Review of leptospirosis notifications in Queensland 1985 to 1996

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Abstract

To provide an overview of leptospirosis in Queensland, the World Health Organization/Food and Agriculture Organization Collaborating Centre for Reference and Research on Leptospirosis undertook a study of notifications of the disease from 1985 to 1996. The review encompassed information drawn from notifications to Queensland Health and questionnaires sent to doctors. Notifications were highest between February and July and the highest population rates were identified in the Central West and Peninsula Health Regions. Ninety-one per cent of notifications were for males. At risk population groups included meat workers, those working with farm animals and banana workers. The study found the incidence of leptospirosis was higher in 1996 than in previous years. Improved diagnosis and surveillance will aid our understanding of the preventable risk factors for leptospirosis, especially in geographic areas not considered at high risk and in groups not in occupations traditionally linked to the disease. *Comm Dis Intell* 1997;21:17-20.

Introduction

Leptospirosis was first recognised in Queensland in 1934 among cane cutters of Ingham, north Queensland[1]. Leptospirosis is an acute febrile disease occurring in humans and animals in all parts of the world[2]. There are more than 250 pathogenic serovars of *Leptospira interrogans*. The disease is potentially lethal, with involvement of the hepatic, renal and central nervous systems. The source of infection is water or soil which has been contaminated with the infected urine of wild, feral or domestic animals[3]. Leptospirosis occurs in all parts of Australia, with the highest incidence of the disease in Queensland and Victoria[4].

Leptospirosis is a notifiable disease in all States and Territories of Australia. A laboratory based notification system was introduced in Queensland from 1988, requiring all laboratory diagnoses to be reported to the Communicable Diseases Branch of Queensland Health. Prior to 1988 all notifications were practitioner initiated.

Methods

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Organization Collaborating Centre for Reference and Research on Leptospirosis sought information on notifications of leptospirosis from 1985 to 1996 in Queensland through notifications to Queensland Health and a mail questionnaire. Notifications of leptospirosis since 1988 were based on isolation of the organism or positive serology. Positive serology was defined as a four-fold or greater change in *Leptospira* Microscopic Agglutination Test (MAT) titre or a single raised MAT titre equal to or greater than 400 with an elevated IgM result.

The Centre reference laboratory receives either tertiary specimens for confirmation by MAT or primary specimens on which MAT and enzyme linked immunosorbent assay (ELISA) serology is performed. The reference laboratory is the only laboratory in Queensland performing *Leptospira* isolation studies, and is the only laboratory able to provide confirmatory leptospirosis serology in the State.

The reference laboratory used a panel of live leptospiral antigens for analysis, represented by the serovars *pomona, hardjo, tarassovi grippotyphosa, celledoni, copenhageni, australis, zanoni, robinsoni, canicola, kremastos, szwajizak, medanensis* and *bulgarica.* These serovars are representative of the leptospiral serovars that are known to exist in Australia.

Rates were calculated using Australian Bureau of Statistics 1991 census data to provide the populations of statistical divisions. The denominators used in the calculations were the populations of the regions.

The questionnaire component of the study commenced in 1991 and was analysed from January 1992 to July 1996. It sought information on occupation, animal contacts, outdoor recreational activities, travel, age, gender, symptoms and location of residence prior to onset of symptoms. Two hundred and sixty-four questionnaires were sent to the referring doctors of those patients whose leptospiral serology was positive or for whom a leptospiral isolate was recovered.

The data were analysed using Epi Info version 6.01.

Results

For the period 1985 to 1995, 710 notifications of leptospirosis were sent to the Communicable Diseases Branch of Queensland Health (Figure 1). This represented a mean annual cumulative incidence of 1.9 per 100,000 population. In 1996, 105 cases were reported. Of 1,072 specimens submitted to the reference laboratory between 1991 and 1995, 27 isolates were recovered but not recorded as notifications. The majority (65%) of notifications were received between February and July (Figure 2). There was a major increase in notifications of serovar *hardjo* from April to October. Notifications of serovar *australis* increased in February to March and in May. There was no significant seasonality in other serovars. No seasonal variation in notifications was evident when analysed by occupation.

The highest number of notifications (35 %) was reported from the Peninsula Health Region (Table 1). There was a relatively high crude rate in this Region of 8.2 per 100,000 population. The Central West Region had a lower number of notifications, but had the highest crude rate, at 8.4 per 100,000 population, although the population of this Region is small.

