Department of Health
Department of the Environment

REPORT OF THE GROUP OF EXPERTS ON CRYPTOSPORIDIUM IN WATER SUPPLIES

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Summary, Conclusions and Recommendations and Government's response

GROUP OF EXPERTS ON CRYPTOSPORIDIUM IN WATER SUPPLIES

SUMMARY

1. Cryptosporidium is a protozoan parasite which has only been recognised relatively recently as a cause of diarrhoea in man. There are numerous species which affect mammals, birds, fish and amphibians but the only species known to infect man is *Cryptosporidium parvum*. In normally healthy individuals, cryptosporidiosis is usually characterised by an acute self-limiting diarrhoeal illness, commonly of 2–3 weeks duration, from which the patient recovers fully. In patients who are immunosuppressed, including those with AIDS, the disease is likely to be much more serious. As yet there is no effective specific treatment.

2. Initially, cryptosporidiosis was thought to be a zoonosis which spread directly from animals to man but it is now recognised that it spreads readily from person to person. Water is also emerging as an important vehicle for the transmission of infection and in the UK and the USA there have already been several outbreaks in which water has been implicated. The prevalence of cryptosporidium in livestock makes it likely that most oocysts in the environment derive from agricultural sources. All types of environmental water can become contaminated and the parasite may be present in low numbers in most waters from time to time.

3. In Britain, the number of reported cases of cryptosporidiosis has been increasing but whether this is a true increase or whether it reflects to a considerable extent greater public awareness and improved detection methods is not known. In 1989, about 9,000 cases were reported. The number of cases resulting from waterborne infection must be less because of other means of spread. When viewed nationally, these waterborne cases represent only a very small fraction of all cases of diarrhoea but their importance lies in the fact that should the mains water become contaminated, many cases of illness may occur in the local area of supply.

4. The water treatment processes in current use were not designed to deal specifically with the problem of cryptosporidial oocysts which are also unaffected by chlorine in the concentrations that can be used. Although treatment processes cannot be relied upon to prevent all oocysts from entering mains water, they are quite effective in dealing with low numbers of the parasite. However, if a water source should exceptionally become heavily contaminated with cryptosporidium, by accidental agricultural pollution or as the result of heavy rainfall and the resultant run-off from agricultural land, or from the discharge of sewage effluent, significant numbers of oocysts may pass into the treated water supply.

5. Efforts are being made to develop a safe and effective disinfectant capable of killing cryptosporidium during the water treatment process. In the meantime, the risk of oocysts passing into the treated supply must be minimised by careful control of catchment areas and by ensuring that current water treatment processes are operated as efficiently as possible.

6. Until more is known about the occurrence of cryptosporidium in the water environment and techniques for its isolation and identification are improved, routine monitoring of treated water for the parasite is not advocated. However, monitoring should be carried out if there has been exceptional contamination of the water source, if there has been a variation from normal operation in the water treatment works or if an outbreak of cryptosporidiosis is suspected in the community. It follows that water companies should develop the capacity to sample and test for cryptosporidium.

7. Even if water treatment processes are operated in accordance with best practice there can be no absolute guarantee that cases of waterborne cryptosporidiosis will not occur. Health authorities, local authorities and the water companies should therefore develop together a clear strategy and contingency plans for the recognition and management of an outbreak of the disease.

8. As a result of the Group's work, a national research programme on cryptosporidium has been established. This should lead to more effective control of cryptosporidium in water supplies. A further Report will be appropriate on the completion of this programme.

9. Copies of the Group of Experts' Report entitled `Cryptosporidium In Water Supplies' may be obtained from HMSO Publications Centre and HMSO Bookshops.

