

Food Safety Program Report: International Women's Day Luncheon Event Enteric Outbreak

To: Chair and Members of the Board of Health

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Recommendation

It is recommended that the Board of Health receive this report for information.

Key Points

- Boards of Health are mandated by the Ontario Public Health Standards (OPHS) to ensure 24/7 availability to receive reports of and respond to suspected and confirmed food-borne illnesses or outbreaks.
- Public Health Units are mandated to implement a food safety management system that among other elements calls for a risk-based inspection of food premises.
- Eighty-Eight attendees at an International Women's Day event held on March 8th at the Best Western Plus Orangeville Inn & Suites, reported gastrointestinal illness with symptoms including vomiting, diarrhea, headaches, and nausea. Implicated food had been prepared and served on-site by an outside caterer.

- An investigation included numerous food and stool samples, epidemiological analysis, and on-site assessments implicated toxins produced by *B. cereus* bacteria in quinoa and sweet potato served at the event.
- *Bacillus cereus* is a spore-forming bacteria that lives in the soil and can easily find its way onto vegetables and fruits. Rice and other starchy foods, meats, milk, vegetables, and fish have all been associated with *Bacillus cereus* illness.
- Illness occurs when people consume food that contains *Bacillus cereus* spores to which have been able to germinate and multiply. Given enough time, these bacteria can produce a heat stable toxin that causes illness such as vomiting.
- Outbreaks involving mass catering events are infrequent but have a great impact.
- The response to this outbreak was swift and followed proven outbreak response methods. An outbreak team was formed to identify and secure the suspect food sources to prevent further consumption.
- Public Health Inspectors will develop and communicate specific recommendations designed to prevent similar outbreaks from recurring.

Background

Food Borne Illness in Wellington-Dufferin-Guelph

Each year it is estimated that 1 in 8 people (4 million Canadians) get sick from contaminated food. Over 11,500 hospitalizations and 240 deaths occur each year due to food-related illnesses.¹

Enteric outbreaks are infrequent in Wellington-Dufferin-Guelph (WDG). In 2022, Wellington-Dufferin-Guelph Public Health (WDGPH) received and investigated 57 suspect foodborne illness complaints. No food-related enteric outbreaks were declared in 2022. It should be noted that an enteric (or gastroenteritis) outbreak involves two or more cases meeting the case definition with a common epidemiological link and with initial onset within a 48-hour period.

Public Health Inspectors Prevent Food Borne Illness

Boards of Health are mandated by the OPHS to ensure 24/7 availability to receive reports of and respond to suspected and confirmed food-borne illnesses or outbreaks. Boards of Health investigate and conduct additional inspections, as necessary to address a) Unsafe food-handling practices; b) Issues of non-compliance with regulations; c) Foodborne illness investigations and outbreaks; d) Complaints; and e) Other inquiries that the board of health deems appropriate, to assess potential health hazards in food premises.²

Public Health Units are also mandated to implement a food safety management system utilizing a hazard identification and risk-based approach for all food premises in the health unit, and shall include, but is not limited to an annual site-specific risk categorization process, an inspection process to assess risk of food safety practices and determine compliance with regulation, and provide consultation and education on food handling practices; and a monitoring and evaluation process to annually assess and measure the effectiveness of food safety strategies.² It is through these management system activities that public health inspectors identify food safety risks and to then take the appropriate education or enforcement action to reduce those risks and protect the public.

The role of the Public Health Inspector at WDGPH is summarized as: To Assess, Protect, and Improve. As it relates to Outbreak Response:

Assess: Collect information and samples, assess risk, form & test hypothesis, determine cause.

Protect: Secure and avoid further consumption of suspect contaminated food. Ensure the specified unsafe food handling practices or conditions are halted.

Improve: Identify factors that contributed to the outbreak. Provide additional education and other supports to food handlers to prevent a recurrence. Take steps to improve internal and external processes to enhance agency outbreak responsive and to reduce risks of recurrence.

What is Bacillus cereus?