For 1985 to 1995, 91% of notifications were for males. The largest proportion (14%) of

Table 1. Leptospirosis notifications by health region, Queensland, 1985 to 1995

Health region	Notifications	Crude rate[1]
Brisbane North	101	1.1
Brisbane South	28	0.6
Central	24	2.0
Central West	10	8.4
Darling Downs	47	2.1
Gold Coast	11	0.2
Mackay	18	1.6
Northern	44	1.6
Peninsula	178	8.2
Sunshine Coast	14	0.3
South West	10	2.1
Wide Bay	19	0.8
Queensland	504	1.9

1. Crude rates calculated for 1989 to 1994.

Figure 1. Leptospirosis notifications by year, Queensland, 1985 to 1995

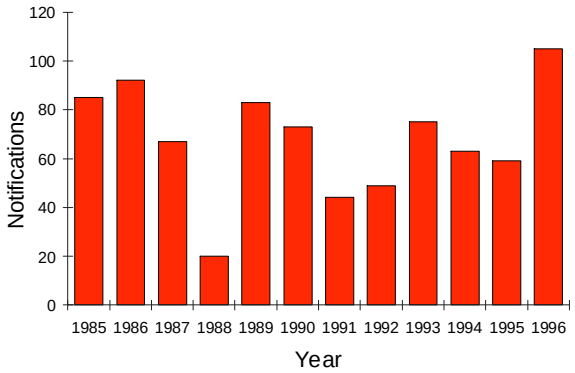

Figure 2. Leptospirosis notifications by month, Queensland, 1985 to 1995

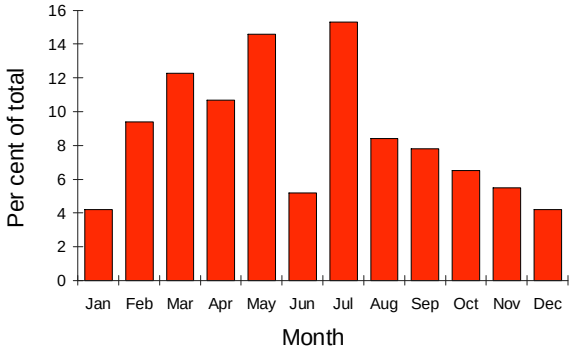

Figure 3. Leptospirosis notifications for males by age group, Queensland, 1985 to 1995

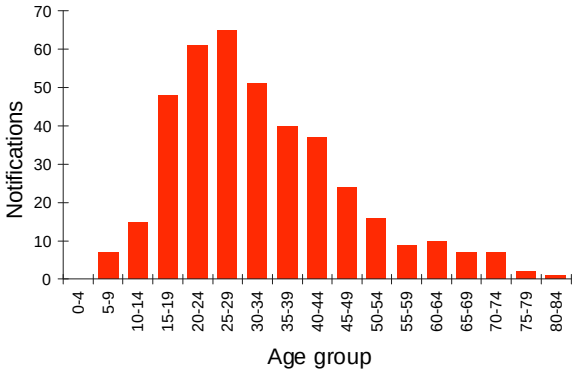

Figure 4. Leptospirosis notifications, by serovar and occupation, Queensland, 1992 to 1996

Table 2.
Leptospirosis notifications by occupation, Queensland, 1992 to 1996

Occupation	Number (%)
Agriculture worker	8 (3)
Animal associated	32 (13)
Banana worker	20 (8)
Cane farmer	9 (4)
Dairy farmer	16 (7)
Meatworker	37 (16)
Shooter	3 (1)
Student	8 (3)
Unemployed	3 (1)
Miscellaneous	38 (16)
Unknown	64 (27)
Total	238 (100)

Table 3.
Leptospirosis notification rates by serovar, Queensland, 1992 to 1996

Serovar	Number (%)
Australis	28 (12)
Broomi	1 (0)
Bulgarica	3 (1)
Canicola	6 (3)
Celledoni	3 (1)
Copenhageni	6 (3)
Hardjo	73 (32)
Kremastos	6 (3)
Pomona	23 (10)
Robinsoni	6 (3)
Szwajizak	9 (4)
Tarassovi	13 (6)
Zanoni	53 (23)
Non pathogen	1 (0)
Total	231 (100)

notifications was for males in the 25-29 years age group (Figure 3).

