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COMMUNITY INVOLVEMENT AND SELF-RATED HEALTH STATUS: FINDINGS FROM A CROSS-SECTIONAL SURVEY IN CENTRAL SYDNEY

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A sense of community and community involvement are said to have positive effects on health status; however, research supporting such associations is inconclusive. This article uses data from the 1998 NSW Health Survey—an annual telephone survey of approximately 17,000 residents throughout the State—to investigate the association between sense of community and community involvement and self-reported health. Other variables including physical activity, smoking, alcohol consumption, and socio-demographic characteristics, were also examined for their relationships with self-reported health.

BACKGROUND

'Participation' has long been a central tenet of primary health care.[1] Participation can vary from token representation to group membership to full–equal partnership in controlling community organisations, and is regarded as one of the key principles of health promotion.[2,3] Having a sense of community and community involvement are said to have positive effects on health but research supporting such associations is inconclusive.[4–7]

Involvement in community organisations and activities is one form of participation that has received attention in the United States (US) and more recently in Australia as an element of social capital.[8,9] Community psychology research in the US supports the idea that participation in neighborhood action groups contributes to an increased sense of community and

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that both participation and sense of community are associated with improved health.[10]

Sense of community has been measured as feelings of belonging to a neighbourhood or local area and is consistent with interpretations of social capital that focus on community trust, norms, and networks.[11]

Australian research has also identified some correlates of participation in resident action groups and also some predictors of successful group outcomes.[12] However, no quantitative Australian research has demonstrated an association between community involvement or sense of community and health.

To contribute to the debate on the effects of community participation on health, this study examined the association between sense of community and community involvement and self-reported health.

METHODS

The dataset was extracted from the 1998 NSW Health Survey via the Health Outcomes Information and Statistical Toolkit (HOIST), which is maintained by the Centre for Epidemiology and Research, NSW Department of Health.[13,14] The dataset contains 880 study subjects aged 16 years or older who were resident in Central Sydney Area Health Service (CSAHS). Variables assessed included socio-demographic characteristics, smoking status, weight status, level of physical activity, and alcohol risk level as well as sense of community and community involvement (Table 1). The study outcome variable—self-reported health status—was assessed on a five-level Likert scale. The questions about sense of community and community involvement were based on similar questions used in US research on participation in community action groups and modified for use in a telephone survey.[15,16] They are based on the theory that sense of community encourages participation and that participation is a positive outcome in its own right, which is assumed to be associated with better health.[10] The single-item indicator for self-reported health has been widely accepted as a good predictor of mortality in many studies,[17] and has been used in the NSW Health Survey as one of the key questions for monitoring population health status.[14]

Prevalence estimates of study variables were weighted for the probability of selection based on the household size and number of telephone lines, and also for age and sex structure of the resident population of CSAHS based on the 1996 Census data.[14] In recording study variables of level of sense of community and level of community involvement, respondents who reported 'a great deal', 'quite a lot' or 'moderately' to the sense of community question were recoded as 'having some sense of community'. The rest were recoded as 'having little sense of community'. Similarly, the respondents were categorised as either 'having been involved in the community', including 'moderately' or 'very', or 'having not been involved in the community'. The study outcome variable of health status was recoded as either 'poor to fair' or 'good to excellent'. Unconditional logistic regression analysis was conducted to examine the factors that might be associated with self-reported health at multivariate levels with all variables entered in a single step without checking any of the entry criteria except tolerance. Data were analysed using SPSS for Windows 10.0, a computer program for the social sciences.

TABLE 1

ASSESSMENT OF SENSE OF COMMUNITY, COMMUNITY PARTICIPATION AND HEALTH STATUS, 1998 NSW HEALTH SURVEY

To what extent do you feel a sense of community with other people in the neighbourhood where you live? Would you say:

1. a great deal
2. quite a lot
3. moderately
4. a little
5. not at all
6. don't know.

Over all, how involved are you in community or social groups? Would you say:

1.very involved
2 moderately involved
3. slightly involved
4. not involved at all
5. don't know.

In general, would you say your health is

1. excellent
2. very good
3. good
4. fair
5. poor.

Source: Population Health Division. 1998 NSW Health Survey (HOIST). Sydney: Centre for Epidemiology and Research, NSW Department of Health.

RESULTS

The response rate to the 1998 NSW Health Survey was 66.3 per cent in residents of the CSAHS.[14] Of 880 study subjects, 46 per cent were males and 54 per cent were females, with mean ages of 42 and 44 respectively. Forty two per cent were either married or living with a partner. A little more than half of respondents (51 per cent) were working full time and three quarters (75 per cent) had finished secondary and tertiary education. Most (72 per cent) reported speaking English at home. Approximately half of the respondents reported having some sense of community (50 per cent), or having been involved in the community (46 per cent) (see Table 2). Spearman's rho correlation coefficient between sense of community and being involved in the community was low (0.304). Additional findings include: 22 per cent of respondents

TABLE 2

MULTIVARIATE LOGISTIC REGRESSION: FACTORS ASSOCIATED WITH SELF-REPORTED HEALTH STATUS OF 'POOR TO FAIR'

Factors	Characteristics of study sample	Multivariate logistic regression analysis: (Having reported 'poor to fair' health status)			
	Weighted % (*N* = 880)	%	OR*	95% CI	*P*
Sense of community					
Having some	49.9	14.6	1		
Having little	50.1	16.4	1.12	0.58–1.28	0.46
Community involvement					
Being involved	46.4	15.4	1		
Not involved	53.6	17.2	1.09	0.63–1.37	0.71
Gender					
Male	46.1	15.4	1		
Female	53.9	15.7	1.10	0.73–1.66	0.649
Age in groups					
16–30	32.4	12.4	1		
31–40	21.6	7.4	0.64	0.32–1.26	0.19
41–50	21.6	20.5	1.94	1.05–3.55	0.03
51–60	11.8	14.2	1.45	0.67–3.14	0.34
>60	12.5	30.9	3.66	1.34–4.96	0.01
Marital status					
Married–with partner	42.4	11.7	1		
Widowed	5.8	26.1	1.17	0.56–2.45	0.68
Separated–divorced	11.8	21.4	1.34	0.76–2.39	0.31
Never married	40.0	16.2	1.36	0.84–2.22	0.21
Education level					
Up to Year 10	23.9	20.8	1		
HSC–TAFE	35.5	15.0	0.81	0.75–1.94	0.45
Tertiary	40.5	11.3	0.78	0.76–2.08	0.38
Employment					
Full–time	51.1	8.5	1		
Part–time	12.2	16.4	2.30	1.30–4.10	0.01
Unemployed	3.1	18.9	2.28	0.89–5.85	0.09
Home duties	6.5	13.0	1.73	0.74–4.04	0.21
Student	12.2	13.8	1.90	0.95–3.80	0.07
Retired	10.5	32.0	2.43	0.92–6.42	0.07
Others	4.4	62.3	11.2	5.01–25.02	0.00
Language spoken at home					
English	72.4	15.3	1		
Other than English	27.6	16.4	1.53	1.01–2.33	0.05
Smoking status					
Non smoker	70.6	12.6	1		
Smoker	29.4	22.5	2.20	1.46–3.33	0.001
Alcohol risk level					
Nil	21.2	21.1	1		
Low	56.7	12.7	0.73	0.46–1.16	0.19
Hazardous	14.8	14.2	0.95	0.51–1.80	0.89
Harmful	7.4	23.9	0.89	0.40–2.01	0.78
Level of physical activity					
Adequate	64.4	13.1	1		
Not adequate	32.7	18.5	1.67	1.14–2.45	0.03
Weight status					
BMI≤25	64.5	12.3	1		
BMI>25	35.5	18.6	1.57	1.07–2.32	0.02

Note: * odds ratio was adjusted for other variables in the table.

Source: Health Promotion Unit, Central Sydney Area Health Service.

reported drinking alcohol at hazardous and harmful levels, 29 per cent were smokers, 36 per cent were overweight and 33 per cent were physically inactive.

Table 2 also shows that both sense of community and community involvement are not associated with self-reported health status. The study variables of age, employment status, language spoken at home, smoking status, weight status and level of physical activity are independently and significantly associated with self-reported health after controlling for the other variables in the model.

Compared with younger people aged 16 to 30 years, the adjusted odds ratio for reporting 'poor to fair' health status was 1.94 (95 per cent CI 1.06–3.55) for people aged 41 to 50 and 3.66 (95 per cent CI 1.34–4.96) for people over 60 years.

Compared with those working full time, people working part time had a higher chance of reporting poorer health, with an adjusted odds ratio of 2.30 (95 per cent CI 1.30–4.10), as did people speaking a language other than English at home (adjusted OR 1.53 with 95 per cent CI 1.01–2.33).

In addition, people who were smokers (adjusted odds ratio of 2.20, with 95 per cent CI 1.46–3.33), overweight (adjusted odds ratio of 1.57 with 95 per cent CI 1.07–2.32) or physically inactive (adjusted odds ratio of 1.67 with 95 per cent CI 1.14–2.45) are significantly more likely to report poorer health.

DISCUSSION

This analysis found no evidence supporting an association between community involvement and self-reported health. The factors associated with self-reported health are age, employment status, language spoken at home, smoking status, weight status, and level of physical activity. People who are aged 41 to 50 years or over 60 years, work part time, speak a language other than English at home, smoke, are overweight, or are physically inactive are significantly more likely to report their health status as 'poor' or 'fair'.

The results are consistent with Veenstra's study,[7] which concluded that civic participation was unrelated to self-reported health. Both studies focused on individual attributes. Most social capital studies that have reported associations with health have, however, examined the association between community involvement and community level indicators of health status such as all cause or disease-specific mortality rate.[4] It may be that associations between community involvement or social capital and health are detectable when communities rather than individuals are the unit of analysis.

In the Australian context it may be that general 'participation' in civic life does not affect health. The culture of volunteering and nature of participation in the United States differs markedly from that in Australia.[18] Therefore, it may be important to specify what sort of participation leads to better health and to consider whether our current approaches to measurement of participation are adequate. The issue of international comparisons also raises the question of whether social capital is a cross-cultural construct, although Putnam would argue that it is.[8]

The results are limited by the cross-sectional study design that limits the findings of any causal relationship. It was not possible to obtain information about other variables that might play important roles in community participation or health, such as social support and trust. Also, individuals and groups may need to collaborate on shared activities before any benefits of this involvement manifest as health improvements.

