

INTRODUCTION

Some 6,583 lives have been lost and 547,071 injured due to motor vehicle crashes since 1990 in British Columbia. Injury is the leading cause of death and hospitalization for children, youth and adults (to age 44) in BC. Approximately 1,200 people in BC are injured each day and of these four will die. Motor vehicle crashes are responsible for most of those deaths, and alcohol is a persistent factor in these crashes. Alcohol-related motor vehicle crashes represent a leading cause of morbidity and mortality, particularly in young people, carrying an immeasurable human cost, as well as an enormous burden to society. While British Columbians have enjoyed substantial reductions in the annual number of motor vehicle driver fatalities since the 1990's, traffic safety remains a serious social concern, with 443 deaths, and some 30,692 people injured in the year 2003 alone. During that year, drinking and driving crashes contributed to 23.5% of all fatal crashes and 10.8% of all injury-related crashes in BC.

OBJECTIVES

The objectives of this research were to examine (1) driver and passenger fatalities and injuries in drinking driving motor vehicle crashes and estimate the risk of non restraint use in injuries and fatalities, (2) review the epidemiological information of crash occurrence, and (3) review the public attitudes about alcohol impaired driving in BC. Recognition of the association between alcohol and trauma is important not only for proper care and for treatment of the underlying problem, but to stimulate enactment of preventive measures aimed at reducing the risk of alcohol-associated motor vehicle injuries and fatalities.

DATA AND METHOD

BC's traffic accident system accumulates and maintains information on all reported traffic collisions occurring in the province. Annual crash data were obtained from the Insurance Corporation in British Columbia (ICBC). The database contains information on personal factors: injury type and anatomical site injured for each person, restraint use, as well as the information on vehicle damage severity, time of the crash, road conditions and cause of crash and crash characteristics. The ICBC data includes several variables regarding the use and availability of restraint systems within each vehicle and for each occupant. Manual (or active) belt use is defined as the use of shoulder belt, lap belt, lap and shoulder belt, or any combination of belt use with a child safety seat. The alcohol related injury data included in this study involved all injury crashes not just serious ones since information on injury severity in a crash is not recorded by the police in BC. Police reports describe the type of crash, the characteristics of each vehicle and information about injuries, if any, to occupants of each vehicle. For all occupants, police specify what appears to be the most important injury, the location (head, abdomen etc.) and the nature of the injury (concussion, laceration, fracture etc.). In this study, drinking and driving crash-related risk factors were analyzed using real-world collision data in BC. Chi-square tests (or Fisher's exact tests when expected frequencies were below 5) were performed to compare demographic risk factors of alcohol-related crashes. Only significant differences over a threshold of 5 percent were indicated. The odds ratio (OR) and 95% confidence interval (CI) were used in this study to analyze the risk of non use of seat belt. Overall fatal injury and specific types of injury were compared for non seat belt use crashes with seat belt use crashes using logistic regression to estimate the odds ratio; i.e., the odds of fatal injury and type of injury in non use seat belt alcohol-related crash motor vehicle occupants relative to seat belt use occupants. The odds ratio (OR) indicates the risk of fatal injury and injury types while driving under the influence of alcohol with properly restraint compared with the risk while driving under the influence of alcohol without restraint.

RESULTS

Driver age gender

Mean age was 34.31 years (range, 15 to 88 years and Std. Deviation-13.45) for alcohol-related motor vehicle crashes in 2003. Of all drivers with the alcohol factor involved in Police-attended casualty collisions, 79.3% were male. With respect to age, 7% of the alcohol-involved drivers were under the legal drinking age of 19. In 2003, 89.4 % of drivers killed and 79% injured in alcohol-related crashes were male.

Drinking Drivers Involved in Alcohol Related Collisions Compared to all Licensed Drivers by Age

Age	Active licensed drivers	# of drivers involved in alcohol related collisions	% of total driver population	% of total drivers involved in alcohol related collisions
16-20	187,806	347	6.62	17.30
21-25	224,672	421	7.92	20.64
26-35	496,801	451	17.51	22.11
36-45	618,523	432	21.8	21.18
46-55	580,326	254	20.46	12.45
56-65	376,255	95	13.26	4.65
66-75	228,304	24	8.05	1.18
76+	124,607	10	4.39	0.4

$\chi^2=610$ P<0.001

Risk of injuries, fatalities and non restraint use

Drivers who operated motor vehicles after drinking were less likely to wear seat belts. The OR for fatality was 4.70 among unrestrained occupants compared with restrained occupants. The OR for injury was 4.66 among unrestrained occupants compared with restrained occupants. Entire body (OR 9.70, CI 5.88-15.9), head, face, nose, eye (OR 6.72, CI 5.37-8.41) and upper torso injuries (OR 5.71, CI 3.18-8.41) were the more common body sites injured in unrestrained occupants compared to restrained occupants. Likewise fractures (OR 10.70, CI 7.35-15.5), lacerations (OR 7.50, 5.55-10.15) and concussions (OR 5.49, CI 2.71-11.12) were the more common types of injuries received by unrestrained occupants compared to the restrained occupants.

