



## RAPID RISK ASSESSMENT

# *Cyclospora* infections in European travellers returning from Mexico

21 July 2017

### Main conclusions and options for response

The United Kingdom reports increases in the number of cyclosporiasis cases for the third consecutive year, with a large proportion of cases identified in travellers returning from Mexico, particularly from the Riviera Maya and Cancun regions. Infections amongst these travellers are considered mostly foodborne and do not appear to be associated with contaminated water consumption or hygiene failures.

In 2017, cases in travellers returning from the same region were reported also by Belgium and France, in addition to other non-EU countries like Canada and the United States of America.

With regard to the elevated risk of *Cyclospora* infection demonstrable in travellers returning from Mexico and other countries, it is recommended that awareness of this infection should be raised among travellers and travel agencies as well as clinical laboratories and healthcare professionals.

*Cyclospora* infection causes watery diarrhoea, nausea, loss of appetite and abdominal cramps, usually within two to 14 days after the ingestion of oocysts. Anyone with these symptoms should consult their local healthcare provider, particularly following travel to Mexico and other areas considered endemic for cyclosporiasis.

Healthcare providers should consider the diagnosis of cyclosporiasis in patients with travel history and prolonged watery diarrhoea and request specific tests for this parasite. They should also include the patients' travel history on the request form and consider sending the isolate to a reference laboratory for confirmation. Further typing, including whole genome sequencing could be useful for case linkage and infection/contamination source tracking [1]. Once a case has been identified, health authorities should consider testing the patients' symptomatic travel contacts.

Even though cyclosporiasis is not a notifiable disease, competent authorities could consider encouraging healthcare providers to report the diagnosed infection to national surveillance authorities. National public health authorities may consider collecting information related to exposure history and region of travel of cyclosporiasis cases. They should also consider descriptive and analytical studies on travellers returning from the affected areas. The UK has developed a standard questionnaire to interview cases which is available for use in other countries upon request.

In addition, the UK authorities provide the following additional advice to travellers to decrease the risk of *Cyclospora* infection when travelling to endemic countries [2]:

- Follow good food and water hygiene advice at all times on holiday, even if staying in high-end, all-inclusive resorts;
- Where possible, avoid buffets and choose freshly prepared, thoroughly cooked food that is served piping hot;
- Avoid fresh uncooked berries, unpeeled fruit and any leafy salad items since these are difficult to clean;
- choose bottled water, or water that has been boiled or filtered with a filter designed for purifying drinking water. Avoid having ice cubes in your drinks and do not drink tap water or use it to clean your teeth;
- Consume tea and coffee made with boiling water and served steaming hot.

As the vehicle of infection is not known, new cases in travellers to Mexico are likely to occur. New cases and critical developments should be reported to the ECDC Epidemic Intelligence Information System for Food- and Waterborne Diseases and Zoonoses (EPIS-FWD).

## Source and date of request

ECDC Internal Decision, 17 July 2017

## Public health issue

Prolonged outbreak of *Cyclospora* infections in Mexico which has been affecting European travellers for at least three consecutive years.

## Consulted experts

ECDC experts (in alphabetical order): Birgitta de Jong, Orlando Cenciarelli, Thomas Mollet, Ettore Severi, Marc Struelens, Johanna Takkinen

External experts who contributed to this assessment:

- Belgium: Javiera Rebolledo (Scientific Institute of Public Health)
- France: Mathias Bruyand (Santé publique France)
- Mexico: Javier Montiel Perdomo (Ministry of Health)
- United Kingdom: Alison Smith-Palmer (Health Protection Scotland), Claire Alexander (NHS Greater Glasgow and Clyde), Jo Freedman and Richard Elson (Public Health England), Rachel Chamber (Public Health Wales).

Experts from WHO Regional Office for Europe reviewed this risk assessment; however, the views expressed in this document do not necessarily represent the views of WHO.

ECDC acknowledges the valuable contributions of all experts. All experts have submitted declarations of interest and a review of these declarations did not reveal any conflict of interest.

## Disclaimer

ECDC issued this risk assessment document in accordance with Article 10 of Decision No 1082/13/EC and Article 7 of Regulation (EC) No 853/2004 establishing a European Centre for Disease Prevention and Control. In the framework of ECDC's mandate, the specific purpose of an ECDC risk assessment is to present different options on a certain matter with their respective advantages and disadvantages. The responsibility on the choice of which option to pursue and which actions to take, including the adoption of mandatory rules or guidelines, lies exclusively with the EU/EEA Member States. In its activities, ECDC strives to ensure its independence, high scientific quality, transparency and efficiency. This report was written under coordination of an Internal Response Team at the European Centre for Disease Prevention and Control (ECDC). All data published in this RRA are correct to the best of our knowledge as of 14 July 2017. Maps and figures published do not represent a statement on the part of ECDC or its partners on the legal or border status of the countries and territories shown.

