>
<td>2008</td>
<td>19%</td>
<td>893</td>
<td>12%</td>
<td>348</td>
</tr>
<tr>
<td>2009</td>
<td>16%</td>
<td>943</td>
<td>9%</td>
<td>349</td>
</tr>
</tbody>
</table>
New Public Health and Wellbeing legislation

The Victorian Parliament recognises that:

- The State has a significant role in promoting and protecting the public health and wellbeing of persons in Victoria.
- Public health and wellbeing includes the absence of disease, illness, injury, disability or premature death and the collective state of public health and wellbeing.
- Public health interventions are one of the ways in which the public health and wellbeing can be improved and inequalities reduced.
- Where appropriate, the State has a role in assisting in responses to public health concerns of national and international significance.

Given these objectives, on 1 January 2010, the Health Act 1958 and Health (Infectious Diseases) Regulations 2001 were replaced by the Public Health and Wellbeing Act 2008 and Public Health and Wellbeing Regulations 2009.

The new legislation updates and modernises Victoria’s public health framework, and aims to achieve the highest attainable standard of public health and wellbeing by:

- Protecting public health and preventing disease, illness, injury, disability or premature death.
- Promoting conditions in which persons can be healthy.
- Reducing inequalities in the state of public health and wellbeing.

Notifiable conditions: What has changed?

- Blood lead greater than 10ug/dL is now a notifiable condition
- Chikungunya virus is a notifiable disease
- Giardiasis is no longer notifiable
- Hepatitis A has moved from a group B notification to a group A notification.

This means that cases of hepatitis A should be notified immediately upon initial diagnosis, whether presumptive or confirmed, by telephone or fax, followed by written notification within five days.

A new ‘Notifiable Conditions’ form, incorporating the above changes, is now in use. Medical practitioners or laboratories wishing to receive a copy of the new ‘Notifiable Conditions’ form can contact the Communicable Disease Prevention and Control Unit at the Department of Health on telephone 1300 651 160. Alternatively, notification can be made online at: www.health.vic.gov.au/ideas

More information about the new legislation can be found at http://www.health.vic.gov.au/phwa
Eighty-one per cent of LGAs achieved immunisation coverage greater than or equal to 90 per cent in cohort one. Victoria reached 91.89 per cent coverage in cohort one compared to the Australian coverage of 91.64 per cent. Victoria ranked fourth behind ACT (93.16 per cent); Tas (92.49 per cent); NSW (92.14 per cent) in the coverage rate for cohort one.

Seventy-seven per cent of LGAs achieved immunisation coverage greater than or equal to 90 per cent in cohort two. State coverage for cohort two was 91.73 per cent compared to the Australian coverage of 91.64 per cent. Victoria ranked third behind ACT (93.15 per cent) and Tas (92.77 per cent) in the coverage rate for cohort two.

Seventeen per cent of LGAs achieved immunisation coverage greater than or equal to 90 per cent for cohort three. Forty-four per cent (35 out of 79) of LGAs recorded between 65 per cent and less than 85 per cent for vaccine coverage in cohort three. State coverage for cohort three was 86.18 per cent compared to the Australian coverage of 82.59 per cent. Victoria had the highest coverage rate in cohort three this quarter.

In response to the Pandemic Influenza H1N1 2009 (Swine flu), the Commonwealth government purchased 21 million doses of Pandemic Influenza vaccine – Panvax® H1N1, enough vaccine for the whole of the population. The Panvax® H1N1 vaccine program commenced on 30 September 2009. On the 3 December 2009 the Therapeutic Goods Administration (TGA) expanded registration of the vaccine to include use in babies from six months to children nine years of age. Babies and children to nine years require two doses spaced by a minimum of 28 days and children and adults from 10 years of age and over require a single dose.

The pandemic vaccination program will focus on vaccinating certain groups at higher risk of exposure such as frontline health care workers and parents and guardians of young infants and those vulnerable to more severe outcomes from the disease. However anyone, including healthy people, who wish to be protected against swine flu can also be given the free vaccine.

People who are more at risk of complications from influenza include Indigenous people; pregnant women; people with chronic disease and the obese.

The Commonwealth government announced funding for an expanded free seasonal influenza vaccine program under the National Immunisation Program (NIP) from January 2010. The expanded program is in addition to the current influenza vaccine recommendations for older persons and targets all people at increased risk of complications from influenza infection. The additional groups who are eligible for free influenza vaccine are pregnant women, all Indigenous people aged from 15 to 49 years and people with medical conditions predisposing to severe influenza aged from six months to 64 years.

The free national human papillomavirus (HPV) vaccine (Gardasil®) program for catch-up of females between 13 and 26 years of age ended on 31 December 2009. Gardasil® can give protection against four of the most common types of HPV (types 6, 11, 16 and 18). HPV types 6 and 11 cause 90 per cent of genital warts and HPV types 16 and 18 cause about 80 per cent of cervical cancers. The vaccine program continues on the NIP for girls in Year 7 of secondary school.
Table 1: Childhood immunisation coverage by local government area, Victoria, 30 September 2009

<table>
<thead>
<tr>
<th>Age group</th>
<th>% fully immunised</th>
<th>Local government area (LGA)</th>
<th>Total LGAs (%LGAs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&lt;15 months</td>
<td>100</td>
<td>Alpine, Horsham, Pyrenees, Strathbogie, Towong, West Wimmera, Yarriambiack</td>
<td>7 (9)</td>
</tr>
<tr>
<td></td>
<td>95+</td>
<td>Hindmarsh, Moone, South Gippsland, Southern Grampians, Wanganarta Wellington, Wodonga</td>
<td>7 (9)</td>
</tr>
<tr>
<td>85–&lt;90</td>
<td></td>
<td>Corangamite, Greater Dandenong, Greater Shepparton, Manningham, Melbourne, Mildura, Moorabool, Mount Alexander, Nilumbik, Swan Hill Wyndham, Yarra Ranges</td>
<td>12 (15)</td>
</tr>
<tr>
<td>80–&lt;85</td>
<td></td>
<td>Hepburn, Queenscliffe</td>
<td>2 (3)</td>
</tr>
<tr>
<td>75–&lt;80</td>
<td></td>
<td>Buloke</td>
<td>1 (1)</td>
</tr>
<tr>
<td>24&lt;27 months</td>
<td>100</td>
<td>Mansfield, West Wimmera</td>
<td>2 (2)</td>
</tr>
<tr>
<td></td>
<td>95+</td>
<td>Alpine, Bass Coast, Campaspe, Colac-Otway, Corangamite, Gannawarra, Glenelg, Horsham, Latrobe, Moorabool, Nilumbik, Northern Grampians Surf Coast, Warrnambool, Whittlesea, Wodonga</td>
<td>16 (20)</td>
</tr>
<tr>
<td>85–&lt;90</td>
<td></td>
<td>Ararat, Bayside, Benalla, Cardinia, Glen Eira, Golden Plains, Greater Dandenong, Greater Shepparton, Hindmarsh, Melbourne, Mornington Peninsula, Port Phillip, South Gippsland, Stonnington Wargara, Yarriambiack</td>
<td>16 (20)</td>
</tr>
<tr>
<td>80–&lt;85</td>
<td></td>
<td>Queenscliffe, Strathbogie</td>
<td>2 (3)</td>
</tr>
<tr>
<td>60&lt;63 months</td>
<td>100</td>
<td>Yarriambiack</td>
<td>1 (1)</td>
</tr>
<tr>
<td></td>
<td>95+</td>
<td>Moone, Strathbogie</td>
<td>2 (3)</td>
</tr>
<tr>
<td>90–&lt;95</td>
<td></td>
<td>Ballarat, Baw Baw, Boroondara, Corangamite, Darebin, Latrobe, Manningham, Stonnington, Whittlesea, Wodonga</td>
<td>10 (13)</td>
</tr>
<tr>
<td>80–&lt;85</td>
<td></td>
<td>Alpine, Ararat, Benalla, Buloke, Cardinia, Central Goldfields, East Gippsland, Frankston, Golden Plains, Greater Bendigo, Hindmarsh Kingston, Knox, Loddon, Macedon Ranges, Maribyrnong, Moroondah, Moreland, Mornington Peninsula, Queenscliffe, Southern Grampians, Surf Coast, Swan Hill, Wargara, Warrnambool, West Wimmera, Yarra</td>
<td>27 (34)</td>
</tr>
<tr>
<td>75–&lt;80</td>
<td></td>
<td>Greater Shepparton, Melbourne, Mount Alexander, Port Phillip, Yarra Ranges</td>
<td>5 (6)</td>
</tr>
<tr>
<td>70–&lt;75</td>
<td></td>
<td>Gannawarra, Hepburn</td>
<td>2 (3)</td>
</tr>
<tr>
<td>65&lt;70</td>
<td></td>
<td>Murrindindi</td>
<td>1 (1)</td>
</tr>
</tbody>
</table>
**Enteric diseases**
Joy Gregory, Department of Health and OzFoodNet Victoria.

