

Feedback from operational stakeholders who manage or respond to outbreaks is that they are often too busy to review literature or obtain relevant background information to assist them with acute response. Unlike a traditional analytical outbreak investigation report, **Watching Briefs** are intended as a rapid resource for public health or other first responders in the field on topical, serious or current outbreaks, and provide a digest of relevant information including key features of an outbreak, comparison with past outbreaks and a literature review. They can be completed by responders to an outbreak, or by anyone interested in or following an outbreak using public or open source data, including news reports.

Watching brief	
<b>Title</b>	Listeriosis in Australia – January to July 2018
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<b>Date of first report of the outbreak</b>	12 <sup>th</sup> September 2018
<b>Disease or outbreak</b>	Listeriosis, which is caused by the bacteria <i>Listeria monocytogenes</i> serotype 4b Sequence type ST240 (1).
<b>Origin (country, city, region)</b>	A national outbreak of listeriosis is linked to the consumption of rockmelon (cantaloupe) originating from New South Wales and affecting other states of Australia, including Victoria, Queensland and Tasmania (2).
<b>Suspected Source (specify food source, zoonotic or human origin or other)</b>	Consumption of rockmelons (cantaloupe) from a single grower in New South Wales, the largest State of Australia (3). The grower’s farm is named Rombola Family farms and is based at Nericon near Griffith in regional New South Wales (4).
<b>Date of outbreak beginning</b>	Between 17 January and 9 February 2018, 10 elderly people fell sick and were diagnosed with listeriosis (4). The Australian National Focal Point (NFP) notified World Health Organization (WHO) of the listeriosis outbreak on 2 March 2018 (3).

<p><b>Date outbreak declared over</b></p>	<p>Ongoing cases were documented until 27<sup>th</sup> July; no cases were reported after that. However, no official announcement has been made regarding the end of the outbreak.</p>
<p><b>Affected countries &amp; regions</b></p>	<ul style="list-style-type: none"> <li>• Australia: New South Wales, Victoria, Queensland, Tasmania (5)</li> <li>• Singapore: 2 cases reported to be genetically linked to the Australian outbreak strain (5). The farm which was identified as the source for the listeria outbreak is a major supplier of rockmelons in Australia and exports to at least nine countries, including Singapore (6).</li> </ul>
<p><b>Number of cases (specify at what date if ongoing)</b></p>	<p>Up to 27<sup>th</sup> July 2018, there have been 22 confirmed cases, which comprises of 6 cases in NSW, 8 cases in VIC, 7 cases in QLD and 1 case in TAS (7).</p>
<p><b>Clinical features</b></p>	<p>Listeriosis is a life-threatening infection caused by consuming food contaminated with the bacterium <i>L. monocytogenes</i> (8). This disease primarily affects pregnant women and their newborns, older adults, and persons with weakened immune systems (8). The incubation period usually varies from 3 days to 70 days (8).</p> <p><u>General Symptoms</u></p> <ul style="list-style-type: none"> <li>• Fever</li> <li>• Muscle aches</li> <li>• Sometimes diarrhoea and other gastrointestinal symptoms (8)</li> </ul> <p>These symptoms might vary in different cases. In <b>severe cases or cases of invasive listeriosis</b>, patients might develop septicaemia and/or meningitis (9).</p> <p><b><u>In Pregnant women:</u></b> Infection might cause miscarriage, stillbirth or premature delivery (8).</p> <p><b><u>Other risk groups (Older people and immunocompromised individuals):</u></b> Additionally, these people might suffer from headache, stiff neck, confusion, loss of balance, and convulsions (8).</p>
<p><b>Mode of transmission (dominant mode and other documented modes)</b></p>	<ul style="list-style-type: none"> <li>• Listeria is mostly contracted through eating contaminated food containing <i>L. monocytogenes</i> bacteria. Babies can be born with listeriosis if their mothers eat contaminated food during the pregnancy (9).</li> </ul>

