A Pilot Naturalistic Driving Study on Fatigue in Winter Maintenance Operations

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Although the research concerning fatigue in winter maintenance drivers is sparse, much of the research relating fatigue to CMV drivers can be applied to winter maintenance personnel. For example, inconsistent and varying schedules, which have been shown to contribute to fatigue in CMV drivers, are inherent in the job of winter maintenance drivers due to the unpredictability of winter storms. Also, winter maintenance drivers are generally required to work long shifts while performing many activities in addition to driving (e.g., communicating with central office personnel, monitoring the application of de-icing agents, etc.) during winter emergencies. The goal of the current project was to evaluate the feasibility of collecting of naturalistic driving and actigraph data (i.e., objective sleep quantity and quality) to investigate issues related to winter maintenance operator fatigue during winter operations.

Four winter maintenance operators from the Virginia Department of Transportation were recruited to participate in the naturalistic driving study. All four drivers completed three months of participation in the study (January 24, 2013, to April 29, 2013). More than 368 hours of valid on-road data were collected, including 338 hours (24 days) of winter emergency operations and approximately 30 hours of non-winter emergency operations. Additionally, more than 6,600 hours of actigraph data were collected from the four winter maintenance operators.

Ninety-two safety-critical events (SCEs) were observed during the three months of data collection. Drivers were at least moderately drowsy during 35.9 percent of the SCEs. The majority of the drowsy driving SCEs (63.6 percent) occurred in the circadian low between 2:00 a.m. – 6:00 a.m. Fatigue was the critical reason in 28.3 percent of the SCEs.

A total of 516,867 minutes of actigraph data were collected during a three-month period. Overall, drivers averaged less sleep during winter emergencies versus non-winter emergencies. And, drivers averaged less sleep in the 24 hours prior to a SCE versus no SCE.

Four winter maintenance operators compose a very small sample. Therefore, these data should not be used to make any general comparisons, nor are the participant winter maintenance operators and their data representative of the population of winter maintenance operators. Instead, the data illustrate the feasibility of conducting a naturalistic driving study during winter maintenance operations and the need for a larger naturalistic study with winter maintenance operators to more accurately assess fatigue. This is needed as we still know very little about the causes of driver fatigue in winter maintenance operations. This information will be critical to informing the appropriate strategies and techniques to effectively reduce driver fatigue, thereby reducing crashes and their associated injuries and fatalities for all road users.