GROUP OF EXPERTS ON CRYPTOSPORIDIUM IN WATER SUPPLIES

TABLE OF RECOMMENDATIONS AND THE GOVERNMENT'S RESPONSES

RECOMMENDATION	RESPONSE
(the numbers refer to the numbering of the recommendations and paragraphs in the Report)	(most of the recommendations and responses apply to the whole of the UK but, to simplify, refer to the organisational arrangements which apply in England and Wales)
THE ORGANISM	
Detection and viability	
There are many gaps in the current state of knowledge about cryptosporidium which limit our ability to devise more satisfactory ways of controlling the impact of the organism on man. Current methods for the detection of oocysts in environmental samples are inefficient and unreliable and likely to lead to an underestimate of the numbers present. Furthermore, these methods are not yet able to distinguish between different species of oocysts or to determine whether the oocysts detected are viable and therefore capable of causing infection.	
Recommendations	
1. Research should be undertaken:	1. A national programme of research has been initiated, co-ordinated by the Drinking Water Inspectorate with the assistance of the Water Research Centre. The research is being funded by the Department of the Environment, the National Rivers Authority, the Foundation for Water Research, Yorkshire Water plc, Anglian Water plc, Severn Trent plc, Southern Water plc and Thames Water plc, and supported by the Public Health Laboratory Service. Organisations undertaking the work are the Scottish Parasite Diagnostic Laboratory, Glasgow; the Moredun Research Institute, Edinburgh; University College, London; the Public Health Laboratory, Rhyl; the Water Research Centre; Strathclyde Regional Council; Lothian Regional Council; Central Scotland Supply Board; and the five water companies listed above.
(i) to improve current methods for the isolation, identification and enumeration of cryptosporidial oocysts in environmental samples; (Chapter 3)	
(ii) to develop methods (for example, specific antibodies and gene probes) for distinguishing the different species of cryptosporidium; (paras 2.3–2.4, 3.11)	The research identified in recommendation 1 is included in the national programme.
(iii) on the viability of oocysts recovered from environmental samples and the survival of oocysts in the environment; (para 2.10)	
(iv) on the ways in which the oocysts may be killed or rendered non-infective, (para 2.11)	
2. Because the techniques involved in analysing environmental samples of cryptosporidium are highly complex and specialised, research programmes should provide for results to be cross-	2. Provision has been made in the national research programme referred to in the response to recommendation 1 for cross-checks to be made as advocated.

checked with one of the specialist laboratories working in this field. (Chapter 3, paras 13.21–13.22)

Pathogenicity

Originally species of cryptosporidium were each thought to be confined to one host but this has been shown not to be the case. However, the only species that is believed to be an important cause of disease in man is *Cryptosporidium parvum*.

Recommendation

3. Research should be undertaken into the pathogenicity of different species of cryptosporidium for man. (paras 2.3, 2.13)

3. The Government accepts this recommendation and will consider how best to take this work forward.

CONTROL OF CRYPTOSPORIDIUM IN THE ENVIRONMENT

Occurrence

Evidence on the occurrence of cryptosporidium in the environment is very limited. It does, however, seem likely that there exists in many waters a background level of oocysts which may be increased by heavy rainfall, agricultural contamination or possibly other factors.

Recommendation

4. Research should be undertaken to determine the levels of oocysts occurring in different types of water sources in the UK including ground water and to seek to determine the origin of these oocysts. (Chapter 4)

4. Surveys of the different types of water source including ground water are included in the national research programme referred to in response to recommendation 1.

Catchment Control

Although small numbers of cryptosporidial oocysts may occur from time to time in most environmental waters, a risk to health is only likely to arise if an unusually high concentration of oocysts occurs in the water source. Should this happen, although water treatment processes will remove large numbers of oocysts, a significant number may still pass through into the final drinking water. Catchment control may reduce the risk of this occurring and is therefore of considerable importance. The prevalence of cryptosporidial infection in livestock makes it likely that the majority of oocysts found in both ground and surface water derive from agricultural sources. Contamination may also arise from the disposal of the products of sewage treatment processes when infection exists in the community.

Recommendations

5. The Ministry of Agriculture, Fisheries and Food and the National Rivers Authority should review advice on the storage and disposal of animal manure in order further to reduce contamination of water courses and ground water, particularly close to water abstraction points. (paras 4.3–4.5)

5. The Government accepts the need to review, in consultation with the NRA, advice on the storage and disposal of animal manure as part of its policy of seeking further to reduce contamination of watercourses. Such a review has been set in hand. The Government has already introduced a number of measures to reduce pollution of water from farm waste. Free initial advice on pollution avoidance is offered by the Agricultural Development and Advisory Service, generous 50% grants are available under the Farm and Conservation Grant Scheme towards the construction, replacement and improvement of farm waste facilities; and new regulations will be introduced later this year setting minimum constructional standards for farm waste containment facilities. The Government will also seek at the next legislative opportunity to increase the maximum fine in Magistrates Courts (Sheriff Courts in Scotland) for polluting controlled waters from the present £2,000 to £20,000.

6. The National Rivers Authority, water companies and those responsible for private supplies, should in collaboration with the Minister of Agriculture, Fisheries and Food, seek ways to reduce contamination of water sources, particularly close to water abstraction points including boreholes and wells. (Chapter 4)

6. The Government endorses this recommendation. The NRA is currently reviewing, and preparing a report on, the impact of farm waste; this includes an assessment of the sources of cryptosporidium from such practices, and the means of reducing them. It will work closely with water companies and those responsible for private supplies and with MAFF to seek ways in which contamination of water sources can be reduced.