	<ul style="list-style-type: none"> <li>Listeria does not spread from person to person. However, it is commonly found in the environment (soil) and some foods such as raw meat, unpasteurized milk, soft cheeses, deli meats, raw fruits and vegetables (10).</li> </ul>
<b>Demographics of cases</b>	<p><u>Case demographics as of 27 July 2018 (7)</u></p> <ul style="list-style-type: none"> <li>Confirmed cases: 22</li> <li>Gender: 9 males (41%); 13 females (59%)</li> <li>Age: average 70 years, range 0-94 years (0-year-old - live birth at 36 weeks)</li> <li>Jurisdictions: NSW (6), VIC (8), QLD (7), TAS (1)</li> <li>Deaths: 7, plus 1 miscarriage.</li> <li>Institutional residents: 0</li> </ul>
<b>Case fatality rate</b>	<p>The case fatality rate as of 27<sup>th</sup> July 2018 is 31.81 % (7).</p>
<b>Complications</b>	<ul style="list-style-type: none"> <li>In some cases, listeriosis can spread outside the intestines and cause a more advanced form of disease, called invasive listeriosis (11).</li> <li>Complications include bacterial meningitis, endocarditis, and septicaemia (11).</li> <li>In pregnant women, it might affect the unborn baby (foetus) and can lead to miscarriage or still birth (11).</li> </ul>
<b>Available prevention</b>	<p><b><u>For the general population</u></b></p> <ul style="list-style-type: none"> <li>Avoid potentially contaminated food, especially for individuals in high risk groups (12)</li> <li>Thorough washing of raw fruits and vegetables is recommended (13).</li> <li>Raw food from animal sources such as poultry, beef and pork should be cooked properly (13).</li> <li>Knives, cutting boards and hands should be washed promptly after handling uncooked foods (13).</li> <li>Consumption of unpasteurised milk should be avoided (13).</li> </ul> <p><b><u>Additional precautionary measures for individuals at high risk</u></b></p> <ul style="list-style-type: none"> <li>Pregnant women and immunocompromised people should avoid cold deli meats, soft cheeses, pre-packaged salads and chilled raw sea food (13).</li> </ul>

	<ul style="list-style-type: none"> <li>• They are advised to eat properly cooked and pasteurised dairy products (13).</li> </ul> <p>There is no evidence of acquired immunity and there is no vaccine to prevent listeriosis (12).</p> <p>There are various preventive strategies followed by the Food Standards Australia New Zealand (FSANZ) to develop national standards for food processing controls and close monitoring is carried out (12).</p>
<p><b>Available treatment</b></p>	<ul style="list-style-type: none"> <li>• Treatment involves antibiotics and supportive therapy (9). The physician prescribes the antibiotic treatment as per the <i>Australian Therapeutic Guidelines – Antibiotic</i> (12).</li> <li>• The standard antibiotic therapy is for 14-21 days and following are the list of medicines for Listeria infection (14) : <ul style="list-style-type: none"> <li><b><u>Mild infection</u></b> (14) <ul style="list-style-type: none"> <li>- Oral amoxicillin / ampicillin (2-3 g / day)</li> </ul> </li> <li><b><u>Severe infection</u></b> (14) <ul style="list-style-type: none"> <li>- Intravenous amoxicillin / ampicillin (4-6 g / day)</li> <li>- Intravenous gentamicin for 14 days</li> <li>- If patient is allergic to ampicillin, trimethoprim 160 mg/ with sulfamethoxazole 800mg, oral or intravenous depending on the severity of condition (should not be used in the first trimester of pregnancy), is the generally recommended alternative.</li> </ul> </li> </ul> </li> <li>• The treatment and management protocol is almost the same for both pregnant women and people at elevated risk of invasive listeriosis, apart from the fact that foetal surveillance is carried out in case of pregnant women (14).</li> </ul>
<p><b>Comparison with past outbreaks</b></p>	<p>This outbreak is compared below to similar outbreak of listeriosis in Australia in the years 2003, 2009, 2010 &amp; 2014. A comparison is also done with the recent outbreak of listeriosis in South Africa in 2017.</p> <p><i>L. monocytogenes</i> exposure in contaminated foods is common in Australia. However, invasive listeriosis is an uncommon disease. From the years 2011-2015 in Australia, the five year mean was 78 cases per year, with a notification rate of 0.3 per 100,000 population (12).</p> <p><b><u>2018</u></b></p> <ul style="list-style-type: none"> <li>• 22 cases and 7 deaths notified to the NNDSS (7)</li> </ul>

