



UK Health
Security
Agency

Outbreak report

**Outbreak of gastro-intestinal illness in participants at the World Triathlon Event held at
Sunderland, July 2023**

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on behalf of the Outbreak Control Team

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1 Executive Summary

1.1 Background

This report describes an outbreak of gastro-intestinal (GI) illness (diarrhoea and vomiting) in athletes who participated in the AJ Bell 2023 World Triathlon Championship Series Sunderland event held on the weekend of 29/30 July 2023. The event included a range of classes of triathlon held over the two days, with both international and domestic athletes taking part.

The swimming leg of the triathlon event took place in the sea, within the harbour walls at Roker. The cycling and running events were staged in Roker and Seaburn.

1.2 Co-ordination of the response

Reports of illness from participants were first received by British Triathlon on Saturday 29 July and Sunderland City Council were alerted on Monday 31 July.

A multi-agency group was convened to investigate these reports of illness among participants at the event and to determine, if possible, an underlying cause. The group included representatives from British Triathlon, Sunderland City Council (event organising team, Public Health team, Communications and Environmental Health) and UKHSA North East Health Protection team.

The initial meetings were led by Sunderland City Council, with the North East Health Protection Team taking over the investigation after the first two meetings. At this point, representatives from the Field Services (epidemiology team) and Communications teams of UKHSA North East and the UKHSA-commissioned public health laboratory at Newcastle Hospitals Trust joined the outbreak control team.

1.3 Investigations

The organising team at British Triathlon initially received one report of illness on Saturday 29 July with others reporting on the evening of Sunday 30 July. By Monday 31 July there had been reports of illness in 12 participants.

Over the course of the week, the number of people reporting illness increased and the focus of discussion shifted to the investigation of illness in participants. At this point, the North East HPT took over the management of the outbreak and established an outbreak control team as per routine outbreak investigation. Further outbreak control team meetings were held on 8 August, 11 August and 17 August 2023. This report focuses on the findings of the UKHSA-led investigation.

British Triathlon sent a message to all participants asking them to report any illness experienced since the event. Details of all participants who reported illness were shared with the Health Protection Team (HPT); the HPT then sent them an on-line questionnaire, gathering information about illness, participation in the event, other possible exposures / cause of illness.

A faecal sample pot was sent to all UK-based participants who reported illness asking them to send a sample to the UKHSA-commissioned public health laboratory in Newcastle. Specimens were tested for gastro-intestinal viral, bacterial and protozoal pathogens. Any positive samples were also sent to the UKHSA reference laboratory at Colindale for further typing.

1.4 Results

Eighty-eight participants reported illness to British Triathlon and were sent a questionnaire. Seventy-eight of the participants reporting illness were UK-based and were sent a faecal sample pot.

Forty-seven specimens were received by the UKHSA-commissioned public health laboratory and were tested for viral, bacterial and protozoal pathogens

- Thirty-two people had a confirmed infection
 - Twenty three people were found to have norovirus infection
 - Seven people were found to have other viral infections (1 adenovirus, 1 astrovirus, 3 rotavirus, 2 sapovirus)
 - One person had was found to have a bacterial infection (campylobacter jejuni) on culture and one person had a non-STEC e coli infection
- 15 samples were negative for all pathogens tested although it was noted that specimens were collected over one week since the event, so quite possible that infection may have been present but resolved by the time that specimen was collected.

Four of the cases were considered to be secondary cases i.e. had acquired their infection from another participant (usually a household member or partner) who had been unwell following the event.

Information from the questionnaires identified that illness was reported in participants from all the different classes of event and on both days of the event.

The median incubation period (time between the race and onset of illness) was 34.16 hours, and the median duration of illness was two days. Symptoms were typically diarrhoea (88%), nausea (81%), abdominal cramps / pain (77%) fever (53%) and vomiting (52%).

Most cases reported swimming front crawl and almost all of them reported swallowing water during the event (88%).

Although some cases reported travelling with other participants or sharing accommodation, there was no evidence of a single common source of exposure (a 'point source' to which all cases had been exposed) other than participation in the event.

1.5 Conclusion

This was an outbreak of gastro-intestinal (GI) infection, mainly caused by norovirus, affecting participants in a large triathlon event, with over 1,200 people taking part over a two day period.

The spread of cases across all classes / type of race and both days of the event and the absence of any evidence of exposures to a single food source or common pre- or post-event activity made person-to-person spread or contact with a contaminated shared environment other than the race course seem less plausible, and the OCT concluded that the common exposure of all cases having swum in the sea was the most likely source of infection

Open water swimming is known to be associated with risk of GI illness with outbreaks reported in many countries involving a range of pathogens. There is well-publicised advice about reducing the risk of illness, focusing on general hygiene measures both during and after swimming but the challenge in events like this, particularly triathlons where the swimming is the first part of the event, is that athletes are unlikely to take time during the competition to take these actions. They are also likely to have hand-to-mouth contact when drinking / eating during the rest of the event.

The OCT recommended that this information should be highlighted by event organisers in information sent to participants in any future events.

2 Background

2.1 The event

The AJ Bell World Triathlon Championship Series event was a two-day event held in Sunderland on 29 and 30 July 2023.

The event comprised several classes of event

Participant Event	Date	Approximate number of athletes registered	No. who participated on the day
Sprint distance	29/07/2023	361	275
Super Series Youth	29/07/2023	129	116
Super Series Adult	29/07/2023	119	100
Standard distance	30/07/2023	1042	710
Big swim bike run	29/07/2023	72	55

The swim leg of all events was held in the sea, within the harbour area at Roker, Sunderland. The swim events were 750m (sprint) or 1500m (elite and mass participation). All participants wore wetsuits for the swim.

