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Safety Effectiveness of the HAWK or Pedestrian Hybrid Beacon

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The number of people who choose to walk or to ride a bicycle instead of driving has increased in recent years, because of the cost of transportation, the desire for healthier lifestyles, and for other reasons. Pedestrians and bicyclists, however, encounter serious risks—a large number are killed in traffic accidents every year in the United States.

Problem

Many roadway crossing treatments are available to address concerns about the safety of pedestrians (*1*), but only a few are appropriate for high-speed conditions or for wide crossings. In the late 1990s, Richard Nassi, then transportation administrator for the City of Tucson, Arizona, developed the High-Intensity Activated Crosswalk, or HAWK, pedestrian beacon; the 2009 *Manual on Uniform Traffic Control Devices* (MUTCD) calls the device the pedestrian hybrid beacon (*2*).

The HAWK is designed to assist in pedestrian crossings, especially at major arterials with minor street intersections (*3*). The HAWK stops vehicles so that pedestrians can cross the roadway and then permits the drivers to proceed as soon as the pedestrians have passed. Because signal control on a side street could encourage unwanted additional traffic through the neighborhood, the HAWK was designed with stop control on the side streets.

At a HAWK crossing, drivers receive multiple cues for the possible presence of a pedestrian. The cues include

- A unique beacon configuration—two red lenses over a single yellow lens;
- High-visibility crosswalk markings, in a ladder style distinct from two transverse white lines;
- A stop bar approximately 50 ft from the crosswalk;
- Solid lane lines, 8 in. wide, between through-travel lanes; and
- Signs—sometimes illuminated—that read "Pedestrian Crossing" or "School Warning."

When activated, the HAWK provides a red indication requiring drivers to stop for pedestrians crossing the major roadway. In Tucson, the HAWKs reduce pedestrian waiting time with "hot button" or instantaneous service. The HAWK can be designed to provide synchronization of signals on the arterial street.

Photo: Michael J. Cynecki

Example of a HAWK treatment in Tucson, Arizona. [Note: The pedestrian is Richard Nassi, developer of the HAWK.]

PHOTO: MICHAEL J. CYNECKI

Anecdotal experience indicates that the HAWK device improves safety. A comprehensive evaluation was needed, however, to establish the beacon's effectiveness.

Solution

The Federal Highway Administration (FHWA) sponsored a study that used a before-and-after, empirical Bayes approach to evaluate the safety effectiveness of the HAWK device (*4, 5*). The empirical Bayes method is a statistical approach that determines the effectiveness of a treatment from external factors—such as increases in traffic volumes—and from the randomness of crashes. Data were collected on crashes and traffic volume at 102 unsignalized intersections that served as the control sites and at 21 HAWK sites, typically 3 years before and 3 years after the installation. The number of observed crashes that occurred after the installation of a HAWK was then compared with the predicted number of crashes if the treatment had not been installed.

The researchers found the following changes in crashes after installation of the HAWK:

- A 69 percent reduction in crashes involving pedestrians, statistically significant at a 95 percent confidence level;
- A 15 percent reduction in severe crashes that result in injury; this was not statistically significant at a 95 percent confidence level, probably because of the low number of these types of crashes; and
- A 29 percent reduction in total crashes, statistically significant at a 95 percent confidence level.

Application

The 2009 MUTCD provides the information needed to make decisions about the installation and operation of pedestrian hybrid beacons. According to the guidance, "When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then . . . the pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs" (*2*, Section 4F.02).

All 21 HAWKs in the safety study were located at a minor intersection, with the minor street controlled by a stop sign, or at a major driveway controlled by a stop sign. In June 2011, the National Committee on Uniform Traffic Control Devices, which proposes revisions and interpretations of the MUTCD, recommended removal of the directive specifying installation at a 100-ft distance.

Benefit

This study showed that the HAWK beacons provided significant reductions in total crashes and in crashes involving pedestrians. Compared with a traffic signal, the HAWK beacon provides faster service to pedestrians and less delay to motorists—drivers are allowed to proceed on the flashing red after pedestrians have crossed their half of the roadway; moreover, the beacon costs about half as much as a traffic signal. As a result, the pedestrian hybrid beacon is rapidly gaining acceptance; in addition to Tucson, more than 14 cities have installed the device. The Tucson area currently has more than 100 installations.

The pedestrian hybrid beacon is a proven countermeasure that increases pedestrian safety at crossings with high volumes, that have wide streets, or that have high operating speeds.

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Suggestions for Research Pays Off topics are welcome. Contact G. P. Jayaprakash, Transportation Research Board, Keck 488, 500 Fifth Street, NW, Washington, DC 20001 (202-334-2952; gjayaprakash@nas.edu).