



Research on the Health and Wellness of Commercial Truck and Bus Drivers: Summary of an International Conference

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Research on the Health and Wellness of Commercial Truck and Bus Drivers

Summary of an International Conference

Gerald P. Krueger, Rapporteur

November 8–10, 2010
Baltimore, Maryland

Sponsored by
Transportation Research Board
Federal Motor Carrier Safety Administration

In Partnership with
National Institute for Occupational Safety and Health

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This report has been reviewed by a group other than the authors according to the procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Preface

In November 2010 some 200 attendees gathered in Baltimore, Maryland, for a conference focused on commercial truck and bus driver health and wellness issues.

The conference brought together individuals from public-sector agencies (federal and state), the private sector (industry and labor unions), academia, and research institutions, both domestic and international, from transportation and health arenas.

The conference goals were to (a) review research that identifies health and wellness issues for commercial drivers; (b) examine the magnitude of these issues; (c) identify countermeasures and current practices addressing these issues; (d) explore and, to the degree possible, document the effectiveness of such countermeasures and current practices; and (e) identify research gaps in this field.

To plan this event, TRB assembled a committee appointed by the National Research Council to develop and organize the conference program. The planning committee was chaired by Eric Wood, University of Utah. The committee members are listed on p. ii of this report. Their expertise and efforts on behalf of this conference are acknowledged with thanks.

The program included keynote speakers to introduce the conference and topic. Each of the concurrent sessions on the diverse technical topics began with a lead speaker or expert, who introduced and provided an overview of the specific topic. Some sessions featured peer-reviewed papers. Another type of session highlighted current industry practices. A third type of session was composed of panels of practitioners and experts delving into a particular health and wellness issue and treatments or countermeasures.

These proceedings contain abstracts of the papers presented as well as a summary of the various topics presented and discussed. The proceedings were prepared by the conference rapporteur as a factual summary of what occurred at the conference. The expert assistance of Gerald P. Krueger, Krueger Ergonomics Consultants, consultant to TRB and conference rapporteur, throughout the conference process is gratefully acknowledged. The responsibility for the published conference summary rests with the rapporteur and the institution. The planning committee's role was limited to planning and convening the conference. The views contained in these proceedings are those of individual conference participants and do not necessarily represent the views of all conference participants, the planning committee, or the Transportation Research Board of the National Research Council.

The proceedings were reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise in accordance with procedures approved by the Report Review Committee of the National Research Council. The purposes of this independent review are to provide candid and critical comments that will assist the institution in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the project charge. The review comments and draft manuscript remain confidential to protect the integrity of the process.

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TRB thanks the following individuals for their review of this report: David Melton, Liberty Mutual Research Institute; Cathy Murphy, Blue Shield of California; Donald A. Osterberg, Schneider National, Inc.; and Eric Wood, University of Utah Rocky Mountain Center for Occupational and Environmental Medicine. Suzanne B. Schneider, TRB Associate Executive Director, managed the review process. Although the reviewers provided many constructive comments and suggestions, they did not see the final draft of the report before its release. The review of this report was overseen by C. Michael Walton, Ernest H. Cockrell Centennial Chair in Engineering, University of Texas at Austin. Appointed by the National Research Council, he was responsible for ensuring that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered.

TRB gratefully acknowledges the funding support provided by the Federal Motor Carrier Safety Administration (FMCSA) for the conference and also thanks the National Institute for Occupational Safety and Health for its partnership. Special thanks go to Albert Alvarez of FMCSA for his vision, encouragement, and insight, which contributed significantly to making the event the success that it was.

Overview

The first International Conference on Commercial Driver Health and Wellness was held November 8–10, 2010, at the Sheraton Inner Harbor Hotel in Baltimore, Maryland. The conference was sponsored by the Transportation Research Board (TRB) and the Federal Motor Carrier Safety Administration (FMCSA) of the U.S. Department of Transportation and was accomplished in partnership with the National Institute for Occupational Safety and Health (NIOSH). These proceedings highlight and document what transpired at the conference; summarize noteworthy issues and gaps in knowledge identified at the conference; and describe suggestions that were discussed there for possible future directions that the transportation health and safety community might pursue in these arenas. Gerald P. Krueger, Krueger Ergonomics Consultants, served as consultant to TRB and rapporteur for this conference. He prepared these proceedings as a factual summary of what occurred at the conference.

The conference featured numerous technical papers, platform presentations, discussion panels, and several vendor exhibits, each contributing toward (a) reviewing current knowledge on the impact of health factors on commercial driver job safety and performance, (b) documenting what is known about the benefits and costs of known commercial driver health and wellness (H&W) programs, and (c) exploring relevant case studies that provide lessons learned for implementing employee H&W programs, lessons gleaned from both commercial driving settings (e.g., carriers that have experimented with H&W programs) and from other industries where successful applications might be emulated.

Topics portrayed during the conference included the following:

- Research on the effects of H&W on commercial driver safety and performance;
- Identification of the most serious health risks to commercial motor vehicle (CMV) drivers;
 - Cost–benefit and return-on-investment (ROI) analyses of effective H&W programs that might apply to both small and large commercial truck and bus carriers;
 - Impacts of targeted, focused employee H&W initiatives, such as those involving physical activity, exercise, and fitness, diet and nutrition, weight management and control, smoking cessation, screening for and treating sleep disorders, disease management, and healthy behavioral changes;
 - Case studies and lessons learned, both positive and negative, for implementing H&W programs, particularly in truck and bus motor carrier companies;
 - Best practices, positive elements of effective employee H&W programs, and pointers on effective implementation in large and small companies; and
 - Instillation of an H&W philosophy into the culture of the commercial driving community.

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CONFERENCE OBJECTIVES

The overall purpose of the conference was to stimulate thinking, discussion, and research on employee H&W issues. It was also organized to identify for the transportation community demonstrated successful program applications central to ensuring that commercial drivers are both productive and safe in their jobs, which entail the transport of passengers and freight on the nation's roadways. Conference objectives therefore included the following:

- Providing accounts of evidence-based benefits—both personally based and ROI—of H&W programs for commercial drivers and their employers:
 - Considerations of corporate human capital strategies and the cost benefits of providing employee (driver) H&W programs,
 - Through case studies, identifying practices that work and those that do not seem to work, and
 - Identifying recent policy or regulatory developments, or both, that may affect employee health and well-being (especially that of commercial drivers).
- Learning about the latest research examining health issues that affect the performance and safety of commercial drivers, such as
 - Obesity, hypertension, cardiovascular problems, diabetes, and other health issues;
 - Physical fitness, diet and nutrition, and tobacco and smoking cessation;
 - Injuries, musculoskeletal disorders, sprains, and pains;
 - Psychological stress, mental health, and depression;
 - Work structure and organizational contributions to health issues;
 - Aging, communicable diseases, and sleep disorders; and
 - Disease management and access to and delivery of needed health care.
- Identifying successful practices and other industry corporate experiences with H&W programs, such as
 - Establishing a corporate and personal H&W philosophy,
 - Making H&W changes and behavioral modification, and
 - Involving families in successful H&W initiatives.

BACKGROUND

From 1995 to 2006, the U.S. Department of Transportation's FMCSA (formerly the Office of Motor Carriers of the Federal Highway Administration) conducted a concentrated program of educational outreach and research on CMV driver alertness, fatigue, health, wellness, and fitness. The comprehensive program, directed by FMCSA's Office of Analysis, Research, and Technology, initially concentrated significant research on driver fatigue. Gradually, FMCSA directed more emphasis on topics concerning commercial driver health, wellness, and fitness, a shift prompted and promoted by several of the following developments:

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1. In 1996, the Office of Motor Carriers together with the American Trucking Associations (ATA) Foundation (later renamed the American Transportation Research Institute) began a countrywide outreach program to educate the commercial trucking and bus–motor coach industries and the motoring public about the risks of and the countermeasures to driver fatigue. As part of that outreach, a train-the-trainer program entitled Mastering Alertness and Managing Driver Fatigue was launched in 1996 to educate commercial carriers and their drivers on the importance of proactively managing driver fatigue (O’Neill et al. 1996). After about 5 years of “teaching fatigue,” it became clear that if a driver’s lifestyle could be focused on health, wellness, and fitness, it would be a precursor to overall safety consciousness. With the tenet that healthy workers make safer workers, the theory was that a driver who adopts a personal health, wellness, and fitness philosophy is more likely to properly follow established safety rules and to manage his or her driving alertness and fatigue levels (Krueger et al. 2002). Subsequently, a wellness training program—Gettin’-in-Gear: Wellness, Health and Fitness for Commercial Drivers—initially developed by Roberts and York (2000) was refined by Krueger and Brewster (2002) and then linked with the fatigue training (Krueger and Brewster 2005). Combined presentations of the pair of fatigue and wellness courses taught across the United States were attended by over 4,500 commercial carrier representatives (safety managers, driver and fleet managers, human resources personnel, corporate officials, commercial vehicle safety inspectors, etc.).

2. About that time, occupational medicine declared the health of commercial drivers to be of special interest because the workplace of commercial drivers was identified as being the community (Solomon et al. 2004). At the Centers for Disease Control and Prevention (CDC), Husting and Biddle (2005) described the occupation of commercial driving as fitting the CDC’s public health model because motor vehicle safety is an important public health issue that particularly involves commercial drivers. Husting (2005) also observed that leading transportation companies around the country had begun identifying driver H&W as key to improving their corporate safety records; decreasing health care and worker compensation costs; increasing employee morale and job satisfaction; and often improving retention of valued healthy drivers. Proactive companies were adapting elements of driver wellness programs into operations as part of their human capital strategy and their corporate culture.

