Managing cryptosporidium in swimming pools

SHPN guide to using the external guidance

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Overview

This Scottish Health Protection Network (SHPN) guide should be used alongside the external guidance that it relates to.

This guide covers the use of the Public Health Wales (PHW) Guidance for the investigation of Cryptosporidium linked to swimming pools in Scotland.

This external guidance has been approved for use in Scotland by the SHPN Guidance Group (SHPN-GG).

Intended audience

This guidance is for health protection professionals only.

Other people who require advice should contact their local health protection team.

What the guidance covers

In scope

The guidance is for investigating and managing Cryptosporidium in swimming pools only.

This guidance covers:

- epidemiology of Cryptosporidium in Scotland
- key prevention measures
- identifying cases and clusters
- convening an incident management team (IMT)
- using the inspection checklist risk assessment
- sampling and laboratory processes in Scotland

Out of scope

This guidance does not cover Cryptosporidium investigations related to swimming in open water – such as seas, lakes and rivers.

Guide for use in Scotland

This guide was developed by a Guidance Development Group (GDG).

The guide has been approved for use in Scotland by the SHPN Gastrointestinal and Zoonoses Topic Group (GIZ-TG) and the SHPN Guidance Group (GG) through the agreed review and adoption process.

Cryptosporidium epidemiology in Scotland

Cryptosporidiosis is a parasitic disease caused by Cryptosporidium species.

The two most common species to infect humans in the UK are:

- Cryptosporidium hominis
- Cryptosporidium parvum

Cryptosporidium can be acquired through a variety of food and environmental exposures as well as through human and animal contact.

The highest incidence rates continue to be seen in young children (aged 0 to 4 years).

There have been 11 Cryptosporidium in swimming pools situations recorded in Scotland on HPZone between January 2014 and July 2023.

Refer to the PHS Gastrointestinal and Zoonoses Biennial Report for more information.

Prevention

Full prevention measures are outlined in the PHW Guidance and we present a summary of key messages for the public and pool operators.

<details>
<summary>Swimming pool users – key messages</summary>

Diagnosed or suspected illness

- People who have had a laboratory diagnosis of cryptosporidiosis must not enter swimming pools for 2 weeks after the symptoms have ceased.
- People who have had diarrhoea (those who are not a confirmed cryptosporidiosis case) must not enter swimming polls for 48 hours after symptoms have ceased.
</details>

Hygiene measures

- Shower thoroughly with soap before using the swimming pool. Make sure there is no faecal matter adhering to the skin.
- Always wash hands after changing nappies or using the toilet. Take children to the toilet before swimming and offer frequent toilet breaks.
- Older children and adults with continence issues should wear appropriate swim nappies.
- Do not swallow the swimming pool water and discourage children from deliberately putting water in their mouths.

Babies and toddlers

- Babies and toddlers must wear waterproof double wrap swim nappies when using the swimming pool. They should never swim in the nude or wearing ordinary nappies.
- Please use the nappy-changing facilities provided. Nappies must never be changed in the swimming pool areas.

Swimming pool operators – key messages

Cryptosporidium is resistant to chlorine disinfection.

Keeping the parasite out of the pool, and removal from the water through effective filtration are key control measures.

- Promote healthy swimming behaviours as outlined above.
- Follow the Pool Water Treatment Advisory Group code of practice.
- Ensure adequate pool water circulation, coagulation and filtration to remove contaminants at all times regardless of outbreak status.
- Deal with contamination promptly and appropriately.
- Have good filter backwashing practice and procedures.
- Ensure adequate pool design and construction to prevent cross connections and spread of contamination.
- Have circulation, filtration and treatment for learner pools that is separate from the main pool.
- Pools with supplementary disinfection by ozone or ultraviolet (UV) light may offer increased disinfection of Cryptosporidium as the water passes though the treatment plant if the dose and contact time are sufficient.

Non-mains-fed water sources

The Guidance Development Group have produced this additional advice for non-mains fed water source swimming pools in Scotland.

If non-mains-fed water is being used to supply a pool, protection of the source from faecal contamination from grazing animals is vital.