**Outbreaks of gastrointestinal illness**
There were 188 outbreaks of gastrointestinal illness reported to the department’s Communicable Disease Prevention and Control Unit (CDPCU) during the fourth quarter of 2009 (table 1). Of these, thirteen outbreaks were considered to be foodborne or probable foodborne and one was probable waterborne. For the remaining 174 outbreaks, person to person transmission was suspected in 158 outbreaks. The mode of transmission was unknown for the remaining 16 outbreaks.

**Foodborne disease outbreaks**
Joy Gregory, Department of Human Services and OzFoodNet Victoria.

Thirteen outbreaks were considered to be foodborne or probable foodborne and one was suspected to be waterborne this quarter, affecting at least 475 people. These outbreaks are summarised below:

An outbreak of vomiting and/or diarrhoea occurred amongst a group of people after they attended a wedding in October. Sixty-five guests were interviewed and 41 people suffered vomiting and/or diarrhoea with a median incubation period of 40 hours after consumption of food at the reception. A cohort study was conducted but no foods were identified with statistically significant association with illness. The pattern of illness suggested a viral aetiology and the high attack rate suggested that food was the vehicle of transmission.

In November, CDCPU investigated two outbreaks of *Salmonella Typhimurium* 170 in two separate aged care facilities. The first outbreak affected 22 out of 71 residents at the facility and onsets occurred over a two week period. The second outbreak affected 20 out of 60 residents and was similar to the previous outbreak, with onsets occurring over a 13 day period. A food source was unable to be identified for either outbreak despite intensive investigations, however the spread of onsets over a two week period in both outbreaks suggested ongoing low dose contamination of foods and/or kitchen equipment.
An outbreak affecting four residents of a small aged care facility was also investigated in November. Cases had symptoms consistent with *C. perfringens* and two cases had faecal specimens positive for *C. perfringens* enterotoxin. Three cases had onsets on the same day with a fourth case becoming symptomatic two days later. A food source for this outbreak was unable to be determined.

An outbreak of gastroenteritis occurred after a group of 25 people shared a meal together at a private residence in November. Guests shared a meal of chicken and rice, a stir fried noodle and prawn dish, a garden salad and a bread pudding. The prawn and noodle dish had raw eggs added to it and it is suspected that the eggs were not cooked adequately. Six guests submitted faecal specimens which were positive for *Salmonella Typhimurium* 3.

In November, an outbreak of gastroenteritis at a rural school was investigated. Absentee record analysis showed approximately 135 students (out of 250) absent over a three week period with a majority (100 students) becoming ill during the week 16–20 November. Results of water testing carried out by the school revealed that the private drinking water supply (underground, concrete rainwater tank) was not suitable for consumption due to high levels of *E. coli*. Despite investigations being carried out at the school it was not possible to determine how the water became contaminated. The school closed temporarily while an alternative water supply was arranged. As no faecal samples were collected the aetiology for this outbreak was unable to be determined.

Table 1: Outbreaks of gastrointestinal illness, 1 October–31 December 2009

<table>
<thead>
<tr>
<th>Setting</th>
<th>Outbreaks</th>
<th>Persons affected</th>
<th>Pathogen/toxin (number of outbreaks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aged care</td>
<td>101</td>
<td>2,273</td>
<td>Norovirus (60)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suspected viral (33)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unknown (5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Salmonella Typhimurium</em> 170 (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Clostridium perfringens</em> (1)</td>
</tr>
<tr>
<td>Camp</td>
<td>3</td>
<td>51</td>
<td>Norovirus (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suspected viral (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unknown (1)</td>
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<tr>
<td>Child care/play centre</td>
<td>15</td>
<td>203</td>
<td>Norovirus (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suspected viral (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mixed pathogen outbreak (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unknown (1)</td>
</tr>
<tr>
<td>Commercially catered function</td>
<td>4</td>
<td>118</td>
<td>Norovirus (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suspected viral (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hospital</td>
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<td>432</td>
<td>Norovirus (26)</td>
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<td></td>
<td></td>
<td>Suspected viral (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rotavirus (1)</td>
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<td></td>
<td>Unknown (1)</td>
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<tr>
<td>Military</td>
<td>3</td>
<td>155</td>
<td>Norovirus (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Campylobacter</em> (1)</td>
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<tr>
<td>Private residence</td>
<td>3</td>
<td>18</td>
<td>Norovirus (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Salmonella Typhimurium</em> 3 (1)</td>
</tr>
<tr>
<td><em>Residential facility (other)</em></td>
<td>15</td>
<td>127</td>
<td>Norovirus (5)</td>
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<td></td>
<td></td>
<td></td>
<td>Suspected viral (9)</td>
</tr>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Restaurant</td>
<td>9</td>
<td>242</td>
<td>Norovirus (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hepatitis A (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fish wax ester (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suspected viral (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unknown (1)</td>
</tr>
<tr>
<td>School</td>
<td>3</td>
<td>241</td>
<td>Norovirus (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suspected viral (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unknown (1)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>188</td>
<td>3,860</td>
<td>Norovirus (106)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suspected Viral (59)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Salmonella Typhimurium</em> 170 (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hepatitis A (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Salmonella Typhimurium</em> 3 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rotavirus (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fish wax ester (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Clostridium perfringens</em> (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Campylobacter</em> (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mixed pathogen outbreak (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unknown (13)</td>
</tr>
</tbody>
</table>

* *other residential facility includes: disability service (2), early parenting centre (1) boarding house (1), supported residential service (4), supported services accommodation (7).*
In November, an outbreak of vomiting and/or diarrhoea occurred amongst a group of 106 people who attended a function at a restaurant. Approximately 25 guests reported being unwell and two food handling staff reported being ill with gastroenteritis prior to the event, one of whom returned to work within 48 hours after symptoms resolved. The aetiology of this outbreak was unable to be confirmed but it is suspected to have been viral transmitted via contaminated food.

