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Safety Effect of Roundabout Conversions in the United States: Empirical Bayes Observational Before-After Study

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Abstract

Modern roundabouts are designed to control traffic flow at intersections without the use of stop signs or traffic signals. U.S. experience with modern roundabouts is rather limited to date, but in recent years there has been growing interest in their potential benefits and a relatively large increase in roundabout construction. This interest has created a need for data regarding the safety effect of roundabouts. Changes in motor vehicle crashes following conversion of 23 intersections from stop sign and traffic signal control to modern roundabouts are evaluated. The settings, located in seven states, are a mix of urban, suburban, and rural environments with the urban sample consisting of both single-lane and multilane designs and the rural sample consisting of only single-lane designs. A before-after study was conducted using the empirical Bayes procedure, which accounts for regression to the mean and traffic volume changes that usually accompany conversion of intersections to roundabouts. For the 23 intersections combined, this procedure estimated highly significant reductions of 40 percent for all crash severities combined and 80 percent for all injury crashes. Reductions in the numbers of fatal and incapacitating injury crashes were estimated to be about 90 percent. In general, the results are consistent with numerous international studies and suggest that roundabout installation should be strongly promoted as an effective safety treatment for intersections. Because the empirical Bayes approach is relatively new in safety analysis, the potential of this methodology in the evaluation of safety measures is demonstrated.

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