Cryptosporidium outbreak in a continuously tested public water supply 2004

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Cryptosporidium Outbreak in a Continuously Tested Public Water Supply

Introduction

The Department of Public Health and Planning in the Midland Health Board (MHB) was notified of nine confirmed and two suspected cases of cryptosporidiosis on the 3 June 2004. All of the cases were on the same water supply that services approximately 25,000 people. This supply had been the source of an outbreak of cryptosporidiosis in April/May 2002.[1] As a result of the 2002 outbreak a filtration system was installed in December 2003. However, due to a high demand on the water supply and an inability of the system to deal with the high turbidity of the water the local authority added unfiltered water to the filtered water at a ratio of 1:4. The local authority carried out testing for *Cryptosporidium* on a daily basis when they started using the unfiltered water. The water supply had also been tested for *Clostridium perfringens,* an indicator organism for *Cryptosporidium*.

An outbreak control team (OCT) meeting was convened on the 3 June 2004. Initial investigation indicated that the water supply was the most likely source of the outbreak. The local authority was informed of the situation and advised to either issue a boil water notice or to supply only filtered water to the public. They agreed to switch to a completely filtered water supply. A memo was sent to all hospitals in the area to reiterate the importance of using boiled water at all times for those who were immunocompromised.

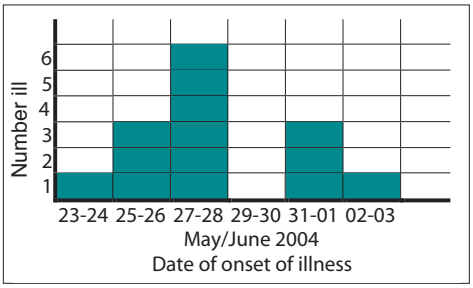

Figure 1. Epidemic curve

Epidemiological Investigation

A case control study was undertaken. All cases were laboratory confirmed and controls were family or household members who were not ill. In total, fourteen cases were laboratory confirmed with the onset of symptoms ranging from 25 May to 3 June 2004 (Figure 1).

As all of the *Cryptosporidium* positive cases drank water, it was not possible to determine the relative risk of drinking water versus not drinking water. Therefore, the effect of the quantity of water consumed on the probability of becoming ill was investigated. Patients and controls were assigned an exposure score for water consumption relative to a base-line of one, which was taken to be all those who consumed one or less glasses of water per day (Table 1). Analysis for Linear Trend in Proportion (Table 2) showed there was a linear trend between the quantity of water consumed and the likelihood of becoming ill (p<0.001).

Table 1. Exposure score relative to quantity of water consumed

Quantity of water in glasses (250ml)	Exposure score	Number of Cases	Number of Controls
0-1	1	1	12
2-3	2	1	3
4-7	4	7	6
7-11	8	5	1

Other possible sources of infection were investigated. However, in this outbreak no significant risk factor, other than the volume of water consumed, was established.

Environmental Investigation

Testing for *Cryptosporidium* carried out by the local authority was positive on the 8 –9 May 2004 (0.0015/10L). Four samples tested for *C. perfringens* prior to the outbreak were all negative. Samples taken on the 3 June 2004 from the 4:1 filtered/unfiltered supply and on the 5 June 2004 from the fully filtered supply were both negative for *Cryptosporidium*. A sample of the raw water source taken on 4 June 2004 was found to have one *Cryptosporidium*-like body/400L water.

Table 2. Odds ratios for water exposure

Exposure score	Odds ratio (relative to baseline)
1	1
2	4
4	14
8	60

Chi square for linear trend: 10.95; p value: 0.00094

Discussion

This outbreak was epidemiologically shown to be linked to the water supply. The shape of the epidemic curve (Figure1) would suggest that there was a common source of exposure over a short period of time in this outbreak rather than a continuing source. Analysis demonstrated that the probability of becoming ill increased with the quantity of tap water consumed (Table 3) (P<0.001). These results suggest that the level of *Cryptosporidium* peaked in the supply for a short period of time. However, this water supply was being tested for *Cryptosporidium* on a daily basis at this time and the only positive results were outside the incubation period for this outbreak and were below generally accepted levels of *Cryptosporidium* in a water supply. The UK Water Supply (Water Quality) Amendment Regulations 1999 S.I. 1524, have defined as a treatment standard, a level of less than one *Cryptosporidium* oocyst per 10 litres when sampled over a 24hr period. No numerical standard for *Cryptosporidium* is set in the revised Drinking Water Directive (98/83/EC). Outbreaks of cryptosporidisois associated with drinking water have occurred where oocysts counts have been below the UK limit (<1/10L).[2]

Anecdotal information indicated that there was extensive diarrhoeal illness in the community at the time. This suggests there may have been unidentified cases of cryptosporidiosis associated with this outbreak.

Cryptosporidium was not isolated from the water source during the incubation period for this outbreak which indicates that testing a water supply is not sufficient to determine the risk of a *Cryptosporidium* outbreak. Active surveillance of cases is required to identify an outbreak in a timely manner thus allowing prompt control measures to be implemented.

The work of the environmental health officers, laboratory staff and public health staff is acknowledged.

C. Eve O'Toole, Phil Jennings, Gerard Meagher and Ina Kelly, MHB

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