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SPICES, HIGH-RISK FOODS AND PUBLIC HEALTH: A SALMONELLA OUTBREAK ON SYDNEY HARBOUR

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This article illustrates how a simple epidemiological investigation can determine the possible cause of an outbreak of foodborne illness in the absence of direct microbiological evidence of contamination. The identification, as the likely source of an outbreak, of a high-risk food that was flavoured by a spice after cooking—and that had no subsequent heat treatment—has implications for food handlers, food inspectors and the regulators of imported spices.

INTRODUCTION

Salmonella typhimurium is the most common salmonella serovar causing foodborne illness in humans and is responsible for 30 to 40 per cent of cases in which a salmonella pathogen has been isolated.[1] Of these isolates, phage type 135 is one of the most common and has been linked to large outbreaks of food poisoning in Australia.[2]

The addition of contaminated spices to cooked foods that will receive no further heat treatment has the potential to cause human illness. Pathogens in spices can remain relatively dormant until they are mixed with a suitable medium (for example: cooked rice, egg or meat) and subjected to favourable growing conditions in which they can multiply to hazardous levels. Salmonella has been isolated in a number of spices,[3] with contaminated paprika having been linked to a large outbreak involving an estimated 1000 cases of foodborne illness caused by the consumption of flavoured potato chips.[4]

continued on page 2

CONTENTS

TABLE 1

ODDS RATIOS FOR INDIVIDUAL FOOD EXPOSURES

Food	Cases n = 11	Controls n = 25	Odds ratio	95% CI
Egg	8	6	8.4	1.8–39.6
Beef	7	13	1.6	0.4–6.5
Ham	6	13	1.1	0.3–4.4
Lettuce	3	12	0.4	0.1–1.8
Tea	4	9	1.0	0.2–4.3
Coffee	4	13	0.5	0.1–2.2
Biscuits	4	9	1.0	0.2–4.3

Note: One participant did not consume any food or drink.

INCIDENT

In April 1998, a group of 47 people, mostly of retirement age, took part in a short cruise on Sydney harbour. A brunch was served which consisted of some sandwich 'fingers' as well as tea and coffee. By the same time the next day, several of the cruise participants were suffering symptoms including: vomiting, diarrhoea, abdominal cramps, headache and/or fever. A member of the cruise party notified the Northern Sydney Public Health Unit (NSPHU) of the illnesses and an investigation was begun by the food inspectors.

METHODS

With the assistance of the South Eastern Sydney Public Health Unit (SESPHU), a full inspection of the cruise operator's boat and catering facilities was undertaken. A list of food served was ascertained and passed onto NSPHU to facilitate follow-up of the possible outbreak. A full list of all the cruise participants and their phone numbers was obtained from the cruise organiser. Food inspectors from NSPHU then interviewed participants by phone to obtain relevant food histories and details of any recent illness. The following case definition was established: a person who had attended the cruise function; consumed the food provided; and had suffered vomiting, diarrhoea and/or abdominal pain within a period of 24 hours. Results were coded and entered into a database using the TELEFORM program. Odds ratios were calculated to explore associations between food exposure and illness using the STATA 5.0 statistical package.

RESULTS

Inspection of premises

Inspection of the premises failed to identify any evidence of poor hygiene or incorrect food-handling practices. In particular, food-storage facilities were found to be operating at the correct temperature and there was no evidence of likely cross-contamination.

Food exposures and illness

Thirty-seven of the 47 cruise participants were interviewed, the majority of whom were women aged in their sixties and seventies. Of those interviewed, 11 reported illness after the cruise, with most having experienced vomiting, diarrhoea, and abdominal cramps and some complaining of fever, headaches and chills. The mean time of onset of symptoms was approximately 12 hours. Three people had visited their general practitioner and submitted stool specimens which were later confirmed positive for *Salmonella typhimurium* with identical phage types (135). Table 1 shows the various foods consumed, whether or not individuals became ill, and the corresponding odds ratios.

DISCUSSION

Preliminary investigations suggested that the outbreak had a foodborne source and stool cultures subsequently isolated *S typhimurium* phage type 135 as the common pathogen. The case-control study implicated the consumption of curried egg as the most likely cause of illness by demonstrating a statistically significant odds ratio.