Following the swim, participants took off their wetsuits and completed the cycling and running events on a course within Roker and Seaburn.

2.2 How the incident came to light

The organising team at British Triathlon initially received one report of illness on Saturday 29 July with others reporting on the evening of Sunday 30 July. By Monday 31 July there had been reports of illness in 12 participants.

Concerns were being raised by several participants about water quality in the swim area following the publication on 31 July of Environment Agency testing results. These results were from testing on 26 July and indicated high levels of E coli in a sample collected north of the swim area used in the event.

Given the concerns about illness and water quality received by British Triathlon, the event organising team at Sunderland City Council convened a meeting on Tuesday 1 August to review the situation.

2.3 *Outbreak Control Team*

Initial meetings (held on 1 August, 2 August, 3 August and 4 August 2023) to investigate the situation were convened and chaired by the event organiser at Sunderland City Council, and had representatives from British Triathlon, Sunderland City Council (Public Health, Environmental Health and Corporate Communications teams) and the UKHSA North East Health Protection Team (HPT).

Over the week, the numbers of people reporting illness increased and the focus of discussion shifted to the investigation of illness in participants. At this point, the UKHSA North East's Health Protection Team took over the management of the outbreak and established an outbreak control team as per routine outbreak investigation. Further outbreak control team meetings were held on 8 August, 11 August and 17 August 2023.

This report focuses on the findings of the UKHSA-led investigation.

3 Investigations

3.1 *Epidemiological*

3.1.1 Case finding and investigation

At the meeting, chaired by Sunderland City Council, on 2 August, it was agreed that a message would be sent to all participants asking them to report illness to British Triathlon. The message outlined the plan for investigation and that their details would be passed to the UKHSA North East Health Protection team who were leading the investigation of illness.

Details of people reporting illness were shared with the HPT who sent an on-line questionnaire to all cases¹. The questionnaire gathered demographic information, details of the event they had participated in, onset, symptoms and duration of illness and possible exposures/ risks for transmission of infection.

3.1.2 Case definitions

The Outbreak control team agreed a case definition of 'a participant in any of the events at the Sunderland Triathlon who developed GI symptoms on or after the day of participation.

Primary case:

A participant in any of the events at the Sunderland Triathlon who developed GI symptoms within 7 days of taking part

Secondary case:

A participant in any of the events at the Sunderland Triathlon who developed GI symptoms more than 7 days after taking part in the event and who described contact with another symptomatic person prior to onset

For both case definitions

Confirmed case: a person symptoms and an organism confirmed on laboratory testing

Probable case: a person with symptoms but no confirmed diagnosis on laboratory testing

¹ Questionnaires were sent to all cases who provided email or mobile phone details

3.1.3 Consideration of analytical study

The OCT discussed whether it would be possible to undertake an analytical study to explore factors associated with illness. Discussions took place with event organisers to understand the detail of the event, behaviours and activities undertaken by participants before, during and after the event.

3.2 *Microbiological*

As cases were predominantly resident across the UK, the OCT agreed that to ensure consistent testing and management of results, all specimens should be handled at the same laboratory. The North East HPT already had an established process for the collection and return of faecal samples from outbreaks that occurred within the region, and so decided to use the same process for this outbreak.

A faecal sample specimen pot was posted to all UK-based cases (n = 78) with a request for them to submit a stool sample (even if their symptoms had resolved). Samples were returned by post in a pre-paid specimen postal pack, to the UKHSA-commissioned public health laboratory at Freeman Hospital, Newcastle.

Initial analysis was carried out using the Biofire polymerase chain reaction (PCR) testing platform testing for

- Campylobacter
- Salmonella
- Shigella/Enteroinvasive Escherichia coli (EIEC)
- Shiga-toxin producing Escherichia coli (STEC)
- Enterotoxigenic Escherichia coli (ETEC) lt/st
- Enteraggregative Escherichia coli (EAEC)
- Enteropathogenic Escherichia coli (EPEC)
- Adenovirus F 40/41
- Astrovirus
- Norovirus genotype I/ genotype II
- Rotavirus A
- Sapovirus
- Cryptosporidium
- Giardia lamblia
- Clostridium difficile (C. difficile) toxin A/B
- Plesiomonas shigelloides
- Vibrio
- Yersinia enterocolitica
- Cyclospora cayetanensis
- Entamoeba histolytica

3.3 *Environmental*

Information was gathered from British Triathlon and the organising team at Sunderland City Council about the event, including how participants were 'managed', e.g. possible points of contact / communal gathering, the route of the event, number and location of toilets, hand sanitising stations, food and drink stations

4 Results

4.1 Epidemiology

4.1.1 Cases

Eighty-eight participants reported illness to British Triathlon and all were sent a questionnaire by the HPT. Seventy-eight UK-based cases were also sent a faecal sample pot.

Cases were distributed throughout the UK and there were also overseas participants from Spain, USA, France, Italy and Belgium (based on travel information and not confirmed residence).

Seventy-eight questionnaires (89%) were completed

- 7 cases from UK and 3 cases from overseas did not return questionnaires
- 3 cases were excluded from further analysis as they did not have diarrhoea or vomiting
Therefore denominator for analyses was 75

The age range of cases was 15 - 70 years, with a mean age of 37 years. 40/75 (53%) cases were female and 35/75 (47%) were male

Among the cases the most common symptoms reported were diarrhoea (88%), nausea (81%), abdominal pain (77%), vomiting (52%) and fever (53%). Twenty-four respondents noted "Other" symptoms including headache, lower back pain, fatigue, dizziness, weakness, tight throat and muscle ache. Thirty-one cases reported being still ill at time of completion of survey.

