Winter Sports Death Review
A Review of All Accidental Skiing, Snowboarding and Tobogganing Deaths in Ontario from January 1, 1991 to December 31, 2012

Office of the Chief Coroner
Province of Ontario

December 2015
This report is dedicated to the 45 Ontarians who lost their lives in skiing, snowboarding and tobogganig accidents, and whose deaths are the subject of this review.
Dear Ontarians,

The Office of the Chief Coroner submits this report on the review of all accidental skiing, snowboarding and tobogganing deaths which occurred in the Province of Ontario between January 1, 1991 and December 31, 2012.

The motto of the Office of the Chief Coroner is: *We speak for the dead to protect the living.* As a result of what we have learned from this review, we are providing four categories of recommendations aimed at increasing winter sport safety and preventing future deaths. It is our hope that this report and its recommendations will prevent similar future tragedies, creating a safer Ontario in which all recreational winter sports enthusiasts can enjoy skiing, snowboarding and tobogganing.

We encourage all Ontarians to take personal responsibility for their own safety and for the safety of all winter sports participants.

Sincerely,

Roger P. Skinner, BA, MD, CCFP(EM)
Regional Supervising Coroner
Chair, Winter Sports Death Review
Office of the Chief Coroner
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1.0 Executive Summary

A total of 45 skiing, snowboarding and tobogganing related deaths dating from 1991 – 2012 were reviewed. Skiing was the sport involved in the majority of fatalities, (34 cases, 76%), with tobogganing (6 cases, 13%) and snowboarding (5 cases, 11%) fatalities occurring less frequently.

In 35 of the cases, (78%), the decedent was male. The highest proportion of fatalities was among those aged 17 years or younger, (40%). Deaths occurred throughout the winter season from November to April; however, the majority of deaths occurred during the months of February and March with 17 cases (38%) and 16 cases (36%), respectively. On average, death was found to occur slightly more frequently on weekdays, with the highest number of occurrences on Wednesday through Friday (60%).

Those individuals classified as ‘highly experienced’ in their winter sport activity, through instruction and/or family reporting, had the highest fatality rate at 14 cases (31%). The majority of fatal incidents occurred during social-type outings with friends or family, in 37 cases (82%). Five fatalities (11%) occurred during a school organized event, two incidents occurred in other scenarios (4%) and one case (2%) was during a competitive event.

In 24 of the cases (53%), death occurred due to collision with a tree or multiple trees. Medical care and/or surgery was performed in 30 cases (67%) and death was most frequently pronounced in hospital (37 cases, 82%). Alcohol and/or drug use, by the deceased, confirmed via post-mortem testing, was a factor in seven cases (15%). The most frequent cause of death was head injury (22 cases, 50%) followed by multiple injuries (13 cases, 30%). The use of a helmet was confirmed in 11 cases (24%).
2.0 Introduction

Skiing, snowboarding and tobogganing are popular winter activities, with 19 million annual visits by skiers and snowboarders of all ages to Canadian ski resorts [1]. The Canadian Ski Council reports that there are approximately five million skiers and snowboarders in Canada, as of 2015 [1]. In Ontario, there are approximately 1.16 million skiers and snowboarders, based on preliminary results from Rosall Remmen & Cares Associates (RRC), visited Ontario ski/snowboard hills approximately 3.42 million times in the 2014/2015 season [2]. During the period of 2007 – 2010, Canadian youths aged 5 – 19 years visited hospital emergency rooms 1,970 times for skiing, 3,194 for snowboarding and 1,793 times for sledding (tobogganing) injuries of varying degrees of severity [3]. Head injuries account for approximately 9 – 19% of all injuries reported by ski patrols and emergency departments and neck injuries account for 1 – 4% [4]. Traumatic brain injury is the leading cause of serious injury and death among skiers and snowboarders [4, 5], and children under 13 years of age have two times the number of head, face and neck injuries compared to other age groups [6].

In the province of Ontario, mandatory helmet use is only required when skiers and snowboarders enter specialty terrain parks within a ski resort [7], or by students who are on a skiing or snowboarding class trip as per the Ontario Physical Education Safety Guidelines (OPHEA) [8]. The province of Nova Scotia passed legislation on December 5, 2011 requiring all skiers and snowboarders, both youths and adults, to wear a helmet [7]. The helmet standards, Z263.1 published in 2008 and updated to Z263.1-14 in 2014, developed by the Canadian Standards Association (CSA) pertaining to skiing and snowboarding helmet safety requirements have yet to be met by any manufacturer [7, 9]. The Canadian Ski Council, the Canadian Ski Area Associations and OPHEA support the use of hard shell helmets which are CEN 1077, ASTM F-2040 or Snell RS-98 certified when skiing or snowboarding [8, 10]. It is important to note that the combination of helmet use, other safety equipment use (e.g. wrist guards for snowboarders), properly maintained and fitted equipment and adhering to the Alpine Responsibility Code, all work in conjunction to create a safer winter sports environment [1].
3.0 Background

In response to the deaths of five youths, (four skiers and one snowboarder), while on separate school supervised outings, the Office of the Chief Coroner (OCC) reviewed all accidental skiing, snowboarding and tobogganing fatalities, dating from 1991 – 2012, to identify opportunities to promote safety and prevent similar deaths. For the purposes of this review, only deaths which had been classified as “accidental” or non-intentional by the investigating coroner were included. Deaths due to natural causes while partaking in winter sports, such as a heart attack or stroke while cross country skiing, were excluded to focus on sport-specific safety measures. The main goal of this review was to use death investigation data in conjunction with expert opinions to develop recommendations which have the potential to increase the safety of skiing, snowboarding and tobogganung for all Ontarians.

4.0 Review Methodology

4.1 Review Teams

The Winter Sports Death Review team was subdivided into two teams.

