CHIRPP INJURY BRIEF

Canadian Hospitals Injury Reporting and Prevention Program

Injuries associated with BICYCLES

2006, Ages 1 year and older

SOURCE OF THE STATISTICS

Injury data were obtained from the database of the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP). CHIRPP is an injury surveillance system operating in the emergency departments of 10 pediatric and 4 general hospitals in Canada. Data collection began in April 1990 at the pediatric hospitals and between 1991 and 1995 in the general hospitals. CHIRPP is a program of the Injury and Child Maltreatment Section of the Health Surveillance and Epidemiology Division, Public Health Agency of Canada.

Briefs and reports are updated when there is reason to believe the injuries or circumstances surrounding the injuries have changed. For example, the report of injuries associated with a specific product would be updated if the manufacturing regulations for the product are changed to include a new safety element. There is no need to update reports on a regular basis because the data collection sites are not a representative sample of all Canadian hospitals. Frequent updates would simply increase the number of records included in the report but not necessarily result in any change in the patterns and distributions found.

LIMITATIONS

It is important to note that the injuries described do not represent all injuries in Canada, but only those seen at the emergency departments of the 14 hospitals in the CHIRPP network. Since most of the data comes from the pediatric hospitals, which are in major cities, injuries suffered by the following people are under-represented in the CHIRPP database: older teenagers and adults, who are seen at general hospitals; native people; and people who live in rural areas. Fatal injuries are also under-represented in the CHIRPP database because the emergency department data do not capture people who died before they could be taken to hospital or those who died after being admitted.

INCLUSION AND EXCLUSION CRITERIA

A May 2008 search of the CHIRPP database for injuries associated with bicycles was conducted (ages 1 year and older; 1,850,948 records total). The records were retained if i) the narrative contained one of the following text strings: “BIKE”, “BICYCLE”, “TRICYCLE”, “UNICYCLE”, “CYCLE” , “BICYCLETTE”, “VELO” or “PEDALER ii) and the injury occurred in 2006. This final dataset was then reviewed manually to confirm all cases occurred outdoors, were associated with non-motorized bicycles. Cases involving exercise bikes, motocross, motorcycle, motorized dirt bikes, or toy bikes were excluded.

RECOMMENDED CITATION

Injury briefs and reports and data from them may be copied and circulated freely provided that the source is acknowledged. The following citation is recommended:

Health Surveillance and Epidemiology Division (Public Health Agency of Canada). *Injuries associated with bicycles:* Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) database, 2006, 1 year and older, 3,993 records.

FOR MORE INFORMATION

Please contact the Injury and Child Maltreatment Section, Health Surveillance and Epidemiology Division, by PHONE at (613) 957-4689, by FAX at (613) 941-9927 or visit our website at:

http://www.phac-aspc.gc.ca/inj-bles/

Overall Pattern

Overall, 3,993 cases were identified where the injury was associated with a bicycle (3526.1 cases per 100 000 CHIRPP records). Among 2006 CHIRPP cases, this represents 3.4% of total cases, approximately 9% of all sports and recreation activities, and 44% of all wheeled, non-motorized activities (bikes, scooters, scooter boards, inline skates and skateboards).

There were 11% of cases admitted to hospital for treatment, compared to a 7.0% admittance rate for CHIRPP during the same timeframe for all injuries. The leading injuries reported were fractures (34.0%), lacerations (18.0%), and minor head injuries or concussions (7.3%). The majority of injuries occurred between April and October (94%), with a slightly higher proportion on the weekend (16%) than the weekdays (14%).

The analysis will be divided into cases involving ***children*** (between 1 and 10 years of age) (43.1% of cases), ***youth*** (11-15 years) (40.3% of cases) and ***adults*** (16 years and up) (16.7% of cases), to compare patterns among these groups. For all age groups combined, the median age was 11.9 and the interquartile range was 6.3 years (minimum age 1 year, maximum age 85 years). Analysis of the adult age group indicates a median age of 24 years.

Table 1 summarizes the age and sex distribution by these age groups.

Table 1. Injuries associated with bicycles, age and sex distribution, CHIRPP, ages 1 year and older, 2006.