Duration of symptoms reported were between 1 day and 4 days. The median duration of symptoms was 2 days (range 1-7 days). One case reported having symptoms during the event only.

Five cases visited their GP because of symptoms related to their illness, and one case visited the GP and also consulted NHS 111. Two cases submitted a sample via their GP; these results are not included in this report.

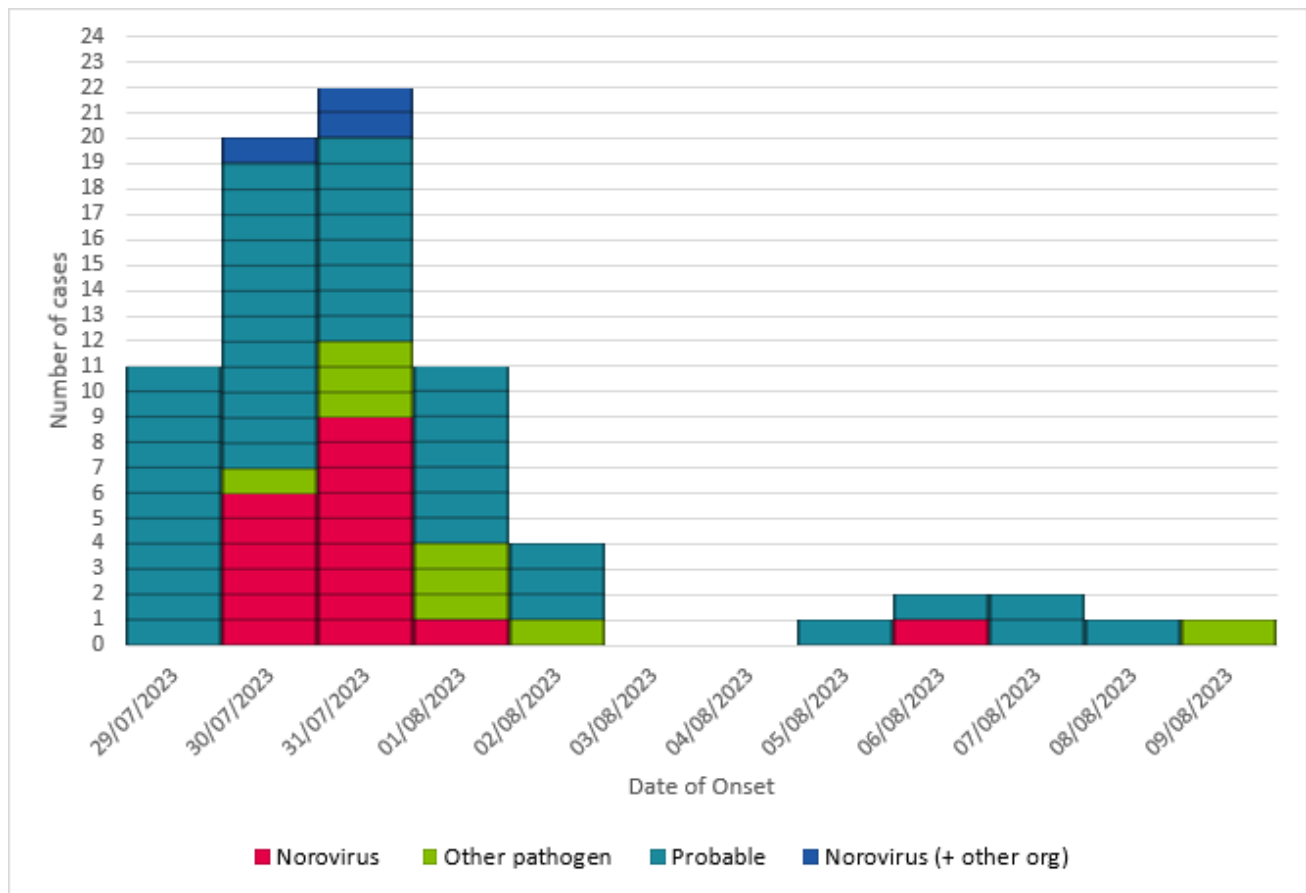
4.1.2 Epidemic curve

The median time from exposure to onset of the first symptoms in primary cases was 34.16 hours (n=65, range 0.7-95.6 hours). 77% of cases had symptom onset within 48 hours of starting the event.

There were five² cases who had onset more than 7 days after the event; four of these cases reported contact with another participant who had symptoms

² Two other cases with onset greater than 7 days after the event were excluded from epidemic curve as they reported onset date later than the date that they completed the questionnaire

Figure 1: Distribution of cases by date of onset



The attack rate (percentage of participants who reported illness) was calculated by participant category and by day of participation; it was found to be similar (4-5%) in all categories and both days.

4.1.3 Exposures

A number of possible exposures were investigated

- Pre-event swim training and race familiarisation
 - o 30% (22/75) undertook a familiarisation of the race including the bike and run route.
 - o 36% (26/75) cases had undertaken a practice swim prior the event.
 - o 23 of the 26 cases who had undertaken a practice swim did this in the sea where the event was taking place (three had also swum in a pool and one in another location). Three had swum in other locations (one in another area of the sea, one in a lake and one in a pool)
- The date of practice swim ranged from the day of the race and a week before the race.
 - o Of the cases who practiced in the sea before the event, the median onset was similar to the cohort overall, median 32.6 hours (range 0.67 – 95.6).
- Style and duration of swimming:
 - o The majority of cases who participated reported their swimming style as front crawl (69/75), followed by breaststroke (head under water) (3/75), breaststroke (head above water) (3/75).

