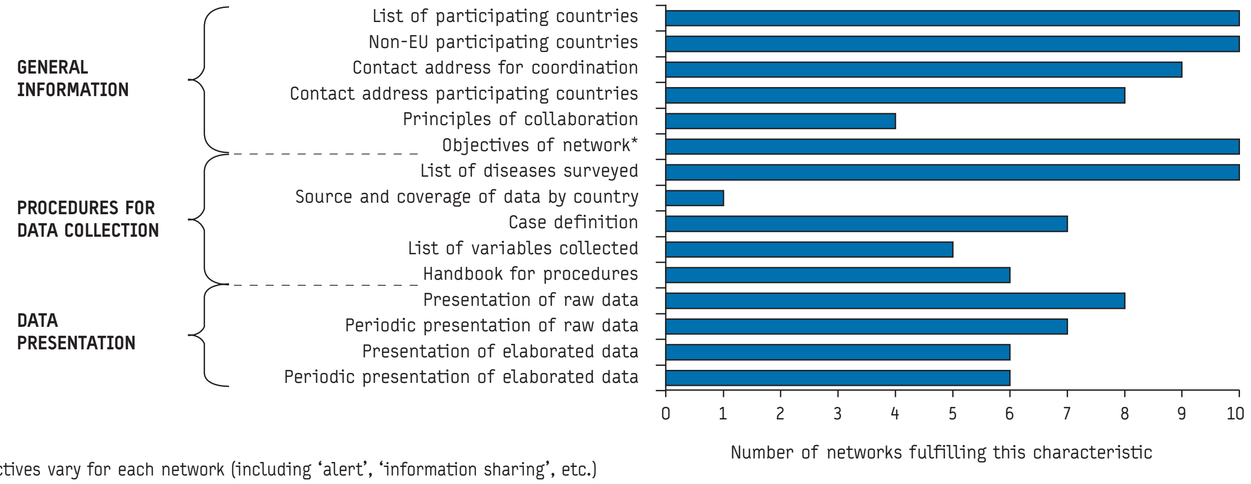
Figure

Number of surveillance networks that have these selected characteristics on their websites



* Objectives vary for each network (including 'alert', 'information sharing', etc.)

each member state and the EU. In addition, it would stimulate the formulation of proposals that would contribute to a standardisation of surveillance procedures in the EU.

Recommendations

Contents of the EU networks´ websites should be reviewed to include a basic set of characteristics that are common to each of these sites. These basic characteristics could include: 1) case definitions, 2) procedures used for data collection and 3) periodic reports which include elaborated data for the entire EU and, if it is possible, also raw data. As the European Centre for Disease Prevention and Control (ECDC) will have a role in harmonising the functioning of the European surveillance networks, it should also take a leading role in establishing guidelines for the inclusion of these basic characteristics on the networks' websites.

Acknowledgements

We would like to thank Rosa Cano Portero and Elena Martínez-Sánchez for the critical revision of this manuscript.

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Original Articles

Outbreak report

Two clusters of human infection with influenza A/H5N1 virus in the Republic of Azerbaijan, February–March 2006

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Following the appearance of influenza A/H5 virus infection in several wild and domestic bird species in the Republic of Azerbaijan in February 2006, two clusters of potential human avian influenza due to A/H5N1 (HAI) cases were detected and reported by the Ministry of Health (MoH) to the World Health Organization (WHO) Regional Office for Europe during the first two weeks of March 2006. On 15 March 2006, WHO led an international team, including infection control, clinical management, epidemiology, laboratory, and communications experts, to support the MoH in investigation and response activities.
As a result of active surveillance, 22 individuals, including six deaths,

