

## At-a-glance

# Sentinel surveillance of emergency department presentations for barbecue brush-related injuries: the electronic Canadian Hospitals Injury Reporting and Prevention Program, 2011 to 2017

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## Abstract

A barbecue (BBQ) brush is a common household item designed for cleaning grills used for barbecuing. Data from the electronic Canadian Hospitals Injury Reporting and Prevention Program database were analysed to estimate the frequency of injuries related to BBQ brushes as a proportion of all injuries, as well as to describe characteristics associated with such injury events. Between April 1, 2011 and July 17, 2017, BBQ brush injuries were observed at a frequency of 1.5 cases per 100 000 eCHIRPP cases (N = 12). Findings suggest that in addition to risks associated with the ingestion of loose BBQ brush bristles attached to foods, loose bristles could also result in injury via other mechanisms.

**Keywords:** *barbecue brush, grill brush, bristle*

## Introduction

Canadian surgeons are warning people of the potential dangers of loose wire bristles following continued reports of injuries related to the ingestion of wire bristles from a barbecue (BBQ) brush. In one case, a man who struggled with unexplained stomach pains was found to have ingested a BBQ brush bristle, which was ultimately surgically removed from his small intestine.<sup>1</sup> A BBQ brush is a cleaning tool used to remove residue from BBQ grills so as to ensure a clean cooking surface. These bristles, which are often made of steel, may break off or detach from the brush, remain on a BBQ grill, and subsequently transfer to food cooked on the grill without being noticed. In their food safety tips for barbecuing, Health Canada advises people of this potential risk.<sup>2</sup> Studies have reported cases where, once ingested, these thin, sharp wire bristles have perforated or embedded along the

aerodigestive and gastrointestinal tract, including at sites such as the tongue,<sup>3</sup> pharynx,<sup>4</sup> small intestine/bowel,<sup>5</sup> and colon.<sup>6</sup>

Recent findings from the United States' National Electronic Injury Surveillance System (NEISS) database have identified 43 cases of wire bristle injury between 2002 and 2014.<sup>7</sup> The objective of this analysis is to identify and describe cases of injuries related to BBQ brushes that were captured within the electronic Canadian Hospitals Injury Reporting and Prevention Program (eCHIRPP) database.

## Methods

### Data source

The eCHIRPP<sup>8</sup> database is a dynamic web-based injury and poisoning surveillance system that collects patients' accounts of pre-event injury circumstances (narratives of "what went wrong") using an injury

## Highlights

- The electronic Canadian Hospitals Injury Reporting and Prevention Program (eCHIRPP) database allows for sentinel surveillance of near real-time injury trends and description of injury contexts.
- BBQ brush injuries have been identified in the eCHIRPP at a frequency of 1.5 cases per 100 000 eCHIRPP cases.
- Pediatric and non-pediatric cases had a similar frequency of BBQ brush injury at 1.4 cases and 1.6 cases per 100 000 eCHIRPP cases respectively, though the risk of this injury among these different populations is unknown.
- April and August were the months when injuries occurred most frequently, although injuries occurred through most months of the year.

reporting questionnaire completed during their visit to the emergency department (ED). Their records are supplemented by clinical information input by an attending physician or other staff, and data coders input additional information to complete the record.<sup>9</sup> This surveillance system better captures less serious cases of injury than traditional injury surveillance databases, such as mortality or hospital administrative data, and also provides details regarding the injury event. Records between

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April 1, 2011 and July 17, 2017 were extracted from the eCHIRPP database for all ages to use for the present analysis.

### Key variables

Cases of BBQ brush injury were identified when both of the following criteria were met. The case identification criteria were:

(i) Description of injury

- The direct cause of injury, or main factor for injury, was identified under “Kitchen gadgets and items, not elsewhere classified, including corkscrews, oven mitts, toothpicks, skewers, BBQ brush, etc.” (eCHIRPP code 358F), or
- The narrative text included bilingual terms such as “barbeque,” “barbecue,” “bbq,” or “bristle” (or variations thereof).

