

Victorian Infectious Diseases Bulletin

Case-Control Studies of Sporadic Cryptosporidiosis in Melbourne and Adelaide

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Cryptosporidium parvum became recognised over the past decade as a significant pathogen in community gastroenteritis. Research on the infection sources for this organism has focused on outbreak situations mainly, and there is little information on the relative contribution of different sources to sporadic disease. Recently completed case-control studies in two Australian cities highlighted the importance of public swimming pools and person-to-person contact in disease transmission.

INTRODUCTION

Outbreaks of cryptosporidiosis have been attributed to contaminated drinking water, recreational water, person-to-person transmission and some foodstuffs. In Australia, only one drinking water-related outbreak in a small private supply has been documented.¹ In contrast, the reported detection of large numbers of oocysts in the Sydney water supply in 1998 was not associated with an increase in disease rates² and remains the subject of some controversy.³ Large swimming pool-related outbreaks have been detected in several Australian States in recent years.⁴⁻⁶

The number of cryptosporidiosis cases associated with recognised outbreaks probably represents only a small fraction of all cases occurring in a community over time. Thus, the disease burden and related public health costs of sporadic cryptosporidiosis may be more significant than those of outbreaks. The primary focus of international research has been the cause of cryptosporidiosis outbreaks, but it is also important to identify the risk factors for sporadic disease to develop

appropriate public health responses to reduce disease rates.

METHODS

STUDY SETTING

Between 1998 and 2001 we conducted separate case-control studies in Melbourne and Adelaide to assess risk factors for sporadic cryptosporidiosis. The studies carefully assessed drinking water, given the potential importance of population exposure via this route.

The two cities were chosen to represent the opposite ends of the water quality and treatment spectrum of Australian metropolitan water supplies: Melbourne has high-quality source water from protected catchments with no human access and applies minimal treatment (chlorination only), while Adelaide has poor-quality source water from unprotected catchments and applies full conventional water treatment (coagulation, sedimentation, filtration and chlorination). Other major population centres in Australia have drinking water supplies between these extremes.

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CASE AND CONTROL RECRUITMENT

We prospectively identified eligible cases from pathology laboratory reports to the departments of human services in Victoria (June 1998 to May 2001) and South Australia (November 1998 to May 2001), and recruited age/gender-matched controls from the general population using the electronic White Pages telephone directory.

Eligible cases were defined as people who had laboratory-confirmed cryptosporidiosis, resided in the metropolitan area of each city, could speak English and had a telephone. Eligible controls were people who resided in the metropolitan area of each city, did not have gastroenteritis symptoms during the two-week period before the onset of symptoms in the matched case, could speak English and had a telephone.

Cases completed a telephone questionnaire covering the two-week incubation period before symptom onset, and matched controls completed the same questionnaire for an equivalent time period. To increase the statistical power of the studies, four controls were matched to each case.

RISK FACTORS ASSESSED

The risk factors assessed in the studies were selected on the basis of reported outbreaks, the ecology of *C. parvum* and biological plausibility. We assessed associations between illness and the type and quantity of water consumed, consumption of selected foods (green salads, berries, mushrooms, carrots, sausages, hamburgers, offal, unpasteurised milk products and raw shellfish), travel, recreational water activities, gardening activities, contact with other people with gastroenteritis, work with young children or people with a disability, contact with sewage and contact with domestic and farm animals. We also assessed factors potentially affecting host susceptibility, such as the use of stomach ulcer medication and immune system disease.

Data analysis was performed with Stata software (Version 5.0 for Windows) using conditional logistic regression formulated as a stratified Cox proportional hazard regression model, with the matched sets as strata. Linear trend analysis was used to evaluate a dose-response relationship when this was relevant.

RESULTS

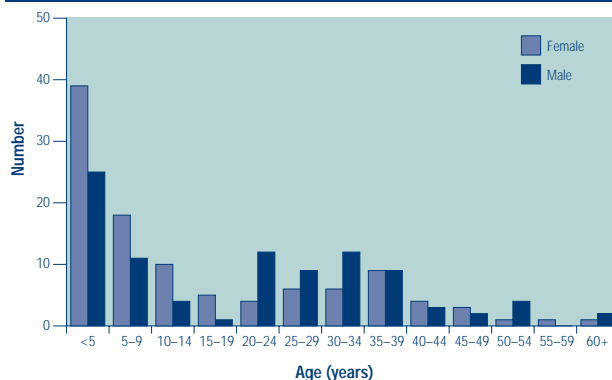
CASE NUMBERS AND DEMOGRAPHICS

The numbers of cases reported, interviewed and included in statistical analysis are shown in Table 1.

Both cities reported higher case numbers in late summer to autumn each year. The median age of cases was 11 years in Melbourne (range 0–81 years old) and 10 years in Adelaide (range 0–83 years old). The age distribution was bimodal, with peaks in the under 5 years and 20–39 years age ranges (Figure 1). Cases were equally distributed between the sexes.

During February 2001, in response to a rise in case numbers, the Department of Human Services Victoria commenced enhanced surveillance for cryptosporidiosis via general practitioners and pathology laboratories. The

Figure 1: Cryptosporidiosis Cases, by Age and Sex, Melbourne (n = 201)



result was an increase in the number of Melbourne cases reported in the last few months of the study.

CLINICAL SYMPTOMS

Clinical symptoms of cryptosporidiosis among cases were often prolonged, with a mean duration of 22.4 days in Melbourne and 19.4 days in Adelaide. Diarrhoea was the predominant symptom, occurring in 98.5 per cent of cases in both cities. Hospitalisation for one or more nights was reported by 7 per cent (Melbourne) and 11.9 per cent (Adelaide) of cases respectively.

RISK FACTORS IDENTIFIED

Cryptosporidiosis was not associated with the consumption of plain tap water in either Melbourne or Adelaide. In Melbourne, 81.6 per cent of cases and 77.7 per cent of controls reported consuming any plain tap water, while the proportions in Adelaide were 61.2 per cent of cases and 59.3 per cent of controls. The crude odds ratio (OR) for consumption of any plain tap water versus consumption of no plain tap water was 1.3 (95% CI 0.9–1.9) in Melbourne. The adjusted OR was 1.3 (95% CI 0.9–2.1). In Adelaide, the crude OR was 1.1 (95% CI 0.7–1.6) and the adjusted OR was 1.0 (95% CI 0.7–1.6). Similarly, there was no significant dose-response relationship in either city using a linear trend.

For Melbourne, statistically significant risk factors in the adjusted analysis were swimming in public pools (OR = 2.7; 95% CI 1.9–3.8), household contact with children aged 5 years old or younger with diarrhoea (OR = 7.4; 95% CI 4.0–13.8), household contact with people aged more than 5 years old with diarrhoea (OR = 1.8; 95% CI 1.1–2.9) and calf contact away from home (OR = 2.9; 95% CI 1.5–5.7). Contact with any animal at home (OR = 0.6; 95% CI 0.4–0.8) and the consumption of uncooked carrots (OR = 0.6; 95% CI 0.4–0.9) were statistically significant protective factors.

For Adelaide, statistically significant risk factors in the adjusted analysis were household contact with children aged 5 years old or younger with diarrhoea (OR = 8.6; 95% CI 4.8–15.6), household contact with people aged more than 5 years old with diarrhoea (OR = 3.7; 95% CI 2.2–6.2), calf contact away from home (OR = 5.1; 95% CI 1.5–17.3) and the consumption of unboiled water from a rural river, lake or dam within Australia (OR = 3.1; 95% CI 1.5–6.5).

Table 1: Cryptosporidiosis Cases, Melbourne and Adelaide

Location	Reported	Interviewed	Excluded		Analysed
			Disease Clusters ^a	Delayed Interview ^b	
Melbourne (35 months to May 2001)	271	239	24	14	201
Adelaide (31 months to May 2001)	173	161	22	5	134

Notes

- Disease clusters were defined as cases with onset dates within 14 days of a primary case and who resided in the same household or attended the same swimming pool or attended the same childcare centre. Only the primary case from each cluster was included in the analysis.
- Cases were excluded from analysis if they were interviewed more than eight weeks after symptom onset.

Contact with any animal at home (OR = 0.6; 95%CI 0.4–0.9) and the consumption of uncooked carrots (OR = 0.6; 95%CI 0.4–0.9) were statistically significant protective factors.

