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Snowmobile Fatalities

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ABSTRACT: Autopsy protocols on all snowmobile fatalities were reviewed for a five year period covering the years 1988–1992, with respect to the age of the victim, sex, operator status, type of accident, fatal injuries sustained, the presence of ethanol, and the month of the year and day of the week the fatality occurred. During the study period there were 31 snowmobile fatalities, accounting for 9.4% of all transportation fatalities. The majority of deaths (54.8%) resulted from drowning and or hypothermia, either as a result of breaking through the ice or driving into open waters. Collision with a stationary or moving object accounted for 22.6% of fatalities, while being thrown from the machine accounted for 16.1% of deaths. Pedestrians accounted for 6.5% of all snowmobile deaths. Head and chest injury were responsible for deaths due to collision, while head and neck injury accounted for deaths due to being thrown from the machine. All victims were male with an average age of 34.7 years and the majority (87%) were vehicle operators at the time of the fatality. Of those tested for the presence of ethanol 86.3% tested positive, 72.7% of whom were legally intoxicated. Accidents occurred throughout the months of December through May, with more accidents occurring on Friday and Tuesday than any other day of the week. Based on these findings snowmobile fatalities could be significantly reduced, with operator education regarding the hazards of ethanol and instruction in ice safety.

KEYWORDS: pathology and biology, snowmobile, ice safety, alcohol

Snowmobiles are a popular vehicle within the province of Newfoundland and are used for recreational purposes as well as a method of transportation in northern communities. Modern snowmobiles are capable of considerable speeds, in excess of 140 km per hour, and despite their low center of gravity are potentially unstable. This study was undertaken to examine the significance of snowmobiles as a cause of transportation fatalities, and to examine the factors involved in such occurrences.

Material and Methods

Autopsy protocols on all fatalities involving snowmobiles were reviewed for a five year period from 1988–1992. From each protocol information regarding the age and sex of the victim, the presence or absence of a positive blood alcohol, and the operator status of the victim with reference to being a driver, passenger, or pedestrian was determined. In addition, the type of accident and resulting injuries were recorded. Accidents were classified as either immersion (breaking through the ice or driving into open waters), collision with a fixed

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or moving object, or ejection from the machine. Lastly, the month of the year and day of the week the incident occurred were recorded. In addition the total number of transportation accidents occurring during the study period were determined. Transportation fatalities included motor vehicle, motorcycle, recreational vehicle, and non-commercial aircraft deaths.

Results

During the study period there were a total of 31 snowmobile fatalities, accounting for 9.4% of all transportation accidents that occurred within the province (Fig. 1). The number of fatalities occurring each year is shown in Fig. 2. Immersion accidents (drowning and