- A swim time in minutes was available for 97% (73/75) cases. The swim times ranged from 5 minutes to 50 minutes, with a mean swim time of 24 minutes.
- 88% (66/75) participants swallowed water during the swim.
- Contact with someone with symptoms
 - Five percent (4/75) cases reported having contact in the 7 days prior to onset with others who were unwell with diarrhoea and vomiting. These were all secondary cases (i.e. participants who had contact with another case from the event).
- Recent travel
 - Eleven percent (8/75) cases reported travelling from outside the UK in the 7 days prior to onset.
- Contact with other participants prior to the event
 - Eight percent (19/75) cases reported travelling as part of a group, including triathlon groups, Belgian Triathlon Federation, Swiss Triathlon Federation, other members from their club and family.
 - 19% (14/75) cases stayed in accommodation prior to the event. (3 at the same hotel in Sunderland and 3 within another hotel in Sunderland.)
 - 25% (19/75) cases ate as part of a group or with others not attending the event
- Eating during or after the event
 - Cases reported eating at a number of food vendors after the event; there was no single / common premises reported.

4.1.4 Analytical study

The OCT agreed not to conduct an analytical study for this outbreak; this decision was based on two key factors (i) the lack of a credible alternative hypothesis to exposure to seawater and (ii) the inability to robustly test that primary hypothesis.

Given the distribution of cases across all groups of individuals associated with the event it was highly improbable that there existed a single source of infection that could explain all cases, other than exposure to seawater.

Exposure to seawater was universal for all participants in the race. Where exposure is universal and investigators wish to gather evidence on the significance of that universal exposure to illness, capturing data to quantify the level of exposure is required.

The OCT agreed that, given the time after the event, participants' recall of the detail of the factors that would be needed to undertake a robust study would be poor, and therefore undertaking an analytical study to test the hypothesis that exposure to seawater was the cause of the outbreak was assessed to have a very high probability of being statistically inconclusive.

4.2 Microbiological

Forty-seven samples (60% of cases who were sent samples pots) were submitted to the laboratory.

Thirty two cases had infection confirmed on microbiological testing.

Organism	Number of cases
Norovirus	23 cases <ul style="list-style-type: none">• 2 of these cases were infected with both norovirus + a non-STE^c e coli³• 1 of these cases was infected with both norovirus + sapovirus
Sapovirus	2 cases
Rotavirus	3 cases <ul style="list-style-type: none">• 1 of these cases was infected with both rotavirus and a non-STE^c e coli
Adenovirus	1
Astrovirus	1
Campylobacter jejuni	1
Non-STE ^c e coli only	1
No organism detected	15

The first ten samples which tested positive for norovirus on the BioFire platform were then further typed using the Roche flow system and TiB reagents to determine genotype. All were found to be Genogroup 1.

All samples from cases positive for norovirus were sent to the UKHSA Virus Reference Department (VRD) at Colindale for genetic sequencing. Multiple genotypes (Genogroups 1.3, 1.2, 1.5, 1.6 and

³ There are different types of E .coli that can cause diarrhoea. Diarrheagenic E. coli (DEC) strains are among the most common agents causing diarrhoea and based on their specific virulence factors and phenotypic traits are divided into pathotypes including enteropathogenic E. coli (EPEC), enterotoxigenic E. coli (ETEC), /Shiga toxin-producing E. coli (/STE^c), enteroinvasive E. coli (EIEC), enteroaggregative E. coli (EAEC) and Diffusely Adherent E. coli (DAEC). Public health actions are only taken for STE^c cases.

Genogroup 2 (unable to type further)) were identified; this pattern is consistent with contamination of food or water with faecal matter.

The presence of multiple genotypes means that it was unlikely that infection had been spread by a single individual contaminating an environment or passing infection person to person.

4.3 *Comment on water quality testing*

Although not within the remit of the outbreak control team, initial meetings between British Triathlon, Sunderland City Council and UKHSA discussed the findings of water quality testing undertaken by British Triathlon in line with World Triathlon event standards. Sampling was carried out at the swim site prior to and during the weekend of the event as per their event protocol. The results of these samples were reported to be excellent.

Following the event, organisers were made aware that samples collected by the Environment Agency from a nearby site (not the swim site) three days prior to the event showed very high levels of e coli in water (an indication of faecal contamination). These results were not published until after the event and coincided with heavy rainfall and adverse weather conditions at the time of testing.

4.4 *Closure of the outbreak*

The outbreak investigation was declared closed following the final OCT meeting on 17 August 2023.

5 **Communications**

There were a number of communication challenges presented by this outbreak which required significant resource from all organisations involved. To note this includes communications to wider partners, stakeholders and participants in the event as well as broader media handling.

Communication to participants

- Information about the investigation of illness in participants was sent by British Triathlon to all participants on Thursday 3 August
- From 3 August onwards, the Health Protection Team sent an on-line questionnaire which included a covering note explaining the process of investigation, to all participants who had reported illness
- All participants who submitted a stool sample were sent a text message and a follow-up letter and FAQs by the HPT; these results were sent out from Tuesday 15 August
- Timing of the results messages was carefully coordinated with the publication of initial findings (see below) so that all involved were informed of our findings simultaneously
- All participants were sent a summary of initial findings on Tuesday 15 August

Communication to North East partners

- Briefings about the investigation and an update on the results were sent to North East Directors of Public Health, the Regional Director of Public Health for North East & Yorkshire and the three North East Local Resilience Forums

- Information about the investigation was also shared with Environmental health teams in the North East local authorities in case of any local reports of illness
- There was also liaison with Northumbrian Water, DEFRA, DHSC, the Environment Agency and briefings to local councillors as well as North East MPs (if and when requested).