Private water sources

Private water sources should meet drinking water quality standards if they are being used to supply a swimming pool.

The quality of water from private supplies is more likely to fluctuate than mains water as they are more likely to be impacted by:

- weather (such as heavy rainfall events)
- sewage overflows
- animal movements

Water sampling

Annual water samples taken by the local authority for regulated private water supplies may not be representative of the water quality at the time of failure.

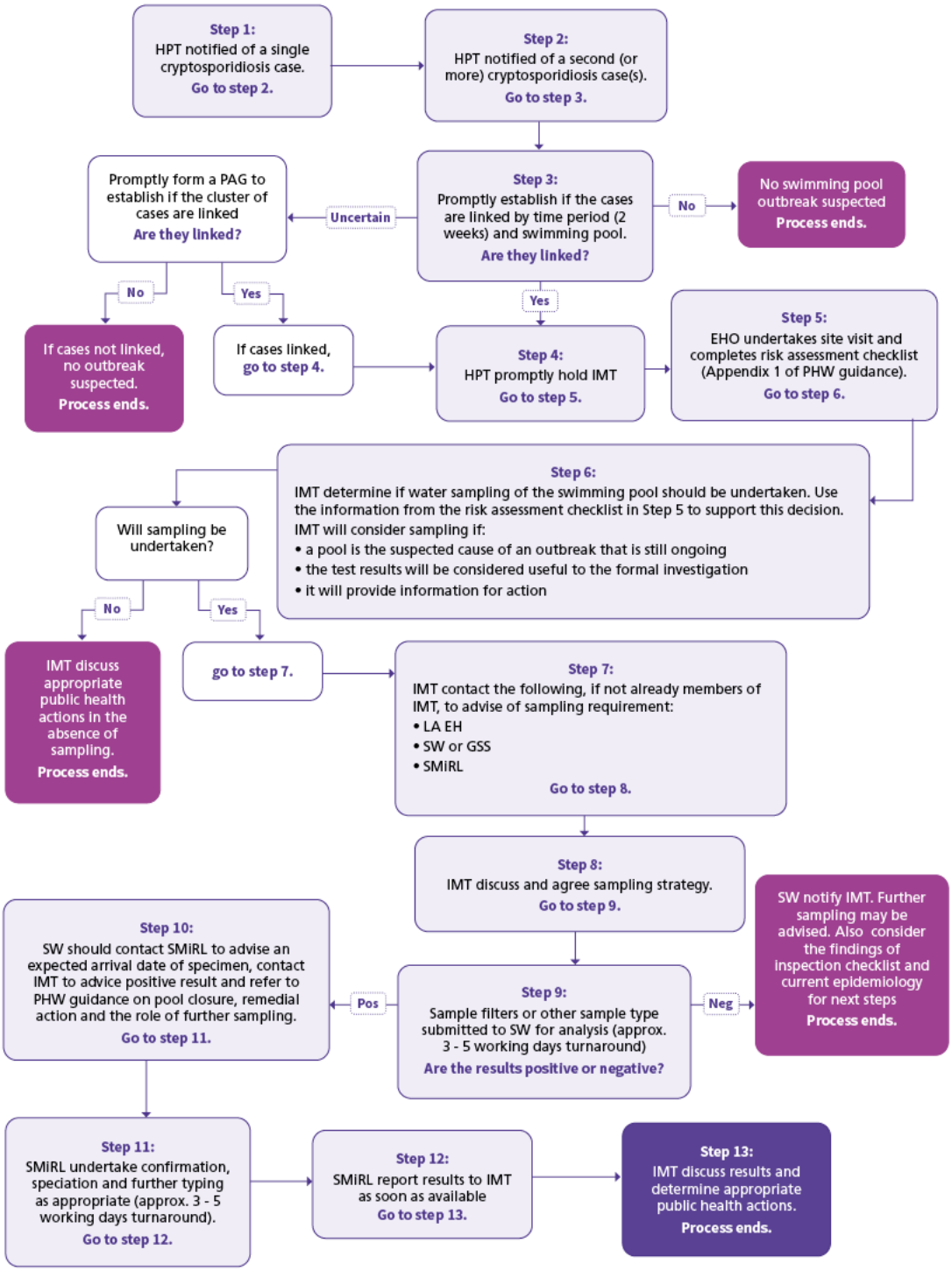
Any investigations should include a:

- review of their private water supply risk assessment
- visit to the water source to assess this possible contamination and water quality

Pathway for investigation

This is a generic overview of the process and is not prescriptive.

