

A foodborne outbreak of Group A streptococcus: an under-recognised method of spread

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ABSTRACT

Foodborne transmission of Group A *Streptococcus* (GAS) is a rare cause of pharyngitis outbreaks. This report details a GAS outbreak in New Zealand that was associated with a foodborne route of transmission. This outbreak was relevant in the New Zealand context given the high incidence of rheumatic fever (RF).

Foodborne transmission of Group A *Streptococcus* (GAS) is an uncommon but reported cause of pharyngitis outbreaks.¹⁻⁶ This mode of transmission is often overlooked due to the more common droplet transmission of GAS.²

An outbreak of GAS cases associated with a single event was reported to the Auckland Regional Public Health Service on 9 December 2019. There were approximately 100 attendees at this event, an “open day” function for a public service provider that took place on 29 November 2019. It was reported that many of the people who attended the event had become unwell within 1 to 2 days with a rapid onset of illness that included symptoms of fever, sore throat, headache, myalgia, lethargy, anorexia, malaise, vomiting and diarrhoea. Of those, multiple went on to test positive for GAS via a throat swab.

Food was provided at the function. The majority of the food was prepared by staff members onsite, with other plates being brought in from home.

Methods

There were around 100 attendees at the open day. This is an approximate number, as there was no set guest list for the event and attendees were able to bring family members/friends along. The number was identified with the assistance of multiple attendees.

Unwell cases were identified through a survey that was sent to attendees. This included questions about whether they had become unwell after the event, who attended the event with them, what symptoms they experienced, whether they had seen their family doctor about this and if any of

their household contacts had been unwell. See Appendix 1 for a copy of the questions asked. Staff from Auckland Regional Public Health Service followed up the cases that reported being unwell and ascertained whether they had been swabbed for GAS, and if so, what the result was and if this was treated with antibiotics. Unwell household contacts of cases identified in the survey were asked similar questions to those in the survey.

A confirmed case was defined as any person who attended the function or who was a contact of an attendee and had symptoms of a fever and sore throat or gastrointestinal symptoms **AND** a positive throat swab for GAS. These swabs were taken by healthcare professionals who used a bacterial swab to take samples from the patient’s oropharynx. These were then sent to a laboratory and cultured. A small number of positive samples were sent for M protein (emm) typing, which analyses the sequence of a portion of the emm gene that dictates the M serotype.

A probable case was defined as any person who attended the function or was a contact of an attendee and had symptoms of a fever and sore throat or gastrointestinal symptoms but without a positive throat swab. This included those who were swab-negative but symptomatic.

Results

There were 18 confirmed cases, and 30 probable cases of GAS. Of the confirmed cases, 14 attended the event, and 4 were contacts of attendees. Of the probable cases, 20 cases attended the event, and 10 were contacts. Not all probable cases were swabbed during their acute illness.

The index case was identified as an individual who subsequently reported being unwell 2 days prior to the event with a sore throat and malaise. This individual was identified as the only person who had been unwell before the event. Three days after the event, the index case sought medical attention for a toe infection. Their toe was swabbed and was positive for GAS (*Streptococcus pyogenes*). This infection was treated with a course of antibiotics (augmentin). The index case had lesions on their hands at the time of the event; while these had not been swabbed, from their symptoms and recent history, they would likely have been caused by GAS. They did not have a throat swab performed at this time.

The index case had worked preparing food (salads, meat, eggs, potatoes) the day before the event. This food was left without refrigeration overnight. In an outbreak, it would be expected that all positive samples would have the same emm serotype. M protein (emm) typing was performed on three of the positive throat swabs

from attendees. These were all positive for a common gene—emm12 GAS.

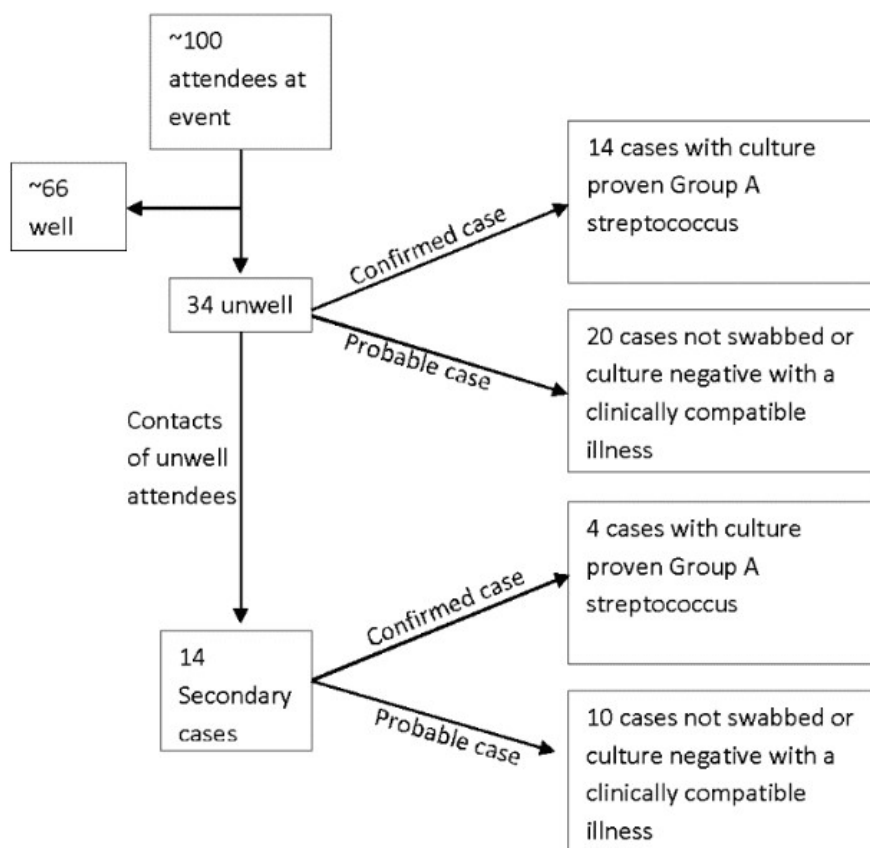
The attack rate was ~14% among attendees for confirmed GAS cases and ~34% (34/~100) including all confirmed and probable cases.