Main Review Team
The Main Review Team developed the project charter, reviewed all case files, developed the data extraction tool used to analyze the information contained within files, developed recommendations and wrote the final death review report. Members of this team included:

- Dr. Roger Skinner, Regional Supervising Coroner – Toronto West Region
- Dr. Reuven Jhirad, Deputy Chief Coroner
- Dr. Dan Cass, Deputy Chief Coroner – Investigations (Former)
- Dr. Nav Persaud, Investigating Coroner and Research Scientist
- Dorothy Zwolakowski, Executive Officer – Investigations (Former)
- Amanda Lowe, Project and Research Analyst (Former)
- Victoria Snowdon, Project and Research Analyst

Specialist Review Team
The Specialist Review Team provided additional assessment and reviewed medical records of head injury specific cases to provide an expert opinion as to whether or not helmet use may have prevented death. Members of this team included:

- Dr. Charles Tator, Professor of Neurosurgery
- Dr. Charis Kepron, Forensic Pathologist
- Dr. John Rossiter, Neuropathologist
4.2 Project Charter

A project charter, which included the review mission, scope and primary questions to address was created in order to guide the review process.

**Mission and Scope:**
To review all accidental fatalities as a result of skiing, snowboarding and/or tobogganing that occurred in the period from January 1, 1991 – December 31, 2012.

**Questions:**
1. Are fatalities as a result of skiing, snowboarding or tobogganing more likely to occur in those with limited experience?
2. Are fatalities as a result of skiing, snowboarding or tobogganing more likely to occur during adverse weather conditions?
3. Are head injury fatalities as a result of skiing, snowboarding or tobogganing more likely to occur when a helmet is not worn?

4.3 Identification of Cases

The Main Review Team identified all accidental skiing, snowboarding and tobogganing deaths that occurred during the time period of January 1, 1991 – December 31, 2012 (total of 45 cases).

4.4 Specialist Review Team

Each Specialist Review Team member independently reviewed all of the head injury case files to provide an expert opinion as to whether or not helmet use may have prevented death. Where available, the following were reviewed: the coroner investigative statement, the post-mortem report, hospital medical records, ambulance reports and police reports. All members of the Specialist Review Team and the Main Review Team then conferred to discuss opinions and make conclusions for each case. Decisions regarding the prevention of death were based upon best case circumstances, such as the use of an approved, properly fitted helmet with a properly functioning chin strap.

4.5 Expert Panel

Following data analysis and the development of draft recommendations, stakeholders who shared an interest in skiing, snowboarding and/or tobogganing safety were invited to provide feedback regarding the draft recommendations and discuss new potential recommendations. Organizations represented at the Expert Panel included:
4.6 Written Report

Following the feedback forum, discussions with stakeholders at the expert panel and using the data obtained and analyzed from case reviews by both the Main Review Team and the Specialist Review Team, the final report was written by the Main Review Team.

5.0 Case Studies

All winter sports accidental deaths which occurred during the review period were of equal importance and contributed to an overall understanding of winter sports deaths and recommendations for possible prevention. Case files which were considered to be representative of the type of winter sport activity, the circumstances surrounding accidents, the types of deaths and issues raised during review were selected for case study highlight for illustrative purposes.

Case Study #1: Snowboarder

Background
This 48 year old female was a highly experienced snowboarder. While travelling at high speeds into a turn, she collided with a grouping of trees and the impact resulted in death. A helmet was worn.

Cause of Death
Blunt trauma due to snowboarding accident

Issue
1. The snowboarder was travelling at a high rate of speed on the relatively short runs of the ski hill. This marked the third speed-related death at this location within a five year period.
Case Study #2: Tobogganer

Background
This 14 year old male was tandem tobogganing on a GT-Racer style toboggan with a friend at a local hill. While racing other youths on different toboggans down the hill, they lost control and veered into a tree. The friend, who was seated in the back, did not suffer serious injuries and sought help. The 14 year old was pronounced dead in hospital. Neither youth was wearing a helmet at the time of the accident.

Cause of Death
Head and facial injuries due to blunt force trauma as a consequence of GT racer/tobogganing accident

Issues
1. A helmet was not worn and a head injury caused death.
2. The GT Racer style toboggan is designed for only one rider at a time.
3. There was no adult supervision at the local hill where the youths frequently tobogganed.

Case Study #3: Non-Head Injury Death

Background
This 30 year old male was snowboarding and came to a fork in the ski hill trail where he snowboarded into a fence post which marked the divide in the trail. Following a loss of consciousness lasting a matter of seconds, he complained of abdominal pain and difficulty breathing. He was transferred to hospital where it was determined that the collision had resulted in a rupture of the thoracic aorta. He was pronounced dead during surgery. His level of snowboarding proficiency was unknown.

Cause of Death
Rupture of thoracic aorta with internal hemorrhage due to blunt trauma

Issue
1. The placement of fixed objects (fence post) on the ski hill.

Case Study #4: Skier

Background
This 66 year old female was a highly experienced skier. While at a ski hill with her daughter, both women skied from the base of one run to the base of another to a chair lift. It was at this time that the deceased fell into a trench that a ski groomer machine had been excavating in the area. The ski groomer machine backed over the deceased.
**Cause of Death**
Multiple traumatic injuries to chest and neck due to crush injury

**Issue**
1. The area in which the ski groomer machine was operating had not been fenced off, nor had the run been closed.

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**Case Study #5: Head Injury Death**

**Background**
This 19 year old male and a friend were tobogganing tandem-style on an inflatable raft down a ski hill run after operational hours. He was observed to have consumed alcohol prior to tobogganing. Bystanders noted that they were travelling at high speed, lost control and entered the woods beside the run. The deceased was noted to be unconscious with difficulty breathing at the scene and was later pronounced dead in hospital. He had not been wearing a helmet at the time of the accident.

**Cause of Death**
Head injury due to blunt trauma

**Issues**
1. A helmet was not worn and a head injury was the cause of death.
2. The deceased and his friend rode the inflatable raft toboggan tandem fashion.
3. The ski hill had been entered after operational hours.
4. Alcohol/drug use during participation in winter sports.