In the crude analysis, a number of other factors were significantly associated with disease risk but were not included in the adjusted analysis because there were concerns about the potential for ascertainment bias or statistical instability. Immune system illness, overseas travel, and the consumption of unboiled water, ice or salads overseas, for example, were strongly associated with the risk of cryptosporidiosis, but the relevant ORs were likely to have been substantially inflated as a result of selective screening practices by general practitioners and pathology laboratories.

DISCUSSION

These are the first reported case-control studies to examine risk factors for sporadic cryptosporidiosis in an industrialised country. Our results suggest that drinking water is unlikely to be a major cause of sporadic cryptosporidiosis in the major metropolitan centres of Australia. We found that the risk factors for sporadic infection were generally similar for both Melbourne and Adelaide despite vastly different water supplies. These risk factors included those commonly associated with outbreaks of disease, most importantly, swimming in public pools and person-to-person transmission.

The severity of disease reported by cases in these studies was attributable to the selective effect of the passive surveillance system by which they were identified. Such cases are likely to represent only a small fraction of all cryptosporidiosis cases in the community, because only those with relatively severe symptoms are likely to seek medical attention and have a faecal specimen examined. In contrast, feeding studies in volunteer subjects and outbreak investigations with active case finding have reported less severe clinical symptoms and a shorter duration of disease.

The selective recruitment of people with severe illness is unlikely to have biased the findings because current evidence indicates that each individual strain of *C. parvum* may produce symptoms ranging from mild to severe gastroenteritis. We have no reason, therefore, to suppose risk factors for moderate to mild cases are different from those for severe cases. The inclusion criteria for cases and controls (telephone connection and ability to speak English) are also unlikely to have introduced significant bias into the studies because only one notified case in Melbourne and four in Adelaide were excluded on this basis.

Interestingly, two exposures were identified as protective in both Melbourne and Adelaide: consumption of raw carrots and household contact with animals (most commonly cats or dogs). The reasons for these associations are speculative at present. Regular consumption of fresh vegetables has been reported as a protective factor in unpublished outbreak studies in the United Kingdom.⁷ This association may

represent a marker of dietary differences that reduce exposure or enhance host resistance. Or, perhaps it represents a source of frequent exposure to oocysts that induces a protective immunological response.

Regarding the protective effect of household contact with animals; the genetic basis of host range in different species and genotypes of *Cryptosporidium* is poorly understood. It appears, however, that the genotypes commonly found in domestic cats and dogs do not readily establish clinical infections in humans. Contact with domestic animals at home may also be postulated to represent a source of frequent exposure to oocysts of low human virulence leading to a protective immune response.

CONCLUSIONS

In summary, these studies suggest that drinking water is unlikely to be a major cause of sporadic cryptosporidiosis in metropolitan centres in Australia. It emphasises three areas of public health importance. First, public swimming pools are an important potential source of large numbers of cryptosporidiosis cases. This reinforces the need for relaying appropriate and regular public health messages to the public and swimming pool managers, in an attempt to prevent both sporadic disease and outbreaks. Second, the public needs further education about general hygiene measures to limit person-to-person transmission. Third, given the severity of illness in immunocompromised people with T-cell deficiencies, this population group should be cautioned about public swimming pool attendance and other important risk factors identified from these studies.

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Infectious Diseases News

BIOLOGICAL TERRORISM AND THE VICTORIAN RESPONSE

On 4 October 2001, a case of inhalational anthrax was reported in the United States, with the subsequent detection of further inhalational and cutaneous anthrax cases. The cases were found to be associated with the intentional contamination of three mail items addressed to political and media identities. These events led to reports of suspected biological threats worldwide.

In Victoria, a total of 596 incidents were reported between 10 October and 31 December, of which 187 resulted in testing for *Bacillus anthracis* at the Microbiological Diagnostic Unit at the University of Melbourne. These incidents resulted in over 800 individual tests being conducted, all of which have been negative.

The response to the threat has involved an intensive and cooperative effort between the Department of Human Services and emergency services including the Metropolitan

Fire Brigade, the Country Fire Authority, the Victorian Police and the Australian Federal Police. Close liaison has also been maintained between Commonwealth and international authorities.

Guidelines for the diagnosis and management of anthrax cases, and the management of potential exposures were widely distributed and are available on the Department's website at <http://www.dhs.vic.gov.au/phd/bioterrorism/index.htm>. Detailed information on the investigations conducted in the United States is available at <http://www.cdc.gov/mmwr/>.

ANOTHER MEASLES OUTBREAK IN YOUNG ADULTS IN MELBOURNE

Victoria has experienced its second outbreak of measles among young adults in less than 12 months. The first outbreak occurred in February, when 51 cases were notified. The second outbreak was detected on 21 October, when two hospitalised females aged 23 and 24 years old were notified. Up to 31 December, a total of 18 laboratory confirmed cases were notified, of whom nine (50 per cent) were hospitalised. One case was not considered part of the outbreak as their infection was acquired overseas. Eighty-eight per cent of cases were aged 18–34 years old; none of this age group had a documented history of previous measles vaccination. Two cases were infants younger than 12 months of age who were ineligible for vaccine. One additional case had a clinically compatible illness but no epidemiological link to other cases.

Measles vaccine is now available free of charge to adults aged 18–34 years old, and the Department is urging young adults to be vaccinated. Vaccination is particularly important for health care workers, who are at increased risk of exposure to disease and may readily transmit infection to susceptible persons. Clinicians should maintain a high index of suspicion for measles in persons with a rash illness and report suspected cases promptly to the Department on 1300 651 160.

NEW GUIDELINES FOR THE CONTROL OF MENINGOCOCCAL DISEASE

The Communicable Diseases Network Australia recently published updated *Guidelines for the Early Clinical and Public Health Management of Meningococcal Disease in Australia*. The guidelines aim to provide advice on the issues faced by primary care and public health

practitioners in the management, surveillance and control of meningococcal disease. The document is available from the Commonwealth Department of Health and Aging or on its website at <http://www.health.gov.au/pubhlth/cdi/>.

PUBLIC HEALTH TRAINEES AWARDED FOR EXCELLENCE

Victorian Public Health Training Scheme graduate and current OzFoodNet-Victoria Project Officer, Ms Nittita Prasopa-Plazier, was awarded the scheme's inaugural Nancy Millis award for the student who performs best in the final assessment for the Master of Health Science (Public Health Practice) degree. Nancy Millis, an eminent microbiologist and chancellor of La Trobe University, was instrumental in the establishment of the Microbiological Diagnostic Unit.

PhD student Brent Robertson from Monash University won the 2001 GJ Rouch Prize, awarded by the Victorian Branch of the Australasian Faculty of Public Health Medicine (AFPHEM) for his work on case-control studies of sporadic cryptosporidiosis in Melbourne and Adelaide. The prize, named in honour of the former Chief Medical Officer of Victoria, Dr Graham Rouch, is awarded annually to an advanced training candidate in public health medicine who gives the best presentation of research work at an AFPHEM meeting.

OZFOODNET UPDATE

In the quarter July–September 2001, OzFoodNet-Victoria finalised study protocols for three case-control studies which will examine the risk factors for *Salmonella* Enteritidis, *Salmonella* Typhimurium 135 and *Campylobacter* infection.

Two gastroenteritis prevalence surveys were commenced. The Victorian Population Health Survey, managed by the Health Outcomes Section of the Department of Human Services, commenced in August and the results are expected early in 2002. The Community Gastroenteritis Prevalence Survey, managed by the National Centre for Epidemiology and Population Health, commenced in September and will run on a monthly basis for the next 12 months.

For further information about the projects, please contact Joy Gregory (03 9637 5897; joy.gregory@dhs.vic.gov.au).

A Conditioned Response to Head Lice

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'... you are never rid of them, it's like trying to have a BBQ without flies.'

Head lice are small, wingless, blood-sucking, host-specific parasites. Their discovery generates extraordinary responses from parents, health practitioners and school staff. The epidemiology of head lice infections (Pediculosis) is poorly understood and the data, until recently, have been limited. Much of the existing evidence regarding the treatment and control of head lice infections seems ignored in favour of urban myth. This article explores and discusses the existing evidence base for the effective control of head lice infections.

