Experimenting at Uni: **Salmonella** in laboratory students

Timothy S. Sloan-Gardner

# Case Report

Laboratory-acquired infections are generally considered a potential hazard for those employed in microbiology and pathology laboratories.1–3 However, outbreaks associated with teaching laboratories overseas highlight the risks for students working with bacterial pathogens.4–6

This article describes the first two known cases of non-typhoidal salmonellosis acquired from a university teaching laboratory in Canberra, Australian Capital Territory (ACT), Australia. Ethics approval was not sort for this investigation as the data were collected for the purpose of public health surveillance.7

Keywords: salmonellosis, laboratory-acquired, case study, public health.

## Case 1

A 20-year-old female presented to the emergency department with a three-day history of vomiting, abdominal cramps and watery diarrhoea. She was admitted to hospital and treated with intravenous fluids and oral antibiotics. The patient’s symptoms improved and she was discharged after two days.

A faecal sample collected on the day of admission was examined for a range of pathogens by ACT Pathology at the Canberra Hospital, Garran, Australian Capital Territory. Standard bacterial cultures were set up to test for the presence of Salmonella, Campylobacter and Shigella; antigen tests were conducted for rotavirus and norovirus, and direct microscopy was performed for parasites.

The stool sample was culture positive for Salmonella enterica. The sample was sent for further typing to the Microbiological Diagnostic Unit Public Health Laboratory (MDU) in Melbourne, Victoria. The isolate was typed as serovar Typhimurium, with a multiple-locus variable-number tandem repeat analysis (MLVA) pattern of 04-16-07-00-517. This pattern had not been seen before in the ACT.

The case reported consumption of chicken and eggs in the week before the onset of symptoms, as well as contact with animals (cat and turtle). None of the case’s friends or family members had been ill recently nor had the case travelled outside of Canberra. The case did participate in an undergraduate microbiological course at a university in Canberra in the two weeks prior to symptom onset. The case’s stool was still positive for S. Typhimurium MLVA pattern 04-16-07-00-517 two months after initial symptom onset.

## Case 2

A 20-year-old male presented to the emergency department almost two months after the first case, with a five-day history of abdominal pain, bloody diarrhoea and nausea. The case was admitted to hospital and treated with intravenous fluids and oral antibiotics. The patient’s symptoms improved and he was discharged after five days.

A stool sample collected on the day of admission for the second case was also positive for S. Typhimurium MLVA pattern 04-16-07-00-517.

The second case reported consumption of chicken and eggs in the week before the onset of symptoms, though no contact with animals. None of the case’s friends or family members had been ill recently nor had the case travelled outside of Canberra. The second case was in a later cohort of the same undergraduate microbiological course as Case 1.

# Investigation

Whilst both cases attended the same course, they were in separate classes which used the same teaching laboratory. Additionally the cases were not known to each other; consequently, person-to-person transmission between the cases was thought unlikely.

In the course, students undertook routine bacterial culture and biochemical identification of Salmonella, Shigella, Escherichia coli and Staphylococcus aureus cultures. The seed stocks for these organisms had been in the university for a number of years and their exact type/subtype was unknown.

The university provided a sample of the Salmonella used in the course for typing, which matched the two cases; S. Typhimurium MLVA pattern 04-16-07-00-517.

Whilst the convenors had undertaken a risk assessment for the course, a review identified some deficiencies which were later addressed. These included:

* As part of the course, the students received laboratory safety information and a presentation. Whilst students were only required to wear gloves if they had unhealed cuts or abrasions on their hands and were instructed to practise appropriate microbial techniques, there was no direct observation of appropriate hand washing during or upon leaving the laboratory.
* Students were not restricted, merely discouraged, from bringing any personal equipment (e.g. mobile phones, books, pens) into the laboratory.
* There was a need for a new non-pathogenic strain of Salmonella for use in future classes.

# Discussion

Whilst both cases had reported consumption of chicken and eggs prior to their illness, there was no link in location nor brands.

This case report highlights the need to take into account non-traditional exposures when investigating novel Salmonella Typhimurium subtypes. It also adds to the evidence of the risk of laboratory-acquired infections in teaching laboratories. Whilst the university had undertaken a risk assessment for the course and students were provided with safety instructions, the lack of restrictions on students bringing their personal belongings into the laboratory likely facilitated exposure to the pathogens being tested. Universities should review current risk assessments to mitigate the chances of laboratory-acquired infections occurring in teaching laboratories.