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**Case Study #6: Cross Country Skier**

**Background**
This 74 year old fit and healthy male was cross country skiing alone on an unmaintained bush trail near his home. After failing to return home on time, a search was initiated and he was found deceased. Ski track marks indicated that he had apparently skied down a moderate slope into a large rut, sharply veered off course and then fell and struck his head on a boulder. He had not been wearing a helmet at the time of the accident.

**Cause of Death**
Hypothermia with head injury due to fall

**Issues**
1. A helmet was not worn and a head injury contributed to death.
2. The activity was performed alone and on an unmaintained trail.
Case Study #7: Head Injury Skiing Death

**Background**
This 57 year old male, who was an experienced skier, was found deceased by other skiers in a ditch beside a ski run designated for experienced skiers. He had been skiing alone. Investigation revealed that he had probably been skiing at a high rate of speed, lost control, skied into the wooded ditch area and hit his head. He was not wearing a helmet at the time of the accident.

**Cause of Death**
Head injury due to trauma

**Issue**
1. A helmet was not worn and a head injury caused death.

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6.0 Findings

6.1 Sex

Males represented the majority of winter sports fatalities. During the study period, 35 (78%) males out of a total of 45 individuals died while skiing, snowboarding or tobogganing (Graph 1).

**Graph 1 – Sex of Individuals Involved in Winter Sports Fatalities**

![Sex of Individuals Involved in Winter Sports Fatalities, 1991-2012](image)

- Male: 35, 78%
- Female: 10, 22%
6.2 Age

Youths, age 11-14 and young adults, age 18-30, represented the largest number of deceased overall, with 11 cases in each category (24% each) (Graph 2). The 41-60 age range had the next highest level of fatalities with 9 cases (24%), followed by the 41-60 age category with 9 cases (20%), the 15-17 age category with 7 cases (16%), 60+ age category with 6 cases (13%); and the age range with the smallest number of deceased was 31-40 years of age with 1 case (2%).

Graph 2 – Age of Individuals Involved in Winter Sports Fatalities

*Youngest deceased was 11 years old
6.3 Year

The deaths were fairly evenly distributed over the 21 years (Graph 3). There were three years in which there were no fatalities: 1994, 1995 and 2001. The number of fatalities per year has typically been observed to range from 1-4, with one year as high as 6.

Graph 3 – Number of Winter Sports Fatalities per Year, 1991-2012
6.4 Month

Winter sports fatalities occurred most frequently during the months of February and March, with 17 (38%) and 16 (36%) cases out of a total of 45 cases, respectively (Graph 4). The remaining months had the following distribution of fatal incidents, in descending order: December (6, 13%), January (3, 7%), April (3, 4%) and November (1, 2%). Note: no related fatalities occurred May through October.

Graph 4 – Number of Cases of Winter Sports Related Fatalities by Month
6.5 Day

Most fatalities occurred on weekdays from Wednesday to Friday, with 9 cases (20%) on each of the three days (Graph 5). Tuesday represented the lowest number of deaths with 2 cases (4%) out of 45 cases. There were 5 cases on Mondays and Saturdays and 6 cases on Sundays.

Graph 5 – Number of Winter Sports Related Fatalities by Day of the Week

<table>
<thead>
<tr>
<th>Day</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>5</td>
</tr>
<tr>
<td>Tuesday</td>
<td>2</td>
</tr>
<tr>
<td>Wednesday</td>
<td>9</td>
</tr>
<tr>
<td>Thursday</td>
<td>9</td>
</tr>
<tr>
<td>Friday</td>
<td>9</td>
</tr>
<tr>
<td>Saturday</td>
<td>5</td>
</tr>
<tr>
<td>Sunday</td>
<td>6</td>
</tr>
</tbody>
</table>

Number of Cases of Winter Sports Fatalities by Day of the Week, 1991-2012
6.6 Time of Accident

Of the known times of day for winter sports accidents, death occurred more frequently in the afternoon and evening, between noon and midnight, with 16 (35%) out of 26 cases as compared with the overnight and morning time periods (10 cases, 22%) (Graph 6). Note: no related fatalities were documented to have occurred from 4am to 8am.

Graph 6 – Number of Winter Sports Related Fatalities Based on Time of Day

*Note: there were 19 cases for which time of day was not available. Those cases are not represented in this graph.
6.7 Type of Winter Sport

Most winter sporting accidents resulting in death, occurred while skiing, 34 cases (76 %), followed next by tobogganing, 6 cases (13%) and then snowboarding, 5 cases (11%) (Graph 7).

Graph 7 – Type of Winter Sport Involved in Fatalities

Type of Winter Sport Involved in Fatalities, 1991-2012
6.8 Type of Skiing

Of the three types of skiing, alpine style was the most frequently associated with death, with 28 cases (82%) out of a total of 34 cases (Graph 8).

Graph 8 – Type of Skiing

6.9 Type of Snowboarding

All snowboarding cases under review were of the standard downhill type (5 out of 5 cases; 100%)
6.10 Type of Tobogganing

Out of 6 fatal tobogganing incidents, half of the cases were the traditional type (Table 10). At 1 case each (17% each), the other styles used were: tube, GT-Racer and other (inflatable raft).

**Graph 10 – Type of Tobogganing Involved in Fatal Incidents, 1991-2012**
6.11 Level of Proficiency

Fatalities in those who had been classified as highly experienced were the most prevalent of the cases reviewed, with 14 cases (36%) out of 39 cases relating to skiers and snowboarders (Table 1). Classifications of beginner and experienced were similar, in terms of the number of cases, with 9 cases (23%) involving experienced individuals and 8 cases (21%) involving beginners, followed by unknown (8 cases, 18%) and elite (3 cases, 7%). A classification of elite would be that given to a certified ski instructor. Classifications were designated through the coroner’s investigations or friends and family.