3. In 2003, NIOSH sponsored a conference on commercial driver occupational safety and health, held at Wayne State University in Detroit, Michigan (Saltzman and Belzer 2007). Participants at the NIOSH conference pointed to evidence that occupational illnesses not only jeopardize highway safety but also diminish the quality of life for truck drivers and may lead to premature death. They concluded that substantial additional research is needed on commercial driver health issues, among them the following:

- Poor health habits: These included prevalence of tobacco smoking, obesity, lack of physical activity, chronic diseases such as diabetes, and elevated suicide rates;
- Driver injuries: In 2001, half of driver injuries involving lost workdays were due to sprains caused by overexertion such as lifting heavy objects (K. Newman, Bureau of Labor Statistics, U.S. Department of Labor, unpublished work); the contribution of slips and falls from vehicles is on a similar level of incidence with driver strains, which is not addressed in such Bureau statistics;

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- Driver fatigue: Sleep disorders, sleep loss, sleepiness, and driver operational errors; unsafe driving, injuries, and deaths; and
- Driver illnesses: Work-related environmental exposures (to toxic fumes, continuous noise, and whole-body vibration) may cause respiratory diseases, reductions in pulmonary function, lung cancer, allergic inflammation, hearing loss, musculoskeletal injuries, lower back pain, and other conditions having safety implications.

4. FMCSA's new hours-of-service (HOS) rules for the trucking industry (effective in January 2004) were vacated by a July 2004 federal court ruling, which raised questions about the health of commercial drivers. In reply, as part of FMCSA's August 2005 HOS rules, commercial carriers were expected to include wellness training to CMV drivers as part of their safety and operational management regimens. Subsequent ongoing federal court challenges to the HOS rules and the FMCSA's response to them contributed to the continuing debates about driver H&W topics.

5. From time to time, the National Transportation Safety Board urged FMCSA to place more emphasis on H&W of commercial drivers and to update medical qualification standards for CMV drivers. For the past several years, FMCSA has had medical review panels actively updating CMV medical qualification guidelines (www.fmcsa.dot.gov, search site for medical programs).

6. In identifying important safety research issues facing commercial drivers, TRB's Truck and Bus Safety Committee (ANB70), published an E-Circular (Knipling 2007), which contained a review chapter (Krueger et al. 2007) on commercial driver H&W issues related to highway safety. Subsequently a standing Subcommittee on Truck and Bus Operator Health and Wellness was established (ANB70-3). At about that same time FMCSA requested that the TRB Commercial Truck and Bus Safety Synthesis Program (CTBSSP) address the relationship between corporate-sponsored employee H&W programs in order to highlight their potential for enhancing highway safety in the commercial truck and bus–motor coach industries. *CTBSSP Synthesis 15* (Krueger et al. 2007; Krueger 2008) provided a comprehensive review of the numerous issues related to these topics.

7. Spurred on by NIOSH leadership, those who developed the Transportation, Warehousing, and Utilities sector of the second National Occupational Research Agenda (NORA) singled out the need to identify health, wellness, and safety risks as an important national issue to be addressed and proposed solutions for commercial truck and bus and motor coach drivers. These H&W research needs are included as part of the U.S. Department of Labor's national research agenda (NORA 2009).

8. In May 2010, the American Sleep Apnea Association, together with FMCSA and the ATA, cosponsored a conference to address the growing safety and health concerns over the prevalence of sleep disorders such as sleep apnea in the commercial driving workforce (Grandi 2010).

IMPETUS FOR THE CONFERENCE

The accumulating levels of activity just outlined suggest the growing importance and

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attention being given to driver H&W issues for the CMV transport safety community. Accordingly, in 2009, Albert Alvarez, of FMCSA's Office of Analysis, Research, and Technology, deemed it timely to bring together the information resources of a myriad of stakeholder communities to collectively assess the state of knowledge in these topical matters and to potentially identify promising new directions for work efforts of driver H&W advocates. Alvarez spearheaded the effort to enlist the resources of TRB, FMCSA, and NIOSH to convene the first International Conference on Commercial Driver Health and Wellness in Baltimore, Maryland, in November 2010, as reported in these proceedings.

ORGANIZATION OF THE CONFERENCE

To plan the conference, TRB established a Committee on Research on the Health and Wellness of Commercial Truck and Bus Drivers, which was chaired by Eric Wood of the University of Utah. The committee membership consisted of individuals from noteworthy academic and medical research centers, insurance industry programs, and with considerable representation from commercial driver trade industry groups from the trucking, bus, and motor coach sectors, and including labor unions. [The complete list of distinguished members of the committee, along with a biographical sketch of each member, is presented elsewhere in this document.](#)

The committee met in December 2009 to establish the goals and objectives of the conference, to shape the outline and framework for the structure of the anticipated meetings, and to officially set the plans in motion for the November 2010 conference in Baltimore, Maryland. Several subsequent meetings of the committee were conducted by means of teleconference, e-mail, and other electronic means of communication. The goals of the committee and of the conference sponsors were to (a) assemble a broad-brush program to air and explore a mix of H&W research results; (b) learn from practical H&W program experience (case studies) of both commercial shipping companies and industries outside of transportation; (c) hear from the employee health insurance sector and from legal representation on worker claims; (d) experience some aspects of successful employee H&W programs, including health and fitness training programs already in place at some companies, whether with drivers or not; (e) learn about cost-benefit aspects of successful H&W programs; (f) convene panels of actual commercial drivers and their spouses to permit them to share their family experiences regarding H&W topics; and (g) hear from government safety and health agency executives and policy makers who administer programs that regulate or otherwise affect commercial drivers. In addition, NIOSH volunteered to conduct two embedded symposia, organized by Jennifer Lincoln, focusing predominantly on driver obesity and weight control programs.

INTRODUCTORY AND KEYNOTE ADDRESSES

Conference Chairman Wood welcomed all attendees to the inaugural international

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conference on November 8 as he pointed out that the groundswell and enthusiasm to initiate this event had been building for many years. He indicated that the unique constellation of job demands, lifestyle challenges, and economic pressures in the commercial truck and bus transportation industries places huge burdens on drivers and their employers to promote and maintain optimal health and wellness. The burden of these factors, he said, can be measured by various metrics such as company medical expenses, turnover of employees, accidents and injuries, or driver health outcomes. Wood said that the true need for this conference could be summarized in a brief statement by a recent driver patient: “Doc, I know I need help; I just don’t know what to do.” In his welcoming remarks, **Albert Alvarez**, of FMCSA, set the stage for the transactions that followed by stressing that the timing was right for bringing together this group of just over 200 participants, who possessed a diverse array of backgrounds. Alvarez challenged the assembled group to explore and discuss cross-cutting issues in research, H&W programs, and safety and ergonomic issues and especially to investigate the potential ROI strategies for promulgating the value of adopting H&W programs in the commercial transportation industries.

Adding her welcome to the attendees, **Anne S. Ferro**, FMCSA Administrator, highlighted some of the important U.S. Department of Transportation statistics implicating commercial driver health topics that affect driving safety on the nation’s roadways. In particular, Ferro mentioned concerns over the high rates of driver obesity, hypertension, smoking, sleep disorders, diabetes, cardiovascular problems, and other health conditions that not only affect safe driving performance but that seemingly also contribute to a lower life expectancy for career drivers than might be exhibited in the general U.S. adult population. The quality of life for commercial drivers, she said, can and should be dramatically improved. Ferro challenged the conference participants to help FMCSA and occupational health and safety advocacy groups to identify the important issues, to propose workable solutions to some of the better-understood problems, and to initiate research on information gaps that might be indentified during the conference.

Dee W. Edington, of the University of Michigan Health Management Research Center, captivated the conference attendees with his keynote address: “Zero Trends: Health as a Serious Business Strategy.” Edington pointed out that it is unlikely that most industry sectors would be successful in the competitive national and worldwide environment without healthy and high-performing employees. He indicated that since World War II, companies have focused the design of health-related benefits on paying for sickness and negative health behaviors, which achieved an unsustainable increase in corporate costs. Companies tired of paying exclusively for sickness and behavior change now want to focus on healthy, high-performing employees and to include these strategies in the total cost to obtain the best value for their health management plans. Based on decades of worker health research, Edington recommends that companies transform employee health from a health strategy to a business strategy through a population health management approach. His talk, a takeoff from his popular and pertinent book *Zero Trends—Health as a Serious Economic Strategy* (Edington 2009), focused on the costs of doing nothing; established a business case (based on more than 200 research

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publications) for investing in population health management, for which *Zero Trends* follows the adage “Don’t get worse, and help the healthy people stay healthy”; and outlined the design of a total transformational health management strategy, including the following five pillars: (a) corporate senior leadership must create the vision to integrate health into the core business; (b) operational leadership must align the workplace with the vision; (c) self-leadership must be encouraged with a goal of creating winners; (d) actions should be rewarded to reinforce the culture of health; and (e) quality assurance must ensure that outcomes drive the strategies.

In her featured luncheon address on November 9, **Christine M. Branche**, Principal Associate Director of NIOSH, reiterated that the mission of the institute is to generate new knowledge in occupational safety and health and to transfer that knowledge into practice for the betterment of workers. Historically, NIOSH has focused its efforts almost exclusively on prevention of exposure to toxic substances and hazardous conditions found at work. Although this approach has produced substantial success in reducing occupational disease and injury, Branche pointed out that NIOSH now understands more clearly that the overall health of workers is influenced by factors both inside and outside the workplace: stress at work and home, physical and chemical exposure, energy imbalance from diet and limited exercise, smoking, medications, hypertension, and alcohol use, to name a few. She pointed out that motor vehicle crashes are the leading cause of U.S. occupational fatalities and that they account for 35% to 40% of all workplace fatalities, of which almost 40% are truck drivers. In 2008, an estimated 57,700 injuries to U.S. truck drivers resulted in days away from work, the second highest number among all occupations.

