

## Recommendations for snowmobile safety



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Snowmobiles continue to pose a significant risk to children younger than 15 years of age and young adults aged 15 to 24 years. Head injuries remain the leading cause of mortality and serious morbidity, arising largely when snowmobilers collide, fall or overturn during operation. Children have also been injured while being towed by snowmobiles in a variety of conveyances. No uniform code of provincial or territorial laws governs the use of snowmobiles by children and youth. Because evidence supporting the effectiveness of operator safety certification is lacking, and because many children and adolescents do not have the required strength and skills to operate a snowmobile safely, the Canadian Paediatric Society does not recommend the recreational operation of snowmobiles by persons younger than 16 years of age. Snowmobiles should not be used to tow anyone on a tube, tire, sled or saucer. Furthermore, we recommend a graduated licensing program for snowmobilers 16 years of age and older. This statement suggests both active and passive snowmobile injury prevention strategies, and recommends that manufacturers make safer equipment for snowmobilers of all ages.

### SNOWMOBILE INJURIES

In Canada, snowmobiling is associated with the highest rate of serious injury of any popular winter sport. It is also an activity in which younger people are more likely to be the victims (1). The popularity of snowmobiles has increased (2-4) along with their size and speed (5). The National Electronic Injury Surveillance System of the United States Consumer Product Safety Commission (CPSC) reported no decline in snowmobile injuries during the past 10 years. The average annual number of snowmobile injuries treated in American emergency departments in 1997 and 1998 was more than 10,000. Of these injuries, 10% occurred in children younger than 15 years of age, and another 25% occurred in adolescents and young adults aged 15 to 24 years (D Tinsworth, CPSC, personal communications).

The Canadian Hospitals Injury Reporting and Prevention Program, a computerized information system that collects and analyzes data on injuries of people who are seen at the emergency departments of 10 paediatric hospitals and six general hospitals, began data collection in 1990 at the paediatric centres, and between 1991 and 1994 in the general hospitals. A search of the entire database revealed a

total of 772 files of injuries to children under the age of 16 years associated with snowmobiles from 1991 to 2001. Almost one-half of the events occurred on the weekend, primarily on private property or in bush country (6).

Between January 1992 and December 1997, the Death Certificate Data Files of the CPSC recorded 51 deaths in children younger than 16 years of age that were directly attributable to snowmobile use (D Tinsworth, CPSC, personal communications). This number is almost certainly an undercount. The CPSC does not routinely acquire death certificates involving collisions with licensed motor vehicles. In Canada, on average, four children under the age of 16 years die each year from snowmobile mishaps (7).

Among the reported deaths and injuries, boys were two to three times more likely than girls to be the victims. Head injuries are the leading cause of injury and death (4,8,9). Most deaths and serious injuries arise from the operators striking a fixed object such as a tree, cable or wire, or another vehicle (4). Children younger than 16 years of age were injured or killed when they fell from their snowmobiles, had the vehicle roll over them, or crashed the snowmobile into another snowmobile, vehicle or stationary object (D Tinsworth, personal communication, January 21, 2000, and Steve McFaull, personal communication, April 25, 2002). Near-drowning events from breaking through the ice involving children younger than 16 years of age are infrequent, in contrast to the prominence of drowning as a cause of death for older teenagers and adults (8,9). Frostbite and hypothermia are recognized hazards (10,11) and are reported infrequently. Other causes of injury included mishaps involving the loading and unloading of the snowmobile and the body of the operator striking different parts of the snowmobile during sudden stops. Burns associated with refueling mishaps have also been documented (D Tinsworth, CPSC, personal communications).

More than 50 children in each of the National Electronic Injury Surveillance System and Canadian Hospitals Injury Reporting and Prevention Program samples were injured when their sled, tube, tire or saucer overturned, struck an object, or was hit by another vehicle while being towed by a snowmobile. In general, children younger than eight years of age who were injured or killed on snowmobiles tended to be passengers on snowmobiles or sleds when the incidents occurred (12).

