

ENHANCED Q FEVER RISK EXPOSURE SURVEILLANCE MAY PERMIT BETTER INFORMED VACCINATION POLICY

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Abstract

The association between farming risks and Q fever is not well documented in Australia. In a review of New South Wales notifications, data were analysed using 3-year study periods from 1993 to 2007 to investigate possible trends and explore reported risk exposures. A retrospective case series was also conducted using acute Q fever cases notified during 2007 from a rural area of New South Wales. Occupation was recorded for less than 50% of Q fever notifications in New South Wales during the study period. A significant decline in the proportion of notifications occurred in the occupational group reported as 'Abattoir/Meat' worker and a significant increase occurred in the 'Farmer/Livestock' category. The case series found that in the month prior to illness onset 78% (42/54) reported direct contact with animals. In the month prior to becoming ill with Q fever 71% (31/51) of employed cases had contact with newly introduced livestock in their workplace. As a result of their Q fever illness 93% of cases required time off work or school, with a median of 21 days. At the time of the structured interviews 63% had not fully recovered. The epidemiology of Q fever disease in New South Wales has changed and amongst notified cases the relative importance of non-abattoir contact with livestock, wildlife or feral animals appears to be increasing. The surveillance field 'Occupation' no longer alone adequately describes risk exposure for many of the people notified with Q fever and a new field that better describes risk exposures is required. This may allow more finely tuned vaccination policy. *Commun Dis Intell* 2009;33:42–46.

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Introduction

Q fever is an acute febrile illness caused by the intracellular gram-negative bacteria *Coxiella burnetii*¹ and is the most common zoonotic disease in Australia.² Transmission usually occurs because of direct or indirect contact with infected animals, their tissues or products.³ There are several clinical syndromes of Q fever including a self-limited febrile illness, pneumonia, endocarditis, hepatitis and osteomyelitis.⁴ The case-fatality rate among untreated cases may be as high as 2.4% but is usually less than 1%.⁵

Since the 1930s Q fever has been strongly associated with Australian abattoirs.^{6,7} In a review of Q fever notifications in New South Wales, for the period 1991–2000, where data on occupation were recorded, 51% of the cases were recorded as abattoir or meat workers, and agriculture related occupations represented 29% of the cases.⁷ Queensland and Victoria have reported abattoir worker as the occupation in 40%–45% of notifications.⁸

The association between farming and Q fever is less well documented. In south-west Queensland the majority of recent notifications have been associated with an occupation of farming.⁹ In north-western New South Wales a Q fever cluster was described in a shearing team.¹⁰ During a Q fever vaccination program on the north coast of New South Wales, over 27% of cattle workers had laboratory evidence of pre-existing immunity to Q fever.¹¹

There is an effective, safe vaccine against Q fever¹² and vaccination of people at risk of Q fever is the main disease prevention strategy available in Australia.¹³ Abattoir- and other meat industry workers were the main focus of the National Q Fever Management Program conducted in Australia from 2001–2004.¹⁴ Since the end of the National Q Fever Management Program, cases of Q fever continue to be reported despite the availability of an effective vaccine. In New South Wales annual notified cases have increased from 143 in 2005 to 175 in 2006 and 215 cases in 2007.¹⁵

In New South Wales Q fever is a Category 3 scheduled medical condition under the provisions of the *NSW Public Health Act 1991* and is notifiable to public health units. In accordance with NSW Department of Health (NSW Health) policy, Q fever is followed up by public health units for the purpose of monitoring the epidemiology to inform the development of better prevention strategies.¹⁶

The aim of this investigation was to describe the changing epidemiology of Q fever in New South Wales and to survey notified individuals in the Hunter New England region, a rural area of New South Wales, to better understand current risk exposures.

Methods

New South Wales Q fever notifications recorded in the NSW Notifiable Diseases Database (NDD)

were sourced from NSW Health's HOIST (Health Outcomes Information and Statistical Toolkit). Data were analysed for New South Wales and the Hunter New England region.