Figure 1: Overview of the Cryptosporidium notification, public health investigation and sampling process in Scotland



Local risk assessment and professional judgement may result in deviations to the process outlined here.

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Overview of the Cryptosporidium notification, public health investigation, inspection and sampling process in Scotland PDF | 61.4KB

Full text version

Step by step description of the pathway

Step 1

HPT notified of a single cryptosporidiosis case.

Step 2

HPT notified of a second (or more) cryptosporidiosis case(s).

Step 3

HPT promptly establish if the cases are linked by time period (2 weeks) and swimming pool?

- **If yes,** go to step 4.
- **If no,** no outbreak suspected, process ends.
- **If uncertain,** promptly consider forming a Problem Assessment Group (PAG) to establish if the cluster of cases are linked.
  - If they are linked, go to step 4.
  - If not, process ends.

Step 4

HPT promptly convene an Incident Management Team (IMT) and go to step 5.

Step 5

Environmental Health Officer (EHO) undertakes site visit at the swimming pool premises and completes the checklist (available in Appendix 1 of the Public Health Wales Guidance) to inform the risk assessment.

Go to step 6.

Step 6

IMT determine if water sampling of the swimming pool should be undertaken. The information gathered from the site visit and risk assessment checklist will support this decision.

The IMT will consider sampling if:

- a pool is the suspected cause of an outbreak that is still ongoing
- the test results will be considered useful to the formal investigation
- it will provide information for action

Will sampling be undertaken?

If yes, go to Step 7

If no, the IMT will discuss the appropriate public health actions in the absence of sampling. Process ends.

Step 7

IMT to contact the following, if not already members of IMT, to advise of sampling requirement:

- local authority environmental health team
- Scottish Water (SW) or Glasgow Scientific Services (GSS)
- Scottish Microbiological Reference Lab (SMiRL)

Go to step 8.

Step 8

IMT discuss and agree sampling strategy. Go to step 9.

Step 9

Sample filters or other sample type submitted to SW for analysis. Results should be available in 3 to 5 working days.

Are the results positive or negative?

If negative result, SW notify IMT and further sampling may be advised. The IMT should consider the findings of inspection checklist and current epidemiology for next steps. Process ends.

If positive result, go to step 10.

Step 10

Scottish Water should:

- contact SMiRL to advise an expected arrival date of specimen
- contact IMT to advise of positive result
- refer to PHW guidance on pool closure, remedial action and the role of further sampling

Go to step 11.

Step 11

SMiRL undertake confirmation, speciation and further typing as appropriate. Results should be available in 3 to 5 working days. Go to step 12.

Step 12

SMiRL report results to IMT as soon as available. Go to step 13

Step 13

IMT discuss results and determine appropriate public health actions. Process ends.

Identification of clusters or cases

Identification by HPT

In Scotland, clusters and outbreaks are identified and managed by NHS health protection teams (HPTs).

Cryptosporidium isolated from human samples is a notifiable organism under the Public Health etc. (Scotland) Act 2008, and HPTs should be notified of human cases by laboratories.

Routinely, each notified case to the HPT will be contacted to provide surveillance information. Local arrangements should be in place for gathering surveillance information.

This supports identification of the source of infection and epidemiological links between other cases.

Update HPZone

Cases, clusters and outbreaks are recorded on HPZone.

Where it has been identified that a cryptosporidiosis case has used a swimming pool in the 10 days preceding symptom onset and/or whilst symptomatic, the details of the swimming pool(s) should be added as a specific context on HPZone.

Adding it as a specific context also supports with identifying potential linked cases that are from another NHS board, but have also visited the same swimming pool.