PUBLIC HEALTH IMPORTANCE

Regardless of the arguments about whether head lice infections are of public health significance, parents of school-aged children are concerned. We have just completed a survey of parents of Victorian primary school-aged children (n = 710), and 77 per cent said head lice were a health concern (Department of Human Services, unpublished data). Head lice do not transmit any infectious diseases, yet anecdotal and published evidence suggests families adopt dangerous and ineffective remedies to rid their children of lice.^{2,3}

MANAGEMENT AND CONTROL

There are three human lice species found worldwide: head lice (*Pediculus humanus capitis*), pubic lice (*Phthirus pubis*) and body lice (*Pediculus humanus var corporis*). Many of the recommendations about lice control stem from research conducted on body lice, a more robust and mobile parasite and the vector for typhus, trench fever and relapsing fever. While pubic lice are certainly found in Australia, there is no evidence to suggest that body lice have ever been found in Australia.

The literature regarding the management and control of head lice is conflicting. Our understanding of the biology of head lice is a critical element that must not be overlooked in treatment and control strategies.

BIOLOGY

Head lice have survived, and thrived, for 10 000 years.⁴ They are a parasite highly suited to their environment. Each of their six legs ends in a claw, enabling them to grip the hair and move swiftly in both directions along the hair shaft at an estimated 15–30 centimetres per minute.⁵

They breathe through seven paired spiracles, one on the thorax and six on the abdomen. It is thought that blocking the abdominal spiracles makes it difficult for the lice to breathe. Running and hiding is hard if you can't breathe!

DETECTION

Contrary to commonly held misconceptions, lice can be present on a head for weeks or even months without causing an itch. An itchy scalp is the most common sign associated with pediculosis, yet as few as 14 per cent, up to 50 per cent, of infected people scratch or itch.^{6–8} Successful head lice control depends on families regularly looking for lice.

Research has shown that the most effective method of detecting lice is to use hair conditioner and a fine-tooth comb.⁹ While dry checking can detect eggs, it is not as effective at finding live lice, particularly when lice numbers are low.⁹ In 2000, the *British Medical Journal* published similar findings suggesting traditional scalp inspection is a poor method of detecting lice, possibly resulting in 30 per cent false positive or 10 per cent false negative findings.¹⁰

The detection method known as 'conditioner and combing' involves combing inexpensive, white hair conditioner through dry, brushed hair. The next step, after the hair is divided into smaller sections, is to comb each section using a head lice comb. After each combing, the comb is wiped onto a tissue, allowing lice and eggs to be easily seen. The aim is to cylindrically coat each hair in conditioner.

TREATMENT

Treatment, management and control of head lice are complex tasks, and increasing pediculicide resistance worldwide hinders the progress.¹¹ Ectoparasitosis treatment provides a rare example of the deliberate use of insecticides on humans.¹² Families concerned about the ongoing expense of, or exposure to, frequent insecticide-based treatments are instead opting for a mechanical removal method (such as 'conditioner and combing'). When this method is used as a treatment option, it involves the same approach as described for detection and it is continued every second day until no live lice are found for 10 days.⁹

This treatment method, used in the United Kingdom since 1989, allows parents to tackle the problem of head lice without the repeated use of pediculicides, providing a sustainable, inexpensive and effective method of control. When treating headlice, it is suggested a product need only be applied once. From the clinical trial results available, however, none of the more than 40 (20 herbal and 23 pediculicide-containing) over-the-counter head lice products in Australia are 100 per cent ovicidal. In a recent review of head lice products, the Therapeutic Goods Administration recommended re-treatment seven to 10 days after the initial application.⁸

TREATING COMBS, CARPETS AND THE CLASSROOM

There is little evidence to support the position that objects or furnishings in a household or classroom play an important role in head lice transmission. Australian research suggests there is no risk of head lice transmission

from classroom floors.¹³ Hats are a very low transmission risk and, similarly, pillowcases pose only a low transmission or reinfection risk. There is insufficient evidence to support an association between the transmission of head lice and the sharing of combs or brushes.^{13,14} This suggests head lice control should concentrate on the major route of transmission, that is, head-to-head transmission.

Finding head lice on people in childcare facilities or hairdressing salons frequently generates unnecessary distress. Data from James Cook University show head lice on combs and brushes are easily killed by immersion in hot water at 60°C for one minute.¹⁵ The subsequent risk of transmission from the comb or brush to the next user is zero. This provides further evidence to reduce the work and perceived drama associated with finding head lice.

Head lice rarely fall from the head; those that do are likely to be either injured or elderly and about to die. Despite head lice observed on furniture, it is believed that these lice were senile and posed no risk for reinfection.⁸ Louse eggs are laid very close to the scalp, but the louse itself lives on a hair shaft, moving down to the scalp to obtain the three or four blood meals required each day.

Once off the head, the louse dehydrates and dies at a rate dependant on humidity. North Queensland research demonstrated that lice die in approximately 24 hours in a tropical wet season and in six hours in the dry season. Louse eggs will not hatch at room temperature, so there is no transmission risk, even if the hair to which they are attached falls from the head.

CONCLUSION

There is no doubt that head lice cause frustration. Head lice treatment, management and control must adopt the scientific principles involved in the treatment of other parasites. Providing families, health practitioners and schools with consistent and accurate messages empowers them to manage pediculosis with confidence.

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An Outbreak of *Salmonella* Typhimurium Phage Type 99 Linked to a Restaurant in Victoria

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On 15 August 2001, the Communicable Diseases Section of the Department of Human Services identified and commenced investigating an outbreak of Salmonella Typhimurium phage type 99 (S. Typhimurium 99) infections associated with an eatery (Restaurant A) in Melbourne. The outbreak investigation identified 50 patrons who had become ill after dining at Restaurant A, with an eye fillet beef dish being the only meal significantly associated with illness (relative risk of 5.8, with 95%CI 3.4–9.9; p < 0.001). This report summarises the investigation and reinforces the need for food safety programs in restaurants.

Salmonella is the most commonly reported cause of food-borne disease outbreaks in Australia,¹ with most outbreaks attributable to contaminated animal products.¹ However, contaminated fresh produce is an increasingly important cause of outbreaks of food-borne diseases, including salmonellosis.² This report summarises an investigation of an outbreak of *S. Typhimurium* 99 and reinforces the need for food handlers to understand how to prepare foods correctly to eliminate pathogenic organisms and minimise the risk of contamination.

BACKGROUND

On 7 August 2001, a physician notified the Department of a case of salmonellosis in a patient who became ill after eating at Restaurant A on 28 July 2001. A further seven persons out of a family group of nine who had dined with the confirmed case at Restaurant A had also reported gastrointestinal symptoms. The confirmed case and the seven suspected cases had eaten or tasted an eye fillet beef meal. The local council had also received reports of two other patrons who had become ill after eating an eye fillet beef meal from Restaurant A on 27 July 2001. On 14 August 2001, the Microbiological Diagnostic Unit notified the Department of five confirmed and five presumptive cases of *S. Typhimurium* 99. One of the presumptive cases had been part of the 7 August 2001 family group. All 10 cases of *S. Typhimurium* 99 had eaten an eye fillet beef meal (hereafter referred to as the beef meal) at Restaurant A on 27 July or 28 July 2001.

S. Typhimurium 99 is a relatively rare serovar in Australia. The National Enteric Pathogen Surveillance Scheme reported only 16 *S. Typhimurium* 99 cases Australia-wide in 2000 (four from Victoria). In 2001, non-human isolates of *S. Typhimurium* 99 found in Victoria came from pigeons (the most common source), sheep, ducks and a cow.³ The Department initiated an outbreak investigation as a result of the increase in the numbers of this phage type and the common link with Restaurant A.

METHODS

A suspected case was defined as a person who booked and ate at Restaurant A on the 27 July 2001 or 28 July 2001 and subsequently experienced diarrhoea (three or more loose bowel motions) within seven days of attending the restaurant. Cases were confirmed if *S. Typhimurium* 99 was detected in a faecal specimen.

Restaurant A provided the booking list for persons who had dined at the restaurant over the two days 27 and 28 July 2001, and active case finding commenced on 16 August 2001. Menus were obtained for the two days and a standard questionnaire was administered by telephone.

The questionnaire included information on clinical symptoms, food history and the date and time of attending the restaurant.

Staff from the Department conducted an environmental inspection of Restaurant A on 15 August 2001 to review hygiene practices and the procedures used for preparing and serving food. The team requested details of beef suppliers and also collected further samples of a beef meal to submit to the Microbiological Diagnostic Unit for analysis. They also questioned food handlers about recent illness.

A number of food samples from the weekend in question, including some components of the beef meal, had already been collected on 5 August 2001 by the restaurant's food safety consultant and sent to a private laboratory for testing. Faecal specimens were collected from 30 patrons who reported illness and were referred to the Microbiological Diagnostic Unit for microbial analysis.