Initially, New South Wales notifications were analysed using five 3-year study periods from 1993–2007 to investigate possible trends and explore reported exposures. The occupation recorded for each notification of Q fever was grouped for analysis into 'Abattoir/Meat' work and a small range of other occupational categories. Data were also described by gender, Indigenous status, Area Health Service of residence and hospitalisation. Analysis was conducted using SPSS® Graduate Pack 15.0 for Windows® (version 15, SPSS Inc, Chicago, Ill, USA). Chi square for trend analysis was conducted on gender and occupation variables over the study periods using Epi Info (version 6, Centers for Disease Control and Prevention, Atlanta, Georgia).

A retrospective case series was also conducted using acute Q fever cases from the 2007 notifications of Q fever from a rural area of New South Wales (Hunter New England), to gain a better understanding of Q fever risk exposures. This group was selected because of recent increased notifications in the area. Routine follow-up of notified cases had already occurred, however additional information on occupation, the nature of potential Q fever risk exposures and morbidity were obtained using a structured telephone survey of those that met the case definition for acute Q fever. Acute Q fever was defined according to the NSW Response Protocol for Public Health Units as: definitive laboratory evidence for acute Q fever; or laboratory suggestive evidence and a compatible clinical history.¹⁶ Analysis for the retrospective case series was conducted using SAS V9.1 and Microsoft Office Excel, 2003. Ethics approval was not required.

Results

For the period 1993–2007 there were 3,447 notifications of Q fever in New South Wales residents with the highest number of notifications occurring in the period 1993–1995 (Figure 1). Most Q fever notifications (90%; $n=3123$) occurred in the working age group, 15–64 years, and less than 3% ($n=81$) were in children aged under 15 years (Figure 2).

Over the whole study period more than 80% (2,764 of 3,446) of notifications were males but an increasing proportion of females were notified with Q fever; 12.8% in 1993–1995 to 28.4% in 2005–2007 ($P<0.0001$). Across New South Wales, the large majority (94.9%) of notifications occurred in residents of rural Area Health Services. Only 43% (1,494 of 3,446) of notifications over the study period had

Figure 1. Notifications of Q fever, New South Wales, 1993 to 2007, by 3-year groupings

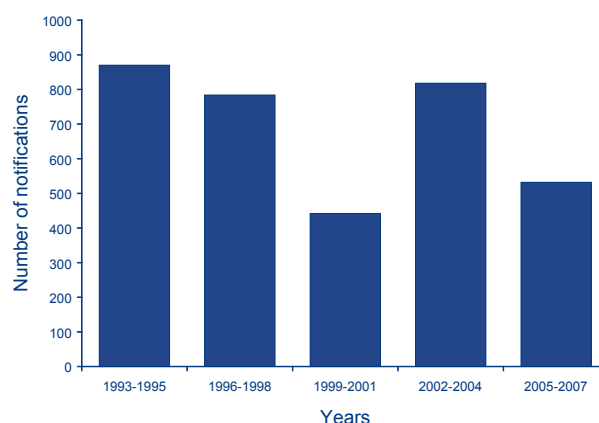
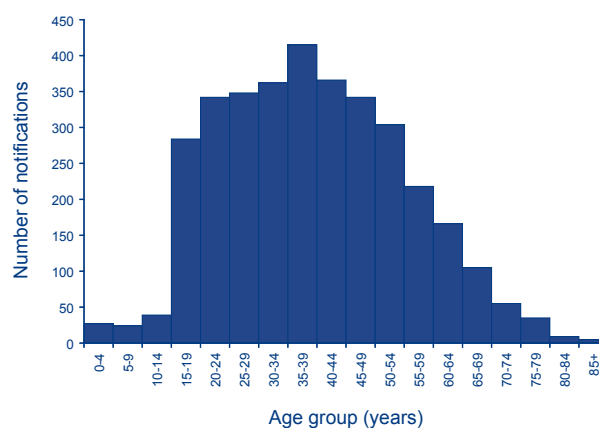


Figure 2. Age distribution of Q fever notifications, New South Wales, 1993 to 2007

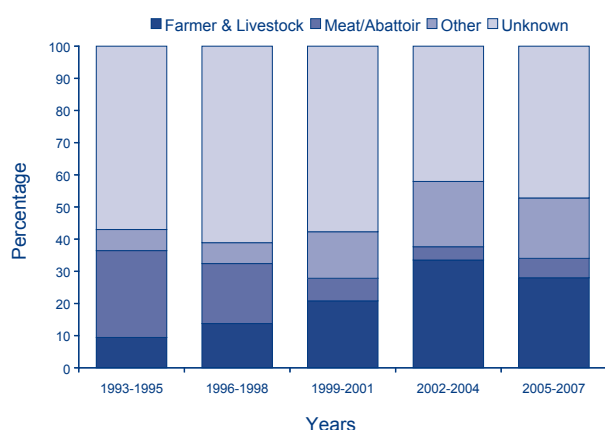


valid data for the hospitalisation variable. Among notifications with valid data, 24% (358/1494) were reported to have been hospitalised.

