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Risk Assessment Group

# PRIMARY RISK ASSESSMENT

Non toxigenic Cholera case in Belgium

Date of the signal	Date of the RA	Signal provider	Experts consultation	Method
6/07/2017	7/07/2017	<b>NRC V. Cholera</b> <b>Prof. Melin</b>	<b>Permanent membres:</b> Dr Sophie Quoilin, Dr Daniel Reynders, Dr. Valeska Laisnez, Dr Carole Schirvel, Dr Romain Mahieu, Mme Mireille Thomas  Dr Laurence Nick, Dr. Caroline Theugels, Dr P. Demol, M. P. Guilmin.  <b>Specific experts :</b> M. Bart Bautmans (AZ&G, milieu), Dr Naïma Hammani (AZ&G), Dr Stéphanie Jacquinet (WIV-ISP), Prof. Pierrette Melin (NRC Choléra), M. Pascal Mailier (IRM)	<b>eMail consultation</b>
<b>Date of update</b>	<b>Closing date</b>			

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**PRIMARY RISK ASSESSMENT  
OF POTENTIAL PUBLIC  
HEALTH EVENT**

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<b>Signal</b>	<p>In May a 46-year-old patient having practiced water sports has developed a bacteraemia caused by a non-toxigenic <i>Vibrio cholerae</i> non-01 non-0139. This patient was previously treated for hepatic pathology. The patient is not immunocompromised. He took NSAID recently and had signs of erosive gastritis seen on gastroscopy, which could explain the bacteraemia according to the treating physician.</p> <p>Freshwater coming from the suspected area, natural open-air recreational water, has been tested by the National Reference Centre for <i>V. cholerae</i> and the contamination is quantified as high with <math>5.10^2 - 10^3</math> CFU/ml.</p> <p>The creek where the patient performed water sports is already classified as 'prohibited for swimming/recreational activities' by the regional authorities due to bacterial contamination based on an average of all the measurements performed in the last four years.</p> <p>The risk to be assessed is related to the organisation of a Triathlon in the incriminated creek on 29/07/2017 and the risk of <i>V. cholerae</i> infection in future recreational use of the creek and of other bathing places as well under EU-monitoring conditions.</p>		
Description		Score	Description / arguments
1	Cause known?		<p>Non-01/non-0139 <i>V. cholerae</i> is found in aquatic environments worldwide.</p> <p>In recent years, infections due to non-01/non-0139 <i>V. cholerae</i> have been reported from Austria (two cases of necrotizing fasciitis, 7 cases with otitis media, 1 case septicaemia), Sweden (three people with mild to severe wound infections after swimming in the Baltic Sea), Germany (urinary tract infection after swimming in a lake), and the Netherlands (septicaemia after swimming in a lake) (5, 6, 7, 8).</p> <p>Climate conditions can have an impact on water contamination. The number of vibriosis infections, which can be life-threatening, has increased substantially in Baltic Sea states since 1980. This increase has been linked to observed increases in sea surface temperature, which has improved environmental conditions for <i>Vibrio</i> species blooms in marine waters. The unprecedented number of vibriosis infections in 2014 has been attributed to the unprecedented 2014 heat wave in the Baltic region (13). ECDC is actually running a real-time model that uses daily updated remote sensing data to examine worldwide environmental suitable conditions such as sea surface temperature and salinity for <i>Vibrio</i> spp. (<a href="https://e3geoportal.ecdc.europa.eu/SitePages/Vibrio%20Map%20Viewer.aspx">https://e3geoportal.ecdc.europa.eu/SitePages/Vibrio%20Map%20Viewer.aspx</a>).</p>
2	Unexpected/unusual	Unusual and	<i>Vibrio cholerae</i> 01 or 0139 cases are not present in Belgium; only imported cases have been notified.

