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Q fever knowledge and follow-up practices of northern Australian rural general practitioners

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Introduction

Q fever is a vaccine preventable condition in humans caused by *Coxiella burnetti*, a bacterium found in a wide variety of animals. A notifiable condition in Australia since 1952, Queensland consistently reports the highest Q fever notification rate (6.3 per 100,000 per annum) of all the States and Territories.[1] Humans contract Q fever by inhaling the bacteria shed from infected animals or contaminated dust particles, ingestion of contaminated dairy products or handling infected animal products. People working with livestock such as abattoir workers, veterinarians and farmers, have historically been regarded at high risk of *Coxiella burnetti* infection2. However, cases and outbreaks associated with catteries3, wildlife4, cases without direct animal contact5 and cases involving children6 are increasingly reported. Symptoms of Q fever can range from sub-clinical infection to fulminant pneumonia and hepatitis.[2] Thus diagnosis of Q fever presents a challenge to the physician.

Early identification, appropriate treatment and follow-up of acute Q fever cases are important for the health and wellbeing of individuals. Long-term complications of Q fever occur in 5% of cases and may appear months to years after the acute infection. Endocarditis is the most commonly reported long-term complication, with other complications including vascular infections, osteomyelitis and chronic fatigue syndrome.[2] These long-term complications may affect the quality of life and earning capacity of the individual living with Q Fever.[7,8] There is much debate, but no consensus, as to the follow-up of patients diagnosed with Q fever.[2,9,10]

Living in rural and regional areas may put individuals more at-risk for Q fever. Compared to people living in metropolitan locations, rural residents are more likely to have contact with livestock and wildlife. Inhaled contaminated soil or dust spread by wind can cause Q fever infection[2] and Northern Australia has recently been affected by low rainfall and dry conditions which may further contribute to the number of Q fever cases.[11,12] By virtue of their location, Australian rural general practitioners (GPs) are more likely to see cases of Q fever than their metropolitan counterparts. The higher level of GPs' knowledge of Q fever and previous experience with Q fever cases have been shown to reduce the risk of hospitalisation of patients with acute Q fever.[13]

This paper reports the findings from a cross sectional survey of Q fever knowledge, Q fever vaccination and usual clinical follow-up practices among rural GPs in a Far North Queensland (FNQ) region.

Setting

The Atherton Tablelands covers 12,178 km^2 and is situated an hour's drive west of Cairns. Whilst predominantly farming land, the diversity of the natural landscape (rainforest, wetlands and savannah) attract tourists and tree-changers to the region. The resident population, 46,384[14] live on farms, residential acreages or in one of the small towns spread through the area. In the period, 2007 to 2017 there have been 124 acute Q fever notifications on the Tablelands.

Method

Atherton Tableland private practice rural GPs, and registrars in general practice training, (N=56) were invited to complete an anonymous survey via Survey Monkey® (Palo Alto, California, USA) or hard copy. The survey consisted of open and closed questions about Q fever: annual confirmed case numbers, vaccinator status, education, knowledge of transmission sources and at-risk occupations, and usual follow-up practice for confirmed Q fever.

Invitations were issued by email, and in person at local GP education sessions and workshops. Responses collected at those events were placed in a secure box provided at the venue. A reminder invitation was emailed two weeks after the first invitation and the survey was open for responses for six weeks. The invitation to participate in the study, reminder email and informal verbal prompts, were sent by one of the investigators, who is a rural GP residing in the area and known to the cohort.

The data were entered, and descriptive analysis undertaken using SPSS IBMv22 software.

Ethical approval

The project was approved by the James Cook University Human Research Ethics Committee (H7277).

Results

Surveys were completed by 16 respondents (response rate 28.6%) with a median of 24 years' experience as a practicing doctor (range 2-38 years). Three respondents had undertaken education or training specific to Q fever, including two registered Q fever vaccinators. Most respondents (n=11) would diagnose fewer than 2 cases of acute Q fever annually and no cases of chronic Q fever (see Table 1).

Table 1 Respondents' estimate: annual number of diagnosed acute and chronic cases

Q fever cases diagnosed annually	0 cases	1 case	2 cases	>2 cases	unsure
acute	5	6	4	1	-
chronic	11	4	-	-	1

Most respondents correctly identified transmission modes of Q fever as contact with infected livestock or animal carcasses (n=15), contact with contaminated animal blood products, foetal or reproductive products (n=11) and direct or indirect contact with contaminated soil (n=10). However, fewer than half identified contact with contaminated wildlife (n=7), cats and dogs (n=3) as possible sources of Q fever transmission (see Table 2).

Table 2 Modes of Q fever transmission

	Had Q fever education (n=3)	No Q fever education (n=13)	Total (N=16)
Contact with infected livestock or animal carcasses	3	12	15
Contact with contaminated animal blood products, foetal or reproductive products	3	8	11
Direct or indirect contact with contaminated soil	2	8	10
Direct or indirect contact with contaminated wildlife	2	5	7
Contact with domestic cats and dogs	1	2	3
Tick borne	0	3	3
Person to person	0	0	0

Nearly all respondents were likely to recommend Q fever vaccination to those involved in primary production of livestock, abattoir or saleyard workers and veterinary workers (see Table 3). When asked who was at risk of Q fever, respondents identified those groups as well as a number of other agricultural or rural related workplaces. These included hunters, animal workers, forest rangers wildlife carers, council workers, and hobby farmers.

