

Hécatombe sur la glace

Les blessures aux joueurs augmentent-elles le risque de blessure chez les membres du personnel?

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RÉSUMÉ

OBJECTIF Vérifier le nombre et la nature des blessures graves qui peuvent survenir quand les membres du personnel de soutien traversent la patinoire en direction du banc des joueurs ou vont s'occuper d'un joueur blessé sur la glace.

TYPE D'ÉTUDE Étude hybride, série de cas et enquête

PRINCIPAUX PARAMÈTRES ÉTUDIÉS Circonstances et nature des blessures rapportées.

RÉSULTATS Au cours de 4 saisons, on a rapporté 988 blessures à des membres du personnels de l'équipe et de soutien, incluant 94 commotions, 5 blessures aux organes internes, 226 fractures et 86 entorses ou luxations. La plupart des blessures ont été subies par les membres du personnels de l'équipe et de soutien responsables du bien-être des joueurs (gérants, entraîneurs, thérapeutes et personnel médical d'urgence).

CONCLUSION Les membres du personnels de l'équipe et de soutien subissent des blessures sérieuses en chutant sur la glace. Plusieurs stratégies préventives peuvent être adoptées: modification du plan de la patinoire, politique restreignant l'accès à la surface glacée et recommandations à ceux du personnel de l'équipe et de soutien qui doivent secourir les joueurs blessés sur la glace de porter des dispositifs de stabilisation de la marche.

POINTS DE REPÈRE DU RÉDACTEUR

- Chaque année, plus de 250 non-joueurs qui participent à des sports sur glace subissent des blessures importantes à la suite de chutes sur la surface glacée. Ces blessures comprennent des traumatismes orthopédiques et des commotions.
- À lui seul, le port du casque ne suffit pas à réduire le risque de blessure sur la glace. On admet généralement que le casque protège contre les traumatismes neurologiques sévères, mais son efficacité pour prévenir les commotions n'a pas été démontrée.
- Les auteurs proposent plusieurs stratégies préventives pratiques, incluant une politique interdisant de traverser la patinoire, une modification de la patinoire et des dispositifs de stabilisation de la marche largement disponibles.

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Mayhem on the ice

Do players' injuries put team staff at risk of injury?

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ABSTRACT

OBJECTIVE To investigate the potential for serious injury and the nature of injuries incurred as team staff or support personnel cross ice surfaces to get to players' benches or to attend to injured players.

DESIGN Hybrid study, case series with survey.

MAIN OUTCOME MEASURES Circumstances and nature of reported injuries.

RESULTS Over 4 seasons, 988 injuries to team staff or support personnel were reported, including 94 concussions, 5 injuries to internal organs, 226 fractures, and 86 separations or dislocations. Most of the injuries were incurred by team staff or support personnel responsible for the welfare of players (managers, trainers, therapists, and emergency medical staff).

CONCLUSION Team staff and support personnel incur serious injuries as a result of falls on the ice. Several preventive strategies can be put in place: changes in rink design, policies restricting access to the ice surface, and encouraging team staff and support personnel who must cross the ice surface to attend to injured players to wear gait-stabilizing devices.

EDITOR'S KEY POINTS

- More than 250 non-playing participants in ice sports incur serious injuries each year as a result of falls on the ice surface. These injuries include orthopedic trauma and concussion.
- Simply wearing a helmet is not enough to reduce the risk of injury crossing the ice. Although helmets are widely recognized to protect against serious neurologic trauma, they have not been demonstrated effective at preventing concussion.
- The authors propose several practical preventive strategies, including a "no crossing the ice" policy, rink redesign, and widely available gait-stabilizing devices.

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There is a known risk of injury among those actively participating in team sports that take place on ice.¹ There is virtually no information on risk of injury among non-playing participants, such as coaches, managers, and other support personnel. These people are sometimes required to cross ice surfaces to access player benches or to attend to injured players. We were aware of 2 cases of team staff incurring serious injuries as a result of falls while crossing the ice, and we were concerned that these might not be isolated events. We searched the Hockey Canada Accident Database to assess the likelihood of team staff or support personnel incurring serious injuries while crossing the ice and to discover the nature of their injuries.

Case 1

During warm-up time, a ringette team manager was crossing the ice to access the players' bench. The arena had been recently constructed (2003), and only 1 of the players' benches was accessible from outside the ice surface. The other was accessible only by crossing the ice. A player who was skating backward saw the manager at the last second and fell while trying to stop, causing the manager to fall backward and strike her head on the ice. The manager was unconscious for a few minutes and was transferred by ambulance to a regional hospital. She had a serious occipital laceration and was diagnosed with a concussion. She reported ongoing symptoms for 6 weeks.

