



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
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Memorandum

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SUBJECT: Incidents Involving Tents between 2010 and 2015

Health Canada identified the need to develop a National Standard for Canada (NSC) for the flammability and labelling requirements for tents. The Canadian General Standards Board (CGSB) is responsible for managing the standards development process from the beginning of the process to publication, including the creation and management of a committee. In 2015, CGSB formed the CGSB Committee on Tents (Committee) to review existing standards and develop technical requirements, and harmonize standards, as applicable. U.S. Consumer Product Safety Commission (CPSC) staff was invited to participate as an informational member in the harmonization and standard development activities. To support the efforts, CPSC staff was asked to provide an analysis of tent-related incident data. The report is intended to provide the Committee with supporting information that will assist them with defining the scope, identifying hazards, and developing labelling and performance requirements.

In 2016, ASTM International formed the Collaboration AC306, Task Group on Tent Flammability Standards, to review the CPAI-84 standard. AC306 will be assessing the scope and performance requirements of CPAI-84 and updating the standard, as applicable. The CPSC staff data report will also support the ASTM International Collaboration AC306.

Tent Incident Data: CPSC staff searched CPSC's National Electronic Injury Surveillance System (NEISS) and CPSC's Injury and Potential Injury Incident (IPII) Database for tent incidents that occurred between 2010 and 2015. NEISS is a probability survey of emergency department-treated injuries so these cases are limited to ones where somebody was injured and

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treated in an emergency department. As a probability sample, NEISS enables CPSC staff to make national (United States) estimates of emergency department-treated injuries.

The IPII database comprises internet complaints, newspaper accounts, hotline reports, and medical examiner reports and is part of the Consumer Product Safety Risk Management System (CPSRMS). These include incidents where injuries are involved, incidents with no injuries, and some incidents involving fatalities. IPII is not a probability sample and cannot be used to produce national estimates.

NEISS Cases:

The NEISS code used in the search for tent incidents was ‘5029 – Tents or tent stakes’¹. It included cases where the injury date was between January 1, 2010, and December 31, 2015. Cases were considered out of scope if a tent did not play a part in any substantial way in causing the incident. One such example of an out-of-scope case is one where a consumer, “... was trying to light kerosene heater in a tent when it exploded”. The heater exploded; not the tent.

For the in-scope cases, 16 different hazard pattern classifications were created. For each of the in-scope NEISS cases, one of these classifications was selected as the primary factor in the incident. For some of the cases, an additional one of these classifications was selected as a secondary factor. For example, in a case with a narrative, “... 16 YOF with laceration to right hand from tent pole while dismantling tent.”, was classified as ‘General Injury while Assembling/Disassembling Tent’ as the primary factor and ‘Cut by Tent Pole’ as the secondary factor.

The eighteen hazard pattern classifications are listed below.

- 1 – ‘Low Visibility’ – An injury is caused by low visibility of tent stakes.
- 2 – ‘Structural Fail’ – The tent fails structurally and causes an injury.
- 3 – ‘Assembly/Disassembly’ – General injury while assembling or disassembling the tent.
- 4 – ‘Windblown’ – A tent element is blown by wind, generating a hazard.
- 5 – ‘Hammering’ – Injury occurs during stake hammering.
- 6 – ‘Trips in Tent’ – The consumer trips while passing through the tent.
- 7 – ‘Tent Ignites’ – The tent catches fire from an ignition source, usually inside of the tent.
- 8 – ‘Strain Injury’ – A strain injury occurs due to the rigorous nature of tent handling.
- 9 – ‘Cut by Pole’ – A consumer is cut by a tent pole.
- 10 – ‘Cut by Stake’ – A consumer is cut by a tent stake.
- 11 – ‘Struck by Tent Part’ – A tent structural element strikes a consumer, causing an injury. In some of these incidents, the tent part is stationary and the consumer bumps into it.
- 12 – ‘Childplay with Tent Part’ – A young child injures themselves with a tent component.
- 13 – ‘Trips on Outside of Tent’ – A consumer is injured when tripping while outside of the tent.
- 14 – ‘Environmental Hazard’ – A consumer suffers from a tent-related environmental hazard *e.g.*, contact dermatitis from sleeping in a tent.
- 15 – ‘Fall During Assembly’ – A consumer is injured from a fall that occurs assembling the tent.

¹ Camping equipment (excluding trailers, lighting equipment, sleeping bags, cots, hammocks, coolers, stoves and heaters)

16 – ‘Hit by Elastic’ – A consumer is hit by a tent’s elastic cord, causing an injury.