		<p>Unexpected based on short term water quality</p>	<p>Contamination of recreational water with non O1 or non O139 is expected but this specific screening is not performed in routine. The quality of water is indeed based on the presence of Intestinal enterococci (IE) and <i>Escherichia coli</i> (EC), according to the EU directive 2006/7/EC (1).</p> <p><b>The norms are:</b></p> <p><i>Short term water quality</i> (= indicators used <b>in routine</b> for assessment of water quality): Regarding the presence of IE ≤ 400 CFU/100 ml and EC ≤ 1000 CFU/100 ml, the water is considered safe for swimming/recreational use. When the IE ≤ 700 CFU/100 ml and EC ≤ 2000 CFU/100 ml, there is a warning the water is not to be used for swimming/recreational activity by small children and persons with a lower resistance (f.i. immune-compromised, heart-lung patient, ...). The use is prohibited when the water-quality exceeds 700 CFU/100 ml for IE and 2000 CFU/100 ml for EC.</p> <p><i>Long-term water quality:</i> According to the 2006/7/EC the water quality is followed on a program which is analysed on a long term base (4 years). Looking into the 95<sup>th</sup> percentile of the monitoring program over 4 years, the water-quality is excellent when IE &lt; 200 CFU/100 ml and EC &lt; 500 CFU/100 ml. When the 90<sup>th</sup> percentile over 4 years exceeds 330 for IE and 900 for EC, the quality is considered bad.</p> <p>When used for swimming, a profile of the water body has to be made. The water quality parameters IE and EC, together with the profile of the water body, are used as a signal function to assess the risk of attendance of other micro-organisms and water quality in general.</p> <p><b>The actual situation is:</b></p> <p>Based on the long-term 'bad' water quality, the creek had been closed; recreational/swimming activity had been prohibited. This information suggests that the <i>V. cholerae</i> case could be suspected when using the creek for water sports activities. The meteorological conditions (explained ahead) over the last few months are in favour of this conclusion.</p> <p>Using only the short-term water quality, the contamination is unexpected. As the 2017 water quality to the specific creek shows:</p> <table border="1" data-bbox="678 1503 1385 1877"> <thead> <tr> <th>date</th> <th>IE</th> <th>EC</th> <th>T</th> </tr> <tr> <td></td> <td>CFU/100 ml</td> <td>CFU/100 ml</td> <td>°C</td> </tr> </thead> <tbody> <tr> <td>18/04</td> <td>10</td> <td>46</td> <td>12.1</td> </tr> <tr> <td>02/05</td> <td>50</td> <td>110</td> <td>13.0</td> </tr> <tr> <td>16/05</td> <td>20</td> <td>371</td> <td>18.6</td> </tr> <tr> <td>30/05</td> <td>90</td> <td>161</td> <td>22.6</td> </tr> <tr> <td>13/06</td> <td>120</td> <td>270</td> <td>20.7</td> </tr> <tr> <td>27/06</td> <td>90</td> <td>77</td> <td>20.5</td> </tr> </tbody> </table>	date	IE	EC	T		CFU/100 ml	CFU/100 ml	°C	18/04	10	46	12.1	02/05	50	110	13.0	16/05	20	371	18.6	30/05	90	161	22.6	13/06	120	270	20.7	27/06	90	77	20.5
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3	Severity		<p>There are more than 200 serogroups of <i>Vibrio cholerae</i> and the serogroups O1 and O139 are associated with the clinical syndrome of cholera.</p>																																

			<p>The other ones have been associated with sporadic cases of foodborne gastroenteritis, skin infections. Severe cases (septicemic disease, necrotising fasciitis, ...) are rare but described and most often among patients with liver diseases, immune-compromising, elderly, ...</p> <p>Antibiotic therapy does exist.</p>
4	Dissemination (Low/Medium/High)	Low	<p>Among the serogroups of <i>Vibrio cholerae</i>, serogroups O1 and O139 can cause large epidemics while the others are not described as having spread capacity in epidemic form even if they have the underlying potential to cause epidemic disease if the appropriate complement of virulence genes is acquired (6).</p> <p><i>Vibrio</i> counts vary with season and peak in warm seasons (10, 11, 12). Long periods of high temperature and low rainfalls are favourable to persistent contamination what were precisely the meteorological conditions in Belgium for spring and early summer 2017.</p> <p>Repetitive heat periods in the context of climate changes are observed what could increase over time the risk to acquire infectious diseases from the environment. The spread capacity of <i>Vibrio cholerae</i> in Belgian natural recreational/swimming waters under the different levels of water quality is currently not measured.</p>
5	Risk of (inter)national spread	No	<p>No spread capacity in epidemic form with these serogroups.</p> <p>Exposed people remains at risk:</p> <ul style="list-style-type: none"> <li>- Triathlon in incriminated creek has been cancelled by decision to close the creek for recreational/swimming use from now to the end of the year due to 'bad' long term water quality.</li> <li>- Other triathlons are planned during the summer while the contamination of Belgian natural recreational/swimming waters by <i>Vibrio cholera</i> is unknown. Participants to these sport events come from various Belgian regions and possibly from neighbouring countries.</li> </ul> <p>It is not necessary to notify the case to IHR/EWRS as only O1 or O139 serogroups have to be notified due to their spread capacity in epidemic form.</p>
<b>Preparedness and response</b>			
6	Preparedness		<p>Quality of bathing water is based on the European directive 2006/7/EC (1) which has been transposed into legislation at regional level (2, 3, 4) but:</p> <ul style="list-style-type: none"> <li>- Actual monitoring program is probably not sufficient enough to be used as an (overall) indicator for <i>V. cholera</i></li> <li>- Analysis of environmental samples requires specific sample material and it is not usually done in Belgium.</li> </ul> <p>Cholera is included in mandatory notification list of all three regions but the case definition does not include non O1 non O139.</p>