Public attitudes on alcohol impaired driving in BC

There is evidence that public attitudes about impaired driving have not kept up with those in other jurisdictions. Although 80% of British Columbians identified drinking and driving as a serious problem in a 2002 survey, that number is lower than Ontario (86%) and Quebec (99%). In the same survey, 11.3% of BC drivers reported driving while feeling impaired at least once in the past two months. The equivalent number in Ontario was 5.4%. Using this survey data, it was estimated that there were approximately 2.5 million self-reported episodes of driving while impaired (DWI) in 2002¹. The incidence and rate of DWI reported are probably underestimates for several reasons. First, individuals may be reluctant to admit to DWI because this behavior carries a social stigma and can be illegal. Second, because respondents were asked to report "driving after having had, perhaps, too much to drink," some may have denied being impaired after drinking episodes. Third, this survey did not include data from drivers aged <19 years, and DWI occurs frequently in this group. However the Adolescent Health Survey found that heavy drinking is becoming more common among BC youth. Of high school students who drink, the rate of binge drinking in the previous month increased from 36% in 1992 to 44% in 1998².

Time of occurrence

Alcohol-related casualty collisions were more likely to occur on weekends (Friday, Saturday and Sunday) than on week days. In 2003, approximately 61% of all alcohol-related injury collisions occurred on weekends. Likewise 63.4% of all alcohol-related fatal crashes occurred on weekends. The peak occurrence for alcohol-related injury crashes was between 9:00pm.-3:00 am. The peak of alcohol-related fatal crashes occurred between 11:00 pm -12:00 am.

Traffic Fatalities by Age and Drinking Driving

Alcohol involvement	<16	16-20	21-30	31-40	41-50	51-60	61-70	70+
Percentage of non alcohol related crashes	85%	69%	68.8%	64.6%	80%	73.7%	84%	95.5%
Percentage alcohol involved	15%	31%	31.2%	35.4%	20%	26.3%	16%	4.5%
Number of Alcohol involved	4	16	30	22	11	10	6	3
Total fatalities	27	52	96	62	55	38	38	67

$\chi^2=117$ P<0.001

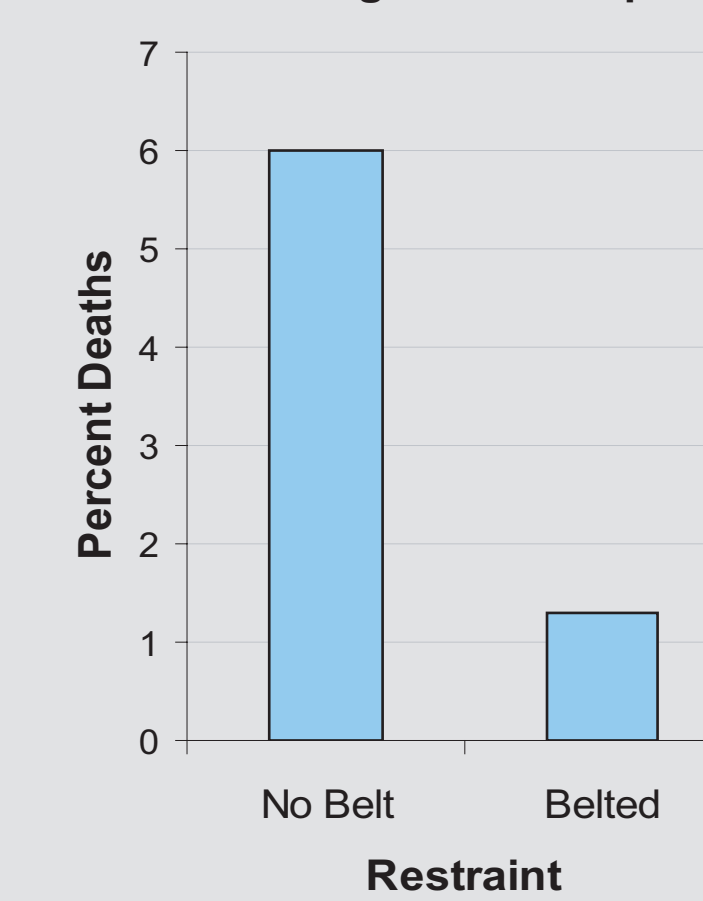
Seat Belt Use by Drinking Drivers

Restraint use	Alcohol related crashes (n=4652)
No restraint use	13.5%
Restraint use	58.7%
Unknown	27.8%