There were 503 in-scope tent cases in NEISS occurring between 2010 and 2015. Table 1 shows the incidents by hazard pattern including the primary and secondary factors.

Table 1. Classification of NEISS Tent-related Cases from 2010 – 2015

| Hazard Pattern | Primary Factor | Secondary Factor |
|-------------------------------|-----------------------|-------------------------|
| Assembling/Disassembling Tent | 133 | 7 |
| Low Visibility of Tent Stakes | 69 | 0 |
| Struck by Tent Part | 65 | 63 |
| Structural Fail | 56 | 0 |
| Strain Injury | 37 | 46 |
| Trips in Tent | 29 | 1 |
| Trips on Outside of Tent | 28 | 50 |
| Cut by Stake | 24 | 22 |
| Childplay with Tent Part | 19 | 0 |
| Cut by Pole | 15 | 23 |
| Environmental Hazard | 9 | 1 |
| Tent Ignites | 8 | 0 |
| Hammering | 7 | 12 |
| Windblown | 4 | 27 |
| Fall During Assembly | 0 | 14 |
| Hit by Elastic | 0 | 3 |

The leading hazard pattern (by primary factor) of these NEISS cases (133 out of 503) was a consumer being injured while assembling or disassembling the tent. Many (111) of these assembly/disassembly cases have secondary factors. The most common secondary factor for these cases is ‘strain injury’ which occurred in 44 of these cases. In 23 other assembly/disassembly cases, the secondary factor was, ‘struck by tent part’.

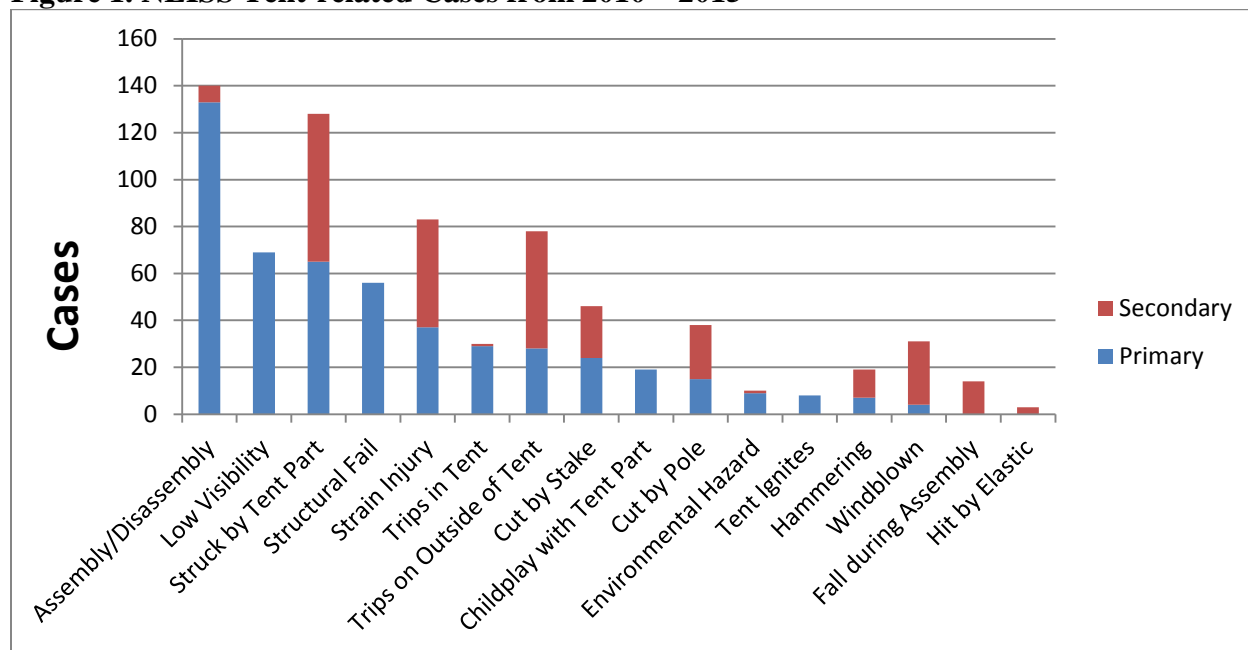
After the assembly/disassembly cases, the next leading hazard pattern, by primary factor, was ‘low visibility of tent stakes’ with 69 cases. Of these 69 cases, 46 had ‘tripping while outside of tent’ as a secondary factor and 16 had ‘cut by tent stake’ as a secondary factor. These are incidents where a consumer does not see the tent stake and either trips over it or cuts their foot or leg on it.

