

# CHRONIC CARRIAGE AND FAMILIAL TRANSMISSION OF TYPHOID IN WESTERN SYDNEY

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## Introduction

Typhoid is a systemic bacterial disease caused by *Salmonella enterica* subspecies *enterica* serovar Typhi (commonly *S. Typhi*).<sup>1</sup> It is usually contracted by ingestion of food or water contaminated by faecal or urinary carriers excreting *S. Typhi*.<sup>2</sup> Typhoid continues to contribute to the global burden of disease, particularly in countries with low and middle gross national income.<sup>1</sup> Locally acquired cases of typhoid in Australia are uncommon, with most cases being associated with international travel.<sup>3</sup>

Humans are the only known hosts for *S. Typhi* and no animal or environmental reservoirs have been identified. People with typhoid typically present with a sustained fever, headache, malaise and anorexia. The clinical picture of typhoid varies depending on the severity of the disease. The case fatality rate is usually below 1% if appropriate antibiotic treatment is given.<sup>1</sup> The incubation period ranges from 3–60 days (usually 8–14 days) and about 10% of untreated typhoid patients excrete *S. Typhi* for 3 months after onset of symptoms.<sup>1</sup> Chronic carriage occurs in 3%–5% of the population infected with *S. Typhi*, with the gallbladder a site of persistence.<sup>4</sup> This is an important public health issue, as carriers act as a reservoir for further spread of the disease through bacterial shedding in faeces.<sup>4</sup>

In New South Wales, typhoid is notifiable under the *Public Health Act 2010* and public health follow-up is required to prevent spread of the disease.<sup>5</sup> An epidemiological review of typhoid in New South Wales identified 250 case notifications between 2005 and 2011, of which 240 were believed to have been acquired overseas.<sup>3</sup> Case notifications remained stable over that period with the highest rates of typhoid (1.8 per 100,000) in Western Sydney Local Health District (LHD).<sup>3</sup>

From January to July 2013, the Western Sydney LHD received 17 case notifications for typhoid, which is an increase compared with 2012 figures (9 case notifications). The Western Sydney Public Health Unit (PHU) investigated the higher-than-usual number of typhoid case notifications compared with the same period in the previous year, with particular interest in the cases with no recent history of overseas travel, no overseas visitors and no epidemiological link to other recent cases. This case report examines the investigations and follow-up completed by the Western Sydney PHU for a family cluster of cases.

## Background and methods

In May 2013, the Western Sydney PHU received laboratory notifications for 2 cases of *S. Typhi* infection (confirmed from faecal culture). The cases were siblings (aged 3 years and 6 years), with symptom onset in late April 2013. Both children experienced fever, diarrhoea and vomiting and were admitted to hospital.

Following notification, the PHU conducted case management and investigations as per the NSW Health communicable diseases protocol.<sup>5</sup> An interview using a standardised questionnaire was conducted with the children's father to seek further information, to identify contacts and the likely source of infection. All contacts were screened using stool sampling, household contacts included the children's 8-month-old brother and both parents. Other contacts were 4 people in a family household where meals were shared. In addition, isolates that were identified as *S. Typhi* were phage typed at the Microbiological Diagnostic Unit, The University of Melbourne. Ethics approval was not required as the investigation and follow-up was conducted under the *Public Health Act 2010*.<sup>5</sup>

## Description of cluster

The results of the initial public health investigations indicated that the 2 cases were locally acquired. None of the family members reported that they had received vaccination for typhoid and there was no recent travel to typhoid endemic countries reported by the family, nor any recent visitors from overseas. The vaccination status of the household where meals were shared was unknown. The family had immigrated to Australia from Bangladesh a number of years previously, and only the father had travelled back to Bangladesh in 2011 for 3 weeks. The food suppliers used by the family were not associated with any other cases in Western Sydney.

Results of the screening of household contacts were negative for *S. Typhi* for the children's 8-month-old brother, their mother and all 4 members of the other household. However, *S. Typhi* was cultured from both screening stool specimens submitted by the children's father. *S. Typhimurium* was also isolated in one of these specimens. The father was asymptomatic, he did not report a history of chronic illness, nor was he taking any medication. He reported providing some assistance with his children's activities of daily living, specifically

with food preparation. Following the detection of *S. Typhi* in stool specimens, the father had an abdomen ultrasound that showed a single mobile gallstone measuring 7 mm in the gallbladder, which can be a site of persistence for *S. Typhi*.

Public health action to minimise the spread of infection included providing education to the family on hand hygiene, establishing there was no occupational, school or child care risks and ongoing management to ensure cases clear *S. Typhi*. All 3 familial cases were phage type E9, which has been shown to be found in Bangladesh.<sup>6</sup>

## Discussion

The public health investigations supported the hypothesis that the children's father was a chronic carrier of *S. Typhi* and the likely source of their infection. Chronic *S. Typhi* infections can persist for decades, infected individuals are highly contagious and typically asymptomatic, making the identification of carriers difficult.<sup>7</sup> An epidemiological study has shown a strong link between the development of the chronic carrier state and the presence of gallstones; approximately 90% of chronically infected carriers have gallstones.<sup>7</sup>

It is possible that the father contracted *S. Typhi* on his most recent trip to Bangladesh. Travellers who return to their country of origin to visit friends and relatives are at an increased risk of contracting diseases such as typhoid.<sup>8</sup> They are at higher risk as they are more likely to travel to rural areas, less likely to have received pre-travel advice, less likely to exercise food and water precautions, less likely to receive typhoid vaccination before travelling and have lower levels of perceived risk.<sup>8</sup> Travellers who are returning to their countries of origin to visit family and friends account for a large number of cases of typhoid reported in New South Wales. Of overseas acquired cases from 2005 to 2011, 77% were associated with people returning to their country of origin.<sup>3</sup>

The higher number of typhoid case notifications in Western Sydney LHD may reflect the cultural diversity of the area. Approximately 40% of the population report being born overseas and a high proportion of migrants report coming from typhoid-endemic areas.<sup>9,10</sup> This familial cluster highlights the importance of screening household members for *S. Typhi* carriage, particularly when there is no reported recent overseas travel or visitors from endemic countries.

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