This outbreak involved the vomiting form of *Bacillus cereus*. *Bacillus cereus* is a spore-forming bacteria that lives in the soil and can easily find its way onto vegetables and fruits. Rice products and other starchy foods, such as potatoes, pasta and cheese products have been implicated in the vomiting form of *Bacillus cereus* illness. Meats, milk, vegetables, and fish have been associated with the diarrhea form of the illness. Illness occurs when people consume food that has been temperature abused, allowing *Bacillus cereus* spores to germinate and multiply. Given enough time, this pathogen will proliferate and produce a heat stable toxin that causes illness.³

Discussion

The Outbreak Investigation

The initial response focused on identifying and securing the suspect food sources to prevent further consumption and to ensure samples were available for lab analysis. An outbreak team was formed, and the team began its investigative work in earnest. The quick and effective actions taken by public health inspectors on the evening of the outbreak and early the following day ensured that suspect food and ingredients were both secured from further consumption and were collected for laboratory analysis. This action protected the public and permitted a fulsome investigation.

A customized outbreak questionnaire was created by and distributed electronically via the event organizer to attendees. This unique method for capturing outbreak information contributed to a rapid epidemiological analysis.

In general, the outbreak investigation followed established processes. Refer to Appendix 1 for details of the investigation process steps.

Results of Investigation

The epidemiological analysis was based on information received up to and including March 14th, 2023, at 2:41pm from responses to the on-line outbreak questionnaire submitted by 213 of an estimated 264 individuals (244 guests and 20 food handlers/serving staff) associated with the outbreak. Key investigative findings are detailed in this report.

As indicated in Table 1, one hundred and ninety-three (193) respondents provided information on whether they had experienced gastrointestinal symptoms after consuming the meal. Of those respondents, 88 (45.6%) indicated that they had experienced symptoms, giving an attack rate of 45%. Since not everyone who attended the event (number estimated at 244 guests and 20 food handlers or staff) responded to the questionnaire, this is probably an over-estimation of the actual overall attack rate (percentage of people consuming the meal who were ill in the outbreak). The minimum attack rate that occurred, based on this estimated total number of guests and staff, was 33.3%. Six respondents were unsure whether they had experienced symptoms, indicating that the overall attack rate may have been slightly higher than 33.3% if those respondents had in fact become ill.

Symptoms at/after event?	Freq.	Percent
Unsure	6	3.1
No	99	51.3
Yes	88	45.6
Total	193	100.0

Nausea was the most common symptom, with 84.5% of ill respondents reporting this. Approximately 63% of ill respondents experienced vomiting, which in some cases was reported as very severe and protracted, and approximately 54% experienced diarrhea. Headache was also quite common among symptoms reported, with 44.0% indicating that they had experienced this symptom and some describing the headache as severe and persistent.