Cooked egg is an ideal medium for salmonella growth and has been associated with numerous outbreaks of salmonella food poisioning.[5] Furthermore, salmonella species have been detected in spices (such as curry powder) and can be a risk when added directly to foods that receive no further heat treatment.[6] Other possible scenarios that may have led to salmonella contamination

of the egg include poor hygiene practices by an infected foodhandler or cross-contamination with uncooked food (for example, raw chicken). However, initial inspections found no evidence to support either of these hypotheses.

The cruise operator's premises were reinspected after our results were obtained and two samples of curry powder were found and submitted for microbiological analysis. Both samples were found to be negative for salmonella. The food handlers who prepare food for the cruises were provided with education on correct handling, preparation and storage of high-risk foods.

Despite the lack of direct microbiological confirmation, the strong epidemiological evidence identifying curried egg as the likely source of the outbreak has implications for the food industry. While safe food handling techniques are vital for food caterers, these alone cannot prevent outbreaks of illness associated with the use of spices in food preparation unless raw ingredients are free of pathogens. Most spices are imported and the safety of these food ingredients lies foremostly with the regulators of imported food (the Australian Quarantine Inspection Service). The increase in the international trade of these products and the emergence of new salmonella serovars in the countries exporting these products demands continued vigilance and stringent control at all levels of food production.[7] Further reported outbreaks of foodborne illness linked to contaminated spices such as the one described here may indicate a need for increasing the routine surveillance of imported spices.

ACKNOWLEDGEMENTS

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NSW PUBLIC HEALTH BULLETIN

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The *Bulletin* aims to provide its readers with population health data and information to motivate effective public health action.

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Articles, news and comments should be 1000 words or less in length and include a summary of the key points to be made in the first paragraph. References should be set out in the Vancouver style, described in the *New England Journal of Medicine*, 1997; 336: 309–315. Send submitted articles on paper and in electronic form, either on disc (Word for Windows is preferred), or by email. The article must be accompanied by a letter signed by all authors. Full instructions for authors are available on request from the editor.

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LESSONS LEARNT FROM THE MANAGEMENT OF MULTIPLE CONTACTS OF A CASE OF PERTUSSIS IN A DELIVERY SUITE

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The recent epidemic of pertussis in NSW has included many cases among adults.[1] Delays in the diagnosis and notification of pertussis can result in the exposure of large numbers of susceptible persons, particularly when the case is a health worker. This article describes a case of pertussis in a health care worker who, while infectious, had multiple contacts with patients and their families in a maternity unit; and the response of the local public health unit and the hospital infection-control staff. The lessons learnt and an estimate of the costs are also presented.

METHOD

The index case was notified to the Wentworth Area Public Health Unit on Christmas Eve 1997, two weeks after laboratory diagnosis. Follow-up revealed that the case was a registered nurse who worked as a midwife in the delivery suite at a large district hospital. Onset of illness was estimated to be four weeks prior to notification. The case had attended work full-time for the three-week period they were infectious.

The standard definition for contacts of cases of pertussis used by the Western Sydney Area Public Health Unit is: 'any person with 20 hours or more face-to-face work, social or household contact with the case during the infectious period'.[2] However, due to the vulnerability of neonates and the risk of transmission of *Bordetella pertussis* from infected mother to child, it was decided—in consultation with the AIDS and Infectious Disease Branch of the NSW Health Department—to expand the definition of contacts in this situation to include any exposure.

Identification of the mothers and babies who had been exposed to the case posed two problems. First, the case had worked between 12 and 14 shifts while infectious; however, the maternity unit was unable to identify those mothers, babies and support persons who had had prolonged contact with the case during that time. Second, mothers and their support persons could have been exposed to the case while receiving antenatal care in the clinic room, during monitoring in labour or while assisted during delivery.

Consequently, it was decided that all mothers admitted to the delivery suite or seen in the clinic room during the case's three-week infectious period, together with their newborn babies and any partners or family members present during labour, would be defined as contacts. They were advised by both telephone and letter to attend the Emergency Department at the Nepean Hospital to obtain a 10-day course of erythromycin. Also, staff who had come in close contact with the case were identified; advised to take a course of erythromycin; and provided with an information sheet on the disease.

The Emergency Department at the Nepean Hospital was informed that an influx of parents and their babies was likely during the Christmas holiday period. Pertussis information sheets, prescribing information and the limited available stock of erythromycin from the hospital pharmacy were sent to the Emergency Department.