	<ul style="list-style-type: none"> <li>• Most prevalent in the age group of 70 years and above (7)</li> <li>• About 59% of the total cases were females (7)</li> <li>• Strain of <i>L. monocytogenes</i> identified was serotype 4b strain ST240 (1, 15).</li> </ul> <p><b><u>2014</u></b></p> <ul style="list-style-type: none"> <li>• 80 cases notified to the National Notifiable Diseases Surveillance System (NNDSS) (16)</li> <li>• Most prevalent in the age group of 80 years and above (16)</li> <li>• 51% of the total cases were male (16)</li> </ul> <p><b><u>2010</u></b></p> <ul style="list-style-type: none"> <li>• 71 cases notified to the NNDSS (17)</li> <li>• Most prevalent in the age group of 60 years and above (17).</li> <li>• 54% of the total cases were males (17).</li> <li>• Multijurisdictional outbreak associated with melons (17).</li> <li>• Strain of <i>L. monocytogenes</i> identified was 1/2b, 3b, 7 binary type 158 (17).</li> </ul> <p><b><u>2009</u></b></p> <ul style="list-style-type: none"> <li>• 36 cases and 4 deaths reported to the NNDSS (18).</li> <li>• Multijurisdictional outbreak linked to chicken wraps sold on domestic flights across Australia (18).</li> </ul> <p><b><u>2003</u></b></p> <ul style="list-style-type: none"> <li>• About 60-70 notified cases reported with a case fatality rate 20-30 % (18).</li> <li>• No common source of outbreak identified (18).</li> </ul> <p><b><u>South Africa Outbreak 2017</u></b></p> <ul style="list-style-type: none"> <li>• 1034 laboratory confirmed cases &amp; about 200 deaths (19).</li> <li>• The case fatality rate was 28.6 % (19).</li> <li>• 91% of the strains belonged to <i>L. monocytogenes</i> Sequence Type 6 (ST6) (20).</li> </ul>
<p><b>Unusual features</b></p>	<ul style="list-style-type: none"> <li>• There were no unusual features identified and the commonly affected people were the immunocompromised and predominantly elderly people (7).</li> <li>• Consequently, onsets of illness were distributed throughout the outbreak period with no obvious clustering at one point in time (7).</li> </ul>

	<ul style="list-style-type: none"> <li>All <i>L. monocytogenes</i> positives were further identified as the outbreak WGS strain belonging to MLST240 (7).</li> </ul>
<p><b>Critical analysis</b></p>	<p>During recent years in Australia, the incidence of listeria infection is constant or has slightly declined owing to the collective efforts of the food industry and the government through implementation of standard food safety and hygiene protocols and improvement of the integrity of the cold chain (12). However, there are some shortcomings which have been identified through investigations.</p> <p><u>Investigations</u> The rockmelons from the Rombola Family Farms (RFF) were sampled by the NSW DPI (NSW Department of Primary Industries) and the whole melons as well as a composite sponge swab tested positive for <i>L. monocytogenes</i> (7). There were also some other peripheral issues noticed in the packing unit of the farms, which included dirty fans (used to reduce the moisture content of melons after washing) and some unclean spongy materials used for packing (7).</p> <p>Investigations carried out in the rockmelon outbreak indicate that adverse weather conditions (heavy rainfall in December prior to harvest, followed by dust storms) are likely to have significantly increased the organic load and amount of <i>L. monocytogenes</i> present on rockmelons prior to harvest (7).</p> <p><u>Implications</u> Food borne outbreaks due to <i>L. monocytogenes</i> that result in product recalls pose an economic burden for a country from the individual and societal perspective (21). Moreover, additional costs are incurred for investigations, ongoing prevention and control activities (21).</p> <p><b><u>Comparative analysis of Australia vs South Africa outbreak</u></b></p> <p>A timely epidemiological and environmental investigation was conducted which resulted in early detection of the outbreak source and early recall, which limited the number of cases in Australia (3). Despite the high number of cases in South Africa, there has been a tremendous delay in the actions taken by the health authorities and the government to trace the source of <i>L. monocytogenes</i> outbreak (22, 23). On the other hand, Australia’s response in rapid identification of the food source, prompt exchange of detailed export information, and genetic sequences through the INFOSAN network helped reduce the public health and trade impact of the outbreak (24).</p>

<p><b>Key questions</b></p>	<ol style="list-style-type: none"> <li>1. Is the rockmelon from the affected farm exported and what is the likelihood of spread to other countries?</li> <li>2. Are the cleaning and sanitizing methods used in the food processing areas adequate for prevention of further outbreaks?</li> <li>3. How can food safety agencies improve food safety associated with packaging and storing of processed foods?</li> <li>4. Have there been genetic changes in the bacteria?</li> </ol>
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