# Listeriosis in Australia – January to July 2018

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**Watching brief**

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<th>Date of report</th>
<th>12&lt;sup&gt;th&lt;/sup&gt; September 2018</th>
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<tbody>
<tr>
<td>Disease</td>
<td>Listeriosis, caused by the bacteria <em>Listeria monocytogenes</em> serotype 4b Sequence type ST240 (1).</td>
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<td>Origin</td>
<td>A national outbreak of listeriosis is linked to the consumption of rockmelon (cantaloupe) originated from New South Wales and has affected other states of Australia namely Victoria, Queensland, Tasmania.(2)</td>
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<td>Suspected Source</td>
<td>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).</td>
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<td>Date of outbreak beginning</td>
<td>The outbreak began after 10 elderly people were diagnosed with Listeriosis after consuming cantaloupe and became ill between 17 January and 9 February, 2018 (4). The Australian National Focal Point (NFP) notified WHO of the Listeriosis outbreak on 2 March 2018 and all the identified cases have had their illness onset since 17 January 2018. (3).</td>
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Date outbreak declared over

Ongoing cases were documented until 27th July and there were no cases reported after that. However, no official announcement has been made regarding the end of the outbreak.

Affected countries & regions

- Australia: New South Wales, Victoria, Queensland, Tasmania (5)
- 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 and Singapore is one of them (6).

Number of cases

Up to 27th July, 2018 there have been about 22 confirmed cases which comprises of 6 cases in NSW, 8 cases in VIC, 7 cases in QLD and 1 case in TAS (7).

Clinical features

Listeriosis is a life-threatening infection caused by consuming food contaminated with the bacterium *Listeria monocytogenes* (8). This disease primarily affects pregnant women and their newborns, older adults, and persons with immune systems weakened by cancer, cancer treatments, or other serious conditions (like diabetes, kidney failure, liver disease, and HIV/AIDS) (8). Rarely, persons without these risk factors can be affected (8). The incubation period usually varies from 3 days to 70 days (8).

General Symptoms

- Fever
- Muscle aches
- Sometimes diarrhoea and other gastrointestinal symptoms (8)

The symptoms might vary in different cases-

**Pregnant women:** Apart from the general symptoms, infection in the pregnant women might lead to miscarriage, stillbirth, premature delivery, or life-threatening infection of the newborn (8).

**Other risk groups:** Additionally, these people might suffer from headache, stiff neck, confusion, loss of balance, and convulsions (8).

In **severe cases or cases of invasive listeriosis**, patients might develop septicaemia and meningitis (9).
| Mode of transmission | • Listeria is mostly contracted through eating contaminated food containing *Listeria monocytogenes* bacteria and babies can be born with listeriosis if their mothers eat contaminated food during the pregnancy (9).

• Listeria does not spread from person to person. However, it is commonly found in the environment (soil) and some raw foods such as raw meat, unpasteurized milk, soft cheeses, deli meats, raw fruits and vegetables (10).

• Unlike many other bacteria, Listeria can grow in the refrigerator as well and consuming contaminated food does not always cause illness in most of the people however people with high risk and pregnant women can become sick (10).

• Apart from the immune status of the host, the virulence of the infecting strain and the size of the inoculum also exerts its effect on the invasiveness of the Listeria infection (11). The infective dose is unknown but is estimated to be between $10^4$ - $10^6$ organisms/g of ingested product, although this threshold might reduce in groups at high risk (11). |

| Demographics of cases | **Case demographics as of 27 July 2018 (7)**

• Confirmed cases: 22
• Gender: 9 males (41%); 13 females (59%)
• Age: average 70 years, range 0-94 years (0-year-old - live birth at 36 weeks)
• Jurisdictions: NSW (6), VIC (8), QLD (7), TAS (1)
• Onset dates of illness: from 17 January 2018 to 10 April 2018 (Figure 1)
• Deaths: 7, plus 1 miscarriage.
• Institutional residents: 0 |

| Case fatality rate | The case fatality rate as of 27th July 2018 is 31.81 %.(7) |

| Complications | • This infection becomes serious in pregnant women, elderly people especially who are aged 65 years or above and immunocompromised people. (12).

• In few cases, listeriosis can spread outside the intestines and cause a more advanced form of disease, called invasive |
listeriosis(12). The symptoms could be severe, and these include(12):
- Headache
- confusion
- stiff neck
- changes in alertness
- loss of balance or difficulty walking
- convulsions or seizures(12)

- Complications include bacterial meningitis, endocarditis, and septicaemia.(12)

- In pregnant women, it might affect the unborn baby (foetus) and can lead to miscarriage or still birth (12). Even with prompt treatment, some infections result in death, especially in seniors and those with weakened immune systems (12).

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### Prevention

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<th>Available prevention</th>
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<td><strong>For the entire population</strong></td>
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<td>- Thoroughly wash raw vegetables and fruits before eating.</td>
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<td>- The raw food from animal sources such as poluty, beef and pork should be cooked properly.</td>
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<tr>
<td>- Separate uncooked meats from vegetables</td>
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<td>- The knives, cutting boards and hands should be washed promptly after handling uncooked foods.</td>
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The main approach to reduce exposure to L. monocytogenes are to limit the contamination of food products and well communicate with the high-risk individuals to avoid potentially contaminated food. There is no evidence of acquired immunity and there is no vaccine to prevent listeriosis (13).