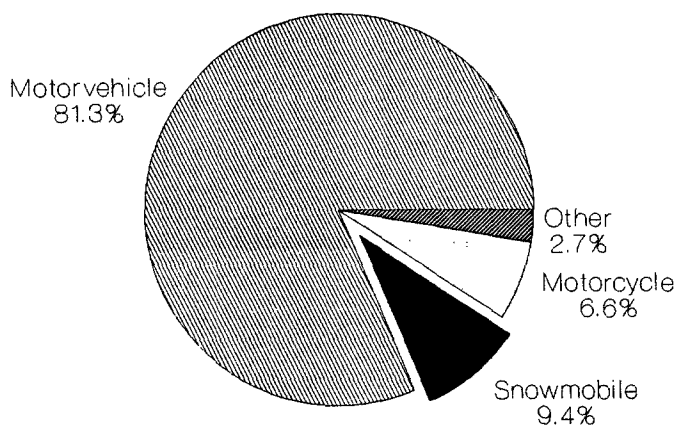


FIG. 1—*Transportation fatalities.*

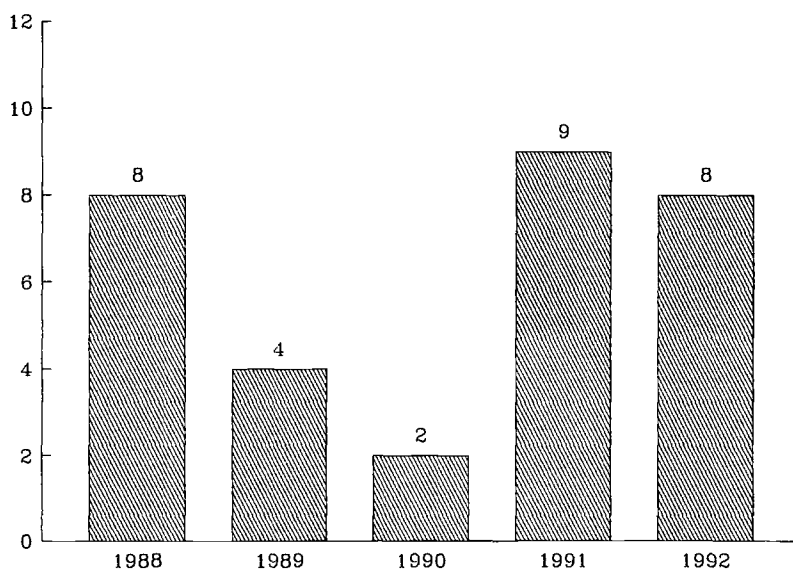


FIG. 2—*Fatalities by year of occurrence.*

or hypothermia) accounted for 54.8% of all fatalities, collision with a stationary or moving object accounted for 22.6% of fatalities, ejection from the machine accounted for 16.1% of fatalities while pedestrians totalled 6.5% of snowmobile fatalities (Fig. 3).

Analysis of collision and ejection incidents demonstrated that head and chest trauma accounted for the majority of injuries (Fig. 4), with head and chest injury accounting for

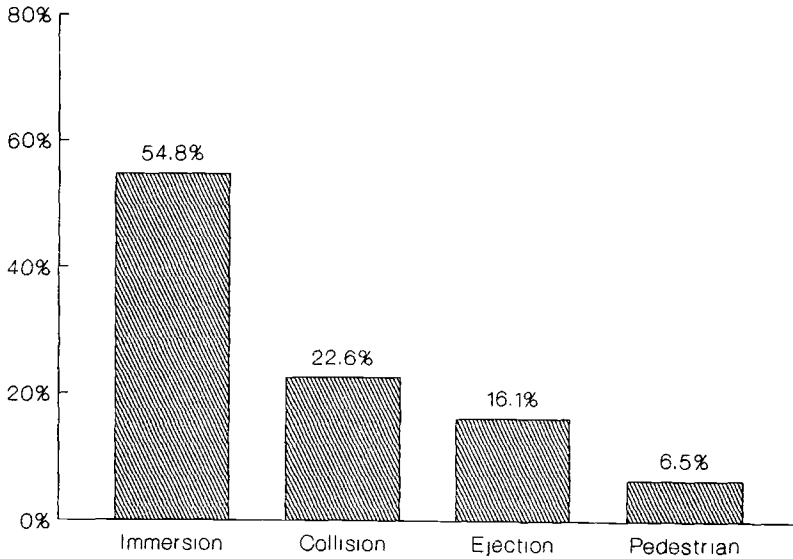


FIG. 3—Type of incident.