There were 65 cases where the primary factor was classified as ‘struck by tent part’. For these cases, only seven had a secondary factor and six of these had a secondary factor of ‘cut by tent pole’. In many of these ‘struck by tent part’ cases, where there was no secondary factor involved, the consumer bumped into a tent part while walking inside or outside of the tent. There were 63 cases that had ‘struck by tent part’ as a secondary factor. Of these 63 cases, 28 had a primary factor of ‘structural fail’ and 23 had a primary factor of ‘assembly/disassembly’.

There were 56 incidents where ‘structural fail’ was the primary factor. These 56 cases included 28 where the secondary factor was ‘struck by tent part’ and 24 cases where the secondary factor was ‘windblown’.

Figure 1 shows these same 503 in-scope cases in a graph, tracking both the primary and secondary factors.

Figure 1. NEISS Tent-related Cases from 2010 – 2015



NEISS is a probability sample. The hospitals that comprise NEISS represent all of the hospital emergency departments in the United States. Each NEISS record has a weight that tells how many such emergency department visits that it represents. Using these weights, NEISS estimates (and associated confidence intervals) can be produced. Table 2 contains estimates of NEISS tent cases by type of incident (by Primary Factor).

Table 2. NEISS Estimates of Tent-related Emergency Department Visits (Primary Factor) for 2010 – 2015

| Primary Factor | n | Estimate | 95% Confidence Interval | Annual Average | Annual Average 95% CI |
|----------------------------|-----|----------|-------------------------|----------------|-----------------------|
| All | 503 | 19,600 | (15,000, 24,200) | 3,300 | (2,500, 4,000) |
| Assembly/Disassembly | 133 | 4,700 | (3,100, 6,300) | 800 | (500, 1,100) |
| Low Visibility | 69 | 3,000 | (2,000, 4,100) | 500 | (300, 700) |
| Struck by Tent Part | 65 | 2,800 | (1,500, 4,000) | 500 | (300, 700) |
| Structural Failure | 56 | 2,500 | (1,400, 3,700) | 400 | (200, 600) |
| Trips in Tent ² | 29 | 1,300 | (600, 2,100) | 200 | (100, 300) |

Note: Estimates are rounded to the nearest 100 injuries.

Figure 2 displays these estimates along with their 95% confidence intervals.

² Not all type of incident classifications are included in this table because CPSC does not publish NEISS estimates smaller than 1,200, estimates with fewer than 20 incidents, or estimates with a coefficient of variation greater than .33.

Figure 2. NEISS Annual Average Estimates of Tent-related Injuries Involving Emergency Department Visits (Primary Factor) for 2010 – 2015