Accordingly, Branche said that several years ago NIOSH began dedicating significant attention to the occupational health and safety plight of commercial drivers. Among the several current NIOSH research projects in trucking are a mortality study of independent owner–operators (see [summary of the presentation by Birdsey et al., page 69](#)) and ongoing surveys of truck driver injury and health and of truck driver anthropometry and work space. NIOSH also issued research grants to screen for sleep apnea, examine issues of ingress and egress hazards in large trucks, and study concerns for health, injury, and musculoskeletal disorders of truck drivers. Branche also described NIOSH’s WorkLife Program to integrate traditional occupational health with health promotion.

CONFERENCE AGENDA

It is beyond the scope of this short overview to summarize the many important points made in the numerous presentations and discussions held at the conference. A summary for each talk or paper presentation is provided in these proceedings. Presented here is a summary of take-away points from the conference.

Health Risks to Commercial Drivers and Medical Issues

Several presentation sessions deliberated over some of the most prevalent health risks and medical issues facing commercial drivers. Various presentations outlined what is generally known about driver obesity or being overweight and attempts to determine

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what to do about it (e.g., Wood et al., Bigelow et al., Olson et al., Cheskin, Murtaugh et al., Apostolopoulos et al., Thiese et al., Perry, and Osland); others addressed sleep apnea (Mabry et al., Berger, Harrykisson), sleepiness and driver fatigue (Mani and Belenky), cardiovascular disease (Papp), musculoskeletal disorders (Lester), and the risks of other ergonomically related injuries (falls: Merryweather; exposure to acoustic noise, whole-body vibration, and cabin air quality: Fu et al.).

Awareness of the importance of such medical conditions as those just mentioned, as well as others, and the risks they pose to commercial driver health and safety has dramatically increased. However, on the basis of conference presentations and discussion it appears that the H&W research community is still short on identifying viable, workable incentive-based preventive programs and countermeasures to each of these health-related issues. For example, a common refrain in the conference attendee surveys is that although the H&W research community has identified many issues about obesity and being overweight, it has not sufficiently agreed on how to resolve the tricky nuances of requirements for weight management and control in the commercial driving world (see the section on obesity and commercial drivers: research perspective).

Case Studies: Corporate H&W Programs

Many different facets of H&W programs were described at the conference. Before specific case studies are addressed, it seems appropriate to take a stab at defining workplace H&W programs. A suitable definition for corporate wellness programs can be attributed to William B. Baun, Director of the University of Texas MD Anderson Cancer Center, who has lectured on this topic for over a decade Baun defined workplace wellness programs as organized, employer-sponsored programs designed to assist employees (and sometimes their families) as they adopt and sustain behaviors that reduce health risks, improve quality of life, enhance personal effectiveness, and benefit the organization's bottom line. (Berry et al.).

Several models of corporate H&W programs described at the conference can be best identified as a form of case studies [e.g., that of Edington in his keynote address; those of three large commercial carriers: J.B. Hunt Transport (Woodruff), Con-way Express (Springer and Petrancosta), and Schneider National (Bossen and Schneider); and those from industrial sectors outside of transportation: Fusion Sleep (Pffiffer); Words of Wellness (Shaffer), Sperian Protection USA (Vittoria), Blue Shield of California (Murphy), and Nationwide Better Health (Wilhide)]. In addition, two driver discussion panels contributed significantly to these case studies by highlighting issues from the perspective of drivers employed by large carriers or from others who are independent owner-operators, as well as ideas gleaned from their families. Many common threads can be identified in these presentations, including the following suggestions offered by individual participants:

- Place significant value on employees, especially drivers, as the cornerstone of your company—drivers are crucial to the continued success of your company;
- Start an H&W program modestly at first, but start somewhere and build on initial successes;
- Make a company assessment of employee H&W status, for example, begin with a health risk appraisal (HRA) of all employees;

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- Establish H&W program elements most relevant to your worker population's needs;
- Educate all levels of the company about the importance of corporate H&W programs and work toward making them a part of the company's culture of excellence;
- Keep your healthy employees healthy; avoid having more of them slip into need for health care;
 - Before hiring, consider preplacement physicals and H&W screening and use job placement to avoid problems attributable to fitness considerations;
 - Diagnose employee medical problems early, establish a treatment plan, and implement longitudinal tracking or monitoring for progress;
 - Employ health coaches, trainers, and longitudinal monitoring of individually based H&W initiatives;
 - Encourage participation by employee family members in corporate H&W programs;
 - Target particular health issues with intervention programs (e.g., focused nutrition-oriented, weight management, and smoking cessation programs);
 - Incentivize employee participation in H&W initiatives (e.g., rewards, insurance discounts, fitness membership reimbursement) and create group competition for healthy behaviors such as weight loss and smoking cessation;
 - Do not penalize employees for doing the right thing: diagnosis and treatment of ailments should not lead to job loss or loss of income, status, or other benefits but rather to gain control of medical conditions and to retain valued employees;
 - Recognize that long-term, experienced employees may be your greatest asset; how you treat them affects employee morale throughout and undoubtedly affects employee turnover;
 - Measure outcomes, track progress, and monitor individual and group successes and failures;
 - Determine strategy measures for human capital management of all aspects of human resources and H&W programs and identify the ROI on your efforts;
 - Periodically reevaluate your H&W program efforts, retool, modify efforts, and re-engage the workforce to H&W activity; and
 - Tie driver H&W to safety; good carriers do, and they find more receptivity if such programs are linked to safety programs for which they have already invested so much (see white paper by Kahn in these proceedings).

The differences in approach to establishment of a good corporate H&W program seem more a matter of degree of emphasis than differences in actual inclusiveness of various elements. Programs also differ in terms of incentives, motivational and behavioral economic principles, and whether they are positioned as part of human resources or as a benefit initiative versus a corporate strategic program. One particularly pertinent publication cited in TRB CTBSSP Synthesis 15 is *Building Blocks for a Successful Workplace Wellness Program* (Huber et al. 2005). It might serve as a primer for wellness managers new to the field or for experienced managers who want a guidebook. Huber et al. identify numerous practical steps for beginning a program and explore elements, strategies, characteristics, and objectives employed in successful wellness programs. For more details on these topics, readers should consult the [summary of Osland's white paper](#), "Wellness Lessons from Transportation Companies," in these proceedings ([page 46](#)) and Edington's work (Edington 2009).

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Driver Behavioral Change

Many participants noted that not only do many transportation companies that want to be successful need to incorporate a cultural change toward integration of an H&W philosophy, but obviously numerous individual behavioral changes need to be acculturated in the employee work force. This statement of course implies that behavioral changes will be adopted by drivers themselves. In many ways, behavioral change issues are embedded in most of the presentations made at the conference, but particular sessions were specifically directed toward behavioral change topics (e.g., [Knipling, Everdon et al.](#), [Lenneman, Olson et al.](#), [Moquin, Coughlin et al.](#), [Morgan et al.](#), and individual discussions as well: those by [Hull, Chute](#), and [Ash](#) and those by panelists discussing their personal experiences: [Frank Silio](#), [Ralph Garcia](#), [Norm Littler](#), [Michael McDonal](#), and [Karen Heaton](#)). Behavioral change looms as one of the biggest challenges facing those who hope for an H&W culture change in the industry.

Lifestyle Wellness Coaching and Training

Perhaps behavioral change was most central to the conference sessions about the expectation that drivers will take visible steps to improve their physical fitness levels, that is, engage in physical activity (e.g., [Springer and Petrancosta](#), [Bossen and Schneider](#), [Everest, McGuire](#), as well as [Lenneman](#) and [Gordon](#)). These same presenters indicated that individual coaching can go a long way toward developing understanding and commitment in individual drivers. The reported success stories indicate that longer-term commitments to incorporate personal behavioral and fitness changes are made and kept.

Hurdles to Establishing Employee H&W Programs

Many participants cited numerous hurdles to establishment of a viable, effective employee H&W program in any workplace. At first, these hurdles seem particularly ominous in the workplace involving commercial truck and bus drivers. But case studies, mostly gleaned from other industrial settings, and concerted study of what seems to work and what does not can assist any company to make significant and continuous strides toward getting it right. At the conference, some of the organizational influences were outlined by [Michael Quinlan](#), and many anticipated hurdles to good H&W program development were elaborated on by [Kahn](#), [Vittoria](#), [Murphy](#), [Pffiffner](#), and [Shaffer](#) and by the [union-organized panel](#) of [Watt](#), [Goetzel](#), [Landsbergis](#), [Luisi](#), and [Fisher](#). These topics were also taken up by other speakers and with active participation from the audience at the conference as well. [Kahn](#) prepared a white paper entitled “Driver Health and Wellness: Why Don’t the Good Carriers Do More?” which describes many legal and financial constraints for operating a driver H&W program. The report by [Huber et al. \(2005\)](#) is another resource for addressing H&W program hurdles.

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ROI FOR EMPLOYEE H&W PROGRAMS

One of the overriding goals of the H&W conference was to determine whether potential ROI could be identified for both large and small commercial carriers if they initiated employee H&W programs.

Deciding on Metrics

Determining what constitutes an ROI metric for employee H&W programs is probably most readily grasped as simply the ratio of dollars saved or returned to a function of dollars invested or expended in the conduct of such programs. Many speakers at the conference pointed out that numerous factors might be considered in determining both the costs and other quantifiable efforts that go into conducting an H&W program. These include at least the following:

- Employee costs associated with instituting, leading, and conducting an H&W program within a company;
 - Employment of occupational health nurses, physicians or physician assistants, wellness coaches, employee health monitoring, and human resources personnel;
 - Costs of administering HRAs;
 - Employee education sessions (e.g., on nutrition, weight management, smoking cessation, and diabetes) and purchase of educational materials;
 - Employee time off from work to participate in H&W activities;
 - Access to physical exercise equipment and facilities;
 - Preventive medicine initiatives (e.g., offering immunizations);
 - Sleep disorder clinic evaluations and treatments;
 - Medical treatment; and
 - Senior and mid-level management time involved in championing and running a good H&W program.