Case 2

A company hockey team's coach lost his footing while walking across the ice surface. His head struck the ice and he incurred a cerebral hemorrhage. Despite neurosurgical intervention, he died from complications 10 days later.^{2,3} Partially as a result of his injury, a "no crossing the ice" policy was instituted in rinks in the Ottawa, Ont, area,⁴ and player benches, penalty boxes, and the timekeeper's box were made accessible from outside the ice surface. All team staff contracted to avoid walking on the ice surface to gain access to players' benches, penalty boxes, and timekeepers' stations.⁵ Team staff now remain at their benches when shaking hands with players before and after games.⁴ Rink personnel and paramedics or team staff attending to injured players are required to wear helmets when crossing the ice.⁵

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METHOD

Hockey Canada maintains an administrative accident database for insurance purposes and for managing risk.⁶ Reporting is recommended "for each case where an injury is sustained by a player, spectator or any other person at a sanctioned hockey activity."⁷ Injury reports are filed by team personnel within 90 days of the injury and collected by provincial and regional hockey associations. Official injury reports are entered into the accident database. The nature of, and circumstances surrounding, each injury are described.⁷ (Report forms can be found at <http://members.hockeycanada.ca/downloads/insurance/English%20Injury%20Reports/Hockey%20Canada.pdf>.)

An anonymous subset of data from the Hockey Canada Accident Database was made available to us by Hockey Canada. The subset was limited to injuries incurred between 2001 and 2005 by team staff or support personnel with the mechanism "fall on ice." We examined injuries incurred by "team officials" (not players, game officials, or spectators) during games (exhibition or regular season, playoff or tournament) to select occasions where team staff or support personnel were likely to be wearing street shoes on the playing surface.

The data were manipulated and analyzed in Systat,⁸ primarily as simple tables. Some of the frequency analyses are presented with data missing.

RESULTS

Hockey Canada's database contained reports of 988 injuries resulting from falls on the ice incurred by team staff or support personnel from the middle of 2001 to the middle of 2005. The most frequent injuries, sprains or strains (n=301), accounted for 36% of all reported injuries. A remarkable number of fractures were reported (n=226). Other serious injuries included 5 injuries to internal organs and 94 concussions (11% of all injuries). **Table 1** shows a summary of the number and relative frequency of all injuries. Most reported injuries (at least 92%) happened during game time (periods 1 to 3 and overtime). Where information was available on the position of the team official (n=645), we found trainers were most frequently injured (45%), followed by managers (26%), coaches (20%), hockey administrators (7%), and emergency medical staff (2%). Most of those injured (63%) were sent to hospital for assessment and management (**Table 2**).

DISCUSSION

There is a known risk of injury for those who participate in sports on ice. We found that non-playing team staff or

Table 1. Injuries incurred by team staff or support personnel as a result of "falls on ice" reported to Hockey Canada from mid-2001 to mid-2005

TYPE OF INJURY	NUMBER OF INJURIES INCURRED	% OF ALL INJURIES*
Concussion	94	10
Internal organ	5	1
Fracture	226	23
• Skull or jaw	10	4 [†]
• Vertebrae	2	1 [†]
• Trunk	2	1 [†]
• Arm	127	56 [†]
• Leg	75	33 [†]
• Unknown	10	4 [†]
Separation or dislocation	86	9
Strain or sprain	301	30
Laceration	59	6
Confusion	75	8
Unknown	142	14
TOTAL	988	100

*Percentages add to slightly more than 100 due to rounding.

[†]Percentage of fractures.

Table 2. Positions of team officials or support personnel injured in "falls on ice" as reported to Hockey Canada

POSITION	NUMBER OF FALLS	% OF ALL FALLS
Trainers	290	29
Managers	170	17
Coaches	132	13
Hockey administrators	43	4
Emergency medical staff	10	1
Unknown	343	35
TOTAL	988	100

support personnel are also at risk of being injured as a result of falls on the ice surface. As most of the reported injuries occurred during game time and were incurred by team staff or support personnel responsible for the welfare of players (managers, trainers or therapists, and emergency medical staff), it seems likely that these injuries occurred while attending to injured players. Injuries do occur outside playing time, however, as the injuries in both of our cases occurred as team staff were preparing for the start of the game.