7. In the longer term, the Ministry of Agriculture, Fisheries and Food should promote the development of safer methods for the use of manure (solid and liquid) as a fertiliser in agriculture. (paras 4.3–4.5)

7. The Government accepts that it should promote the development of safer methods for the use of manure as a fertiliser in agriculture and currently undertakes research on this subject. This research programme will be reviewed and adjusted, as appropriate, taking account, inter alia, of the Group's recommendations.

8. The Department of the Environment and sewerage undertakers should consider ways of improving sewage treatment processes to effect a further reduction in the pathogens in sewage effluent and sewage sludge. (paras 4.6–4.8)

8. The Government agrees that there is a need to establish the efficiency with which sewage works remove cryptosporidial oocysts from the final effluent. Sewerage undertakers are being consulted on how best this might be done. DOE will be initiating research into the effects of existing sludge treatment processes on the viability of the oocysts.

CRYPTOSPORIDIOSIS IN MAN

Laboratory analysis and reporting

An accurate assessment of the incidence of cryptosporidiosis is difficult because laboratory policies for examining stools are not standardised and in England and Wales, laboratories are not required to report positive findings.

Recommendations

9. As soon as practicable, the Department of Health should designate cryptosporidiosis as a `reportable' disease as defined in the Review of Law on Infectious Disease Control (Department of Health, 1989). (paras 6.1–6.3)

9. The Government will consider this recommendation with the comments received in response to the 1989 consultation document.

10. The Public Health Laboratory Service, in association with other NHS and private laboratories, should review and standardise policies for examining faecal samples for cryptosporidium. (paras 6.1–6.3)

10. The Government agrees with the objective of this recommendation and will consider the scope for achieving some standardisation of policies for testing faecal samples in public and private sector laboratories. The Public Health Laboratory Service has recently revised its own policy and now recommends testing for cryptosporidium in all stool samples from children and young adults with diarrhoeal illness.

Animals as a source of infection

Cryptosporidiosis is normally acquired by the faecal–oral route whereby oocysts excreted in the faeces of an infected animal are ingested by a susceptible person. Livestock are an important reservoir of cryptosporidial infection and direct transmission from animal to man is considered to be a major route of infection. Good personal hygiene can minimise the risk of acquiring the infection.

Recommendations

11. Environmental health officers should issue guidance to farmers, veterinarians, and others who come into contact with livestock on the importance of personal hygiene to protect themselves and their families from cryptosporidial infection. (para 6.7)

11–15 The importance of personal hygiene in reducing the risk of spread of cryptosporidial infection cannot be over–emphasised. The Government is concerned to ensure that those members of the community who may at times be exposed to an increased risk of infection, should receive advice on how to guard against that risk. Copies of the Group's Report are therefore being sent to all health authorities, local authorities, water companies, the Health Education Authority, the Institution of Environmental Health Officers and to a number of organisations representing various recreational interests, with the request that they review their present education programmes and

material to check that these messages are included.

12. Environmental health officers and health educators should issue guidance to schools on the particular importance of personal hygiene for children who are to go on farm visits or have contact with farm animals and on the need to report to the local Consultant for Communicable Disease Control or Medical Officer for Environmental Health any subsequent significant diarrhoeal illness among such children. (para 6.7)

Person to person spread of infection

Person to person spread is now recognised as a major route of transmission of cryptosporidiosis. Normal persion hygiene, including the washing of hands after using the toilet and before eating, reduces the risk of spread of secondary infection in this way. Such precautions are particularly important during an outbreak.

Recommendations

13. In an outbreak of cryptosporidiosis, those responsible should ensure that extra care is taken over personal hygiene, particularly:

(i) in playgroups, nursery schools, day care centres; (para 6.9)

(ii) in hospitals where infected patients and staff may transmit the illness to other patients and staff unless appropriate precautions are taken; (para 6.9)

(iii) in water treatment works which may be contaminated (para 7.29)

14. In an outbreak of cryptosporidiosis, environmental health officers, health educators general practitioners, and others responsible, should actively promote high standards of hygiene in the community especially in the affected families to prevent secondary spread from person to person. (paras 6.9, 12.26, 12.28)

Waterborne infection

Water is now known to be an important vehicle of transmission of cryptosporidial infection and several community outbreaks of cryptosporidiosis in the UK and the USA have been linked with mains water supply. Since both zoonotic and person to person spread are also important, only a proportion of the 9,000 cases reported in Britain in 1989 can be linked with water. When viewed nationally, the number of waterborne cases of cryptosporidiosis comprises only a very small fraction of all cases of diarrrhoea. Their significance lies in the fact that should the mains water become contaminated, many cases of illness may occur in the area of supply. (Recommendations relating to contamination of mains water supply follow from Recommendation 19 onwards). Since most environmental waters may be contaminated with low numbers of oocysts from time to time, there must also be a slight risk of infection directly from these waters.