were evaluated for HAI and associated risk infections in six districts. The investigations revealed eight cases with influenza A/H5N1 virus infection confirmed by a WHO Collaborating Centre for Influenza and one probable case for which samples were not available. The cases were in two unrelated clusters in Salyan (seven laboratory confirmed cases, including four deaths) and Tarter districts (one confirmed case and one probable case, both fatal). Close contact with and de-feathering of infected wild swans was considered to be the most plausible source of exposure to influenza A/H5N1 virus in the Salyan cluster, although difficulties in eliciting information were encountered during the investigation, because of the illegality of some of the activities that might have led to the exposures (hunting and trading in wild birds and their products). These cases constitute the first outbreak worldwide where wild birds were the most likely source of influenza A/H5N1 virus infection in humans.
The rapid mobilisation of resources to contain the spread of influenza A/H5 in the two districts was achieved through collaboration between the MoH, WHO and its international partners. Control activities were supported by the establishment of a field laboratory with real-time polymerase chain reaction (RT-PCR) capacity to detect influenza A/H5 virus. Daily door-to-door surveillance undertaken in the two affected districts made it unlikely that human cases of influenza A/H5N1 virus infection remained undetected.

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Key words: Azerbaijan, influenza a virus, H5N1 subtype, communicable diseases, emerging, disease outbreaks

Introduction

Following anecdotal reports of die-offs of birds in January 2006, influenza A/H5N1 virus infection was confirmed in February 2006 by the State Veterinary Laboratory in Baku in samples obtained from wild birds, commercial poultry (chickens), and backyard poultry (ducks) in central and south Azerbaijan [1]. However, there was reportedly no extensive spread through backyard poultry in the villages. The Republic of Azerbaijan, with approximately 8.4 million inhabitants [2], lies on the shore of the Caspian Sea in the Caucasus, bordering the Russian Federation, Georgia, Armenia, Turkey, and Iran. As common in the whole subregion, migratory birds fly through Azerbaijan twice each year, from Siberia to Africa in the autumn (August-December) and back in the spring (February-May) [3].

On 6 March 2006, the Ministry of Health (MoH) of the Republic of Azerbaijan reported to the World Health Organization (WHO) Regional Office for Europe a cluster of nine cases, including two deaths, of potential human influenza with influenza A/H5N1 HAI [4]. The patients had become ill over a two week period, with dates of illness onset from 15 February to 4 March 2006, and lived in Daikyand settlement in Salyan district, 130 km southeast of the capital, Baku [FIGURE]. Their symptoms included fever, headache, cough and meningeal signs. The clinical presentation was varied, which may have obscured and delayed the suspicion of influenza A/H5N1 virus infection.