Without any group level data available, the analysis could not adjust for any possible contextual effects. Given that the type of community is likely to modify community involvement (for example, affecting the number of organisations in the community), it is highly likely that any conclusions based on this analysis are committing a psychologistic fallacy (that is, assuming that individual-level outcomes can be explained exclusively in terms of individual-level characteristics).[19] This highlights the importance of health surveys collecting group-level data as well as individual data, so that appropriate multi-level analyses can be done.

CONCLUSION

We found no evidence of a relationship between community involvement and self-rated health status. We recommend that future efforts to study this association use communities or groups as the unit of analysis and that more effort goes into developing adequate indicators of participation and sense of community. It may be that the sorts of indicators being examined at the individual level are appropriate: for instance, membership in community, political, social and hobby organisations; number of organisations belonged to; level of responsibility or activity as a member; and length of membership.[12] However, aggregating these data at a meaningful social level—perhaps local government area, town, or region—may better reflect how social participation affects sense of community and health.

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ANTHRAX AND OTHER SUSPECT POWDERS: INITIAL RESPONSES TO AN OUTBREAK OF HOAXES AND SCARES

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Between 14 October and 16 November 2001, NSW Health was involved in the response to over 500 incidents where people were exposed to powdery materials suspected to contain spores of *Bacillus anthracis*. A public health response was established across NSW, to collate information about exposed people, and to provide them with the results of laboratory tests and to reassure them. This response relied heavily on the resources and staff of public health units, and on the cooperation and coordination of a range of government agencies. This article describes the number and characteristics of the incidents involving 'suspicious white powders', and draws conclusions about the public health implications of the procedures for communicating microbiological results to exposed people.

BACKGROUND

Anxiety became a background element in the lives of many people, after the terrorist attacks in the United States on 11 September, 2001. Perceptions that our lives were not as safe as had been assumed were widely discussed.

In early October 2001, the media reported that a 63 year-old man in Florida, who worked for a newspaper publisher, had died from anthrax. The discovery of *B. anthracis* spores at the man's workplace, and in an envelope on his desk, led to a fear of 'suspicious white powders' and the prospect of renewed terrorist activity.[1] Large numbers of reports of suspected *B. anthracis* spores were subsequently received by police around the world. Some related to malicious hoaxes, while others represented the fear of individuals faced with an improbable but unpredictable threat.

Anthrax is a disease caused by infection with the bacterium *B. anthracis*. The bacteria can lead to three forms of anthrax: cutaneous, pulmonary, and intestinal. Anthrax occurs among grazing animals in many parts of the world, including livestock along the 'anthrax belt' in eastern Australia, which extends from Queensland to Victoria. Anthrax is considered a possible weapon of biological warfare, as the pulmonary form of the disease has a very high fatality rate and is difficult to treat.

In Sydney, the first publicised 'white powder' incident occurred at Kingsford Smith Airport on 14 October 2001, but earlier incidents had been reported to the police from 11 October. An attendant found an amount of white powder on a piece of luggage and alerted airport security staff. The material was soon found not to be *B. anthracis*. The discovery of suspicious powders that followed was abetted by a number of deliberate hoaxes.

The NSW Government opened the Police Operations Centre (POC) in Surry Hills to help deal with the threat of terrorist activity. This communication facility allowed the collation of information from all the relevant events and provided a venue for meetings between representatives of NSW Police, NSW Fire Brigades, the Ambulance Service of NSW, and NSW Health.

NSW Health's responsibility was to provide appropriate prevention, treatment, and guidelines, should a genuine case of anthrax be identified. NSW Health was also to report laboratory results to affected people and to help abate the fear caused by the exposure. Given the low risk that this threat posed, the preventive use of antibiotics was not recommended by NSW Health.

METHOD

Reporting of incidents

People who were concerned that they had been exposed to suspicious powders generally sought help by calling emergency services on '000'. The emergency service response included attendance at the site, initial assessment of the risk, recording of personal details, collection of the suspect items, and the decontamination of affected people and surfaces. Three levels of exposure were recognised in the response: people who had touched a suspicious powder; people who had been close to a suspicious powder; and people who had been in the same room as a suspicious powder. The suspicious powders were transported to the NSW Police Forensics Services Group (FSG) laboratory where a sample was extracted for microbiological assay at the Institute of Clinical Pathology and Medical Research (ICPMR) at Westmead Hospital.

Collection of forensic specimens

On receipt at the FSG laboratories, specimens were stored until they could be checked for the presence of irritant, toxic, or explosive chemicals or radioactive materials. Where such chemicals or materials were absent, a sample of any suspicious material was taken to ICPMR. FSG carried out full criminal investigations on any specimen that came from a deliberate hoax.

A system of assigning priority to samples was initiated in cooperation between NSW Health and NSW Police. This gave a high priority to samples from incidents in which a person had come into contact with the suspicious powder, a medium priority for incidents where the material was loose but had not been touched, and a low priority to

incidents where a suspicious package had been received but not opened.

Microbiological testing

All samples were processed in a physical containment Level 3 (PC3) laboratory within the ICPMR. Gram and spore stains were performed directly on powder as a rapid presumptive test. Samples were inoculated on to a variety of media designed to detect the presence of other potential biohazard agents (such as *Yersinia pestis*) as well as *B. anthracis*. Plates were examined after 24 and 48 hours incubation. Gram positive, spore-forming rods that were non-motile and non-haemolytic, underwent further identification by PCR, cellular fatty acid analysis as well as standard biochemical tests to exclude *B. anthracis*. All results were sent to the POC via secure fax.

Public health follow up of potentially exposed persons

Public health units (PHUs) responded to the first of these incidents on an ad hoc basis. This provided some models with which to adapt the existing NSW Health DISPLAN to the peculiarities of these events. Information about the activities of the emergency services was also gathered and a protocol for the uniform transfer of information was established.

Microbiological results were communicated to the POC where they were matched with the contact details of exposed people collected by the police. This information was collated by health liaison officers and sent to the relevant PHU for communication to the exposed person. An Access database to store the data about exposed people was developed during the response period. This database received information from the FSG, the emergency services incident reports, and the laboratory results.

The PHUs contacted people who had been exposed to the suspect materials to provide results of testing and to offer counselling or other mental health services. The PHUs provided summaries of the numbers of people contacted for each incident and how many had undergone prophylactic treatment or had accepted counselling.

Descriptive analyses were performed on the collected data using Microsoft Access and Excel software. We examined the temporal and spatial distributions of incidents, and the proportions of different responses. The analysis was limited to the study period 14 October to 16 November 2001.

RESULTS

Incidents

Between 11 October and 16 November, approximately 990 'white powder' incidents were reported by members of the public to emergency services. Police reported that 1,534 people had been potentially exposed to these substances both directly and by proximity. Samples from 535 incidents (54 per cent) were received for testing at the FSG laboratories and the following results are based on this group of events. These incidents were more frequently reported on a weekday, and during the weeks beginning 14 October and 21 October (Figure 1). Sydney and its suburbs was the source for 415 of these incidents (77 per cent). However, incidents were experienced in every area health service. Police estimated that about one third were hoaxes. The remainder were precautionary calls about powder in legitimate postal items or in unexpected places including tissue boxes and elevators.

Forensic samples and microbiological test results

Of the 535 samples, 151 (28 per cent) yielded no material suitable for microbiological assay, and 375 samples (70 per cent) had been through the full 48-hour culture period and the results reported to the POC. The remaining nine samples had either not been cleared by the FSG or had not been finally processed by ICPMR at the end of the study period. No positive result for *Bacillus anthracis* was identified. Among some of the substances submitted, further analysis identified talcum powder, cleaning agents, sugar, and starch. Anecdotal reports from emergency services personnel indicated that observations of powders at the site of incidents identified cement, dust from gyprock, and laundry detergent.

Public health

Of 1,534 exposed people, 853 (55.6 per cent) were reported to have been contacted by PHU staff. Of these, five (0.3 per cent) received prophylaxis from hospitals—which was not consistent with public health advice—and 31 (2.0 per cent) were referred for counselling to an area mental health service.

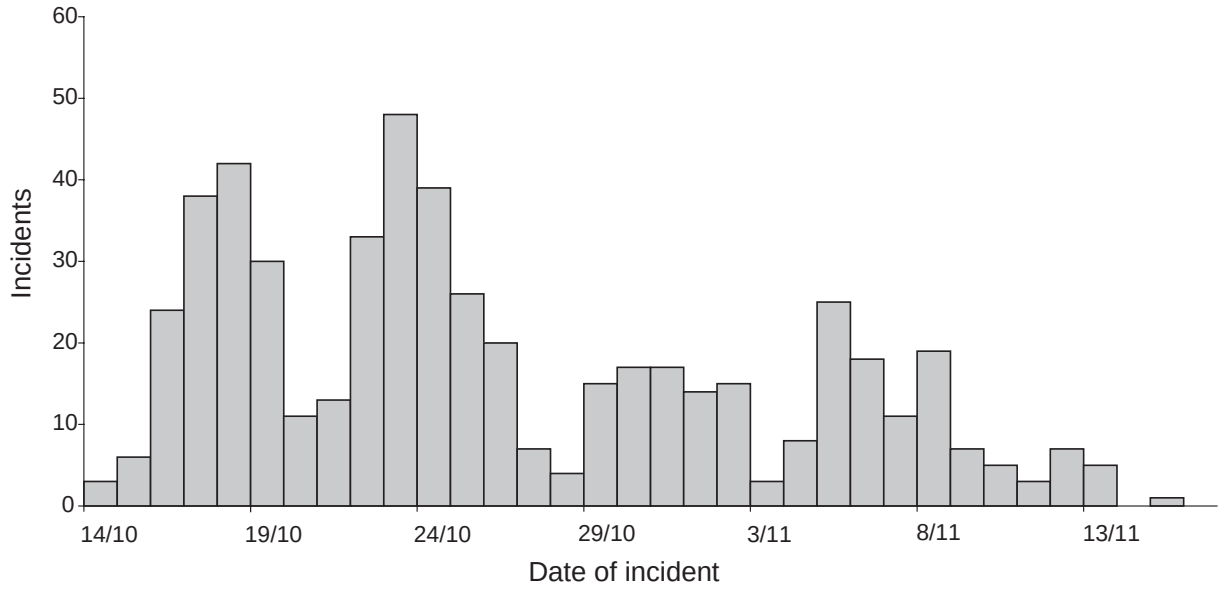
DISCUSSION

No incidents of exposure to anthrax-containing substances were identified in NSW, or elsewhere in Australia, during the study period. However, in the United States, postal delivery of *B. anthracis* spores led to the infection of 22 individuals, of whom five eventually died.[2] Anthrax scares occurred throughout Australia and the world during October and November 2001. Positive tests for *B. anthracis* from the post were announced from Kenya, the Bahamas, Greece, Brazil, Russia, India and Pakistan, all of which were retracted after further testing. The only confirmed positive result was an environmental sample found in Argentina. The spores were of the Sterne variety, used for making vaccines for animals, and were found in a letter.

