Circumstances of Injuries to Cyclists

Results in Emergency Department Visits in Toronto & Vancouver

Introduction

Cycling is sustainable mode of transportation that has many individual and population health benefits, increases in physical fitness, decreases in body weight, lower risks of associated diseases; and reductions in air, noise, and water pollution. Unfortunately, the risk of injuries discourages people from cycling. In addition, injuries result in trauma and costs at both the individual and societal levels.

To identify ways to prevent injury events, we are conducting a multicentre case-crossover study focusing on "Bicyclists & the Cycling Environment" (the BICE Study).

Methods

Adult cyclists who lived and were injured in either Vancouver or Toronto and visited the emergency departments of Toronto General, Toronto Western, St. Michael’s, Vancouver General or St. Paul’s Hospitals were screened for eligibility and recruited to participate in an interview about their injury trip and circumstances. Here we report on the circumstances of the first 300 eligible injury events, 150 in each city (May to December 2008).

We summarize descriptive data about the cyclists (age, sex), the trip (purpose, prior use of drugs and alcohol, city), the injury event (crash vs. fall and sub-classifications of these, and whether a motor vehicle was involved or not) and the injury (Acuity Score (CTAS) and hospitalization).

Analytical comparisons were made using chi-square tests (e.g., comparisons of cyclist and trip characteristics between cities) and by calculating odds ratios (e.g., comparisons of injury circumstances by cyclist and trip characteristics). Adjusted analyses were conducted using multiple logistic regression, with two models, one for each of the following: (1) crash vs. fall, and (2) motor vehicle involved vs. not.

Results

The median CTAS was 3 (inter-quartile range: 3-4). Of the 300 cyclists studied, 27 (9.0%; 95% Confidence Interval: 5.8-12.2%) had injuries severe enough that they were admitted to hospital.

Injury circumstances were broadly classified as: • collisions (218 cases; 72%, 95% CI: 66.7-77.1%) or falls (84 cases, 28%, 95% CI: 23.3-33.1%) and • involving motor-vehicles (145 cases; 48%, 95% CI: 42.4-53.7%) or not (155 cases; 52%, 95% CI: 46.5-58.7%).

There were no differences in CTAS or hospital admissions by either • comparisons between cities (figure upper left) • proportions of injuries involving motor vehicles (cars, buses, trucks, dooring) were almost identical in the two cities • odds of a collision involving vehicle door were higher in Toronto (OR: 2.83; 95% CI: 1.13-7.62) • odds of a collision involving streetcar tracks were higher in Toronto (OR: 19.8; 95% CI: 5.9.45.0) • odds of a collision involving pedestrians or cyclists were lower in Toronto (OR: 0.93; 95% CI: 0.5-1.83)

Motor vehicle involvement and detailed primary injury circumstances (figure upper right)

Motor vehicles were involved in many injury events beyond direct crashes. For example, nearly half of crashes involving streetcar tracks involved maneuvers to avoid double-parked cars or cars moving in or out of parking spots.

Crude analyses of injury circumstances (tables)

Injured cyclists who used drugs or alcohol prior to their trip more commonly had falls not involving motor vehicles, but these associations were not statistically significant. All other variables (age, sex, trip purpose, city) were significant in at least one analysis and were offered to the relevant logistic regression model.

Multiple logistic regression models

Comparing the odds of a crash involving motor-vehicles vs. not, collisions were more common • in Toronto (OR: 2.88; 95% CI: 1.63-5.07) than Vancouver, and • on trips to work or school (OR: 4.42; 95% CI: 2.38-8.23) than trips for other purposes.

Comparing the odds of a crash involving motor-vehicles vs. not, those involving motor vehicles were more common • among injured cyclists less than 30 years old (OR: 2.02; 95% CI: 1.24-3.30) than those who were older, and • on trips to work or school (OR: 2.88; 95% CI: 1.79-4.65) than for other purposes.

Implications & Limitations

The injury circumstances and the differences between cities suggest that transportation infrastructure and interactions with motorized and non-motorized traffic are important factors in cycling injuries, ones that could be modified for injury prevention in the future.

The current analysis did not correct for cyclist “exposure to risk”, for example, there are more streetcar tracks in Toronto than in Vancouver. Analysis of the full dataset will use the case-crossover method to compare route characteristics of injury sites to control sites. This will correct for differences in use of various types of infrastructure, to allow “risk of injury” estimates, rather than the simple “frequency of injury” estimates provided here.

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