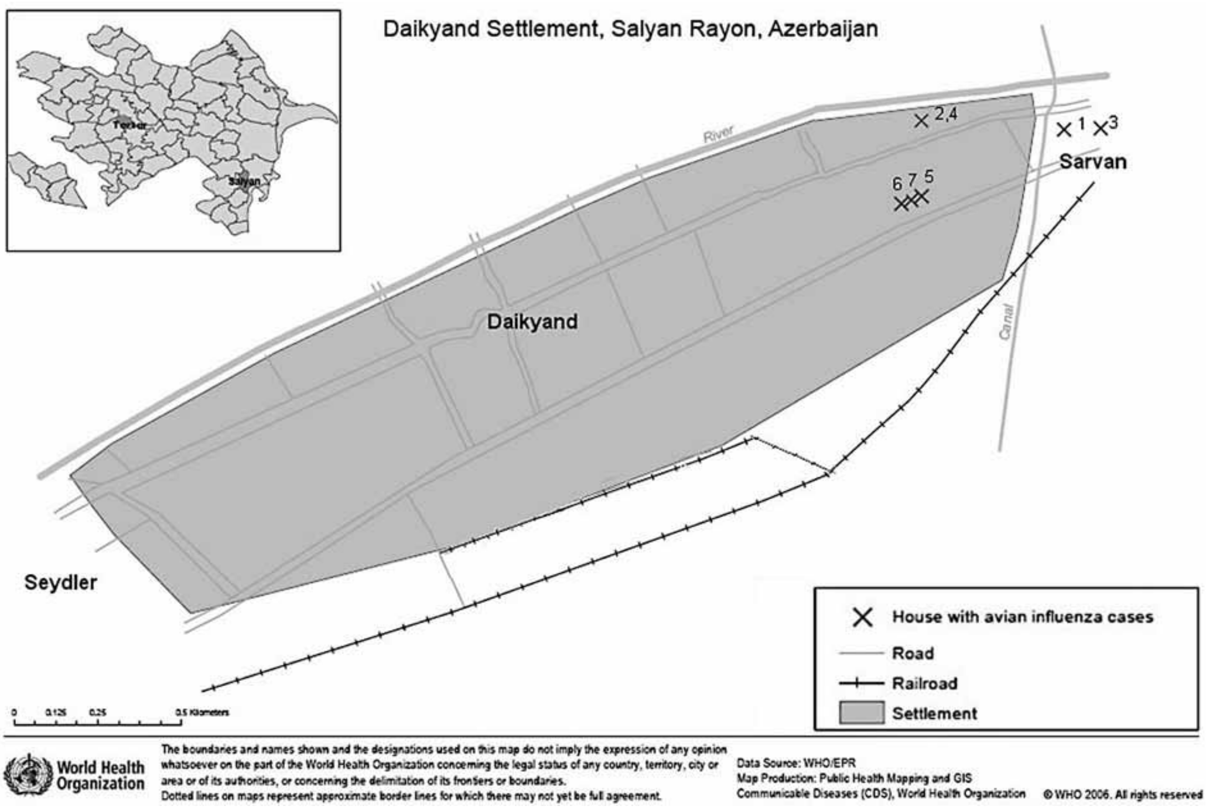
On 9 March 2006 another pair of cases where influenza A/H5N1 virus infection was suspected was reported to the MoH from Bayim-Sarov, Tarter district in central eastern Azerbaijan. The date of illness onset of the first case was 28 February 2006 and was initially diagnosed with reactivation of tuberculosis (TB). Because of this diagnosis, influenza A/H5N1 virus infection was only considered when the second patient became ill on 4 March 2006.

On 15 March 2006, further to a request for assistance by the MoH, a WHO-led international team that had been in Azerbaijan since 5 March 2006 to support the implementation of the national surveillance system for HAI was strengthened by experts in infection control, clinical management, epidemiology, laboratory work and communication. The team, which eventually comprised 11 individuals representing five institutions and organisations (Robert Koch-Institut, Germany; Státní Zdravotní Ústav – Centrum Epidemiologie a Mikrobiologie, Czech Republic; US NAMRU-3, Egypt; WHO Headquarters, Switzerland; WHO Regional Office for Europe, Denmark), was deployed in order to assist in

i) describing the outbreak;
ii) public health surveillance, including active case-finding;
iii) timely and accurate laboratory diagnosis of influenza A/H5 virus infection;
iv) safe and effective case management and transport of patients for whom influenza A/H5N1 virus infection was considered.

Figure

Cluster of human infection with influenza A/H5N1 virus, Daikyand settlement, Salyan District, Azerbaijan, February-March 2006



Methods

Surveillance system, case finding and case investigation

In accordance with national ministerial decrees issued early in 2006, district chief doctors implemented reporting of cases where influenza A/H5N1 virus infection was suspected from the local doctors to the MoH and informed and trained healthcare workers on how to detect and report such cases. All reported cases were investigated at district level and, after reporting to the central level, also by the MoH-WHO response team.

Since early February 2006, the general public was also informed, through social mobilisation campaigns (e.g. distribution of posters, school lessons) at district and national level, about the risk of exposure to and mode of transmission of influenza A/H5N1 virus, symptoms of AI, and was invited to seek medical care if suggestive symptoms developed.