The Health Services Disaster Control Centre (HSDCC) at Rozelle was opened from 22 October to coordinate the overall health response (ambulance, public health, mental health, hospital, and laboratory). NSW Health made use of existing plans for dealing with terrorist actions and events of biological warfare, as outlined in DISPLAN, to respond to the 'suspicious white powder' incidents. These plans had been developed or made more detailed in preparation for the 2000 Olympics; however, the 'suspicious white powder' incidents were smaller and more frequent than those planned for in DISPLAN.

FIGURE 1

DISTRIBUTION OF 'WHITE POWDER' INCIDENTS BY DATE, NSW, BETWEEN 14 OCTOBER AND 16 NOVEMBER 2001



Source: NSW Police Forensics Services Group.

The investigation and follow-up of these incidents provided a huge challenge for NSW Health. Coordinating information from different sources, provided by multiple agencies, through incompatible information systems, was difficult. Although the liaison officers at the POC tried to keep PHUs informed about incidents in their areas as they occurred, this was not sustainable and the work shifted to concentrating on those incidents for which results were available.

During the process of checking for the presence of dangerous substances, 151 samples proved to have no material amenable to microbiological assay. According to comments from PHU staff, reporting this to exposed people required a particular sensitivity because some exposed people remained concerned in the absence of a definite identification of the material to which they had been exposed. Similarly, anecdotal reports suggest that exposure to 'suspicious white powders' caused substantial stress for some people. It would be valuable, in any future events of such an unusual nature, to establish an evaluative process to assess the mental health effects of public health responses to those events.

After the first three weeks of the response to the outbreak of anthrax scares in NSW, as it became clear that none of the exposures had involved a real threat, the NSW Health response was scaled down, to become less intensive. This reduced demand on staff, while maintaining a service to ensure the public's health. To facilitate this, the emergency services staff attending the incidents were provided with a detailed fact sheet, to give to exposed people, explaining the circumstances under which they would or would not be contacted with laboratory results.

In the absence of a positive result, the main concern of NSW Health was the reduction of anxiety among people who had been involved in incidents. Anecdotal evidence suggests that the action of decontaminating people who were exposed to 'suspicious white powders', which was expected to reduce their anxiety, instead seemed to increase it. Similarly, it was suggested that reporting results had the potential to reawaken anxiety, especially when no tests had been conducted or when there had been a long wait for the results.

CONCLUSIONS

This outbreak demonstrated the ability of NSW Health to work cooperatively with other agencies, and reinforced the importance of regular dialogue between agencies. Regular consultation and reporting within NSW Health was important, since many different tasks were undertaken in isolation from each other and the individuals involved needed to know the requirements and constraints of those engaged in other tasks.

At the time, it seemed that placing health liaison officers in the police facilities was worthwhile, to facilitate communication between the different agencies and to ensure appropriate and effective responses. Critical to this was explaining the priorities of the different agencies to each other. However, this complicated the coordination of the NSW Health response, and was associated with increased stress among those staff. Instead, the collation

and coordination of information could probably have been conducted in the offices of NSW Health, from data provided directly from the Police Forensics Services Group and the laboratories of the ICPMR.

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LABORATORY INVESTIGATION OF SUSPECTED BIOTERRORISM INCIDENTS, NSW, OCTOBER 2001 TO FEBRUARY 2002

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In October 2001, the threat of bioterrorism became a reality, following identification of a case of inhalational anthrax in the United States. This was the first case in a bioterrorism-related outbreak, caused by exposure to mail contaminated with spores of *Bacillus anthracis*. This provoked a worldwide spate of hoaxes and scares related to suspicious 'white powders'. In New South Wales, between October 2001 and February 2002, more than 1,000 incidents were investigated and 594 samples of suspicious substances were submitted for microbiological examination to the Centre for Infectious Diseases and Microbiology, Institute of Clinical Pathology and Medical Research, Westmead. This article describes the laboratory investigation of those suspicious substances.

BACKGROUND

In preparation for the Sydney Olympic Games in 2000, the Centre for Infectious Diseases and Microbiology Laboratory Services (CIDMLS) developed procedures for the culture and identification of infectious bacterial agents known to be potential weapons of bioterrorism. These include *Bacillus anthracis* (anthrax), *Brucella melitensis* (brucellosis), *Yersinia pestis* (plague), *Francisella tularensis* (tularemia), and *Burkholderia pseudomallei* (melioidosis). Procedures were established for the management of a bioterrorism-related outbreak, and for communication between relevant agencies including: the Australian Defence Force, the Defence Science and Technology Organisation, the NSW Police Forensic Services, the NSW Fire Brigade, and the NSW Department of Health.

These procedures were reactivated in mid-October 2001, following the report of a case of inhalational anthrax in the United States on 4 October and of laboratory confirmation of a second case on 12 October. These cases were the first in a bioterrorism-related outbreak of anthrax in the United States that eventually involved 22 cases and five deaths due to exposure to finely milled spores of *Bacillus anthracis* sent through the mail.[1] This outbreak led to widespread laboratory testing for environmental contamination in the United States, and a worldwide spate of hoaxes and perceived threats of bioterrorism involving possible exposure to suspicious 'white powders' and other suspicious substances.[2,3]

METHODS

Organisation of the NSW response

The CIDMLS received the first specimens of suspicious substances for analysis on 12 October 2001. Procedures for the handling of suspicious substances, and identification of agents of bioterrorism (that is, the bacteria isolated from suspicious substances), established before the Sydney Olympic Games in 2000, were reactivated. A team of staff was formed to deal with large numbers of specimens as rapidly as possible.

Initially, the CIDMLS received a number of large objects—such as mailbags, parcels, other potentially contaminated articles, and quantities of suspicious powders—in

'hazardous material' (hazmat) containers, with a request to exclude the presence of infectious material prior to forensic examination. Procedures were developed to maintain integrity of evidence, in case of subsequent criminal prosecution. All samples submitted to the CIDMLS remained in the custody of the Police Forensic Services Group, which reported the results of laboratory testing; this relieved laboratory staff from constant telephone enquiries.

Within a few days, a NSW Police Operations Centre was opened to coordinate communication between all the agencies involved in the investigation and control of incidents, including the police, the fire brigade, and NSW Health. 'Hazardous material' teams were responsible for management of incident sites, and for collection and packaging of articles for testing using standard operating procedures. Each sample for laboratory investigation was given a unique 'event number' that allowed tracking, collation of results, and follow-up of people exposed in the incident. All laboratory results were sent to both the Police Operations Centre and Police Forensic Services Group via secure fax. Public health units were responsible for follow-up, for communicating results of laboratory testing, and for reassuring people potentially exposed to suspicious substances. This responsibility is described in an accompanying article by Leask, Delpech, and McAnulty in this issue of the *NSW Public Health Bulletin*.[4]

Meanwhile, the national Public Health Laboratory Network (PHLN) established common laboratory procedures for the safe transport and handling of suspicious 'white powders'.[5] A workshop was held on 19 October 2001 at the Queensland Health Scientific Services Laboratory at Coopers Plains, Queensland, at which representatives of all PHLN laboratories shared methods of identification and analysis of *B. anthracis*, particularly nucleic acid detection using polymerase chain reaction (PCR).

Sample collection

Samples suspected of containing bacterial agents of bioterrorism must be examined in a physical containment level 3 (PC3) laboratory within the CIDMLS. To be handled safely, they must be free of radioactive and or toxic chemical agents and be received in a clean container small enough to be opened safely in a biological safety cabinet. This excludes large items, such as mailbags. After discussion with the Police Forensic Services Group and the NSW Fire Brigade, a staging area was established at the Police Forensic Services Group headquarters at Westmead, where articles were tested for radioactive substances and toxic chemicals, and where small samples of any suspicious substance were collected. Samples were packed in 'hazardous material' containers and transported to the PC3 laboratory in the same way as routine specimens, in accordance with Instruction Number 602 of the *International Air Transport Association Dangerous Goods Regulations*.[6]

Microbiological testing

Protocols for the examination of 'white powders' or suspicious substances include phase contrast microscopy and examination of a gram stained preparation by light microscopy for bacteria and spores, which are the basis of a preliminary report. Initially, specimens were inoculated into media that support the growth of all known bacterial agents of bioterrorism. However, within the first week, intelligence reports established that the risk was confined to *B. anthracis* and laboratory protocols were modified accordingly. Brain heart infusion (BHI) broth and two blood agar plates were inoculated. BHI broth and one blood agar plate were incubated at 35°C aerobically, and one blood agar plate was incubated in CO_2. The plates were examined after 24 and 48 hours of incubation for the presence of non-haemolytic colonies of gram positive non-motile rods resembling *B. anthracis*.

Suspicious isolates were tested by *B. anthracis*-specific PCR, initially using the method modified by Queensland Health Scientific Services from a published method,[6] and later using an in-house fluorescence detection method with a faster 'turn around' time. Additional testing included bacterial fatty acid analysis by gas chromatography and standard biochemical tests.[7]

RESULTS

Samples submitted and results of microbiological testing

In NSW, there were two main periods of activity: 15 October to 23 November 2001, following bioterrorism-related outbreaks of anthrax in the United States; and 2 January to 6 February 2002, following an extortion threat on the McDonalds' food chain. More than 1,000 incidents were investigated during these periods. During the first period, the Bioterrorism Response Unit at the CIDMLS examined 475 samples; during the second period, 119 samples were examined.

Spores were not identified by microscopy in any samples submitted. *B. anthracis* grows readily on blood agar plates incubated at 35°C, and is usually detectable within 18–24 hours. A wide variety of bacteria were isolated from samples, mainly environmental, including many non-haemolytic colonies of gram positive rods (nine of which were non-motile and closely resembled *B. anthracis*; however, specific PCR was negative and all nine suspicious isolates were subsequently identified as *B. megaterium* using a combination of gas chromatography and standard biochemical tests).