Occupation was recorded for less than 50% of Q fever notifications in New South Wales. The highest reported occupation groups were 'Farmer/Livestock' (16.1%) and 'Abattoir/Meat' (13.9%). A significant decline in the proportion of notifications in the occupational group 'Abattoir/Meat' worker ($P<0.0001$) occurred over the study periods (Figure 3). The proportion in the 'Farmer/Livestock' occupational group increased over the study period ($P<0.0001$).

For the period 1 January 2007 to 31 December 2007 there were 75 notifications of Q fever in people resident in the Hunter New England area. On serological and clinical review, 61 were found to have acute Q fever and 12 (20%) of these were female. Structured interviews were completed with 54 of the 61 notifications (89%).

Figure 3. Notifications of Q fever, New South Wales, 1993 to 2007, by occupation group



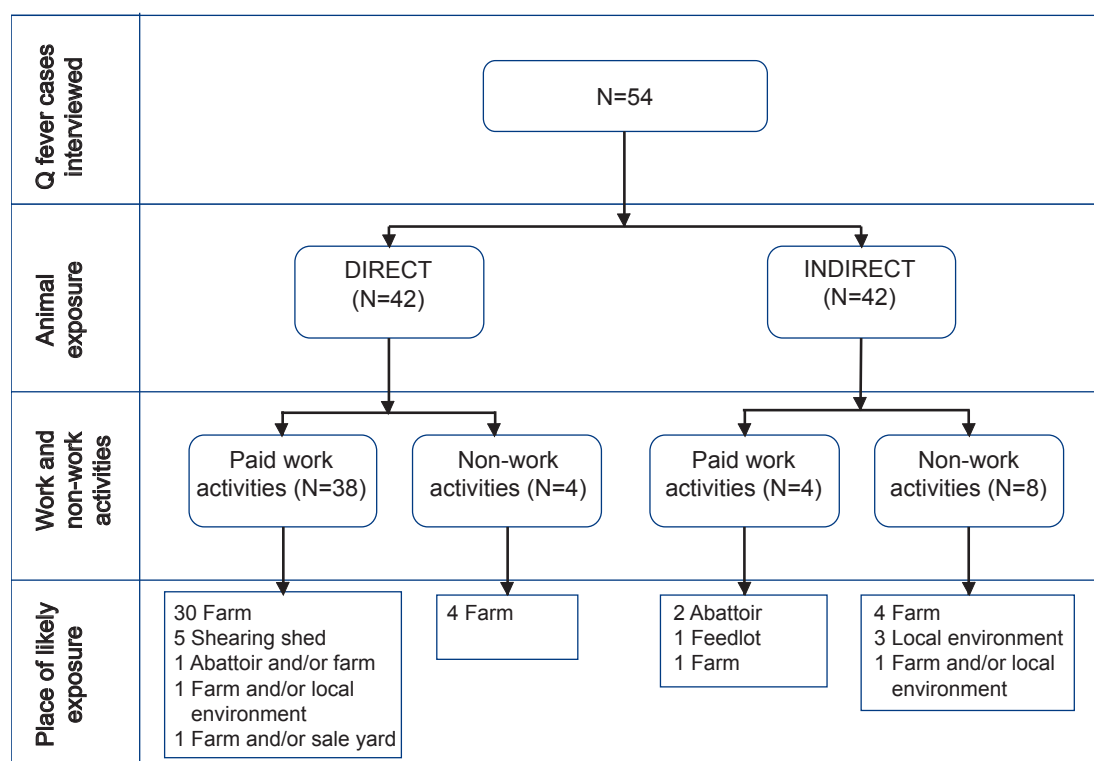
Of those surveyed 42 (78%) described themselves as living on a farm, or in a semi-rural area or village. Most worked (94%; $n=51$) in the month prior to illness onset with 18 occupations reported. Abattoir work was uncommon (6%; 3), while the occupations of farmer, farm manager and farm worker predominated (70%; 36). In the month prior to becoming ill with Q fever, 31 (61%) of those working had contact with newly introduced livestock as part of their work.