15. The appropriate Government departments should issue advice to the public that:

(i) water not intended for consumption should not be drunk (for example, by ramblers or campers) without first being boiled;

(ii) people who use rivers, reservoirs and inland waterways for recreational purposes may run a slight risk of contracting cryptosporidiosis from the ingestion of contaminated water. (para 6.11)

Travellers' diarrhoea

Cryptosporidiosis is emerging as an important cause of travellers' diarrhoea.

Recommendation

16. The Department of Health should draw to the attention of doctors that cryptosporidium is a significant cause of travellers' diarrhoea. (para 6.12)

16 and 17. The Government accepts these recommendations and will look to Directors of Public Health and Consultants in Communicable Disease Control to ensure that adequate steps are taken to alert doctors to the potential severity of the infection in immunosuppressed patients and to the need to advise those patients how best to minimise the risk of infection. Doctors should also be informed of the possibility of cryptosporidium as a cause of travellers' diarrhoea.

Clinical aspects

Cryptosporidiosis is an unpleasant diarrhoeal illness from which otherwise healthy people usually recover with supportive treatment in about two to three weeks, although the severity and duration of illness varies considerably. In immunosuppressed patients, particularly those with AIDS, the disease is much more serious and potentially life-threatening.

Recommendation

17. In view of the severity of cryptosporidiosis in immunosuppressed patients, the Department of Health should draw to doctors' attention the need to advise such patients on ways to minimise the risk of contracting the infection. (para 6.21)

Infective dose

Little is yet known about the infective dose of cryptosporidium for man.

Recommendation

18. Research should be undertaken into the minimum infective dose of cryptosporidium for man. (para 6.17)

18. This work is included in the national research programme referred to in the response to recommendation 1.

WATER TREATMENT AND DISTRIBUTION

Current water treatment practices

Water treatment is an integrated operation, although it proceeds through a series of unit processes each of which contributes to the safety of the treated water supply. Each individual process has an essential and defined role, which cannot be changed or set aside without some risk of cryptosporidial oocysts passing into public supply. Evidence from documented outbreaks of cryptosporidiosis suggests that the risk of oocysts penetrating the treatment works increases under certain circumstances.

Recommendations

19. To minimise the risk of cryptosporidial oocysts passing into public water supplies, water companies should pay particular attention to the following:

(i) the operation of rapid filters should avoid sudden surges of flow which may dislodge retained deposits; (paras 7.17–7.22, 10.2)

19. The Government drew the attention of the water industry to recommendation 19(i) following receipt of the Expert Group's interim report.

The Government accepts these recommendations as representing good water works practice and is asking water companies to check that they are adequately covered in their operating manuals.

(ii) rapid filters should not be restarted after shutdown without backwashing; (paras 7.20, 10.2)

(iii) after cleaning, slow sand filters should not be brought back into use without an adequate "ripening period"; (paras 7.25–7.26)

(iv) by–passing of part of the water treatment process should be avoided. (Chapter 7, para 10.3)

20. Water companies should install monitors to make it possible to measure the turbidity on each rapid filter to assist early detection of conditions which may favour the breakthrough of oocysts into the treated water. (paras 7.22, 10.2)

20. The Government accepts this as a prudent measure and is asking water companies to take appropriate action.

21. Water companies should assess the value of coagulant aids to assist flocculation and retention of oocysts. (para 7.15)

21. The Government accepts this recommendation and is asking water companies to consider whether wider use of coagulant aids would improve the removal of oocysts. In doing so it is drawing attention to those coagulant aids which have been approved by the DOE Committee on Chemicals and Materials of Construction for use with Public Water Supplies.

22. Water companies should maintain borehole linings and seals to a high standard. (paras 7.4–7.5)

22. The Government accepts this recommendation as representing good waterworks practice and is reminding water companies that borehole linings and seals should be maintained to a high standard.

