

Q fever vaccination in Queensland abattoirs

Morton Bell^{1,2}, Mahomed Patel¹ and John Sheridan²

Abstract

Outbreaks of Q fever continue to be recorded in abattoirs despite a protective vaccine being available. All accredited abattoirs in Queensland were surveyed to ascertain the number that conducted Q fever vaccination programs. Only ten of the 30 abattoirs had vaccination programs. Vaccination programs were present at all abattoirs with more than 360 employees. Thirty-seven per cent of abattoir employees worked at abattoirs that did not have vaccination programs. Research is required into the attitudes and barriers to vaccination at smaller abattoirs so that vaccination coverage can be increased. Economic data, including litigation costs, should be considered in a cost-effectiveness study so that smaller abattoirs appreciate the benefits of implementing vaccination programs. The protocols for vaccination of new employees should be analysed for their capacity to provide appropriate worker coverage. Abattoir workers are a readily identifiable at-risk group who should be fully protected from this occupational disease. It is the responsibility of industry and health authorities to ensure all workers are appropriately protected. *Comm Dis Intell* 1997;21:29-31.

Introduction

Q fever is an acute debilitating disease caused by *Coxiella burnetii*. It is a zoonosis, an occupational hazard and a significant cause of morbidity among abattoir employees^{1,2,3,4,5}.

Outbreaks of Q fever in abattoirs involving as many as 30 or more workers have been investigated and reported on for over 30 years^{1,2,3,4,5}. These reports have recorded the

severity of the disease in those affected and the high level of absenteeism during outbreaks. The disease can result in prostration for up to five days, an average of two weeks off work and a fatigue syndrome which can last for weeks, months or years^{4,6}. It has been estimated that the cost of an uncomplicated acute case of Q fever is \$7,000⁶. The cost of a chronic case, which may complicate up to 20% of acute cases, can range up to \$50,000⁶. These costs include

medical and legal expenses, compensation, lump sum payment and replacement labour.

In 1995 there were 184 notifications of Q fever in Queensland, and approximately 40% of these were reported in abattoir workers (unpublished data, Queensland Health, Notifiable Diseases System).

During 1995, there was one confirmed outbreak of 30 cases in a southern Queensland abattoir and another smaller

1. Master of Applied Epidemiology Program, National Centre for Epidemiology and Population Health, The Australian National University Canberra, ACT 0200.

2. Communicable Diseases Branch, Queensland Health, Brisbane.

ISSN 0725-314
Volume 21
Number 3
6 February
1997

Contents

Q Fever and vaccination in Queensland abattoirs <i>Morton Bell, Mahomed Patel and John Sheridan</i>	29
Fatal encephalitis and meningitis at the Gold Coast Hospital, 1980 to 1996 <i>John Gerrard</i>	32
An outbreak of dengue 2 in the Torres Strait <i>Marlene Griffiths, Scott Ritchie, Diana Terry, Rob Norton and Debra Phillips</i>	33
Communicable Diseases Surveillance	34
Overseas Briefs	40

probable outbreak. Neither of the affected establishments had a vaccination program in operation.

Although a vaccine with 100% efficacy has been available since 1989, few practitioners are familiar with the prevaccination hypersensitivity test that is essential to its safe administration^{7,8}. Prevaccination testing consists of a skin hypersensitivity test and test for antibodies followed by vaccination for those who are neither sensitised nor immune. The cost of vaccination varies according to the number of employees tested at a time and the number requiring vaccine. Large-scale testing programs have shown that around half to two-thirds of current employees could require vaccination⁷. Vaccination has been shown to confer protection for at least five years⁸. Ongoing exposure to the organism in the abattoir may act to boost protection. As vaccination is highly efficacious, its use has been widely advocated to the meat processing industry^{7,8}. Despite this, outbreaks in abattoirs continue to occur.

The question arose as to whether Q fever outbreaks were continuing to occur because of a lack of vaccination coverage in abattoirs. We decided to determine the percentage of abattoirs vaccinating their employees and the percentage of meat processing industry workers who were covered by vaccination programs.

Background

There are two classes of facility which process meat for human consumption in Queensland. These are abattoirs and slaughterhouses, both of which must be accredited by the Queensland Meat and Livestock Authority (QMLA). Accredited abattoirs are larger facilities with many employees that process larger numbers of animals. Slaughterhouses

are much smaller, employ fewer people and account for less than five per cent of employees in the meat processing industry. This investigation was confined to accredited abattoirs.

Methods

A list of accredited abattoirs was obtained from the QMLA. An accredited abattoir was defined as a facility processing meat for human consumption, with full-time meat inspection staff and accredited by the QMLA under the *Meat Industry Act 1993* and Conditions for Accreditation for Meat Processing. The study was further limited to abattoirs which slaughtered animals that are known to be able to transmit Q fever; these included abattoirs slaughtering cattle, sheep and goats.

In July 1996, a telephone survey of abattoir health and safety officers (HSO) was conducted to ascertain which abattoirs had implemented Q fever vaccination programs and the number of staff employed at each abattoir. Information on costs associated with vaccination in Queensland was obtained from CSL Vaccines Limited.

Results

The Queensland Meat and Livestock Authority provided a list of 33 accredited abattoirs. Thirty of these abattoirs were eligible for the study and the remaining three were excluded, because one slaughtered only horses, another only pigs and the third was closed. Employee numbers ranged from 10 to 800 per abattoir.

Ten of the 30 abattoirs, employing 63% of abattoir workers in Queensland, had Q fever vaccination programs in place (Table). Three additional abattoirs had submissions and costings presently before

management or boards for approval. Each of the seven abattoirs with a staff of more than 360 employees had vaccination programs. None of the 13 with less than 170 employees had a vaccination program. Abattoirs without vaccination programs were distributed across Queensland.