Likewise, various speakers cited numerous indicators of cost savings that could be accounted for in the equation, including savings in at least the following:

- Direct costs (e.g., fewer hospital claims, physician visits, and pharmacy costs),
- Indirect costs (e.g., less absenteeism, less presenteeism, fewer disability issues), and
- Future costs (e.g., cuts in health services to treat complications, less disease progression, or keeping healthy people healthy) ([see the PowerPoint slides by Wilhide](#)).

But the dollar values included in ROI figures constitute only a portion of the story. As Petrancosta of Con-way Freight and Springer of Wellness Coaches, USA, point out, many more “indicators of the worth” of an employee H&W program transcend dollars and cents, such as employee pride, satisfaction, and retention. These two presenters characterized some H&W participant responses by offering such quotes as “You saved my life.” “I wish my Coach was here 10 years ago.” “Our Coach has completely transformed our culture.” “There

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is no substitute for a Coach in the Workplace.” “Employee morale has never been higher.” “My Coach has become an important part of my life.” “I did not realize how much the company cared about me.” Indeed, several of the larger transportation companies (e.g., truck carriers) implementing employee H&W programs link lower employee turnover rates partly to the success of their H&W programs. Numerous qualitative statements were made at the conference to back up the notion that investing in employee H&W reaped corporate benefits beyond the monetary aspects.

ROI from Truck Carriers

A few quantitative indexes of ROI were expressed in case studies presented at the conference. Only three of these were from transportation industries, actually from three large trucking companies (see the PowerPoint slide presentations by Woodruff for J.B. Hunt, Bossen and Schneider for Schneider National, and Springer and Petrancosta for Con-way Freight). Other coverage of ROI for H&W programs was described in various ways in the presentations of Wilhide of Nationwide Better Health; Pfiffner of Fusion Sleep; Shaffer of Words of Wellness; and Vittoria of Sperian Protection (see their PowerPoint slides as well).

Woodruff described how J.B. Hunt’s preemployment screening, job safety placement, and Better Health for Life (BHFL) program reduced preventable claim costs by approximately \$550 per participant and resulted in a positive ROI in the first 12 months of the company’s H&W program. After making some improvements to their BHFL program over a 3-year period, J.B. Hunt’s ROI for their H&W program ranged from 1.9 to 1 for certain elements of the program to an ROI of 3.3 to 1 for other facets, with a net program savings of between \$1.6 and \$4.1 million.

Bossen and Schneider described the H&W program at Schneider National as focusing on employee fitness, in part through tracking indicators of body mass index, blood pressure, cholesterol, glucose, aerobic capacity, smoking, and others. With Schneider National’s comprehensive program to evaluate and treat drivers for sleep apnea, health care savings well in excess of \$500 per enrolled driver per month were realized.

Con-way Freight’s chief safety officer described their program as a full integration of mutually dependent tenets involving an integration of health, wellness, and safety. Healthy, fit, well workers are safer workers, he said, and therefore wellness is a fundamental injury prevention strategy at Con-way; Petrancosta added that safe workers who avoid injury are healthier people. Con-way employs an integrated H&W program with several partners, especially involving Wellness Coaches, USA. Among its programs, Con-way also champions a sleep apnea awareness component and reports satisfactory but unstated ROI on their overall program.

ROI from Other Industry Sectors

The conference also sought to learn from the experiences of H&W representatives from outside the commercial transportation industry sectors. Several such speakers provided these lessons. Using rather comprehensive calculations of what to include and what not to include in determining ROI, Nationwide Better Health’s Wilhide demonstrated the ROI and impact

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of behavioral adherence on clinical improvement and functional status in corporate disease management programs. One of Nationwide Insurance's client companies (an automotive parts manufacturer with 15,000 employees and a comprehensive H&W program) reported an ROI of 4.95 to 1 for their H&W program, with gross savings totaling almost \$2 million compared with a base year and with savings of \$120 per month for those members with managed diseases. A cohort of chronic members who participated in disease management programs showed an ROI of 3.53 to 1 compared with nonparticipants, who showed an ROI of 0.88 to 1.

Citing studies by J&K Health Consulting (2009) and Martin (2009), Piffner described data indicating that medical costs for overweight and obese truckers are up 44% more than those for truckers with more normal weight. The data pointed out that with no H&W program, drivers tend to gain an average of over 8.5 lb per year. Piffner's presentation reaffirmed that weight management facets of employee H&W programs pay great dividends. Vittoria, Vice-President of Human Resources at Sperian Protection, USA, a large international company that manufactures personal protective equipment, presented figures showing that 43% of the company's health costs come from only 10% of its employees.

Vittoria cites Edington's tenet: "Invest your money keeping your low risk people healthy as the business case for health." Sperian tackled their employee health issues from that standpoint. Vittoria cited Sperian figures indicating that overweight participants (those with body mass index >27.5) cost \$1,464 per year more than individuals within a healthy weight range (not including pharmacy costs), whereas those reporting a lot of stress incurred \$2,064 more in expenses than low-risk participants (not including pharmacy costs). Although his analysis is more detailed, Vittoria reports that in Sperian's comprehensive H&W program, a decrease in total body mass index figures in the Sperian employee population over a 2-year period is expected to decrease medical claims and pharmaceutical costs of over \$200,000, which averages to an ROI of 4.2 to 1. These data, he says, do not include significant cost savings associated with decreased absenteeism and worker's compensation claims and show increased productivity, morale, and retention. Sperian believes that it is less costly to invest in the health of their workforce than it is to pay for the cost of treating illness. Sperian requires employees to become active partners in good health management. Among other significant findings attributed to their H&W initiatives, Sperian reports a 54% decrease in injury rates. Vittoria recommends that H&W programs select an easy-to-measure metric (like employee body mass index) to track progress and project ROI.

Also mentioned in discussion at the conference was the meta-analysis of the literature on costs and savings associated with workplace wellness programs by Baicker et al. (2010). They reported that medical costs fall by about \$3.27 for every dollar spent on wellness programs and in addition that absenteeism costs fall by about \$2.73 for every dollar spent. Although further exploration of the mechanisms at work and broader applicability of the findings are needed, this ROI suggests that wider adoption of such programs could prove beneficial for budgets and productivity as well as for health outcomes of valued employees.

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FINAL OBSERVATIONS

The First International Conference on Commercial Driver Health and Wellness provided information to enhance the understanding of the importance of employee H&W programs and identified issues that remain to be addressed by U.S. truck and bus and motor coach industries. The conference presentations and discussions made it clear that personal health, wellness, and fitness are critically important for truck drivers and bus and motor coach operators for themselves and for their families. Many participants also emphasized how important employee H&W are to commercial truck carriers and bus and motor coach companies that want to retain quality employees and control escalating costs associated with driver safety and health issues. Several speakers at the conference pointed out that highly sought-after financial ROIs are not the only positive outcomes of adopting employee H&W programs in the commercial driver work force. Healthier drivers can lead to improved morale, lower driver turnover, reduced medical and worker's compensation costs, and increased roadway safety by decreased accident risk.

The following is a summary of some of the key observations made by individual participants at the conference. None of these observations should be construed as consensus findings of the conference participants as a whole, the planning committee, or TRB.

- As yet, there is insufficient recognition by many companies of the benefits employee H&W programs might offer their own company (i.e., improved driver morale, cost benefits that affect productivity, improvements in bottom-line profits, and more).
- Forward-thinking corporate human capital management strategies that include emphasis on driver health, wellness, and fitness can help a company attain or maintain a position of excellence in the transportation industry.
- In the long term, progress is likely to depend on a cultural change, a paradigm shift toward embracing integrated models of health, safety, and productivity management as being the shared responsibility of individual drivers, their managers, and senior leadership of their organizations.
- To begin to address commercial driver health issues, corporate H&W programs do not need to be all-encompassing. Even at smaller companies, programs can be started simply by administering a health risk appraisal to drivers and all other employees to determine the most pressing needs and then establishing a plan to address those needs.
- Numerous corporate experiences with positive formal employee H&W programs are available from which others can learn and share success. There is a gap between what is known from H&W research and best practices in other industries and what could be applied in transportation communities that employ commercial drivers.
- Companies interested in developing their own employee H&W programs could benefit from guidance and resources on how to do it. Better tools and off-the-shelf practices could be developed for translating knowledge into action.
- Although there are several good, usable models of employee H&W programs that commercial carriers can emulate or adopt for their purposes, each company may wish to tailor H&W programs to their particular needs.

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- Templates could be developed that contain all the elements of well-designed commercial driver H&W programs in such a manner that selected elements can be easily adapted to each company's circumstances (i.e., for both large and small carriers). The program templates could include training and communication modules and provide a myriad of ideas for successful implementation.
- Continued research can provide the best possible information to those charged with updating physical, medical, and fitness standards for commercial driver qualifications, so as to address not only transient states, diseases, and medical conditions but also specific functional abilities linked to crash causation.
- More applied worksite H&W research could help elucidate how successful employee H&W programs pertain to employee health and safety in the commercial truck and bus and motor coach industries.
- It would be beneficial to convene commercial driver H&W conferences every couple of years to be able to track progress and to share new ideas and research results.

An abundance of very useful H&W information was conveyed at the conference. Many lessons learned were described. Table 1 shows some of the more commonly cited health risks and issues and a few notes about each of them. Next, some questions for further thought gleaned from presentations and discussion during the conference are presented.

Some Questions for Further Thought

These questions are drawn from observations made by individual participants at the conference and should not be regarded as consensus views or recommendations of the conference participants, the conference planning committee, or TRB.

Q: If researchers or practitioners come up with good, new health guidance information, especially recommendations about how to implement facets of H&W programs, what is the best way to get that information into the hands of commercial drivers or their employers in a credible, usable format and in a convincing enough way that drivers will adopt and use that guidance?

Q: Is there concern that drivers may be punished (e.g., may jeopardize their jobs) for doing the right things like completing a health risk appraisal or getting diagnosed and treated for medical conditions such as hypertension, diabetes, sleep disorders, and so forth? If so, what are possible approaches to this issue?