## Disease background information

Cyclosporiasis is a gastrointestinal illness caused by the coccidian parasite *Cyclospora cayetanensis*. Usually, people get infected through the consumption of water or food contaminated with sporulated oocysts (the infective form of the parasite). Humans constitute the reservoirs of the parasites but direct person-to-person transmission is unlikely because the excreted oocysts are non-infectious until they mature in the environment [3]. The first documented cases were identified in Papua New Guinea in 1978 [4]. Cyclosporiasis is reported in many countries, but it is most common in tropical and subtropical areas including South and Central America, South Asia, south-east Asia, the Middle East and Africa [5].

In endemic countries, surveillance studies of apparently immunocompetent people show *Cyclospora* infection rates from 0 to 41.6% (in Peru) [4].

In USA, Europe and Australia, outbreaks are usually linked to the consumption of fresh produce such as raspberries, basil, snow peas/sugar snap peas, and salad imported from endemic countries [6]. *Cyclospora* is resistant to chlorination and iodination [5].

The incubation period ranges from two to 14 days, with an average of seven days. After ingestion of sporulated oocysts, the parasite infects the mucosal epithelium of small intestine and usually causes watery diarrhoea, nausea, loss of appetite and abdominal cramps. Other symptoms may include weight loss, myalgia and fatigue [7].

In immunocompetent people, diarrhoea is self-limiting, but may be prolonged or relapse for weeks. In immunocompromised patients, particularly those infected with HIV and with HIV/TB co-infection, the symptoms may be more severe and last longer. The potential sequelae of *Cyclospora* infection include Guillain-Barré syndrome, reactive arthritis, acalculous cholecystitis, and biliary infection [8]. The treatment consists of rehydration and administration of antibiotics (usually trimethoprim/sulfamethoxazole) [3], especially for immunocompromised cases [9].

Although *Cyclospora* oocysts can be detected by examining stool specimens by microscopy using special staining (modified acid-fast or safranin) or fluorescence microscopy, the diagnosis is easily missed when screening algorithms are not followed [10]. *Cyclospora* oocysts can be distinguished from those of *Cryptosporidium* based on cellular shape and diameter size.

From 2000 to 2015, outbreaks of cyclosporiasis were reported in 13 countries (see Table 1).

**Table 1. Worldwide cyclosporiasis outbreaks: 2000–2015 [4]**

Area	Date	Number of cases <sup>a</sup>	Vehicle	Origin
Australian cruise ship: Fremantle departure	2010 May–Jun	266 <sup>b</sup>	Lettuce <sup>c</sup>	Malaysia <sup>c</sup>
Canada (BC) <sup>d</sup>	2001 May	17	Thai basil	USA
Canada (BC)	2003 Jul	11	Cilantro <sup>c</sup>	UD <sup>e</sup>
Canada (BC)	2004	17	Mango, basil <sup>c</sup>	UD
Canada (BC)	2004 May–Jun	8	Cilantro <sup>c</sup>	UD
Canada (BC)	2006 Jun–Jul	28	Basil or garlic	UD
Canada (BC)	2007 May–Aug	29	Basil	Mexico
Canada (Ontario)	2005 Apr	44	Basil <sup>c</sup>	UD
Canada (Quebec)	2005 Jul	200	Basil	Mexico
Canada <sup>g</sup>	2015 May–Aug	97	UD	UD
Colombia (Medellin)	2002 Apr	31	Salads, juice	UD
Cruise ship (several countries)	2009 Apr	160	UD	UD
Germany	2000 Dec	34	Salads, herbs	France, Italy, Germany
Indonesia (Bangor)	2001 Sep	14	UD	UD
Mexico (Monterrey)	2001 Apr	97	Watercress	UD
Peru (Lima)	2004 Nov	127	UD	UD
Peru (Lima)	2005 Mar	37	UD	UD
Poland	2013 Nov	3 <sup>h</sup>	Drinking water	Indonesia
Spain (Madrid)	2003 May	11 <sup>h</sup>	Raspberry juice	Guatemala
Sweden (Stockholm)	2009 May–Jun	18	Sugar snap peas	Guatemala
Turkey (Izmir)	2005 Sep	19	Drinking water	UD
Turkey (Istanbul)	2007 Jul–Aug	286	UD	UD
United Kingdom <sup>g</sup>	2015 Jun–Sep	79 <sup>h</sup>	UD	Mexico
USA (Pennsylvania)	2000 Jun	54	Raspberry cake	Guatemala
USA (Texas and Illinois)	2004 Feb	95	UD	UD
USA (Pennsylvania)	2004 Jun–Jul	96	Snow peas	Guatemala
USA (Florida)	2005 Apr	592	Basil	UD
USA (Texas)	2013 Jun–Aug	270	Cilantro	Mexico
USA <sup>g</sup> (Iowa and Nebraska)	2013 Jun–Aug	227	Lettuce	Mexico
USA <sup>g</sup>	2014 Jun–Aug	304	Cilantro	Mexico
USA <sup>g</sup>	2015 May–Aug	546	Cilantro <sup>c</sup>	UD