Discussion

From the outset this outbreak was investigated as a probable foodborne outbreak for several reasons. Firstly, most if not all attendees ate food at the event, and it is very unlikely that all attendees who became unwell (34% of attendees) were in close enough contact with the index case for droplet spread to occur.

Secondly, foodborne outbreaks of GAS due to food preparation by a subject with infected hand wounds, although infrequent, are well described in the literature.³⁻⁴ One case report describes an outbreak of 72 cases of GAS in a rural correctional centre in Australia that was associated with food contamination by a food handler with infected

Figure 1: Confirmed and probable cases of GAS in event attendees and their contacts.



hand wounds.⁴ In the outbreak reported here the index case had infected hand wounds, and a subsequently positive *Streptococcus pyogenes* culture result from a foot wound 3 days after the event, raising the possibility that the hand wounds were caused by the same bacteria.

Thirdly, there was a short incubation period, with the majority (23/34=68%) of cases that attended the event becoming unwell within 2 days after the event. There is evidence that foodborne outbreaks of GAS are associated with a shorter incubation period than outbreaks caused by respiratory transmission.³

Many GAS foodborne outbreaks have been associated with salad consumption.^{1,3,4} Salads are often implicated in foodborne transmission as they require significant hand contact during preparation.⁴ The index case reported here was involved in the preparation of a salad. While the index case used gloves to prepare the food, it is unclear if they had gloves on for the whole time of food preparation. Furthermore, this salad was left unrefrigerated overnight. This is an unsafe food hygiene practice and would have allowed the food to warm up, and therefore for GAS to multiply. The warming of food has been implicated in the majority of reported outbreaks.⁴ It follows that the majority of outbreaks occur in warmer months.⁴ The outbreak reported here occurred in summer in New Zealand.

The reason why this outbreak is particularly significant in the New Zealand context is due to the high prevalence of rheumatic fever (RF)/heart disease. In 2022, the rate of first episode RF hospitalisations in the age group 5–14 years was 8.8/100,000.⁷ Therefore, New Zealand is considered to have a moderate–high risk population for RF (a low-risk population is defined as an incidence <2/100,000 per year in school aged children [5–14 years old]).⁸ In New Zealand, GAS throat infections

in those who fall in a high-risk group for RF are treated aggressively to prevent subsequent rheumatic heart disease.⁹ Recent research shows that preceding Group A *Streptococcal* skin infections can also lead to acute RF.¹⁰ High-risk groups include people of Māori or Pacific ethnicity, aged 3–35 years, or living in crowded circumstances or in lower socio-economic areas of the North Island of New Zealand.⁹ If a throat swab is unable to be taken and followed up on in primary care, the recommendation is to treat those at high risk with a clinically compatible illness to Group A strep throat empirically with antibiotics.⁹ All the cases in this outbreak fell into a “high-risk” group for the development of RF/heart disease. This may be why some cases who became unwell were not swabbed for GAS and were empirically treated. Given the high-risk population that attended the open day, it was very important for Auckland Regional Public Health Service to identify all unwell cases and their contacts, and to ensure that they received medical attention +/- antibiotics.

Conclusion

This report outlines an interesting outbreak of foodborne transmission of GAS. Foodborne transmission should be considered as a possible cause when assessing outbreaks of GAS. Not all probable cases were swabbed during their acute illness. Hence, the number of confirmed cases is likely to be an underrepresentation. This report emphasises the importance of good food hygiene, hand washing and staying home when you are unwell to prevent further outbreaks.^{3–4} This was a particularly significant outbreak due to the high rate of RF in New Zealand, and the implications of untreated GAS pharyngitis in high-risk populations that were affected in this outbreak.

COMPETING INTERESTS

Nil.

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