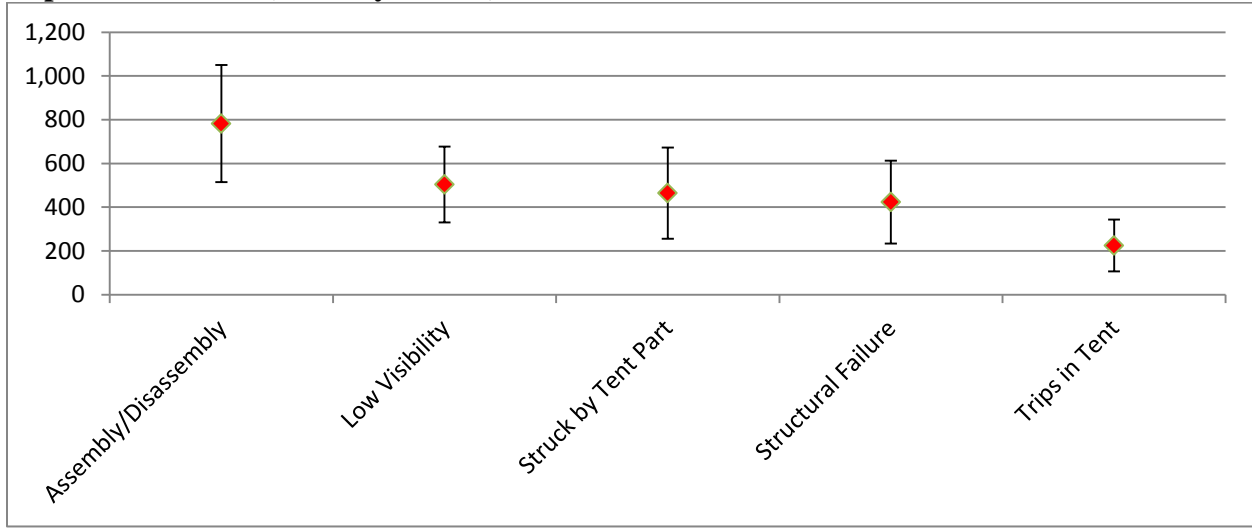


Table 3 contains estimates of NEISS tent cases by hazard pattern by either Primary Factor or Secondary Factor. So, if an incident is categorized as ‘Assembly/Disassembly’ for the Primary Factor and ‘Strain Injury’ as the Secondary Factor, it counts as both.

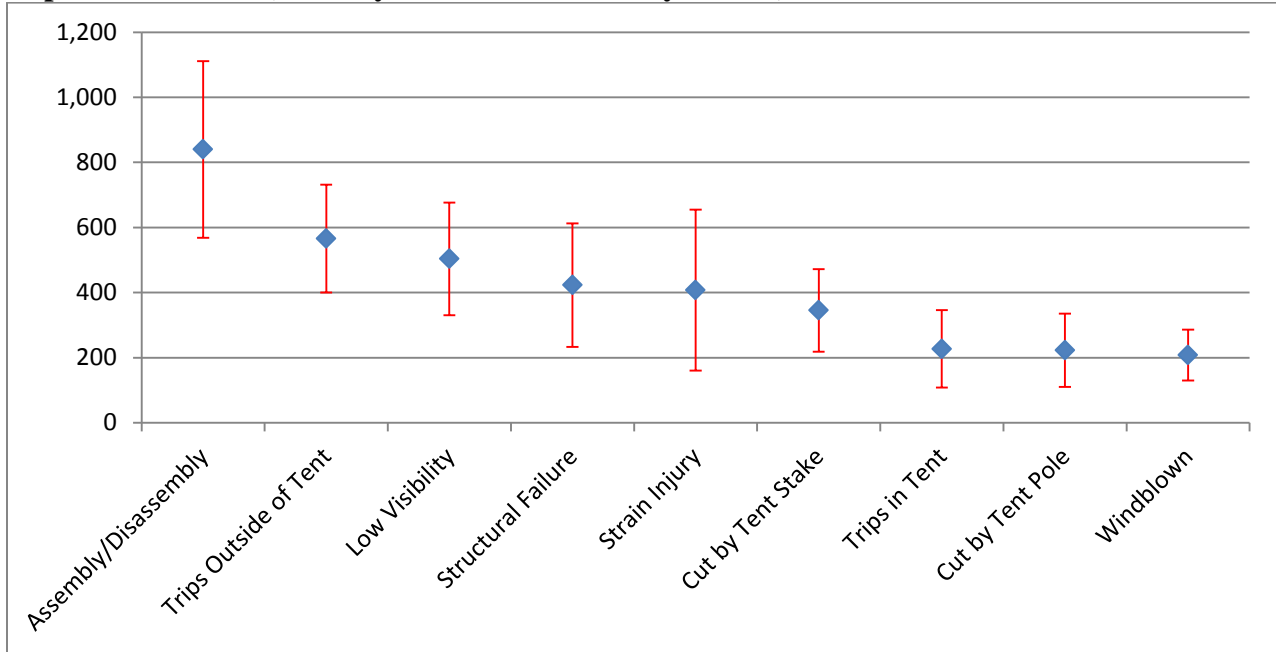
Table 3. NEISS Estimates of Tent-related Emergency Department Visits (Primary or Secondary Factor) for 2010 – 2015

| Primary Factor | n | Estimate | 95% Confidence Interval | Annual Average | Annual Average 95% CI |
|-----------------------|-----|----------|-------------------------|----------------|-----------------------|
| Struck by Tent Part | 128 | 5,400 | (3,400, 7,400) | 900 | (600, 1,200) |
| Assembly/Disassembly | 140 | 5,000 | (3,400, 6,700) | 800 | (600, 1,100) |
| Trips Outside of Tent | 78 | 3,400 | (2,400, 4,400) | 600 | (400, 700) |
| Low Visibility | 69 | 3,000 | (2,000, 4,100) | 500 | (300, 700) |
| Structural Failure | 56 | 2,500 | (1,400, 3,700) | 400 | (200, 600) |
| Strain Injury | 83 | 2,400 | (1,000, 3,900) | 400 | (200, 700) |
| Cut by Tent Stake | 46 | 2,100 | (1,300, 2,800) | 300 | (200, 500) |
| Trips in Tent | 30 | 1,400 | (700, 2,100) | 200 | (100, 300) |
| Cut by Tent Pole | 38 | 1,300 | (700, 2,000) | 200 | (100, 300) |
| Windblown | 31 | 1,200 | (800, 1,700) | 200 | (100, 300) |

Note: Estimates are rounded to the nearest 100 injuries.

