# Managing the risk of *Listeria monocytogenes* in health services

A summary of the *Listeria* workshop held on 25 August 2016

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# Key messages

- Because *Listeria monocytogenes* are very common in the environment, your **food safety program** should include measures to mitigate the risk to patients in your care.
- *Listeria monocytogenes* are reasonably acid and salt tolerant, and can grow at refrigeration temperatures (< 5 $^{o}$C).
- These organisms are readily killed by heat (70 $^{o}$C) and food grade sanitisers and disinfectants.
- High risk foods can include ready to eat meats, cheeses, fresh fruit and vegetables.
- Managing the risk to patients involves:
  - substituting lower risk options (see table 3)
  - careful attention to temperature control of foods prepared and stored
  - managing production sizes so unused portions are not retained for more than 24 hours
  - monitoring the effectiveness of cleaning and sanitising processes.

## Sources

Presentation by Tom Ross '***Listeria monocytogenes:* epidemiology and ecophysiology'** Food Safety Centre, University of Tasmania for the DHHS *Listeria* Workshop held 25 August 2016.

Presentation by Dr Kari Gobius '**Control of *Listeria monocytogenes* in hospitals'** Research Group Leader – Food Safety & Stability, CSIRO for the DHHS *Listeria* Workshop held 25 August 2016.


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# Introduction

The Chief Health Officer of Victoria, Professor Charles Guest, and the Food Safety Unit at the Department of Health and Human Services held a professional development workshop via webinar in August 2016. The workshop was designed specifically for health service employees who are responsible for managing the risk of *Listeria monocytogenes* (*L.* monocytogenes) to ensure safe food is served to patients. Managing the risk of *L. monocytogenes* to patients requires careful management by key health service staff, such as dietitians, food service managers and food handlers. This workshop provided information on how staff can manage this risk and also provided a forum where participants could ask specific questions of food safety experts.

Dr Kari Gobius, Principal Food Safety Researcher at the CSIRO Werribee, and Dr Tom Ross, Associate Professor of Food Microbiology at the University of Tasmania gave brief presentations about *L. monocytogenes* and ways to reduce the risk to patients, followed by a question and answer session. Dr Heather Haines, Manager of the Evidence Team in the Food Safety Unit moderated the workshop. The topics covered included *L. monocytogenes* growth behaviour, methods for managing the risk of the bacterium in the food preparation environment, and identifying food preparation methods that enable safe food to be served to patients. The following is a summary of the material presented by the expert panel members.

## *Listeria monocytogenes*

### Listeriosis

Illness as a result of infection by *L. monocytogenes* is characterised by:

- high mortality although the overall number of cases is low
- the most susceptible are the very young, old, pregnant and immuno-compromised patients
- a potentially long incubation period – over two months
- 85 per cent of cases have known predisposing factors.

**Table 1: Relative susceptibility – predisposing host factors that influence susceptibility**

| Population group | Susceptibility relative to health young adult (=1) |
|---|---|
| Transplant recipients | 2584 |
| AIDS patients | 865 |
| Pregnant woman | 10-40 |
| Perinatal and neonates | 839 |
| Dialysis | 476 |
| Cancer | 70-110 |
| Over 65 years | 7.5 |

### Pathogen Profile

The main route of infection of *L. monocytogenes* is believed to be through food contamination, through cross contamination or through the organisms being naturally occurring in the food.

*L. monocytogenes* is:

- ubiquitous in the environment
- salt tolerant – for example, it can grow in foods that salt has been added to for partial preserving action, such as ready-to-eat ham, smoked fish, or environments containing 14-15 per cent salt (NaCl) ($a_w$>0.92)
- cold tolerant – grows at refrigeration temperatures (4 °C) and possibly as low as 0 °C
- moderately acid tolerant – for example, it can't grow in foods where the pH is less than 4.2 although, in fermented foods, growth may be prevented at somewhat higher pH due to the presence of lactic acid formed during the fermentation process
- readily killed by heat; 70 $^{o}$C for two minutes.

## Eco-physiology

Table 2 provides an indication of the rate at which *L. monocytogenes* can grow in food. Semi-preserved products such as cheese, ham and smoked salmon, have salt, sugar, starter culture or other treatment added to them to extend their shelf life. *L. monocytogenes* can still grow in these types of foods however the growth rate may be slower. The growth rate times in Table 2 can be doubled for an indication of the slower growth expected in semi-preserved products.