The public health follow-up of isolated cases of Cryptosporidium is usually undertaken during office hours. However, when an outbreak of Cryptosporidium associated with a swimming pool is suspected, urgent actions may be required.

Problem assessment group (PAG)

A PAG may be formed if HPTs identify:

- an increase in cryptosporidiosis cases above background levels and,

- the cluster of cases are linked through case interview or through other additional information - for example:
  - same postcode area
  - all reporting swimming but the name of the swimming pool not included in the surveillance form
  - similar demographics

A PAG should be set up in line with the Management of public health incidents (MPHI)– guidance on the roles and responsibilities of NHS-led incident management teams (MPHI guidance).

Convening an Incident Management Team (IMT)

A PAG may determine that convening an Incident Management Team (IMT) is necessary.

As the management of any swimming pool associated cryptosporidiosis outbreak is likely to constitute a public health incident involving multiple stages of investigation and a range of partners, it would usually be appropriate to establish an IMT:

- once a cluster is suspected
  or
- there is evidence of an outbreak (two of more linked cases over the same two-week time period)

It is the responsibility of the NHS board to call an IMT.

This multi-disciplinary, multi-agency group would then take on responsibility for investigating and managing the incident in line with the MPHI guidance.

This provides support to the IMT when preparing and dealing with a public health incident.

IMT Membership

Key members of the IMT should include representation from:

- NHS HPT
- PHS gastrointestinal and zoonoses (GIZ) team
- local authority Environmental Health Officer (EHO)
- Scottish Water (SW) or public analyst laboratory – for example, Glasgow Scientific Services (GSS)
- Scottish Microbiology Reference Laboratory (SMiRL)
- NHS board/local authority communications team

Membership is not limited to the above agencies.

IMT decision to sample for Cryptosporidium

The decision to sample for Cryptosporidium should be taken by the IMT convened to manage the outbreak. This decision will be partly informed by the information gathered in the risk assessment checklist.

The risk assessment checklist is appendix 1 of the PHW guidance. This checklist should be completed by an EHO during a site visit to the swimming pool.

Cryptosporidium is not a routine test parameter for swimming pools. Sampling for Cryptosporidium should be considered if:

- a pool is the suspected cause of an outbreak that is still ongoing
  and
- the test results will be considered useful to the formal investigation
  and
- it will provide information for action

It should be noted that often a contamination event will have taken place some time ago, and in a pool with efficient water treatment, the parasite may have been removed.

Sampling for Cryptosporidium may be indicated particularly where filtration is sub-optimal and filter beds are suspected of being contaminated.

Consider sampling filter sand and/or backwash can in this instance.

Sampling strategy and requests

Once a decision is taken by the IMT to test the swimming pool, the following groups should be notified (if not already members of the IMT).

- The relevant organisation for provision of sampling equipment as per local pathways, for example, a public analyst laboratory such as GSS, or SW.
- The IMT are advised to contact both Scottish Water and Glasgow Scientific Services to check whose equipment is available for use and can facilitate sampling the quickest.
- Scottish Water for analysis of samples.
- Environmental Health Officer.
- Scottish Microbiology Reference Laboratory.

The IMT should discuss and agree an appropriate sampling strategy.

Sampling pool water requires large-volume filter samples to be taken using specialist equipment.

Other sample types may also be informative – for example filter sand or backwash.

When developing the sampling strategy, the IMT should consider potential challenges – for example, access to power supply or the location being sampled having low pressure.

Full guidance on sampling for Cryptosporidium is available in Section 5.11 of the PHW guidance for the investigation of Cryptosporidium linked to swimming pools.

Arranging sampling

All HPTs should have an agreement in place on how they would arrange water sampling if required by an IMT.

SW and GSS both offer a sampling service.

SW and GSS can hire the sampling equipment to the local authority environmental health departments to carry out the sampling.

Depending on resource, SW or GSS may undertake the sampling.

Documented standard operating procedures and worksheets for recording all the relevant sampling information will be provided by SW or GSS.

Accessing sampling equipment

Sampling equipment from SW and GSS can be accessed Monday to Friday between 9am and 5pm.