RESULTS

A total of 149 mothers were contacted. Sixty-five mothers, 42 babies, 18 fathers, one grandmother and four siblings, were provided with erythromycin by the Emergency Department. Contacts who were on holiday were advised to obtain erythromycin from their local general practitioner or the nearest hospital. All were recommended to seek prompt medical attention if the symptoms of pertussis developed, and local medical practitioners were alerted to the situation. No secondary cases of pertussis were reported to the Western Sydney Area Public Health Unit in either mothers or babies in the following four weeks.

COSTS INCURRED

The cost of the intervention to the Western Sydney Area Health Service was estimated at $6000, comprising: erythromycin provided to 151 contacts ($788.10); overtime for infection control and public health staff (3 days = $2000); telephone and postage ($250); and emergency staff time for providing erythromycin (100 person-hours = $3000).

LESSONS LEARNT

The following problems were encountered when tracing the contacts of the health care worker:

- lack of staff to assist in contacting the exposed mothers by phone over the four-day Christmas holiday period;
- inadequate, incorrect, or out-of-date contact information for many mothers;
- overload of the Emergency Department with anxious parents during a busy holiday period;
- exhaustion of the hospital's stock of erythromycin and difficulty obtaining extra stock over the holiday period.

To avoid such problems in future, the Western Sydney Area Public Health Unit has developed a protocol for dealing with outbreaks of infectious disease. This protocol emphasises early recognition of the potential for large numbers of contacts, and identification of alternative options for implementing public health interventions, such as providing special facilities within the outpatients department or at community health centres.

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PERTUSSIS: A COMMENT

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The article by Vella et al. highlights the practical difficulties of managing exposure to pertussis in the health care setting. It is likely that other instances of exposure of newborn infants to pertussis in the health care setting have occurred in New South Wales during the period of highest pertussis activity in 1996–97. The method of diagnosis of the index case is not stated—a positive culture would have been of greater concern than positive serology alone. No data were presented describing compliance with the recommended course of erythromycin. Few of those who obtained erythromycin are likely to have completed a full 10-day course for themselves or their infants. However, erythromycin prophylaxis has been shown to be effective in the more intense exposure situation of mother to infant,[1] and appears to have been effective in the present hospital outbreak. As pointed out by the authors, this incident prompted a public health response and raises at least two questions. Is the transmission of pertussis to patients (including but not limited to neonates) by health care workers a significant problem? What role is there for pertussis boosters for health care workers or adults in general?

The first report to draw attention to the then barely recognised problem of adult pertussis was from Sydney in 1978.[2] Australia currently has one of the highest notification rates for pertussis in persons over 20 years of age among countries with established pertussis immunisation programs.[3] Adults are estimated to have been responsible for introducing infection into the household in approximately 15 per cent of cases.[4] Although whole cell pertussis vaccine has been used successfully to terminate outbreaks in an institutional setting, it has generally been considered unsuitable for use in adults.[5] Current infant/child acellular pertussis vaccines must also be modified for use in adults by reducing the amount of pertussis antigens as well as the diphtheria and tetanus content.

A trial of such a vaccine in 550 adults was recently carried out by the Centre for Immunisation Research at the New

Children's Hospital, with a preliminary report at the recent National Immunisation Conference in Melbourne.[6] The vaccine was well tolerated, with good immune responses; efficacy was not examined. A randomised controlled trial of acellular pertussis vaccine in adults, with endpoints of clinical or serologic pertussis, is currently under way in the United States. The evidence from these and other trials on efficacy and tolerability will provide a good basis for decisions on the use of pertussis vaccines in adolescents and adults.

Given the difficulty of immunising adults at a community level, implementation of additional pertussis boosters after the age of five years is most likely to be feasible as part of a secondary school-based program. However, health care workers are an identifiable and accessible target group for immunisation. A review of management of patients and health care workers exposed to pertussis recommends wearing of a mask until five days of erythromycin prophylaxis have been completed or restriction from work if pertussis develops.[7] This is clearly a big ask! Health care workers generally have levels of antibody to pertussis antigens that are no higher than those in the general population, so they would be expected to be no less susceptible to infection.[8] The expense and potentially high morbidity associated with pertussis exposure in hospitals, particularly with those exposed to infants, will make use of acellular pertussis vaccine in at least some subgroups of health care workers an attractive option in the hospital environment.[9]

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CHANGES TO THE *BULLETIN'S* WEB SITE

We are pleased to announce the following changes to the *Bulletin's* Web site:

- Cumulative subject and author indexes for the period 1990–1998 are now available in an HTML format. These indexes are located at the beginning of the Web site and will be updated annually.
- All issues of the *Bulletin* since it was first published in May 1990 are now available from the Web site. They have been scanned as PDF files and are available in an Acrobat format. An Acrobat reader is freely provided from the Web site.