**Table 2: Growth rate in food of *L. monocytogenes***

| | |
|---|---|
| **Growth rate in food:** | At 37 $^{o}$C, 10 fold increase every two hours |
| | At 20 $^{o}$C, 10 fold increase every three-four hours |
| | At 4 $^{o}$C, 10 fold increase two-three days |

## How to kill *L. monocytogenes* with heat

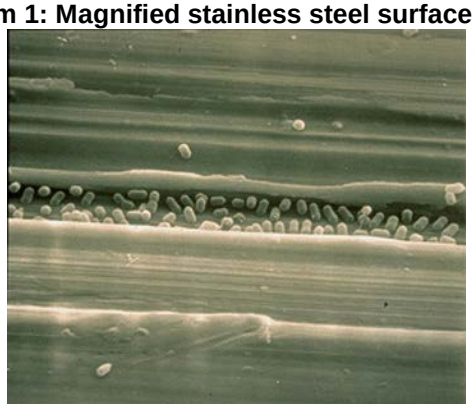
To achieve a 6D reduction of *L. monocytogenes* (that is, a reduction of the number of bacteria from 1,000 000 to one), cooking food at a minimum of 70 $^{o}$C for two minutes will kill *Listeria* species and other pathogens present. Rapid chilling post cooking also helps to minimise the risk from *L. monocytogenes*. This cooking temperature and time combination does not destroy some toxins formed by other pathogens, or spores that may germinate in suitable conditions post-cooking. Your food safety program will have instructions on cooking temperatures to be met.

# Cleaning and sanitising

*L. monocytogenes* is easily killed by sufficient heat, chlorine-based sanitisers and quaternary ammonia-based food safe sanitisers[1]. Your food safety program will provide detail about how to undertake an effective cleaning and sanitising regime. Check the method in the food safety program, and make sure staff are following it correctly.

It is important the cleaning is effective or the sanitiser will react with the food residue and other soil left on the surface, reducing the effectiveness of the sanitiser[2]. There are many types of food safe sanitisers on the market. Each should be assessed for safety and effectiveness before adopting it for use.

**Diagram 1: Magnified stainless steel surface harbouring *L. monocytogenes***



*This electron micrograph image shows how* L. monocytogenes *can survive in the grooves of a stainless steel surface, like a food preparation bench top. This makes thorough cleaning, followed by sanitising, an important control mechanism.*

# Your food safety program

Your food safety program should include a process to follow when you are considering changing practices for food preparation. This includes practices such as if you decide to alternate the type of sanitiser used in the kitchen environment. Keep minutes of the food safety management team meetings and record any agreed changes to practices. For example, use the Material Safety Data Sheet and evidence of efficacy of a sanitiser proposed to be

[1] NSW Food Authority. Risk assessment of the vulnerable persons food safety scheme 2012. NSW/FA/CP056/1204 (page 22)

[2] FSANZ. Safe Food Australia – A guide to the Food Safety Standards, 2nd ed., 2001

adopted as supporting documentation for the decision. Ongoing verification of a sanitiser's efficacy can also be used to support the decision.

The new practices should then be documented in the food safety program and the any changes to practice tracked for transparency. Keep a change log with the program for the food safety auditor; they will review these changes as part of the kitchen audit. Remember to train staff in safe handling and correct use before the changes are implemented.

### Changing the food safety program and requirements under the Victorian *Food Act* (1984)

Your health service must be externally audited by a Department of Health and Human Services-approved food safety auditor within three months of making changes to your food safety program. The food safety auditor will check any changes in procedure as well any supporting evidence. You can find the list of approved food safety auditors at <https://www2.health.vic.gov.au/about/publications/factsheets/approved-food-safety-auditors

**Case Study 1:** At the rural hospital, a chlorine-based food safe sanitiser has been in use for two months in the kitchen. Staff are happy using it and know the measures off-by-heart when preparing bottles weekly. Sean was conducting an internal audit and looked up the procedure for sanitiser use in the food safety program. He found staff should be preparing the bottles daily, not weekly, as the chlorine evaporates over time and loses its efficacy. As the food safety program procedure was to prepare it daily, Sean notified the food safety supervisor who retrained all the kitchen staff. They now prepare it daily, and no change was necessary to the program.

**Case Study 2:** Mi Kim is a dietitian who learnt about alternating sanitisers at a food safety workforce development event. She discussed the benefits with the food safety supervisor at her health service, and suggested they adopt a food safe quaternary ammonium-based sanitiser for use with the existing chlorine-based one they use now in a three month alternating pattern.

The food safety supervisor consulted the food safety program and read about convening the food safety management team for decisions such as this one. A meeting was called with an agenda circulated. The team discussed the benefits and disadvantages of adopting the alternating sanitiser proposal. Mi Kim brought documentation from the cleaning supplies company that showed the effectiveness of the sanitiser, as well as the Material Safety Data Sheet. The food safety supervisor outlined what training would need to be undertaken to implement a new sanitiser.