Developments in water treatment

When operated optimally and assuming no more than background levels of oocysts in raw water sources, current water treatment processes appear able to prevent contamination of water supplies by cryptosporidial oocysts. Nonetheless, current practices cannot guarantee the removal of all oocysts and since the infective dose of cryptosporidium to man may be very small, this is a cause for concern.

Since the standard method for disinfecting treated water supplies by chlorination is ineffective against cryptosporidial oocysts, alternative disinfectants are required, particularly to treat recycled waste water from the water treatment process. There may also prove to be scope for changes at water treatment works to increase the removal of oocysts, for example by improvements to coagulant methods utilising the electrical and other surface properties of the oocysts, and by using different types of filters.

Recommendation

23. Research is required into:

(i) the effect of ozone and other disinfectants, including chlorine dioxide and the use of ultraviolet light on cryptosporidial oocysts and the potential for the use of these agents in water treatment, particularly in the treatment of recycled water from the water treatment process; (paras 7.27–7.34)

23. Research recommended at 23(i) and (ii) has been included in the national research programme referred to in the response to recommendation 1.

The Government accepts recommendation 23(iii) and is considering ways of initiating the research.

(ii) the electrical and other surface properties of the oocyst and the scope for applying the knowledge gained in water treatment processes; (para 7.14)

(iii) the use of different types of filters capable of trapping oocysts. (paras 7.17–7.19)

Disposal of contaminated sludge and process waste water

If a water treatment works exceptionally becomes contaminated with cryptosporidial oocysts, process waste water and sludge may contain very high numbers of oocysts. Eventually it is hoped that methods will be found to kill the oocysts and thereby remove any risk from recycling washwater or from returning large numbers of oocysts in sludge to land. In the short term, water companies must make arrangements for the disposal of sludge and washwater to minimise the risk of further contamination of water courses.

Recommendations

24. Water companies should make arrangements with the appropriate authorities, including the National Rivers Authority, to dispose of sludge, which has become contaminated with oocysts, to designated sites where subsequent contamination of water courses is avoided. (para 7.28)

24. The Government agrees and is asking water undertakers to discuss appropriate arrangements with waste collection and disposal authorities, Her Majesty's Inspectorate of Pollution and the NRA.

25. Water companies should establish with the National Rivers Authority contingency plans for the disposal of process waste water from the treatment process when it is contaminated with oocysts. (para 7.29)

25. The NRA will discuss with water companies, on a regional basis, the best means of disposing of waste water from treatment processes when it is contaminated with oocysts.

Distribution system

The normal management of the distribution network should involve no hazard from cryptosporidial oocysts. Contamination may occur in an emergency when reduced water pressure may permit ground water including possibly sewage leaked from sewers to penetrate into the distribution system. Routine disinfection with chlorine following an emergency or during planned repair and replacement of mains as set out in the existing Operational Guidelines*, cannot provide a safeguard against contamination with cryptosporidial oocysts although it is effective against other pathogens.

Recommendation

26. Water companies and the Drinking Water Inspectorate should keep under review the existing guidelines* for the repair and maintenance of distribution systems and should modify them whenever possible to take advantage of new methods of sampling and disinfection as these become available. (para 7.35–7.36)

26. The Government accepts this recommendation. The Drinking Water Inspectorate will liaise with water companies to keep the guidelines under review, and modify them when appropriate.

Service reservoirs

Most water distribution systems contain service reservoirs, some of which may be grass-covered and grazed by livestock.

Recommendation

27. In accordance with current guidelines*, water companies should ensure that the grazing of livestock is not practised on grass-covered service reservoirs. (para 7.37)

27. The Government agrees and is reminding water companies that grass-covered service reservoirs should not be grazed by livestock.

Footnote* Operational Guidelines for the Protection of Drinking Water Supplies (WAA Sept. 1988.)

POINT OF USE DEVICES

Point of use devices are sometimes used in an attempt to improve the quality of drinking water, whether from private or public supplies. Reliable data on the efficiency and safety of these devices are lacking.

Recommendations

28. Research should be undertaken:

(i) on the efficiency of point of use devices in removing contaminants, including cryptosporidial oocysts;

28(i). DOE will shortly let a contract for this research.

(ii) on the possible hazards that may be caused through the retention by point of use devices of harmful organisms or substances. (Chapter 8)

28(ii) The Government accepts this recommendation and is considering ways of getting research underway.