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NSW ARBOVIRUS SURVEILLANCE WEB SITE

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Viruses transmitted by mosquitoes are known generically as 'arboviruses', and are the cause of considerable human disease across Australia. In New South Wales alone an average of more than 550 cases are notified each year. The resulting morbidity associated with these diseases imposes a significant economic burden on the community. For this reason the NSW Department of Health funds the Arbovirus Surveillance and Mosquito Monitoring Program.

The program undertakes surveillance at over 40 locations throughout the State including: major centres along the coast, several Sydney suburbs, and at inland NSW towns along the principal river systems. The main viruses of concern include the polyarthritides—Ross River virus and Barmah Forest virus; and the encephalitides—Murray Valley Encephalitis virus and Kunjin virus. Arbovirus activity is detected via the isolation of arboviruses from mosquitoes and by flavivirus seroconversion in sentinel chickens. Mosquito populations are also monitored. All laboratory aspects of the program are conducted at the Institute of Clinical Pathology and Medical Research, Westmead Hospital.

The aim of the program is to act as an early warning system so that health authorities can undertake vector control measures and issue media releases warning the public to take self-protective measures against mosquitoes.

For the timely functioning of the program, it is critical that results are disseminated rapidly. However, with the high number of participating bodies (councils, public health units, etc), ensuring this has been difficult. The Internet, especially the World Wide Web, provided an obvious solution; hence the birth of the NSW Arbovirus Surveillance Web site.

The main function of the site is the rapid dispersal of analysed results from the surveillance program. All results are readily available, which means that an individual can look up the results from their own location as well as those from the surrounding region. There is also a considerable amount of space on the site devoted to information on mosquitoes and arboviruses, with much of this information being drawn from the Department of Medical Entomology Web site at **http://medent. usyd.edu.au/**.

Included on the NSW Arbovirus Surveillance Web site are:

- human disease notifications
- weather information (which influences mosquito abundance)
- publications from the program
- mosquito and arbovirus fact sheets
- related Web sites
- educational training videos
- contacts for further information
- a large range of high-quality photographs.

The NSW Arbovirus Surveillance Web site is a one-stop source of information on arboviruses and mosquitoes.

The site is updated daily. While it has more than 220 pages it is easy to navigate. The navigation icon that appears on the home page is included at the bottom of every page. Currently it is the only Web site that has been constructed for an arbovirus surveillance program in Australia.

The site can be viewed at: **http://www.arbovirus.health.nsw.gov.au/** or, for those on the Department of Health Intranet, at: **http://internal.health.nsw.gov.au:9320/arbovirus/index.htm**. Please examine the Web site. Your comments are welcomed by the authors.

INFECTIOUS DISEASES, NSW: JANUARY–FEBRUARY 1999

TRENDS

1999 has had a relatively quiet start for some seasonal infectious diseases, notably **cryptosporidiosis**, **pertussis** and **hepatitis A,** reports of which are all down compared to this time last year. Reports of **arboviral disease** increased to relatively high levels earlier than usual in the arboviral season (December–May), especially in the west of the state (Figure 1).

Reports of **gonorrhoea** remain high, especially among inner city men, and the long-term increasing trend shows no sign of abating. In response, several control measures have been implemented, including:

- the Sexual Health Advisory Committee (SHAC) has established an expert sub-committee to advise on a strategic response to the increase in gonorrhoea cases;
- the Chief Health Officer wrote to all general practitioners in metropolitan Sydney in October 1998 alerting them to the outbreak. He is seeking their assistance with identification and treatment of cases, contact tracing, assessment and treatment of contacts; and providing a fact sheet for themselves and for patients;
- the Chief Health Officer wrote to all public and private laboratories encouraging them to refer isolates to the Gonococcal Surveillance Laboratory at the South Eastern Area Laboratory Service (SEALS) to assist with monitoring of strains of gonococcus and ensure that appropriate treatment strategies are being employed;
- South Eastern Sydney Public Health Unit (SESPHU) has designed a case control study to examine risk factors for infection (pending ethics committee approval);
- SESPHU in collaboration with Sydney Sexual Health Centre and the AIDS Council of NSW has implemented an education campaign using postcards targeted at gay men.