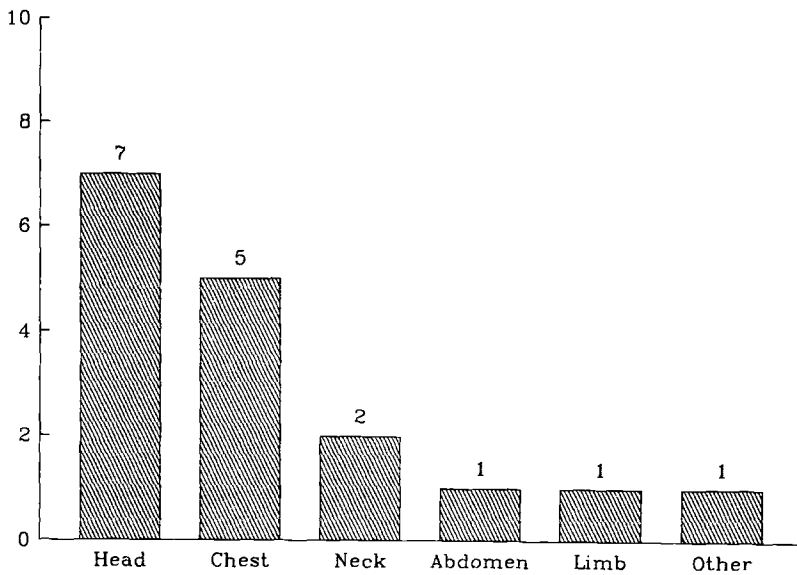


FIG. 4—Classification of injuries.

the majority of collision fatalities, while head and neck injury accounted for all ejection fatalities (Fig. 5).

Of the 31 fatalities all victims were male, with a mean age of 34.7 years, and a range of 9 to 70 years of age. As a group victims aged between 31 to 40 years of age accounted for the majority of fatalities (Fig. 6). Twenty seven of the victims (87%) were operating the vehicle at the time of the fatality while 2 (6.5%) were passengers.

Alcohol analysis was performed on 22 of the victims. Of these 19 (86.3%) tested positive, 18 of which were vehicle operators. Sixteen victims, all vehicle operators, had a blood alcohol in excess of 18 mmol/L, the highest level being 57 mmol/L. The average blood alcohol of a victim with a positive result was 38.5 mmol/L.

Fatalities occurred throughout the months of December through May for drowning incidents and throughout the months of December through April for collision and ejection incidents (Fig. 7). More fatalities occurred on a Friday than any other day of the week, followed by Tuesdays (Fig. 8).

Discussion

Snowmobile fatalities contribute a significant percentage of transportation deaths within the province of Newfoundland, second only to motor-vehicle fatalities. As of 1992 there were 27,704 registered snowmobiles in the province, an increase from 12,231 registered in 1988. Using these statistics the fatality rate per 10,000 registered vehicles ranges from 1 to 6.5 per 10,000 registered vehicles, significantly higher than those reported from a recent study within Ontario [1].

The cause of death in this study is interesting inasmuch as immersion, resulting in drowning and/or hypothermia is the most common fatal event, while in similar studies collision with a moving or stationary object is the most common [1]. Geographical considerations could account for this given the vast expanses of water characterizing the province of Newfoundland. What is also interesting is that a recent report from The Royal Life

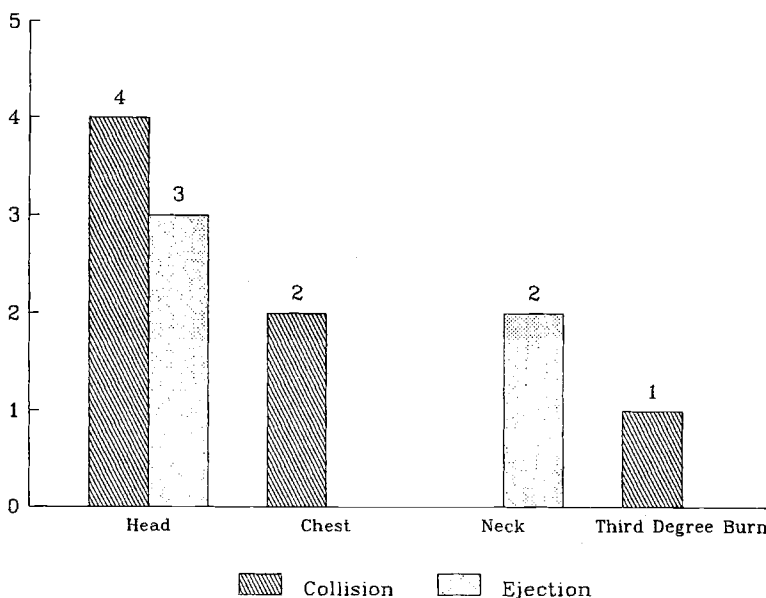


FIG. 5—Fatal injuries.

