LEGIONNAIRES' DISEASE, NSW, 1991–2000

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Reports of Legionnaires' disease can create alarm in the community because of the fear of outbreaks of illness, yet the vast majority of cases occur sporadically. Legionnaires' disease is characterised by general malaise, a lack of appetite, muscle aches and headache, followed by high fever, chills, a dry cough and pneumonia. Abdominal pain and diarrhoea may occur. Up to 39 per cent of hospitalised patients may die, and the death rate is higher among people who have other underlying diseases. Risk factors for the disease include male gender, older age, smoking, diabetes, chronic lung disease, renal disease, cancer, and immune suppression.[1]

At least 35 species of *Legionella* have been identified.[1] Most reported cases of Legionnaires' disease in NSW are caused by *L. pneumophila*, and less commonly *L. longbeachae* infections. *L. pneumophila* outbreaks have been associated with inhalation of water that has become aerosolised from contaminated cooling towers or occasionally from domestic water supplies.[2,3] The mechanism of infection with *L. longbeachae* is unclear, but it is likely to involve the inhalation of organisms with dust during the handling of potting mix, soil, or other contaminated materials.[4,5]

Cases of Legionnaires' disease are notifiable throughout Australia. In NSW, cases are routinely investigated by public health units (PHUs). PHU officers interview each notified case of Legionnaires' disease to identify possible exposures, should other patients emerge who report similar exposures. Where the interviews indicate that patients have had common exposures, PHU officers initiate epidemiological and environmental studies that include physical and microbiological assessment of the possible exposures. This article reviews the characteristics of people notified with Legionnaires' disease in NSW for the years 1991—2000.

METHODS

Under the NSW Public Health Act 1991, all laboratories and hospitals must notify suspected cases of Legionnaires' diseases to the local PHU. The case definition for Legionnaires' disease is a person with the signs and symptoms of pneumonia in whom *Legionella* has been isolated; or who has a positive *Legionella* antigen in their urine or respiratory secretions; or who has a four-fold or greater rise in antibody titre between acute and convalescent sera. PHU staff record case details on a confidential statewide database. We analysed the characteristics of cases of Legionnaires' disease and

FIGURE 1

REPORTS OF LEGIONNAIRES' DISEASE, NSW, 1991 TO 2000, BY MONTH OF ONSET.

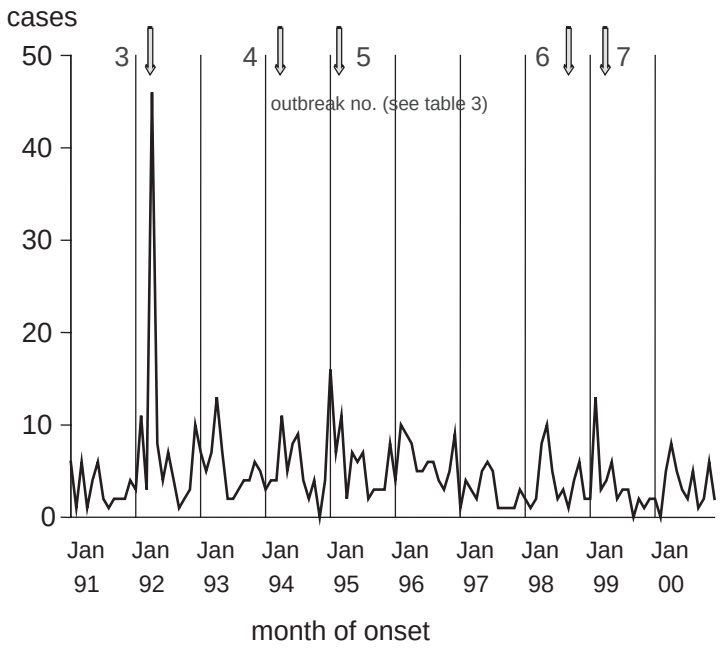

TABLE 1

PATIENTS NOTIFIED HAVING, AND DEATHS RESULTING FROM, LEGIONNAIRES' DISEASE, PRESENTED BY YEAR OF ONSET, SEX, AND AGE GROUP, NSW, 1991–2000