In November, an outbreak of gastroenteritis was reported amongst a large group of 260 people who attended a function at a restaurant. The dinner was a set menu with no choices so it was decided that a cohort study would be unlikely to yield useful information. It was reported that the attack rate in this group was about 60 per cent. A small group of 14 guests who had special dietary requests were interviewed and nine had become unwell within a median of 32 hours after the function. One case had Norovirus detected in a faecal specimen and there were two secondary cases reported in family members who did not attend the function. Gastroenteritis was reported in a second group of 24 people who dined at the same restaurant complex the following evening. Nineteen were interviewed and nine reported gastroenteritis with the same illness profile as the previous outbreak. Data collected from both sets of questionnaires showed some correlation between illness and consumption of the seafood entrée, which had components common to the menus served to both groups, however the number of guests interviewed in the first outbreak was too small to draw any accurate conclusions. Based on information collected during the investigation it is suspected that these two outbreaks were foodborne Norovirus outbreaks.

Two outbreaks of hepatitis A were investigated this quarter that were associated with two separate restaurants. In the first outbreak, three cases developed symptoms within four days of each other and were likely to have acquired their illness through consumption of semi-dried tomatoes (SDT). One of these cases was a food handler at the premises. A further six cases who had eaten at this restaurant during their incubation period were subsequently identified. These cases had onsets between three and five weeks later. The source may have been food contaminated by the infected food handler, foods cross-contaminated by contaminated SDT or direct consumption of contaminated SDT. There was also a case in the second outbreak who was a food handler at a restaurant where four patrons were subsequently linked to. These four cases had onsets approximately three to five weeks after the food handler. Again, it could not be certain what the source for these cases may have been as there were various possibilities. Two separate outbreaks were reported at the same military barracks in December. The first outbreak was caused by Campylobacter, with five confirmed cases notified. Onsets of illness occurred over an eight day period and as only one case was interviewed a source of illness could not be identified. The second outbreak occurred approximately two weeks later and was confirmed as Norovirus. The outbreak affected 18 military personnel and all had an onset of gastroenteritis on the same day. Only staff that ate at the same mess became unwell – those that went home remained well. It is suspected that this was a foodborne Norovirus outbreak.

Hepatitis A activity

One hundred and seventy cases of hepatitis A were notified this quarter. One hundred and sixty one cases were locally acquired. Of the locally acquired cases, 83 had consumed semi-dried tomatoes in their incubation period. The median age for locally acquired cases was 34 years (range 5–83 years) and there were approximately equal numbers of males and females. Univariate analysis of a case control study showed a significant association between consumption of semi-dried tomatoes and illness with hepatitis A (odds ratio=10.32; 95%CI 4.7–22.7).
**Norovirus activity**

Norovirus and suspected viral activity this quarter (165 outbreaks) increased by 29 per cent on the number of norovirus and suspected viral outbreaks notified in the same quarter in 2008 (128 outbreaks) and was the busiest quarter for the last two years. Eighty-six per cent of the norovirus outbreaks and 78 per cent of the suspected viral outbreaks were in aged care and health care settings.

**Blood borne viruses**

**Hepatitis B – newly acquired infections**

Between October and December 2009 the department received notifications for 528 cases hepatitis B, of which 23 (four per cent) were newly acquired infections. This was similar to the previous quarter and the same as the fourth quarter of 2008. The yearly total for 2009 (n=86) was six cases fewer compared to 2008 (n=92) (figure 2).

Of the 23 newly acquired cases notified in the fourth quarter, 18 (78 per cent) were in males and five (22 per cent) were in females. Cases were aged between 15 to 67 years with a median age of 41 years and with nearly 60 per cent in the age range 30 to 49 years.

Twelve of 23 newly acquired cases were Australian born (52 per cent), eight were overseas born (35 per cent) and for the remaining two cases, country of birth was unknown or not reported. Indigenous status was reported for 91 per cent of the cases (n=21) of which two were reported as being of Aboriginal and/or Torres Strait Islander origin.

Sixteen cases (70 per cent) were from metropolitan Melbourne and six cases (26 per cent) were from regional Victoria and for the remaining case, postcode of residence was not reported.

Co-infection with hepatitis C was reported in three of the 23 cases (13 per cent).

Among the 23 newly acquired cases, 16 reported having symptomatic hepatitis as the reason for testing for hepatitis B. Other reasons reported included having elevated liver function tests (LFTs) (n=3), patient requested (n=1), drug and alcohol screening (n=1), having a medical condition (n=1) and refugee screening (n=1).

Injecting drug use was the main risk factor reported for six cases (26 per cent). Risk factors reported for the remaining cases included sexual transmission (n=4), other risks (n=5) and tattooing (n=1). For six cases a definitive risk factor was not identified.

**Hepatitis C – newly acquired infections**

A total of 563 cases of hepatitis C were notified during the fourth quarter of 2009, of which 45 cases (seven per cent) were newly acquired infections. The yearly total for 2009 (n=184) increased by nearly 20 per cent compared to 2008, but lower than the highest annual total in 2006 (n=207) (figure 3).
Of the 45 newly acquired hepatitis C cases reported in this quarter, 56 per cent (n=25) had a previous negative hepatitis C antibody testing history within the past 24 months.

Sixty-nine per cent (n=31) were male and 31 per cent (n=14) females. Ages ranged from 13 months to 53 years with a median age of 27 years. Fifty-eight per cent (n=26) were in the age group 20 to 29 years.

Eighty per cent of the cases (n=36) were Australian born, seven cases were reported as overseas born and for the remaining two cases, country of birth was unknown or not reported. Indigenous status was reported for 43 cases (83 per cent) of which one case was reported as being Aboriginal and/or of Torres Strait Islander origin.

Sixty-nine per cent (n=31) of the cases were from the metropolitan Melbourne and the remaining 31 per cent (n=14) from regional Victoria.

Of the 45 newly acquired cases, drug and alcohol screening was the main reason for testing reported for 14 cases. Reasons for testing reported for the remaining cases included presented with signs and symptoms (n=12), having elevated liver function test (n=5), prison screening (n=4), routine antenatal screening (n=4), screened for sexually transmissible infection (n=3), screened upon patient request (n=3), and postnatal screening (n=1). (Note that cases may have reported multiple reasons for testing).

Injecting drug use (IDU) was the main risk factor reported for 37 cases (82 per cent). Risk factors reported for the remaining cases included having a hepatitis C positive sexual partner (n=2), needle stick injury in a non health care worker (n=1) and perinatal transmission (n=1). For three cases a definitive risk factor was not identified.

Hepatitis D

Three cases of hepatitis D were notified during the fourth quarter of 2009 taking the total to 11 cases in 2009 compared to 15 cases in 2008 (figure 4).

The three cases reported in this reporting period were in males; two were age 53 years and the other male was 58 years of age. Risk factor data is not routinely collected for hepatitis D.