Briefings within organisations

- All members of the outbreak control team undertook internal briefings and updates on the ongoing investigation.

For UKHSA, this included briefings for UKHSA national communications colleagues and the Chief Executive Officer and senior leadership team within UKHSA.

Media Handling

There was considerable media interest in this outbreak, particularly as the outbreak occurred at a time when there had been sustained and detailed national coverage of problems with water quality elsewhere and public concerns regarding the discharge of sewage into water courses over the preceding months.

As noted in earlier sections, the reports of illness to the event organisers were accompanied by social media comments and speculation about the possible causes of illness and potential link to pollution/sewage discharges.

Media interest in the event and reports (via social media) of illness was already high before the OCT convened.

Both Sunderland City Council and British Triathlon had already been fielding enquiries from local, national and international print and broadcast media.

An initial reactive media statement was prepared once the OCT had convened and media enquiries post the initial interest were dealt with on a case-by-case basis with the agreement of the OCT. The statement outlined that the formal multi-agency investigation was underway and included information and health advice on swimming in open water

www.gov.uk/government/publications/swim-healthy-leaflet/swim-healthy.

A further reactive statement was issued by the OCT as a result of media enquiries requesting details on the number of pots and responses that UKHSA North East's HPT had received as a result of the proactive message to all participants made by British Triathlon. This was picked up by national media and regional broadcasters.

No further updates on speculative queries re number of responses were made; although the media were advised that once an initial investigation had been undertaken, they would be updated accordingly.

Following the positive norovirus results, a proactive statement reporting preliminary findings of the investigation was published on Tuesday 15 August. It was also proactively published on British Triathlon's website and received widespread coverage locally and nationally

6 Hypothesis

The initial hypothesis of the OCT was that this was an outbreak of GI illness associated with a mass participation event.

Possible sources or routes of transmission including contaminated water, person-to-person transmission, contaminated communal area or a contaminated food source were all considered.

The onset dates of illness, and hence incubation period for infectious agent, along with the nature and duration of symptoms were in keeping with a norovirus or other gastrointestinal (GI) viral infection, however the OCT kept an open mind about other possible infectious agents and samples were tested for the full range of pathogens throughout the investigation.

As the investigation proceeded, the spread of cases across all classes / type of race and both days of the event and the absence of any evidence of exposures to a single food source or common pre-event activity made person-to-person spread or contact with a contaminated shared environment other than the race course seem less plausible, and the common exposure of all cases having swum in the sea more likely as the source of infection.

Although results of water testing carried out in the area of the swim event were reported as 'excellent', the OCT recognised the challenges of microbiological testing of water and the interpretation of those results. The presence of 'excellent' results did not lead the OCT to exclude contact with contaminated water as a possible cause of illness.

7 Conclusion

This was a large outbreak of GI illness associated with a mass participation triathlon event.

The causative organism in the majority of cases was norovirus, with other GI viruses contributing to case numbers. We also detected non-STEC e coli in a number of cases; these organisms are often associated with dirty / contaminated water, although clinical significance when detecting this by PCR is uncertain. Most of those who had non-STEC e coli detected were co-infected with a GI virus.

In fifteen of the cases who submitted a stool sample no organism was detected however that does not mean they were not affected or did not, at some earlier point in time, have an infection. Although PCR testing is very sensitive and can often detect organisms after symptoms have resolved the length of time between symptoms and submission of samples may sometimes result in no causative organisms being identified.

The spread of cases across all classes / type of race and both days of the event and the absence of any evidence of exposures to a single food source or common pre- or post-event activity made person-to-person spread or contact with a contaminated shared environment other than the race course seem less plausible, and the OCT concluded that the common exposure of all cases having swum in the sea was the most likely source of infection.

Open water swimming is known to be associated with risk of GI illness with outbreaks reported in many countries involving a range of pathogens. There is well-publicised advice about reducing the risk of illness, focusing on general hygiene measures both during (don't put head under water, don't swallow water) and after swimming (wash hands / shower as soon as possible (asap) after swimming, wash wetsuits asap and wash hands after handling wetsuits) but the challenge in events like this, particularly triathlons where the swimming is the first part of the event, is that athletes are unlikely to take time during the competition to take these actions. They are also likely to have hand-to-mouth contact when drinking / eating during the rest of the event.

We know that norovirus (and other GI viruses) is easily transmissible through a number of routes including person-to-person spread, contact with a contaminated environment (often after illness in a

communal area), contaminated food or water and our investigation looked at all these possible routes of infection.

- The pattern of illness in terms of person / time (illness across a range of participants / class of events over both days) and the lack of contact between all groups of participants over the course of the weekend led us to conclude that person-to-person or contact with a common contaminated environment other than the racecourse were less likely sources of infection.
- There were a number of food stalls / outlets that participants purchased food from before and after the event, but participants did not report visiting any single common outlet.
- We also know that members of the public / spectators and staff from the event purchased food from these outlets and had no reports of illness from either group, therefore we consider that contaminated food was unlikely to be the source of illness

The only common exposure that all participants had was swimming in the sea as the first leg of their triathlon event.

We recognise that the water sampling undertaken by British Triathlon found that the water quality was within acceptable limits, however it is well recognised that

- The result of a sample is the result at that moment in time
- The volume of water in the harbour area is large and changing, due to the tide, and so a single sample cannot give absolute assurance that the water is not contaminated
- The microbiological testing that is undertaken for assessing water quality uses faecal indicator organisms (E coli species) and, importantly in this case, does not include testing for norovirus⁴
- We also know that in the week prior to the event, there was heavy rainfall and adverse weather in the area, which is known to have an impact on water quality and has been reported as a contributing factor in other outbreaks associated with open water swimming.