All data were collated and analysed using Epi Info 6.04c software. Univariate analysis included the Yates chi-squared test with p values less than 0.05 considered significant and relative risk (RR) with 95 percent confidence intervals (95%CI).

RESULTS

The Department conducted interviews with 153 out of a possible 316 people who were on the booking lists and had attended the restaurant. Fifty of these interviewees (33 per cent) met the suspected case definition, and 22 of these cases were culture confirmed *S. Typhimurium* 99.

Symptoms of the 50 cases included diarrhoea (100 per cent), abdominal pain (88 per cent), fever (78 per cent) and vomiting (40 per cent). The median incubation period was 25.5 hours (range 3.5–79.5). The median duration of illness was seven days (range 2–17), with 70 per cent of cases consulting a general practitioner about their illness (including one case who was admitted to hospital for three days).

The attack rate in those persons who ate the beef meal was 74 per cent. Only the beef meal was significantly associated with illness (RR 5.8, 95%CI 3.4–9.9; p < 0.001). The meal consisted of eye fillet beef, salsa verde, red wine jus, potato fondant and caramelised onion. Most diners ate all food served on the plate, making it impossible to determine an individual risk for each component. Including people who tasted the meal from another person's plate more than doubled the risk of illness (RR 12.5, 95%CI 5.3–29.8; p < 0.001). Only five of the 50 cases (one confirmed and four suspected) had not consumed or tasted the beef meal.

The environmental inspection revealed a lack of a food safety program. In addition, the inspection identified a

number of food-handling practices that might have contributed to contamination of foodstuffs. These included:

- The same tongs were used to handle raw and ready-to-serve steak.
- Chopping boards were not washed adequately between uses.
- Storage of several types of meat together in refrigerator drawers.
- All steaks placed onto the same wire rack at the end of cooking.

The potato, onions and red wine jus were reportedly cooked at high temperature for an extended period of time, and there appeared to be adequate cooking of the eye fillets. The fillets came from grass-fed cows that were processed in Queensland. The salsa was freshly made and consisted of parsley, garlic, anchovies, capers, bread and olive oil. The parsley came in batches, with one batch consisting of approximately 10 bunches of parsley, which was enough for approximately three preparations of salsa. The source of the parsley could not be traced.

No bacterial pathogens were isolated from food samples collected by the Food Consultant on 5 August 2001. No organisms were cultured from samples collected by DHS on 15 August 2001.

DISCUSSION

This investigation identified a total of 50 confirmed or suspected cases of *S. Typhimurium* 99 associated with dining at Restaurant A between 27 July and 28 July 2001. Of these cases, 70 per cent consulted a general practitioner and one patron was hospitalised for three days. The epidemiological investigation strongly suggested the outbreak was caused by consumption of the beef meal, although the actual component of the meal responsible for the infection could not be identified. Contamination of ingredients might have occurred before the restaurant received the foodstuffs or via cross-contamination during food storage or preparation.

Given the nature of the meal, it was not possible to separate any association between the individual components and illness. The salsa verde is (main ingredient: parsley) a possible source of contamination, because it was the only uncooked part of the meal — consisting of fresh produce prepared in batches, and it was not used in any other meal at Restaurant A. One possible explanation is that the parsley was contaminated and inadequately washed before use.

Fresh produce such as alfalfa sprouts, cilantro and parsley have all been associated with food-borne illness, including salmonellosis and shigellosis.^{2, 4, 5} These outbreaks have

usually been linked to faecal contamination by birds, animals or humans during post-harvest handling, shipping or processing in circumstances that permitted bacterial multiplication.² We were unable to trace the source of parsley used in the dish, so no environmental investigation was possible.

Another possibility was cross-contamination through the use of unwashed cutting boards or blenders in the salsa preparation. Whatever the contamination mechanism, if inadequate refrigeration of the salsa occurred, it would have resulted in increased bacterial multiplication due to the release of nutrients from the broken plant tissue in chopped parsley.^{4, 5} That may account for the high attack rate (74 per cent) among patrons who ate the beef meal.

The other parts of the meal are less likely sources. The potato fondant, caramelised onion and red wine jus are cooked at high temperatures for an extended period, and the environmental inspection revealed that there was no likely mechanism of contamination of the eye fillet and that cooking appeared to be adequate.

This outbreak serves as a timely reminder of the importance of food safety programs, which by 1 January 2003 will be a mandatory requirement for all restaurants in Victoria. A comprehensive food safety program should address the possible mechanisms of contamination in this outbreak by including: (1) controls to reduce or eliminate pathogenic organisms in fresh produce, such as washing adequately, serving promptly after preparation, and refrigerating prepared fresh produce (for example, freshly made salsa); and (2) controls to avoid the risk of contamination from raw animal products. Food safety programs, through approved supplier programs, will also provide greater assurance of high quality starting material, particularly fresh produce. As a result of this outbreak, food safety education was provided at Restaurant A, which is developing a food safety program to be implemented before legislative requirements apply.

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Immunisation Update

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Data cited in this report are based on the Australian Childhood Immunisation Register (ACIR) Coverage Report. The ACIR report measured immunisation coverage at 30 September 2001 for children aged 12- <15 months and 24- <27 months at 30 June 2001. Only vaccines administered before 12 months of age were included in the coverage calculation for the former age group, and only those vaccines administered before 24 months of age were included in the coverage calculation for the latter age group.

Table 1 groups immunisation coverage by local government area for the two birth cohorts. For a copy of the ACIR report listing immunisation coverage against individual vaccines for

each local government area, contact Michele Sands (michele.sands@dhs.vic.gov.au).

Table 1: Childhood Immunisation Coverage, by Local Government Area, Victoria, 2001

Age Group	% Fully Immunised	Local Government Area (LGA)	Total LGAs (% LGAs)
12-<15 months	95%+	Ararat (RC), Bass Coast (S), Buloke (S), Campaspe (S), Colac-Otway (S), Delatite (S), East Gippsland (S), Gannawarra (S), Golden Plains (S), Hindmarsh (S), Horsham (RC), Loddon (S), Mildura (RC), Moyness (S), Northern Grampians (S), Strathbogie (S), West Wimmera (S), Yarriambiack (S)	18 (23%)
	90-94%	Alpine (S), Ballarat (C), Banyule (C), Bayside (C), Boroondara (C), Brimbank (C), Cardinia (S), Casey (C), Central Goldfields (S), Corangamite (S), Glen Eira (C), Glenelg (S), Greater Bendigo (C), Greater Dandenong (C), Greater Geelong (C), Greater Shepparton (C), Hobsons Bay (C), Hume (C), Kingston (C), Knox (C), Macedon Ranges (S), Maribyrnong (C), Melton (S), Mitchell (S), Moira (S), Monash (C), Moonee Valley (C), Moorabool (S), Moreland (C), Mornington Peninsula (S), Nillumbik (S), Southern Grampians (S), Stonnington (C), Swan Hill (RC), Towong (S), Wangaratta (RC), Warrnambool (C), Wellington (S), Whitehorse (C), Whittlesea (C), Wodonga (RC), Wyndham (C), Yarra (C), Yarra Ranges (S)	44 (56%)
	85-89%	Baw Baw (S), Darebin (C), Frankston (C), Hepburn (S), La Trobe (S), Manningham (S), Maroondah (C), Melbourne (C), Pyrenees (S), Queenscliffe (B), South Gippsland (S), Surf Coast (S)	12 (15%)
	80-84%	Indigo (S), Port Phillip (C)	2 (3%)
	<80%	Mount Alexander (S), Murrindindi (S)	2 (3%)
24-<27 months	95%+	Glenelg (S), Loddon (S), Moira (S), Moyness (S), Queenscliffe (B), Southern Grampians (S), Towong (S), West Wimmera (S), Yarriambiack (S)	9 (12%)
	90-94%	Alpine (S), Ararat (RC), Bass Coast (S), Buloke (S), Campaspe (S), Corangamite (S), Frankston (C), Golden Plains (S), Greater Geelong (C), Greater Shepparton (C), Horsham (RC), Knox (C), Maroondah (C), Mildura (RC), Mitchell (S), Moorabool (S), Nillumbik (S), Northern Grampians (S), Pyrenees (S), Swan Hill (RC), Wangaratta (RC), Warrnambool (C), Wodonga (RC)	23 (29%)
	85-89%	Ballarat (C), Banyule (C), Bayside (C), Brimbank (C), Cardinia (S), Casey (C), Darebin (C), Delatite (S), East Gippsland (S), Gannawarra (S), Glen Eira (C), Greater Bendigo (C), Hepburn (S), Hindmarsh (S), Hume (C), Indigo (S), La Trobe (C), Macedon Ranges (S), Melton (S), Moonee Valley (C), Mount Alexander (S), Murrindindi (S), South Gippsland (S), Strathbogie (S), Surf Coast (S), Wellington (S), Whitehorse (C), Whittlesea (C), Wyndham (C), Yarra Ranges (S)	30 (38%)
	80-84%	Baw Baw (S), Boroondara (C), Colac-Otway (S), Hobsons Bay (C), Kingston (C), Manningham (C), Maribyrnong (C), Melbourne (C), Monash (C), Moreland (C), Mornington Peninsula (S), Port Phillip (C), Stonnington (C), Yarra (C)	14 (18%)
	<80%	Central Goldfields (S), Greater Dandenong (C)	2 (3%)