Other problems associated with snowmobile operation reported in the literature include hearing loss from

**Table 1**  
**Summary of provincial and territorial snowmobile vehicle legislation: Age restrictions and helmet requirements**

Jurisdiction	Minimum driver age	Age-related driver restrictions	Mandatory helmet use
British Columbia	None	Highways: require driver's license for operating on or across a highway	No
Alberta	None	Highways: must be 14 years of age or older Public property: drivers younger than 14 years must be supervised by an adult	No
Saskatchewan	12 years	Drivers 12 to 15 years of age must have passed an approved safety training course and be supervised by someone with a valid driver's license Drivers over 16 years of age require completion of a safety course	Yes*
Manitoba	None	Drivers younger than 14 years of age must be supervised by an adult (residents in remote areas exempt)	Yes
Ontario	None	Private property: no restrictions Public property: drivers younger than 12 years of age must be closely supervised by an adult Highways: require a valid driver's license	Yes*
Quebec	14 years	Drivers younger than 16 years of age must carry a certificate of competence Drivers younger than 14 years of age may operate off-road vehicles during competitions under certain conditions	Yes*
New Brunswick	None	Highways: must be 16 years of age or older to drive on a highway and must be 14 years of age or older and meet certain conditions to drive across a highway Drivers younger than 14 years of age must be supervised by an adult over 19 years Drivers under the age of 16 are required to take an approved safety training course	Yes
Nova Scotia	None	Private property: drivers under 10 years of age must be supervised by an adult Public property: must be 10 years of age; adult supervision required for those under 14 years of age	Yes*
Prince Edward Island	None	Drivers 10 to 14 years of age must be supervised by an adult Highways: have a valid driver's license to drive across a highway	Yes
Newfoundland and Labrador	None	Drivers younger than 16 years must be accompanied by someone at least 16 years of age	No
Yukon	None	Highways: must be 16 years of age or older	Yes
Northwest Territories	None	May not cross a roadway/shoulder or operate on ice or snow-packed surface if under 16 years of age Fort Resolution Settlement Area: Minimum age of 16 years for snowmobile operators	No
Nunavut		Adopting the Northwest Territories All-Terrain Vehicles Act	

\*Helmets are also required for those being towed. Data for this table were collected by contacting the Ministries of Transport from each province and territory and consulting their respective off-road vehicles and snowmobile acts and bylaws

prolonged exposure to excess engine noise (13) and white finger syndrome arising from the effects of cold weather and hand-arm vibrations from the handlebar of the snowmobile (14). Common factors identified in other studies and contributing to snowmobile incidents include operator error, speeding, travelling on inappropriate terrain, night-time operation and alcohol use (2,9,15-17).

#### SNOWMOBILE LEGISLATION IN CANADA

While all provinces require that snowmobiles be registered, Manitoba provides an exemption for northern residents. Registration is a requirement in the territories only if the off-road vehicle is operated on a highway; otherwise, local governments can establish bylaws, if desired. Some provinces have no age restrictions on registering a snowmobile. Most provinces have a minimum age requirement, and some also require underage operators to provide either proof of parental permission or evidence of having taken a government-approved safety course (Table 1).

Evidence supporting that operator safety certification courses adequately educate children and youth to operate

snowmobiles safely is lacking. The influence of sanctioned courses on snowmobile-related injuries to individuals younger than 16 years of age has not been assessed. Some provinces require a driver's license to operate on or cross a public road. A few provinces and the territories have set a minimum age for such activities, either with or without adult supervision, while Alberta has no restrictions. Most provinces require snowmobile operators to have insurance, but Manitoba exempts northerners while British Columbia, Prince Edward Island and Nova Scotia have no requirements. Newfoundland and Labrador and the territories require insurance only if the snowmobile is used in on-road operation or to cross a highway. Saskatchewan is the only province that holds the person providing supervision of snowmobile activities liable for the actions of the individual he or she is monitoring.

British Columbia has no minimum age restriction on snowmobiling, while the territories set a limit on highway operation to 14 years of age, leaving further regulation to local bylaws. Five provinces (Alberta, Manitoba, New Brunswick, Prince Edward Island and Newfoundland) specify no minimum age if an adult supervises the child. The minimum

age of unsupervised snowmobiling ranges from 10 years in Prince Edward Island to 16 years in Saskatchewan, with two provinces (New Brunswick and Saskatchewan) also requiring a safety course as a condition of underage operation. The age of the 'supervisor' may be as young as 16 years.

Helmets are required for both the operator and the passenger in most provinces. Helmet use is required for highway operation of off-road vehicles in the territories. British Columbia, Alberta and Newfoundland have no helmet requirements. Three provinces (Saskatchewan, Ontario and Quebec) require helmets for anyone being towed by a snowmobile.

With the exception of British Columbia, all provinces and territories require headlights, tail lights and stop lamps on snowmobiles. Most provinces require mufflers, a few specify brakes and only Ontario requires a mirror. Quebec requires daytime lights and Prince Edward Island specifically prohibits firing a gun from a snowmobile. Only three provinces reference drug or alcohol use and a similar number specify speed limits for various venues of snowmobile operation in their legislation. With the exception of Prince Edward Island, which requires adult supervision for children younger than 10 years of age, snowmobiling on private property is exempt from restrictions.