Table 1 – Level of Proficiency

<table>
<thead>
<tr>
<th>Level of Proficiency</th>
<th># of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginner</td>
<td>8</td>
<td>21%</td>
</tr>
<tr>
<td>Experienced</td>
<td>9</td>
<td>23%</td>
</tr>
<tr>
<td>Highly Experienced</td>
<td>14</td>
<td>36%</td>
</tr>
<tr>
<td>Elite</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>Unknown</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>100%*</td>
</tr>
</tbody>
</table>

*Note: due to rounding percentage total is greater than 100%

6.12 Previous Winter Sport Training

For more than two thirds of the cases (27 out of 39 cases, 69%), information regarding whether or not the deceased had completed previous training (e.g. ski lessons) in their sport of participation was not available (Table 2). Training was known to have been completed in 10 cases (26%)

Table 2 – Previous Winter Sport Training

<table>
<thead>
<tr>
<th>Previous Winter Sport Training</th>
<th># of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>10</td>
<td>26%</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Unknown</td>
<td>27</td>
<td>69%</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>100%</td>
</tr>
</tbody>
</table>
6.13 Activity Outing Type

The majority of fatalities occurred when people were participating in winter sports in a social manner (37 out of 45 cases, 82%) (Graph 11). The next most frequent type of outing was supervised school trips with 5 cases (11%). An incident during a competitive scenario occurred in one case (2%) and ‘other’ accounted for 2 cases (4%), where in one instance, the individual was on ski patrol and in the other, the individual was examining prospective ski instructors.

Graph 11 – Activity Outing Type Related to Winter Sports Fatalities
6.14 Activity Supervision

In the majority of cases the deceased were not supervised while undertaking winter sports (35 out of 45 cases, 78%) (Table 3). Of the 6 total cases that occurred under supervision (13%), 1 case (2%) was supervised by a certified instructor, 2 cases (4%) were supervised by a family member and 3 cases (7%) were designated as supervised by ‘other’, which includes a teacher in two cases and during a competition with spectators in the other.

Table 3 – Activity Supervision

<table>
<thead>
<tr>
<th>Activity Supervision</th>
<th># of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervised by Certified Instructor</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Supervised by Family Member</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Supervised by Other</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>Not Supervised</td>
<td>35</td>
<td>78%</td>
</tr>
<tr>
<td>Unknown</td>
<td>4</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%</td>
</tr>
</tbody>
</table>
6.15 Helmet Use

In 11 cases out of a total of 45 cases (24%) the use of a helmet was confirmed (Graph 12). It is unknown if the helmets worn were single-impact or multi-impact or if the helmets were certified.

Graph 12 – Helmet Use

Use of a Helmet During Winter Sports Related Fatalities, 1991-2012

- Yes: 11, 25%
- No: 24, 53%
- Unknown: 10, 22%
6.16 Non-Helmet Protective Equipment Use

Out of a total of 45 cases, 2 cases (4%) had confirmed non-helmet protective equipment worn (Table 4), which were ski goggles and a head lamp.

Table 4 – Non-Helmet Protective Equipment Use

<table>
<thead>
<tr>
<th>Non-Helmet Protective Equipment Worn</th>
<th># of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>31%</td>
</tr>
<tr>
<td>Unknown</td>
<td>29</td>
<td>64%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%*</td>
</tr>
</tbody>
</table>

*Due to rounding, percentage does not total 100

6.17 Equipment Status

Individuals who owned their own winter sports equipment were represented in 14 of the 45 cases (31%), followed by those who rented from the ski hill (6 cases, 13%) and those who borrowed (2 cases, 4%) (Table 5).

Table 5 – Equipment Status

<table>
<thead>
<tr>
<th>Equipment Status</th>
<th># of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned</td>
<td>14</td>
<td>31%</td>
</tr>
<tr>
<td>Rented</td>
<td>6</td>
<td>13%</td>
</tr>
<tr>
<td>Borrowed</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Unknown</td>
<td>23</td>
<td>51%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%*</td>
</tr>
</tbody>
</table>

*Due to rounding, percentage does not total 100
6.18 Jumps/Tricks Performed

Based upon information contained within case files, 4 cases of 45 total cases (9%) were known to involve the deceased performing jumps and/or tricks while partaking in winter sports (Table 6).

<table>
<thead>
<tr>
<th>Jumps/Tricks Performed</th>
<th># of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
<td>9%</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>47%</td>
</tr>
<tr>
<td>Unknown</td>
<td>20</td>
<td>44%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%</td>
</tr>
</tbody>
</table>

6.19 Snow Conditions

In the majority of cases (29 out of 45, 64%), the snow conditions at the time of the accident were unknown (Graph 13); however, of the known cases, the most prevalent condition was clear (11 cases, 24%).

Graph 13 – Snow Conditions at Time of Incident in Winter Sports Related Fatalities, 1991-2012

*Some cases include more than one category, so percentage does not total 100%
6.20 Visibility

Similar to the snow conditions, the level of visibility at the time of the accident was unknown in the majority of cases (31 out of 45, 69%) (Table 7). A total of 12 cases (27%) occurred when the visibility was clear.

<table>
<thead>
<tr>
<th>Visibility</th>
<th># of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear</td>
<td>12</td>
<td>27%</td>
</tr>
<tr>
<td>Poor</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Unknown</td>
<td>31</td>
<td>69%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%</td>
</tr>
</tbody>
</table>

6.21 Light Conditions

Winter sports accidents were found to have occurred most frequently during daylight hours, in 22 out of 25 cases, (49%) (Table 8).

<table>
<thead>
<tr>
<th>Light Conditions</th>
<th># of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>22</td>
<td>49%</td>
</tr>
<tr>
<td>Twilight</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Dark</td>
<td>8</td>
<td>18%</td>
</tr>
<tr>
<td>Unknown</td>
<td>14</td>
<td>31%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%</td>
</tr>
</tbody>
</table>
6.22 Obstacles Struck

Most decedents struck an object during the accident. In slightly more than half of the fatalities, 24 out of 45 cases (53%), the deceased struck a tree (Graph 14). Falls were the next most common mechanism of injury, in 15 cases (33%). An example of an ‘other obstacle’ is a bush, whereas an example of the ‘other’ category is being struck by a snowmobile.