(ii) Nature of injury

- The nature of injury code indicated a foreign body in the individual’s body (code 31 to 37 NI). Existing eCHIRPP codes for patient’s age and the external cause, nature, and treatment of injury were used to describe the cases. Pediatric cases (ages 17 years and below) and non-pediatric cases (ages 18 years and above) were examined.

In instances where only one of the two criteria was met, an analyst adjudicated the case manually.

### Statistical analyses

Data mining syntax (PERL regular expressions)<sup>10</sup> was used when assessing narrative

text. This approach matches relevant character patterns within narrative text with specified search terms so as to identify relevant cases. Descriptive methods were used to present injury frequencies, and logistic regression was used to assess trends over time. Frequency estimates are presented as proportions relative to the total number of records in the database (proportion = (injury N / total eCHIRPP N) \* 100 000; presented as the number per 100 000 eCHIRPP cases). All analyses were conducted using SAS Enterprise Guide version 5.1 (SAS Institute Inc., Cary, NC, USA).

### Results

A total of 12 cases of BBQ brush injuries were identified among 794 237 eCHIRPP records, resulting in a frequency of BBQ brush injury of 1.5 cases/100 000 eCHIRPP cases. No significant changes were observed over time with the number of counts per year staying relatively stable (data not shown). Differences were not observed based on sex, with 6 cases occurring for each.

Figure 1 describes the age groups affected by such injuries, including the frequency of BBQ brush injuries relative to all other eCHIRPP cases. The frequency of BBQ brush injury among pediatric and non-pediatric cases were relatively similar in our dataset at 1.4 cases and 1.6 cases per 100 000 eCHIRPP cases respectively.

Of all BBQ brush injury cases, only one was identified as occurring external to the

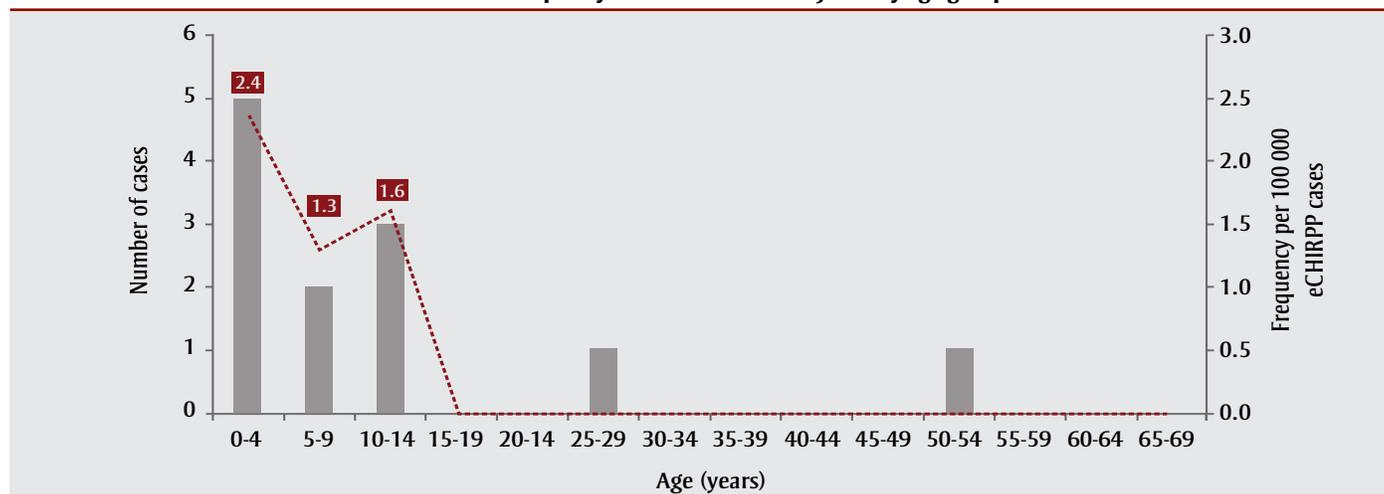
home. Cases were observed between April and December, with April and August having the highest proportion (N = 3 and N = 4 respectively). Nine patients reported eating as the mechanism of injury. All but one case was identified to have resulted in an injury to internal organs (pharynx, trachea or esophagus), with the one remaining identified to be to the eye. Finally, five of the observed cases (41.7%) required the patient to be admitted to the hospital as a result of their injury. Table 1 describes the circumstance, nature, and treatment of BBQ brush injury.