One of the key challenges during this investigation was managing the reporting of an 'e coli outbreak'. This occurred prior to any of the OCT investigations, in particular any microbiological investigation of human cases, and reflected the misunderstanding and confusion about e coli (used as a marker of water quality / faecal contamination) and shiga-toxin producing e coli (STEC) or E coli O157 infection which can cause severe illness and is a major public health concern.

Although discussions took place between members of the OCT and the Environment Agency and Northumbrian Water, it was not the remit of the OCT to investigate wider issues about sewage management and bathing water quality.

⁴ From <https://environment.data.gov.uk/bwq/profiles/help-understanding-data.html>

A sample tells us the quality of the water at that specific time, but water can change even over the course of one day. In each sample we test for bacteria that indicate whether there is [faecal matter](#) in the water. These bacteria are known as faecal indicator organisms or FIOs and the specific ones that we test for are: [Escherichia coli](#) or E. coli (EC) [Intestinal enterococci](#) (IE). These bacteria can come from many sources including sewage, agricultural livestock, wildlife, birds and road drainage.

When more of these FIOs are present in a bathing water they can indicate greater risks to a bathers' health. The standards we use for levels of FIOs are specified in the [Bathing Water Regulations](#) and are based on World Health Organisation research which recorded the frequency of stomach upsets in people bathing in differing water quality.

8 Lessons identified and recommendations

A number of important issues were identified during this investigation

- Prompt notification of illness by participants and prompt sharing of information between partner organisations when reports of illness were received enabled rapid investigation of cases
- There were challenges in understanding of risk and interpreting water quality samples, particularly when taken from large bodies of water / tidal sites. Although clear testing protocols were in place and results were satisfactory, it is difficult to accurately assess the impact of adverse weather, particularly heavy rain in catchment areas, on water quality.
 - o Although not within the remit of this report, the OCT noted the lack of communication between the agencies responsible for water quality testing and suggested that this should be reviewed
- The use of new laboratory testing technologies (PCR) meant that diagnoses were made quicker, but that it also detected organisms where clinical significance is uncertain
- Having a coordinated media response was very important, ensuring that the same messages were being given by all organisations involved. It was also important that communication about results to participants took place at the same time as information was released to media, requiring careful coordination between the HPT and communication teams.
- Open Water swimming is not without health risk and even where water testing produces acceptable results this does not mean there is no risk of infection and event organisers must ensure that all participants are aware of this and of guidance to minimise the risks.
- A number of factors relating to participant behaviour were identified
 - o Reminder about hand hygiene, particularly before eating at the end of an event
 - o Not participating in swimming or any other mass participation events if suffering from gastro-intestinal illness

The chair of the OCT would like to thank British Triathlon, Sunderland City Council and all OCT partners for their support in what was a prolonged and complex investigation.

Appendix 1: Outbreak Control Team Membership

UKHSA North East
Kirsty Foster, Consultant in Health Protection (Chair)
Gayle Dolan, Consultant in Health Protection
Gemma Hudspeth, Senior Health Protection Practitioner
Angela Cox, Epidemiological Scientist, Field Services
Adrian Wensley, Senior Epidemiological Scientist, Field Services
Gareth Hughes, Consultant Epidemiologist, Field Services
Vicky Crennel, Senior EPRR Manager
Julie Kinsella-Shenton, Regional Communications Manager
David Tate, Consultant in Public Health Infections
UKHSA-Commissioned Public Health Laboratory, Newcastle
Michelle Permain, Enteric Lead
Ryan Jardine, Bio-medical scientist
Sunderland City Council
Gerry Taylor, Executive Director, Health, Housing & Communities
Victoria French, Senior Manager, Health and Wellbeing
Rawiyad Ahmad, Public Health – Health Protection lead
Colin Rudd, Senior Environmental Health Officer
Brendan Bell, Environmental Health Officer
Rachel Parkes, Environmental Health Officer
Rose Peacock, Media Relations Manager
Lucy Nicholson, Senior Communications Manager
Louise Darby, Communications Business Partner
British Triathlon
Andy Salmon, CEO British Triathlon
Nikki Phillips, Director of Digital Transformation & IT
Natasha Beach, Medical Director

Appendix 2: Information sent to participants re reports of illness on 3 August 2023

Dear [Name],

British Triathlon and World Triathlon are aware of illness among some participants following AJ Bell 2023 World Triathlon Championship Series Sunderland. We are working with Sunderland City Council and the UK Health Security Agency North East (UKHSA North East) in line with their routine processes.

Whilst the cause of this illness is being investigated by the relevant authorities, anyone who is or who has been feeling unwell is encouraged to view the online resources below. Diarrhoea and vomiting is usually a self-limiting illness, however it is important to follow the advice available. If you are concerned about any illness you may be experiencing please call your GP.

For information about diarrhoea and vomiting, please view the NHS website here:

<https://www.nhs.uk/conditions/diarrhoea-and-vomiting/>.

For information about staying safe when open water swimming, please view the information from the UK Health Security Agency here: <https://www.gov.uk/government/publications/swim-healthy-leaflet/swim-healthy>.

Participants who have already reported illness to British Triathlon are being contacted by UKHSA North East to support their investigations. If you have experienced diarrhoea and vomiting, please contact sunderland@britishtriathlon.org.