Figure 3 displays these estimates and their 95% confidence intervals.

Figure 3. NEISS Annual Average Estimates of Tent-related Injuries Involving Emergency Department Visits (Primary Factor or Secondary Factor) for 2010 – 2015



IPII Incidents:

Unlike NEISS, CPSC’s Injury and Potential Injury Incident (IPII) Database is not a probability sample. These IPII tent incidents are not representative of all tent incidents and cannot be used to produce national estimates. They are simply all of the in-scope tent incidents between 2010 and 2015 that came into CPSC’s IPII database from internet complaints, newspaper accounts, hotline reports, or medical examiner reports. While they cannot be used to produce estimates, the IPII incidents provide a minimum - it is known that there have been at least as many tent incidents as those collected in IPII. These include incidents with no injuries, incidents involving non-fatal injuries, and incidents involving fatalities. Some incidents have multiple victims.

IPII contains 26 in-scope tent-related incidents between 2010 and 2015 including 12 deaths and 148 injuries. Nine of the deaths were the result of carbon monoxide poisoning. Two of the deaths and 138 injuries were the result of incidents where a tent failed structurally in wind or rain. There was one death and 117 injuries that resulted from the collapse of a tent set up outside of a sports bar. In another incident, one death and 20 injuries resulted when a tent that people had gathered under due to a storm was lifted off of its moorings and then fell.

The categories for type of incident differ from those for the NEISS incidents. The six hazard pattern categories for these IPII tent incidents are listed below:

- 1 – Structural Fail (Weather) – The tent fails structurally due to wind or rain.
- 2 – ‘Assembly/Disassembly’ – General injury while assembling or disassembling the tent.
- 3 – ‘CO Poisoning’ – A consumer inside of the tent suffers carbon monoxide poisoning.
- 4 – ‘Tent Ignites’ - The tent catches fire from an ignition source, usually inside of the tent.

5 – ‘Structural Fail (Not Weather-related)’ – The tent fails structurally when assembled (without wind or rain).

6 – ‘Non-CO Inhalation Injury’ – A consumer inside of the tent suffers a non-CO inhalation injury.

For the IPII incidents, there are no secondary factors; just one categorization for the type of incident. Table 4 contains the 26 in-scope IPII tent incidents by hazard pattern.

Table 4. Classification of Reported Tent Incidents from 2010 – 2015

| Hazard Pattern | Number of Incidents | Deaths | Injuries |
|---------------------------------------|----------------------------|---------------|------------------|
| CO Poisoning | 7 | 9 | 5 |
| Structural Fail (Weather) | 6 | 2 | 138 ³ |
| Tent Ignites | 6 | 1 | 1 |
| Assembly/Disassembly Injury | 4 | 0 | 4 |
| Non-CO Inhalation Injury | 2 | 0 | 0 |
| Structural Fail (Not Weather-related) | 1 | 0 | 0 |

Summary:

There were an estimated average of over 3,200 NEISS emergency department-treated tent-related injuries per year during 2010 – 2015. This is about nine per day. There were sixteen hazard patterns that accounted for these injuries. Some of the most common ways consumers were injured were putting up or taking down a tent, tripping on tent stakes, or tent structural fails. There were only eight NEISS cases where the tent ignited.

There were 12 deaths in tent-related IPII incidents between 2010 and 2015. Nine of these deaths involved carbon monoxide poisoning. There were no carbon monoxide cases associated with tents in NEISS, but carbon monoxide injuries may be underreported due to the difficulty of diagnosing them. Two deaths and 138 injuries were caused by incidents involving a tent structural fail in wind or rain. One death and one nonfatal injury were caused by incidents where the tent ignited.

³ One of the six ‘Structural Fail (Weather)’ incidents involved 117 injuries. Another involved 20 injuries. In the incident that involved 117 injuries, 17 of the victims were hospitalized and 100 were treated at the scene.