Intersection Conflict Warning System (ICWS) Safety Evaluation

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ABSTRACT

Rural intersections account for 30% of crashes and 6% of all fatal crashes. A promising solution has been the Intersection Conflict Warning System (ICWS) at rural two-way stop-controlled intersections. Early studies indicate lower intersection approach speeds, reduced conflicts, improved compliance with traffic control, and improved gap selection. The Minnesota Department of Transportation (MnDOT) installed the ICWS at six different intersections, with four cameras at each, in an effort to collect data on gap space, conflict occurrence, driver behavior, and diminishing effectiveness.

RESEARCH QUESTION

Does the use of ICWS increase awareness of crossing vehicles and reduce crashes at major and minor highways?

BACKGROUND

From 1998 – 2000, 62% of all intersection-related fatal crashes in Minnesota occurred at rural intersections. In an effort to reduce the percentage of fatal crashes at rural intersections, MnDOT began implementing ICWS’s. Six intersections were recorded for fourteen days. Seven days prior to the installation of the ICWS and seven days after installation. The video was reduced into length of time at intersection, type of vehicle, type of stop, ICWS activation, accepted and rejected time to complete action through intersection. After installation data was taken again for seven days at test intersections after a 12-month implementation of ICWS.

METHODS

First, data is compared from the initial seven days to the seven days at the same intersection after ICWS installation. Second, before ICWS installation and immediately after installation data will be compared to after 12-month installation data. Emphasis of safety are gap space, conflict occurrence, and diminishing effectiveness of ICWS. Gap space was determined by reducing video of the first five cars in a random 15 minute interval during each hour. Conflict occurrence was determined by reducing the remaining 45 minutes of each hour long video. Diminishing effectiveness was determined by analyzing the gap and conflict data.

RESULTS AND DISCUSSION

The percent of accepted gaps decreased by 18.07% from before to one year after at the treatment sites. At control sites, the percent of accepted gaps decreased 14.67% from before to one year after. Of 6 second or less gaps the accepted rate decreased at both treatment and control sites by 79.59% and 43.72%, respectively. At treatment sites, there was a 40.19% decrease in acceptance of gaps that were 7-9 seconds. The control sites showed a 74.22% decrease in acceptance of all 7-9 second gaps. In the 10-12 second interval, the treatment sites had a 26.63% decrease in acceptance, while the control sites showed a 25% decrease in acceptance. Of gaps that were 12 seconds or more, the treatment and control sites decreased acceptance by 2.21% and 2%, respectively. At the treatment and control sites, as gap time increases, the amount of rejected gaps decreases, and the amount of accepted gaps increases. Even as the number of total cars at the sites remains similar, the number of accepted gaps for each second is generally lower at treatment and control sites one year after than they were before the ICWS was implemented. Though this trend may indicate there is a spill-over effect, more analysis needs to be conducted to determine if this trend is statistically significant and actually caused by the placement of the ICWS. Furthermore, conflict occurrence and driver behavior data needs to be analyzed to get a complete picture of the effectiveness of the ICWS. Further results, a final approval, and a proposed recommendation to the MnDOT is expected to occur in late 2016.

REFERENCES


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