29. The Department of the Environment should promote the establishment of a testing protocol to set standards for point of use devices. (Chapter 8)

29. The Government accepts this recommendation.

MONITORING FOR CRYPTOSPORIDIAL OOCYSTS

Monitoring strategy

The provisional method approved for the sampling, concentration and identification of cryptosporidial oocysts is inefficient and unreliable, particularly at low levels. Furthermore it is not yet possible to distinguish the different species of cryptosporidium or to determine the viability of any oocysts detected. Given these shortcomings in the methodology and until more information is available from current research about the occurrence of cryptosporidium in water sources, the Group does not feel able to recommend that water companies should undertake routine monitoring of treated water for cryptosporidium. However, evidence from the documented outbreaks of cryptosporidiosis points to an increased risk of oocyst contamination following accidental agricultural pollution of source water or following a period of exceptionally heavy rainfall after a dry spell, especially when associated with recent spreading of slurry on agricultural land in the catchment area. The risks appear slightly higher in the spring and autumn. It also seems likely that water supplies are more susceptible to oocyst contamination when there has been a major change in water treatment process or, exceptionally, when a normal treatment process (such as a slow sand filter) has to be by-passed for operational reasons.

Recommendations

30. In association with local agricultural interests, the National Rivers Authority and health and local authorities, each water company should develop a strategy for monitoring treated water supplies which takes into account the importance of local environmental and agricultural factors in different catchment areas. (paras 10.4–10.6)

30. The Government endorses this recommendation. The Drinking Water Inspectorate will check upon the action taken by water companies in England and Wales and the effectiveness of their liaison with the other bodies mentioned.

31. Each water company should regularly review its monitoring strategy. (para 10.6)

31. The Government is recommending this action to water undertakers.

32. In formulating a monitoring strategy, water companies should consider the desirability of monitoring treated water for cryptosporidial oocysts in the following circumstances:

32. The Government endorses the recommendation and is requesting water companies to take appropriate action. The Drinking Water Inspectorate will check upon the action taken by water companies in England and Wales.

(i) following exceptional contamination of water sources by agricultural pollution or sewage;

(ii) for a transitional period when a significant planned change in water treatment processes or distribution network takes place;

(iii) when, for exceptional operational reasons, the water treatment process is operating abnormally;

(iv) when turbidity readings or levels of indicator or other organisms deviate from the normal ranges;

(v) if an outbreak of cryptosporidiosis in the community is suspected as being linked to a water supply. (para 10.7)

Monitoring in an outbreak

If a waterborne outbreak of cryptosporidiosis is suspected, water companies will need to establish an investigative programme of monitoring to determine whether oocysts are present at any stage in the water supply system.

Recommendation

33. If a waterborne outbreak of cryptosporidiosis is suspected, the water company should establish an investigative programme for monitoring for cryptosporidial oocysts as soon as possible and representative samples for examination should be taken from:

33. The Government endorses the recommendation and will ask water companies to make appropriate preparation. In any outbreak, in England or Wales in which there are grounds for believing that infection may be waterborne, the Drinking Water Inspectorate would check upon the monitoring being undertaken by water companies.

(i) the source waters;

(ii) the surrounding catchment areas and mud deposits in reservoirs, especially if there is evidence of the spreading of manure;

(iii) treatment works including backwash water, sludge, filter beds and any recycled water;

(iv) pipelines and service reservoirs, especially if information on the geographical spread of the disease indicates an affected area smaller than the total area served by the water supply;

(v) points in the distribution network where contaminated water may still remain even after it has been flushed out of the rest of the system. (para 10.8)

Implementation

Although routine monitoring is not advocated at the present time, water companies need to be ready to implement a programme of monitoring should the need arise.

Recommendations

34. Water companies should have trained staff and the equipment available to sample water supplies for cryptosporidial oocysts and should make arrangements in advance so that these samples can be examined expeditiously when required. These arrangements must include provision for independent sampling and for cross-checking of the results of examination by independent laboratories with specialist experience. (paras 10.10, 12.32)

34. The Government endorses the recommendation and is requesting water companies to take appropriate action. The Drinking Water Inspectorate will check upon the action taken by water companies in England and Wales.

35. To ensure quality control, the Public Health Laboratory Service should promote the development of a national accreditation scheme for laboratories testing for cryptosporidium. (para 10.10)

35. The Government fully endorses the need for proper quality assurance in laboratory testing and the desirability of an effective external quality assessment scheme. The Public Health Laboratory Service have indicated that they would be willing to promote the development of a national quality assessment scheme for laboratories testing for cryptosporidium and consideration will be given to this proposal.