# Acknowledgements

The authors acknowledge the following persons and organisations for their assistance with the investigation: Deborah Denehy and staff at the ACT Government Analytical Laboratory; staff at ACT Pathology, The Canberra Hospital; Mary Valcanis and staff at the Microbiological Diagnostic Unit, Melbourne, Victoria; and staff at the unnamed university

# Author Details

Timothy S. Sloan-Gardner1

1. OzFoodNet, Health Protection Service, ACT Health, Holder, Australian Capital Territory.

## Corresponding author

Timothy S. Sloan-Gardner

Health Protection Service,

Population Health, Protection and Regulation,

25 Mulley Street,

Holder, Canberra ACT 2611.

Telephone: +61 02 5124 9210.

Email: Timothy.Sloan-Gardner@act.gov.au.

# References

1. Alexander DC, Fitzgerald SF, DePaulo R, Kitzul R, Daku D, Levett PN, et al. Laboratory-acquired infection with Salmonella enterica serovar Typhimurium exposed by whole-genome sequencing. J Clin Microbiol. 2016;54(1):190–3.
2. Barker A, Duster M, Van Hoof S, Safdar N. Nontyphoidal Salmonella: an occupational hazard for clinical laboratory workers. Appl Biosaf. 2015;20(2):72–4.
3. Weinstein RA, Singh K. Laboratory-Acquired Infections. Clin Infect Dis. 2009;49(1):142–7.
4. Centers for Disease and Control Prevention. Human Salmonella Typhimurium infections linked to exposure to clinical and teaching microbiology laboratories 2017. [Internet.] [Updated 19/07/2017.] Available from: https://www.cdc.gov/salmonella/typhimurium-07-17/index.html .
5. Centers for Disease and Control Prevention. Human Salmonella Typhimurium infections linked to exposure to clinical and teaching microbiology laboratories (final update) 2014. [Internet.] [Updated 5/06/2014.] Available from: https://www.cdc.gov/salmonella/typhimurium-labs-06-14/index.html .
6. Centers for Disease and Control Prevention. Human Salmonella Typhimurium infections associated with exposure to clinical and teaching microbiology laboratories (final update) 2011. [Internet.] [Updated 17/01/2012.] Available from: https://www.cdc.gov/salmonella/2011/lab-exposure-1-17-2012.html .
7. Australian Capital Territory. Public Health Act 1997. Available from: http://www.legislation.act.gov.au/a/1997-69/.

**Communicable Diseases Intelligence**

ISSN: 2209-6051 Online

**Communicable Diseases Intelligence (CDI) is a peer-reviewed scientific journal published by the Office of Health Protection, Department of Health. The journal aims to disseminate information on the epidemiology, surveillance, prevention and control of communicable diseases of relevance to Australia.**

**Editor:** Cindy Toms

**Deputy Editor:** Simon Petrie

**Design and Production:** Kasra Yousefi

**Editorial Advisory Board:** David Durrheim, Mark Ferson, John Kaldor, Martyn Kirk and Linda Selvey

**Website**: <http://www.health.gov.au/cdi>

**Contacts**Communicable Diseases Intelligence is produced by:   
Health Protection Policy Branch, Office of Health Protection, Australian Government Department of Health  
GPO Box 9848, (MDP 6) CANBERRA ACT 2601

**Email:** [cdi.editor@health.gov.au](mailto:cdi.editor@health.gov.au)

**Submit an Article**You are invited to submit your next communicable disease related article to the Communicable Diseases Intelligence (CDI) for consideration. More information regarding CDI can be found at: <http://health.gov.au/cdi>.

Further enquiries should be directed to: [cdi.editor@health.gov.au](mailto:cdi.editor@health.gov.au).

This journal is indexed by Index Medicus and Medline.

Creative Commons Licence - Attribution-NonCommercial-NoDerivatives CC BY-NC-ND

© 2019 Commonwealth of Australia as represented by the Department of Health

This publication is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International Licence from <https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode> (Licence). You must read and understand the Licence before using any material from this publication.

**Restrictions**The Licence does not cover, and there is no permission given for, use of any of the following material found in this publication (if any):

* the Commonwealth Coat of Arms (by way of information, the terms under which the Coat of Arms may be used can be found at [www.itsanhonour.gov.au](http://www.itsanhonour.gov.au/));
* any logos (including the Department of Health’s logo) and trademarks;
* any photographs and images;
* any signatures; and
* any material belonging to third parties.

**Disclaimer**Opinions expressed in Communicable Diseases Intelligence are those of the authors and not necessarily those of the Australian Government Department of Health or the Communicable Diseases Network Australia. Data may be subject to revision.

**Enquiries**Enquiries regarding any other use of this publication should be addressed to the Communication Branch, Department of Health, GPO Box 9848, Canberra ACT 2601, or via e-mail to: [copyright@health.gov.au](mailto:copyright@health.gov.au)

**Communicable Diseases Network Australia**Communicable Diseases Intelligence contributes to the work of the Communicable Diseases Network Australia.  
<http://www.health.gov.au/cdna>