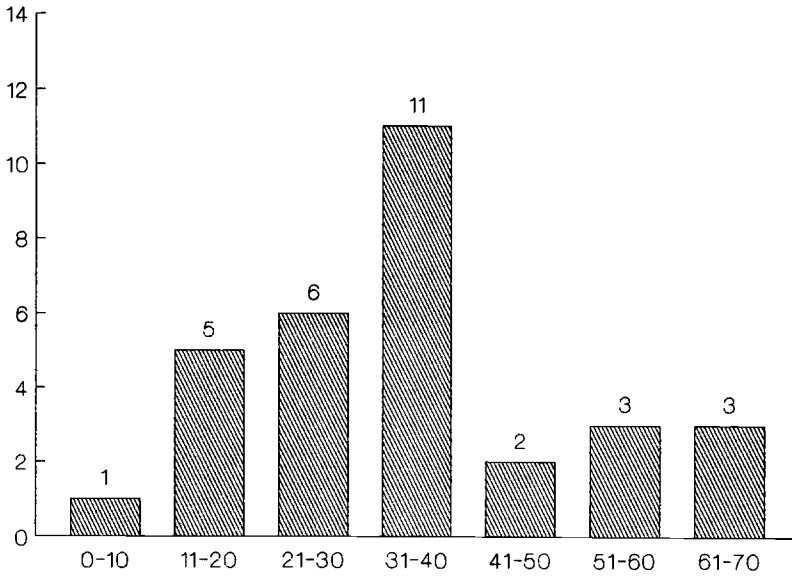


FIG. 6—Age groups of victims.

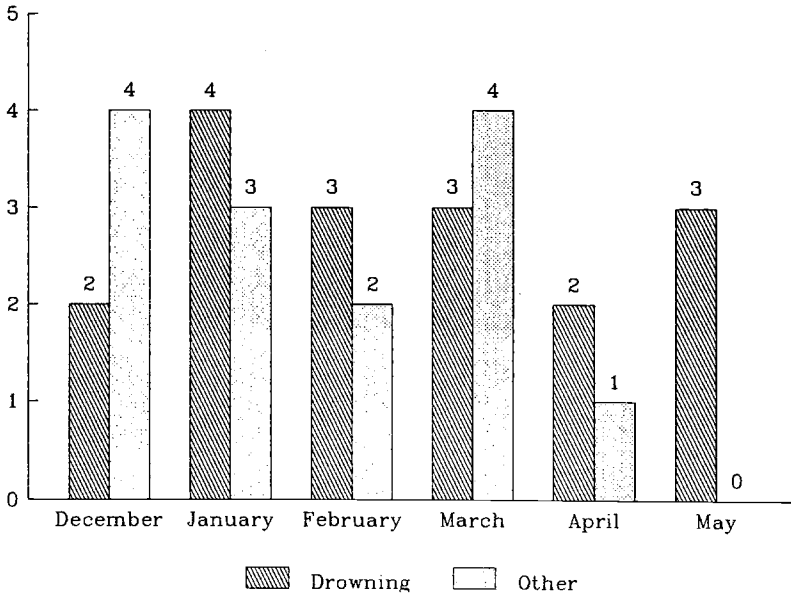


FIG. 7—Fatalities by month of occurrence.

Saving Society Canada, lists snowmobiling as the number one cause of recreational drowning in the province for both 1990 and 1991, a situation that is unique to Newfoundland [2].