EPIDEMIOLOGICAL STUDIES

Whenever an outbreak of cryptosporidiosis is recognised, it is clearly important that the source of infection is identified as soon as possible. Water may be suspected as a possible route of infection if epidemiological surveys reveal infection concentrated in particular localities served by a common water supply or if a significant number of primary cases are occurring among adults.

Recommendation

36. When an outbreak of cryptosporidiosis is recognised, the Director of Public Health should ensure that:

(i) all medical laboratory services in the affected and surrounding areas consider the desirability of screening all stool samples for cryptosporidial oocysts; (para 10.11)

(ii) epidemiological investigation is undertaken at an early stage to identify possible sources of disease and modes of transmission; (para 10.12)

(iii) where epidemiological survey establishes a link with pet animals, specimens are taken from these animals to ensure that they are not a source of transmission; (para 10.13)

(iv) the Ministry of Agriculture, Fisheries and Food Veterinary Investigation Centres are consulted to establish information on significant recent diarrhoeal disease in livestock of farms within the local water supply catchment or upstream of an abstraction point; (para 10.13)

(v) consideration is given to the establishment of case control studies. (para 10.14)

36. The Government accepts the need for adequate epidemiological investigation whenever an outbreak of cryptosporidiosis is recognised. Directors of Public Health and Consultants in Communicable Disease Control will be asked to ensure that careful consideration is given to the good practice outlined in this recommendation.

INVESTIGATION AND MANAGEMENT OF AN OUTBREAK

Health authorities, local authorities and water companies already have policies and plans for the recognition and control of outbreaks of communicable disease, which should include arrangements to be made when water is suspected as a vehicle for the transmission of infection in the community. However, it is most important that close liaison is maintained routinely between health and local authorities and water companies to detect at a very early stage those situations in which the community may be at risk from infection. Should an outbreak occur, close cooperation at all times between these organisations is essential.

Recommendations

Plans

37. Health authorities, local authorities and water companies should review the adequacy of their existing emergency plans for dealing with a suspected waterborne outbreak of cryptosporidiosis and should together draw up an Outbreak Control Plan for the control of infection in the community on the basis of the best practices outlined in

37–46. Copies of this report are being sent to all health authorities, local authorities and water companies, and they are being asked to review existing emergency plans for dealing with a suspected waterborne outbreak of cryptosporidiosis in the light of these recommendations. The Government strongly supports the need for close

Chapter 12. (Chapter 12)

liaison and co-operation between health authorities and local authorities and water companies, both routinely and in an outbreak situation, to protect the public from waterborne infection.

38. Arrangements should be made to ensure that the plans are regularly tested and kept up-to-date and that any action recommended following an outbreak is carried out. (para 12.5)

39. Each of the plans should set out clearly:

(i) the statutory duties of the organisation and the responsibilities of named individuals; (para 12.7)

(ii) the communication network to operate both routinely and on an emergency basis within the organisation and with other organisations such as the Ministry of Agriculture, Fisheries and Food Veterinary Investigation Service and the National Rivers Authority. The chief officers involved should be the Director of Public Health, the Chief Environmental Health Officer and the water company's Technical Director or Director of Operational Services or equivalent; (paras 12.8-12.10)

(iii) the options available for the control of an outbreak and the action that would be required to implement them; (paras 12.17-12.20)

(iv) guidelines on supplying information to the media and the public and the practical arrangements necessary to ensure speedy action. (paras 12.21-12.24)

Outbreak Control Team

40. The Outbreak Control Plan should provide for the establishment of an Outbreak Control Team which includes members from the health authority, local authority and water company, to be called into being by the Director of Public Health should he suspect an outbreak. (para 12.11, 12.14)

41. Members of the Outbreak Control Team should be of such seniority and expertise that they are able to commit the organisations they represent on action. (paras 12.7, 12.13)

42. The terms of reference of the Outbreak Control Team should include the following:

(i) to review the evidence for an outbreak and the results of epidemiological and microbiological investigations;

(ii) to decide on control measures and to determine

the necessary commitment of personnel and resources;

(iii) to make on-going arrangements for informing the public;

(iv) to decide when the outbreak has finished;

(v) after the outbreak, to prepare for submission to the Drinking Water Inspectorate and the Department of Health and to the health authorities, local authorities and water companies concerned, its report of the outbreak containing recommendations for further action. (para 12.15)

43. The Outbreak Control Team should meet frequently throughout the outbreak and should have full administrative and secretarial support. (para 12.16)

44. The Outbreak Control Team should decide on appropriate control measures, including whether to advise the public to boil all water used for drinking and culinary purposes. (paras 12.17–12.20)