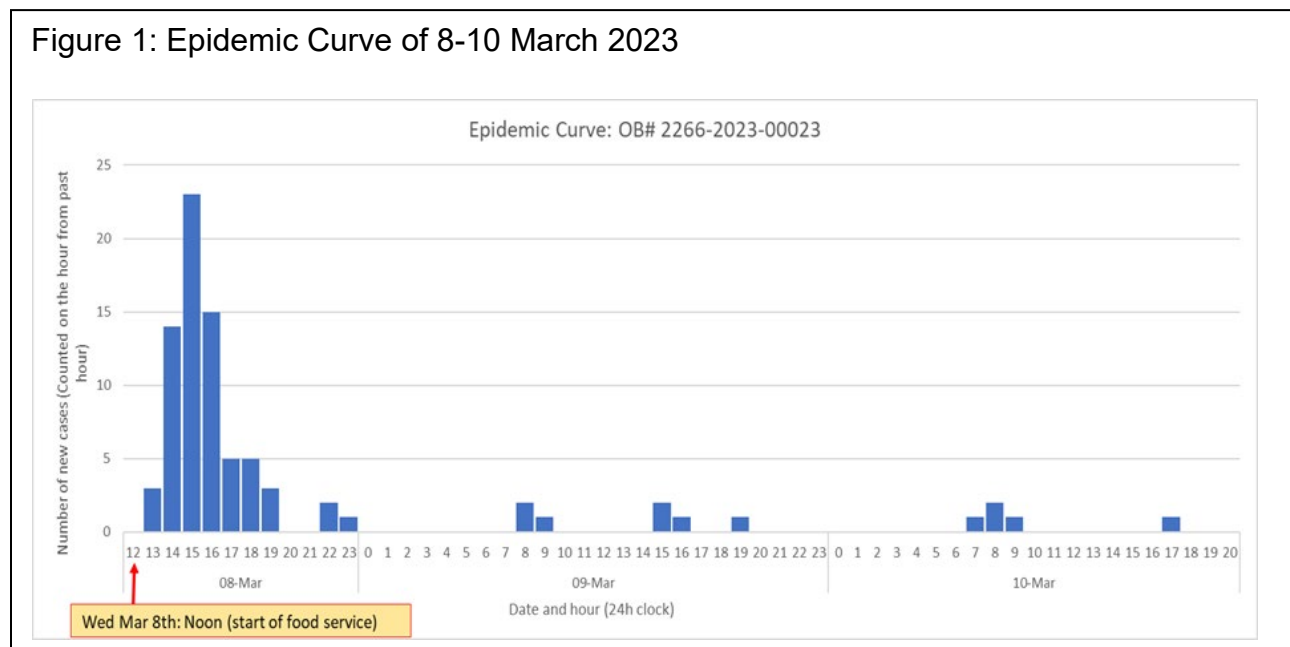
Most (70.7%) of respondents reporting illness had recovered by the time they responded to the survey one to three days after the event. However, 29.3% reported that they were still experiencing symptoms at that time. Based on the responses to the survey, two individuals indicated that they had visited the emergency room at a hospital for medical assistance and/or had been admitted for care.

The food exposures analysis showed that, based on data gathered from respondents to the outbreak questionnaire, the menu item most positively associated with illness, while also being statistically significant at the 10% level, was the chicken bowl, while the item most negatively associated with illness was the same bowl served with tofu instead of chicken.

This meant that guests and others who ate the chicken bowl were statistically more likely to become ill, whereas those who ate the same bowl with tofu instead of chicken were statistically less likely to become ill. However, some individuals who ate the chicken bowl did not become ill, while some who ate the tofu bowl did become ill.

The epidemic curve shown in Figure 1 illustrates the trend in new cases arising within each hour following the start of lunch service at the event, based on responses to the outbreak questionnaire. For each bar shown on the chart, new cases are counted on the hour for the previous hour (e.g., the bar for 1300h [shown as 13h on the chart] shows cases with onset between 12:01 noon and 1300h (1:00 pm).

Figure 1: Epidemic Curve of 8-10 March 2023



Results of tests conducted on the food samples submitted did prove to be conclusive, revealing that both the quinoa and sweet potato samples submitted for laboratory analysis produced high levels of the bacterium *Bacillus cereus*.

None of the clinical specimens (stool samples) submitted during this outbreak investigation yielded positive results for any of the laboratory tests performed for enteric gastrointestinal pathogens, including norovirus.

On-Site Inspection Findings

Public Health Inspectors conducted on-site food safety assessments on March 9th and March 16th at the Best Western Plus Orangeville Inn & Suites catering kitchen. The purpose of the initial March 9th visit was to identify and eliminate any visible hazards, to collect food samples and to secure suspect food or ingredients from future consumption.

The March 16th food safety assessment examined in detail the safety of food handling practices and food preparation steps of the two food items implicated by the laboratory. This assessment requires the advanced skills and expertise of Public Health Inspectors and utilized a HACCP (Hazard Analysis Critical Control Points) approach. The assessment revealed that the outside caterer's food preparation processes related to cooling, plating, and serving the quinoa resulted in the quinoa spending extended periods of time in what is referred to as the 'temperature danger zone' (4 - 60°C). Specifically, the containers used to cool product were too large to permit rapid cooling and the containers remained at room temperature for too long before being placed into the cooler. In addition, product remained at room temperature for an extended period during plating and service. Such extended time in the 'temperature danger zone' is associated with the growth and development of hazardous concentrations of bacterial cells or toxins.