Q: What is the best way to build in scheduling or find time for drivers to participate in physical activity and preferably exercise, especially in over-the-road operations?

Q: How can regular health care visits (e.g., to medical clinics, dentists, and other such) be established with a predominantly over-the-road work and driving schedule?

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Q: What is the best way to include and involve drivers' family members in H&W program initiatives and health care plans?

Q: What steps could be taken to encourage medical practitioners not just to treat symptoms of illness but to strive for wellness of their patients?

Potential Approaches Noted During Conference

The following observations concerning potential approaches to improve commercial driver health and wellness were made by individual participants at the conference. These observations should not be regarded as consensus views or recommendations of the conference participants, the conference planning committee, or TRB.

- Implement corporate H&W training for all employees to attain better understanding of the risks to health and safety they encounter because of the occupation they work in and attain “buy-in” for adopting more health-conscious approaches to job and home life.
- Train all employees on alertness and fatigue management to reduce risks associated with work-related sleep loss.
- Determine the true value and best mechanism for electronic record keeping of periodic physical exams, health care visits, commercial driver medical exam results, drug test failures, medical and worker compensation claims, and so forth.
- Evaluate screening assessments for physical and functional capacity testing—for example, for commercial driver medical exams consider the nondriving physical aspects of the workplace (e.g., lifting, tarping)—and consider job safety analysis and job redesign for safety.
- Improve compliance monitoring for sleep disorder treatment protocols [e.g., use of continuous positive airway pressure (CPAP) for apnea; potential of portable battery-powered CPAP for in-truck use].
- Improve availability of useful guidance on driver use of chemical substances (e.g., stimulants, hypnotics, nutritional supplements, and such) [see work by Krueger (2010) and Krueger et al. (2011)].

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SUMMARY OF AN INTERNATIONAL CONFERENCE

TABLE 1 Some Common Driver Health Risk Issues and Potential Actions

Driver Health Issues	Potential Actions	Barriers to Overcome
Being Overweight and Obesity	Health risk appraisal	Inherited traits for obesity
	Weight management plan	Nutrition easily compromised
	Education on diet and nutrition	
	Physical exercise program	Finding time to exercise
	Behavioral change motivation	Easily become discouraged
	Incentives to lose weight	
	Medical intervention	May not work satisfactorily
Lack of Physical Fitness	Physical status assessment	
	Education and individual coaching	Coaching may be expensive
	Set fitness goals	Impatience with slow progress
	Physical exercise program	Simplicity at first, progress slowly
	Access to exercise equipment	No equipment access on the road
	Peer competition motivation	
	Ensure scheduling for exercise	Tough to schedule on the road
Hypertension and Cardiovascular	Health risk appraisal	Reluctance to obtain care
	Subsequent testing and monitoring	Regular monitoring must be habit
	Medical case management	
Smoking and Tobacco Use	Count cigarettes smoked, etc.	Nicotine addiction tough to break
	Tobacco cessation programs	Need replacement pleasure
	Incentivize success/peer competition	After stumbling, try again
Type II Diabetes	Get tested for blood sugar levels	Hesitancy to be labeled diabetic
	Glucose management training	
	Adhere to dietary recommendations	Difficult to track diet/nutrition
	Compliance of glucose meter use	Not reliable in taking measures
	Medical case management (take A1C)	
	Establish as part of health and safety	Still concern for crash liability
Environmental Risks	Industrial hygiene determine risks	Some risks are insidious
(e.g., noise, fumes, vibration,	Recognition of risk (e.g., hearing loss)	Easy to let prevention slide
slips, trips, falls, musculoskeletal disorders)	Use of ergonomics countermeasures	
Access to Health Care	Insurance programs must suffice	Appointments too difficult
	Schedule time for your health	Costly time away from work
	Use ubiquitous “minute clinics”	No place to park a truck
	Employers assist drivers to participate	On-the-road work not conducive

KEYNOTE ADDRESS

Zero Trends

Health as a Serious Business Strategy

Dee W. Edington, *University of Michigan*

It is unlikely that most industry sectors will be successful going forward in this competitive national and worldwide environment with anything but healthy and high-performing people. Since World War II companies have focused their health-related benefit designs on paying for sickness and health behaviors and what it got them is an unsustainable increase in costs. They are now saying, “We are tired of paying exclusively for sickness and behavior change but now we want to focus on healthy and high performing individuals and, in fact, we want these strategies included within the total cost to get to the total value of health.” This session will focus on transforming health from a health strategy to a business strategy through a population health management approach. It will focus on the cost of doing nothing; the business case (based on over 200 research publications) for investing in population health management; and the five primary pillars to design a total transformational health management strategy.

MEDICAL ISSUES

Cardiovascular Disease and Driving

Elaine M. Papp, *Federal Motor Carrier Safety Administration*

The U.S. Department of Transportation certifies medical fitness for duty of transportation workers, including commercial motor vehicle drivers who operate in interstate commerce. Drivers of large trucks and buses make up the largest regulated population of American transportation safety workers, who must receive a medical examination at least once every 2 years. These regulation efforts are critical to the control and prevention of large truck and bus crashes, injuries, and deaths.

In America's aging workforce, cardiovascular disease is the leading cause of death and disease, and implantable cardioverter defibrillators (ICDs) are increasingly used to treat life-threatening arrhythmias.

This presentation discussed cardiovascular disease, including the health and safety impacts of the ICD on commercial driving: should truck and bus drivers with ICDs drive? New data on the prevalence of medical devices, including ICDs and pacemakers, were also presented.

MEDICAL ISSUES

Implementing Sleep Apnea Program for Commercial Motor Vehicle Drivers

Lessons Learned from Two Programs

J. Erin Mabry, Jeffrey S. Hickman, and Richard J. Hanowski, *Virginia Tech Transportation Institute*; Tom DiSalvi, *Schneider National, Inc.*; Debra Plumlee, *J.B. Hunt*; Mark Berger, *Precision Pulmonary Diagnostics, Inc.*; and Jeffrey Durmer, *Fusion Sleep Medicine Program*

Obststructive sleep apnea (OSA), the most common sleep disorder, is caused by repetitive collapse of the upper airway during sleep. Approximately 28% of commercial motor vehicle drivers in the United States are estimated to possess mild or higher levels of OSA (FMCSA 2006) and may be at greater risk of being involved in a traffic- or work-related incident (National Heart, Lung, and Blood Institute 2005).

Two carriers, Schneider National Inc. (SNI) and J.B. Hunt (JBH), have implemented OSA programs to screen, diagnose, treat, and manage their OSA-positive drivers. The current study provided an overview of these OSA programs; outlined each carrier's screening, testing, and compliance protocol; and compared and contrasted their approaches. Focus group research was also conducted with drivers and staff involved in each program to assess driver and staff perceptions of and opinions on their respective OSA programs.

Each focus group and phone meeting consisted of six parts: (a) OSA program participation; (b) screening, testing, and education; (c) recommended treatments; (d) treatment compliance; (e) program outcomes; and (f) closing thoughts. All focus groups and phone interviews have been completed; the resultant data are in the process of being analyzed via content analysis [adapted from a framework analysis methodology by Ritchie et al. (2003)].

Although the protocols share several similarities—such as types of treatment devices, compliance monitoring protocols, and modes of follow-up with drivers—significant differences were noted in how the two programs screened and tested for OSA. SNI drivers are primarily screened for OSA via a proprietary web-based screening tool, the Somni-Sage Screening Questionnaire, developed by Precision Pulmonary Diagnostics. SNI drivers who screen with a high likelihood of OSA undergo a full night polysomnography to test for the presence of OSA. JBH drivers are primarily screened for OSA by using health records, anthropometric data, and signs and symptoms of OSA. JBH drivers with a high likelihood of OSA are tested by using a portable sleep testing device that they wear overnight while sleeping at home or in their truck. Both SNI and JBH follow similar protocols for providing OSA education to drivers and treating OSA with automated positive airway pressure (APAP) when necessary. Furthermore, both carriers employ a rigorous compliance monitoring program and maintain long-term follow-up with drivers.

MEDICAL ISSUES

A total of 32 participants involved in SNI's or JBH's OSA programs were included in the focus groups and phone interviews. In an initial analysis of driver and staff comments, drivers were asked about the benefits and disbenefits they experienced while participating in the OSA program. Staff were asked what facilitated the implementation and maintenance of their carrier's OSA program and what barriers they experienced. Drivers reported benefits such as better-quality sleep, not falling asleep while driving, and better health. Driver disbenefits included discomfort from the treatment mask, being "tied" to a machine, and general complaints regarding the APAP device. Staff reported that helpful carrier and OSA provider staff, diligent compliance monitoring, and consistent driver follow-up aided program implementation and maintenance. Staff also reported that logistical challenges, driver acceptance, and delays in testing due to the volume of drivers at risk for OSA were the primary barriers in program implementation and maintenance.

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MEDICAL ISSUES

Employer-Driven Sleep Apnea Disease Management Program in Commercial Trucking

Mark Berger, *Precision Pulmonary Diagnostics, Inc.*

Obststructive sleep apnea (OSA) is very common in commercial motor vehicle (CMV) operators. Untreated OSA has been associated with increased health and safety risks. Because of this fact, the FMCSA is considering adoption of more stringent and comprehensive guidelines as part of the mandatory biannual commercial driver medical certification examination. With the prospect of large numbers of CMV operators requiring diagnosis and treatment, some national employers of CMV operators are considering adoption of comprehensive OSA disease management programs. The purpose of this presentation was to report the 4-year outcomes from a novel employer-sponsored OSA disease management program specifically designed for long-haul CMV operators.