Comparison of Injury Type in Restraint Non-use Occupants versus Restraint Use Occupants in Alcohol Related Crashes in 2003

Type of Injury	No restraint use	Restraint use	OR	CI
ABRASION	47	128	3.25	2.26-4.68
BRUISES	63	171	3.26	2.37-4.50
WHIPLASH	26	125	1.84	1.18-2.87
BLEEDING	62	77	7.14	4.97-10.26
CONCUSSION	13	21	5.49	2.71-11.12
LACERATIONS	99	117	7.50	5.55-10.15
FRACTURE	70	58	10.70	7.35-15.5
OTHER	35	92	3.37	2.23-5.10
TOTAL INJURIES	415	789	4.66	3.88-5.60
NO INJURIES	219	1943		

Risk of Death and Seatbelt Use in Road Traffic Crashes Involving Alcohol Impaired Drivers



Discussion

The results of this study indicate that drinking and driving is related to higher rates of fatal and injury-related crashes, and that children and young adults are a priority population for injury prevention strategies. Driving while impaired by alcohol and failing to use occupant protection are two of the most important risk factors for motor vehicle injury and fatality. The analysis demonstrated that, in drinking and driving crashes, the risk (OR) of fatal injury is 4.70 times higher among unrestrained occupants compared with restrained occupants. Driving while impaired by alcohol and failing to use occupant protection are two of the most important risk factors for motor vehicle injury and fatality in British Columbia roads. The OR for injury was 4.66 among unrestrained occupants compared with restrained occupants. Entire body (OR 9.70), head, face, nose, eye (OR 6.72) and upper torso injuries (OR 5.17) were more common body sites injured in unrestrained occupants compared to restrained occupants. Likewise fractures (OR 10.70), lacerations (OR 7.50) and concussion (OR 5.49) were the more common types of injuries received by unrestrained occupants compared to the restrained occupants. Safety belt use is the single most effective strategy a person can employ to prevent deaths and injuries and reduce the costs associated with motor vehicle crashes. Traffic crashes are not only a grave public health problem for our province, but also a significant economic burden. We need to develop, promote and implement effective educational, engineering, and enforcement programs aimed at ending preventable tragedies and reducing the economic costs associated with motor-vehicle-related crashes.

