vehicular incidents decreased by an average of 0.35% (95%CI: -1.77%,1.07%), the rate of fatalities due to roadway incidents increased by an average of 0.38% per year (95%CI: -0.35%,1.13%). The MVC fatality rate for Black, non-Hispanics (1.09%; 95%CI: -0.72%,2.88%) and Hispanics (1.31%; 95%CI: -0.19%,2.88%) increased, whereas the average annual MVC fatality rate for whites decreased (-0.50%; 95%CI: -1.24%,0.24%). The average annual MVC fatality rate for workers aged ≥65 years increased significantly (1.61%; 95%CI: 0.03%,3.24%). The MVC fatality rate for driver/sales workers and truck drivers, who accounted for 39% of all work-related MVC deaths for 2011–2019, increased 0.72% per year on average (95%CI: -0.25%,1.76%). The average annual MVC fatality rate for installation, maintenance, and repair occupations showed a significant increase of 3.43% (95%CI: 0.61%,6.20%), which was significantly greater than the percentage change in overall MVC fatality rate (3.46%; 95%CI: 0.58%,6.35%). The average annual MVC fatality rates for construction and extraction occupations (-2.11%; 95%CI: -3.83%, -0.43%) and management occupations (-5.65%; 95%CI: -7.58%, -3.67%) declined significantly, and these declines were significantly greater than the percentage change in overall MVC fatality rate ((-2.07%; 95%CI: -3.90%, -0.28%), (-5.61%; 95%CI: -7.65%, -3.55%), respectively).

Discussion: While the overall work-related MVC fatality rate has not significantly changed over the 9-year study period, trends varied across incident types, demographics, and occupations. MVC fatality rates for those aged ≥65 years and those working in installation, maintenance, and repair occupations increased significantly, while rates for those working in construction and extraction and management occupations and rates of nonroadway incidents across all occupations declined significantly. It is important to identify factors associated with the decline in rates for certain subgroups of the workforce and apply what is learned to other work settings. Research should continue to focus on reducing MVC fatalities across other subgroups where little or no decline occurred.

H1.3

Title: Lessons Learned from Using Crash Records for Injury Surveillance in the AFF Sector

Authors: Eva Shipp, Amber Trueblood, Hye-Chung Kum, Shubhangi Vasudeo, Marcelina Perez, Lingtao Wu

Introduction: Fatal injuries in the agriculture, forestry, and fishing (AFF) sector are grossly overrepresented compared to the rate across all sectors in the U.S., based on the National Census of Fatal Occupational Injury (CFOI). CFOI data indicate that transportation-related injuries are among the top contributors to these fatal events. However, little is known about motor vehicle crashes in AFF, specifically events involving logging trucks and agricultural vehicles in the southwest (SW) region (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas). The overarching goals of this ongoing project are (1) to develop an integrated database of AFF-related motor vehicle crashes that occurred on public roadways in the SW region and (2) use these data to conduct surveillance and research focused on identifying factors associated with higher injury severity events.

Methods: Each state in the U.S. maintains a database of crash records for events occurring on their public roadways. These records include structured fields pertaining to person, vehicle, roadway, and environmental factors related to crash events and resulting injuries. In addition to the structured fields, records include free-text crash narratives where law enforcement officers provide additional details on crash causation. The present project includes the structured fields for crash records from Arkansas, Louisiana, New Mexico, Oklahoma, and Texas for the years from approximately 2010 to 2020. Narratives were obtained for Texas and Louisiana. To the extent feasible, the structured data fields across the five states were mapped to the Minimum Model Uniform Crash Criteria published by the National Highway Traffic Safety Administration to facilitate their integration. Descriptive statistics and geographic information system methods are used to identify the distribution of variables and identify spatial and temporal crash patterns. Multiple logistic regression models were constructed to identify factors associated with higher severity crashes involving logging trucks and farm vehicles. Finally, text mining methods including natural language processing applied to crash narratives are being used to better classify and understand AFF crashes.