Vaccine-preventable diseases

Stacey Rowe, Department of Health

Invasive pneumococcal disease (IPD)

A total of 78 cases of IPD were notified in the fourth quarter; a 20 per cent decrease from the 97 cases notified during the same time in 2008. This brought the total number of notified IPD cases for 2009 to 364, comparable with the 359 cases notified in 2008. Cases were in persons aged between one and 91 years. The modal age group was 60–64 years (10 cases, 13 per cent). There were 29 cases in adults aged 65 years or older, of which 12 were aged 85 years or older. Six cases (seven per cent) were in children aged 0–4 years. No cases were notified in infants.
aged less than 12 months. Fifty-eight per cent were male. Indigenous status was able to be collected for 66 cases (85 per cent) of which two (three per cent) were reported to be of Aboriginal and/or Torres Strait Islander origin; the remainder were not Indigenous. The case fatality rate during the quarter was five per cent. There were no deaths in children or Indigenous persons.

Specimens from all but one case during the quarter were submitted for serotyping. Serotype was established for 77 cases (99 per cent), with the remaining case not typable. Six cases were eligible for free conjugate vaccine under the National Immunisation Program. The serotype for one case was untypable: the remaining five cases were infected by serotypes against which the vaccine does not protect – three were 19A and one was 33F. Of the 29 persons notified aged 65 years or older, 18 (62 per cent) were infected with a serotype contained within the polysaccharide vaccine. Of these, eight cases were reported as fully vaccinated. Five cases were not vaccinated, two cases were partially vaccinated and three cases were of unknown vaccination status. Of the four deaths that occurred in the fourth quarter, two were due to IPD in persons aged 65 years or older. One cases infection was caused by a serotype contained within the 23-valent pneumococcal polysaccharide vaccine but the person was not vaccinated; and one case was fully vaccinated, but whose infection was caused by a serotype against which the vaccine does not protect. Both cases had other risk factors reported.

Mumps
No cases of mumps were notified in the fourth quarter of 2009.

Pertussis
There were 1,055 cases of probable and confirmed pertussis notified in the fourth quarter of 2009, the highest quarterly total since 1997. This brought the annual total of notified pertussis cases to 3,702 – over twice the number of notifications received in 2008 (1,647 cases). The monthly totals increased throughout 2009, peaking in September with 387 cases. This notable increase was observed in both children and adults (figure 5). Those notified in the fourth quarter were aged from 21 days to 98 years, with 22 cases aged less than five years (of which three cases were in


The 12th National Immunisation Conference – Evidence and Strategies for a New Decade, will encompass the most important aspects of where we have come from and where we are going in immunisation in Australia. Attendees will hear about development of a new national immunisation strategy and new arrangements between the Commonwealth and jurisdictions. The broader international context for vaccination will be on the agenda. The latest evidence and new ways of communication about adverse events will be considered. It will also be time to consider evaluation of existing vaccines and new vaccines.

In addition, successful and innovative immunization programs will be presented.

Early bird registration closes 1 June 2010
http://www.phaa.net.au/ 12thNationalImmunisationConference.php
infants aged less than 12 months). A majority of cases notified during the quarter (60 per cent) were in females. No deaths were reported in 2009.

Other notifiable diseases

Invasive meningococcal disease
Stacey Rowe, Department of Health

Fifteen cases of invasive meningococcal disease were notified in the fourth quarter compared to 16 during the same period in 2008. The 2009 total was 43 cases, a 34 per cent reduction on the 65 cases for 2008. Those notified in the fourth quarter were aged from two months to 43 years, of which three (20 per cent) were aged 12 months or less and three (20 per cent) were aged between 14 and 20 years inclusive. Eight cases (53 per cent) were in males. Two deaths were reported this quarter: a 77 year-old male with significant co-morbidities and various exposure risks; and an 80 year-old male whose exposure risk was unknown. Seven cases were due to infection with *Legionella pneumophila* serogroup 1. One case was caused by *Legionella Bozemanii* infection and six cases were caused by *Legionella Longbeachae* infection. No common exposures were identified between the cases. Environmental sampling and testing were undertaken in four of the 14 cases; however, these did not reveal any definitive sources of infection.

Legionellosis
Stacey Rowe, Department of Health

Fourteen cases of legionellosis were notified in the fourth quarter, an increase from the eight cases notified in the previous quarter and the 10 cases notified in the same period in 2008. The median age of notified cases was 75 years, with a range of 48 to 89 years. Nine were male. Two deaths were reported this quarter: a 77 year-old male with significant co-morbidities and various exposure risks; and an 80 year-old male whose exposure risk was unknown. Seven cases were due to infection with *Legionella pneumophila* serogroup 1. One case was caused by *Legionella Bozemanii* infection and six cases were caused by *Legionella Longbeachae* infection. No common exposures were identified between the cases. Environmental sampling and testing were undertaken in four of the 14 cases; however, these did not reveal any definitive sources of infection.

Creutzfeldt-Jakob disease (CJD)
Genevieve Klug, Australian National CJD Registry

Due to the nature of the disease, months or years may elapse between the notification date of suspected CJD cases and their subsequent confirmation (or rejection) by the Australian National CJD Registry (ANCJDR). Thus the figures reported here will differ from those in table 10, which counts confirmed and probable cases by their notification date.

Table 2: Notification of suspect and confirmed, definite and probable CJD cases by quarter, June 2004–December 2009

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Suspect # notified</th>
<th>Confirmed* CJD</th>
<th>Not CJD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun–04</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sep–04</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec–04</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mar–05</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Jun–05</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sep–05</td>
<td>10</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Dec–05</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Mar–06</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Jun–06</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sep–06</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec–06</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Mar–07</td>
<td>4</td>
<td>2</td>
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</tr>
<tr>
<td>Jun–07</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sep–07</td>
<td>5</td>
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</tr>
<tr>
<td>Dec–07</td>
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<td>2</td>
</tr>
<tr>
<td>Mar–08</td>
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<td>2</td>
</tr>
<tr>
<td>Jun–08</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sep–08</td>
<td>7</td>
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</tr>
<tr>
<td>Dec–08</td>
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<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Mar–09</td>
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<td>1</td>
</tr>
<tr>
<td>Jun–09</td>
<td>5</td>
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<td></td>
</tr>
<tr>
<td>Sep–09</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Dec–09</td>
<td>9</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>41</td>
<td>23</td>
</tr>
</tbody>
</table>

# notified = suspect cases notified within the Qtr  
* confirmed = cases confirmed as definite or probable reclassified within the quarter
Nine Victorian suspect CJD cases were notified to the ANCJDR during the last quarter of 2009. All of these cases remain under investigation. During the quarter, two previously notified cases were reclassified: one suspect case was subsequently confirmed CJD and the other reclassified as non-CJD. The findings for this quarter bring the total number of notifications for 2009 to 20. This number was in keeping with the number notified in the previous two years. A total of four suspect cases were confirmed as CJD and five suspect cases as non-CJD cases during 2009. While the number of confirmed cases was lower than the figures observed in 2008 (n=13), it is not without precedent and should be considered as a natural fluctuation in case classifications.

A comparison of the annual notification figures for the complete years since 2005 indicated that the mean number of new suspect CJD notifications is 18 cases per year. On average, eight cases per year are confirmed with CJD, and five are excluded from a CJD diagnosis. To date, two thirds of all notifications (n=96) notified since June 2004 have been classified, while the remainder are still under investigation.

Mycobacterial infections

Lynne Brown, Department of Health

Tuberculosis

Owing to the slow growing nature of Mycobacterium tuberculosis, data are preliminary and subject to change.