The total time for the PCR assay on suspicious colonies, after an average of 16–18 hours incubation (overnight), was four hours, which allowed a provisional result to be issued within 24 hours of receipt of the specimen in the laboratory.

DISCUSSION

Bacterial agents of bioterrorism are generally classified as risk category group three (RCG3) pathogens. Handling of powders or other material suspected to contain them should be performed in a PC3 facility. Weaponised agents of bioterrorism, including *B. anthracis* spores and *Coxiella burneti* (the cause of Q fever), are developed for aerosol delivery and can remain viable for many years. Safe investigation requires staff trained to handle dangerous organisms. It also requires well-documented procedures, not only for microbiological testing but also to ensure biological security and integrity of forensic evidence.

Previous bioterrorism response protocols for the Sydney Olympic Games in 2000 were useful in managing the incidents between October 2001 and February 2002. In particular, existing procedures for a coordinated and practical decision-making that could be rapidly reactivated were invaluable. However, the 'white powder' incidents were a significant challenge to all agencies involved, including the CIDMLS. Previous procedures were designed for response to incidents of bioterrorism associated with defined events and venues. The possibility of agents of bioterrorism being disseminated through the postal system greatly increased the number of possible exposures, and the demand for resources needed to manage them.

The establishment of a staging area for screening, and pre-testing of suspicious articles, greatly facilitated handling of specimens and reduced the laboratory workload. Triage of specimens allowed some specimens that did not contain suspicious substances to be discarded. Multiple copies of specimens, such as advertising mail, that were suspected of being contaminated, were not tested once the presence of *B. anthracis* spores had been excluded in one sample.

Nevertheless, during the first six-week period, staff who normally perform routine diagnostic and public health microbiology were on call almost continuously so that samples could be processed as rapidly as possible. Accrued days off were cancelled and administrative and non-urgent maintenance procedures were postponed. The PC3 laboratory at the Centre for Infectious Diseases and Microbiology is normally used for diagnosis of tuberculosis and analysis of cultures thought to contain other RCG3 pathogens such as *Brucella* spp. Careful planning was required to ensure that the bioterrorism work did not interfere with routine work and, after the first two weeks, all but the most urgent samples were batched to make optimal use of the PC3 facility. Major public health laboratories in other jurisdictions experienced similar problems; however, because of the relatively large population of Sydney, the Centre for Infectious Diseases and Microbiology received more than half of all bioterroism-related specimens submitted to laboratories in Australia during this period. This heavy workload could not have been sustained without significantly compromising routine laboratory functions.

Even when the chance of detecting *B. anthracis* is low, rapid handling of specimens to exclude its presence as quickly as possible is essential to allow people potentially exposed to be reassured and normal business to resume in premises suspected of being contaminated. Rapid methods for on-site testing of samples for *B. anthracis* are still unreliable. At present, rapid PCR on suspicious overnight cultures provides the best balance of accuracy and speed, although further confirmatory testing is needed.

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ROSS RIVER VIRUS IN WESTERN SYDNEY: A SEROLOGICAL SURVEY

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Ross River virus is an arbovirus predominately associated with rural Australia,[1,2] although outbreaks have also occurred on the fringe of metropolitan areas. Periodically, notifications of Ross River virus infection in residents of the Wentworth Area Health Service have been reported,[3,4] with the majority of these cases likely to be acquired locally. Following the notification of cases of Ross River virus infection acquired from one locality in the Wentworth Area Health Service in 1999 and in 2000–01, a serological survey accompanied by a self-administered questionnaire was performed. This article describes the results of the survey and the questionnaire that were undertaken to determine the prevalence of undiagnosed cases and to investigate the prevalence of risk factors.

METHODS

The serological survey was designed to identify the prevalence of undiagnosed cases within the local area where cases had been previously notified. To accompany the survey, a questionnaire was designed to identify the symptoms and risk factors associated with any further cases notified.

The Werrington neighbourhood, within the Penrith Local Government Area, was chosen as it contained the residence of notified cases of Ross River virus infection. A list of households from an area of approximately three-square kilometres within Werrington was obtained, using an electronic telephone directory. Phone calls were made to every second household on the list, and additional phone calls were made where there was no response. Within the households contacted, all individuals over the age of 12 years were eligible to take part in the survey and invited to attend a clinic for a free blood test. A letter confirming the place and time of the clinic appointment was sent to participating households. Clinics were held twice-weekly at the local community centre over a three-week period during May 2001. At the clinic, each participant provided 10 ml of blood and completed a self-administered questionnaire on risk-avoidance behaviours and symptoms for Ross River virus infection, and for possible exposures to mosquitoes during the period January to May 2001.

Blood samples were tested for specific antibodies against Ross River virus at the Institute of Clinical Pathology and Medical Research, Westmead using a neutralising Enzyme Linked Immunosorbent Assay (ELISA) total antibody test. This test has a sensitivity of 99 per cent and a specificity of 100 per cent.[5] If the test was positive, specific IgM was measured using an IgM capture ELISA, a test that has a sensitivity of 98 per cent and a specificity of 99 per cent.[5]

A case of Ross River virus infection was defined as a positive serological result, irrespective of symptoms. Where symptoms consistent with Ross River virus infection were reported, local acquisition was defined as not having travelled outside the Penrith Local Government Area during the incubation period (which is four weeks prior to onset of illness). Participants with positive results were contacted by telephone and a letter was sent to participants with negative results.

The data were entered into Microsoft Access and analysed using Excel and SAS software. Ethics approval was granted by the Wentworth Area Health Service Ethics Committee.

RESULTS

The contact details of 1,345 households were obtained. Of the 778 calls made, 444 (57 per cent) agreed to receive information on Ross River virus infection. Of the 444 households who agreed to receive information, 179 households agreed to participate in the survey. Of these 179 households, 325 residents agreed to attend the clinic, provide blood samples, and answer a self-administered questionnaire.

A comparison between the population of the survey area and the sample population tested for Ross River virus is shown in Table 1.[6] The age structure of the sample population was significantly different compared to the study population (χ^2=50.6, *df*=7, p<0.01) with the older age group (50–75 years of age) over-represented and the

TABLE 1

ESTIMATED RESIDENTIAL POPULATION AT JUNE 1999 AND SAMPLE CHARACTERISTICS AT MAY 2001, WERRINGTON, NSW

Variable	Estimated residential population	Sample characteristics
N	**4709**	**325**
Males (%)	50.0	45.2
Females (%)	50.0	54.8
Aged < 25 years (%)	29.4	17.2
Aged ≥ 25 and < 50 years (%)	56.1	55.1
Aged ≥ 50 and < 75 years (%)	13.4	25.2
Aged ≥ 75 years (%)	1.1	2.5

Source: Wentworth Population Health Unit.

younger age group (<25 years of age) under-represented in the sample population.

Of the 325 residents tested, five had recent exposure (IgG positive, IgM positive) and six had a previous exposure to Ross River virus (IgG positive, IgM negative). This produced a point prevalence of 1.5 per cent for recent exposure (95%CI=0.5–3.6). Of the five recently exposed cases, three were symptomatic and two were asymptomatic. Two of the symptomatic cases most likely acquired the infection locally as they reported that they had not travelled outside the area during the incubation period. None of the five recent Ross River virus infections had been previously diagnosed or notified to the Wentworth Population Health Unit.

The majority of participants who provided a blood sample did not to take precautions against Ross River virus infection (Table 2). Behaviours were also compared between those aware of the risk of Ross River virus infection from mosquito bites (75.6 per cent of participants) and those unaware of the risk from mosquito bites (24.4 per cent of participants). Those aware of the risk were significantly more likely to remove mosquito-breeding sites than those unaware of the risk (Relative Risk 'RR'=2.5, 95%CI=1.3–5.0). Those aware of the risk were also more likely to use knockdown spray in their bedrooms than those unaware of the risk, although this difference was not significant ('RR'=1.9, 95%CI=0.9-3.7). For the remaining behaviours, there was no significant difference between those aware of the risk and those unaware of the risk.

DISCUSSION

This survey was undertaken in response to an apparent cluster of Ross River virus infection within the Werrington area. Of three serological surveys for Ross River virus since 1980, one survey in Queensland reported a 1.4–3.5 per cent infection rate,[7] while studies in New South Wales and South Australia found a recent infection rate of 1.7 per cent and 0 per cent respectively.[1,8] The prevalence in our study (1.5 per cent) is consistent with these surveys.

Our study is not without limitations, the main one being that only one blood test was taken for each participant and thus seroconversion was not confirmed. Since IgM can persist in the body for some time, it is difficult to determine when infection occurred.[9] The recruitment process was not random; however, this was not considered to be a problem, as the selection of every second household provided a stratified sample that resulted in participants being drawn from all over the survey area. This method of recruiting individuals to the study was effective, as 325 people from 179 households volunteered to provide a blood sample. This was a reasonable response considering that initial contact was by telephone, and that participants gained little personal benefit from their involvement. Confirming the time and place of blood collection, and the use of the local neighbourhood centre, may have helped increase the response rate. Selection bias could occur, however, with the possibility that individuals with Ross River virus-like symptoms were more likely to agree to provide a blood sample than those without symptoms. Likewise, measurement bias may have occurred, as self-report was used to record risk behaviours. If this measurement bias did occur, it is likely to have been non-differential as many risk factors did not differ between those who were aware of the risk of Ross River virus infection and those who were not aware.

The results from the questionnaire of risk behaviours for Ross River virus infection show that the majority of

TABLE 2

PREVALENCE OF RISK BEHAVIOURS FOR ROSS RIVER VIRUS INFECTION, THOSE AWARE OF RISK FACTORS COMPARED TO THOSE UNAWARE OF RISK FACTORS, WERRINGTON, NSW, MAY 2001

Precaution	Percentage of all participants *N*=295 [c]	Percentage of group aware of risk of Ross River virus *n*=223	Percentage of group unaware of risk of Ross River virus *n*=72	Prevalence Rate Ratio (95% CI)
Use repellent (sometimes or often)	54.0	53.9	54.3	1.0 (0.8–1.3)
Outdoor activities at home [a]	57.3	58.7	52.8	1.1 (0.9–1.4)
Outdoor activities away from home [a]	53.2	54.7	48.6	1.1 (0.9–1.5)
Use of repellent inside home [a]	8.1	6.7	12.5	0.5 (0.2–1.2)
Use of repellent at work [a]	2.4	3.1	0.0	b
Wear long sleeves and trousers	20.0	19.7	20.8	0.9 (0.6–1.6)
Remove mosquito breeding sites	23.7	27.8	11.1	2.5* (1.3–5.0)
Use knockdown spray in bedroom	18.3	20.6	11.1	1.9 (0.9–3.7)
Flyscreens on windows and doors	95.6	95.5	95.8	1.0 (0.9–1.1)

* = significant (p< 0.05);

a = includes rarely;

b = relative risk cannot be calculated

c = 30 of the 325 participants did not complete the questions relating to risk factors and risk behaviours.