	Total		*L. pneumophila*		*L. longbeachae*		Other–Unknown	
Characteristic	**Cases *n***	**Deaths *n* (%)**	**Cases *n***	**Deaths *n* (%)**	**Cases *n***	**Deaths *n* (%)**	**Cases *n***	**Deaths *n* (%)**
Total	577	56 (10)	317	31 (10)	133	10 (8)	127	15 (12)
Year of onset								
1991	37	4 (11)	16	1 (6)	0	0 (0)	21	3 (14)
1992	104	8 (8)	80	7 (9)	14	0 (0)	10	1 (10)
1993	66	8 (12)	34	6 (18)	13	2 (15)	19	0 (0)
1994	60	8 (13)	30	3 (10)	8	0 (0)	22	5 (23)
1995	75	6 (8)	35	4 (11)	16	0 (0)	24	2 (8)
1996	74	9 (12)	34	5 (15)	30	2 (7)	10	2 (20)
1997	33	3 (9)	18	3 (17)	9	0 (0)	6	0 (0)
1998	46	5 (11)	22	0 (0)	19	4 (21)	5	1 (20)
1999	41	2 (5)	22	1 (5)	12	1 (8)	7	0 (0)
2000	41	3 (7)	26	1 (4)	12	1 (8)	3	1 (33)
Sex								
Male	402	40 (10)	236	23 (10)	81	7 (9)	85	10 (12)
Female	172	16 (9)	79	8 (10)	52	3 (6)	41	5 (12)
Unknown	3	0 (0)	2	0 (0)	0	0 (0)	1	0 (0)
Age group (years)								
<5	4	0 (0)	1	0 (0)	0	0 (0)	3	0 (0)
5–24	12	0 (0)	6	0 (0)	0	0 (0)	6	0 (0)
25–44	102	3 (3)	62	2 (3)	17	0 (0)	23	1 (4)
45–64	230	22 (10)	137	11 (8)	48	3 (6)	45	8 (18)
65–84	216	27 (13)	102	16 (16)	64	5 (8)	50	6 (12)
85+	13	4 (31)	9	2 (22)	4	2 (50)	0	0 (0)

TABLE 2

CHARACTERISTICS OF PATIENTS NOTIFIED HAVING LEGIONNAIRES' DISEASE—INCLUDING RATE PER 100,000 POPULATION—PRESENTED BY RESIDENCE, SEX, AGE GROUP, AND DIAGNOSTIC TESTS, NSW, 1991–2000

	Total		*L. pneumphila*		*L. longbeachae*		Other–unknown	
Characteristic	***Cases***	***Rate***	***Cases***	***Rate***	***Cases***	***Rate***	***Cases***	***Rate***
Total	**577**	**9.3**	**317**	**5.1**	**133**	**2.2**	**127**	**2.1**
Residence								
Sydney area	390	10.7	242	6.7	133	3.7	58	1.6
Other NSW	177	7.0	71	2.8	90	3.5	63	2.5
Unknown	10	–	4	–	0	–	6	–
Sex								
Male	402	13.1	236	7.7	81	2.6	85	2.8
Female	172	5.5	79	2.5	52	1.7	41	1.3
Unknown	3	–	2	–	0	–	1	–
Age group (Years)								
<5	4	0.9	1	0.2	0	0	3	0.7
5–24	12	0.7	6	0.3	0	0	6	0.3
25–44	102	5.4	62	3.3	17	0.9	23	1.2
45–64	230	17.6	137	10.5	48	3.7	45	3.4
65–84	216	30.8	102	14.6	64	9.1	50	7.1
85+	13	18.4	9	12.8	4	5.7	0	0
Laboratory confirmed	**516**	**8.4**	**303**	**4.9**	**127**	**2.1**	**86**	**1.4**
Serology	258	4.2	140	2.3	81	1.3	37	0.6
Antigen	32	0.5	22	0.4	6	0.1	4	0.1
Culture	115	1.9	89	1.4	13	0.2	13	0.2

TABLE 3

NOTABLE OUTBREAKS OF LEGIONNAIRES' DISEASE, NSW, 1987–2000

No.	Date	Place	Reported cases	Deaths	Likely source
1	April 1987 [6]	Wollongong	44 [a]	9	Shopping mall cooling tower
2	April 1989 [7]	Western Sydney	12 [b]	Not stated	Bowling club, source unclear
3	April 1992 [7]	South Western Sydney	26	6	Fairfield business district, source unclear
4	April 1994 [8]	Western Sydney	4 [c]	Not stated	Hotel cooling tower
5	Jan 1995 [9,10]	Western Sydney	11	3	Shopping mall cooling tower
6	Nov 1998 [11]	Western Sydney	3	0	Work place cooling tower(s)
7	Feb 1999 [12]	Wentworth and Western Sydney	7	0	Source unclear

(a) 45 others symptomatic

(b) organism species not available

(c) 28 symptomatic persons identified in an epidemiological study

associated deaths notified to PHUs between 1991 and 2000. Incidence rates were calculated using average Australian Bureau of Statistics estimated mid-year populations for each year. From reports provided by PHUs, we identified outbreaks between 1987 and 2000.

RESULTS

Case notifications (1991–2000)

For the 10-year period 1991 to 2000, 577 cases of Legionnaires' disease were reported in NSW (Table 1). Of these cases, 516 (89 per cent) were confirmed by laboratory tests. Of all cases, 317 (55 per cent) were identified as caused by *L. pneumophila*, 133 (23 per cent) by *L. longbeachae* and six (one per cent) by other species (including five *L. micdadei* and one *L. bozemanni*) or unspecified species (121 [21 per cent]). Cases were more often males (70 per cent of all cases, with a rate more than twice that of females), and older (with the rate generally increasing with age for all *Legionella* species) (Table 2). The rate of disease due to *L. pneumophila* among Sydneysiders was more than twice that for other residents of NSW. Differences in rates by area of residence were not as distinct for other species of *Legionella*.