Overview

There were 152 notifications of tuberculosis to the department in the fourth quarter of 2009. This was a fifty-five per cent increase from the previous quarter (n=98) and a 45 per cent increase on the same quarter in 2008 (n=105). The total number of notifications in 2009 was 414, which was a ten per cent increase on the 2008 total (n=378), and increases the number of notifications since 2007 by 16 per cent. The annual incidence rate has now reached 7.8 per 100,000 population, based on the 2008 estimated resident population (ERP) by the Australian Bureau of Statistics; compared with an incidence rate of 7.2 per 100,000 population in 2008.

The female to male ratio in the fourth quarter was 1:1.5, which was slightly different from the usual equal number of males and females. Patients aged 25–29 years comprised twenty per cent of the total notifications (n=31), and over half of the persons notified were aged between 20 years and 34 years. In this quarter the typical age related bi-modal pattern was not seen in total numbers of notifications, but could be seen in the incidence rates, with the 80 years and older age group showing the highest rate per 100,000 population. In this age-group eighty-seven per cent were elderly patients who were overseas born, compared with previous years when most of the TB notifications in this age group were in the

Table 3: Notifications of tuberculosis, by site of disease, Victoria, October–December 2009

<table>
<thead>
<tr>
<th>Site</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary</td>
<td>54</td>
</tr>
<tr>
<td>Pulmonary and other sites</td>
<td>25</td>
</tr>
<tr>
<td>Lymph nodes</td>
<td>50</td>
</tr>
<tr>
<td>Bone / Joint</td>
<td>6</td>
</tr>
<tr>
<td>Pleural</td>
<td>7</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>2</td>
</tr>
<tr>
<td>Meningeal</td>
<td>1</td>
</tr>
<tr>
<td>Miliary</td>
<td>2</td>
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<tr>
<td>Peritoneal</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
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<tr>
<td>Total</td>
<td>152</td>
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Table 4: Treatment outcomes for TB notifications received in 2007

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Still to be assessed</td>
<td>7</td>
</tr>
<tr>
<td>Completed treatment</td>
<td>303</td>
</tr>
<tr>
<td>Defaulter</td>
<td>3</td>
</tr>
<tr>
<td>Died of other cause</td>
<td>16</td>
</tr>
<tr>
<td>Died of TB</td>
<td>2</td>
</tr>
<tr>
<td>Interrupted treatment (2 months or more)</td>
<td>2</td>
</tr>
<tr>
<td>Not followed up - outcome unknown</td>
<td>4</td>
</tr>
<tr>
<td>Therapy ceased - not TB</td>
<td>1</td>
</tr>
<tr>
<td>Transferred out of Australia</td>
<td>18</td>
</tr>
<tr>
<td>Grand total</td>
<td>356</td>
</tr>
</tbody>
</table>
elderly Australian born. This may represent the beginning of an increase in notifications in the now ageing migrants who came to Australia many years ago and are now reactivating latent infection. This quarter four children aged younger than 15 years were notified with primary disease. Two of the children were Australian born; one child was found to have primary disease as a result of contact investigation and the other child was the daughter of an undiagnosed source case, subsequently found on contact tracing. The other two children were born overseas and presented with symptoms of TB.

In the fourth quarter of 2009, 94 per cent (n=143) of notifications were for overseas born patients. Of these, 38 per cent were born in India and patients from other countries in Central Asia (n=19), Vietnam (n=11) or countries in West or Horn of Africa (n=15) accounted for an additional thirty-one per cent. Information about date of arrival was known for 138 of the 143 overseas born patients. Of these 13 per cent were diagnosed with TB after arriving in Australia in 2009 and 45 per cent were diagnosed within two years of arrival. There were no notifications in Indigenous Australians for this reporting period. One patient was known to have HIV/TB co-morbidity. Thirteen patients were notified with active tuberculosis as a result of investigation of a Tuberculosis Undertaking (TBU), one patient was notified following a referral from a refugee screening clinic and four patients were diagnosed with TB disease as a result of contact investigations.

Site of disease

Pulmonary disease accounted for 52 per cent of all notifications (n=79). Additional sites, other than the lungs were noted in 25 notifications with pulmonary TB. The most common additional sites were lymph nodes (n=10) and miliary TB (n=5). Extra pulmonary disease was reported in 48 per cent of notifications—the most common sites being lymphatic (68 per cent) with bone/joint TB accounting for eight per cent (n=6) and pleural TB in 10 per cent of notifications (n=7).

Laboratory confirmation of diagnosis in some form (smear, culture, antigen detection or histology) was obtained in 95 per cent of notifications. Eighty per cent of all notifications were confirmed by culture, which is similar to the culture confirmation rate for the same period in 2008, but a nine per cent increase on the previous quarter. The diagnosis was confirmed by culture in 81 per cent of pulmonary notifications, a similar result to 2008. There was one case of multi-drug resistant TB in the last quarter taking the total for Victoria in 2009 to two cases (down from five cases in 2008). Information about HIV testing was available for 138 of 152 patients and 84 per cent of TB patients were reported to be tested for HIV infection (n= 116), which was a 15 per cent increase on the number of patients tested in the same quarter in 2008; however 16 per cent of patients were still not tested for HIV.

Information about treatment outcomes for patients notified in 2007 is presented in table 4 above. The department acknowledges the assistance of treating physicians in providing this important information. Collection of these data was usually reported with a time delay of two years to take into account the long-term treatment of TB patients: average length of treatment for most patients in Victoria is about nine months.

Vector borne diseases

James Fielding, Department of Health

Alphavirus infection

A total of 81 cases of Ross River virus disease were notified during 2009, a two-thirds reduction on the 244 notified in 2008 although a single peak in cases was not evident as compared to previous years (figure 7). Eleven (14 per cent) of the 2009 cases were reported in the
fourth quarter compared to 14 and 30 cases in the previous quarter and the same period in 2008 respectively. Eight (73 per cent) of the fourth quarter cases were in females. The median age of those notified was 53 years (range: 20–80 years); eight were aged over 50 years. All cases were residents of rural regions: Gippsland (six cases); Loddon Mallee (four cases) and; Barwon-South Western (one case).

There were 15 cases of Barmah Forest virus disease notified in 2009, nearly half the 31 cases notified in 2008 (figure 7). Six (38 per cent) of the 2009 cases were notified in the fourth quarter. All six cases were in females aged from 35 to 78 years (median = 59 years). Five cases were residents of Gippsland region. Exposure data about one case from metropolitan Melbourne was unavailable.

Flavivirus infection
In 2009, 43 cases of flavivirus infection (of which 39 were dengue fever) were notified to the department nearly three times the 15 cases (of which nine were dengue fever) notified in 2008. There were 11 cases of dengue fever and one unspecified flavivirus infection notified in the fourth quarter, of which a majority (67 per cent) were female with an age range of 14 to 58 years (median = 24 years). Nine cases were reported as acquired overseas: southeast Asia (four cases); Oceania (three cases), and; South Asia (two cases). Place of acquisition was unknown for the remaining four cases.