Source: Wentworth Population Health Unit.

residents did not take precautions against infection whether or not they were aware of the risk. This was despite recent local publicity recommending the use of insect repellent, wearing long-sleeved loose fitting clothing, and removing mosquito-breeding sites to reduce the risk of infection. The lack of precautions taken indicates that the community was unprepared or insufficiently motivated to modify their behaviour to avoid acquiring Ross River virus infection. The only risk behaviour that was different between the two groups—removing mosquito breeding sites—is unlikely to have a significant effect as the nearby open land contains numerous breeding sites for mosquitos such as creeks and swampland. Given the limited potential for environmental modification, public health units in affected areas need to develop innovative ways of influencing risk behaviours within communities at risk.

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MOVING TOWARDS A STATEWIDE APPROACH TO COURT DIVERSION SERVICES IN NSW

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There are significantly higher prevalence rates of severe mental health problems and disorders in correctional centres, compared to the general population.[1] The Corrections Health Service and the NSW Department of Health undertook a study of the health status of inmates in NSW correctional centres, and reported that approximately one third of males and half of females had a history of mental health assessment and/or treatment by a psychiatrist or a psychologist.[2] This finding supports the establishment of court-based mental health liaison services for individuals with psychiatric disorders, which divert individuals from court settings to community-based services. One such initiative is the NSW Statewide Community and Court Liaison Service, previously described in the July 2002 issue of the *NSW Public Health Bulletin* (Volume 13, Number 7).[3] This article describes the evolution of a statewide approach to court diversion and court liaison in NSW and its context in the overall provision of forensic mental health services.

OVERVIEW OF FORENSIC MENTAL HEALTH POLICY

A strategic approach to the delivery of forensic mental health services has been addressed in the draft NSW Forensic Mental Health Strategy.[4] The aim of the strategy is to provide an integrated comprehensive forensic mental health system in NSW and to propose a comprehensive model to support forensic mental health services. The Second National Mental Health Plan identifies the need for improved mental health services for this specific population.[5] Likewise, the discussion paper *Towards a National Approach to Forensic Mental Health* is a guide to the development of these improved services.[6] The discussion paper proposes a comprehensive and integrated statewide approach involving several state government departments providing tertiary specialist forensic mental health services (such as a forensic hospital clinic, a forensic community clinic, a court liaison service, and psychiatric services to prisons). This will work in collaboration with secondary services provided by the local area mental health services (such as general psychiatric hospitals, community mental health services, and private mental health practitioners).

A proposed model for the provision of integrated forensic mental health services in NSW is based on best practice models elsewhere in Australia, New Zealand, and other countries.[6] Victoria, Queensland, and Western Australia have similar approaches to provision of an integrated statewide model of service delivery. A statewide forensic mental health approach should provide a range of specialist services to the existing local area mental health services across NSW. These specialist services include the following four components: inpatient services provided in secure forensic psychiatric facilities, community forensic mental health services, prison mental health services, and court diversion and court liaison services. These four components must work in unison, and should collaborate closely with existing local area mental health services, to provide effective pathways for comprehensive specialist forensic mental health services.

The United Nations *Standard Minimum Rules for the Treatment of Prisoners 1955*, Rule 82 (1), states that: '… persons who are found to be insane shall not be detained in prisons and arrangements shall be made to remove them to mental institutions as soon as possible'.[7] In practice, such people have in the past spent extended periods in prison rather than in hospital.[8] The development of a new forensic mental health hospital, in an appropriately secure environment outside of prison, is an essential ingredient in the spectrum of services that forensic patients need. An external judiciary process, such as the courts or the NSW Mental Health Review Tribunal, would determine the security locations of mentally ill or mentally disordered defendants and offenders in the forensic system.

The target group for forensic mental health services in NSW includes the formal definition 'forensic patient' as defined in Schedule 1 of the *NSW Mental Health Act 1990*: that is, people found not guilty by reason of mental illness, people unfit to stand trial, and inmates from the prisons who are usually temporarily transferred under Section 97 and 98 of that Act.[9] The forensic services may also include offenders or alleged offenders referred directly by the courts, particularly aggressive patients with high treatment needs, sex offenders, stalkers, and arsonists.

COURT DIVERSION AND COURT LIAISON

Court diversion and court liaison are not synonymous terms but they are closely related.

Court diversion

Court diversion has been defined as a transfer of mentally ill people from criminal justice system to hospital or community mental health placements.[10] It involves the access of mentally ill or mentally disordered defendants to mental health services. It does not equate to discontinuation of existing criminal charges, but it does allow the courts to be informed of relevant mental health issues as they relate to the defendant and the community. With this in mind, a formal diversionary measure was included within Sections 32 and 33 of the *NSW Mental Health (Criminal Procedures) Act 1990*.[11] These Sections only relate to summary (often minor) offences and not to committal proceedings or indictable offences.

Court liaison

Court liaison has a broader meaning, which includes court diversion. It also includes the linking, brokering, and advocating for appropriate care; collaborating with the various agencies and departments in providing continuity of services; and a shared responsibility for the management and care of the forensic client that avoids duplication of tasks and roles by joint stakeholders.[12] Court liaison sits within a broader framework model for forensic patients and compliments, but does not replicate, the existing local area community mental health services in providing an integrated model of service provision.

NSW STATEWIDE COMMUNITY AND COURT LIAISON SERVICE

The operational task of the NSW Statewide Community and Court Liaison Service (SCCLS) begins when people with mental health problems or disorders are apprehended by the police. The police, corrective services, legal aid services, and magistrates, bring this specific population to the attention of the court-based SCCLS staff. To improve identification of our target population, we have engaged in educational initiatives and regular consultation with lawyers, custodial staff, and magistrates. Association and collaboration occurs not only in the courthouse but also in other arenas such as police cells, lawyers' offices, and correctional centres. The requirements of confidentiality and informed consent are met at all times.

Psychiatric assessment, and negotiation by our health staff involves liaison with families, mental health services, non-government agencies, public prosecutors, lawyers, magistrates, the NSW Department of Corrective Services, general practitioners, and private psychiatrists, among others. The SCCLS also links clients with the existing mental health services provided by Corrections Health within correctional centres. On discharge from prison, the SCCLS staff re-links inmates with mental health problems and mental disorders back to the local area mental health services.

ACCESS TO MENTAL HEALTH TREATMENT

The SCCLS also assists where appropriate with admissions to psychiatric inpatient facilities,[9] and advises custodial staff on medications and other health matters. People on orders under Section 32 of the *NSW Mental Health (Criminal Procedures) Act 1990*,[11] and people on bail, are linked with the local community mental health centres.[3] Although the SCCLS provides court liaison services, both in-custody and out-of-custody, it does not provide outpatient psychiatric treatment in the courthouse. Forensic psychiatric treatment is the combined role of an envisaged statewide community forensic service and the existing local area community mental health centres.

COURT REPORTS

In May 2002, the SCCLS became involved in quality initiatives of the Statewide Court Report Unit of the Clinical Services Directorate, Corrections Health Service. This court reporting program provides comprehensive consultant psychiatric reports for the courts for those individuals in custody housed at the 29 prisons across the state. The reporting service has been highly successful in reducing the report production time from 12 to two weeks. Where a more complex or detailed psychiatric assessment is needed for a person in custody, a forensic psychiatric report can be produced no-matter where the origin of the requesting court.

THE EFFECTIVENESS AND OUTCOMES OF COURT LIAISON SERVICES

The quality and efficiency of diversion schemes can be measured on a range of health and judiciary performance indicators. These may include quality of life and social wellbeing, rates of re-hospitalisation, rates of incarceration and recidivism, court processing time, and time spent on remand.[13] A key performance indicator is the ability to successfully negotiate diversion of mentally ill or disordered individuals away from the criminal justice system towards a variety of community and inpatient mental health facilities.

A range of factors may affect the ability of area mental health services to accept the mentally disordered offender. These may include demands on existing services, the perceived dangerousness of the mentally disordered offender, and a myth that prison mental health services are better equipped to manage mentally ill defendants with minor criminal charges. The latter factor is sometimes referred to as 'the criminalisation of the mentally ill', a factor that poses a particular challenge for staff involved with court liaison schemes.[14] Our court liaison mental health staff play an important role in advocating and facilitating access to community based mental health services as a viable alternative to incarceration for minor offences.[4] The judiciary, not mental health workers, determine the outcome of judicial proceedings. The long-term benefit from ongoing negotiations with area mental health services is improved access to psychiatric treatment and care for mentally disordered offenders at the interface of the criminal justice system.

CONCLUSION

The forensic population is a small target group who are relatively under-serviced. This small target group usually requires specific resources and expertise to manage their often complex and serious problems. Court liaison should be seen as part of a spectrum of forensic mental health services that address the needs of this population.

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FACT*SHEET*

L E P T O S P I R O S I S

WHAT IS LEPTOSPIROSIS?

Leptospirosis is a bacterial disease of humans and animals. It is caused by *leptospira* bacteria that are found in infected animal urine and animal tissues.

WHAT ARE THE SYMPTOMS?

Common initial symptoms of leptospirosis are fever, severe headache, sore muscles, chills, vomiting, and red eyes. These symptoms can mimic other diseases, such as influenza, and diagnosis is often difficult. Some people do not have all of these symptoms.

Some people with leptospirosis go on to develop severe disease. This can include Weil's disease, which is kidney failure, jaundice (yellow colouration of the skin which indicates liver disease), and haemorrhage into skin and mucous membranes. Meningitis (inflammation of the lining of the brain) and bleeding in the lungs can also occur. Most people who develop severe disease require hospitalisation and severe leptospirosis can sometimes be fatal.

WHAT ARE THE LONG-TERM EFFECTS?