METHODS

A comprehensive OSA disease management program was developed addressing the unique demands inherent in delivering care to a highly mobile work force. An integrated national system was created in which screening, diagnosis, and treatment are coordinated and managed through a single entity, ensuring a streamlined and consistent program for employed CMV operators. Screening CMV operators for OSA risk to identify those in need of a diagnostic sleep study is performed through a patented (U.S. 7,720,696 B1), web-based questionnaire. Those drivers selected for sleep testing are routed to a participating program-networked center where Type-1 polysomnography (PSG) is performed. Immediate scoring and physician interpretation of the PSG is standard procedure.

For those drivers diagnosed with OSA, an autotitrating positive airway pressure (APAP) machine with mask and humidifier is dispensed and appropriate education and training are provided. A wireless data transmitter is attached to the APAP unit, allowing program technicians to monitor adherence and efficacy of PAP treatment. In some cases in which very severe or complex OSA is suspected, a formal PAP titration study is performed. Most drivers are adequately treated with APAP (or continuous PAP, or CPAP), but some are converted to bilevel PAP after a titration study. All pertinent information concerning program administration, driver test results, driver treatment compliance, and interventions is deposited in an encrypted, web-based portal compliant with the Health Insurance Portability and Accountability Act of 1996. This program has been awarded a U.S. patent (U.S. 7,599,892 B1).

MEDICAL ISSUES

RESULTS

Pooled results from three participating national trucking companies for the period April 10, 2006, through April 10, 2010, were presented. A total of 24,861 CMV operators were screened with the web-based questionnaire. Certain medical conditions are common in CMV operators: hypertension, 20.2%; diabetes, 7.4%; heart disease, 5.7%; gastroesophageal reflux (GERD), 10.9%. These conditions are more prevalent in drivers diagnosed with OSA, with odds ratios (ORs) approximately twice those of all commercial drivers surveyed: hypertension, OR 2.23; diabetes, OR 2.66; heart disease, OR 2.05; GERD, OR 1.83). Most CMV operators are male (92%) and almost all responders (95%) deny symptoms of excessive daytime sleepiness (EDS), as measured by the Epworth sleep scale (ESS). The average and median ESS for all drivers surveyed were 3.46 and 3, respectively. EDS was not a predictor for OSA presence or OSA severity, with the mean ESS between 5.0 and 5.48 and the median ESS between 4 and 5 for all severities of OSA diagnosed. Of the 24,861 drivers screened, 6,922 (27.8%) were identified as at risk for OSA. Thus far, 1,575 drivers have been tested and diagnosed with OSA [apnea–hypopnea index (AHI) > 60, 15.8%; AHI 30 to 59, 23.2%; AHI 15 to 29, 32.6%; AHI 5 to 14, 28.4%]. Fifty-five drivers had an AHI greater than 100. Of 1,016 drivers with PAP compliance data encompassing at least 60 days, 97% are averaging at least 4 h of usage per day.

CONCLUSIONS

A novel sleep apnea disease management program has been developed for the commercial trucking industry that integrates screening, diagnosis, treatment, and treatment monitoring through one entity. This program has identified and successfully treated over 1,500 truck drivers with sleep apnea and demonstrates the effectiveness of employer-sponsored wellness programs. Decisions to test or treat commercial drivers for sleep apnea should not be based on driver-reported sleepiness.

MEDICAL ISSUES

Comparative Health Care Utilization in Patients Diagnosed with Obstructive Sleep Apnea Syndrome With and Without Treatment in Urban County Hospital Setting

Rajesh Harrykissoon, *College Station Medical Center*

Patients with obstructive sleep apnea syndrome (OSAS) use health care resources at higher rates than control subjects for years prior to diagnosis (Smith et al. 2002). Bahammam et al. reported a rise in health care costs each year before diagnosis. Adherence to treatment in patients with OSAS results in a significant reduction in physician claims and hospital stays (Bahammam et al. 1999). Peker et al. (1997) further demonstrated that continuous positive airway pressure (CPAP) treatment reduces the need for acute hospital admission due to cardiovascular and pulmonary disease in patients with OSAS.

The aim of this study of OSAS patients in an urban county hospital setting was to determine whether there is a difference in health care utilization between those who are treated with CPAP versus those who remain untreated. Patients in this county setting are commonly uninsured and the county hospital district currently does not provide PAP devices to those diagnosed with OSAS.

METHODS

A retrospective chart review was performed from January 2008 to March 2008 with a subsequent 1-year follow-up of patients with moderate to severe OSAS [apnea-hypopnea index (AHI) >15] who were diagnosed with nocturnal polysomnography and underwent a CPAP titration. The patients who received a CPAP device were matched by age and AHI to a like sample size of those who did not receive a device. Primarily the number of hospital and clinic encounters between these two groups were compared, but the number of comorbidities and medication prescribed between these groups were also compared.

RESULTS

Cases reviewed totalled 256, of which a successful follow-up was obtained in 91%. Of the 234 cases, only 26 patients (11%) had received a CPAP machine. The most frequently reported reason for not having a CPAP device was the patient's financial limitations.

MEDICAL ISSUES

Excluding those with an AHI >15, eight patients were included in the CPAP group and nine patients in the untreated group. They were matched for age [mean, 50 years; (SD), ± 12.7 years] and AHI (mean, 69 events/h; SD, ± 35.9 events/h). The body mass index was not statistically different between the two groups (mean, 45.3 kg/m²; $p = 0.94$). It was found that the mean number of encounters among the untreated group was statistically higher as compared with the treated group (19 mean visits versus 10 for the treated group, $p = 0.02$). The mean number of comorbidities was, however, not statistically different between the two groups (9.3 versus 10 in the treated group, $p = 0.75$) and the mean number of medications prescribed was also not statistically different (14.1 versus 15.6 for the treated, $p = 0.76$).

CONCLUSION

It was found that in this patient population, those with moderate to severe OSAS who remained untreated have twice the number of hospital and clinic visits compared with those who are treated despite the number of comorbidities and medications. This finding implies that untreated OSAS is an independent risk factor for incurring higher health care costs. Therefore, to offset this increased resource utilization, it may be more cost-effective to attempt at least to provide a CPAP device to all patients with moderate to severe disease.

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COMMERCIAL DRIVERS' HEALTH AND WELLNESS STATUS

Health Profile of Commercial Drivers

Eric Wood, Anita Kinney, Maureen Murtaugh, Matthew S. Thiese, and Kurt T. Hegmann, *University of Utah*

Commercial drivers are reported to be at risk for negative health outcomes because of the unpredictable nature of the profession, the amount of time spent operating commercial vehicles, and perceived barriers to achieving healthy lifestyle recommendations (Backman 1983; Hertz 1988; Korelitz 1993; U.S. Department of Health and Human Services 2000). Drivers often spend days to weeks away from their home base, they commonly meet nutritional and dietary needs at restaurants or food stores convenient to the routes they serve, and sleep and rest needs are often met in the sleeping berths of their truck cabs. It is uncommon to find facilities or space to achieve recommended exercise along truck routes or at rest stops. In addition to these lifestyle challenges, work-related factors specific to driving also might play a role in health outcomes. Many drivers are subjected to lengthy periods of relative inactivity while sitting and driving that are interspersed with periods of high physical activity (e.g., loading and unloading, securing loads, installing tire chains). In addition, sitting in the work space of the truck cab subjects individuals to continuous vibration, which has been cited as a risk factor for low back pain and other musculoskeletal disorders (Andersson 1997; Bernard 1997; Garg 1992). Finally, because of the time and distance away from a home base, accessing traditional health care resources is difficult. This unique constellation of lifestyle challenges and occupational demands has been implicated in chronic disease processes with potential for acute exacerbations such as cardiovascular disease, diabetes mellitus, and hypertension (Van Uffelen 2010; Robinson 2005; Solomon 2004). To date, very limited data have been presented that describe the prevalence or magnitude of diseases or disease markers in this population of workers.

METHODS

Descriptive health data were presented from a research study on the personal risk factors and their relation to occupational injuries and diseases. Commercial drivers were enrolled in the study at truck stops, national trucking conventions, and for a limited subset through computer web-based questionnaires. Methodology included data collection via a questionnaire, and biometrics and serology from 650 commercial drivers. Point prevalence was calculated for a report of physician-diagnosed hypercholesterolemia, hypertension, diabetes mellitus, sleep apnea, and other selected health outcomes. Also presented were measured results of blood pressure, body mass index (BMI), waist circumference, neck circumference, total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides, and glycated hemoglobin (HbA1c).

COMMERCIAL DRIVERS' HEALTH AND WELLNESS STATUS

RESULTS

The mean age of subjects was 47 ($\mu = 47.0$ years ± 10.6) with 86.9% men and 13.1% women. Average length of time working as a commercial driver was 16.9 years ($\mu = 16.9$ years ± 11.9). Point prevalence was calculated for a report of physician-diagnosed hypercholesterolemia (25.6%), hypertension (28.4%), diabetes mellitus (10.3%), and sleep apnea (14.5%). Measured results were also presented of systolic blood pressure ($\mu = 132.1$ mg/dL ± 17.7), diastolic blood pressure ($\mu = 84.5$ mg/dL ± 11.4), BMI ($\mu = 33.1$ kg/m² ± 9.0), waist circumference ($\mu = 112$ cm ± 19), neck circumference ($\mu = 42.9$ cm ± 9.4), total cholesterol ($\mu = 193$ mg/dL ± 80), LDL cholesterol ($\mu = 100$ mg/dL ± 48), HDL cholesterol ($\mu = 36$ mg/dL ± 15), triglycerides ($\mu = 227$ mg/dL ± 141), and HbA1c ($\mu = 4.82\%$ ± 1.37).

CONCLUSIONS

The findings indicate that this population of commercial drivers is markedly different from the U.S. working population with respect to reported disease prevalence and markers of disease. These findings have relevance for targeting screening, diagnosis, and treatment of this large population of workers at risk for negative health outcomes. Furthermore, these findings support an increased potential risk for individuals to sustain acute health events during performance of routine work duties (commercial driving) with further risk for acute injury or death due to crashes. The findings have broader implications for public health and safety.