Malaria
A total of 118 cases of malaria were notified in 2009, 15 more than in 2008. There were 15 cases notified in the fourth quarter of 2009 compared to 49 cases in the previous quarter and 15 during the corresponding period in 2008. Consistent with previous quarters, a majority (11 cases, 73 per cent) were male; three cases (20 per cent) were in females and sex was not stated for one case. The median age of cases was 38 years (range: 6–61 years); four cases were in children aged 6–14 years. The most common cause of infection was *Plasmodium vivax* (seven cases, 47 per cent), of which five were acquired in Papua New Guinea, one in Pakistan and country was not stated for the other. The remaining eight cases were all acquired in Africa: six were due to *P. falciparum*; one was due to *P. malariae*, and; one was a mixed *P. falciparum* and *P. malariae* infection.

Zoonoses

James Fielding, Department of Health

Leptospirosis
Ten cases of leptospirosis were notified to the department in 2009, six more than in 2008. There were 11 cases of dengue fever and one unspecified flavivirus infection notified in the fourth quarter, of which a majority (67 per cent) were female with an age range of 14 to 58 years (median = 24 years). Nine cases were reported as acquired overseas: southeast Asia (four cases); Oceania (three cases), and; South Asia (two cases). Place of acquisition was unknown for the remaining four cases.

Psittacosis
A total of 37 confirmed and probable cases of psittacosis were notified to the department in 2009, 13 (26 per cent) fewer than the 50 cases notified in 2008. Eleven of the cases were notified in the fourth quarter, the same number as the corresponding quarter in 2008 but three fewer than the previous quarter. Seven (64 per cent) of the fourth quarter cases were in males with an age range of 31 to 79 years (median = 59 years); nine cases (82 per cent) were in adults aged 50 years or older. Six cases were from two rural regions (four cases in Grampians region and two cases in Hume region) and the remainder were from metropolitan regions. Seven cases reported exposure to domestic birds, of which four reported them to be psittacines, and the remainder reported exposure to wild birds. No occupational exposures were reported.

Q fever
There were 24 notified cases of Q fever in 2009, three more than in 2008. Seven of the 2009 cases were notified in the fourth quarter, the same number as the corresponding quarter in 2008 and two fewer than the previous quarter. Five (71 per cent) of the cases were in males. The median age was 59 years, with an age range of 35 to 60 years; five cases were in persons aged between 57 and 60 years inclusive. Six of the cases were resident in rural regions: three in Gippsland region; two in Loddon Mallee region and one in Hume region. The one metropolitan case reported that his infection was acquired during travel in Queensland. Two cases, a gardener and a meatworks labourer, were occupationally acquired.
Sexually transmissible infections (STIs)

Chlamydia

A total of 3,385 cases of chlamydia were notified to the department during the fourth quarter of 2009 taking the total for 2009 to 13,917. This was a 12 per cent increase on the 12,379 cases notified in 2008 (figure 8).

Fifty-seven per cent (n=1,931) of the cases were in females and 43 per cent (n=1,442) were in males. Sex was not reported for 12 cases. The age range of females was 20 days old to 75 years with a median age of 22 years. The age range of males was 32 days old to 90 years with a median age of 25 years. Infections were most commonly reported in the 20 to 24 year age group for both females and males (42 per cent and 37 per cent respectively). Eighty per cent of the total number of cases was in the age group 15 to 29 years.

Indigenous status was reported for 55 per cent of the total cases, of which 16 were reported as being Aboriginal and/or Torres Strait Islander origin. Note that the percentage reported here is based on the total chlamydia notifications, and for the reporting period 45 per cent of the chlamydia notifications were notified from laboratories only and Indigenous status of the patient is not a routinely collected data field by laboratories.

A majority of the cases (n= 2,444, 72 per cent) reported had a metropolitan postcode of residence. Region of residence was not reported for 107 cases and the remaining cases were from regional Victoria.

Enhanced data were available for 1,343 cases (40 per cent). From January 2009, HIV co-infection status was added as a new enhanced data field to the STI enhanced surveillance questionnaire. This is also the first time that HIV co-infection data have been collected at a state-wide level.

Of the cases where enhanced surveillance data were available, 36 cases were reported as being HIV positive and all were in MSM.

Among the 1,343 cases, screening was reported as the main reason for testing for 54 per cent followed by clinical presentation and contact tracing (27 per cent and 12 per cent respectively). Five per cent reported other reasons while for 27 cases this information was unknown or not reported.

Males

Of the 622 males for whom enhanced surveillance data were available, 62 per cent (n=385) reported a female sexual partner and 26 per cent (n=160) reported a male sexual partner. Source of infection was unknown or not reported for 13 per cent (n=78).

Among the males reporting a female sexual partner, 54 per cent (n=209) reported having a casual sexual partner, 35 per cent (n=135) reported having a regular sexual partner and two per cent (n=7) reported sex worker as the source of infection. Sexual partner type was unknown or not reported for nine per cent (n=33). For those cases reporting a male sexual partner, 78 per cent (n=125) reported having a casual sexual partner, 16 per cent (n=25) reported having a regular sexual partner and for the remaining 10 cases this information was unknown or not reported.

Females

Of the 719 females for whom enhanced surveillance data were available, 81 per cent (n=585) reported a male sexual partner and one per cent (n=7) a female sexual partner. Source of infection was unknown or not reported for the remaining 18 per cent (n=127).

Seventy-eight per cent (n=487) of the cases reported Victoria as the place of infection; nine per cent (n=54) reported overseas and one per cent (n=7) reported interstate. This information was unknown or not reported for 12 per cent (n=12).

Figure 8: Notified cases of chlamydia by quarter, Victoria, January 1997–December 2009
information was not reported or unknown.

A majority of the cases (n= 616, 86 per cent) reported that their infection was acquired in Victoria. The remainder reported overseas acquisition (n=24, three per cent), interstate (n= six, one per cent) and unknown or not reported (n=73, 10 per cent).

**Gonorrhoea**

There were 336 gonorrhoea cases reported in the fourth quarter of 2009 taking the total number of gonorrhoea notifications reported in 2009 to 1,491. This was a 61 per cent increase on the 922 cases notified in 2008. This was also the highest annual number notified since at least 1997 (figure 9).

Prior to 2005, the proportion of cases reported in females was less than 10 per cent of the total cases notified, however, this proportion increased from nine per cent in 2004 to almost 20 per cent in 2009 (table 5).

Eighty-four per cent of the cases (n=282) were in males (age range: 16 to 66 years) and 16 per cent (n=53) were in females (age range: 14 to 47 years). Sex was not reported for one case. The median ages for males and females were 29 and 25 years respectively. Infections were most commonly reported for the 20 to 29 year age group.

Eighty per cent of the cases (n=268) reported a metropolitan postcode of residence. Postcode of residence was not reported for 21 cases (six per cent) and the remainder were from regional Victoria.

Indigenous status was reported for 72 per cent (n=243) of which four cases were reported as being Aboriginal and/or Torres Strait Islander origin.

Enhanced surveillance data were received for 54 per cent (n=182). From January 2009, HIV co-infection status was added as a new enhanced data field to the STI enhanced surveillance questionnaire. This was also the first time that HIV co-infection data had been collected at a state-wide level.

Of the 182 cases for whom enhanced surveillance data were available, 30 were reported as being HIV positive of which all were in MSM.

Among the 182 cases, 84 (46 per cent) were tested due to clinical signs and symptoms of STIs, followed by screening (n=64, 35 per cent) and contact tracing (n=17, nine per cent). Five cases reported other reasons and for the remaining nine cases reason for testing was unknown or not reported.