Other interventions under consideration in view of the continuing increase in notifications include: targeted education of health care workers and health educators; and screening programs linked with referral to treatment services in community settings where there is a high likelihood of unsafe sexual behaviour with casual partners.

Nineteen cases of **meningococcal disease** were reported in January (Table 3). No links were identified from among the cases, reported from 13 areas. For all of 1998, 187 cases were reported in NSW. While summer is not considered the typical high-risk season for this disease (winter–spring is), these cases serve as a reminder to clinicians that **meningococcal disease** can present at any time of the year, and that constant vigilance for its signs and symptoms is required. Patients with suspected meningococcal disease should be treated **without delay** to minimise the risk of adverse outcomes.

TUBERCULOSIS AND HEALTH CARE WORKERS

In early February, NSW Health received a report of a case of active tuberculosis in a health care worker (HCW) who had cared for patients in several Sydney hospitals. The case was assessed to have been potentially infectious for two months prior to diagnosis based on the presence of: acid-fast bacilli in a direct-smear sputum sample, history of cough, and a chest x-ray showing bilateral infiltrates. During this period the case had worked at seven Sydney hospitals over 19 days. NSW Health convened a series of advisory panels including experts in infectious diseases, tuberculosis, paediatrics and public health to clearly define contacts whose exposures warranted screening for tuberculosis. A review of medical records by clinical and public health unit staff in South Eastern and Central Sydney Areas identified 97 patients and 50 staff potentially exposed to the case; and follow-up was initiated immediately. Routine screening of the case's household contacts was also initiated.

More than 400 cases of tuberculosis are reported in NSW each year. Tuberculosis is caused primarily by infection with *Mycobacteria tuberculosis.* However, of those persons infected, the lifetime risk of developing active disease (rather than asymptomatic infection) is probably only in the order of 10 per cent. Of those infected persons who develop disease, a significant proportion will not develop it for some years.

Tuberculosis is spread by respiratory droplets from a person with active disease. Identifying exposed contacts, screening them for evidence of infection (with a Mantoux skin test), and treating infected contacts with prophylactic antibiotics (typically isoniazid for six months) is very effective in preventing active tuberculosis.

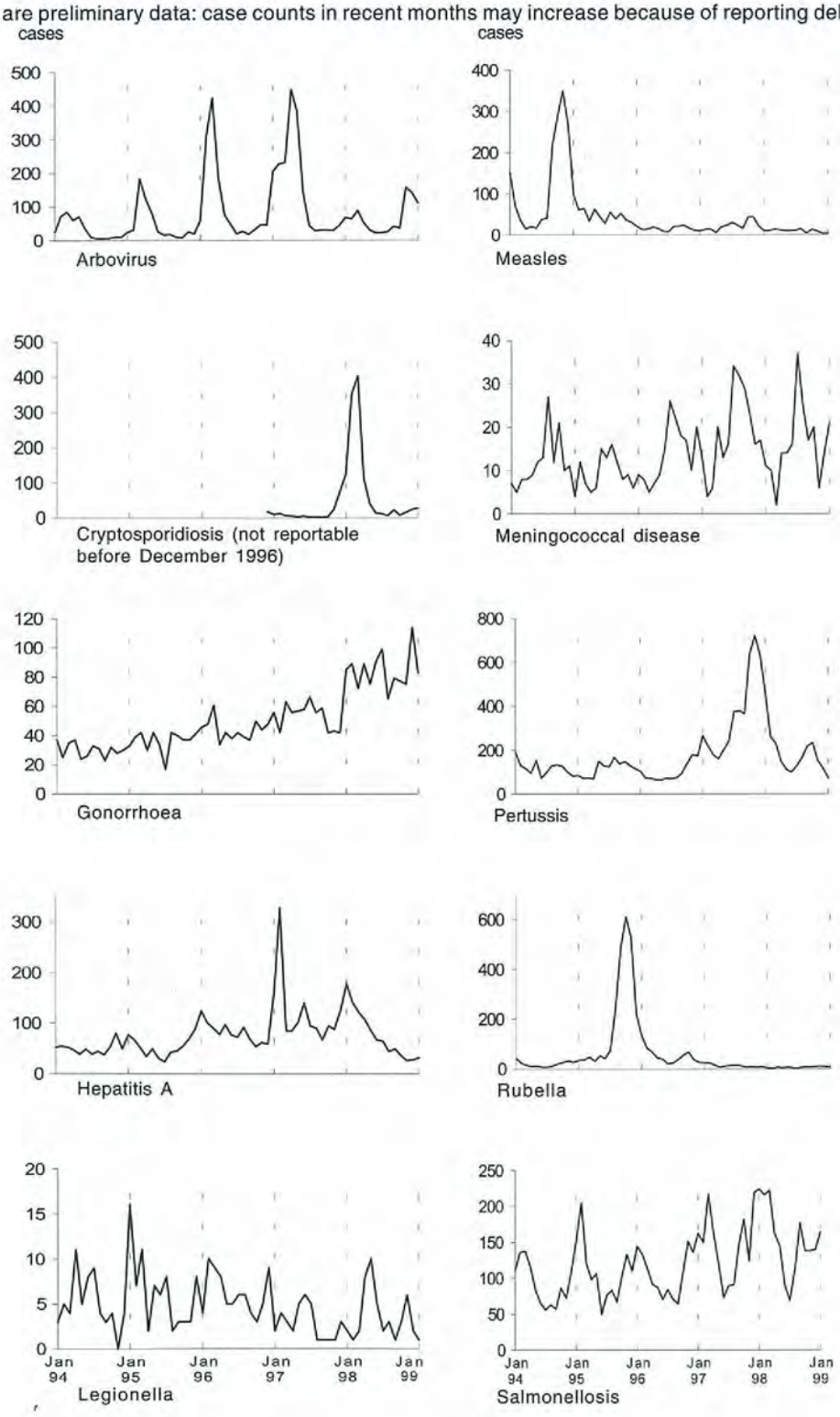
Tuberculosis does not discriminate by occupation. Since the health care industry is one of Australia's major employers, a case will occur occasionally in a HCW. In line with international practice, NSW has established long-standing policies for screening health care workers for tuberculosis to minimise the risk that a HCW will be exposed to tuberculosis (and then expose others) (see Circular 94/95: *Health care worker screening and protection*). In short, this policy requires that:

- All medical, nursing, ward, pathology, radiology, dental, mortuary and paramedical hospital staff receive a Mantoux test before placement unless there is documentation of a positive Mantoux test, adequate treatment for disease or infection, or a negative Mantoux test within the previous three months. Mantoux-positive persons require an inital chest x-ray to rule out active disease and additional x-rays

FIGURE 1

REPORTS OF SELECTED INFECTIOUS DISEASES, NSW, JANUARY 1994 TO JANUARY 1999, BY MONTH OF ONSET

These are preliminary data: case counts in recent months may increase because of reporting delays



periodically as clinically indicated;

- HCWs and voluntary workers should be offered BCG vaccination and/or regular surveillance with Mantoux testing if Mantoux-negative;
- HCWs should not commence work in a high-risk area without prior screening and clearance.

Whether, and how often, screening (Mantoux tests or chest x-rays for Mantoux-positive workers) is undertaken during employment depends on the estimated risk of infection (that is, Mantoux conversion rates in cohorts of unvaccinated HCWs).

HCWs should be classified into high-, medium- and low-risk groups, depending on the occupational group, the risk in community served by a health care facility, and the area in which a HCW works in a health care facility.

High-risk: HCWs include those working in respiratory clinics, chest clinics, intensive care, emergency departments and bronchoscopy theatres; those who work regularly with tuberculosis or HIV-positive patients; laboratory staff working with tuberculous material; mortuary staff; and immunocompromised HCWs. Such HCW who are Mantoux negative should be screened periodically by Mantoux tests during employment. The frequency of screening (for example, annually or biannually) should depend on the estimated risk of infection.

Medium risk: HCWs include other medical and nursing staff, physiotherapists, radiographers, paramedical staff and students involved in direct patient care who are not included in the high-risk category; community nurses working with communities in the high-risk category; ambulance personnel; and non-clinical staff who are regularly in close contact with patients. Such HCWs who are Mantoux negative should also be periodically screened by Mantoux tests during employment unless the risk of infection is shown to be less than one percent per annum.

Low risk: HCWs include staff who are not routinely exposed to patients or their clinical specimens: for example, kitchen, administration and clerical staff. They should not be routinely screened during employment.

No screening program can guarantee that there will be no tuberculosis among HCWs or any other occupational group, since it is possible for a person to be exposed to TB and develop active infectious TB in the interval between screenings. HCWs should have a high level of suspicion for tuberculosis and seek medical assistance if they develop the typical symptoms of tuberculosis, including chronic cough, especially if accompanied by weight loss and fever. NSW Health will review its current policies for HCW screening in consultation with the state Tuberculosis Advisory Committee.