The response rate from the questionnaire was 73%, with 61% of non-respondents residing in the Peninsula Region. Meat workers accounted for 16%, animal-associated occupations (mainly graziers, farm hands and stockmen) 13% and banana industry workers 8% (Table 2). Other notifications included persons identified as hermit, retired, home duties, clerical, builders, cruise operators, white-water rafters, tourists, council workers, mechanics, labourers and prospectors. The majority of the 16 notifications from the dairy farming industry occurred in the Peninsula Region with only one notification each from the Sunshine Coast, Wide Bay and Darling Downs Regions. All except one of the notifications from the banana industry occurred in the Peninsula Region, and 17 of the 32 notifications from animal-associated occupations were also from this Region. Of 32 meat worker notifications, 15 were from the Darling Downs Region.

The recorded serovars are shown in Table 3. Serovars *tarassovi, hardjo, zanoni, pomona, szwajizak and australis* represented 87% of the notifications in the State.

The clinical symptoms most commonly reported in the questionnaires were fever (90%), headaches (65%), myalgia (55%), arthralgia (38%), vomiting (36%), respiratory symptoms (21%), rigors (19%), and renal and hepatic involvement (14%). There appeared to be no significant difference in symptoms associated with each of the major serovars. The proportion of serovars varied between the major occupational groups (Figure 4).

Discussion

Unlike many other notifiable diseases, notifications of leptospirosis did not increase in Queensland following the introduction of laboratory notification in 1988. However, the data show that the 1996 notifications were higher than in previous years. The low 1988 figure could be due to incomplete data collection following a change in collection methods. The 1996 increase may suggest a greater practitioner appreciation and interest in the disease, or a greater number of people involved in at-risk exposures .

The increased notifications in summer and autumn coincide with peak rainfall in the north of the State. The reduced average incidence reported in June represented a fall in incidence of the three major serovars. While the survey data are not sufficient to confidently identify a cause, possible explanations include reduced prevalence of the organism in the environment, or reduced occupational or recreational exposure of humans to the organism.

Leptospirosis remains an endemic disease in the Peninsula Region of Queensland. This Region, especially the east coast, differs from the rest of the State in having high rainfall and

tropical temperatures. These climatic conditions support significant rodent and marsupial populations, known hosts of leptospirosis[1]. Many persons of certain occupational groups in north Queensland work in close association with these animal hosts. Notifications in this Region occurred mainly in the dairy and banana industries.

Leptospirosis in the sugar cane industry dates back to the days of manual harvesting methods. With mechanical harvesting, exposures and consequent risks have changed. The banana industry has assumed many of the manual work practices previously associated with the cane industry. Greater prevention and control measures on banana plantations are recommended. The risk of leptospirosis in dairy communities is well recognised in north Queensland. McClintock (Queensland Department of Primary Industries, personal communication) showed in 1994 seroprevalence for antibodies to leptospirosis of 21% in dairy farmer groups on the Atherton Tableland. Work practices associated with an increased risk of infection are well recognised in this industry, as is the need for further education of farmers and associated workers.

The number of notifications from the Central West Health Region was small and the high rate should be interpreted with caution. Notifications from this Region may reflect contact with animals through activities such as slaughtering on properties, or recreational or professional shooting.

Meat workers represented the largest occupational group in responses to the questionnaire. The majority of meat worker notifications were from the Darling Downs Region. This is possibly explained by the number of abattoirs in this region and the work practice-related nature of the disease in this industry.

While potential occupational exposures to leptospirosis are well described, some exposures may reflect recreational pursuits, especially in Far North Queensland where the organism is common. Further study needs to be undertaken to identify common non-occupational risk factors. Clinicians need to be aware of the non-specific nature of the symptoms of leptospirosis, and maintain it as a differential diagnosis even when an occupational risk is not identified.

Awareness of leptospirosis as a potential diagnosis is also needed among clinicians working in geographical areas outside those considered to be at most risk. Clinicians should not discount leptospirosis in their differential diagnosis because they think it is a disease of the hot tropics. Knowledge of the incidence of leptospirosis is restricted by the nonspecific nature of the symptoms of the disease, potential misdiagnosis by clinicians and the lack of laboratory confirmation of clinical diagnoses. Improved identification of leptospirosis cases will improve our knowledge of preventable risk factors for the disease.

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