Surveillance Report

The Department of Human Services receives notifications of infectious diseases from medical practitioners and laboratories. These notifications prompt investigation and action to control infectious diseases in Victoria. For some diseases, investigation is initiated on the basis of clinical suspicion in the absence of laboratory confirmation. Prompt notification of infectious diseases is an integral component of prompt public health action. Please do not delay. To notify, call 1300 65 1160 or fax 1300 65 1170.

This section includes a summary of infectious disease notifications received until 30 September 2001. The report has been produced by the Communicable Diseases Section, Department of Human Services, in cooperation with the Victorian Infectious Diseases Reference Laboratory and the Epidemiology and Social Research Unit of the Macfarlane Burnet Centre for Medical Research. We gratefully acknowledge the contribution of the Microbiological Diagnostic Unit, University of Melbourne; the Melbourne Sexual Health Centre; and the Victorian Collaborative Group on HIV and AIDS Surveillance.

Table 13 includes historical comparisons of selected diseases with 2000 data at both the State and regional level. Summary data at local government level for the diseases listed are available from Greg Mathews, Communicable Diseases Section, Department of Human Services (03 9637 4108). There have been no notifications of anthrax, diphtheria, leprosy, plague, poliomyelitis, rabies, viral haemorrhagic fevers or yellow fever. Cryptosporidiosis, hepatitis D and E, influenza, invasive pneumococcal disease, Japanese encephalitis and lyssavirus (Australian bat lyssavirus and other lyssaviruses) were added to the list of notifiable diseases on 16 May 2001. Amoebiasis, chancroid, hydatid disease, Lymphogranuloma venereum, primary amoebic meningo-encephalitis, taeniasis, typhus and yersiniosis ceased to be notifiable on 16 May 2001.

For comments or queries related to data for sexually transmissible diseases, contact the Communicable Diseases Section, Department of Human Services (03 9637 4126). For HIV/AIDS enquiries, contact Cathy Keenan or Dr Nick Crofts, Epidemiology and Social Research Unit, Macfarlane Burnet Centre for Medical Research (03 9282 2290).

Fortnightly surveillance data from the Victorian Infectious Diseases Reference Laboratory are available at <http://www.dhs.vic.gov.au/vidr/>. All data in this report are provisional and subject to revision as further information becomes available. You can find general information related to the control of infectious diseases (The Blue Book) on line at http://www.dhs.vic.gov.au/phd/hprot/inf_dis/bluebook/index.htm.

OUTBREAKS OF GASTROINTESTINAL ILLNESS

For the third quarter of 2001 there were 15 outbreaks of gastrointestinal illness reported to the Communicable Diseases Section of the Department of Human Services (Table 1). Five of these outbreaks were considered to be

food-borne or probable food-borne outbreaks. Of the remainder, five were confirmed as Norwalk-like virus gastroenteritis and five were suspected viral gastroenteritis; all of these are suspected to have been transmitted by person-to-person contact.

Table 1: Outbreaks of Gastrointestinal Illness, Victoria, 1 July – 30 September 2001

Setting	Outbreaks	Persons Affected	Pathogen/Toxin (number of outbreaks)
Restaurant / reception / other food premises / specific food	4	80	<i>Salmonella</i> Typhimurium 99 (2) Suspected enterotoxin (1) Suspected butterfish consumption (1)
Aged / disability / health care institution	4	92	Norwalk-like virus (1) Suspected viral (3)
Recreation / holiday / camp	3	86	Norwalk-like virus (2) <i>Campylobacter</i> (1)
Children's service / school	2	25	Norwalk-like virus (1) Suspected viral (1)
Family / social gathering	2	25	Norwalk-like virus (1) Suspect viral (1)
Total	15	308	Norwalk-like virus (5) Suspected viral (5) <i>Salmonella</i> Typhimurium 99 (2) <i>Campylobacter</i> (1) Suspected enterotoxin (1) Suspected butterfish consumption (1)

BUTTERFISH CONSUMPTION

In August, the Department received a complaint about a diarrhoeal illness among a group of 15 colleagues who had dined at a restaurant for lunch. Four of the 15 complained of watery diarrhoea within approximately three hours after meal consumption. No other symptoms were reported. All four cases had consumed butterfish and only one person who had consumed the butterfish was not ill. Attempts were made to contact the entire group, but only half were available for interview.

A sample of the raw fish was obtained from the restaurant and analysis revealed that the species was Escolar. This species is known to have a high oil content (as high as 23 per cent by weight). Humans do not easily digest the type of oil contained in this species of fish, which can cause diarrhoea if eaten in large quantities. It is believed that illness in this group of patrons was caused by the consumption of Escolar.

DANCE EISTEDDFORD

A family member of participants who had attended a dance eisteddford over a three-day period in early August notified the Department of approximately 30 people who had suffered gastroenteritis following the competition. Dance schools from across Victoria had attended the competition, and several councils assisted the Communicable Diseases Section in the investigation.

Given the large number of participants (more than 300), 85 were randomly selected for interview. A total of 57 (67 per cent) interviews were completed: thirty-three participants (58 per cent) reported illness consisting of vomiting and/or diarrhoea following attendance at the competition, and one child reported vomiting and diarrhoea three days before attending. Faecal specimens were collected from five cases and all were positive for Norwalk-like virus.

Further investigations revealed that a child had vomited in the carpeted foyer area of the hall during the second day of competition. Exposure to aerosols of vomit, together with inadequate cleaning of the affected area and sanitary facilities, is believed to have enabled the virus to be transmitted throughout this setting.

CAMPYLOBACTER INFECTION AT SCHOOL CAMP

A pathology company notified a case of *Campylobacter* infection to the Communicable Diseases Section in September. The pathologist indicated that the case had attended a school camp and that there were reports of several other children on the camp who had been ill. The school was contacted and revealed that year 9 students live on a farm for seven weeks but generally return home on the weekends. There were 27 students and staff on the farm at the time, of whom six had been ill with gastrointestinal symptoms. A menu for the week preceding the onset of illness was obtained, and all students and staff attending the camp were interviewed. The investigation revealed that unpasteurised milk was served for breakfast every morning. There was no statistically significant association with any of the food, drink or camp activities. The crude relative risk, however, was higher for those who had consumed the unpasteurised milk for one of the breakfasts (relative risk 3.21, with 95 per cent confidence interval of 0.84–12.27) and hot dogs for lunch on the same day (relative risk 2.94, with 95 per cent confidence interval of 0.80–10.81). Further analysis was limited by the small sample size. Unpasteurised milk is a known risk factor for *Campylobacter* infection, however all food and milk samples collected were negative.

IMPORTED CHOLERA CASE FROM BALI

A 40-year-old man who travelled to Bali in early September developed severe watery diarrhoea after one week. He was hospitalised for a short period on his return to Australia, during which time *Vibrio cholera* O1 – Ogawa was identified from stool specimens.

Nationally, there have been other reports of cholera cases of the same biotype and serotype, all with links to travel to Bali. Indonesian health authorities are now investigating possible sources. Travellers to Bali are advised to take special care to avoid potentially contaminated water and food prepared with contaminated water, including the ice used by some hotels and restaurants to cool drinks.

AN ACUTE CASE OF HEPATITIS E

Hepatitis E virus is the major etiologic agent of enterically transmitted non-A, non-B hepatitis throughout the world.