Similarly, the food preparation processes related to cooling, plating, and serving the sweet potato also resulted in the sweet potato spending extended periods of time in this high-risk temperature range. Further, the caterer indicated that the sweet potato had not been washed prior to slicing or cutting. If this reflected what was usually done by the caterer, the use of unwashed sweet potatoes in the preparation of the meal served at the event would probably have resulted in surface contamination, such as bacteria, being introduced into the flesh of the sweet potato, increasing the likelihood of bacterial growth later in the food preparation process.

It should be noted that two other suspect food vendors at the event were identified, investigated, then removed as suspect.

Next Steps

Public Health Inspectors will develop and communicate specific recommendations designed to prevent similar outbreaks from recurring. Recommendations will focus on the elevated risks associated with mass catering (preparing and serving food for large groups at the same time). Mass catering requires specific skill sets, knowledge, processes, and equipment to adequately manage the risks and challenges associated with preparing and serving food to large groups of people.

These recommendations will be operator practice-based (for example, practices related to chilling or portioning / serving at mass catering events) but will also be system-based (for example, public health communication and training strategies with respect to food safety at mass catering events).

Health Equity Implications

Large scale food production (mass catering) presents elevated food safety risk. It is a common production and service practice in a wide range of settings, affecting a range of populations. For example, 37.8% of the Outbreak respondents were aged 50-59 and 27.5% were aged 60 or older. Mass catering also occurs at schools, health care settings, and seasonal special events to name a few. Food served at mass catering events is also often conducted by volunteers with lower levels of large-scale food handling experience and formal knowledge.

Continued and evolving efforts by public health inspectors to improve mass catering practices will serve to reduce food safety risk across all populations.

Conclusion

Outbreaks involving mass catering events are rare but have a great impact. The scarcity of outbreaks can be contributed in part to the inspection, enforcement, and educational role (Assess, Protect, Improve) carried out by public health inspectors.

When outbreaks do occur, the rapid and effective response by Public Health Inspectors in concert with highly skilled support functions and partner agencies is crucial to protect the public and to prevent future outbreaks.

Mass catering requires specific skill sets, knowledge, processes, and equipment to adequately manage the risks and challenges associated with preparing and serving food to large groups of people. This is a food safety risk area where Public Health Inspectors will continue to evolve the prevention approach to maximize safe food handling practices.

Ontario Public Health Standards

Foundational Standards

- Population Health Assessment
- Health Equity
- Effective Public Health Practice
- Emergency Management

Program Standards

- Chronic Disease Prevention and Well-Being
- Food Safety
- Healthy Environments
- Healthy Growth and Development
- Immunization
- Infectious and Communicable Diseases Prevention and Control
- Safe Water
- School Health
- Substance Use and Injury Prevention

2023 WDGPH Strategic Directions

- People & Culture:** WDGPH has an organizational culture of engagement, inclusion and agility.
- Partner Relations:** WDGPH collaborates with partners to address priority health issues in the community.
- Health System Change:** WDGPH is positioned to be an agent of change within the broader health sector.

References

1. Public Health Agency of Canada. Infographic: Food-related illnesses, hospitalizations and deaths in Canada. [cited 2023 April 24]. Available from: <https://www.canada.ca/en/public-health/services/publications/food-nutrition/infographic-food-related-illnesses-hospitalizations-deaths-in-canada.html>
2. Ministry of Health and Long-Term Care. Ontario Public Health Standards. Effective February 2019. [cited 2023 April 24]. Available from: [Food Safety Protocol, 2019 \(gov.on.ca\)](#)
3. British Columbia Centre For Disease Control. Bacillus cereus. [cited 2023 April 24]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/bacillus-cereus>

Appendices

Appendix A

WDGPH's Outbreak Response and Investigation Process Summary