Graph 14 – Obstacles Involved in Fatal Incidents in Winter Sports

![Obstacles Struck Bar Chart]

*Some incidents involved multiple obstacles, therefore the number of cases on the graph is greater than the actual number of cases

6.23 Delay in Recognizing Injury

In most cases, 39 out of 45 cases (87%), there was no delay in recognizing that a serious injury had occurred (Table 9).
Table 9 – Delay in Recognizing Injury

<table>
<thead>
<tr>
<th>Delay in Recognizing Injury</th>
<th># of cases</th>
<th>% of case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>No</td>
<td>39</td>
<td>87%</td>
</tr>
<tr>
<td>Unknown</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%*</td>
</tr>
</tbody>
</table>

*Due to rounding, percentage does not total 100

6.24 First Aid at Scene

In over half of the cases, 27 out of 45, (60%), first aid providers were present at the scene and administered care (Table 24). Examples of first aid at scene include ski patrol and off-duty, certified individuals, such as firefighters or registered nurses, who were in the proximity of the accident location and offered their services.

Graph 15 – First Aid at Scene

First Aid Provided at the Scene of Winter Sports Fatalities, 1991-2012

6.25 Medical Care/Surgery Performed

Medical care and/or surgery was performed in a hospital setting in 30 out of 45 cases (67%) (Graph 16). Life-saving measures were not performed if the individual was pronounced dead at the scene of the accident.

Graph 16 – Medical Care/Surgery Performed
6.26 Death Pronouncement Location

The most prevalent death pronouncement location was in hospital, which occurred in 37 out of 45 cases (82%) (Graph 17). Six (13%) of the deaths were pronounced at the scene and two of the deaths were classified into the ‘other’ location, which in one circumstance was en route to hospital and in the other case, occurred a number of years later, at a long-term care facility.

Graph 17 – Death Pronouncement Location
6.27 Post-Mortem Alcohol/Drug Testing

Post-mortem alcohol and/or drug testing was not performed in more than half of the winter sports cases (24 cases of 45 cases, 53%) (Table 10). Of the cases tested, alcohol was detected in 6 cases (13%) and drugs were detected in 1 case (2%).

Table 10 – Post-Mortem Alcohol/Drug Testing

<table>
<thead>
<tr>
<th>Post-Mortem Alcohol/Drug Testing</th>
<th># of cases</th>
<th>% of case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>6</td>
<td>13%</td>
</tr>
<tr>
<td>Drugs</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Negative</td>
<td>15</td>
<td>33%</td>
</tr>
<tr>
<td>Not Tested</td>
<td>24</td>
<td>53%</td>
</tr>
<tr>
<td>Total</td>
<td>N/A (more than one category per case)</td>
<td>N/A*</td>
</tr>
</tbody>
</table>

*Some cases involved both alcohol and drugs, so percentage does not total 100%
6.28 Cause of Death

The most prevalent cause of death was head injury, which occurred in 24 of the 45 cases (53%) (Graph 18). Multiple injuries were documented as the cause of death in 11 cases (24%) and thoracic injuries accounted for 7 cases (16%). The ‘other’ category, which included 2 cases, (4%), consisted of one drowning death and one death due to pulmonary thromboembolism. One death (2%) had an unknown cause of death.

Graph 18 – Cause of Death

<table>
<thead>
<tr>
<th>Cause of Death In Winter Sports Related Deaths, 1991-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head injury</td>
</tr>
<tr>
<td>Multiple injuries</td>
</tr>
<tr>
<td>Thoracic injuries</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Unknown</td>
</tr>
</tbody>
</table>

*Due to rounding, percentage does not total 100
6.29 Helmet Use in Head Injury Deaths

When focused specifically on individuals who died of a head injury while partaking in winter sports, 6 cases of the 25 (24%), involved the use of a helmet (Graph 19).

Graph 19 – Helmet Use in Head Injury Deaths

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**Helmet Use in Head Injury Deaths Related to Fatal Winter Sports Incidents, 1991-2012**

- Helmet Use Unknown: 3, 12%
- Helmet Worn: 6, 24%
- Helmet Not Worn: 16, 64%
7.0 Prevention of Death by Helmet Use – Expert Opinion of Specialist Review Team

Of the 25 head injury specific cases reviewed by the Specialist Review Team, it was their expert opinion that the wearing of a certified, winter sport specific and properly fitted helmet would have prevented death in 9 cases (36%), probably prevented death in 6 cases (24%) and possibly prevented death in 4 cases (16%) (Graph 20).

Graph 20 – Prevention of Death by Helmet Use – Expert Opinion of Specialist Review Team
8.0 Discussion and Conclusion

The Coroners Act provides the statutory basis for the collection and analysis of information about a death in order to prevent further deaths in similar circumstances [11]. The findings of this review demonstrate that the factors which are most frequently associated with death while partaking in winter sports included: alpine skiing, male gender, age 17 years or younger, participation in the sport in a social situation (with family and/or friends), collision(s) with tree(s) and head injuries. Due to our mandate of investigating only deaths, injuries which did not lead to death while participating in winter sports were not considered. Although this review focused on a limited number of deaths, the analysis conducted resulted in useful data that, together with input from the Specialist Review Team and Expert Panel, contributed to the generation of four categories of recommendations aimed at the prevention of future winter sport fatalities. The review of these deaths aligns with other studies of winter sport related injury and death.

This death review focused on all accidental skiing, snowboarding and tobogganing deaths, regardless of injury type, during the study period of January 1, 1991 – December 31, 2012. The predominant winter sport activity was skiing with 34 cases (76%), with alpine being the most frequent type (28 cases, 82%). Snowboarding has become an increasingly popular winter sport activity over the past decade [12]. The fact that this review focused on cases dating back to 1991 may explain the relatively higher incidence of skiing versus snowboarding fatalities observed. Death was found to have occurred more frequently in males (35 cases, 78%) than in females (10 cases, 22%). Warda and Yanchar [3] reported that males appear to be at higher risk for more severe and fatal injuries while skiing and snowboarding, than do females, as was observed in this review. Youths, age 17 and below (the youngest deceased in this review was 11 years old), represented the highest number of fatalities (18 cases, 40%), compared to any other age range. More specifically, the 11-14 year age category had one of the higher death rates with 11 cases (24%). These finding are consistent with previous reports that youth are at the highest risk for death while participating in winter sports [5]. Prior studies have also found that traumatic brain injury has been reported as the leading cause of alpine skiing related fatalities among youths [12, 13].