The team elected to trial it for three months and increase the environmental microbial monitoring to build evidence of its efficacy. The food safety supervisor agreed to train staff in its use by the beginning of the month, and changes were made to the food safety program to reflect this practice. The food safety auditor was notified of the change, and agreed to audit the health service in two and half months. Minutes of the meeting were recorded, and the next meeting was set in two weeks when everyone would report on their actions.

## Controlling the risk of *Listeria monocytogenes*

High risk food in sealed packaging, whether it has been heat or otherwise treated to prevent the growth of bacteria, should be used and discarded within 24 hours once the package is opened.

**Case Study 3**: Roast chicken was cooked at a hospital for lunch on Monday, and cooled in the blast chiller at 1.30pm. The chicken was then shredded for use in sandwiches. It is recommended the chicken is not served to high risk patients after 24 hours has passed. Applying this guideline resulted in the sandwiches containing chicken served at lunch on Tuesday being discarded by 1.30 pm.

## Food substitution or method of preparation changed to manage risk

**Table 3: Swap options to potentially lower the risk of *L. monocytogenes***

| Lower risk option | Higher risk option |
|---|---|
| Roast chicken prepared prior to meal service | Pre-packaged diced chicken that does not go through a subsequent cooking step or in pack heat treatment |
| Fresh cooked salmon, chilled and served within 24 hours | Cold or hot smoked salmon that doesn't undergo further cooking |
| Fruit salad prepared and served daily | Fruit salad prepared on Friday and served on Sunday |
| Retorted meat product (meat cooked in the can) used within 24 hours of opening | Pates |
| Hard cheese, such as cheddar | Soft cheeses, such as brie |
| Pre-sliced ham that is packaged and heat treated in the final package by the manufacturer, and used within 24 hours of opening | Pre-sliced ham that is not heat or otherwise treated in the package |

# Environmental monitoring for *Listeria monocytogenes*

An environmental monitoring program in the kitchen/food preparation area can include swabs for indicating the presence of pathogens such as *Listeria* species or *L. monocytogenes*, or hand-held bioluminescence devices for indicating the efficacy of cleaning and sanitising practices. *L. monocytogenes* are typically haemolytic bacteria: that is, they break down sheep red blood cells incorporated into bacterial culture media. However, there are other haemolytic *Listeria* species, including some non-pathogenic species. Detection of non-haemolytic *Listeria* species in a food processing environment may indicate that the strains detected are not pathogenic, but could serve as an indicator for the presence of *L. monocytogenes* in the same environment.

Your food safety program should have details on what sampling method, locations and frequency to undertake, and may include the following:

What to sample:

- food contact surfaces such as worktops and utensils
- food products such as prepared sandwiches and cold desserts
- ingredients – raw meats and raw seafood.

When to sample:

- as per your food safety program
- after food preparation to find out if *Listeria* species were present during preparation
- after cleaning and sanitising – is it effective?

Types of microbial testing or monitoring can be implemented in a smaller facility:

- many rapid tests available
- usually needs an incubation step such as store at 37 $^{o}$C for 24-30 hours
- bioluminescence testing to indicate surface contamination.

Considerations:

- The equipment required?
- Whether the method has been validated? Look for Australian Standards methods, or AOAC International approved methods, or other certification systems.

## Helpful websites and reference documents

Advice for health professionals about Listeriosis including control measures:

http://www.cdc.gov/listeria/

Advice for the public about Listeriosis

https://www.betterhealth.vic.gov.au/health/healthyliving/food-poisoning-listeria

### External sources of information:

Department of Health and Human Services disease information

https://www2.health.vic.gov.au/public-health/infectious-diseases/disease-information-advice/listeriosis

New South Wales Food Authority: Vulnerable person's food safety scheme

http://foodauthority.nsw.gov.au/aboutus/science/risk-assessment-of-food-safety-schemes/vulnerable-persons-food-safety-scheme

United Kingdom Food Standards Agency: Reducing the risk of vulnerable groups contracting Listeriosis

http://www.food.gov.uk/sites/default/files/listeria-guidance-june2016.pdf

Suppliers of relevant testing services and kits can be accessed through the Yellow Pages http://www.yellowpages.com.au/. Search for 'laboratory supplies'.

For further assistance or advice, please contact the Food Safety Unit, Department of Health and Human Services on phone: 1300 364 352 or by email: foodsafety@dhhs.vic.gov.au.