Since 1993, there has been an increase in the use of the Q fever vaccine in Queensland, mainly in the meat processing industry (G. Newman, CSL Vaccines Ltd., personal communication).

Cost of vaccination

Skin tests and serology to assess immune status to Q fever cost \$55, and vaccine an additional \$65 per individual. Assuming that half of those tested are immune, the approximate cost to initiate a vaccination program for 300 employees would be 300 x \$55 plus 150 x \$65, a total of \$26,250 as a one-off cost. This is equivalent to the cost of disease in four cases with acute Q fever infections.

Assuming a staff turnover of ten per cent per annum, in the same abattoir, where all new employees require vaccination, the recurrent annual cost would be \$3,600, or \$69 per week. If annual staff turnover was 30%, the projected recurrent cost would be \$10,800, or \$208 per week. These may represent slight under-estimates as the \$55 for testing depends to some extent on economies of scale and proximity to medical practitioners.

Discussion

This study found that vaccination programs were being offered in only one-third of abattoirs, which employed two-thirds of the abattoir workforce in Queensland. Employees not offered vaccination programs worked in the smaller abattoirs, employing less than 360 workers.

To ensure protection of employees from Q fever, all abattoirs need to

Table. Abattoirs in Queensland by number of employees and Q fever vaccination program

Size of abattoir by employee numbers	Abattoirs with a vaccination program (total employee numbers)	Abattoirs without a vaccination program (total employee numbers)	Median number of employees per abattoir	Range of employee numbers
>360 employees	7 (3800)	0	500	400 - 800
170 - 360 employees	3 (820)	7 (1845)	270	170 - 360
< 170 employees	0	13 (876)	70	10 - 160
Total	10 (4620)	20 (2721)	190	10 - 800

implement vaccination programs, as well as timely vaccination for all new workers. At present there is not a uniform protocol across the industry for vaccination of new employees.

The major limitation of the study was that the data were obtained by an informal discussion with the health and safety officers, and were not formally validated. We have assumed abattoirs that reported vaccination programs did vaccinate. Our study was an exploratory one to estimate the proportion of abattoirs offering vaccination programs. We believe it is unlikely that respondents would have denied a vaccination program when one was operational at the time. Our estimates therefore reflect the maximum number of abattoirs currently offering vaccination programs.

The barriers to program adoption in abattoirs need to be identified. It is possible that management attitudes or ignorance of the economic benefits of vaccination may be factors. However, lack of easy access to appropriate medical, public health and occupational health expertise might be important barriers. A study to identify barriers should also include an assessment of the uptake of vaccine in all abattoirs and the timing and appropriateness of vaccination for new employees. This research would assess the true coverage offered by programs.

The cost of vaccination is thought to be a major barrier to program introduction. The abattoirs not offering a vaccination program may be unaware of the cost of this disease or of the chronic complications of the

disease. A cost-effectiveness study in these abattoirs comparing the costs of prevaccination testing and vaccination against the costs of the disease, workers' compensation and premiums, replacement labour and litigation, is needed. A favourable economic assessment could assist abattoirs to accept their regulatory responsibilities of providing a safe working environment.

Although a vaccination program may appear expensive, the use of the Q fever vaccine in South Australia reduced the numbers of occupation-related cases and reduced employers workers' compensation premiums⁹. Because the organism is transmitted in aerosols, it is important that not only abattoir employees but all workers who visit or work on an abattoir site are vaccinated against Q fever. This includes service providers such as electricians, plumbers, telecommunication workers, weights and measures inspectors and transport workers. If premises are leased on an abattoir site, for example to meat packers, it must be ensured that these workers, who may not be abattoir employees, are also protected by vaccination.

This study has raised several issues that require research and public health action. Abattoir workers are a readily identifiable at-risk group who should be protected from this occupational disease. All those connected with the meat processing industry, that is management, unions, workers' compensation board members, staff of occupational health and public health units should collaborate to ensure that the

incidence of Q fever in abattoirs is minimised by optimising vaccine coverage rates.

Acknowledgments

Mr Gordon Newman CSL Vaccines Limited and Professor BP Marmion, The University of Adelaide and Institute of Medical and Veterinary Science, Adelaide are thanked for information supplied on vaccine use and costs.

References

1. Johnson DW. Epidemiology of Q Fever in Queensland: A seven-year survey. *Med J Aust* 1966;1:121-125.
2. McKelvie P. Q Fever in a Queensland meatworks. *Med J Aust* 1980;1:590-593.
3. Spelman DW. Q fever, a study of 111 consecutive cases. *Med J Aust* 1982;1:547-553.
4. Buckley B. Q Fever epidemic in Victorian general practice. *Med J Aust* 1980;1:593-595.
5. Sam G, Remington L, Van Buyner P. Q Fever in southern New South Wales. *NSW Public Health Bulletin* 1996;7:91-2.
6. Marmion BP. Vaccine prophylaxis of Q Fever. In: Carangis J, Compiler. *200 Year celebration of vaccine development*. Adelaide: South Australian Health Commission, 1996.
7. Marmion BP, Ormsbee RA, Kyrkou M *et al*. Vaccine prophylaxis of abattoir-associated Q fever: eight years' experience in Australian abattoirs. *Epidemiol Infect* 1990;104:275-287.
8. Ackland JR, Worswick DA, Marmion BP. Vaccine prophylaxis of Q Fever. A follow-up study of the efficacy of Q-Vax (CSL) 1985-1990. *Med J Aust* 1994;160:704-708.
9. Cameron S. Multi-State outbreak of Q fever. *Comm Dis Intell* 1992;16:15.