Of all cases, 56 people (10 per cent) were reported to have died. This case-fatality rate was similar for both the species of *Legionella* and sex of the person, but increased with the age of the person (P for trend test < 0.001).

Outbreak investigations (1987–2000)

Seven outbreaks of Legionnaires' disease,[6–12] all due to a common source, were investigated in NSW. In the 14-year period all were likely to be due to *L. pneumophila* serogroup 1 (Table 3, Figure 1). These outbreaks included at least 107 cases and 18 deaths. (At least 51 of these outbreak-associated cases and three of the deaths were reported during the 10 years 1991–2000, representing less than 10 per cent of all cases during that period.) All seven outbreaks occurred in the warmer months between November and April; four occurred in April. Six outbreaks occurred in the western part of Sydney, and one in Wollongong (south of Sydney). While contaminated cooling towers were suspected to be the source for all these outbreaks, links to a specific source were made in only four.

DISCUSSION

These data indicate that Legionnaires' disease is relatively uncommonly reported in NSW, and that most cases (>90 per cent) are sporadic (that is, unrelated to recognised outbreaks). The death rate for notified cases is just under 10 per cent. Available demographic data indicate that the risk increases with age, and is higher in males than females. Cases due to the more common agent, *L. pneumophila*, occur at a higher rate in urban areas (perhaps related to the higher density of cooling towers in the city), and for unclear reasons, more often in western Sydney than in other parts of Sydney.

These data have several limitations. First, many people infected with *Legionella* bacteria do not present to medical practitioners—or, if they do, may not have diagnostic tests done—consequently many infections are likely to go undiagnosed and unreported.[8] Second, most case notifications are based on people with a serological diagnosis, and as this can be an unreliable means of diagnosis in the absence of paired acute and convalescent clinical specimens, some cases included here may not be true cases. Third, in over one fifth of cases the causal organism was not specified, although many of these were reported as laboratory-confirmed. This may represent deficiencies in completeness of laboratory reporting or data coding errors, indicating a need for improved data recording and checking.

Because of its seriousness, the prevention of Legionnaires' disease remains a high priority. Building managers must follow existing standards to minimise cooling tower contamination with *L. pneumophila*.[13,14] Prevention of infection with other species including *L. longbeachae* is

more difficult, because the mode of transmission is uncertain. Strategies include reducing exposures to potting mix and other soil dusts by moistening dusty materials, wearing masks, and thoroughly washing hands after gardening.

As for many infectious diseases, the identification of the exact source of a sporadic case of Legionnaires' disease is almost always impossible, because the causal organisms are common in the environment, and people are exposed to a wide range of potential sources every day (for example, aerosolised water from domestic or commercial water supplies, air conditioning systems, and dust). Nonetheless, early notification of cases allows PHU staff to investigate exposures that may be shared with other cases, suggesting a possible controllable source. While cases in the seven outbreaks reported here represent only a small proportion of all cases, it is very likely that prompt identification and control of the sources—as well as the more general alerts to building mangers to ensure that cooling towers are checked and cleaned in the absence of an identified point source—help prevent further infections.

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COMMUNICABLE DISEASES REPORT, OCTOBER 2001

TRENDS

Spring is the season when the number of **pertussis** infections tends to increase. Earlier hopes that the large pertussis epidemic was decreasing has not been fulfilled (Figure 1). Notifications of this disease have increased once more, and high numbers have been reported from many areas, notably Northern Sydney, Greater Murray, Northern Rivers and Macquarie health areas (Table 1). All age groups appear to be affected. We estimate that the epidemic will continue into the spring in very high numbers. Clinicians are urged to consider the diagnosis in patients with chronic coughing illnesses, especially if accompanied by inspiratory whooping, paroxysms, and post-tussive vomiting. The administration of erythromycin to cases and their immediate contacts can control further spread of the disease. Public health units can advise on the timing of this treatment. In addition, it is important to remind both new parents and their visitors that people with coughing illnesses should avoid contact with young infants.

Cases of **meningococcal disease** were reported in line with seasonal expectations during winter. To the end of August, 177 cases of this disease were reported, including five people who have died. Intravenous penicillin can be life saving in suspected cases, and clinicians should notify suspected cases to their local public health unit in order to facilitate contact tracing and the instigation of preventive measures.

Reports of **influenza** appear to have peaked in August. Most cases were due to influenza A virus, and a minority were due to influenza B. The information that is available suggests that the 2001 influenza vaccine formulation protected against these strains.