Outbreaks of hepatitis E and sporadic cases have occurred over a wide geographic area, primarily in countries with inadequate environmental sanitation. The clinical course is similar to that of hepatitis A, with a similar case fatality rate (except in pregnant women, for whom the fatality rate may reach 20 per cent among those infected during the third trimester of pregnancy). The incubation period ranges from 15 to 64 days.

The Department of Human Services received a notification in late October for a non-pregnant female who had arrived in Australia from India. She was well on the plane, but within two days of arrival experienced nausea, vomiting and abdominal pain, developing jaundice six days later. She presented to hospital 10 days after the onset of illness and was admitted for three days. Liver function tests showed increased bilirubin, alkaline phosphatase and alanine aminotransferase. The case was negative for hepatitis A, B and C. Serological testing by the Victorian Infectious Diseases Reference Laboratory confirmed the diagnosis of hepatitis E with a high IgG titre.

Other family members in India, her travel companions and her partner were well. It was reported that members of her village in India, however, were unwell with similar illness and that this is a seasonal occurrence in the village when the water level decreases.

SALMONELLA STANLEY IN IMPORTED PEANUTS

In August 2001, the Microbiological Diagnostic Unit noticed a small increase in the number of cases of locally acquired *S. Stanley*. A large proportion of cases were of Asian ethnic backgrounds. The Victorian Department of Human Services and other State and Territory health departments began investigating cases of *S. Stanley* to identify potential sources. The isolates were sensitive to all antibiotics tested, which distinguished them from many overseas-acquired infections. Because the outbreak spanned multiple jurisdictions, the Communicable Diseases Network of Australia asked OzFoodNet to coordinate the investigation.

Investigators in different States conducted intensive hypothesis-generating interviews. The Department of Human Services identified that two cases reported eating 'Shandong' peanuts in their incubation period. Investigating officers purchased a packet of the peanuts for testing. These peanuts were subsequently identified as positive for *S. Stanley* and *S. Newport*. The peanuts were a trial product and were imported from China in May 2001. The Australian New Zealand Food Authority coordinated a national recall of the product.

Victoria reported 10 cases of *S. Stanley* this year, of whom four acquired their infections overseas. Three cases reported having eaten the specific brand of peanuts in the previous month. To 24 November 2001, 74 cases of *S. Stanley* had been notified across Australia, of whom 19 acquired the illness while travelling. Forty-seven cases had fully sensitive antibiograms and became ill after the peanuts were imported in May. Of these 47 cases, 38 per cent reported that they had specifically eaten the product in the incubation period for their illness, and 19 per cent reported having had the brand of peanuts in their house in the month before their illness. States and Territories also reported two cases of *S. Newport* associated with the consumption of these peanuts.

OzFoodNet informed international agencies about the outbreak, which alerted investigators in Canada and the United Kingdom to outbreak associated cases. *S. Stanley* and *S. Newport* were also isolated from peanuts in these countries. The isolates of these international cases appeared to be identical to those of the Australian cases.

MYCOBACTERIUM ULCERANS SKIN INFECTIONS IN THE ST LEONARDS AREA

A total of 11 cases of *M. ulcerans* skin infections in residents or frequent visitors to the St Leonards area of Victoria have now been confirmed by polymerase chain reaction (PCR) testing. All cases were notified in a three-month period between June and September 2001 although a number of cases reported having had a skin lesion for a one or two months before seeking medical review. There were six females and five males, with ages ranging from 18 months to 88 years.

A public alert and education program was combined with selective environmental sampling. Two samples drawn from the bio-film of one water source at the local golf course tested positive for *M. ulcerans* by PCR, but these results need to be interpreted with caution because no clear mechanism of transmission was identified and many cases had no clear links to the site.

The Department continues to support a Melbourne research group that is investigating the ecology of *M. ulcerans* with an emphasis on identifying possible sources and routes for human infection.

SEXUALLY TRANSMISSIBLE INFECTIONS

ACQUIRED IMMUNE DEFICIENCY SYNDROME (AIDS)

There were 18 cases of AIDS notified during the third quarter of 2001: 17 males and one female. The majority (72 per cent) of cases were men who reported male-to-male sexual contact. Of these, 11 individuals had been diagnosed with AIDS during the third quarter, while the remaining seven cases had been diagnosed in 2000 or early 2001.

Although the notification of AIDS is a statutory requirement in Victoria, there is often a time delay between diagnosis and subsequent notification. While the notification of AIDS in Victoria is predominantly through passive surveillance (that is, relying on doctors to notify cases), the Department has begun to follow up doctors actively, seeking AIDS notifications.

Of the 85 individuals notified with AIDS during the 12-month period from October 2000 to September 2001 (80 males, four females and one transgender individual), 63 (74 per cent) had been diagnosed with AIDS within this period. The other 22 individuals had been diagnosed before July 2000. This compares favourably with figures from the previous quarter when only 44 cases (48 per cent) were notified within 12 months of diagnosis.

Since 1983, there were 1932 people notified with AIDS to the end of September 2001—1844 males, 79 females and nine transgender individuals. Over 90 per cent of all males notified reported male-to-male sexual contact.

Table 2: Notifications of AIDS, Victoria

Exposure Category	July–September 2001		October 2000–September 2001		Cumulative Total to September 2001		
	Males (n)	Females (n)	Males (n)	Females (n)	Males (n)	Females (n)	Total# (n)
Male homosexual/bisexual	12	–	57	–	1567	–	1572
Male homosexual/bisexual and injecting drug user	1	–	3	–	99	–	103
Injecting drug user	0	0	2	1	22	12	34
Heterosexual	2	0	5	1	64	49	113
Person from specified country*	1	1	3	1	17	8	25
Haemophilia/related disorder	0	0	2	0	39	1	40
Transfusion recipient	0	0	0	0	8	5	13
Other	0	0	0	0	1	1	2
Unavailable	1	0	8	1	27	3	30
Total	17	1	80	4	1844	79	1932

Includes nine persons for whom sex was reported as transgender.

* Persons from countries with a high prevalence (more than 1 per cent) of HIV.

There were 10 deaths following either a HIV or AIDS diagnosis notified during the third quarter of 2001, eight males, one female and one person for whom gender was not available. 35 deaths were notified over the previous 12

months. In total, 1602 deaths have been recorded, of whom 1455 individuals (91 per cent) had been previously diagnosed with AIDS and 147 had not been notified as having progressed to AIDS.

Table 3: Notifications of Deaths Following HIV/AIDS Diagnosis, Victoria

Exposure Category	July–September 2001		October 2000–September 2001		Cumulative Total to September 2001		
	Males (n)	Females (n)	Males (n)	Females (n)	Males (n)	Females (n)	Total# (n)
Male homosexual/bisexual	5	–	21	–	1298	–	1313
Male homosexual/bisexual and injecting drug user	1	–	2	–	87	–	90
Injecting drug user	1	0	3	1	23	9	32
Heterosexual	0	0	1	1	35	40	75
Person from specified country*	0	1	0	1	7	4	11
Haemophilia/related disorder	0	0	2	0	40	1	41
Transfusion recipient	0	0	0	0	7	5	12
Other	0	0	0	0	0	1	1
Unavailable	1	0	2	0	30	2	33
Total	8	1	31	3	1529	62	1602

Includes eight persons for whom sex was reported as transgender and four persons for whom gender was not specified.

* Persons from countries with a high prevalence (more than 1 per cent) of HIV.

HUMAN IMMUNODEFICIENCY VIRUS INFECTION

There were 47 new HIV diagnoses in Victoria during the third quarter of 2001 (39 males, seven females and one transgender individual), compared with 46 notified during the same quarter in 2000. The average age of those notified was 35.7 years (range 18–62 years), with males being older on average (36 years compared with 32 years

for females). The majority (62 per cent) of males notified during this quarter reported male-to-male sexual contact.

There were 197 HIV notifications in Victoria during the 12 months from October 2000 to September 2001—175 (89 per cent) males, 20 (10 per cent) females and two transgender individuals. This number is consistent with the 198 notifications reported for 2000.

Table 4: Notifications of HIV, by Age Group, Victoria

Age Group (years)	July–September 2001		October 2000–September 2001		Cumulative Total to September 2001		
	Males (n)	Females (n)	Males (n)	Females (n)	Males (n)	Females (n)	Total* (n)
0–12	0	0	0	0	27	8	35
13–19	1	1	4	1	58	6	64
20–29	8	2	41	8	56	7	64
30–39	19	3	73	5	1526	105	1646
40–49	7	1	38	5	1521	67	1597
50+	4	0	19	1	982	54	1039
Unavailable	0	0	0	0	102	2	119
Total	39	47	175	20	4272	249	4564

* Includes 17 persons for whom sex was reported as transgender and 26 persons for whom sex was not specified.