As a subcategory of the review, head injury specific deaths were reviewed by a Specialist Review Team, in addition to the Main Review Team, in order to provide an expert opinion as to whether or not helmet use would have prevented death. The Specialist Review Team was of the opinion that the wearing of a certified, winter sport specific and properly fitted helmet would have prevented death in nine cases (36%); probably would have prevented death in six cases (24%); and could possibly have prevented death in four cases (16%).

The Canadian Ski Council, the Canadian Ski Area Associations and the Ontario Physical and Health Education Association (OPHEA) support the use of hard shell helmets which are CEN 1077, ASTM F-2040 or Snell RS-98 certified when skiing or snowboarding [8, 10]. There is no requirement that helmets sold and worn in Canada meet any recognized standard, such as CEN 1077, ASTM F-2040 or Snell RS-98 [12]. In contrast, the certification standard for hockey helmets was created by CSA [9] and is supported by Health Canada’s Consumer Product Safety Act. The use of helmets in hockey was made mandatory for all regulated sport participants under Hockey Canada regulated by-laws. The Canadian Standards Association (CSA) has developed helmet standards for skiing and snowboarding (Z263.1 published in 2008 and Z263.1-14 published in 2014) [7, 14]. It is recommended that regulation and sport-enforced education and policy, such as that applied to hockey helmets, be considered for skiing and snowboarding. Additional research should be conducted to determine if differences in the standards and requirements of skiing/snowboarding versus tobogganing helmets are necessary.

In addition to the use of helmets which meet appropriate certification standards, it is important to ensure the correct fit of a helmet. A certified helmet that does not correctly fit will not provide adequate protection in an accident while skiing, snowboarding or tobogganing. As per recommendation 1.c, all helmets available for sale in Canada should include proper fit instructions. Safety messages which communicate not only the benefits of wearing a helmet, but of wearing a certified, appropriate and properly fitted helmet may continue to increase the acceptability of helmet use in winter sports and encourage helmet purchasers to educate themselves on the specifications of a helmet (Recommendation 3.a).

The Canadian Ski Council (CSC) is a national umbrella organization that represents the ski and snowboard industry in Canada. According to its National Consumer Profile & Satisfaction Survey, ski helmet usage in Canada has increased from 32% in the 2002-2003 ski season to 89% for all age groups and 98.4% for those under 17 in the 2014-2015 ski season [15]. Some jurisdictions, such as Nova Scotia, New Jersey and Italy, have passed legislation requiring that skiers and snowboarders wear helmets [5, 7]. In Nova Scotia, all participants, regardless of age, must wear a helmet [7]. In New Jersey and Italy, all participants under the age of 18 must wear a helmet [5]. Some Canadian resorts have voluntarily adopted a mandatory helmet policy. It was noted during this review that there is a paucity of independent data regarding helmet use in Ontario and in Canada. Following the institution of measures to ensure universal helmet use, additional research should be conducted to determine if participants are in fact wearing helmets and if there is a resulting decrease in the rate of both serious injuries and death (Recommendation 4).
According to Russell et al., head injuries account for approximately 9 – 19% of all injuries reported by ski patrols and emergency departments in various countries [4]. A review of scientific and medical literature found that helmet use reduces the risk of head injury among skiers and snowboarders [14, 16, 17], with no evidence to support an increased risk of neck or cervical spine injuries as compared to non-helmeted participants [4, 6, 17, 18]. The use of helmets alone, however, does not ensure winter sport safety. All winter sport participants should be familiar with, and adhere to, the Alpine Responsibility Code [1]. Other protective equipment, such as goggles and wrist guards should also be considered, and individuals should not be under the influence of drugs and/or alcohol while participating in winter sports. All skiing and snowboarding participants should consider completing formal instruction to learn appropriate technique and increase safety (Recommendation 3.f).

Analysis of the data revealed that impact with objects while skiing, snowboarding and/or tobogganing is a serious concern, and resulted in death in 34 cases (75%). Obstacles included: trees (24 cases, 53%), fencing and/or fence posts (5 cases, 11%), and other obstacles, such as bushes (5 cases, 11%). In order to educate winter sports participants of the dangers associated with obstacle impact, it is recommended that an awareness program be developed, via collaboration between government and industry, to develop a coordinated message regarding the life-threatening dangers of impact with obstacles (Recommendation 3.b). With respect to tobogganing hills, municipal governments should give consideration to the development of safe tobogganing zones where hills and the base of hills are free of obstacles (Recommendation 2). The development of a targeted safe tobogganing message (Recommendation 3.c) would make tobogganers aware of potential hazards at their local park hill. Additionally, the use of padding on trees and other obstacles is an area of interest that would benefit from additional study. Although padding will not likely eliminate all forms of injury, there is the potential to decrease the severity of an injury sustained by a participant.

This review was initiated because of the deaths of five youths while on separate school supervised outings. Winter sports fatalities stemming from school supervised outings accounted for 11% (5 cases) of deaths reviewed versus 82% (37 cases) of deaths while on social outings with family and/or friends. Issues that were raised as a result of case review of these five deaths included: lack of helmet use and limited supervision while on the ski hill. It is important to note that since these deaths occurred, school outing policies have been updated to promote a safer extra-curricular environment for all students, regardless of the activity. The Alpine Skiing/Snowboarding/Snowblading section of the Ontario Physical Education Safety Guidelines: Secondary Interschool Guidelines – Module 3, 2009 stipulates the equipment, clothing/footwear, facilities, special rules/instructions and supervision practices which must be adhered to during skiing and/or snowboarding excursions [8]. These requirements include: student athletes must wear a CE, ASTM or Snell certified hard shell crash helmet; the activity...
supervisor will review the Alpine Skier’s/Snowboarders Responsibility Code with the athletes; in-area supervision is required; and that athletes must ski/snowboard in areas identified as appropriate by a qualified instructor [8]. In addition to these safety implementations, the Office of the Chief Coroner recommends that school boards ensure that all winter sports school trip supervisors (employees or parents) be familiar with and implement the safety guidelines in the Ontario School Boards’ Insurance Exchange (OSBIE) and OPHEA (Recommendation 3.d). Furthermore, a safety video, such as “A Little Respect, Think First”, an injury prevention program, should be shown to both students and supervisors prior to a school winter sports outing (Recommendation 3.e) [19]. In order to ensure that video messaging remains up-to-date, and therefore relevant to youth, consideration should be given to forming a funding partnership between industry and government.