Recovery from leptospirosis infection can be slow. People can have a chronic-fatigue-like illness that lasts for months. Others can have persistent headache or depression. Occasionally the bacteria can persist in the eyes and cause chronic eye inflammation.

HOW IS IT TRANSMITTED?

Leptospira bacteria usually enter the body through skin cuts or abrasions, and occasionally through the lining of the mouth, nose, and eyes. Many different animals can harbour *leptospira* bacteria in their kidneys. Transmission can occur after contact with infected animal urine or flesh. Soil, mud, or water that has been contaminated with animal urine can be the source of infection. Eating contaminated food or drinking contaminated water has occasionally been responsible for transmission.

WHAT ANIMALS ARE COMMONLY AFFECTED?

Many different mammals can carry *leptospira* bacteria. In Australia, these are most commonly rats and mice, dogs, cattle, native animals, pigs (both domestic and feral), horses, cats, and sheep. Infected animals may have symptoms of the disease or may be completely well.

WHO IS AT RISK?

People at risk are those who have close contact with animals or who are exposed to water, mud, soil, or vegetation that has been contaminated with animal urine. Some occupations are at higher risk (for example: farmers, vets, abattoir workers, and sugar cane and banana farmers). Some recreational activities that involve contact with contaminated water or soil can also allow leptospirosis to be transmitted (for example: camping, gardening, bushwalking, white water rafting, and other water sports).

Although leptospirosis is relatively rare in Australia, it is more common in warm and moist regions such as northeastern NSW and Queensland. About 200 cases are diagnosed nationally each year, although there are likely to be many more undiagnosed cases. Men are affected more often than women.

HOW IS IT DIAGNOSED?

A doctor may suspect leptospirosis in someone who develops symptoms usually one to two weeks after exposure. Confirmation of leptospirosis is usually by a blood test that shows exposure to *leptospira* bacteria. In general, two blood tests taken more than two weeks apart are required to make the diagnosis. Occasionally, the bacteria can be grown from blood, cerebrospinal fluid, and urine.

IS THERE A TREATMENT?

Leptospirosis is commonly treated with antibiotics such as doxycycline or penicillin. Because the testing can take some time and the disease can be severe, a doctor may choose to start antibiotics prior to confirming the diagnosis with tests. Antibiotic treatment is thought to be most effective if started early in the disease.

HOW CAN LEPTOSPIROSIS BE PREVENTED?

There are a number of ways to prevent leptospirosis.

For people who work with animals:

- Cover cuts and abrasions with a waterproof dressing;
- Wear protective clothing (for example, gloves, eye shields or goggles, aprons and boots) when working with animals that could be infected, especially if there is a chance of contact with urine;
- Wear gloves when handling cattle placentas or stillborn or aborted calves or carcasses;
- Shower after work and wash and dry hands after handling potentially infected material;
- Do not eat or smoke while handling animals that may be infected. Wash and dry hands before smoking or eating;
- Vaccinate livestock as recommended by your vet.

For other people:

- Avoid swimming in water where there is a possibility of contamination with animal urine.
- Cover cuts and abrasions with waterproof dressings, especially before coming into contact with soil, mud or water that may be contaminated with animal urine.
- Wear footwear outdoors, especially when walking in mud or moist soil.
- Wear gloves when gardening.
- Control rodents by cleaning up rubbish and removing food sources that are close to housing.
- Do not feed raw offal to dogs.
- Wash hands with soap, as *leptospira* bacteria are quickly killed by soap, disinfectants, and drying.

WHAT DO I DO IF I BECOME SICK?

If you become sick in the weeks following possible exposure to animal urine or a contaminated environment, it is important to tell your doctor about the exposure.

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IS THERE A VACCINE?

There is no human vaccine against leptospirosis licensed for use in Australia. Vaccines are available to prevent leptospirosis in animals (cattle, pigs and dogs) but vaccinated animals are still susceptible to other strains of the organism that are not covered by the vaccine.

CAN SOMEONE BE INFECTED MORE THAN ONCE?

Because there are many different strains of *leptospira* bacteria, it is possible for someone to be infected with another strain and develop leptospirosis again.

ARE PEOPLE WITH LEPTOSPIROSIS INFECTIOUS TO OTHER PEOPLE?

Rarely, leptospirosis can be transmitted from person-to-person (for example, through sexual transmission, and transmission in breast milk). The *leptospira* bacteria can be transmitted in urine for months following infection.

For more information contact your doctor, local public health unit, or community health centre: See under NSW Government at the front of the White Pages.

November–December 2003.

COMMUNICABLE DISEASES REPORT, NSW, FOR AUGUST AND SEPTEMBER 2003

TRENDS

Notifications of communicable diseases through to August 2003 show a typical pattern for late winter, with peaks in **influenza**, **invasive pneumococcal disease**, and **meningococcal disease**, and low levels of **arbovirus infections**, **cryptosporidiosis** and **salmonellosis**. In September, notifications of **invasive pneumococcal disease** began to decline (Figure 1, Tables 4 and 5).

Across NSW, there was a modest increase in **pertussis** in August when 295 cases were notified, and in September when 306 cases were notified. Epidemics occur in NSW every 3 or 4 years, and it is possible that case numbers will continue to rise through the coming months. Clinicians are urged to consider pertussis as a diagnosis in people of any age presenting with a prolonged coughing illness, especially if coughing occurs in paroxysms (bouts), or if coughing paroxysms are followed by vomiting or an inspiratory whoop. Diagnosis may be assisted by nasopharyngeal swabs for PCR or culture (most usefully early in the course of the disease); or, in patients older than two years of age, IgA serology. Treatment with eryrthromycin is important, because it reduces the patient's infectiousness (from about three weeks to about five days), and so helps to protect those in close contact with the patient from contracting the disease. Unless given soon after symptoms begin, however, antibiotic treatment may have little effect on the course of the illness. Suspected cases should be reported by doctors, hospitals, and laboratories to the local public health unit. Infectious cases should stay at home and be excluded from school, childcare, or work. Close contacts may benefit from prophylactic treatment with erythromycin; the staff of public health units can advise on the management of cases and their contacts. Clinicians are also urged to ensure that all children are up to date with their immunisations. Adult pertussis vaccination is also available, and should be strongly considered for adults who regularly come into contact with small children (for example: new parents or grandparents, child care workers, and paediatric health care workers).

ENTERIC DISEASE

August

Gastroenteritis in institutions continues to be commonly reported in the winter months. In August, five outbreaks involving more than 60 people were identified. The Hunter Public Health Unit reported two outbreaks, in a nursing home and a hospital. South Eastern Sydney, Western Sydney and Northern Sydney Public Health Units all reported outbreaks in nursing homes.

The Hunter Public Health Unit investigated a small outbreak involving four patrons who were ill after eating a restaurant meal. All worked at a local childcare centre but there appeared to be no other meals that they had in common, which could explain their illness.

The Northern Sydney Public Health Unit is investigating an outbreak of over 20 people who report illness after eating at a restaurant. *Salmonella Typhimirium* 170 was isolated from the stools of nine cases. The restaurant was inspected by public health unit staff and samples were tested for Salmonella. The cases and a selection of non-ill patrons were interviewed for possible common exposures. In a case control study, illness was significantly associated with eating a dish with fried tofu, prawn and eggplant. Sampling of raw prawn meat from the restaurant identified Salmonella Dublin, resulting in a national trade level recall of the imported product. Raw prawns may contain bacterial or viral pathogens. Thorough cooking is recommended to reduce the risk of illness from this food.

September

September was characterised by a large number of outbreaks reported in institutional settings, particularly aged care facilities.

There were eight outbreaks in nursing homes in Sydney involving over 160 people. Childcare centres accounted for 80 cases of gastroenteritis in five centres in Sydney. There was one outbreak of gastroenteritis of unknown aetiology in a hospital ward.

Two residential colleges reported outbreaks. One, affecting 35 people, was suspected to be caused by Norovirus. In the other, *Salmonella Typhimirium* 135 was isolated from the stools of 13 residents.

Viral gastroenteritis can be prevented by thorough hand washing before eating and preparing food, and after using the toilet. People who are unwell with vomiting or diarrhoea are advised to stay at home and avoid work or school for 48 hours following the resolution of symptoms. Public health units are able to provide specific advice on the control of gastroenteritis in institutions.

QUARTERLY REPORT: HIV NOTIFICATIONS TO THE END OF JUNE 2003

Table 1 summarise recent trends in HIV disease in NSW. In 2001, there were 342 people reported with newly-diagnosed HIV infection in NSW, representing the lowest number in recent years. The number rose to 392 in 2002. In 2003, to June, 224 people were reported with newly diagnosed HIV infection. These data provide further evidence that rates of HIV infection may be increasing in NSW. Of the 2003 cases to June, 92 per cent were male and 69 per cent of these reported male homosexual contact. In the same period, 31 people were reported to have been