Daily active surveillance for human cases of influenza A/H5N1 virus infection began on 1 March 2006 in Daikyand settlement. A total of four brigades, each comprising three local healthcare workers, made daily visits to all households (200 households per brigade) to screen residents for fever or respiratory symptoms, through interviews and direct observation. Surveillance data were reported daily by the chief district doctors to the MoH. A similar system became operational in Tarter district around mid-March 2006.

The surveillance team, which included members from the MoH, the Anti-Plague Station (APS), the Republican Centre of Sanitary Hygiene (both technical institutions reporting to the MoH), and WHO, developed a case definition [see Box] and a standardised case investigation form for potential HAI cases, including the following sections: reporting and demographic details, clinical presentation and evolution, history of admission to healthcare facilities, assumption of antiviral drugs as prophylactic or/and treatment measures, history of exposure to animal and human cases, laboratory test results for influenza A/H5N1 virus, final disposition. Both the case definition and the case investigation form were translated into the languages used locally (Azeri and Russian) and used across the country. Data on cases were gathered from multiple sources, including medical records, district medical officers and epidemiologists and directly by interview from family members. When necessary, the interviewing was repeated to collect all the relevant information as further intelligence came to light.

Forms for the monitoring of healthcare workers and workers in the veterinary sector, as well as for contact persons, were developed and an Epi Info 2000 database was created in English and Russian for data entry and analysis.

Laboratory methods

National laboratory capacity was established using a portable field laboratory was established at the APS premises in Baku by the United States Naval Medical Research Unit 3 (NAMRU-3), Cairo (Egypt). The field laboratory included real-time polymerase chain reaction (RT-PCR) with capacity to detect influenza A/H5 virus. All clinical specimens were tested for the presence of influenza A/H5 virus infection using a two-step procedure, involving testing for 'flu A (matrix gene)' followed by a second round for H5. No serological tests were performed at the field laboratory.

Regardless of the results obtained in the field, all specimens were transferred to the WHO Collaborating Centre for Influenza at the National Institute for Medical Research (NIMR), Mill Hill (United Kingdom) for confirmation by RT-PCR for influenza A/H5 virus (Asian lineage), haemagglutination inhibition test, virus isolation in embryonated eggs and MDCK cells, and genomic sequencing.

Box. Case definition of influenza A/H5N1

<u>*Possible case*</u>

- any individual with unexplained axillary temperature ≥38 °C;
- AND one or more of the following symptoms: cough, sore throat, shortness of breath;
- AND resident in an area where influenza A/H5 virus infection has been suspected (i.e. undiagnosed mass poultry die-offs, dead wild birds seen or probable/confirmed human cases from the area).

<u>*Probable case*</u>

a possible case AND that had, within 7 days prior to the onset of symptoms, one or more of the following:

- close contact (within 1 metre) with a probable or confirmed case;
- close contact with sick or dead poultry or with areas heavily contaminated by their droppings;
- close contact with wild birds or with areas heavily contaminated by their droppings;
- consumption of undercooked bird meat or eggs;
- worked in laboratory processing samples (human or animal) suspected of containing influenza A/H5 influenza virus.

<u>*Confirmed case*</u>

- a probable case for whom a specimen tested positive for influenza A/H5 virus infection by PCR.

Results

Epidemiology

<u>*Cluster 1*</u>

Daikyand is a rural, relatively poor village in Salyan district, with around 4800 inhabitants in 800 households. The village is divided in three settlements: Seydler, Daikyand and Salvan [FIGURE].

Influenza A/H5 infection was laboratory confirmed in samples from seven residents of Daikyand settlement. Six were from the same family and one from a neighbouring family, and became ill over a two week period, with dates of onset from 15 February to 4 March 2006. Four of the seven cases died, and this figure is compatible with the case fatality rate observed elsewhere [5]. The median interval between onset of symptoms and death was 9 days (mean: 11.2 days; range: 8–19 days). Patients' ages ranged from 10 to 20 years (mean: 16 years; median: 17 years); five of the seven cases were females aged 15– 20 years.