EARLY INFLUENZA A OUTBREAK IN A SYDNEY NURSING HOME

South Eastern Sydney Public Health Unit is investigating an outbreak of acute respiratory illness among residents of a local nursing home.

Of the 70 residents, 35 were affected with fever, cough and lethargy with onset between 11 and 20 February 1999. Eight residents have been hospitalised with pneumonia. There have been four deaths apparently associated with the outbreak.

Throat swabs collected on 13 February were processed at SEALS Virology Laboratory and to date influenza A has been isolated from three of 14 specimens. Serological studies are also in hand.

A vaccination program for residents and staff has been conducted. Use of amantadine is being considered if further cases occur. The original source of the outbreak is still being determined.

TABLE 2 INFECTIOUS DISEASE NOTIFICATIONS RECEIVED IN DECEMBER 1998 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	for Dec†	To date†
Blood-borne and sexually transmitted																			
AIDS	1	–	–	3	–	–	–	–	2	–	3	–	–	–	–	–	–	9	196
HIV infection*	2	2	1	–	3	1	–	–	6	–	–	–	–	–	–	1	–	21	393
Hepatitis B: acute viral*	–	–	–	–	1	–	–	1	2	–	–	–	–	–	–	–	–	4	59
Hepatitis B: other*	57	38	4	5	2	6	8	5	29	1	1	1	1	1	–	2	–	165	3766
Hepatitis C: acute viral*	2	–	–	–	–	–	–	–	5	–	–	–	–	–	1	–	1	9	143
Hepatitis C: other*	44	40	51	28	7	60	56	23	106	36	34	20	3	26	2	8	15	559	9570
Hepatitis D: unspecified*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Hepatitis: acute viral (not otherwise specified)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Chlamydia (genital)	25	6	–	2	–	1	17	6	7	7	3	7	4	14	5	6	4	116	401
Gonorrhoea*	22	11	–	–	–	–	1	2	44	2	1	4	3	–	4	2	–	97	998
Syphilis	10	1	1	1	2	1	4	–	15	1	1	–	1	–	1	–	–	43	628
Vector-borne																			
Arboviral infection*	2	–	3	3	2	–	4	3	2	3	8	8	18	11	17	68	3	156	712
Malaria*	–	1	–	1	1	–	2	–	–	3	1	–	–	–	–	–	–	10	158
Zoonoses																			
Brucellosis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Leptospirosis*	–	–	–	–	–	–	2	–	–	2	–	2	–	–	–	–	–	6	47
Q fever*	–	–	–	–	–	1	3	–	1	3	5	3	3	–	–	–	1	20	252
Respiratory and other																			
Blood lead level	8	6	–	1	–	1	5	3	6	1	–	–	1	–	148	–	–	180	1503
Legionnaires' disease	–	–	1	–	2	–	–	–	–	–	–	–	–	–	–	–	–	3	47
Leprosy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Meningococcal infection (invasive)	–	1	1	–	2	2	–	1	2	–	–	–	–	3	1	1	1	15	187
Mycobacterial tuberculosis	8	4	6	–	1	2	3	2	2	1	1	1	–	1	1	–	–	34	428
Mycobacteria other than TB	1	3	–	–	–	1	6	2	6	–	–	–	–	–	–	1	–	21	308
Vaccine-preventable																			
Adverse event after immunisation	1	–	–	3	–	–	–	–	2	–	3	–	–	–	–	–	–	9	196
H. influenzae b infection (invasive)	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	11
Measles	–	–	–	1	–	2	–	–	–	–	–	–	–	–	–	–	–	3	124
Mumps*	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	2	39
Pertussis	4	5	5	23	10	2	19	4	12	1	3	4	–	5	4	37	7	146	2677
Rubella*	–	–	–	–	1	2	1	1	3	–	2	–	–	–	–	–	–	11	81
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Faecal-oral																			
Botulism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cholera*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Cryptosporidiosis	–	1	–	–	–	–	2	–	1	5	3	5	1	–	–	2	–	20	1161
Giardiasis	5	3	4	3	–	2	1	3	7	9	3	1	2	1	1	1	–	47	354
Food-borne illness (not otherwise specified)	4	–	–	–	–	86	–	–	7	–	–	–	–	–	–	–	–	97	249
Gastroenteritis (in an institution)	13	–	–	–	–	42	169	–	8	–	–	–	–	–	–	–	–	232	751
Haemolytic uraemic syndrome	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
Hepatitis A	2	–	2	–	5	4	2	1	5	1	6	–	–	–	–	1	–	29	981
Hepatitis E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Listeriosis*	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	30
Salmonellosis (not otherwise specified)*	9	12	13	1	1	6	11	3	14	23	8	3	4	3	–	1	4	117	1877
Typhoid and paratyphoid*	–	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	2	33
Verotoxin producing *E. coli*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2