RECOMMENDATIONS FOR PREVENTION

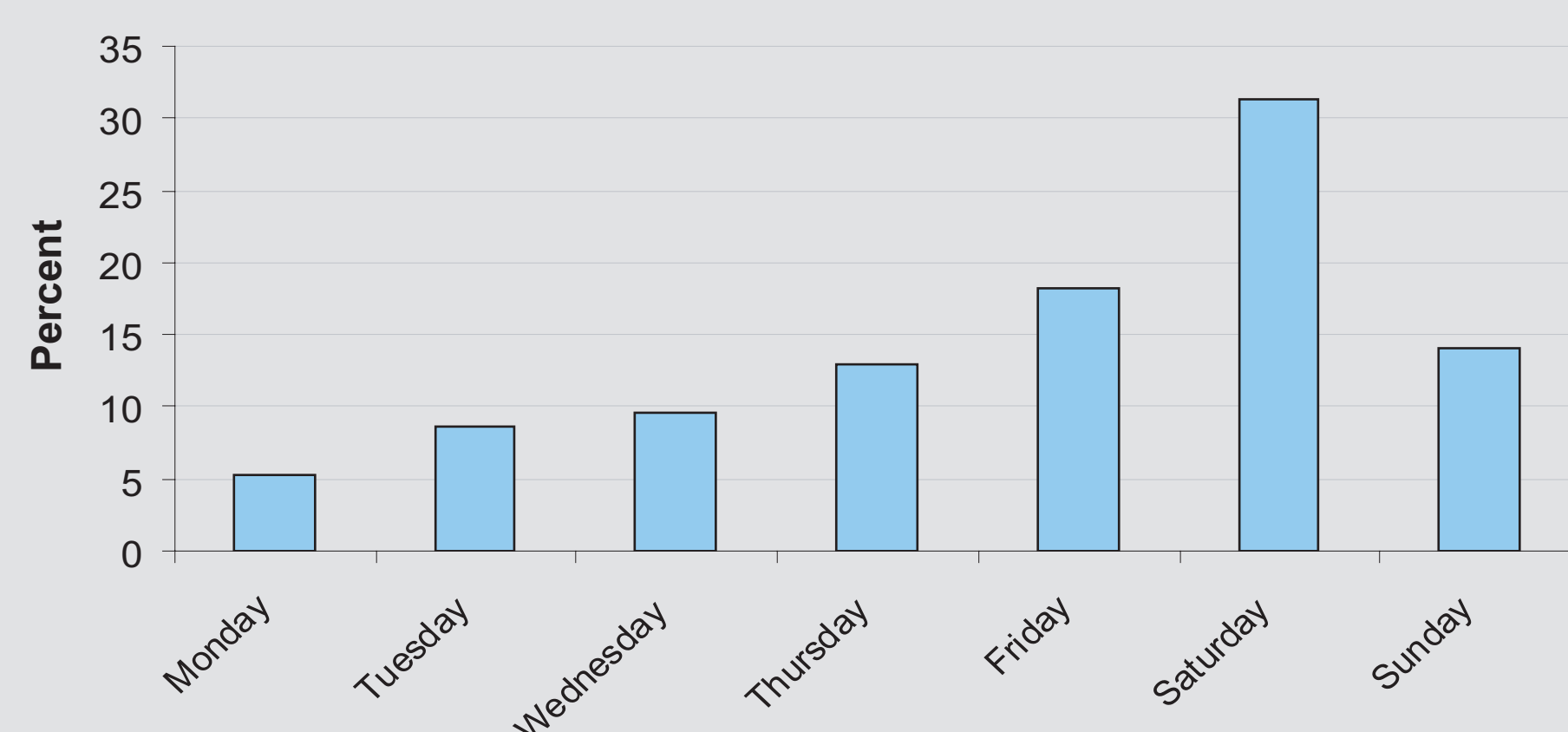
(1) Strategies to reduce alcohol-impaired driving are recommended. Based on the results of our study and two surveys, continued efforts are recommended to deter the general public from DWI, and renewed efforts to identify and intervene with specific groups whose levels of DWI are highest are also recommended. Effective general policies combine laws lowering the legal blood alcohol limit^{3,4,5}, prompt license suspension for people arrested for driving while impaired^{6,7,8}, install sobriety checkpoints^{9,10} and alcohol-ignition interlock programs¹¹, and provide for sustained public education and enforcement³. Using a combination of approaches is more likely to succeed than any single approach. BC traffic collision statistics shows that 33% of DWI drivers were repeat offenders. Furthermore, given the strong connection between repeat DWI and drinking problems, support for the following is recommended: adoption of effective interventions to reduce binge drinking, including comprehensive community-based programs¹²; increasing alcohol excise taxes¹³; server intervention training, accompanied by strong and active management support¹⁴; and screening and brief intervention for alcohol problems in clinical settings^{14,15}. DWI is a complex social, medical, and public health problem. Only through a combination of legal, social, behavioral, environmental, and medical interventions, can we reduce DWI-associated deaths/injuries.

(2) Strategies to increase seat belt use are recommended. Seat belts continue to save thousands of lives in BC/Canada and no other countermeasure can achieve the same level of savings. Enforcement, education and legislation are the three key elements needed to increase the use of seat belts^{16,17}. The effect of enforcement can be seen in the results of Transport Canada's survey of seat belt use across the country, where dramatic dips in enforcement have resulted in corresponding dips in the use rate. Changes in the way enforcement is used can be anticipated to accommodate the growing pressure on the enforcement community. To be effective, public education needs to be targeted and staged. Common messages with simple straightforward language need to be implemented. Public education strives to raise awareness, identify responsibility with the problem, and finally communicate best practices leading to a change in attitude followed by a change in behavior. Effective legislation helps provide the foundation for behavior change and for setting the standards and expectations which guide enforcement and education. The universal adoption of legislation that simplifies and clarifies the law and reduces the chances for misuse and non use of seat belts will result in increased usage^{16,17}.

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Drinking drivers involved fatal traffic crashes, by day of the week and drinking driving 2003 (in percent)



Drinking drivers involved in fatal traffic crashes, by time of day

