Characteristics of Urban Arterial Crashes Relative to Proximity to Intersections and Injury Severity

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Abstract

Intersections of an urban arterial corridor may influence crashes that occur even beyond their physical area. This study examines the effect of the gradual change in the distance of intersection influence on crash characteristics that explain injury severity outcomes of arterial crashes. The approach adopted involves simultaneous estimation of two variables: an ordinal variable representing crash—injury severity and a binary variable representing crash location (intersection versus segment crashes). The dichotomy in crash location is based on the threshold distance of intersection influence. Five sets of bivariate simultaneous models were estimated by using five threshold distances of influence varying from 0 to 200 ft at 50-ft increments. A threshold of 0 ft essentially means that crashes only at the physical area of intersections are treated as intersection crashes. The other four thresholds define crashes 50, 100, 150, and 200 ft from the center of the intersections as intersection crashes. Simultaneous estimation allows accounting for common factors that affect both crash location and injury severity, but are explicitly included in neither model. Effects of these common unknown factors are reflected in the estimated correlation coefficient between the error terms for the two models. The correlation coefficients were found to be significant for influence distances of 150 and 200 ft and insignificant for influence distances 0 through 100 ft. The implications of these results are discussed. Results of the simultaneous estimation also reveal that crashes on the corridor are less severe during afternoon peak traffic conditions and on blacktop surfaces, while segments with a higher speed limit, a wider pavement surface, and a lower-than-median annual average daily traffic are likely to experience more severe crashes. At low-influence distance thresholds (≤50 ft), pavement surface condition (dry pavement) is significant in discriminating intersection crashes from segment crashes, while pavement surface type (blacktop surface) is significant at higher (≥150-ft) thresholds.