

OVERVIEW OF TWO MOTOR VEHICLE INVOLVED SIDE-IMPACT CRASHES IN BRITISH COLUMBIA

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ABSTRACT

High mortality and severe morbidity are associated with side impact crash (SIC) related injuries. The goal of this research is to examine driver injuries/fatalities in SICs and to review the background information surrounding SIC occurrence in British Columbia for the year 2002.

Police reported motor vehicle collision data was obtained from Insurance Corporation of British Columbia for this study. To determine the conditions surrounding transport-related injuries and vehicle damage severity, SIC collision occurrence information from 4,595 SICs was analyzed.

It was determined that males were most likely to be drivers in SICs. The overall rate of injuries and fatalities was 472.6 per 1000 SICs. Most SICs occurred in daylight, under dry weather conditions. Acute traumatic injuries sustained as a result of SICs were whiplash and bruises, with the neck and head being a common location of injury. Majority of SICs occurred due to driving errors such as failing to yield the right-of-way, disobeying traffic signs and driving without due care. SICs most commonly occurred between 10:00 AM to 6:00 PM. Strategies outlining the need for traffic safety law enforcement are discussed.

INTRODUCTION

During 2001, side impact crashes (SICs) contributed to 29.6% of all fatal and injury inducing crashes in British Columbia. High mortality and severe morbidity associated with SIC-related injuries require continuing and improved injury prevention and control strategies. Despite the substantial proportions of this type of crash, little is known about the epidemiology or biomechanics of these collisions when compared to head-on crashes.

Patterns of injury in different types of motor vehicle crashes have significant implications for injury prevention policies. Identifying background features of SICs is necessary to design and implement effective motor vehicle crash prevention protocols. To assess the magnitude of the problem, background information on SIC occurrence, associated injuries and vehicle damage severity in BC was collected.

OBJECTIVES

The aim of this study is to review the background information on SICs and examine injury risk factors for drivers and occupants in BC during 2002.

METHODS

Police reported motor vehicle collision (MVC) data for the year 2002 were obtained from Insurance Corporation of British Columbia (ICBC). All 'intersection right angle' crashes involving exactly two vehicles were selected from this database. In this study, motor vehicle SICs will be analyzed using data from real world crashes in BC during 2002.

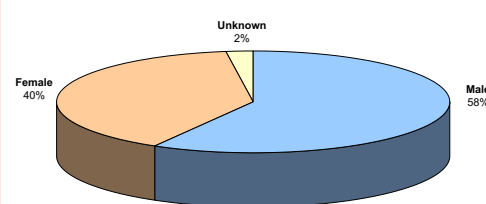


RESULTS

SEX DIFFERENCES

Female drivers were involved in 3,600 (39.3%) SICs, while male drivers were involved in 5,384 (58.5%) SICs. In 206 SICs (2.2%), driver's gender was not reported. The overall rate of SICs was 11.1 per 100,000 population. Among females, 172 SICs per 100,000 were reported and 262 SICs per 100,000 were reported among males. Mean age for female drivers involved in SICs was 41 years and mean age for male drivers involved in SICs was 41.2 years.

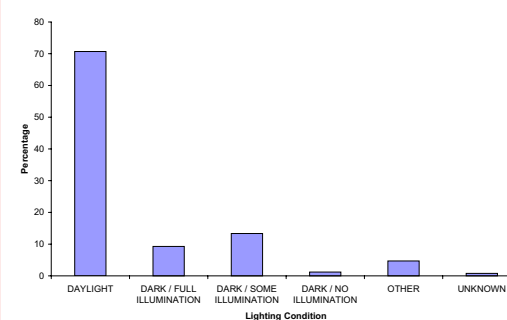
Sex Differences In SIC-involved Drivers in British Columbia, 2002



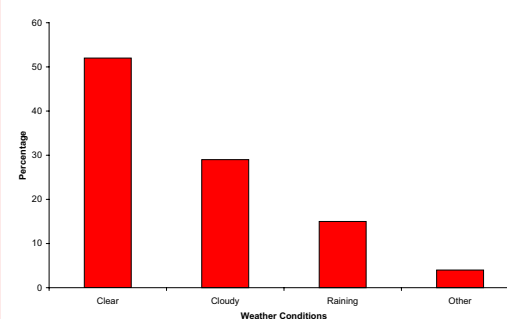
ENVIRONMENTAL FACTORS

Environmental factors and unsafe conditions are known to result in MVCs. Research suggests that MVCs are inversely related to the intensity of light (Ferguson et al, 1995). Seventy-one percent of SICs were reported in daylight, 13.0% took place in the dark with some illumination and 9.0% with full illumination. It is common knowledge that rain, sleet or snow not only reduce visibility but contribute to unsafe road conditions. In this study, most SICs occurred in dry weather conditions (65.0%) while some took place under wet weather conditions (28.0%) and few (3.0%) were reported during snow. The majority of SICs reported on Fridays (17.0%) and Thursdays (16.0%) and the least reported on Sundays (10.0%).