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COMMERCIAL DRIVERS' HEALTH AND WELLNESS STATUS

Health, Safety, and Wellness of Truck Drivers in Canada

Results of a Pilot Study

Philip L. Bigelow, *University of Waterloo and Institute for Work and Health, Canada*; Sheilah Hogg-Johnson and Benjamin C. Amick, *Institute for Work and Health, Canada*; Diane Betts, *Humber Institute of Advanced Learning, and Technology, Canada*; W. Karl Sieber, *National Institute for Occupational Safety and Health*; Mark Skinner, *Infrastructure Health and Safety Association of Ontario, Canada*; and Paul Jakubicek, *University of Waterloo, Canada*

No systematic approach exists in Canada to assess the health and safety of commercial drivers. The major objective of this three-phase pilot project was to determine the feasibility of conducting a national survey that would gather information on the prevalence of and risk factors for health conditions, risk factors for crashes and occupational injury, and barriers to achieving improved health, safety, and well-being. In Phase 1 of the project, drivers and health professionals in the transportation sector were interviewed to gather information on their perceptions of the scope and relative importance of specific risk factors related to motor vehicle injuries, non-motor-vehicle injuries (e.g., musculoskeletal injuries), occupational disease, and driver wellness. In Phase 2, this information along with a literature review informed the development of a pilot questionnaire. In-person interviews were conducted with drivers to determine if the questionnaire content addressed their concerns and to gain feedback on the clarity and appropriateness of individual questions. Interview questions also addressed what they thought were the most appropriate locations to administer the survey, the most appropriate way to contact and approach drivers, as well as the best mode of administration and level and type of incentive to encourage participation. A revised version of the questionnaire was produced based on this feedback. In Phase 3, 107 drivers were recruited at two truck stops in southern Ontario and they completed a pencil-and-paper version of the questionnaire.

The findings from interviews conducted during Phase 1 indicated that respondents were aware of most of the major risk factors for commercial drivers that have been reported in the peer-reviewed literature. Long hours of work along with increased stress and fatigue were viewed by a majority of respondents as major health problems for drivers and a barrier to adopting a healthy lifestyle. Although a few respondents reported concern about sleep quality and its impact on driver health and safety, sleep apnea was not mentioned in any of the interviews. In addition, the use of illegal and legal drugs was not highlighted by any respondents as a concern. Drivers did not mention obesity or cancer as important health or wellness issues but these were highlighted as important by health and safety professionals within the workers' compensation-funded prevention system. Slips, trips, and falls were viewed as major causative factors in musculoskeletal disorders and pain. Age was not

RESEARCH ON THE HEALTH AND WELLNESS OF COMMERCIAL TRUCK AND BUS DRIVERS

mentioned by drivers but was discussed by health and safety professionals as a factor influencing the likelihood of musculoskeletal problems.

Interviews with drivers in Phase 2 were helpful in adapting questions to the context of driving in Canada and for improving the overall acceptability of the survey instrument. Initially, the instrument contained the 12-item General Health Questionnaire, a measure of current mental health, but this scale was removed because drivers believed that it was inappropriate. The revised questionnaire was typically completed in 30 min and addressed the work tasks performed, work organization, injury and collision history, ease of access to medical care, health conditions, musculoskeletal pain, sleep patterns and problems, and exposure to physical and psychosocial hazards.

Pilot testing of the questionnaire was carried out at two truck stops located on a major highway close to the city of Toronto, Canada. The approach that was the most acceptable to drivers involved working with truck stop management and setting up an area where investigators could approach drivers and where drivers could sit and complete the questionnaire.

The overall findings of this project indicate that stakeholders are aware of the risks facing drivers and are supportive of a nationwide survey to gather baseline information. Health and safety professionals in the sector believed that the data from baseline and routine driver health, safety, and wellness surveys would be useful in their prevention efforts. Although initial interviews with drivers indicated some apprehension regarding future use of study findings (e.g., more regulations), when drivers were approached in Phase 3, response rates were very high. Thus the feasibility of a nationwide truck driver health survey was established.

EDITOR'S NOTE: The full-length version of this paper may be found in Appendix A.

COMMERCIAL DRIVERS' HEALTH AND WELLNESS STATUS

Practical Hurdles Confronting Truck and Bus Companies in Implementing Driver Health and Wellness Programs

Jeremy Kahn, *Kahn and Kahn*

At first glance, driver health and wellness is one of those laudable goals for which all commercial carriers ought to strive. Yet even among those carriers predisposed to treat their workers well—and not all are so predisposed—there is a feeling that they are doing what they can in this area but not all that they might.

Rather than examine a statistically valid industry sample, the author, beginning with the premise that responsible carriers are committed to improving health and wellness, interviewed executives of a few successful carriers of various sizes in both the United States and Canada with whom he has had a long professional relationship to explore the many actual practical issues that they perceive as hurdles to implementing and maintaining broader health and wellness policies. Though this approach has an obvious “preaching to the choir” limitation, it is such responsible carriers that will lead the way for the industry, so their views are worth a close look, even if they are not representative of all carriers.

The interview results were both expected and unexpected. Carrier management is generally highly supportive. Although all carriers are concerned about their financial condition, surveyed carriers generally fund their wellness departments in a manner consistent with other departments, and the need to justify wellness expenditures is not significantly different from the justification for other expenditures. Even so, cost remains an important consideration. There is a constant struggle to leverage resources so as to do more with less money.

The biggest hurdle might be characterized as “no good deed goes unpunished.” Carriers are perhaps unique in the extent of mandatory safety rules that apply to the relationship between carrier and driver. Since those rules are so comprehensive, they override many other laws. Once a carrier steps outside the limits of the federal safety rules, no matter how good the intentions, the overstep invites severe potential legal repercussions from a myriad of other laws that apply to workers.

As one example, many truckers use an “independent contractor” owner–operator model. Many of them have a vivid fear that straying just one step beyond what the safety rules mandate will lead them onto the slippery slope toward reclassification of drivers as employees, which they want to avoid at all costs.

These and other similar hurdles were addressed with which responsible, well-meaning carriers grapple, as well as some of the ways that they actually promote wellness within existing constraints.

COMMERCIAL DRIVERS' HEALTH AND WELLNESS STATUS

Wellness Framework

The Four R's

Todd McGuire, *incentaHEALTH*

A wellness framework called the Four R's was presented. The framework was designed for selecting and implementing a corporate wellness program measured against four primary objectives:

1. Reach: maximizing employee participation in a wellness program,
2. Retention: keeping employees actively engaged in the program after they sign up,
3. Results: measuring authenticated outcomes without relying on self-reported data, and
4. ROI: calculating a return on investment.

Real-world experience was used to design and deploy wellness programs in dozens of work settings across the United States and abroad.

Lessons learned relating to the first challenge of every wellness program were discussed: getting employees to sign up for the program. The pros and cons of different tactics such as incentives, privacy and anonymity, and promotion campaigns were addressed. Included was a discussion of the different medical conditions that a wellness program can address.

Getting employees to sign up for a wellness program is just the first challenge. Next the different methods for keeping employees active in a wellness program were analyzed, including different ideas such as team competitions, telephonic coaching, push-and-pull communication technologies, and visual progress reporting. After a special discussion of the difference between short-term and long-term behavior change programs, the cost and scalability of different coaching methods were addressed.

Historically, wellness programs have relied on self-reported data to evaluate program success. In today's era of ever-tightening budgets, wellness program managers must be able to demonstrate the bottom-line impact of wellness efforts. The presentation included the evolution of wellness program measurement techniques, including health risk assessments, nurse-administered screenings, and automated wellness kiosks.

The ultimate goal of a long-term wellness program is to simultaneously improve employee health while controlling health and productivity costs. In the presentation's conclusion, it was demonstrated how employers that successfully maximize program participation keep employees retained in the program and then by tracking measurable outcomes are able to build a sustainable ROI model to track their program's impact on the organization's bottom line. A sample ROI calculation was demonstrated as an example of the Four R's in practice.

BEHAVIORAL ISSUES

Two Behavioral Red Flags***Driver Single-Vehicle Crash Involvement and Nonuse of Safety Belts***

 Ronald R. Knipling, *Consultant*

Numerous studies have established the principle of differential driver risk for both commercial drivers and drivers in general. Naturalistic driving and other studies indicate that approximately 20% of drivers are associated with about 50% of all at-fault road conflicts. These percentages translate into a roughly fivefold difference in risk between high-risk drivers and the rest of the drivers. For involvement in high-drowsiness incidents, differential risk is even greater. Individual differences in risk appear to primarily reflect enduring individual differences (i.e., traits) rather than temporary states, even though multiple temporary factors are always operating to affect driver crash risk. Medical factors play a role in differential driver risk, though personality (defined broadly as behavioral and attitudinal consistency) probably plays a bigger role.

How can carriers discern which commercial drivers are at high risk during driver screening for hiring and then later when drivers are actually hired? Two indicators were suggested. The first is driver involvement in a serious single-vehicle crash, either in the recent past (e.g., for job applicants) or while in service with a company. Single-vehicle crashes are, for the most part, fundamentally different from multivehicle crashes in their causation. They typically indicate a failure of driver vehicle control, whereas multivehicle crashes reflect primarily a failure of response to traffic events. Compared with at-fault multivehicle crashes, in NHTSA's Large Truck Crash Causation Study (LTCCS) single-vehicle crashes were 13 times more likely to have a proximal cause of being asleep at the wheel, 3 times more likely to involve a heart attack or other medical event, and nearly three times more likely to be due to a performance or response execution failure. They are also more likely to involve precrash misbehaviors such as speeding and neglect of vehicle maintenance. Any type of at-fault crash involvement can raise questions about a driver, but involvement in a single-vehicle crash raises more fundamental questions about his or her fitness and suitability for the driving profession.