Research on slips and falls is sparse, and there is no literature on non-playing team staff or support personnel incurring injury as a result of slips and falls on ice. Falls usually occur at 1 of 2 points, either on push off (toe off, rear slip) or touch down (heel strike); the latter is more common.⁹ Head injuries are common in

falls due to the biomechanics of falling backward. A proposed systems model of slip-and-fall accidents on ice surfaces has 6 factors⁹: footwear (sole) properties; underfoot-surface characteristics; sole-surface interface (coefficient of friction); human gait biomechanics (eg, muscle strength, postural control, balance); physiologic and psychological aspects (eg, behaviour, proprioceptive functions, information processing); and the environment (eg, lighting).

Injuries resulting from falls on ice can be prevented by preventing the fall or preventing the subsequent injury. Rinks can be designed or retrofitted to allow access to team benches without having to cross the ice (personal communication from Sarah Turney, City of Ottawa Department of Community and Protective Services, July 2005). Even with changes in access, it is necessary to modify the behaviour of team staff and minor officials. One apparently successful approach has been Ottawa's "no crossing the ice" policy.⁴

An alternative strategy for injury prevention is wearing gait-stabilizing footwear when crossing the playing surface. Improving friction at the ice-footwear interface has been shown to be important for preventing slips on ice.¹⁰ A recent, randomized, double-blind controlled trial found that a gait-stabilizing device (the Yaktrax Walker) greatly reduced the number of falls among elderly people.¹¹ The Yaktrax Walker is an inexpensive gait-stabilizing device that fits over the sole of a shoe and uses spiral metal coils to bite into the ice. The coils do minimal damage to the ice surface.

Helmets are widely recognized to protect against head injury. Having rigorous standards for helmet design and increasing the wearing of helmets has led to reductions in the number of fatal and serious head injuries in hockey.¹² Insisting that all rink staff, team staff, and emergency medical personnel crossing the ice wear helmets is a move toward prevention of serious neurologic trauma. Helmets have not been shown to be effective at preventing concussions, however.¹³ The large number of strains, sprains, and fractures (53% of all injuries) and concussions (10% of all injuries) we found in the Hockey Canada Accident Database constitute injuries that would not be prevented by use of helmets.

Limitations

Using an administrative accident database that was designed primarily for insurance and risk-management purposes is challenging for addressing clinical research questions. There have been several valuable applications of primary accident insurance data sets in the sports medicine literature, such as the relative risk of injury of various sports using Swedish Folksam Insurance data,¹⁴ the relative risk of knee injury of various sports using Swiss Military Insurance data,¹⁵ and the incidence of concussion using Ontario School Boards' Insurance Exchange data.¹⁶ In all these examples, however, there

were good data on the incidence of injuries and the population at risk.

Williamson and Goodman⁶ have shown that concussions are under-reported in the Hockey Canada database, and it is likely that other injury types are under-reported also. There might be differential reporting of more severe over less severe injuries, given the status of Hockey Canada as a supplemental insurer. We were unable to check the accuracy of the reported injuries, and we had no information on the severity of the injuries. The quality of the data was not optimal, as a lot of information was missing.

It was impossible to produce rates of injury, as we had no information on the number of either team staff or support personnel involved or on how many times they had had to cross the ice surface. In the terminology of a methodologic paper describing sports injury rates,¹⁷ our study is best described as a "clinical case series," as we are reporting number and type of injuries but not the population at risk or how much exposure puts them at risk. Also, we have likely underestimated the true number of these injuries in Canada, as we have chosen to examine only injuries in and around hockey games (not ringette, speed skating, figure skating, or broomball) and then only when we were certain that street shoes had been worn on the ice by those injured.

Despite these limitations, the Hockey Canada data confirm our concern that our 2 cases were not isolated incidents and that each year more than 250 Canadians who are non-playing participants in ice sports incur serious injuries as a result of falls on the ice.

Conclusion

Non-playing team staff and support personnel frequently fall on the ice and sustain serious injuries. Some falls can be prevented by redesigning rinks and having policies to govern behaviour (eg, Ottawa's "no crossing the ice" policy). Many injuries seemed to occur when team staff or emergency medical personnel went onto the ice surface to attend to injured players. The most prudent preventive strategy for these injuries would appear to be the wearing of gait-stabilizing devices. Helmets offer only supplemental protection against rare catastrophic head injuries.



Contributors

Mr Arbeau participated in conception and design of the study and wrote the initial draft. **Dr Gordon** participated in conception and design of the study, in acquisition of data, and in analysis of data; helped write the initial draft; and supervised the primary author (R.P.A.). **Dr McCurdie** participated in acquisition of data. All authors helped to interpret data, critically revised the manuscript, and approved the final version of the manuscript.

Competing interests

None declared

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