Lighting Conditions During SICs in British Columbia, 2002



SIC Occurrence Under Different Weather Conditions in British Columbia, 2002



VEHICLE DAMAGE

Of the 4595 crashes, 2421 (52.7%) were property damage only crashes, 2160 (47.0%) were injury-producing crashes and 14 (0.3%) involved a fatality. Consistent with the results reported by Acierno et al. (2003) and Dischinger et al. (1993) using hospital case reports, analysis of BC data suggests that SICs increase the likelihood of injury and greater damage to vehicles when compared to non-SICs.

Comparison of Vehicle Damage Severity in SICs vs. Non-SICs in British Columbia, 2002

Nature of vehicle damage	SICs n (%)	Non-SICs n (%)
Demolished (Repair Impractical)	601 (6.5)	1,632 (4.2)
Severe (Major Structural Repair Necessary)	2,502 (27.3)	6,263 (16.0)
Moderate (Large Dents)	3,459 (37.6)	12,305 (31.0)
Light (Superficial Scratches)	1,791 (19.5)	11,902 (30.0)
No damage (None visible)	64 (.7)	1,755 (4.4)
Unknown	773 (8.4)	5,722 (14.4)
Total	9,190 (100)	39,579 (100)

INJURIES

Compared with other types of crashes, SICs are associated with increased likelihood of injuries (McLellan & Rizoli, 1996). This could be attributed to the proximity of the occupant to the point of impact and lack of significant energy-absorbing structures in area of the vehicle. Approximately 47.0% of SICs resulted in injuries, compared to 37.0% of other type of two vehicle involved crashes resulted in an injury. Analysis of injury rates in SICs indicated frequent injuries took place at vulnerable important body contact sites. Police reported traffic crash data confirmed the neck, head and chest are the most frequently injured body parts as a result of SICs. Acute traumatic injuries including whiplash, lacerations and abrasions were common at SICs. Among those injured in SICs, 9.0% experienced whiplash injuries, 8.4% experienced bruises, 2.0% experienced abrasions and 1.1% experienced lacerations.

VEHICLE MODEL YEARS

SIC rates were calculated for 100,000 vehicles taking the model year and vehicle make into consideration. Vehicles models made between 1980-1989 were involved in the highest rates of SICs (455 per 100,000). Vehicle models made before 1979 accounted for the least amount of SICs (172 per 100,000).

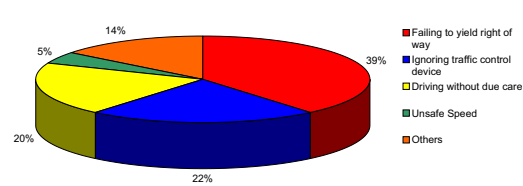
SICs per 100,000 Vehicles, Based on Vehicle Model Years in British Columbia, 2002

Vehicle Model Years	Crashes per 100,000 Motor Vehicles
Before 1979	172.52
1980-1989	455.79
1990-1999	349.48
2000-	239.28
TOTAL	366.85

DRIVER ERRORS

Previous literature suggests that driver errors were major compounding factors of motor vehicle crashes (Kim et al, 1995). Many SICs were attributed to driving errors such as failing to yield the right-of-way (38%), disobeying traffic signs (23%) and driving without due care (20%). Accordingly, the results of our study not only corroborate those reported by Desapriya et al (2003) and Hingson et al (1996) but also support the proposition that a more stringent enforcement of the traffic safety laws that require better compliance with traffic rules by drivers and better vehicle control at traffic stop sign, intersections and traffic lights might produce a future decline in SICs in BC.

SICs and Driving Errors in British Columbia, 2002



In addition, majority of SICs (61.7%) occurred during 10:00 AM to 6:00 PM and therefore it is important to focus extensive traffic law enforcement campaigns within this time period in major intersections throughout BC. Prevention of SICs can be approached through changes in the host, the agent, or the environment, and in their interaction with each other.

CONCLUSIONS

SICs comprised a substantial portion of all injury producing crashes in BC. Analyses of vehicle drivers and occupants in SICs confirmed that the neck and head were the most commonly injured body regions. Majority of SICs in BC occurred in daylight conditions and dry weather conditions. BC data also suggested that SICs also cause greater damage to vehicles when compared to other type of crashes in BC. Vehicle models manufactured between 1980-89 were involved in the highest rates of SICs while model years 1979 and before were least involved in SICs. SICs due to driver errors occur in large numbers in BC and therefore warrant considerable resources for remediation. These findings have direct relevance for future driver, occupant safety policies and injury prevention.

ACKNOWLEDGEMENTS

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