Table 5: Notifications of HIV, by Exposure Category, Victoria

Exposure Category	July–September 2001		October 2000–September 2001		Cumulative Total to September 2001		
	Males (n)	Females (n)	Males (n)	Females (n)	Males (n)	Females (n)	Total# (n)
Male homosexual/bisexual	29	–	130	–	3466	–	3478
Male homosexual/bisexual and injecting drug user	0	–	7	–	205	–	208
Injecting drug user	2	2	8	2	121	38	162
Heterosexual	5	5	14	13	177	145	322
Person from specified country*	0	0	4	5	69	39	108
Haemophilia/related disorder	0	0	0	0	100	1	101
Transfusion recipient	0	0	0	0	20	15	35
Other	0	0	0	0	4	9	13
Unavailable	3	0	12	0	113	2	137
Total	39	7	175	20	4272	249	4564

Includes 17 persons for whom sex was reported as transgender and 26 persons for whom sex was not specified.

* Persons from countries with a high prevalence (more than 1 per cent) of HIV.

Those with newly acquired HIV or incident infection provide a picture of who is presently affected by the HIV epidemic. Such individuals are identified on the basis of a previous negative HIV test and/or a seroconversion illness within the 12 months preceding HIV diagnosis. There were 16

individuals notified with incident HIV infection during the third quarter of 2001. During the previous 12 months, 67 individuals fulfilled the criteria of incident infection. These numbers are consistent with the 62 individuals reported with incident HIV infection during 2000.

Table 6: Notifications of HIV, by Time since Last Negative Test or Seroconversion Illness, Victoria

Time between HIV Diagnosis and Negative Test and/or Seroconversion Illness	July–September 2001			October 2000–September 2001		
	Male	Female	Total	Male	Female	Total#
Less than 1 year	12	4	16	62	5	67
1 year to less than 3 years	6	1	7	23	2	25
3 or more years	6	0	7	25	1	28
No previous negative test or seroconversion illness	15	2	17	65	12	77
Total	39	7	47	175	20	197

Includes two people for whom sex was reported as transgender.

CHLAMYDIA INFECTIONS

The Department of Human Services received 1041 notifications of *Chlamydia trachomatis* in the third quarter of 2001—a 10 per cent increase from the previous quarter's total of 941 and a 17 per cent increase from the total for the same period in 2000. The age and sex distribution of cases remains unchanged, with most cases occurring in young people aged 20–29 years (Table 7). The number of notifications for chlamydia has almost tripled since 1994.

The Department, in conjunction with key stakeholders, developed the Chlamydia Strategy for Victoria 2001–2004

to address the increasing number of chlamydial infections. The aim of this strategy is to provide information to clinicians on epidemiology, diagnosis and treatment, as well as information on activities to decrease the spread of chlamydia. The strategy became available to practitioners in October 2001 and can be downloaded from the website (<http://www.dhs.vic.gov.au/phd>) or obtained as a hard copy (contact Giulia Luzzza: 03 9637 4741). As part of the strategy, a new partner notification officer dedicated to Chlamydia has been appointed to strengthen partner notification procedures.

Table 7: Notifications of *C. trachomatis*, by Age and Sex, Victoria

Age Group	July–September 2001				October 2000–September 2001			
	Male	Female	Unknown	Total#	Male	Female	Unknown	Total#
0–12	5	9	–	14	11	25	2	38
13–19	42	134	3	179	103	449	12	564
20–29	219	357	13	589	761	1230	80	2071
30–39	91	69	10	170	397	284	50	731
40–49	44	21	1	66	157	77	5	239
50+	17	5	–	22	62	24	2	88
Unknown	1	–	–	1	2	1	–	3
Total	419	595	27	1041	1493	2090	151	3734

SYPHILIS INFECTIONS

There were 85 notifications of syphilis in the third quarter of 2001, of which six were reported as infectious syphilis. Unusually for Victoria, four of these cases were classified as primary syphilis, presenting with either an oral or genital chancre. All were aged 15–46 years, and no epidemiological link was established. The Department conducts contact tracing for all infectious cases.

GONORRHOEA INFECTIONS

There were 213 notifications of gonorrhoea in the third quarter of 2001, representing a 24 per cent increase on the previous quarter's number and the highest third quarter count for over a decade. Cases continue to be predominantly homosexual and bisexual males, but the incidence among heterosexual males rose this quarter. This was not accompanied by a corresponding rise in notifications of females. The majority of males reported acquiring infection in Victoria through casual sexual partners.

Table 9: Notifications of Gonorrhoea, by Age Group, Victoria, July – September 2001

Age Group (years)	Sex			Share of total (%)
	Males (n)	Females (n)	Total (n)	
0–12	0	0	0	0
13–19	6	1	7	3
20–29	59	6	65	31
30–39	73	5	78	37
40–49	37	0	37	17
50+	21	3	24	11
Unknown	2	0	2	1
Total	198	15	213	100

Table 8: Notifications of Gonorrhoea, by Gender, Sexual Orientation and Site of Infection, Victoria

Gender	Sexual orientation	Site of infection							Total (n)
		Urethral (n)	Vaginal (n)	Cervix (n)	Rectum (n)	Pharynx (n)	Other (n)	Urine (n)	
Male	Heterosexual	83			0	0	0	2	85
	Homosexual/bisexual	60			15	10	4	7	96
	Not known	13			1	0	1	2	17
	Total male	156			16	10	5	11	198
Female	Heterosexual	0	8	2	0	1	0	0	11
	Homosexual/bisexual	0	0	1	0	0	0	0	1
	Not known	0	2	1	0	0	0	0	3
	Total female	0	10	4	0	1	0	0	15
Total	Male and female	156	10	4	16	11	5	11	213

Notes

1. Isolates or PCR positives received within one month from the same person (same name code and date of birth) are counted once only.
2. Total number of isolates received = 230.
3. PCR diagnoses included in table = 19 (of total of 24 PCR-based diagnoses).

Table 10: Gonorrhoea Notifications, by Gender and Source of Infection, Victoria, July–September 2001

Gender	Source partner	Reported place of acquisition				Total
		Victoria	Interstate	Abroad	Not known	
Males	Client	1	0	0	0	1
	Sex worker	7	0	7	1	15
	Other	16	0	1	1	18
	Casual partner	102	4	6	2	114
	Regular partner	12	0	7	0	19
	Not known	9	1	2	19	31
	Subtotal		147	5	23	23
Females	Client	0	0	0	0	0
	Sex worker	0	0	0	0	0
	Other	2	0	0	0	2
	Casual partner	1	0	0	0	1
	Regular partner	8	0	0	0	8
	Not known	1	0	0	3	4
	Subtotal		12	0	0	3
Total		159	5	23	26	213

MYCOBACTERIUM REFERENCE LABORATORY REPORT

The Mycobacterium Reference Laboratory at the Victorian Infectious Diseases Reference Laboratory prepared this report. Given the slow-growing nature of *Mycobacterium* spp, the report is limited to the second quarter of 2001. Most specimens (both primary and referred) and isolates are from Victorian patients.