During the initial interviews, family members denied any contact with sick or dead wild birds or domestic poultry. However, other community members indicated that in February 2006 a massive die-off of swans had occurred in the area and that the family might have had contact with the swans. Following further repeated interviews, relatives of the cases finally revealed that, in February 2006, the family had been involved in de-feathering dead wild swans.

Among the seven cases, the signs and symptoms reported included fever (six), pneumonia (six) cough (five), sore throat (four), shortness of breath (one), stomach pain (one), body aches (one) and meningeal signs (one). All seven cases were admitted to healthcare facilities in Baku during the course of their illness; four were isolated in designated facilities.

<u>*Cluster 2*</u>

On 28 February 2006, a 24 year old male resident in a camp for internally displaced persons in Bayim-Sarov, Tarter district, in central eastern Azerbaijan, developed shortness of breath, weakness, headache, and had a low grade fever (37.5 °C). As his clinical condition deteriorated, he was admitted to hospital. The patient died on 3 March 2006 with diagnosis of reactivated TB. No samples were conserved for examination and the patient was retrospectively classified as a probable case.

On 4 March 2006, his 18 year old sister developed similar symptoms. On 9 March 2006, three days after referral to Baku, she died, with a diagnosis of TB. However, because of the rapid course of her illness, HAI was suspected. Blood obtained post-mortem tested positive for influenza A/H5 virus infection by the NAMRU-3 field laboratory. These findings were later confirmed at NIMR, Mill Hill (United Kingdom).

In February 2006, a die-off of wild birds had been observed in Tarter district, with no reports of sick poultry in the area. Family members denied that the two siblings had been exposed to sick or dead domestic or wild birds. Information provided by community members, however, suggested that the siblings had purchased a dead turkey that was thought to have been ill, and then de-feathered it, prepared it and ate it.

Other districts

The MoH-WHO team visited other districts identified as being at risk for HAI because of reports of die-offs of birds or laboratory confirmation of influenza A/H5 virus infection in wild birds or poultry. A total of 22 individuals, including six deaths, were investigated for HAI in six districts (Khachmaz, Neftchela, Tarter, Sabail, Salyan and Surakhana) and admitted to healthcare facilities. The final case classification includes eight confirmed cases and one probable case. Of the remaining 13 patients for whom HAI was considered, 12 tested negative for influenza A/H5N1 virus infection and one, from whom no samples were obtained, was diagnosed with another condition following thorough clinical assessment.

Laboratory

One hundred and eight clinical specimens (throat and nasal swabs, sera, and rectal swabs) obtained from 20 individuals, in whom a diagnosis of influenza A/H5N1 virus infection was considered and from 32 of their contacts were tested by RT-PCR.

The field laboratory detected seven cases of influenza A/H5 virus infection and NIMR confirmed eight cases. Of the three specimens (throat swabs) that tested negative at the field laboratory and positive at NIMR, two were from patients from whom additional specimens were obtained and subsequently tested positive at the field laboratory. The throat swabs were taken very early in the course of their illness and the viral load was likely to be low. These results are compatible with the lower sensitivity of tests performed by the field laboratory compared to that of tests performed at the WHO Collaborating Centre for Influenza. All positive results obtained by the field laboratory were confirmed by NIMR. No specimens from contacts of patients tested positive for influenza A/H5 virus infection.

Virus strains were isolated from three cases from the cluster in Salyan district. Phylogenetic comparison of H5 haemagglutinins at the WHO Collaborating Centre for Influenza shows that all genes were of avian virus origin and closely related to the sequences of the corresponding genes of other 'Qinghai Lake' H5N1 viruses isolated from avian species (including viruses isolated from a swan in Azerbaijan in February 2006, A/swan/Italy/179/06, and from a swan in the Islamic Republic of Iran, A/swan/Iran/754/2006, and from humans (in Turkey, Iraq and Egypt)) [6,7]. These viruses were thus distinguishable from the H5 haemagglutinin of viruses isolated in East Asian countries, including China, Indonesia and Vietnam.