The preventive strategies followed by the Food and Health authorities for reducing the contamination of food products can be as follows (13):

- Food Standards Australia New Zealand (FSANZ) follows the Codex Alimentarius Commission guidelines in developing national standards for food processing controls, which closely monitors appropriate food handling and storage procedures (13).
- Packages and processed RTE foods having an unacceptable level of L. monocytogenes is most often recalled from the market (13).
- According to FSANZ Standards, the local and State Government regulatory agencies should closely monitor the implementation of food safety standards and regulate hygiene practices in retail food establishments (13).

### Available treatment

- Treatment involves antibiotics and supportive therapy (9). The physician prescribes the antibiotic treatment as per the Australian Therapeutic Guidelines – Antibiotic (13).
- The standard antibiotic therapy is for 14-21 days and following are the list of medicines for Listeria infection (14) –
  - **Mild infection** (14)
    - Oral amoxicillin / ampicillin (2-3 g / day)
  - **Severe infection** (14)
    - Intravenous amoxicillin / ampicillin (4-6 g / day)
    - Intravenous gentamicin for 14 days
    - 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 to ampicillin.
- The treatment and management protocol remain almost the same for both the pregnant women and for people at elevated risk of invasive Listeriosis apart from the fact that foetal surveillance is carried in case of pregnant women.
However, there are different strategies for different category of patients based on their clinical presentation.

**Asymptomatic**

- No testing, including blood and stool cultures is recommended for persons who report to have consumed contaminated food during the outbreak (15).
- An asymptomatic person is instructed to return for check-up if he/she develops symptoms within 2 months of consuming contaminated food (15).
- For asymptomatic pregnant women, there is no reason to alter or start foetal surveillance with known or presumptive exposure to Listeria infection (16, 17). However, in South Australia pregnant women are advised to start antibiotic therapy (18).

**Mildly symptomatic, afebrile cases**

- Patients who are afebrile but shows some symptoms which appear similar to gastrointestinal or flu like illness (mild nausea, vomiting or diarrhoea) should be managed expectantly (15).
- Some clinicians withhold antibiotic therapy unless the culture confirms Listeria infection and some clinicians would initiate the antibiotic therapy presumptively (15). However, it is important for both the patient and the clinician to know that no current guidelines or effectiveness data exist for this scenario (15).
- If culture confirms Listeria infection, then standard antimicrobial therapy is initiated, which includes intravenous ampicillin (15).
- For pregnant women, assessment of the foetal wellbeing could be done based on individuals’ preferences and keeping in consideration about the patient’s clinical status (16).

**Febrile with or without other symptoms consistent with Listeriosis**

- An exposed individual with a fever higher than 38.1°C (100.6°F) and showing symptoms, which resembles listeriosis and for whom no other cause of illness is known should be tested and treated simultaneously for presumptive listeriosis (15).
- The antimicrobial therapy consists of high-dose intravenous ampicillin (at least 6 g/day) for nonallergic patients for at least 14 days in pregnant women and for 21 days in other individuals (15, 16). Frequently, gentamicin is added to the treatment regimen because it has demonstrated synergism with ampicillin but usage
of gentamicin in pregnant women is slightly controversial owing to its toxicity (16).

- People who are allergic to penicillin, ampicillin, or both should be treated with trimethoprim with sulfamethoxazole (15).
- In pregnant women, Foetal surveillance should be mandatorily carried out in these cases (16).

2018 outbreak shows the same demographics in terms of affecting the elderly population and the immunocompromised people.

- As compared to 2010 & 2014, this outbreak has affected a greater number of females i.e. 13 females out of 22 cases, whereas 2010 showed 54% males and 2014 showed 51% males.
- The strain identified in 2018 outbreak is listeria serotype 4b strain ST240 (1, 19)and in 2010, the strain most commonly identified was 1/2b, 3b, 7 binary type 158 (20).
- L. monocytogenes exposure in contaminated foods is fairly common in Australia. However, invasive listeriosis is an uncommon disease. From the year 2011 - 2015, in Australia, the five year mean was 78 cases per year, with a notification rate of 0.3 per 100,000 population (13).
- There have been 27 pregnancy related cases between the 2010 and 2014 and about 61 deaths associated with Listeria infection (13). In Australia, comprising 51 adult and 10 neonatal deaths (13).

2014

In 2014 in Australia, 80 cases of listeriosis notified to the National Notifiable Diseases Surveillance System (NNDSS) and the listeriosis cases were highest in the age group of 80 years or above, with just over half (51%, 41) of all notified cases being male (21).

2010

In 2010, 71 cases of Listeria monocytogenes infection was reported, a rate of 0.3 cases per 100,000, which is consistent with the 5-year historical mean of 0.3 cases per 100,000 (20) The 2010 notifications
consisted of a multi-jurisdictional outbreak which was associated with melons and did affect about 9 people (20). 76% of the notifications were in the people aged 60 years or more and males accounted for 54% of all notifications and 21% of cases died in 2010 (20). The most prevalent strain of *Listeria monocytogenes* was serotype 1/2b, 3b, 7 binary type 158 (20).