Age Group (Years)	# cases overall (%)	#/100,000 CHIRPP [1]	% male	% male CHIRPP [2]
Children (1-10 years)	1720 (43.1)	3,294.6	66.1	56.9
Youth (11-15 years)	1607 (40.3)	5,289.4	80.7	63.0
Adult (16 years and older)	666 (16.7)	2,172.1	76.7	58.8
Total	**3993 (100.0)**	**3,526.1**	**73.8**	**59.0**

[1] Because CHIRRP collects information from ten children's hospitals and only five of the general hospitals, there is a high number of young children in the database. Using cases per 100,000 within an age group (instead of percentage by age group) adjusts for this uneven distribution.
[2] The proportion of males in the entire CHIRPP database for the given age group.

Circumstances

Table 2 describes the circumstances at the time of injury. Overall, the circumstances which led to the injury can be classified broadly into either *Loss of Control* (81.0%) or *Collision (14.6%)*. The percentage of injuries associated with loss of control decrease significantly between children (82.7%) and adults (78.7%) (X^2 (1, N=2386) =5.09, p<.05). The percentage of injuries involving collisions do not differ between children (13.4%) and adults (16.4%) when tested (X^2 (1, N=2386) =3.53, p>.05).

Table 2. Circumstances, injuries associated with bicycles, CHIRPP, by age group, 2006.

Circumstance	*Total*	*Children*	*Youth*	*Adult*
	# cases (%)	# cases (%)	# cases (%)	# cases (%)
Loss of Control	**3,234 (81.0)**	**1,422(82.7)**	**1,288 (80.1)**	**524 (78.7)**
Fell from bike, NFS	1365	637	470	258
Loss of control, no additional detail	571	310	184	77
Fell doing tricks/stunts	375	101	237	37
Fell due to hill or excessive speed	183	94	71	18
Distracted/chased and fell while biking*	181	82	70	29
Rough terrain (e.g. gravel, mud, sand)	164	54	87	23
Hit obstacle (e.g. rock, pothole), fell	152	68	58	26
Braking suddenly	83	22	46	15
Something caught in wheel/chain and fell	83	29	43	11
Racing (formal or informal)	35	11	15	9
Fell while getting on or off bike	25	14	6	5
Impaired (alcohol or drugs)	17	0	1	16
Collision	**583 (14.6)**	**230 (13.4)**	**244 (15.2)**	**109 (16.4)**
With motor vehicle	260	67	120	73
With fixed object (e.g. curb, tree, sign)	164	73	71	20
With bicyclist	76	43	25	8
With a parked car	59	32	21	6
With a pedestrian	24	15	7	2
Other	**176 (4.4)**	**68 (3.9)**	**75(4.7)**	**33 (4.9)**
Bike mechanical failure	104	28	51	25
Unintended use of bike**	56	38	16	2
Injured while repairing bike	8	0	4	4
Unknown	8	2	4	2
Total	**3,993 (100.0)**	**1,720 (100.0)**	**1,607 (100.0)**	**666 (100.0)**

*Includes being chased by an animal.
**Unintended includes cases such as where more than one patient on bike, riding in inappropriate place.

Injuries

There are up to 3 injuries recorded for each patient. For this analysis, there were a total of 5,075 injuries associated with 3,993 patients. Table 3 lists the nature of injury by body part for only the first, most serious injury. Overall, fractures were the most frequently occurring injury (34.0%) (upper extremity comprised 80% of all fractures), followed by lacerations (17.5%) and soft tissue injuries (15.3%). This pattern is consistent across all 3 age groups.

Table 3. Nature of injury, associated with bicycles, CHIRPP, by age group, 2006.