Upon completion of this review, we returned our focus to our three research questions (Section 3.2 – Creation of Project Charter). Although death occurred in beginners 22% (10 cases) of the time, the combination of those classified as experienced, highly experienced or elite totaled 60% (27 cases). Increased speed due to familiarity with the activity may have contributed to a higher rate of fatality in non-beginner participants. The level of proficiency classification, however, was subjective based upon documentation from the Investigating Coroner or accounts from family and friends, and may not accurately reflect skill level. It was originally presumed that fatalities were more likely to occur during adverse weather conditions. In the cases for which weather conditions were known: 24% (11 cases) had clear snow conditions; 27% (12 cases) had clear visibility; and in 49% (22 cases), the accident took place during daylight hours. Weather conditions were not frequently documented within case files, resulting in a large percentage of cases being classified as unknown. This finding highlighted one of the ways in which death investigation data collection can be improved. Finally, the assumption that fatalities are more likely to occur when a helmet is not worn was investigated. Of the 25 head injury specific cases, a helmet was not worn in 64% (16 cases), a helmet was worn in 24% (6 cases) and in 12% (3 cases) helmet use was unknown. Based upon the expert opinion of the Specialist Review Team, helmet use can prevent death, and therefore, fatalities are more likely to occur when a helmet is not worn.

This special death review is not meant to discourage winter sports enthusiasts from being involved in skiing, snowboarding and/or tobogganing. The Office of the Chief Coroner encourages all Ontarians to incorporate physical activity, particularly in the less active winter months, into their lifestyle. Regular physical activity in childhood (age 5 – 17) develops cardiovascular fitness, strength and bone density, and establishes positive habits which can last a lifetime [19]. Adults, age 18 – 64, who exercise regularly, may benefit from reduced risk of coronary heart disease, stroke, hypertension, colon cancer, Type 2 diabetes and osteoporosis [20]. Older adults (age 65+) who partake in regular physical activity maintain strength,
flexibility, balance and coordination, and may have a reduced risk of falls [20]. It is important to remember that although the 45 deaths reviewed within this report were a tragic loss of life, most Ontarians enjoy skiing, snowboarding and/or tobogganing, without serious injury and/or death. While there exists some inherent risk with all athletic activities, winter sports safety can be increased by exercising smart choices while on the hill, staying in control, being aware of surroundings, following the Alpine Responsibility Code [1] and wearing protective equipment.

Based upon the information gathered from the 45 deaths, which comprised this death review, the Office of the Chief Coroner has developed the following recommendations (Section 9.0 – Recommendations). These recommendations are directed to the organizations most suited to respond and implement change.
9.0 Recommendations

1. Safety Equipment

a) Helmet use

All participants in winter sports (skiing, snowboarding and tobogganing) should wear helmets. Government, safety organizations and the winter sport industry should collaborate to ensure universal helmet use through education, policy and/or legislation.

Directed to:

- Federal Government:
  - Health Canada – Consumer Product Safety
- Ontario Government:
  - Ministry of Health and Long-Term Care
  - Ministry of Tourism, Culture and Sport
  - Ministry of Education
- Ontario Snow Resorts Association
- Parachute

b) Helmet certification standard

Canadian certification standards for skiing, snowboarding and tobogganing helmets should be developed and applied in a manner similar to that for hockey helmets.

Directed to:

- Federal Government:
  - Health Canada
- Ontario Government:
  - Ministry of Health and Long-Term Care
  - Ministry of Tourism, Culture and Sport

c) Proper fit of helmets

All helmets available for sale in Canada should include proper fit instructions.

Directed to:

- Federal Government:
  - Health Canada
- Ontario Government:
  - Ministry of Health and Long-Term Care
  - Ministry of Tourism, Culture and Sport

2. Environment: Safe tobogganing zones

Municipal governments should consider the development of safe tobogganing zones within their parks. In order to create safe tobogganing zones, park design should anticipate that hills may be used for tobogganing. Hills, and the base of hills, should be free of obstructions. In popular tobogganing locations, consideration should be given to padding trees that may be hazards.

Directed to:

- Municipal Government:
  - All Municipalities in Ontario
  - Association of Municipalities of Ontario

3. Education

a) Promotion of the use of certified, appropriate and properly fitted helmets

The following organizations should jointly develop safety messages to communicate not only the benefits of wearing a helmet, but of wearing a certified, appropriate (designed for skiing, snowboarding and/or tobogganing) and properly fitted helmet.

b) Dangers of impact with obstacles awareness program

Government and industry should develop a coordinated skiing, snowboarding and tobogganing educational program regarding the life-threatening dangers of impact with obstacles, notably trees.

Directed to:

- Federal Government:
  - Health Canada
- Ontario Government:
  - Ministry of Education
  - Ministry of Health and Long-Term Care
  - Ministry of Tourism, Culture and Sport
- Municipal Government:
  - All Municipalities in Ontario
  - Association of Municipalities of Ontario
- Industry/Not-For-Profit:
  - Canadian Association of Snowboard Instructors
  - Canadian Ski Instructors Alliance Ontario
  - Canadian Ski Patrol
  - Ontario Snow Resorts Association
  - Parachute
c) Safe tobogganing message

The following organizations should cooperate to develop safety messages to promote safe tobogganing by wearing a certified, appropriate and properly fitted helmet and avoiding areas with obstacles.