We are aware there are concerns around water quality results for a test taken on 26 July by the Environment Agency as part of their regular testing in the local area. These tests were taken outside of the Roker Pier arms and not in the body of water used for the swim and published on Monday 31 July following the event. Below is an outline of information and a timeline of water testing activity:

- In line with the World Triathlon guidelines for hosting a World Triathlon Championship Series event, a series of water quality tests were undertaken in the build up to the event including on Thursday 20 July and analysed in a United Kingdom Accreditation Service (UKAS) accredited laboratory. These results were received on Tuesday 25 July and passed the required standard to host the event. You can view the test results in the statement [here](#)
- Also in line with World Triathlon guidelines, a further test was conducted during the course of the event on Sunday 30 July and analysed in a UKAS accredited laboratory. Indicative results were received on Wednesday 2 August and passed the required standard to host the event. You can view the test results in the statement [here](#)
- Both of these tests were taken within the Roker Pier arms where the swim leg of AJ Bell 2023 World Triathlon Championship Series Sunderland took place
- On Monday 31 July, data was published by the Environment Agency showing reduced water quality was detected on Wednesday 26 July in an area of Roker Beach outside of the pier arms and swim area of the event
- Since Monday 31 July, British Triathlon has been working closely with Sunderland City Council and UK Health Security Agency to seek further information and investigate the cause of the illness

British Triathlon will continue to work with Sunderland City Council and UKHSA North East on this matter.

Kind regards,

British Triathlon and World Triathlon

Appendix 3: Information sent to participants regarding their results

Participants were sent a text message and follow-up letter explaining the results of their sample.

Text message and letters sent

- Positive results by each pathogen / combination of pathogens isolated
- Negative results

All participants were also sent a Frequently Asked Questions (FAQs) document (see below)

UKHSA North East Q&A on preliminary results from 2023 World Triathlon Championship Series Sunderland

What do these preliminary results mean?

This means that, out of the laboratory results received (31 samples to date) UKHSA North East has detected Norovirus in 60% of samples (19/31).

Have other infections been detected?

Yes, so far other viruses (including sapovirus, astrovirus and rotavirus) have been detected in samples from a small number of participants. E. Coli have also been detected in a small number of samples. These E. Coli are not the type associated with severe illness (Shiga toxin-producing, Escherichia coli) and can be carried naturally in the gut of healthy individuals, so it is not possible to say whether their presence is as a result of participation in the event.

It is not uncommon to detect more than one infection following testing of faecal samples, but the predominance of Norovirus makes it the most likely explanation of illness in participants.

What about the results that have come back negative?

Negative results do not mean someone that has had symptoms was not ill but that the laboratory did not identify pathogens in that sample. Not all of the samples from those who have been unwell will be positive.

This is for a number of reasons - sometimes it can be difficult to grow bacteria and viruses in the laboratory and the amount of pathogen present also varies depending on the length of time after illness that the sample was taken.

Does a negative result mean that tests were not reliable?

No – samples are processed using the standard accredited tests used by all microbiology laboratories and as stated above it can depend on the length of time after illness that samples were tested.

What does a negative result mean for the investigation of this outbreak?

The investigation of human specimens forms only one part of the investigation. We also look closely at the symptoms people have had and what they have reported doing in the days prior to experiencing symptoms.

Participants will still be considered as a case if they became unwell with symptoms after participating in the event even if their specimen tested negative.

How many people have tested positive for Norovirus?

To date (15 August 2023) norovirus has been identified in 19 samples

Did participants with Norovirus have other infections too?

Yes, laboratory results show that a small number of participants tested positive for other viruses (including sapovirus, astrovirus and rotavirus). E. Coli have also been detected in a small number of samples. These E. Coli are not the type associated with severe illness (Shiga toxin-producing, Escherichia coli) and can be carried naturally in the gut of healthy individuals, so it is not possible to say whether their presence is as a result of participation in the event.

Can we be sure that all those who reported being ill will be tested and get their results?

The details of all participants who contacted British Triathlon and reported illness were passed onto the UKHSA North East's Health Protection Team who sent out a questionnaire and sample pot.

We have so far been contacted by 88 participants.

Despite the preliminary findings we still encourage those who experienced symptoms after the event to contact British Triathlon and UKHSA North East will follow up their information.

What about participants who travelled or reside overseas?

We have provided support and advice to those participants who reported symptoms and have since travelled overseas or who live abroad.

We have asked these participants to complete an in-depth questionnaire. For practical purposes it was not feasible to request that they submit a faecal sample.

How will participants who sent samples get their results

They will be initially sent a text with a follow-on letter

Once a final Outbreak report is available, all participants (regardless of whether they had symptoms or not) will be sent an executive summary of the findings.

Are there reports of any serious infections such as E coli O157?

Fortunately, all lab results to date have tested negative for infections such as E coli O157/STEC (Shiga toxin-producing Escherichia coli) which may cause severe gastrointestinal illness

Although E. Coli was detected by the Environment Agency in nearby bathing waters this is not that same strain that causes E. coli O157 and other serious infections. Although no STEC has been detected in the samples submitted to date, a small number of participants have tested positive for other E. coli. People can naturally carry these organisms in their gut, and it would not be possible to say whether they had a positive result due to their participation in the event or if they were already carrying these organisms.

Do the preliminary results give an indication of where the infection was picked up?

Norovirus is very easily transmitted through contact with people with the infection and any food, water, surfaces or objects that have been contaminated with the virus. Although investigations continue, we may never know the exact source of infection.

Could it have been picked up from swimming?

It is possible for norovirus infection to occur following exposure to contaminated water, but it has not been possible to identify the likely cause of infection from investigations to date and there are other scenarios in which infection could also have been spread.

Did this mean that participants who took part may have been ill and spread the infection?

The North East Health Protection Team were not notified of any illness prior to the event but some participants have since reported being ill before or on the day of the event

Norovirus does spread very easily between people and from people touching contaminated surfaces and exposure through contaminated water.