### Discussion

Although injuries related to BBQ brushes appear to be rare, our findings show that some are severe enough to warrant hospitalization. Due to the small sample size and the higher representation of pediatric hospitals in our database, we cannot make any inferences on the basis of age. However, we do observe that the frequencies of BBQ brush injury as a proportion of all injury cases are relatively equal between pediatric and non-pediatric groups within our study sample. Raw case counts show that April and August were the months with the highest number of BBQ brush injuries, which is similar to reports from the United States where August was also a month with higher counts, although they reported higher numbers of June and July as well.<sup>7</sup>

It is interesting to observe the different circumstances of injury. While the majority

**FIGURE 1**  
Count and frequency of barbecue brush injuries by age group



**Data source:** Electronic Canadian Hospitals Injury Reporting and Prevention Program (eCHIRPP), April 1, 2011 to July 17, 2017.

**Note:** Frequency estimates for adults have been suppressed due to random variations on account of the small sample size.

**TABLE 1**  
**Key characteristics of barbecue brush injury event**

Characteristic of barbecue injury event	Number of cases
<b>Circumstance</b>	
Eating	9
Ingestion of BBQ brush; not further described	2
Contact with eye	1
<b>Nature of injury</b>	
Foreign body in external eye	1
Foreign body in respiratory tract	4
Foreign body in alimentary tract	6
Foreign body in soft tissue	1
<b>Treatment</b>	
Treated in ED with follow-up PRN	5
Treated in ED, follow-up required, referred to other hospital or specialist clinic for injury treatment	2
Admitted to this or another hospital primarily for injury treatment	5

**Data source:** Electronic Canadian Hospitals Injury Reporting and Prevention Program, April 1, 2011 to July 17, 2017.

**Abbreviations:** ED, Emergency department; PRN, Pro re nata or if needed.

of cases appear to be linked with a mechanism related to the consumption of barbecued foods, there was a case linked to contact of the foreign body (bristle) with the external eye. Due consideration should thus not only be given to loose bristles becoming attached to BBQ grills and the food cooked upon them, but also more broadly to brushes with loose bristles since they can become detached and airborne.

### Strengths and limitations

The eCHIRPP database comprises a selection of EDs across Canada, namely 11 pediatric ones and 7 general sites, so the information presented here should not be used to draw conclusions about BBQ brush injuries across the entire Canadian population. However, previous reports have indicated that CHIRPP data can be representative of the profile of injuries in sports and recreation in Calgary, relative to regional health administration data.<sup>11,12</sup> The benefit of our data source is the ability of this sentinel surveillance system to detect near real-time emerging issues and provide more granular details of injury events that are not available in health administrative data. Certain groups are under-represented in the eCHIRPP data, such as older teens, Aboriginal persons, people who live in rural areas, and fatal cases. While information bias was minimized by the use of standardized

injury-reporting questionnaires, our estimates of BBQ brush injury are likely an underestimate since cases were identified based on key search terms that were explicitly used in the narrative text or based on the use of the appropriate direct cause code. Other cases of BBQ brush injury may have been misclassified if these conditions were not met, or may not have been detected if the patient was not aware that a BBQ brush was involved in their injury at the time that they filled in the injury reporting questionnaire. Finally, since our frequency estimates are based on the proportion of BBQ brush injuries among all eCHIRPP injuries, this study cannot provide estimates of overall risk.

### Conclusion

BBQ brush injuries, though rare in Canada, can result in serious injury. Health Canada collects information on consumer product issues, including injuries related to BBQ brushes, through an incident reporting system. Medical professionals and consumers are encouraged to submit details of consumer products incidents to <https://www.canada.ca/en/health-canada/services/consumer-product-safety/advisories-warnings-recalls/report-incident-involving-consumer-product.html>. Our finding that BBQ brush injuries were not isolated to cases involving the consumption of foods cooked on a BBQ suggests that injury prevention and awareness

efforts should highlight the risks associated with loose BBQ brush bristles across a variety of potential circumstances of injury.

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