45. Because of the complexities of issuing advice to boil water, the action required should be preplanned and periodically tested and evaluated by health authorities, local authorities and water companies. (para 12.24)

46. Information for the public and media during an outbreak should be controlled from one location to be agreed by the Outbreak Control Team. (paras 12.21–12.24)

Health authority plan

47. The health authority plan should specifically include:

(i) an enhanced surveillance system for the early detection of cases of cryptosporidiosis in the community, based on reports from laboratories;

(ii) arrangements to be made to alert general practitioners of a suspected outbreak, with the request that they inform the Consultant for Communicable Disease Control of all cases of diarrhoea and that they promote high standards of hygiene in the community, especially in the families affected to prevent secondary spread from person to person;

(iii) arrangements to inform and advise the staff of

47. Directors of Public Health and Consultants in Communicable Disease Control will be asked to ensure that consideration is given to these good practice guidelines when formulating health authority arrangements for the control of cryptosporidiosis in the community.

NHS hospitals and other NHS premises, private hospitals and nursing homes and the support teams for immunosuppressed persons in the community, such as those with AIDS and those on renal dialysis;

(iv) arrangements for additional medical and nursing staff to be made available and beds designated in the event that significant numbers of patients need to be hospitalised in a large community outbreak;

(v) a review of the implications for NHS hospitals and other health premises of advice to boil water. A survey will need to be carried out in advance to ensure that adequate supplies of boiled water or safe alternative supplies can be provided if necessary. (para 12.25–12.26)

Local authority plan

48. The local authority plan should specifically include:

(i) arrangements to keep the authority informed about the quality of water supplies;

(ii) arrangements to inform and advise the public, the institutions, including schools and residential homes, for which it is responsible, the food and catering industry and other commercial organisations, about an outbreak and on the action to be taken;

(iii) a review of the implications for the institutions for which it is responsible, the food and catering industry and other organisations of advice to boil water. (paras 12.27–12.29)

48. The Government accepts this recommendation and is asking local authorities to ensure that their emergency plans include the arrangements specified.

Water company plan

49. The water company plan should specifically include the action to be taken in the event of a suspected waterborne outbreak of cryptosporidiosis;

49. The Government accepts this recommendation and is recommending this action to water undertakers.

(i) to establish the boundaries of the water supply zone under suspicion;

(ii) to provide the Outbreak Control Team with up-to-date information (including maps) on water sources and distribution to the affected population;

(iii) to investigate the possibility of source pollution, for example, by incidents of pollution upstream of the raw water intake, liaising with the National Rivers Authority, the Ministry of Agriculture, Fisheries and Food Veterinary Investigation Service, practising veterinary officers and farmers as appropriate, to establish what relevant farming practices have recently taken place and whether there has been an outbreak of cryptosporidiosis in livestock in the catchment area;

(iv) to establish whether any significant operational changes have taken place at the water treatment works, for example, by-passing of some element of treatment, or change in coagulant used;

(v) to establish by scrutinising records, whether there have been any unusual variations from normal operating conditions, for example:

(a) changes in raw water, for example, high turbidity, high colour, unusually high or low pH, or changes in its microbiological quality;

(b) coagulation control lost or difficult;

(c) higher than usual turbidity of filtrate;

(d) filter runs of abnormal length;

(e) unusually high throughputs, or unusually rapid changes in throughput;

(f) changes in the microbiological quality of treated water;

(g) unusually high demands for chlorine;

(vi) to establish as soon as possible an investigative programme of monitoring for cryptosporidial oocysts;

(vii) to eliminate oocysts from water treatment processes following the checklist in table 12.1.

(viii) to provide alternative supplies to any priority groups identified by the health authority and local authority where such action is agreed by the Outbreak Control Team to be necessary. (paras 12.30-12.34, table 12.1)

FUTURE RESEARCH

Many of the topics identified by the Group as requiring research have already been included in the current national research programme. The programme will not provide answers to all the outstanding questions relating to cryptosporidium and further research will be required.

Recommendations

50. The Department of the Environment and water companies should promote research into the development of a disinfectant capable of killing cryptosporidial oocysts, particularly into the use of ozone. (paras 13.17–13.19, 13.25)

50. Research into the development of disinfectants is included in the national research programme referred to the response to recommendation 1.

51. The Department of Health should promote research into the development of a specific treatment for cryptosporidiosis. (para 13.25)

51. Much work has already been undertaken to develop a specific antibiotic treatment for cryptosporidiosis. The Government will consider whether any further research effort is needed in this area.