In the month prior to illness onset, 42 (78%) of the cases surveyed reported direct contact with animals,

their tissues or products with 38 (90%) of these occurring during work activities. The remaining 12 (22%) reported indirect contact with dusts that were contaminated by animals tissues, products or excreta, with 4 (33%) occurring during work activities. Direct exposure to cattle was reported by 81% of respondents, exposure to sheep reported by 38% and kangaroos or wallabies exposure reported by 26%. The most common place where exposure to animals occurred was on a farm (Figure 4) although many respondents reported exposure to multiple animal species in different settings. Of those who worked with animals 31% of activities described involved contact with animal blood or body fluids, 32% involved assisting animals with parturition and 46% participated in activities that involved general handling of animals.

As a result of their Q fever illness 50/54 (93%) people had time off work or school, with a median of 21 days off work or school and a range of 2–296 days. Twenty-nine respondents were hospitalised for a median of 6 days and a range of 1–42 days. At the time of the structured interviews (conducted 28 to 93 weeks after illness onset) 34 (63%) people reported they had not fully recovered. Table 1 describes the most frequent ongoing issues reported by respondents. Of those reporting full recovery, the median time to full recovery was 12 weeks with a range of 1–35 weeks.

Figure 4. Description of likely Q fever exposures among interviewed Hunter New England residents notified with acute Q fever in 2007



None of the respondents reported being vaccinated against Q fever. Thirty-eight (70%) people reported that they knew about the vaccine before their illness and the most common reasons provided for not being immunised were: believing that they were not at risk or problems with access (Table 2).

Table 1. Ongoing health conditions in people notified with acute Q fever in the Hunter New England area, 2007

Issue	n*	%*
Fatigue	32	94
Athralgia or myalgia	20	59
Fevers and sweats	9	26
Endocarditis	1	3
Total with ongoing issues	34	100

* Number and per cent is greater than the total as certain respondents reported more than 1 ongoing issue.

Table 2. Reasons provided for not being vaccinated against Q fever in people notified with Q fever from Hunter New England in 2007

Issue	n	%
Thought not at risk	14	37
Access problems	9	24
Not got around to it	5	13
Told not at risk	2	5
Child	2	5
Not provided by employer	2	5
Other	4	11
Total aware of Q fever vaccine	38	100

Discussion

This study of people notified with Q fever confirms that it is a serious illness that commonly produces considerable morbidity, emphasising the importance of prevention. The high proportion of people with ongoing health issues many weeks after illness onset has not previously been reported in Australia. The comparison of hospitalisation rates from routinely collected surveillance data and data gathered during the retrospective survey highlights the underestimation in routinely collected notification data. This would be important to consider when conducting an economic evaluation of Q fever vaccination strategies.

Cases of Q fever continue to be reported in New South Wales despite the availability of an effective

vaccine. The National Q Fever Management Program which operated from 2001–2004 provided free vaccine to some groups at risk. The large reduction in the number of notifications amongst people reporting work in an abattoir is likely to reflect a good outcome from this program, but many people in rural New South Wales who are potentially exposed to Q fever remain susceptible to this disease.

The epidemiology of Q fever disease in New South Wales has changed and amongst notified cases the relative importance of non-abattoir contact with livestock, wildlife or feral animals appears to be increasing. A fifth of notified rural residents described participating in activities that exposed them directly or indirectly to animals, their tissues and products in a non-work setting. The surveillance field 'Occupation' no longer alone adequately describes risk exposure for many of the people notified with Q fever and a new field that describes risk exposures is required. This would allow a more finely tuned focus of future vaccination policy.

Considering awareness of Q fever vaccination was reasonable at 70% (38/54), the barriers to immunisation described in this case series need to be confirmed in a larger sample of people and actions taken to address the underlying reasons for non vaccine uptake. Given the marked step in the age distribution of notified Q fever cases it would be valuable to confirm whether there is an opportunity of targeting Q fever vaccination to rural children, and confirm vaccine safety and efficacy in this group.

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