Table 3 Recommending Q fever vaccination

	Had Q fever education (n=3)	No Q fever education (n=13)	Total (N=16)
Those involved with primary production of livestock eg cattle, sheep, horses	3	11	14
Abattoir or sale yard workers	3	13	16
Veterinary workers - eg veterinarian nurse, kennel hand	3	13	16
Stock agent or working for a stock agent	1	6	7
Other work or recreation with animals - eg wildlife carer, hunter	3	6	9
Those that do not work with animals but have regular contact with animals	1	0	1
Those that have regular outdoor activities eg bush walking, farm stays, mountain bikers etc	1	0	1
Those that do not have contact with any animals at all	0	0	0

We asked respondents to describe their follow up management practices for acute cases of Q fever. Most respondents indicated they would contact the Public Health Unit or an Infectious Disease specialist for advice. Doxycycline was identified by most as the drug of choice to treat acute Q fever and most would do some further blood testing as in ‘repeat serology’ or ‘organise follow-up bloods’. One respondent specifically mentioned the patient ‘should have a series of phase 1 and 2 blood tests’.

Interestingly, the potential for long-term complications was identified by only three respondents who cited ‘screening for chronic’, ‘(to query) chronic Q fever’, and ‘ensure no ongoing weakness/fatigue lasting longer than 4-6 weeks’. Specific cardiac follow-up was identified by three

separate respondents listing issues such as ‘it depends if they have a poor immune system or heart valve issue’, ‘consider echo if underlying heart/valve defects’ and ‘Examine for heart murmur. Refer for echocardiogram’.

Whilst accurately identifying modes of transmission and a number of the at risk groups for infection, one respondent failed to provide details about follow-up stating ‘I have not diagnosed any yet’.

The influence of professional development in Q fever was evident. The three respondents who had specific Q fever education provided more detailed information about their management practice, and recommended the vaccine to a wider range of people than the other respondents.

Discussion

This study identified a range of self-reported usual clinical practice and follow-up (if any) of Q fever cases by rural GPs. Given that rural GPs are more likely to have patients present with Q fever, it is of concern that knowledge about the characteristics of people at risk of contracting Q fever was incomplete, and there was no consensus as to what, or when, follow-up should occur. Rural GPs in our study were aware of the traditional groups and occupations at-risk of Q fever infection and would recommend vaccination to them. However, few recognised the importance of non-occupational exposure such as contact with wildlife, domestic pets, and contaminated soil. Unsurprisingly, respondents with previous Q fever education provided more detail in their responses than those who had not received direct Q fever education, suggesting a need for focused educational opportunities for rural doctors. The Australian College of Rural and Remote Medicine recognised the need for Q fever education and have, in 2018, an online education module to help GPs recognise and prevent Q fever.

There is an awareness of the increased risk of Q fever from inhaled contaminated soil, identified by our rural GPs and nationally. In August 2018, the New South Wales and Victorian governments, following declarations of drought across large parts of Australia, issued public health warnings about the risk of Q fever. Identifying the need for better awareness about Q fever in the community, the NSW government allocated funding for a Q fever education campaign and also research into an improved vaccine. In 2017, the Victorian Farmers Federation Livestock Group funded workshops, toolkits and advertising to promote the dangers of Q fever and the importance of vaccination to farmers in that state.

In our study, there was a range of post diagnosis management strategies with little concurrence among respondents as to what, or when, follow-up was required. For most respondents, any follow-up management decisions would be transferred to the Public Health Unit or Infectious Disease Specialist which could be problematic in some rural and remote areas with little access to these services. There is no consensus, and much diversity of opinion, as to when and what follow-up should be offered after an acute case of Q fever. There are a number of international published ‘guidelines’ or algorithms for the treatment and follow-up of Q fever.[15,16,17] Each of these differs in the type and frequency of testing making it difficult from GPs to establish a relevant benchmark. An Australian author included Q fever in an algorithm for diagnosis and management of (three) zoonotic infections.[18] This algorithm provides specific detail on the follow-up including the investigations and how often the patient should be seen.[18] However, the Therapeutic Guidelines Ltd (eTG) resource available to Australian GPs advises to ‘seek expert advice’ for follow-up and management of acute cases of Q fever and most of our respondents reported they would seek advice from the Public Health Unit or Infectious Disease consultant.

Limitations

The study sample was small and limited to GPs in one rural region so the results could not be generalised to all rural GPs. It is widely reported that engaging GPs in research is difficult with published response rates frequently lower than 30%.[19,20,21] While we invited all rural GPs in our catchment area to participate, only those interested or knowledgeable about Q fever might have participated in the study, resulting in a non-representative sample. To overcome this sampling bias we used a number of strategies to encourage participation: the survey was anonymous, short, required minimal demographic information, and had the majority of questions as a simple 'tick the box' response. Despite these efforts, our response rate was low (28.6%).

Conclusion

Occupational and environmental exposure increase the risk of rural people contracting Q fever – a condition which can lead to debilitating long-term health issues. This study revealed knowledge gaps about Q fever, including who was at risk of Q fever, and inconsistencies in the management of acute cases among this cohort of rural GPs. The lack of consensus about follow-up management reflects the differing opinions of how patients with Q fever should be managed and may be indicative of the current lack of evidence available to support decision making.

Respondents in our study may have been interested in the topic or have some knowledge of Q fever, thus the overall knowledge levels in GPs could be much less. Our results highlight the need and opportunity for an evidenced-based Australian Q fever set of management guidelines. These could be developed with the broad engagement of infectious disease and public health specialists and subsequently disseminated through the professional development programs in the GP colleges.

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Presenter

Dr Aaron Hollins has a focus and passion for the health of rural, remote, Indigenous and tropical populations. As Senior Lecturer, General Practice and Rural Medicine, James Cook University, he supports the training and education of GP registrars and medical students in Far North Queensland. Aaron tells bad dad jokes, will only drink good coffee, prefers the fourth Doctor Who, and works at a stand-up desk.