### 2009

However, the increased number of cases in 2009 was the result of multijurisdictional outbreak, linked to the chicken wrap solds on domestic flight across Australia (22). 2009 records a total of 36 cases and 4 deaths. In 2009, the annual incidence of Listeria was the highest recorded since the OzFoodNet network was established in 2000 (22).

### 2003

Usually, about 60-70 cases of listeriosis is notified annually with case fatality rate of 20-30%. Despite the spike in cases in 2003, no common source of the outbreak could be identified (22).

### South Africa Outbreak 2017

South Africa faced a massive outbreak of Listeriosis in 2017. From the period of January 2017 to May 2018, there have been 1034 laboratory confirmed cases and more than 200 deaths (23). About 400 neonates were affected which comprised 42% of the affected population and there was a high mortality rate. The case fatality rate of this outbreak was estimated to be 28.6%, which is quite comparable to similar outbreaks reported globally (23). The outbreak was declared on 5th December 2017 and contaminated food products recall began in March, 2018 (23). This outbreak demonstrates the cost of underinvestment in food safety systems in SA (23). Ninety one percent of the strains belonged to *Listeria monocytogenes* Sequence Type 6 (ST6) (24).

### Unusual features

- There were no unusual features identified in cases of Listeria infection this year. The commonly affected people were the immunocompromised and predominantly elderly people and the 2018 listeriosis outbreak linked to rockmelons shares many characteristics with previous overseas outbreaks (7).
- Consequently, onsets of illness were distributed between 17 January – 10 April 2018, with no obvious clustering at one point in time (7).
All Listeria monocytogenes positives were further identified as the outbreak WGS strain (7).

**Critical analysis**

**Do environmental conditions affect the emergence of outbreak despite strong and well-regulated food hygiene and safety practices in Australia?**

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 (13)–

- implementation of standard food safety and hygiene protocols and application of Hazard Analysis Critical Control Points (HACCP) principles to decrease the frequency and limit the extent of contamination of *L. monocytogenes* in ready-to-eat (RTE) foods (13)
- improvement of the integrity of the cold chain through processing, distribution, retail with the aim to limit the growth of *L. monocytogenes* (13)
- improved communication about the risk factors, particularly for pregnant women (13)

However, despite these regulations, Listeria infection is still persistent in Australia (7). 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 *Listeria monocytogenes* present on rockmelons prior to harvest (7). Moreover, the netted skin of rockmelons makes this fruit particularly hard to clean and sanitise. The contamination level found on the surface of the rockmelon was quite low (under 100 cfu/g based on the epidemiological data) (7).

Hence this outbreak necessitates the need for better control measures and increased awareness of external threats to food industry as seen in case of rockmelon outbreak, where environmental conditions has a role in affecting the efficacy of the established control measures (7). Moreover to manage the risk, a more unified communication strategy across regulatory authorities is needed to educate the at-risk population (7).

**Comparative analysis of Australia vs South Africa outbreak**

More than 1000 people have been diagnosed with Listeriosis and about 216 deaths have been reported in the 2017 outbreak in South Africa (25). Despite these rising cases, there has been a tremendous delay in the
actions taken by the health authorities and the government to trace the source of *Listeria monocytogenes* outbreak. According to the South African National Institute for Communicable Diseases (NICD) a shortage of the solution used for testing for the *Listeria* bacteria delayed the results of the tests at the suspected source, the Polokwane factory were by two weeks. Following this source identification, the recall of the contaminated product was initiated.(26)

Australia has had 22 diagnosed cases and 7 death cases in the recent outbreak (3). The timely epidemiological and environmental investigation was conducted which resulted in early detection of the outbreak source and early recall was implemented, which limited the number of cases in Australia (3). 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 (27).

As stated by a food processing magazine in SA “No foodborne disease is acceptable, but I really think we should be acknowledging the speed and efficiency of the Australian response, especially when you compare it to the South African experience”(26).

**Australia’s vigilant actions in preventing and containing the outbreak in situations of similar outbreaks in Europe**

Australia’s prompt response to counter the potential fears of Listeria contamination from Europe, the Food Standards Australia and New Zealand (FSANZ) recalled popular brands of frozen vegetables from supermarkets, as some vegetables were imported from Europe (28). Belgium-based frozen food distributor Green yard Frozen NV carried out the recall of its products, which were sold in various across Woolworths, Aldi and IGA stores(29).

This outbreak in Europe has affected various countries in the continent and has infected at least 47 cases and killed 9 people (29)

Food Standards Australia New Zealand did issue a warning for the general public to check freezers for the contaminated product and clearly mentioned the name of the product with its packaging details(28). Initially the suspected source was believed to be corn but later it expanded to include other frozen vegetables as well (29).

However, one person died in Victoria linked to European strain of *Listeria*, but the efforts help contain the effect and prevent its spread (30).
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