TABLE 1

CHARACTERISTICS OF NSW RESIDENTS REPORTED WITH HIV INFECTION, AIDS, OR WHO HAVE DIED FROM AIDS, 1981 TO JUNE 2003

Characteristic	All cases 1981–June 2003						Cases for 2002						January–June 2003					
	HIV		AIDS		AIDS deaths		HIV		AIDS		AIDS deaths		HIV		AIDS		AIDS deaths	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Gender																		
Female	699	5.3	211	4.1	121	3.4	31	7.9	3	4.0	1	4.0	16	7.1	0	0.0	1	10.0
Male	12109	92.5	4957	95.7	3384	96.3	350	89.3	71	94.7	24	96.0	206	92.0	30	96.8	9	90.0
Transgender	25	0.2	14	0.3	9	0.3	3	0.8	1	1.3	0	0.0	0	0.0	1	3.2	0	0.0
Not stated	256	2.0	0	0.0	0	0.0	8	2.0	0	0.0	0	0.0	2	0.9	0	0.0	0	0.0
Age																		
0– 2	27	0.2	7	0.1	3	0.1	1	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
3–12	36	0.3	11	0.2	8	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
13–19	210	1.6	13	0.3	9	0.3	1	0.3	0	0.0	0	0.0	2	0.9	0	0.0	0	0.0
20–29	4103	31.3	759	14.6	540	15.4	90	23.0	3	4.0	2	8.0	45	20.1	1	3.2	0	0.0
30–39	5037	38.5	2145	41.4	1439	41.0	182	46.4	23	30.7	8	32.0	88	39.3	8	25.8	1	10.0
40–49	2484	19.0	1521	29.4	1031	29.3	83	21.2	36	48.0	12	48.0	53	23.7	10	32.3	7	70.0
50–59	810	6.2	547	10.6	353	10.0	23	5.9	11	14.7	3	12.0	26	11.6	9	29.0	2	20.0
60 +	286	2.2	179	3.5	131	3.7	12	3.1	2	2.7	0	0.0	10	4.5	3	9.7	0	0.0
Not stated	96	0.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Exposure																		
Male homosexual-bisexual	7819	59.7	4196	81.0	2913	82.9	246	62.8	49	65.3	18	72.0	155	69.2	22	71.0	7	70.0
Male homosexual–bisexual and IDU	318	2.4	207	4.0	141	4.0	12	3.1	9	12.0	2	8.0	3	1.3	1	3.2	0	0.0
Injecting drug use	433	3.3	106	2.0	53	1.5	9	2.3	0	0.0	1	4.0	7	3.1	2	6.5	0	0.0
Heterosexual	953	7.3	322	6.2	154	4.4	60	15.3	14	18.7	3	12.0	32	14.3	6	19.4	3	30.0
Haemophilia–Coagulation	114	0.9	52	1.0	46	1.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Blood-Tissue recipient–NSI*	122	0.9	102	2.0	90	2.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Vertical	37	0.3	14	0.3	7	0.2	1	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Undetermined	3245	24.8	41	0.8	22	0.6	47	12.0	2	2.7	1	4.0	25	11.2	0	0.0	0	0.0
Not stated	48	0.4	142	2.7	88	2.5	17	4.3	1	1.3	0	0.0	2	0.9	0	0.0	0	0.0
Residence																		
Greater Sydney**	7338	56.1	4318	83.3	2947	83.9	333	84.9	55	73.3	19	76.0	175	78.1	21	67.7	7	70.0
Rest of New South Wales	888	6.8	692	13.4	429	12.2	41	10.5	17	22.7	4	16.0	35	15.6	4	12.9	3	30.0
Unknown	4863	37.2	172	3.3	138	3.9	18	4.6	3	4.0	2	8.0	14	6.3	6	19.4	0	0.0
Total	13089	100	5182	100	3514	100	392	100	75	100	25	100	224	100	31	100	10	100

Source: NSW HIV–AIDS database, Communicable Diseases Branch, NSW Department of Health. Recent HIV data may contain duplicates.

* Needle-stick injury.

** Greater Sydney area health services include Central Sydney, North Sydney, Western Sydney, Wentworth, South West Sydney, and South East Sydney.

diagnosed with AIDS in NSW, and 10 people ever diagnosed with AIDS were reported to have died.

QUARTERLY REPORT: AUSTRALIAN CHILDHOOD IMMUNISATION REGISTER

Table 2 details the percentage of fully immunised children aged 12 months to less than 15 months in each area health service, reported by all service providers.

These data refer to five different cohorts of children whose age has been calculated 90 days before data extraction. The information contained in each of the reports has been extracted from the Australian Childhood Immunisation Register (ACIR) and may not reflect actual coverage due to under-reporting. Table 3 details the percentage of fully immunised children identified as Aboriginal or Torres Strait Islander in New South Wales for the same cohort, reported by all service providers.

CHICKENPOX IN PREGNANCY

Northern Rivers Public Health Unit (NRPHU) reports that chicken pox has been circulating in that area in recent weeks. Chickenpox is caused by infection with varicella virus, which becomes acquiescent after resolution of the symptoms. Once infected, people are almost always immune to reinfection. However, the infection sometimes reactivates later in life causing shingles. In chickenpox, varicella is spread through respiratory secretion (especially coughing and sneezing) and fluid from the vesicles that occur on the skin. In shingles, infection is not spread through respiratory secretions but from contact with the vesicular fluid. The incubation period is 2–3 weeks.

While usually fairly innocuous in children, chickenpox is sometimes associated with severe complications in neonates and adults (especially if pregnant), such as pneumonia and encephalitis. Chickenpox and shingles are usually easily diagnosed by their classic clinical presentation. Serological tests demonstrating the presence of varicella IgG indicate immunity. Before exposure, infection can be prevented by immunisation with varicella vaccine. After exposure, infection can be prevented or ameliorated by an injection of Varicella Zoster Immune Globulin (VZIG), which consists of pooled antibodies taken from blood donors. To be effective, VZIG should be given as soon as possible within 96 hours of exposure. The antiviral drug acyclovir can help treat varicella infections if given early in the course of the disease.[1]

TABLE 2

PERCENTAGE OF FULLY IMMUNISED CHILDREN AGED 12 MONTHS TO LESS THAN 15 MONTHS BY AREA HEALTH SERVICE

Area Health Service	30 Sept 02	31 Dec 02	30 Mar 03	30 Jun 03	30 Sept 03
Central Coast	92	93	93	92	93
Central Sydney	90	90	91	90	90
Hunter	93	94	94	95	93
Illawarra	94	92	92	93	92
Northern Sydney	91	91	90	91	91
South Eastern Sydney	92	91	90	91	92
South Western Sydney	90	92	91	90	91
Wentworth	91	90	93	91	92
Western Sydney	91	92	92	90	91
Far West	90	89	93	88	91
Greater Murray	94	93	92	94	93
Macquarie	91	92	92	94	93
Mid North Coast	88	90	90	89	90
Mid Western	91	94	94	93	94
New England	91	93	92	92	95
Northern Rivers	84	85	85	84	85
Southern	91	91	89	91	92
NSW	**91**	**91**	**91**	**91**	**91**
Australia	**91**	**92**	**91**	**91**	**92**

TABLE 3

PERCENTAGE OF FULLY IMMUNISED CHILDREN IDENTIFIED AS ABORIGINAL OR TORRES STRAIT ISLANDER, AGED 12 MONTHS TO LESS THAN 15 MONTHS

	30 Sept 02	31 Dec 02	31 Mar 03	30 Jun 03	30 Sept 03
NSW	**85**	**86**	**86**	**84**	**88**
Australia	**85**	**84**	**86**	**84**	**87**

These following two cases highlight the confusion that sometimes surrounds the management of varicella infections. Because of their increased risk of complications, varicella vaccination is especially recommended for non-immune adults.

Case 1

Case 1 is a healthy woman who was in the third trimester of her pregnancy when she contacted her public health unit to enquire about her risk of chickenpox, following the diagnosis of shingles in a close contact two weeks earlier. The woman reported no history of previous varicella infection. Serology was taken for varicella IgG and was negative. Because two weeks had elapsed since her first exposure, VZIG would be unlikely to be useful in prevention and the public health unit advised her to watch for, and to report, any symptoms of chickenpox in herself and in any other close contacts.

Almost two weeks later, Case 1 contacted the public health unit to report that another close contact had developed chickenpox vesicles the day before. The public health unit administered VZIG to Case 1, even though more than 96 hours may have passed since her first exposure to the second infectious close contact. A repeat varicella IgG serology, to explore the possibility of sub-clinical infection from exposure to the first close contact remained negative.

However, two weeks later, Case 1 developed chickenpox. The public health unit recommended she take oral acyclovir. The woman delivered her baby the next day, and VZIG was administered to the child at birth. Case 1 recovered uneventfully, and the neonate did not develop clinical chickenpox.

Case 2

Case 2 is a healthy woman who was in the second trimester of her pregnancy when a close contact developed chickenpox, diagnosed by her general practitioner. Case 2 had no history of chickenpox and tested varicella IgG negative.

Two weeks later, Case 2 presented to the general practitioner with vesicles and fever, and was diagnosed with chickenpox. She was prescribed paracetamol for fever. The next day she re-presented to the general practitioner with shortness of breath, vomiting, sore throat, and high temperature. She was diagnosed with varicella pneumonitis, admitted to hospital for intensive care, and treated with intravenous acyclovir. She subsequently recovered and the pregnancy continued.

Discussion

Because of the increased risk of serious complications, non-immune pregnant women who have been exposed to varicella and their newborn babies should receive VZIG as early as possible. The *Medical Journal of Australia* has produced useful guidelines for the management of varicella in neonates and pregnant women.[2]

References

1. Chin J (editor). Control of Communicable Diseases Manual, 17th Edition. Washington DC: American Public Health Association. 2000.
2. Heuchan A-M, Isaacs D. The management of varicella-zoster virus exposure and infection in pregnancy and the newborn period. *MJA* 2001; 174: 288–292. Available online from the MJA website at www.mja.com.au/public/issues/174_06_190301/heuchan/heuchan.html.

FIGURE 1

REPORTS OF SELECTED COMMUNICABLE DISEASES, NSW, JANUARY 1998 TO SEPTEMBER 2003, BY MONTH OF ONSET

Preliminary data: case counts in recent months may increase because of reporting delays.
Laboratory-confirmed cases only, except for measles, meningococcal disease and pertussis
BFV = Barmah Forest virus infections, RRV = Ross River virus infections
LI = Legionella longbeachae infections, Lp = L. pneumophila infections
Gp C and Gp B = disease due to serogroup C and serogroup B infection,
other/unk = other or unknown serogroups