With respect to collision and ejection fatalities, the type of injuries sustained are consistent with the expected mechanics of the accident, with head, and chest injuries predominating

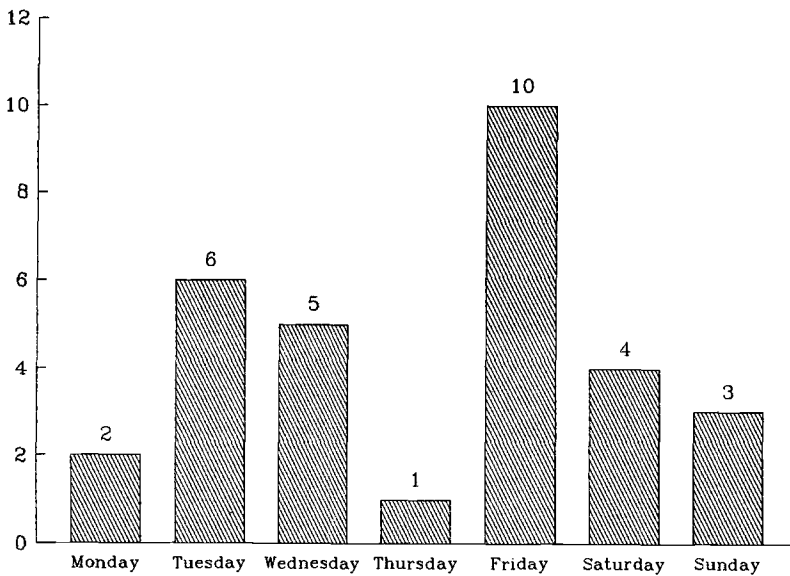


FIG. 8—Fatalities by day of occurrence.

in collision and head and neck injuries predominating in ejection fatalities. Unfortunately no mention is made on the autopsy protocols as to whether a helmet was worn by the deceased at the time of the accident. This is information that would be useful given the incidence of head injury in snowmobile fatalities. It is interesting that in a study of predominantly non-fatal snowmobile accidents, patients that present to a hospital were more likely to have suffered an ejection accident than one involving collision with a moving or stationary object [3]. With fatal trauma however, one is more likely to have been involved in a collision incident, suggesting that collision is less often survivable than ejection.

Of note in this study is that none of the victims were female, previous studies have confirmed the increased incidence in males [1], but the complete absence is noteworthy and most likely is a function of the type of recreational activity involved at the time of the incident that is, hunting or fishing etc.

That alcohol is a factor in snowmobile fatalities should be of no surprise, given the frequency of alcohol use in accidental deaths. Previous studies have suggested that up to 47% of accidental deaths occur in an individual with a positive blood alcohol, and that 44% of motor vehicle accidents occur in operators with a positive blood alcohol [4]. It must be stated however that the percentage of motor vehicle accidents reported, in association with a positive blood alcohol, vary in the literature [5–7]. The finding of a positive blood alcohol in over 86% of those victims tested for alcohol however is a significant finding, particularly with reference to accident prevention. Furthermore the degree to which victims who tested positive have consumed alcohol is a concern, with an average blood alcohol of 38.5 mmol/L, indicating what must surely represent a blatant disregard of the hazards associated with drinking and driving, along perhaps with the perception that drinking while engaged in recreational activity is somehow more acceptable and somehow safer. The role of alcohol in collision and ejection incidents is obvious but may be more complex in submersion incidents in which susceptibility to hypothermia may play a role in the fatal outcome.

Immersion deaths occurred consistently throughout the months of December through May, whereas one might assume that such incidents would occur more frequently as the

average monthly temperature increases. This reflects the importance of checking ice thickness at all times before venturing on the ice. Interestingly more deaths occurred on weekdays than weekends when one might expect increased recreational activity to occur.

The findings in this study suggest that driver education regarding ice safety, and the hazards of consuming alcohol while operating a snowmobile could reduce the incidence of snowmobile fatalities.

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