<sup>a</sup> Both laboratory-confirmed and clinically defined cases are included; <sup>b</sup> 34 and 232 cases in two consecutive voyages; <sup>c</sup> Suspected; <sup>d</sup> British Columbia; <sup>e</sup> Undetermined; <sup>f</sup> Public Health Agency of Canada; <sup>g</sup> Multistate outbreak; <sup>h</sup> Travellers

**Germany:** In December 2000, authorities reported 34 cases in southwest Germany. All cases attended luncheons at a German restaurant, and investigations linked transmission to a salad dish. The sources of the lettuce were traced to farms in southern France and Italy. Although the oocysts may have been transmitted to the lettuce via seasonal workers from endemic countries, it is thought possible that contamination was also through local soil or water contact [11].

**USA:** In 2013, authorities reported 631 cases in 25 states. In 2015 (as of 14 September 2015), 546 confirmed cases were reported in 31 states. Most of these cases did not have a travel history within two weeks before disease onset [12]. In 2016 (as of September 2016), 384 cases were reported [13]. In 2017, Texas authorities reported 68 cases between June and July 2017 [13].

**Canada:** In 2015, 97 cases were reported in five provinces [14]. In 2016, 87 cases were reported in four provinces [15]. For both years, the main affected province was Ontario. No deaths were reported.

On 14 July 2017, the Public Health Agency of Canada reported 57 cases since the beginning of the year. These cases were reported in Ontario (52) and British Columbia (5). The cases became ill between May and June 2017 [15].

**Mexico:** A ProMed post from 8 July 2017 reported an outbreak of cyclosporiasis in the state of Guanajuato. According to the source, more than 80% of the 1 000 participants attending a party became ill [16]. According to an outbreak investigation conducted by the Health Ministry of the State of Guanajuato and the Mexican surveillance system, six cases were linked to this outbreak, one of which was confirmed.

## Event background information

On 14 July 2017, the UK posted a message on the Early Warning and Response System (EWRS) to report an increase of travel-related cases of cyclosporiasis since the beginning of May 2017. From the beginning of the year to 19 July, 58 cases were reported. Cases were equally distributed among females and males, mostly between 20 and 50 years of age. No children under 15 years of age were reported. Information on travel history is known for 38 patients: 23 travelled to Mexico, 10 travelled to a range of other overseas destinations, and five did not travel abroad. This is the third successive year that the UK has observed increases in cyclosporiasis around May and June and where most cases were related to travel to Mexico.

In 2016, the UK reported 440 cases of cyclosporiasis between June and October, 359 of whom reported travel to Mexico, mostly to the Riviera Maya and Cancun regions.

In 2015, 79 UK cases associated with a travel to Mexico were reported. Detailed food histories suggested that cases had consumed a variety of fresh foods including fruits, herbs and salads [10].

Cyclosporiasis is not a mandatory notifiable disease in most EU/EEA countries. In response to an alert launched by the UK in the Epidemic Intelligence Information System for Food- and Waterborne Diseases and Zoonoses (EPIS-FWD) in July 2017, Belgium reported four cases of cyclosporiasis notified in 2017, three of whom had a travel history to Mexico.

In August 2016, in response to a previous alert in EPIS-FWD, France reported six confirmed and three probable cases in July and August 2016 in travellers returning from Mexico. In addition, according to a ProMed posting, two travellers from France who visited Mexico in June 2017, were also diagnosed with *Cyclospora* infection shortly after their return [17].

## ECDC threat assessment for the EU

For the third consecutive year, the UK has reported increases of cyclosporiasis. The increase appears to be mostly driven by travellers returning from Mexico, particularly from the Riviera Maya and Cancun regions. In previous years, most cases appeared to acquire the infection by consumption of contaminated food items.