Results: At present, the surveillance system contains over 8 million records with nearly 9,000 AFF-related crashes. Analysis of the crash records yielded a protocol for appropriately identifying AFF crashes while also quantifying potential misclassification as an AFF event. Analyses also reflect fields that differ markedly between states and how this impacts the interpretation of findings, including the comparison of crashes and their contributing factors across states. Strengths of crash records include their availability and details that are not included in traditional surveillance systems or clinical records. Key limitations of crash records include a lack of injury-specific information including diagnoses codes and specific fields to reflect industry and occupation.

Discussion: Despite their inherent limitations, crash records can be an important component of injury surveillance involving AFF vehicles in the SW region. They also can be used to identify potential risk factors for higher severity crashes which can inform the selection of countermeasures designed to address these factors.

Session H2

Industrial Mobile Robots: Best Practices for Worker Safety

Moderator: Carole Franklin

Mobile robots are changing the operation of industrial environments, and adjacent economic environments such as warehousing. Industrial robots were typically confined to fixed-in-place cells, to which human entry was prevented or controlled so as to maintain the safety of human workers. When the industrial robot was mounted to the capability of motion (e.g., gantry, hand-pushed cart, etc.), there was a well-defined or easily discernible range of motion. Historically, automated mobile machines in the industrial environment were confined to fixed guidepaths. Now, new technological advances are permitting mobile robots to navigate freely in the same spaces as human workers. However, with this new capability come new hazards and risks that must be evaluated for every deployment of mobile robots. This session will introduce concepts of mobile robotics in the industrial environment and how they are being used in industry, discuss the safety standards related to industrial mobile robots and systems of mobile robots, and how to evaluate and mitigate these new hazards related to industrial mobile robot systems.

The workshop will cover the following topics with respect to mobile robots in industry:

- Paradigm Shift in Industrial Robot Safety
- Introduction to Mobile Robots and Applications
- Safety Standards for Industrial Mobile Robots and Other Mobile Platforms
- Risk Assessment and Hazard Mitigation for Industrial Mobile Robot Systems
- Residual Risks for Industrial Mobile Robot Systems

Session Learning Objectives: Participants will learn what mobile robots are, how they differ from other mobile machines in the industrial environment, how they are being used in industry, what safety standards exist for mobile robots and mobile robot systems, and how to evaluate and mitigate hazards related to industrial mobile robot systems.

Paradigm Shift in Industrial Robot Safety

Presenter: Carole Franklin – Director of Standards Development, Robotics, Association for Advancing Automation (A3)

This presentation will describe how safety practices for mobile robotics requires a paradigm shift from fixed-in-place or defined-motion industrial robotics (whether collaborative or not).

Introduction to Mobile Robots and Applications

Presenter: Mark Lewandowski – Robotics Innovation Leader, Procter & Gamble

This presentation will discuss what industrial mobile robots are, and how mobile robots are being used in industry.

Safety Standards for Industrial Mobile Robots and Other Mobile Platforms

Presenter: Jeremy Marvel – Computer Scientist, National Institute for Standards and Technology (NIST)

This presentation will discuss the industry standards for mobile robot safety and other forms of mobile machinery operating automatically or with degrees of autonomy in the industrial environment.

Risk Assessment and Hazard Mitigation for Industrial Mobile Robot Systems

Presenter: Aaron Prather – Senior Advisor, Technology Planning & Research, FedEx

This presentation will discuss the new hazards related to mobile robot systems and how to evaluate and mitigate these hazards.

Residual Risks for Industrial Mobile Robot Systems

Presenter: Federico Vicentini – Head of Product Safety, Boston Dynamics

This presentation will discuss approaches to a special topic of risk assessment, where some residual risks could be left unresolved due to the nature of the application, the environment, the user requirements, or the mobile robots themselves.

NOIRS

National Occupational Injury Research Symposium

Preventing Workplace Injuries in a Changing World

May 10-12, 2022

National Institute for Occupational Safety and Health
NIOSH®