NSW population	
Male	50%
<5	7%
5–24	28%
25–64	52%
65+	13%
Rural*	42%

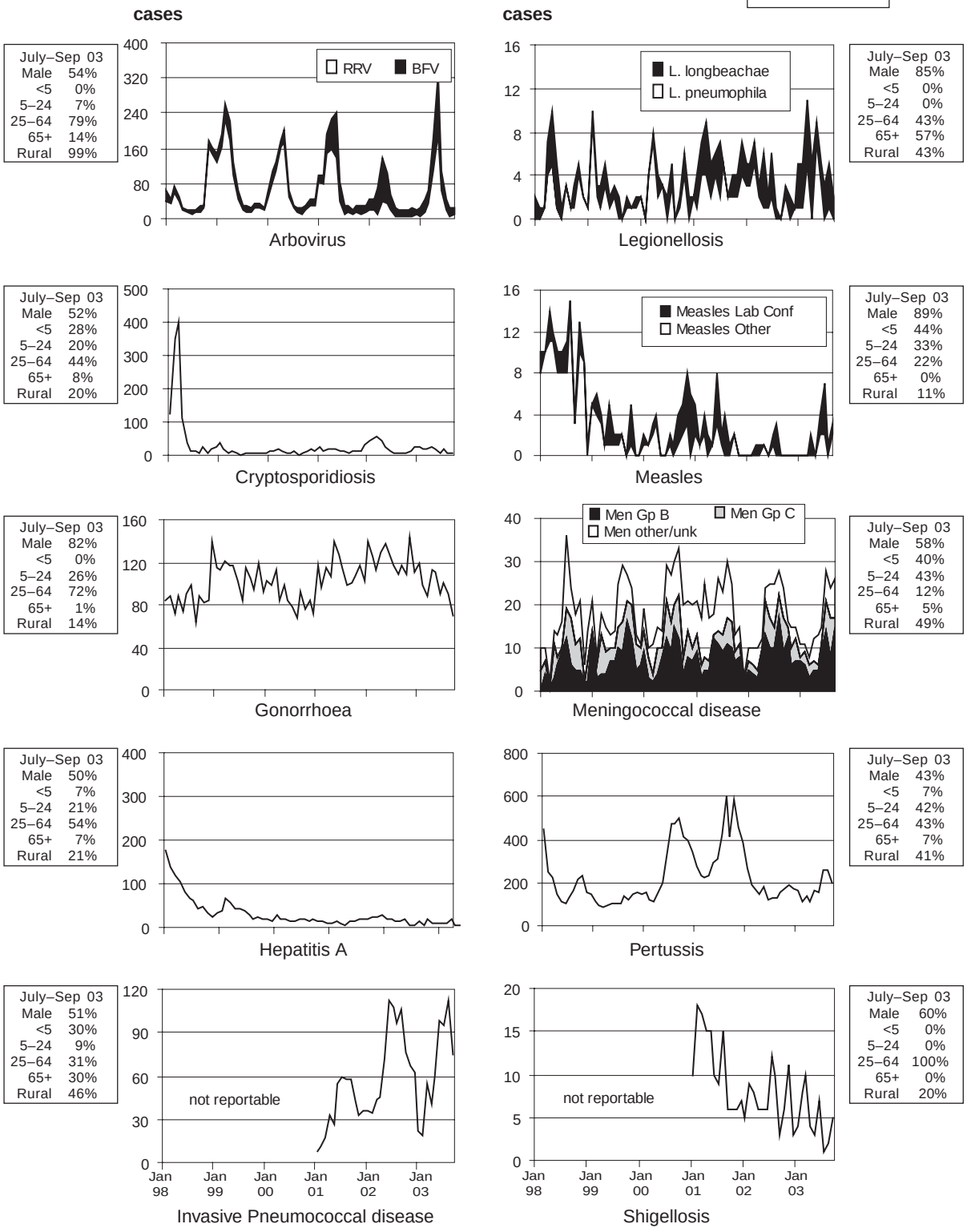

TABLE 4 REPORTS OF NOTIFIABLE CONDITIONS RECEIVED IN AUGUST 2003 BY AREA HEALTH SERVICES

Condition	Area Health Service																		Total	
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	CHS	for Aug†	To date†
Blood-borne and sexually transmitted																				
Chancroid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia (genital)*	79	80	54	27	46	29	65	44	120	20	32	16	12	22	1	24	30	2	705	4,825
Gonorrhoea*	11	7	11	1	6	1	1	2	35	4	1	-	1	1	1	-	2	-	85	850
Hepatitis B - acute viral*	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	3	49
Hepatitis B - other*	51	26	37	6	-	4	2	4	33	3	1	1	4	1	-	1	2	2	180	2,212
Hepatitis C - acute viral*	4	-	-	-	-	-	4	-	1	1	-	-	-	-	-	-	-	1	11	77
Hepatitis C - other*	75	26	65	21	-	31	26	35	54	23	35	9	7	26	3	12	13	43	507	4,530
Hepatitis D - unspecified*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Syphilis	24	3	4	2	11	2	-	2	20	1	5	3	1	1	1	1	1	-	82	585
Vector-borne																				
Barmah Forest virus*	-	-	-	-	-	-	1	-	-	8	6	-	-	-	-	-	-	-	15	378
Ross River virus*	-	-	-	-	-	1	-	-	-	4	1	-	1	-	1	-	-	-	8	449
Arboviral infection (Other)*	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	64
Malaria*	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	88
Zoonoses																				
Anthrax*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brucellosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Leptospirosis*	-	-	-	-	-	-	4	-	-	-	-	1	-	-	-	-	-	-	5	36
Lyssavirus*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psittacosis*	-	-	-	1	-	-	-	1	-	2	1	1	2	1	-	4	-	-	13	48
Q fever*	-	-	-	-	-	-	1	-	-	-	-	2	3	1	3	4	-	-	14	221
Respiratory and other																				
Blood lead level*	3	1	-	-	2	-	5	2	1	-	-	-	3	2	-	-	-	-	19	323
Influenza*	5	5	44	5	117	3	9	6	91	6	3	3	2	4	-	1	3	-	308	449
Invasive pneumococcal infection*	18	7	14	4	9	18	7	10	9	4	5	-	1	3	-	-	6	-	115	488
Legionella longbeachae infection*	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	28
Legionella pneumophila infection*	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	19
Legionnaires- disease (Other)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Meningococcal infection (invasive)*	1	1	3	-	2	5	2	1	3	3	1	-	-	-	-	2	1	-	26	126
Tuberculosis	4	2	8	-	-	2	-	-	4	-	1	-	-	-	-	-	-	-	21	223
Vaccine-preventable																				
Adverse event after immunisation	-	1	-	-	5	-	2	-	3	-	-	1	-	2	-	6	1	-	22	135
H. *Influenzae b* infection (invasive)*	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	5
Measles	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	14
Mumps*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21
Pertussis	17	31	51	10	27	3	17	38	34	9	10	3	3	23	-	7	12	-	295	1,323
Rubella*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Enteric																				
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptosporidiosis*	1	1	1	-	-	-	1	-	3	-	1	-	-	-	-	-	-	-	8	139
Giardiasis*	5	7	14	4	6	3	7	5	7	-	4	1	-	4	1	2	-	-	70	673
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Hepatitis A*	1	1	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	4	67
Hepatitis E*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Listeriosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
Salmonellosis (not otherwise specified)*	11	12	8	5	5	4	8	2	11	4	5	1	2	2	1	5	2	-	88	1,417
Shigellosis*	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2	41
Typhoid and paratyphoid*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	19
Verotoxin producing *E. coli**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* lab-confirmed cases only + includes cases with unknown postcode * * HIV and AIDS data are reported separately in the *NSW Public Health Bulletin* each quarter

CSA = Central Sydney Area
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TABLE 5 REPORTS OF NOTIFIABLE CONDITIONS RECEIVED IN SEPTEMBER 2003 BY AREA HEALTH SERVICES

Condition	Area Health Service																		Total	
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	CHS	for Sep†	To date†
Blood-borne and sexually transmitted																				
Chancroid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia (genital)*	44	65	62	19	25	18	60	22	117	25	27	27	9	21	12	33	17	5	613	5,473
Gonorrhoea*	23	10	8	1	4	-	3	3	60	2	-	1	1	-	2	1	-	-	119	976
Hepatitis B - acute viral*	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-	1	-	-	5	53
Hepatitis B - other*	45	31	4	4	16	7	7	5	24	2	1	2	1	3	5	6	3	3	169	2,491
Hepatitis C - acute viral*	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	88
Hepatitis C - other*	58	30	63	11	31	23	35	29	77	18	36	8	6	18	9	17	10	39	519	5,222
Hepatitis D - unspecified*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	7
Syphilis	22	8	8	-	7	1	2	1	23	1	1	1	2	2	5	-	1	2	87	646
Vector-borne																				
Barmah Forest virus*	-	-	-	-	-	1	3	-	-	8	8	-	-	-	-	-	-	-	20	398
Ross River virus*	-	-	-	-	-	-	1	-	-	3	-	1	-	-	2	1	1	-	9	458
Arboviral infection (Other)*	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	3	67
Malaria*	-	1	1	-	-	-	2	-	4	-	1	2	-	-	-	-	-	-	11	99
Zoonoses																				
Anthrax*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brucellosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Leptospirosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36
Lyssavirus*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psittacosis*	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2	-	-	3	51
Q fever*	-	-	1	-	-	-	4	-	-	2	3	8	6	1	3	-	-	-	28	248
Respiratory and other																				
Blood lead level*	1	13	-	-	4	1	3	-	1	-	2	-	3	1	8	-	-	-	37	360
Influenza*	32	51	59	36	50	4	9	16	29	12	2	6	16	12	2	3	-	-	341	819
Invasive pneumococcal infection*	7	9	12	5	12	14	8	8	11	4	6	2	1	5	3	1	3	-	113	600
Legionella longbeachae infection*	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	29
Legionella pneumophila infection*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
Legionnaires- disease (Other)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Meningococcal infection (invasive)*	1	-	6	1	2	3	3	1	4	1	2	1	-	-	-	-	-	-	25	151
Tuberculosis	6	2	6	-	3	-	-	1	4	-	1	-	-	1	-	1	-	-	25	259
Vaccine-preventable																				
Adverse event after immunisation	3	2	2	-	2	3	3	-	1	1	-	-	2	-	-	3	2	-	24	161
H. *Influenzae b* infection (invasive)*	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5
Measles	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	15
Mumps*	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	23
Pertussis	23	23	48	7	44	1	29	7	51	7	6	8	3	13	2	6	28	-	306	1,630
Rubella*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	21
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Enteric																				
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptosporidiosis*	-	-	-	-	1	-	-	-	2	-	1	-	-	-	-	-	-	-	4	143
Giardiasis*	3	14	12	6	4	2	8	3	19	1	2	2	1	3	1	2	1	-	84	763
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Hepatitis A*	1	-	2	1	-	-	-	-	1	-	-	1	-	-	-	-	-	-	6	72
Hepatitis E*	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	5
Listeriosis*	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	22
Salmonellosis (not otherwise specified)*	9	11	18	1	4	1	3	1	14	3	4	2	2	2	2	4	1	-	82	1,501
Shigellosis*	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	44
Typhoid and paratyphoid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
Verotoxin producing *E. coli**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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2003 INDEX BY SUBJECT

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All manuscripts should contain a short introductory abstract that reflects the structure of the manuscript.
References should be set out in the Vancouver style.
Send submitted manuscripts on paper and in electronic form, either on disc (Word for Windows is preferred), or by email.
The manuscript must be accompanied by a letter signed by all authors.
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