Table 11: Specimens Submitted to the Mycobacterium Reference Laboratory, April–June 2001

Primary Specimens				
<i>M. tb</i> Isolates	New Victorian <i>M. tb</i> Isolates	Non- <i>M. tb</i> Isolates	Negatives	Total
9	5	11	313	338
14	3	14	314	342
17	5	13	368	398
Referred Specimens				
<i>M. tb</i> Isolates	New Victorian <i>M. tb</i> Isolates	Non- <i>M. tb</i> Isolates	Negatives	Total
23	15	44		67
18	12	50		68
15	9	44		59
96	49	176	995	1267

Figure 1: New *M. tuberculosis* Isolates, by Age and Gender, Victoria,

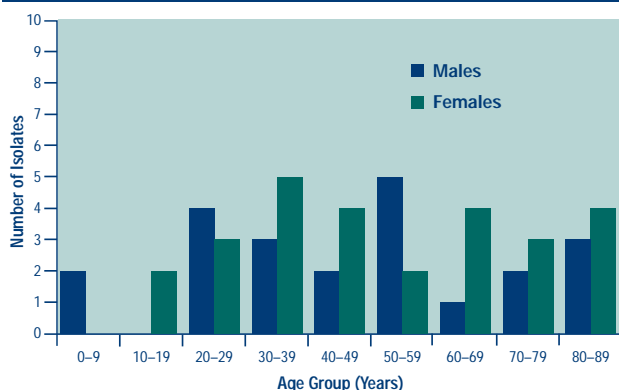


Table 12: Extrapulmonary *M. tuberculosis* Isolates and Resistant Isolates

	April 2001	May 2001	June 2001
Pulmonary site	9	14	17
Extrapulmonary site	8	7	6
Extrapulmonary site details	Lymph node (x4) Sternal biopsy (x1) Urine (x2) Pleural fluid (x1)	Lymph node (x1) Mediastinal swab (x1) Neck (x2) Finger synovium (x1) Paraspinal mass (x1) Cerebrospinal fluid (x1)	Lymph node (x1) Urine (x1) Knee (x1) Uterus (x1) Breast (x1) Thumb (x1)
Resistance		Resistance to Isoniazid (x1) Resistance to Isoniazid and Streptomycin (x1)	Resistance to Isoniazid (3) Resistance to Isoniazid and Streptomycin (x1) Resistance to Streptomycin (x1)

COMMENTS

- *M. tuberculosis* was isolated in April 2001 from the urine and pleural fluid of a patient diagnosed with renal tuberculosis in May 2000. The isolates were fully sensitive to first line drugs on both occasions.
- *M. marinum* was isolated from the forearm of a 72-year-old female who gave a history of injury from a rose bush.
- *M. kansasii* was isolated from bronchial washings of a 72-year-old male.
- *M. ulcerans* was isolated from the elbow of a 75-year-old male with a holiday home on Phillip Island, and from the thigh of a 76-year-old male living in Frankston. The organism was also isolated from a face biopsy of a koala from Phillip Island. There was one request for *M. ulcerans* PCR, which was negative.

Molecular identification techniques such as 16S rRNA sequencing are sometimes used to confirm identification by traditional methods or to identify difficult isolates. These techniques have been useful in identifying some isolates of *M. intracellulare* that could not be identified by routine methods. Some unusual and interesting isolates have also been identified, including *M. interjectum* and *M. triplex*, which are both related to the *M. avium* complex, *M. peregrinum* (a rapid grower) and *M. shimoidei* (which can cause pulmonary disease).

Mycobacterium PCR was performed on 15 specimens: five were paraffin-embedded tissues and one was acetone fixed; *M. avium* complex was detected in two; *M. abscessus* was detected in one; and *M. tuberculosis* complex was detected from an infraclavicular lump following BCG vaccination of a 3-month-old baby from the Northern Territory. The remaining 11 specimens were negative.

Table 13: Notifications of Infectious Diseases, by Department of Human Services Region, Victoria, 1 January to 30 September 2001 and Historical Comparisons

Disease	Barwon		South Western		Grampians		Loddon-Mallee		Hume		Gippsland		Western Metropolitan		Northern Metropolitan		Eastern Metropolitan		Southern Metropolitan		Unknown		Victoria		
	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	2001ytd	2000ytd	
Blood-borne diseases																									
Hepatitis B - Acute	2	4	2	2	6	8	4	0	0	0	11	2	34	6	17	13	20	10	39	30	4	8	139	83	114
Hepatitis B - Chronic/Unknown	7	7	8	24	10	13	9	14	11	396	344	257	279	309	307	313	362	108	89	362	108	89	1448	1426	1899
Hepatitis C - Incident	2	5	1	0	2	1	2	1	7	4	16	16	9	7	14	11	11	4	2	4	2	68	63	78	
Hepatitis C - Unspecified	200	196	83	110	174	165	130	153	161	170	636	923	630	729	526	574	875	1013	578	502	578	502	3993	4535	5720
Hepatitis D	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	1	12
Enteric Diseases																									
Botulism	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Campylobacter Infection	221	223	101	92	149	133	221	176	265	224	451	412	517	827	783	977	831	116	96	831	116	96	3888	3487	5014
Cholera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Cryptosporidiosis	34	1	4	1	4	5	17	11	29	12	54	11	49	11	87	17	78	12	8	1	8	1	364	82	119
Food/Water/Environmental - Other	20	0	0	1	5	4	2	1	0	0	8	22	23	5	28	21	46	3	103	17	103	17	235	74	222
Giardiasis	63	56	25	29	35	23	29	33	29	33	30	34	96	76	105	89	148	163	151	180	8	17	690	700	866
Haemolytic Uraemic Syndrome	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2
Hepatitis A	3	8	1	4	2	4	2	2	2	1	12	14	29	14	22	15	24	24	57	3	5	79	167	199	
Hepatitis E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Listeriosis	2	0	0	0	0	0	0	0	0	0	0	0	2	1	0	4	2	3	2	0	0	0	8	9	11
Paratyphoid	0	0	1	0	0	0	0	0	0	0	1	0	2	1	2	0	1	1	1	1	0	0	8	3	4
Salmonellosis	79	77	36	38	52	52	46	43	45	29	74	92	130	118	156	126	186	175	37	30	37	30	841	780	1009
Shigellosis	3	3	2	1	4	1	2	1	1	0	12	12	25	16	8	14	17	18	5	4	14	5	79	70	115
Typhoid	1	0	0	1	0	0	1	0	0	2	3	2	4	3	1	1	1	1	1	1	1	0	11	10	12
Verotoxin producing E.coli	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	4	0	0
Other Infectious Notifiable Diseases																									
Invasive Meningococcal Disease	15	6	6	6	0	2	5	3	5	4	12	9	15	19	24	19	24	38	0	1	106	107	162	162	162
Legionellosis	2	8	1	4	1	7	2	9	1	6	20	27	17	55	17	43	27	51	1	1	89	211	246	246	246
Tuberculosis	3	6	0	5	5	5	1	3	1	2	63	55	35	38	43	37	65	55	2	1	218	207	291	291	291
Vaccine Preventable Diseases																									
Haemophilus influenzae type b	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	2	3
Influenza	6	0	3	0	6	0	1	0	1	0	5	0	7	0	24	0	46	0	60	0	4	0	162	0	0
Invasive Pneumococcal Disease	20	0	4	0	19	0	7	0	15	0	4	0	11	0	30	0	24	0	86	0	86	0	220	0	14
Measles	1	4	2	0	1	1	1	0	0	0	0	0	7	4	9	2	18	3	21	3	0	1	60	18	21
Mumps	2	1	2	0	0	0	1	1	0	1	8	9	4	9	8	9	12	5	1	1	1	1	38	35	43
Pertussis	20	36	13	36	79	32	25	28	38	49	29	83	63	91	100	81	103	113	8	14	478	563	734	734	734
Rubella	0	4	0	3	2	0	6	2	1	1	2	10	8	6	5	14	16	13	0	1	40	54	66	66	66
Tetanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Vector Borne Diseases																									
Arbovirus - Barmah Forest	0	1	0	0	1	3	2	1	11	4	0	0	0	0	0	0	1	0	0	0	0	0	16	11	18
Arbovirus - Flavivirus	0	0	0	0	1	1	1	1	0	2	3	1	2	3	1	2	8	2	0	1	0	1	16	13	13
Arbovirus - Not Further Specified	1	1	0	1	2	7	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	16	16
Arbovirus - Ross River	9	13	16	28	129	120	63	21	44	9	10	6	15	11	18	14	27	11	19	62	62	350	295	316	
Arbovirus - Kurjin	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	
Malaria	0	1	3	4	1	0	1	5	3	3	9	14	4	14	18	18	29	23	6	9	9	74	91	119	
Zoonoses																									
Brucellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Leptospirosis	13	5	0	0	4	4	2	5	8	2	1	1	0	0	0	0	0	0	0	0	0	1	28	19	36
Psittacosis	1	0	5	1	4	1	3	2	4	0	7	7	11	10	10	22	6	11	3	0	3	0	54	54	86
Q Fever	3	1	1	0	9	2	22	1	7	6	1	0	1	1	2	0	2	0	2	0	7	0	55	11	23
Total	747	673	319	375	725	591	617	516	710	587	1987	2191	2067	2093	2486	2333	3169	3050	1119	878	13946	13419	17177	17177	
Population	333003	203546	285977	243493	233094	610252	764712	973689	1118090	4765856															

Notes

- The data are preliminary figures only and may be subject to revision
- ABS estimated resident population data—June 2000 (preliminary)
- Reporting of invasive pneumococcal disease commenced in December 2000 under a voluntary laboratory based scheme

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