### RECOMMENDATIONS

#### For children younger than 16 years of age:

- Recreational operation of snowmobiles is inappropriate for children and younger adolescents. Children younger than 16 years of age should not operate snowmobiles. Furthermore, children younger than six years of age do not have the strength or stamina to be transported safely as passengers on snowmobiles. Winter recreational activities for children should be developmentally appropriate.
- Advertisements that promote snowmobiling should not be directed to young adolescents. Advertisements should not depict young adolescents driving snowmobiles.

#### For the protection of snowmobilers 16 years of age and older:

- Graduated licensing for snowmobile operators, consistent with prevalent provincial and territorial policies on graduated licensing for motor vehicle drivers, is recommended (18). Although no direct evidence exists for the effectiveness of graduated licensing on teenage motor vehicle operators of snowmobiles, graduated licensing has been shown to be effective in reducing motor vehicle-related deaths among teenagers. Newly licensed operators should be restricted to snowmobiling during daylight hours on groomed trails only, with zero tolerance for alcohol consumption. To operate a snowmobile safely, persons should acquire a learner's permit by taking a state-sanctioned course.
- Snowmobilers should travel at safe speeds, especially on unfamiliar or rugged terrain where hazards, such as

difficult-to-see barbed wire, may be encountered. A speed-limiting governor, to limit the maximum speed, is suggested for newly licensed operators.

- Irrespective of age, snowmobilers should avoid the use of alcohol or other drugs before or during the operation of a snowmobile. Adults should reinforce this message by setting a good example.
- Snowmobilers should wear well-insulated protective clothing, including goggles, waterproof snowmobile suits, gloves and rubber-bottomed boots. All drivers and passengers should wear helmets approved by Snell or other standards organizations for use while operating motorized vehicles, such as motorcycles and snowmobiles. Especially on hilly terrain, snowmobiles should carry bright-coloured antennae flags mounted on rods that are 1.2 m to 2.4 m in length and located on the back of the snowmobile. Operators should carry a first aid kit; an emergency tool kit containing spark plugs, drive and fan belts and an extra key; a survival kit that includes flares; and, if practical, a cellular phone. Snowmobilers should travel in groups of two or more and only on designated, marked trails away from roads, waterways, railroads and pedestrian traffic. Snowmobilers should check the weather forecast before going out and should become familiar with the signs of hypothermia and regularly check for frostbite.
- Snowmobilers should avoid snowmobiling on ice if they are uncertain about its thickness or condition. The condition of trails should also be determined and, where appropriate, avalanche danger ascertained.
- Snowmobilers should not carry more than one passenger. Headlights and tail lights should be on at all times to improve the visibility of the snowmobile to other vehicle operators.
- The use of a saucer, tube, tire, sled or skis to pull someone behind a snowmobile is not recommended. If the need should arise to tow a person, using a sled or cutter attached to the snowmobile by a rigid bar connection reduces the risk of injury. The operator should travel at a slow speed over level terrain away from trees, rocks and other vehicles. In addition, a spotter should be used to watch the individual(s) being towed.
- Snowmobiles must be well maintained. Persons should take appropriate precautions when fueling snowmobiles to avoid burns and when loading snowmobiles on and off trailers to prevent strains and crush injuries.

#### Recommendations for manufacturers include the following:

- Snowmobile manufacturers should incorporate mechanical enhancements, such as seating and handlebar designs, to improve rider comfort and safety, as well as to reduce hand-arm vibration to minimize white finger syndrome and numbness. Manufacturers

should also attenuate the sound levels generated by snowmobiles, improve the headlight luminance and add a rear-view mirror and a global positioning system device (overhead satellites to provide exact current latitudes and longitudes) to all snowmobiles.

Manufacturers are urged to improve snowmobile braking, steering and stability. Emission standards for snowmobiles should be improved.

- Helmet designs need to be improved to minimize visor fogging and improve hearing protection. Safety standards for snowmobile helmets should be developed and snowmobile helmets formally certified. Helmet manufacturers should consider adding features such as built-in radio channels for communication and weather monitoring.

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A parent handout titled "Snowmobiles: Safety tips for families" is available on our Web site. Visit [www.caringforkids.cps.ca](http://www.caringforkids.cps.ca) for a printable version.