			Belgium has diagnostic capacity for humans through NRC.
7	Specific control measures (surveillance, control, communication)		<p><b>Surveillance:</b></p> <p>Regular controls of water are done and measures taken according to the European norms. This does not include <i>V. cholera</i>. Given IE and EC under different monitoring conditions are used as a signal functions for other micro-organisms.</p> <p><b>Control:</b></p> <p>1. According to the legislation, based on analytical results, the environmental team of the Agentschap Zorg &amp; Gezondheid can advise a prohibition for recreational activities. The decision to follow this advice is taken by the mayor.</p> <p>2. For specific circumstances, additional prohibition could be taken according to Article 7 of the European directive on "Management measures in exceptional circumstances":  <i>Member States shall ensure that timely and adequate management measures are taken when they are aware of unexpected situations that have, or could reasonably be expected to have, an adverse impact on bathing water quality and on bathers' health. Such measures shall include information to the public and, if necessary, a temporary bathing prohibition.</i></p>
<b>Public health impact</b>			
A	Public health impact in Belgium (Low/Medium/high)	Medium	<p>Infections are rare but nevertheless described among healthy people. The risk remains limited considering that people making triathlon have by definition good health conditions but wound infections could be a concern.</p> <p>Mild infections cannot be excluded (the level of contamination of the Belgian creek is comparable with the level of contamination of an Austrian lake – 10<sup>6</sup>/L).</p> <p>The contamination of the creek is considered high and according to the KMI/IRM latest long-term forecasting suggesting a return of heat and dry weather during the last 10 days of July, meteorological conditions are not expected to reduce the level of contamination.</p>
B	Recommendations (surveillance, control, communication)		<p><b>Short term:</b></p> <p>To cancel the triathlon. To take samples for the follow up of <i>V cholerae</i> in the creek.</p> <p>To inform relevant regional departments about the risk of contamination by <i>Vibrio cholerae</i> in order to allow them to check if any other sport event will occur during the summer 2017 in regulated bathing places having the similar bad long-term water quality.</p> <p><b>Mid-term:</b></p> <p>To assess if regular surveillance should be broadened to extra mid-term monitoring (controls) including <i>V. cholerae</i>:</p> <p>Considering expected changes in temperature and rainfall patterns related to the global climate changes, relevant regional departments should consider including the detection of this pathogen into some controls during</p>

			<p>summer (bathing season), especially if warm and dry weather and to assess the results taking into account the long-term water quality, the actual and 'past mid-term' meteorological conditions, the profile of the water-body and the actual water quality.</p> <p>This recommendations could be based on the results from:</p> <ul style="list-style-type: none"> <li>- A study about the prevalence of <i>Vibrio cholerae</i> in Belgian natural recreational water taking into account the profile of the water body as the long term and short term water quality parameters using IE and IC as an indicator.</li> <li>- An evaluation of the risk by modelling surveillance data on infectious diseases in human and in water considering also rainfalls, air and water temperature.</li> </ul>
C	Actions		<p><b>Agentschap Zorg &amp; Gezondheid:</b></p> <ol style="list-style-type: none"> <li>1. Based on the analytical results from 2013 to 2016, the environmental team of the Agentschap Zorg &amp; Gezondheid advised to the mayor on cancelation and strict compliance to the prohibition for recreational activities which include body-contact with the water in this location (<a href="http://kwaliteitzwemwater.be/nl/zwemwater/boerenkreek-sint-laureins">http://kwaliteitzwemwater.be/nl/zwemwater/boerenkreek-sint-laureins</a>) for the remaining of the year 2017.</li> <li>2. Plans to send some samples to NRC for <i>V. cholerae</i> identification for the follow up of the situation in this creek.</li> <li>3. Performs a specific risk-assessment as to the profile of the water body has to be evaluated according to re-opening the sports activities after closure due to a long-term bad water quality. In this assessment the meteorological conditions of the last months have to be considered, as to the vulnerability of the water body for bad water quality-conditions.</li> </ol> <p><b>WIV-ISP</b></p> <p>The WIV-ISP takes contact with ECDC for the following :</p> <ul style="list-style-type: none"> <li>- To inform them about the case</li> <li>- To have information about existing surveillance plan, sampling protocol, threshold for interpretation of results, ... at EU level</li> </ul> <p><b>All three regions</b></p> <p>Short term:</p> <ol style="list-style-type: none"> <li>1. To make water controls for <i>V. cholerae</i> in regulated bathing places where sport events will occur during the summer 2017, at least those having a bad long term water quality or no 'very good' results on short term results.</li> <li>2. To prohibit sport event in bathing places having any bad short or long term controls according to the specific risk this summer.</li> </ol> <p>Mid-term:</p> <ol style="list-style-type: none"> <li>3. To evaluate the need <ul style="list-style-type: none"> <li>- for broader surveillance with a plan including additional</li> </ul> </li> </ol>

			<p>controls regarding frequency and type of pathogens to be identified</p> <ul style="list-style-type: none"> <li>- for a specific study on the contamination of Belgian natural recreational water by <i>Vibrio cholerae</i> which could be performed by the NRC <i>V. cholerae</i></li> <li>- for a risk quantification of infectious diseases, namely <i>V. cholerae</i> in changing climate patterns by modelling various variables related to environmental conditions (water and climate) which could be performed by the WIV-ISP.</li> </ul>
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RAG

Risk Assessment Group

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