Case Management

Clinical care at the regional level is limited in Azerbaijan, and mechanical ventilation is genevrally not available at district hospitals. Therefore, 16 individuals for whom diagnosis of influenza A/H5N1 virus infection was considered were transferred to three designated AI referral hospitals in Baku. Patients fulfilling the definition of a probable case following the clinical assessment were admitted to an isolation unit at one of these hospitals. Probable and confirmed cases received oseltamivir (150 mg/day for 5 days), antibiotic and critical care support as needed. Severe cases were given oseltamivir up to 10 days, in accordance with WHO advice [8]. Contacts of confirmed and probable cases, including healthcare workers, were subject to health monitoring by the surveillance teams or in the referral hospitals for seven days after the date of their last known contact. None of the contact persons monitored developed symptoms compatible with HAI.

Discussion

Between February and March 2006, two clusters of HAI with nine cases (eight confirmed and one probable) were identified in Azerbaijan.

The majority of patients developed respiratory symptoms, with the exception of one patient where meningeal signs were predominant, as already observed in Vietnam [9]. Severe hypoxia, caused by the prolonged course of viral pneumonia, appeared to be under-recognised and treated late in children. The early establishment of oxygen saturation monitoring and provision of continuous oxygen therapy is therefore crucial to prevent decompensation and multi-organ failure already observed in cases of influenza A/H5N1 infection elsewhere [10].

Close contact with and de-feathering of infected wild swans were the most plausible exposures to influenza A/H5N1 virus in the Daikyand cluster, although the investigation of the possible source of infection was made difficult because hunting and trading wild birds and their products is illegal, and therefore there was some reluctance in the community affected to disclose information on possible exposures. Repeated interviews of relatives of the cases finally revealed that, in February 2006, all cases had been involved in de-feathering dead wild swans, after a massive die-off of swans had occurred in the area. Swan feathers are used for pillows and can be sold at a good price in the locality. De-feathering birds is often undertaken by women, which explains the predominance of female cases [10,11].

The HAI cluster in Daikyand settlement is the first event where wild birds were the most likely source of influenza A/H5N1 virus infection in humans. However, the difficulties in gathering accurate information, confusion over reported dates of illness onset, and similar experiences with past influenza A/H5N1 outbreaks where multiple plausible exposures were reported, mean that the possibility that limited human-to-human transmission cannot be ruled out.

The economic implications associated with the ban of hunting and trading in wild birds introduced in October 2006, and the fact that the issue of financial compensation related to potential culling of backyard poultry was not addressed in messages to the population may have hindered effective collaboration with the community. Unfortunately, this might have influenced the implementation of control measures as well as the investigation of the source of infection. However, because of door-to-door surveillance undertaken in Salyan and Tarter districts, it is unlikely that additional HAI cases remained undetected.

The rapid establishment of the RT-PCR laboratory in Azerbaijan provided timely and reliable diagnosis of influenza A/H5 virus infection close to the outbreak site overcoming the difficulties of shipping procedures to NIMR for confirmation which were not well established and subject to delay. The specificity of the field laboratory RT-PCR was supported by the absence of false-positive results.

The rapid mobilisation of resources to contain the spread of influenza A/H5 in the two districts was possible because of the close and transparent collaboration between the MoH, WHO and its international partners.

The risk of spread of HAI to western European countries by wild birds is considered to be limited due to widespread awareness that sick and dead wild birds are a potential source of influenza A/H5 virus infection [12].