Our advice to anyone with symptoms of diarrhoea and/or vomiting remains:

- Wash hands thoroughly and regularly at all times, but particularly after using the toilet and before eating.
- Do not go swimming for at least 48 hours after symptoms have stopped or for a longer period if advised by a doctor.

- Do not visit friends or relatives in residential care homes until you have fully recovered and have been free of symptoms for at least 48 hours as there is a real risk that you would introduce the infection into these communities putting vulnerable people at risk.
- Stay away from work or school until you have fully recovered and been free of symptoms for 48 hours.
- Do not handle or prepare food for other people until you have been free of symptoms for at least 48 hours.

What symptoms were reported to UKHSA North East?

Participants reported a range of symptoms including diarrhoea, vomiting, stomach cramps, nausea and fever

Were just the athletes affected?

To date our survey has shown that those participants affected were from across all of the race categories.

Our case definition was anyone who **participated** in the Sunderland Triathlon on 29-30 July 2023 who experienced diarrhoea and/or vomiting following the event.

Organisers also received no reports of illness other than from those who participated in the races.

What is UKHSA advice re open swimming?

General information and health advice on swimming in open water is available here:

<https://www.gov.uk/government/publications/swim-healthy-leaflet/swim-healthy>

Everyone can reduce the risk of becoming ill by:

Choose where and when to swim

- Up to date bathing water quality information is available online during the bathing season between May and September. Other considerations to help you choose where to go include:
- checking the [water quality information](#) for over 400 designated bathing waters in England
- avoiding bathing on higher risk days, by checking the [pollution risk forecast](#), or look for signs at the beach

Before you swim

There are a number of things you should consider including:

- choosing the location carefully and avoid swimming in water with blue-green algal blooms or scums in freshwaters
- covering cuts, scratches or sores with a waterproof plaster before swimming
- wearing appropriate protective clothing such as a wetsuit, gloves or protective footwear

While you are swimming

Remember to:

- avoid stream water running across the beach
- try to avoid swallowing or splashing water into your mouth
- observe local safety advice

After swimming

Following the swim, you can minimise the risk of becoming ill by:

- cleaning your hands thoroughly with soap and water ensuring that all wet sand is removed from hands before eating or handling food
- thoroughly cleaning cuts or abrasions using soap and water
- handle your wetsuit with care after use. Rinse it with clean water as soon as is practicable after swimming. Clean with detergent and rinse as advised by the manufacturer. Always wash your hands with soap and water after handling or cleaning your wetsuit. Allow the suit to dry thoroughly before reuse.

What to do if you become unwell

If you do become unwell with diarrhoea or any other symptoms, seek medical help and let them know you have been open water swimming. Do not swim again until you have had no diarrhoeal symptoms for at least 48 hours, or for a longer period if advised by a doctor.

Information on bathing water and beach risks is available here:

GOV.UK [bathing waters collection of information](#)

GOV.UK [quality of local bathing water information](#)

Surfers Against Sewage provide the [Safer Seas Service app](#), which uses open data from across the UK and water company updates to provide real-time water quality alerts for over 350 locations in the UK

Appendix 4: Water Quality Testing undertaken by British Triathlon

Samples collected 20 July 2023

Water Quality Results Certificate



Client Name: British Triathlon
Water Body Name: Roker Beach

Certificate Reference: TSBN6966062
Analysis Start Date: 21/07/2023
Report Date: 25/07/2023

Analysis Results – Microbiology

Sample 1 - 12C

	Results	EC Bathing Water Directive (2006/7/EC) (For inland waters)	BTF Requirements
E. coli (no/100 ml)	31	Pass Excellent	Pass
Enterococci (no/100 ml)	19	Pass Excellent	Pass
pH	Awaiting Results	-	-

Sample 2 - 14C

	Results	EC Bathing Water Directive (2006/7/EC) (For inland waters)	BTF Requirements
E. coli (no/100 ml)	72	Pass Excellent	Pass
Enterococci (no/100 ml)	50	Pass Excellent	Pass
pH	Awaiting Results	-	-

Sample 3 - 14C

	Results	EC Bathing Water Directive (2006/7/EC) (For inland waters)	BTF Requirements
E. coli (no/100 ml)	220	Pass Excellent	Pass
Enterococci (no/100 ml)	62	Pass Excellent	Pass
pH	Awaiting Results	-	-

The testing results in this certificate relate only to the samples described above. Unless otherwise stated, all results are expressed on an as received basis. All analysis was carried out in UKAS accredited laboratory. Please visit www.swim-safety.co.uk/results-guidance/ for more info on results thresholds.

Samples collected on 30 July 2023

Water Quality Results Certificate



Client Name: British Triathlon
Water Body Name: Roker Beach

Certificate Reference: TSBN1851511
Analysis Start Date: 01/08/2023
Report Date: 04/08/2023

Analysis Results – Microbiology

Sample 1 (30/07/2023)

Test/Unit	Results	EC Bathing Water Directive (2006/7/EC) (For coastal waters)	BTF Requirements
E. coli (no/100 ml)	10	Pass Excellent	Pass
Enterococci (no/100 ml)	3	Pass Excellent	Pass
pH	8	-	Pass

Sample 2 (30/07/2023)

Test/Unit	Results	EC Bathing Water Directive (2006/7/EC) (For coastal waters)	BTF Requirements
E. coli (no/100 ml)	45	Pass Excellent	Pass
Enterococci (no/100 ml)	17	Pass Excellent	Pass
pH	8	-	Pass

The testing results in this certificate relate only to the samples described above. Unless otherwise stated, all results are expressed on an as received basis. All analysis was carried out in UKAS accredited laboratory.

Please visit www.swim-safety.co.uk/results-guidance/ for more info on results thresholds.