Other countries, including Belgium and France, reported cases in travellers to the same country, although in smaller numbers. The considerably lower number of cases reported by other EU countries compared to the UK is likely due to differences in testing and surveillance.

Although readily detectable by microscopy using special staining techniques for coccidia, the possibility of a *Cyclospora* diagnosis is often neglected and identified only in more severe patients after repeated samples are tested.

Immunocompromised patients, particularly those infected with HIV and with HIV/TB co-infection are at increased risk of being infected and developing a more severe and prolonged disease.

The risk from *Cyclospora* infection amongst travellers to Mexico remains high due to the lack of confirmation of suspected vehicles and related control measures.

## References

1. Guo Y, Roellig DM, Li N, Tang K, Frace M, Ortega Y, et al. Multilocus sequence typing tool for *Cyclospora cayetanensis*. *Emerg Infect Dis.* 2016 Aug;22(8):1464-7.
2. Public Health England. Cyclospora advice for travellers. London: PHE; 2016. Available from: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/545769/Cyclospora\\_advice\\_sheet.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/545769/Cyclospora_advice_sheet.pdf).
3. Chacin-Bonilla L. Epidemiology of *Cyclospora cayetanensis*: A review focusing in endemic areas. *Acta Trop.* 2010 Sep;115(3):181-93.
4. Chacin-Bonilla L. *Cyclospora cayetanensis*. In: Rose JB, Jimenez-Cisneros B, editors. Global water pathogens project. Lansing: Michigan State University; 2017. p. 1-43.
5. Arrowood M, Eberhard M, Gabrielli A, Savioli L. Cyclosporiasis. In: Heymann D, editor. Control of Communicable Diseases Manual. Washington, D.C.: American Public Health Association; 2015. p. 139-40.
6. World Health Organization. Emerging issues in water and infectious disease. Geneva: WHO, 2003.
7. Centers for Disease Control and Prevention. Parasites – Cyclosporiasis (*Cyclospora* infection). Atlanta: CDC; 2013. Available from: <https://www.cdc.gov/parasites/cyclosporiasis/epi.html>.
8. World Health Organization. Waterborne zoonoses – identification, causes, and control. Geneva and London: WHO/IWA Publishing, 2004.
9. nhs.uk [homepage on the Internet]. *Cyclospora*. London: National Health Service; 2017 [cited 20 Jul 2017]. Available from: <http://www.nhs.uk/conditions/cyclospora/Pages/Introduction.aspx>.
10. Nichols GL, Freedman J, Pollock KG, Rumble C, Chalmers RM, Chiodini P, et al. *Cyclospora* infection linked to travel to Mexico, June to September 2015. *Euro Surveill.* 2015;20(43).
11. Döller PC, Dietrich K, Filipp N, Brockmann S, Dreweck C, Vonthein R, et al. Cyclosporiasis outbreak in Germany associated with the consumption of salad. *Emerg Infect Dis.* 2002 Sep;8(9):992-4.
12. Sistema Nacional de Vigilancia Epidemiologica. Ciclosporiosis: una enfermedad transmitida por alimentos. Mexico: Sistema Nacional de Vigilancia Epidemiologica; 2015.
13. dshs.texas.gov [homepage on the Internet]. Health advisory: recommendation to test patients with consistent symptoms for *Cyclospora* – July 17, 2017. Austin: Texas Department of State Health Services; 2017 [cited 20 Jul 2017]. Available from: <http://www.dshs.texas.gov/news/releases/2017/HealthAdvisory-07172017.aspx>.
14. phac-aspc.gc.ca [homepage on the Internet]. Outbreak of *Cyclospora* under investigation 2015. Ottawa: Public Health Agency of Canada; 2015 [cited 18 Jul 2017]. Available from: <http://www.phac-aspc.gc.ca/phn-asp/2015/cyclospora-eng.php>.
15. phac-aspc.gc.ca [homepage on the Internet]. Outbreak of *Cyclospora* under investigation 2017. Ottawa: Public Health Agency of Canada; 2017 [cited 18 Jul 2017]. Available from: <http://www.phac-aspc.gc.ca/phn-asp/2017/cyclospora-eng.php>.
16. ProMED-mail. Cyclosporiasis – Mexico: (GJ). ProMED-mail 2017; 8 Jul: 20170708.5159937 [cited 18 Jul 2017]. Available from: <http://www.promedmail.org/post/20170708.5159937>.
17. ProMED-mail. Cyclosporiasis – France ex Mexico: (QR). ProMED-mail 2017; 14 Jul: 20170714.5174986 [cited 18 Jul 2017]. Available from: <http://www.promedmail.org/post/20170714.5174986>.