Directed to:

- Federal Government:
  - Health Canada
- Ontario Government:
  - Ministry of Education
  - Ministry of Health and Long-Term Care
  - Ministry of Tourism, Culture and Sport
- Municipal Government:
  - All Municipalities in Ontario
  - Association of Municipalities of Ontario
- Industry/Not-For-Profit:
  - Ontario Snow Resorts Association
  - Parachute

d) OSBIE and OPHEA guidelines

School boards should ensure that all winter sports school trip supervisors (employees or parents) are familiar with and implement the safety guidelines in the Ontario School Boards’ Insurance Exchange (OSBIE) and the Ontario Physical Education Safety Guidelines (OPHEA).

Directed to:

- Ontario Government:
  - Ministry of Education

e) Safety video

A safety video, such as “A Little Respect, Think First”, should be shown to students and supervisors prior to a school skiing, snowboarding or tobogganing trip. Consideration should be given to forming a partnership between industry and government to ensure that video messaging remains up-to-date.

Directed to:

- Federal Government:
  - Health Canada
  - Public Health Agency of Canada
• Ontario Government:
  o Ministry of Education
  o Ministry of Health and Long-Term Care
  o Ministry of Tourism, Culture and Sport

• Industry/Not-For-Profit:
  o Canadian Association of Snowboard Instructors
  o Canadian Ski Instructors Alliance Ontario
  o Canadian Ski Patrol
  o Ontario Snow Resorts Association
  o Parachute

f) Formal instruction

All skiers and snowboarders should be encouraged to complete formal skiing and/or snowboarding instruction.

Directed to:

• Industry/Not-For-Profit:
  o Canadian Association of Snowboard Instructors
  o Canadian Ski Instructors Alliance Ontario
  o Ontario Snow Resorts Association

4. Additional Research: Helmet use follow-up

In order to evaluate the effectiveness of implementing universal helmet use by alpine skiers, snowboarders and tobogganers of all ages, follow-up research should be completed to determine if participants are actually wearing helmets and if helmet use has resulted in a decrease in the rate of both serious injuries and death. Government and industry should develop a protocol for the collection and sharing of the data necessary for this research.

Directed to:

• Federal Government:
  o Health Canada
  o Public Health Agency of Canada
• Ontario Government:
  o Ministry of Health and Long-Term Care
• Industry/Not-For-Profit:
  o Ontario Snow Resorts Association
10.0 References


Appendix 1 – Recommendations as Directed to Organizations

All Municipalities in Ontario

Recommendations:
• 2. Safe tobogganing zones
• 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
• 3.b) Dangers of impact with obstacles awareness program
• 3.c) Safe tobogganing message

Association of Municipalities of Ontario

Recommendations:
• 2. Safe tobogganing zones
• 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
• 3.b) Dangers of impact with obstacles awareness program
• 3.c) Safe tobogganing message

Canadian Association of Snowboard Instructors

Recommendations:
• 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
• 3.b) Dangers of impact with obstacles awareness program
• 3.e) Safety video
• 3.f) Complete formal instruction

Canadian Ski Instructors Alliance Ontario

Recommendations:
• 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
• 3.b) Dangers of impact with obstacles awareness program
• 3.e) Safety video
• 3.f) Complete formal instruction

Canadian Ski Patrol

Recommendations:
• 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
• 3.b) Dangers of impact with obstacles awareness program
• 3.e) Safety video
Health Canada

Recommendations:
- 1.a) Government, safety organizations and the winter sports industry to collaborate to ensure universal helmet use through education, policy and/or legislation
- 1.b) Canadian certification standards for helmets for skiing, snowboarding and tobogganing should be developed
- 1.c) Requirement for all helmets sold in Canada to include proper fit instructions
- 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
- 3.b) Dangers of impact with obstacles awareness program
- 3.c) Safe tobogganing message
- 3.e) Safety video
- 4. Mandatory helmet use follow-up

Ministry of Education

Recommendations:
- 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
- 3.b) Dangers of impact with obstacles awareness program
- 3.c) Safe tobogganing message
- 3.d) Familiarity with OSBIE and OPHEA guidelines
- 3.e) Safety video

Ministry of Health and Long-Term Care

Recommendations:
- 1.a) Government, safety organizations and the winter sports industry to collaborate to ensure universal helmet use through education, policy and/or legislation
- 1.b) Canadian certification standards for helmets for skiing, snowboarding and tobogganing should be developed
- 1.c) Requirement for all helmets sold in Canada to include proper fit instructions
- 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
- 3.b) Dangers of impact with obstacles awareness program
- 3.c) Safe tobogganing message
- 3.e) Safety video
- 4. Mandatory helmet use follow-up
Ministry of Tourism, Culture and Sport

Recommendations:
- 1.a) Government, safety organizations and the winter sports industry to collaborate to ensure universal helmet use through education, policy and/or legislation
- 1.b) Canadian certification standards for helmets for skiing, snowboarding and toboganning should be developed
- 1.c) Requirement for all helmets sold in Canada to include proper fit instructions
- 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
- 3.b) Dangers of impact with obstacles awareness program
- 3.c) Safe tobogganing message
- 3.e) Safety video

Ontario Snow Resorts Association

Recommendations:
- 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
- 3.b) Dangers of impact with obstacles awareness program
- 3.c) Safe tobogganing message
- 3.e) Safety video
- 3.f) Complete formal instruction
- 4.a) Mandatory helmet use follow-up

Parachute

Recommendations:
- 3.a) Promotion of the use of certified, appropriate and properly fitted helmets
- 3.b) Dangers of impact with obstacles awareness program
- 3.c) Safe tobogganing message
- 3.e) Safety video

Public Health Agency of Canada

Recommendations:
- 3.e) Safety video
- 4. Mandatory helmet use follow-up
Appendix 2 – Review Participants

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Ministry of Education – Representative participated on Expert Panel

Ministry of Tourism, Culture and Sport – Representative participated on Expert Panel

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