Note: this manuscript has been adapted from the following WER publication: Human avian influenza in Azerbaijan, February-March 2006. Wkly Epidemiol Rec. 2005;81(18):183-8. http://www.who.int/wer/2006/wer8118.pdf

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Original Articles

Outbreak report

Cryptosporidium outbreak linked to interactive water feature, UK: importance of guidelines

M Jones[1], D Boccia[2,3], M Kealy[4], B Salkin[5], A Ferrero[6], G Nichols[3], JM Stuart[1]

A need for national guidelines relating to interactive water features was highlighted following three outbreaks of cryptosporidiosis in the United Kingdom, all of which were related to public water features. In August 2003 the Health Protection Agency South West of England was notified of an outbreak of cryptosporidiosis associated with an interactive water feature designed for water play within an adventure park. The water feature was implicated following samples with a high coliform count and the presence of faecal coliforms.

A case was defined as any child (younger than 16 years of age) who had visited the park during August and who subsequently had gastrointestinal symptoms and a faecal sample positive for cryptosporidium. Seventy one children were identified in the cohort. This outbreak of cryptosporidiosis was characterised by a very high attack rate (89%), relatively severe in duration (median 8 days) and had a relatively high hospital admission (16% of cases). The epidemic curve was consistent with a point source of infection, which corresponded to the date 80% of the cohort visited the park. This outbreak has similarities to two other cryptosporidiosis outbreaks reported in England in 2003 that involved public water features. These outbreaks raise issues about the operation and maintenance of water-based recreational attractions that very often involve children. The paper reflects on the basic control measures that can be taken and highlights the need for guidelines, especially since such attractions are becoming increasingly common. The Pool Water Treatment Advisory Group has now produced guidelines.

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Key words: cohort, Cryptosporidium, interactive, outbreak

Introduction

In recent years there has been an increase in reported outbreaks of infectious diseases associated with public water features [1-6]. Cryptosporidium has been the principal pathogen in outbreaks in England and Wales [1,2]. However, *Shigella sonnei* [3], norovirus [4] and *Legionella pneumophila* [5, 6] have been implicated in similar outbreaks in other countries.

In August 2003 an outbreak of cryptosporidiosis was identified in children who had recently visited an adventure park in southwest England. The adventure park contained a number of activities involving contact with water (boats, log flume, interactive water features) and contact with farm animals. Following an earlier complaint from a visitor about the water quality of one of the interactive water features designed for water play, water sampling had revealed a high coliform count (2100 coliforms, 40 *E. coli* per cu mm). A cohort study was implemented to check whether there was any epidemiological evidence for a particular source within the adventure park.

Methods

The cohort population included all children (aged less than 16 years) among household members or friends of a probable or confirmed case who had visited the park with a case during August 2003. A probable case was defined as any child who had visited the park during August 2003 and who subsequently had gastro-intestinal symptoms including diarrhoea, blood in stools, vomiting, nausea, or abdominal pain. A confirmed case was defined as a probable case with a faecal sample positive for cryptosporidium. Children who had travelled abroad in the two weeks before the onset of symptoms were excluded from the study.

Cases were identified from laboratory reports to the Health Protection Agency (HPA). A standardised questionnaire was administered over the telephone with an adult in the family of a case. Exposure data included water exposure (contact duration, type of contact, type of water source), animal contact and food consumption. Data were analysed using Epi Info 6.04 [7]. A univariable analysis was run to assess the association between exposures investigated and onset of disease. As only one variable showed an association and as the numbers were small, multivariable analysis was not performed.

Ten-litre grab samples were taken from the various water features within the park for cryptosporidium oocyst detection by South West Water Ltd. Faecal samples from the farmyard animals were also submitted. Oocysts were detected by light microscopy. Positive specimens were sent to the HPA Cryptosporidium Reference Laboratory for genotyping.

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2. European Programme for Intervention Epidemiology Training
3. Health Protection Agency Centre for Infections, London, United Kingdom
4. Peninsula Health ProtectionUnit, Dartigton, United Kingdom
5. Royal Devon and Exeter Hospital, Exeter, United Kingdom
6. East Devon Council, Sidmouth, United Kingdom