Body part *Nature of injury*	***Total*** **# cases (%)**	***Children*** **# cases (%)**	***Youth*** **# cases (%)**	***Adult*** **# cases (%)**
Upper extremities	**1797 (45.0)**	**714 (41.5)**	**790 (49.2)**	**293 (44.0)**
fracture	1077	459	485	135
soft tissue	286	109	132	45
abrasion	203	65	78	60
sprain/strain	96	32	46	18
laceration	91	39	33	19
amputation -finger	3	2	1	0
other	41	8	15	16
Lower extremities	**838 (21.0)**	**308 (17.9)**	**376 (23.4)**	**154 (23.1)**
laceration	236	93	117	26
fracture	191	60	91	40
soft tissue	181	71	79	31
abrasion	130	51	48	31
sprain/strain	72	24	32	16
other	27	9	9	10
Face (including eye and mouth)	**528 (13.2)**	**328 (19.1)**	**122 (7.6)**	**78 (11.7)**
laceration	298	198	60	*40*
abrasion	79	52	20	*7*
dental	68	45	20	*3*
fracture	41	11	12	*18*
soft tissue/bruise	24	12	5	*7*
other	18	10	*5*	*3*
Head	**399 (10.0)**	**192 (11.2)**	**165 (10.3)**	**42 (6.3)**
minor closed head injury	176	*94*	67	15
concussion	115	*49*	57	9
scalp laceration	38	*22*	11	5
intracranial	30	*7*	17	6
abrasioon	18	*8*	4	6
skull fracture	14	*5*	8	1
other	8	*7*	1	0
Trunk	**298 (7.5)**	**128 (7.4)**	**110 (6.9)**	**60 (9.0)**
soft tissue	101	55	31	15
abrasion	90	40	28	22
internal injuries	43	13	26	4
laceration	36	18	16	2
fracture	20	0	6	15
other	8	2	3	2
Neck and spine	**41 (0.1)**	**14 (0.8)**	**16 (1.0)**	**11 (1.7)**
soft tissue	15	6	5	4
fracture	10	1	6	3
sprain/strain	8	5	2	1
other	8	2	3	3
Other or unknown	**92 (2.3)**	**36 (2.1)**	**28 (1.7)**	**28 (4.2)**
Total	**3,993 (100.0)**	**1,720 (100.0)**	**1,607 (100.0)**	**666 (100.0)**

Treatment in emergency department

Table 4 reports what treatment the patient received in the emergency department (ED). Children were admitted at a rate of 8.7%, increasing to 11.6% in youth (X^2 (1, N=3,327) =8.09, p<.01) and further increasing to 15.3% in the adult age group (X^2 (1, N=2,273) =5.74, p<.05). The 2 fatalities followed impact by a motor vehicle.

Table 4. Treatment received in emergency departments, injuries associated with bicycles, CHIRPP, by age groups, 2006.

Treatment in Emergency Department	*Total*	*Children*	*Youth*	*Adult*
	# cases (%)	# cases (%)	# cases (%)	# cases (%)
Left without being seen	55 (1.4)	25 (1.5)	16 (1.0)	14 (2.1)
Advice	364 (9.1)	214 (12.4)	136 (8.5)	14 (2.1)
Treated, medical follow-up if necessary	1,426 (35.7)	585 (34.0)	505 (31.4)	336 (50.4)
Treated, medical follow-up required	1,576 (39.5)	693 (40.3)	695 (43.3)	188 (28.2)
Short stay, observed in ED	131 (3.3)	53 (3.1)	66 (4.1)	12 (1.8)
Admitted to hospital	438 (11.0)	149 (8.7)	187 (11.6)	102 (15.3)
Fatal	2 (0.05)	1 (0.06)	1 (0.06)	0 (0.0)
Total	**3,993 (100.0)**	**1,720 (100.0)**	**1,607 (100.0)**	**666 (100.0)**

Helmet use

There were 2,993 cases where helmet status was reported (75%); and among these cases, nearly 63% reported wearing a helmet. Analysis by helmet use demonstrated riders who were not wearing a helmet experienced an admittance rate of 12%, compared to 7% of riders who did. Table 5 illustrates helmet use, where status was reported, decreased as age increased.

Table 5. Helmet use, injuries associated with bicycles, CHIRPP, by age groups, 2006.

Helmet use while bicycling	*Total*	*Children*	*Youth*	*Adult*
	# cases (%)	# cases (%)	# cases (%)	# cases (%)
No helmet while bicycling	1116 (37.3)	404 (30.1)	506 (39.2)	206 (57.1)
Wore a helmet while bicycling	1877 (62.7)	937 (69.9)	785 (60.8)	155 (42.9)
Total cases of helmet status reported	**2,993 (100.0)**	**1,341 (100.0)**	**1,291 (100.0)**	**361 (100.0)**

Handlebar Impact

Cases associated with handlebar impact were identified as they are typically serious, often resulting in internal injuries. [3,4] There were 193 cases (4.8%) were the rider made contact with the handlebars and 15% of these were admitted to hospital, compared with an overall admittance rate of 11%. Of admitted cases, 73% were for treatment of internal injuries; of these 78% were associated with loss of control and 15% with a collision.

3 CHIRPP News: Issue 18, June 2000
4 CHIRPP Sampler http://www.phac-aspc.gc.ca/injury-bles/chirpp/injrep-rapbles/pdf/handlebars-07_e.pdf