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## REFERENCES

1. Canadian Institute for Health Information. Snowmobiling is the leading cause of severe injuries due to winter sports and recreational activities, reports Canadian Institute for Health Information (CIHI). Ottawa: CIHI, 2003. <[secure.cihi.ca/cihiweb/dispPage.jsp?cw\\_page=media\\_15jan2003\\_e](http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=media_15jan2003_e)> (Version current at September 30, 2004).
2. Injuries associated with use of snowmobiles — New Hampshire, 1989-92. *MMWR Morb Mortal Wkly Rep* 1995;44:1-3.
3. Injuries and deaths associated with use of snowmobiles — Maine, 1991-96. *MMWR Morb Mortal Wkly Rep* 1997;46:1-4.
4. Rice MR, Alvanos L, Kenney B. Snowmobile injuries and deaths in children: A review of national injury data and state legislation. *Pediatrics* 2000;105:615-9.
5. Beilman GJ, Brasel KJ, Ditttrich K, Seatter S, Jacobs DM, Croston JK. Risk factors and patterns of injury in snowmobile crashes. *Wilderness Environ Med* 1999;10:226-32.
6. Canadian Hospitals Injury Reporting and Prevention Program. Injuries associated with snowmobiles. Ottawa: Health Canada, Population and Public Health Branch, 1999.
7. Statistics Canada. Causes of death — Shelf Tables. Ottawa: Statistics Canada, 2001. <[www.statcan.ca/english/freepub/84-208-XIE/2000/index.htm](http://www.statcan.ca/english/freepub/84-208-XIE/2000/index.htm)> (Version current at September 30, 2004).
8. Hedberg K, Gunderson PD, Vargas C, Osterholm MT, MacDonald KL. Drownings in Minnesota, 1980-85: A population-based study. *Am J Public Health* 1990;80:1071-4.
9. Rowe B, Milner R, Johnson C, Bota G. Snowmobile-related deaths in Ontario: A 5-year review. *CMAJ* 1992;146:147-52.
10. Virokannas H, Anttonen H. Thermal responses in the body during snowmobile driving. *Arctic Med Res* 1994;53(Suppl 3):12-8.
11. Nissen ER, Melchert PJ, Lewis EJ. A case of bullous frostbite following recreational snowmobiling. *Cutis* 1999;63:21-3.
12. Canadian Hospitals Injury Reporting and Prevention Program. Injuries associated with snowmobile sleds. Ottawa: Health Canada, Population and Public Health Branch, 1999.
13. Bess FH, Poynor RE. Snowmobile engine noise and hearing. *Arch Otolaryngol* 1972;95:164-8.
14. Anttonen H, Virokannas H. Hand-arm vibration in snowmobile drivers. *Arctic Med Res* 1994;53(Suppl 3):19-23.
15. Reid DC, Saboe L. Spine fractures in winter sports. *Sports Med* 1989;7:393-9.
16. James EC, Lenz JO, Swenson WM, Cooley AM, Gomez YL, Antonenko DR. Snowmobile trauma: An 11-year experience. *Am Surg* 1991;57:349-53.
17. Rowe B, Milner R, Johnson C, Bota G. The association of alcohol and night driving with fatal snowmobile trauma: A case-control study. *Ann Emerg Med* 1994;24:842-8.
18. American Academy of Pediatrics, Committee on Injury and Poison Prevention and Committee on Adolescence. The teenage driver. *Pediatrics* 1996;98:987-90.

## INJURY PREVENTION COMMITTEE (2003-2004)

**Members:** Drs Bich-Hong Nguyen, Sainte-Justine Hospital, Montreal, Quebec; Richard Stanwick, Vancouver Island Health Authority, Victoria, British Columbia; Lynne Warda, University of Manitoba, Winnipeg, Manitoba (chair); Charmaine van Schaik, Aurora, Ontario; Diane Sacks, University of Toronto, Toronto, Ontario (board representative); John Philpott, University of Toronto, Toronto, Ontario

**Consultant:** Dr Milton Tenenbein, University of Manitoba, Winnipeg, Manitoba

**Liaisons:** Ms Gail Salminen, Ottawa, Ontario (Health Canada, Product Safety Branch); Amy Zierler, Toronto, Ontario (Safe Kids Canada, The Hospital for Sick Children)

**Principal Author:** Dr Richard Stanwick, Vancouver Island Health Authority, Victoria, British Columbia

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The recommendations in this statement do not indicate an exclusive course of treatment or procedure to be followed. Variations, taking into account individual circumstances, may be appropriate.