* lab-confirmed cases only

† includes cases with unknown postcode

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TABLE 3 INFECTIOUS DISEASE NOTIFICATIONS RECEIVED IN JANUARY 1999 BY AREA HEALTH SERVICES

Condition	Area Health Service (1999)																	Total for Jan†	To date†
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA		
Blood-borne and sexually transmitted																			
AIDS	10	6	–	–	–	–	–	2	19	1	–	–	–	–	–	1	–	45	45
HIV infection*	–	–	–	–	–	–	–	–	5	–	–	–	–	–	–	1	–	16	16
Hepatitis B: acute viral*	–	–	1	–	–	–	–	–	–	1	1	–	–	–	–	–	–	4	4
Hepatitis B: other*	49	29	7	1	1	4	9	5	33	–	1	2	–	1	–	1	2	146	146
Hepatitis C: acute viral*	–	–	–	–	–	–	–	–	3	–	–	–	–	–	1	–	2	6	6
Hepatitis C: other*	50	38	56	24	1	31	53	11	75	38	27	18	3	25	2	10	28	508	508
Hepatitis D: unspecified*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hepatitis: acute viral (not otherwise specified)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chlamydia (genital)	14	6	–	2	–	–	6	12	19	9	11	4	–	4	–	6	2	105	105
Gonorrhoea*	27	11	1	2	–	2	4	1	49	2	2	2	2	3	–	–	–	114	114
Syphilis	7	6	–	–	–	–	1	–	10	2	1	1	–	4	–	–	–	33	33
Vector-borne																			
Arboviral infection*	–	3	2	1	–	–	3	6	–	12	14	15	12	10	5	53	6	143	143
Malaria*	1	5	–	1	–	2	2	3	–	2	–	–	–	–	–	–	–	16	16
Zoonoses																			
Brucellosis*	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Leptospirosis*	–	–	–	–	–	–	–	–	–	2	1	1	–	–	–	1	–	5	5
Q fever*	–	–	–	–	–	–	–	–	–	2	3	1	1	–	2	–	–	9	9
Respiratory and other																			
Blood lead level	6	1	–	2	3	–	11	2	4	4	1	18	–	1	–	1	–	55	55
Legionnaires' disease	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Leprosy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Meningococcal infection (invasive)	2	2	1	2	1	–	2	1	2	2	1	1	–	1	–	1	–	19	19
Mycobacterial tuberculosis	2	7	–	3	–	–	–	–	1	–	2	–	–	–	–	–	–	15	15
Mycobacteria other than TB	4	8	–	1	–	2	1	2	11	3	2	–	1	–	–	–	1	36	36
Vaccine-preventable																			
Adverse event after immunisation	3	–	1	–	4	–	–	–	–	1	6	–	–	–	–	–	1	16	16
H.influenzae b infection (invasive)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Measles	1	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	3	3
Mumps*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pertussis	4	11	8	15	14	1	18	2	8	1	4	1	–	2	–	20	6	115	115
Rubella*	–	–	1	–	1	–	–	–	2	–	–	–	–	–	–	–	–	4	4
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Faecal-oral																			
Botulism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cholera*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cryptosporidiosis	1	–	1	–	–	–	2	2	3	–	1	5	3	1	1	10	1	31	31
Giardiasis	4	8	12	4	–	3	5	3	22	8	3	3	1	1	–	6	2	86	86
Food-borne illness (not otherwise specified)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Gastroenteritis (in an institution)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Haemolytic uraemic syndrome	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hepatitis A	3	5	4	–	2	–	1	2	13	–	2	1	–	–	–	–	1	35	35
Hepatitis E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Listeriosis*	–	1	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	3	3
Salmonellosis (not otherwise specified)*	15	23	26	–	1	6	12	11	15	19	17	3	3	3	–	6	3	163	163
Typhoid and paratyphoid*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Verotoxin-producing *E. coli*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

* lab-confirmed cases only

†includes cases with unknown postcode

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