An out of hours service to access sampling equipment is not available.

Contact information for arranging sampling

Glasgow Scientific Services	Phone: 0141 276 0610 Email: GSS@glasgow.gov.uk or gss.samples@glasgow.gov.uk
Scottish Water	Phone: 01382 933 899 (ask for Scientific Services) Email: ScientificServicesProjects@scottishwater.co.uk

Location of sampling equipment

Glasgow Scientific Services	Colston Laboratory 64 Everard Drive Glasgow G21 1XG
Scottish Water	Juniper House Heriot Watt Research Park

Edinburgh
EH14 4AP

and

31 Henderson Drive
Longman Road North
Inverness
IV1 1TR

Cryptosporidium filter cartridges

Cryptosporidium filter cartridges are supplied by SW.

SW can arrange for filter cartridges to be sent to the location of any SW Depot. Discuss this with SW.

To arrange uplift of fresh cartridges, call 01382 933 899.

Sampling advice

Refer to Section 5 of PHW Guidance for the investigation of Cryptosporidium linked to swimming pools for detailed advice on sampling.

Laboratory testing for Cryptosporidium

Sample filters should be submitted by the sampler to SW for detection of oocysts.

Samples collected by GSS are also submitted to SW for analysis.

Back wash samples and sand samples can also be submitted to SW for detection of oocysts if required.

On completion of the sampling procedure, the sampler should contact SW to alert the laboratory to the arrival of the samples and arrangements for drop-off.

Positive sample results

Positive samples will be forwarded from SW to SMiRL in Glasgow for confirmation, speciation and further typing as appropriate.

Subtyping by sequencing the GP60 gene is helpful for investigating clusters of cases and in outbreaks.

In Scotland, samples are tested by SMiRL using GP60 assay and two MLVA assays (under validation).

SW should contact the SMiRL to advise of the positive result and expected arrival date of the specimen.

Contact SMiRL

In hours	The laboratory opening hours are 9am to 5pm, Monday - Friday. • Telephone: 0141 242 9633 • Email: glasgowsmrl@nhs.scot.
Out of hours	Outwith these hours, please alert ggc.northmicrobiology@nhs.scot
Forwarding the post-IMS eluate	SW should forward the post-IMS eluate to the SMiRL at the address below clearly marking the sample 'OUTBREAK'. Scottish Microbiology Reference Laboratories Level 5, New Lister Building Glasgow Royal Infirmary Alexandra Parade, Glasgow G31 2ER

The SMiRL will retain all positive DNA extracts from outbreak investigations indefinitely.

Communicating results

Any results should be communicated by SW and SMiRL laboratories to the IMT as soon as they are available.

Typically, once the request has been received for sampling to take place, sampling, analysis and reporting by SW should take approximately 3 to 5 working days.

Samples which have been forwarded by SW to the SMiRL for confirmation, speciation and typing will be reported within 3 to 5 working days.

IMT control measures

Section 5 of the PHW guidance contains detailed information on control measures for the IMT to consider. This includes information on:

- guidance on pool closure and re-opening
- swimming pool assessment and actions
- outbreak investigations
- public health messaging using a targeted and timely approach

Communications

Information for the public, including a template letter for cases, is provided in Appendix 6 of the PHW Guidance for the investigation of Cryptosporidium linked to swimming pools.

HPTs can adapt this letter for use in Scotland by amending references and weblinks from NHS Wales to NHS Scotland.

This change is required in the final paragraph of the letter (appendix 6).

Information for pool operators

Refer to section 2.3 of the PHW guidance for minimising risks to pool operators during an outbreak.

Pool Water Treatment Advisory Group

- Swimming Pool Water Book: essential guide for the pool industry
- Contact information for the Pool Water Treatment Advisory Group
- PWTAG code of practice

Health and Safety Executive

- Health and safety in swimming pools - HSG179

Sports Scotland

- Facility design guidance for swimming pools

View the external guidance

The external guidance should be used together with our guide for use in Scotland.

View the PHW guidance for the investigation of Cryptosporidium linked to swimming pools

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