**Males**

Among the 159 males notified for whom enhanced surveillance data were available, 64 per cent (n=102) reported a male sexual partner, 28 per cent (n=45) a female sexual partner and for the remaining eight per cent (n=12) this information was unknown or not reported.

Of the 102 males reporting a male sexual partner, 78 per cent (n=80) reported acquiring their infection from a casual sexual partner, 13 per cent (n=13) reported acquiring it from a regular partner and for the remaining nine cases source of infection was unknown or not reported.

**Table 5: Notified cases and proportion of gonorrhoea by sex and year, Victoria, 1997–2009**

<table>
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<td><strong>Males</strong></td>
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</tr>
<tr>
<td>n</td>
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<td>733</td>
<td>1065</td>
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<td>%</td>
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<td>91%</td>
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<td>89%</td>
<td>85%</td>
<td>82%</td>
<td>80%</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>38</td>
<td>33</td>
<td>42</td>
<td>60</td>
<td>69</td>
<td>96</td>
<td>101</td>
<td>156</td>
<td>137</td>
<td>148</td>
<td>164</td>
<td>287</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>11%</td>
<td>7%</td>
<td>5%</td>
<td>5%</td>
<td>8%</td>
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<td>8%</td>
<td>9%</td>
<td>13%</td>
<td>10%</td>
<td>15%</td>
<td>18%</td>
<td>19%</td>
</tr>
</tbody>
</table>
For those reporting a female sexual partner, 69 per cent (n=31) reported acquiring the infection from a casual partner, 11 per cent (n=5) reported acquiring it from a regular partner and 18 per cent (n=8) reported sex worker as the source of infection. For the remaining case this information was unknown or not reported.

Eighty-three per cent (n=132) reported that they acquired their infection in Victoria, six per cent reported as overseas (n=10) and this information was unknown or not reported for 17 cases.

Females
Of the 18 females for whom enhanced surveillance data were available, all reported acquiring their infection from a male sexual partner.

Forty-four per cent of the females (n=8) reported acquiring the infection from a casual partner, 39 per cent (n=7) reported acquiring it from a regular partner and one case identified as a sex worker. For the remaining two cases, this information was unknown or not reported.

Seventy eight per cent (n=18) reported that they acquired their infection in Victoria, two reported interstate and one female reported overseas acquisition. For the remaining two females, this information was unknown or not reported.

Antibiotic resistance
Testing for susceptibility to ceftriaxone and ciprofloxacin was conducted for 187 and 185 isolates respectively. Of the 187 isolates tested for ceftriaxone, 179 were sensitive and the remaining seven isolates were ‘less sensitive’. Of the isolates tested for ciprofloxacin, 54 per cent (n=100) were resistant, 45 per cent (n=83) were sensitive, and two isolates were ‘less sensitive’.

Syphilis— infectious
During the fourth quarter of 2009, the department received notifications for 210 cases of syphilis of which 90 were infectious syphilis, taking the total number of infectious syphilis cases in 2009 to 391. This was a slight increase compared to the number of cases notified in 2008 (n=376) however lower than the highest annual total in 2007 (n=423) (figure 10).

Ninety-one per cent of the cases (n=82) were in males aged from 16 to 66 years, with a median age of 38 years. There were eight cases in females notified this quarter compared to six in the previous quarter.

Of the 90 cases, 26 were primary infections, 27 were secondary infections and 37 were early latent infections. Eighty-two per cent of the cases were from metropolitan regions (n= 74), eight were from regional Victoria and postcode of residence was not reported or unknown for eight cases. Eighty-three per cent (n=75) were Australian born, 14 per cent (n=13) were overseas born and for the remaining two cases, country of birth was unknown or not reported. Indigenous status was reported for 87 cases of which none were reported as being Aboriginal and/or Torres Strait Islander origin.

Enhanced data were collected for all infectious syphilis cases. From January 2009, HIV co-infection status and syphilis re-infection status were added as new enhanced data fields to the STI enhanced surveillance questionnaire.

Eighteen of the 90 infectious syphilis cases reported in the fourth quarter of 2009 were HIV positive. All were male: sixteen of the 18 reported male sexual partner, one a female sexual partner and partner type was not reported for the remaining case. Seventeen cases, of which 16 were MSM, reported having had a previous episode of syphilis infection.

The most commonly reported reason for testing was screening (n=38) followed by cases presenting with signs and symptoms (n=35) and contact tracing (n=13). Other reasons for testing were reported for four cases.

Figure 10: Notified cases of infectious syphilis, by quarter, Victoria, January 1991–December 2009

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<th>Qtr 4</th>
<th>3</th>
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<th>1</th>
<th>1</th>
<th>0</th>
<th>0</th>
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<th>34</th>
<th>80</th>
<th>81</th>
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</thead>
<tbody>
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<td>6</td>
<td>8</td>
<td>20</td>
<td>16</td>
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<td>67</td>
</tr>
<tr>
<td>Qtr 2</td>
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<td>7</td>
<td>3</td>
<td>5</td>
<td>2</td>
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<td>6</td>
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<td>2</td>
<td>3</td>
<td>2</td>
<td>10</td>
<td>19</td>
<td>23</td>
<td>28</td>
</tr>
</tbody>
</table>
Males
Of the 82 males reported, 63 (77 per cent) indicated a male sexual partner, 14 (17 per cent) indicated a female sexual partner and two males indicated both male and female partners. For the remaining four males, this information was unknown or not reported.
Among the males reporting a male sexual partner, 85 per cent \((n = 53)\) reported acquiring their infection from a casual partner and 11 per cent \((n = 7)\) reported acquiring it from a regular partner. For the remaining two cases sexual partner type was unknown or not reported.

Of the 14 males reporting a female sexual partner, six reported acquiring the infection from a casual partner, four reported a regular partner and four males reported sex worker as the source of infection.

Eighty-eight per cent of the male cases \((n = 82)\) reported that they acquired their infection in Victoria, three reported overseas and one reported as interstate. This information was unknown or not reported for the remaining six cases.

Females
Eight females were reported this quarter, all acquired their infections from male partners. Five reported regular sexual partners, two reported casual sexual partners and for the remaining case this information was unknown or not reported. Six of the eight females reported Victoria as the place of acquisition of infection and this information was unknown or not reported for the remaining two cases.

Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS)
Carol El-Hayek and Anita Feigin, Burnet Institute
Please note that numbers are subject to change as a result of ongoing case investigations and annual audit of retrospective records.

There were 64 new HIV diagnoses\(^1\) during the fourth quarter of 2009, bringing the 2009 total to 262, compared with 262 in 2008 (figure 11). Between 2006 and 2009 the annual number of HIV diagnoses has been stable; the mean number of new HIV diagnoses per quarter during the previous four years was 65.

Age, sex and exposure categories
Of the 64 new HIV diagnoses in the fourth quarter of 2009, 95 per cent \((n = 61)\) were male (table 6). This proportion was slightly higher than the 92 per cent in 2009 and 88 per cent in 2008. Seventy-five per cent of males diagnosed this quarter were aged over 30 years (table 6) and the median age of males at HIV diagnosis was 38.1 years compared to 36.4 years in 2009 and 36.1 years in 2008. Among females, two-thirds were aged over 30 years, with the median age of females at diagnosis of HIV being 39.9 years compared to 32.2 years in 2009 and 30.0 years in 2008.

