PROTECTING ROADSIDE WORKERS: FIELD EVALUATION OF A VEHICLE-MOUNTED VARIABLE MESSAGE SIGN AND EXAMINATION OF WORKER PERCEPTIONS AND USE OF COUNTERMEASURES

INTRODUCTION

Roadside service and incident response personnel, including law enforcement officers, emergency responders, and towing and service operators, have a high incidence of severe occupational injury while responding to traffic incidents and providing roadside services. Many countermeasures exist that can afford protection to these roadside workers; however, more research is needed to understand the effectiveness of different countermeasures.

This study aimed to evaluate the effectiveness of a specific countermeasure deployed on service vehicles—a vehicle-mounted variable message sign (VMS)—in promoting safer behaviors in passing motorists. Additionally, the study gathered information about workers' perceptions and adoption or use of different countermeasures. Finally, information was gathered from online news articles regarding the circumstances surrounding different types of roadside incidents.

KEY FINDINGS

Evaluation of Vehicle-Mounted Variable Message Sign

- When the VMS was active, drivers were more likely to move over (change lanes) and slow down than in the cases when the VMS was not active. The odds of a vehicle moving over were 95% higher when the VMS is used.
- Passenger vehicles were more responsive to VMS use than trucks or buses (although both vehicle types are more likely to move over when VMS is active compared to when not).
- If a vehicle was making a lane change, its speed also tended to be lower than those who stayed in a lane (i.e., borrowing from the slogan, they would "slow down" and "move over").
- The presence of service personnel working outside of the vehicle on the roadside tended to increase the likelihood of passing vehicles moving over.

Insights from Survey and Focus Groups

Many outcomes were gleaned from the survey and focus groups. Some select findings include the following:

- Respondents from the towing and recovery industry were less likely to receive training than responders from other agencies.
- Traffic Incident Management (TIM) training showed only small correlations with the use of certain countermeasures and did not show any association for others.
- High-visibility apparel and emergency vehicle lighting were the two most frequently used countermeasures by the respondents. Complacency was the most common reason cited for not always using high-visibility clothing.
- Only 38% of the respondents reported always using traffic cones. Not carrying traffic cones in the service vehicles was the most common reason cited.
- Survey respondents from the towing and recovery industry had the highest odds of experiencing a (self-reported) struck-by incident compared to any other agency group, except for fire departments, which were equivalent.
- Respondents who do not always or frequently use safety apparel, emergency

VIEW REPORT

ABOUT

Founded in 1947, the AAA Foundation for Traffic Safety in Washington, D.C., is a nonprofit, publicly supported charitable research and educational organization dedicated to saving lives by preventing traffic crashes and reducing injuries when crashes occur. Funding for this research was provided by voluntary contributions from AAA/CAA and their affiliated motor clubs, individual members, AAA-affiliated insurance companies, and other organizations or sources.

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lighting, and traffic cones had higher odds of getting struck than those who frequently use these countermeasures.

- Responders with TIM training did not experience lower odds of being involved in struck-by or near miss incidents than responders without training.

Text Mining of News Data

- Law enforcement agencies are associated with over half of struck-by incidents and line-of-duty deaths (LODD) reported by the news. Nearly 20% of reported LODD incidents involved tow truck drivers.
- Morning and night incidents are frequently reported in the news.

IMPLICATIONS

The results from the field study suggest that using VMS can positively impact the behaviors of passing motorists, especially in passenger vehicles; therefore, where vehicles or fleets can accommodate this feature, this should be strongly considered as a countermeasure to protect roadside incident and service personnel.

The results of the current work also help shed insight into reasons why roadside workers do not adopt or use different countermeasures. In many cases, training (including raising awareness), practice, increasing access, or implementing policies or mandates might help to encourage and promote the use of available countermeasures. Education regarding the risks and/or the efficacy of certain countermeasures might be one avenue to reducing complacency or correcting perceptions that certain countermeasures are ineffective.

Based on the modeling efforts, training alone did not have an impact on the occurrence of struck-by and near-miss events, suggesting that the relationship between training and safety experience can be complex. For example, agencies or individuals that experience such incidents might receive remedial training in response. The outcomes might also indicate that existing training programs have room for improvement. For one, it was found that training did not significantly increase compliance with many countermeasures.

METHODOLOGY

Field Study

Video data was collected from one of the Alabama Service Assistance Patrol (ASAP) vehicles, which is equipped with a vehicle-mounted variable message sign (VMS), operating on a 25-mile stretch of interstate in west central Alabama. Over 50 hours of videos were collected between August and October 2021 and 40 different ASAP vehicle stops at various locations were observed. Data from each stop was segmented according to whether the VMS was active or inactive. When active, the VMS displayed a flashing diamond sign.

Deep learning techniques were implemented to extract information from the videos to capture the maneuvers of vehicles approaching the ASAP vehicle, including their speed, lane change behavior, and distance to the ASAP vehicle when a lane change was made. Regression models were used to examine the influence of VMS status on these measures. A range of other factors were also examined in the models, including characteristics of the vehicles, road, and traffic environment.

Focus Groups

Five virtual focus group meetings were attended by a total of 18 participants from four fields of incident management (police, DOT, EMS, and towing and roadside service). Each meeting lasted approximately 90 minutes and the main discussion topics dealt with the adoption of common countermeasures and safety protocols.

National Survey

An online survey was developed and distributed. Data from 1,621 respondents from a variety of occupations were included in the analysis. The survey gathered information from participants, including: (i) their socio-demographic information and agency type (fire, police, paramedics, towing services, etc.); (ii) their experiences with crashes or near-misses while working on the roadside, and (iii) their adoption or use of a variety of countermeasures and safety protocols.

Narrative Text Mining

A total of 5,113 responder-involved incidents were gathered from online news reports dated between July 11, 2001, and December 6, 2020. Through narrative text mining techniques, key attributes of these news-reported incidents were examined in relation to different incident outcomes, i.e., injury severity of the responder involved in the struck-by incident.

REFERENCE

Liu, J., Penmetsa, P., Yang, C., Hainen, A., & Barnett, T. (2023). *Protecting Roadside Workers: Field Evaluation of a Vehicle-Mounted Variable Message Sign and Examination of Worker Perceptions and Use of Countermeasures* (Technical Report). Washington, D.C.: AAA Foundation for Traffic Safety.