Male-to-male sexual contact
Between October and December 2009, 75 per cent of all HIV diagnoses \((n = 48)\) were among men who have sex with men (MSM). This brought the number of HIV diagnoses among MSM in 2009 to 193, making up 73 per cent of all new HIV diagnoses. In the previous year, MSM made up 69 per cent of all new HIV diagnoses. The median age of HIV diagnosis among MSM this quarter was 38.4 years compared with 35.9 years in 2009 overall and 35.3 years in 2008.

In the fourth quarter of 2009, a majority of MSM diagnosed with HIV reported acquiring their HIV infection in Victoria (79 per cent, \(n = 38\)) (figure 12) and 65 per cent \((n = 31)\) reported acquiring their HIV infection from a casual or anonymous partner (figure 13).

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\(^1\) New HIV diagnoses refers to cases whose first ever HIV diagnosis was in Victoria.
In the fourth quarter of 2009, there were 14 HIV notifications associated with heterosexual contact, bringing the number of heterosexual diagnoses in 2009 to 57 compared to 58 in 2008 (table 8). Heterosexual contact was the route of HIV transmission among 22 per cent of new HIV diagnoses in 2009 of which 65 per cent were among males (n=37). Twenty five per cent of all heterosexual cases in 2009 were reported in people born in a high prevalence country (HPC) (n=14) and eleven per cent (n=6) involved heterosexual contact with a person from an HPC (table 8). For over half of all heterosexual cases (n=29) further information on the type of heterosexual exposure could not be ascertained.

The median age at diagnosis in people with homosexually acquired HIV infection in the fourth quarter of 2009 was 42.4 years; 44.8 years among males and 39.9 years among females. The median age at diagnosis of people with heterosexually acquired HIV infection was 36.4 years in 2009 overall, higher than in 2008 (32.8 years).


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<tr>
<td></td>
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<tr>
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<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Total</td>
</tr>
<tr>
<td>Male to male sex</td>
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<td>Heterosexual contact - person from an HPC*</td>
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</tr>
<tr>
<td>Total</td>
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<td>100</td>
<td>64</td>
</tr>
</tbody>
</table>

*High prevalence country (HPC): defined as a country where the adult HIV prevalence is greater than one per cent and HIV is transmitted predominantly by heterosexual contact. This includes countries in sub-Saharan Africa, Cambodia, Thailand, Myanmar, and some Caribbean countries.
Newly acquired infections

In the fourth quarter of 2009, 44 per cent of all new HIV diagnoses (n=28) were classified as newly acquired infections, bringing the total number of newly acquired infections in 2009 to 107 compared with 97 (37 per cent) in 2008 (table 9). Eighty-five per cent of the newly acquired infections in 2009 were among MSM (n=91).

Newly acquired infections defined as having a previous negative HIV test and/or a seroconversion illness within the 12 months preceding HIV diagnosis.


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<th>Exposure category</th>
<th>Current quarter</th>
<th>Annual total</th>
<th>Annual total</th>
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<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Total</td>
</tr>
<tr>
<td>Person from an HPC</td>
<td>2</td>
<td>18.2</td>
<td>0</td>
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<tr>
<td>Hetero contact with person from an HPC</td>
<td>2</td>
<td>18.2</td>
<td>0</td>
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<tr>
<td>Hetero contact with bisexual male</td>
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<tr>
<td>Hetero contact with an IDU</td>
<td>1</td>
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<tr>
<td>Hetero contact with person with HIV</td>
<td>2</td>
<td>18.2</td>
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<tr>
<td>Hetero contact, not otherwise specified</td>
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<td>36.4</td>
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<tr>
<td>Total</td>
<td>11</td>
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Acquired immunodeficiency syndrome (AIDS)

There were ten AIDS notifications between October and December 2009, bringing the total number of AIDS diagnoses in 2009 to 51 compared to 57 in 2008. Eighty-eight per cent of the total AIDS diagnoses in 2009 were among males (n=45) and 65 per cent (n=33) were among MSM.

Deaths

There were two deaths following HIV between October and December 2009, bringing the total number of deaths in 2009 to 11 compared to 33 in 2008. In 2009 ten deaths were among men of whom six were MSM and two were heterosexuals. Three of the 11 deaths were attributed to AIDS.

Table 9: New HIV diagnoses in Victoria, by time since last negative test and/or seroconversion illness, Oct–Dec 2009, Jan–Dec 2009 and Jan–Dec 2008

<table>
<thead>
<tr>
<th>Time between HIV diagnosis and negative test and/or seroconversion illness</th>
<th>Current quarter October–December 2009</th>
<th>Annual total January–December 2009</th>
<th>Annual total January–December 2008</th>
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<tr>
<td></td>
<td>Males</td>
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<td>Total</td>
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<tr>
<td>Less than 1 year (Newly acquired)</td>
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<td>1 year to less than 3 years</td>
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<tr>
<td>3 or more years</td>
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<td>No previous negative test or seroconversion illness</td>
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Comments

The number of new HIV diagnoses in Victoria since 2006 has stabilised with the number of new HIV diagnoses in 2009 resembling the numbers in the previous three years. Male-to-male sexual contact continues to be the most frequently reported route of exposure to HIV and the proportion of cases of HIV diagnosed among people reporting heterosexual contact in 2009 was similar to the previous year.
Table 10: Notifications of notifiable infectious diseases, by Department of Health region, 1 January–31 December 2009

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<th>Notifiable disease</th>
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<th>Grampians</th>
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<th>Hume</th>
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Note: The data are preliminary figures only and may be subject to revision (daily surveillance reports are available online at [http://www.health.vic.gov.au/ideas](http://www.health.vic.gov.au/ideas))
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Total: 250,907 1,561,798 1,001,907 1,242,657 5,204,826
The Victorian Infectious Diseases Bulletin is published quarterly and provides summaries of infectious diseases surveillance data, local news, outbreak investigations, infection control procedures, clinical cases of general interest and brief reports on original clinical or laboratory based research. The bulletin is distributed free of charge to persons with an interest in the control and treatment of infectious diseases in Victoria.

Contributions are invited on any topic dealing with the control of infectious diseases. These may be in the form of articles, short reports or letters. Lead articles will be subject to peer review. As a guide, lead articles should be no more than 2500 words with a 200 word abstract, non-peer reviewed articles 2000 words and short reports and letters 800 words. Submissions should be in Microsoft Word IBM-compatible format with Vancouver-style references. We encourage submissions in electronic format. Original data from which graphs and figures have been prepared should be included. Submissions will be edited to conform with the style of the bulletin.

The editors recognise and thank the individuals and organisations who contribute to the surveillance and management of infectious diseases. We remind authors of their responsibility to cite appropriate persons as authors and to acknowledge separately those whose work contributed significantly but did not justify authorship.

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Published by the Health Protection Branch: Wellbeing, Integrated Care and Ageing., Victorian Government Department of Health

Editorial group: Hazel Clothier, Mark Veitch, Emma McBryde, James Fielding, Stacey Rowe and Rosemary Lester

Production editor: Judy Bennett

Planning editor: Hazel Clothier

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Authorised by the State Government of Victoria, 50 Lonsdale Street, Melbourne.

Printed by Stream Solutions

March 2010