Nonuse of safety belts is linked to single-vehicle crash involvements and to driver risk in general. In the LTCCS, drivers who did not use a belt were 84% more likely to be involved in single-vehicle crashes relative to multivehicle crashes. Overall, they were 30% more likely to be at fault (i.e., assigned the critical reason) in their crashes. A large naturalistic driving study found that high-drowsiness road conflicts were 70% more likely for drivers who did not use a safety belt than for drivers who did, with the probable link being driver obesity, itself a major health and safety concern.

Studies of light-vehicle drivers corroborate the link between nonuse of belts and driving risk. Nonuse is linked to cell phone use, alcohol, speeding, reckless driving, license-related

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violations, and past criminal offenses. Individual risk perception appears to be a key common factor in both nonuse of belts and engagement in at-risk driving behaviors.

These facts also imply a greatly elevated injury risk for nonusers of safety belts because of the multiplicative relationship between increased crash risk and increased injury risk in crashes. If nonusers of belts are 1.5 times more likely to be in a crash (a conservative estimate for single-vehicle crashes, in which drivers are most likely to be injured) and three times more likely to have an increase in injury severity in crashes that occur, then they are overall 4.5 times more likely to be at risk of injury per unit of driving. Such evidence and extrapolations suggest that government and industry should closely scrutinize behavioral red flags such as single-vehicle crash involvement and nonuse of safety belts.

BEHAVIORAL ISSUES

Improving Commercial Driver Health and Driving Performance Through Digital Coaching Health and Wellness Interventions

John Lenneman, *Central Michigan University and HMI Solutions, LLC*

Traditionally, the study of employee health status has focused on productivity and performance, with most studies showing that increased health risks lead to decreases in worker productivity and performance. However, while often not cited in the productivity literature, the effects of a number of varying health risks (e.g., obesity, chronic obstructive pulmonary disease, hypertension) on underlying psychological constructs of human cognition, visual attention, and perception have also been documented (Elias et al. 2003; Liesker et al. 2004; Madden and Blumenthal 1998). These results are important because these same psychological constructs play a critical role in the execution of a number of tasks required to drive a vehicle (e.g., visual scanning, hazard identification). For example, research in the driving domain has shown that impairments of cognition, visual attention, and perception lead to significant deterioration in driving performance (Lamble et al. 2002). In light of these findings, it appears that health and wellness research in the commercial vehicle domain could benefit greatly by a study of the effects of health risks on driver safety in addition to productivity. Specifically, it is suggested that deterioration in cognition, visual attention, and perception that stem from increased health risks can exacerbate driver distraction, impair decision-making abilities in emergency situations, and cause perceptual impairments, all of which may increase the likelihood of a vehicle accident.

Logically then, there should be interest in whether the emergence of driver safety issues and reduction in productivity that result from increases in health risks can be remediated. In fact, increases in health status have been shown to reduce the impairment rates of cognition, visual attention, and perception. For example, Kozora et al. (2002) found that patients with severe cases of chronic obstructive pulmonary disease (COPD) show significant improvement on tests of visual attention, verbal retention, and visuospatial ability as a result of participating in an intense 3-week COPD rehabilitation program. On the basis of the literature cited, those same patients could see significant improvements in driving performance.

The findings in the domains of health and wellness and driving research described earlier were reviewed in more detail. An approach for the assessment and treatment of modifiable health risks that are most applicable to commercial vehicle drivers was also presented. This presentation included reviews of a science-based, self-report instrument that assesses health risk and quantifies worker productivity and a sample of digital coaching wellness, disease

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management, and behavioral health interventions that are most relevant to the commercial vehicle industry. To illustrate the effectiveness of the approach in improving health status, data from over 77,000 health risk assessment participants in a number of intervention programs year by year were presented. For example, in a recent study Lenneman et al. (2011) found that intervention programs aimed at the modifiable health risks of weight, hypertension, and high cholesterol significantly improved the risk status of 38.5% of the participants in the program. Other analyses have revealed that participation in intervention programs can lead to significant improvements in feelings of general health, back pain, medication adherence, stress, weight, nutrition habits, and sleep.

In light of these types of results, the effects of implementing a digital coaching health and wellness program on improvements in worker productivity and driver safety were discussed.

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BEHAVIORAL ISSUES

Behavior-Based Safety Strategy for New Zealand Truck Drivers

Rebecca Everdon, Louis S. Leland, Jr., and Brent Alsop, *University of Otago, New Zealand*

New Zealand's narrow, twisting, hilly roads present a beautiful but unforgiving topography. Trucks transport 80% of the country's freight, yet truck movements represent just 7% of the total distance traveled on major roadways. Truck crashes contribute to around 20% of New Zealand's road fatalities. Usually it is other, more vulnerable road users who die in truck crashes. Still, truck drivers suffer harm when they are not even driving—from falling objects, lifting and handling goods, and even through slips, trips, and falls. New Zealand's Accident Compensation Corporation (ACC) provides for medical treatment and covers the expense of injury. In 2005–2006, new ACC out-of-truck injury claims totaled nearly \$7 million. ACC paid another \$10 million for ongoing treatment and recovery costs for rehabilitation of more than 700 drivers who were previously injured and may never drive again.

There has been considerable research on driver health and safety; many studies used in-truck, high-end, (driver-invasive) technology; others examined health aspects, truck factors, and even personality and attitude. There is scant research specifically focused on driver behavior. Although past studies provide valuable insights, none replicate the conditions faced by New Zealand drivers. The safety strategy in New Zealand uses methods of the behavior-based safety (BBS) system. The BBS system is successful in industry and corporate settings worldwide and has proved effective for increasing safe practices. It provides the foundation to establish a workplace safety culture and can be used to complement existing safety strategies. The system has not been widely tested with lone workers; still, researchers examined the BBS system and concluded that it had potential for use in the transport industry. Essentially, the system works by allowing the people who do the jobs to identify the risks, provide input, and help establish goals for improved safety. Having a voice encourages ownership of the program and motivates workers to take an active role toward their own and others' safety.

Company support and consent are required for driver participation. Safety records are requested for the 12 months leading up to drivers' involvement (baseline), continuing reports (for comparison with driver self-reports) are asked for, and truck-driver-only focus groups are held to encourage communication and to raise driver awareness. Discussions about the risks of the profession reveal that hazards vary depending on the type of transport. Still, every focus group to date has concurred that the top five driver-defined dangers are other road users, road conditions, road design, driver fatigue, and rules and regulations. With this input, safety reports, or critical behavior checklists (CBCs), are designed based on the driver-defined dangers, as well as crash and injury-related factors as identified by the ACC and the Ministry of Transport. The CBCs are tailored to include hazards specific to each group, and ongoing driver feedback is used for revisions.

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Coworker observation and feedback is a key BBS technique, but most New Zealand truck drivers work alone. CBCs remedy the dilemma as a tool for self-reports by lone workers; still, a way was needed to signal when to carry out a self-observation. Technicians designed small, low-tech units that randomly activate a prompt, record the time it occurs, and the time the unit is reset. At the signal, drivers take note of their circumstances but do not complete a CBC until it is safe (when they are not driving) and then reset the unit. CBCs are posted to the researchers at the end of their working week; they analyze driver reports and provide positive feedback, including ratings of percent safe and alertness.

Currently five driver groups are participating, averaging 10 drivers per group. The diversity of drivers allows for stratified random assignments and staggered enrollment enables a time-series multiple baseline analysis. Some drivers have completed CBCs for more than 70 weeks; the most recent group has been reporting for 20 weeks and more enrollments are forthcoming. The BBS program concluded at the end of 2011. The materials were left with the drivers and the researchers offered to help companies continue with the program. Recent analysis suggests a correlation between alertness and percent safe ratings. This program has the potential to enhance the safety of all New Zealand road users. If just one truck crash can be prevented, the program will have been successful.

BEHAVIORAL ISSUES

Pilot Study on Safety and Health Involvement for Truckers

How Motivational Interviewing Affects Driver Weight Loss

Ryan Olson and Brad Wipfli, *Oregon Health and Science University*; Lindsey Alley, *Portland State University*; Kevin Murphy, *Eastern Oregon University*; Denise Ernst, *Health Future Health Management Services*; and Verna Burden, *Health Future*

The pilot study Safety and Health Involvement for Truckers (SHIFT) evaluated a new health promotion intervention model for truck drivers. The evidence-based approach was a weight loss and safe driving competition that was supported with behavioral computer-based training and motivational interviewing (MI) health coaching. Results suggested that the intervention model was substantially more engaging and effective than previous education-based efforts to promote health with drivers. Mean weight loss was statistically and clinically significant, with drivers ($n = 22$) losing an average of about one unit of body mass index ($M = 7.8$ lb, $p < .01$, $d = .68$).

Although the success of the pilot study represents an important step forward in this area, it is important for future research and practice to understand how the intervention worked. While drivers were exposed to all intervention components, participation in cell phone MI health coaching was exceptional, with drivers completing an average of 3.9 out of four planned sessions. The current project is a secondary analysis of audio-recorded MI health coaching sessions from the SHIFT pilot study. The purpose was to understand how the language of coaches and drivers relates to weight loss and behavior change outcomes. Preliminary results from analyses of only the first health coaching sessions were summarized. Additional results were presented that incorporate data from subsequent sessions.

Both health coaching and driver verbal behaviors were coded according to criteria thought to be associated with the efficacy of MI. Health coaching behavior was coded with the motivational interviewing treatment integrity (MITI) system and driver behavior was coded with the client language assessment in motivational interviewing (CLAMI) system. While each system is complex and multifaceted, the MITI system focuses primarily on measuring the coach's adherence to prescribed MI technique, whereas CLAMI focuses primarily on measuring client change talk and counterchange talk. Coders received extensive training and practice in coding methods and produced reliable data as measured with Cohen's kappa coefficients.

A female health coach conducted all sessions and demonstrated a high level of proficiency in MI by averaging 97% ($SD = .06$) MI-adherent responses to driver utterances. Surprisingly, the only coaching behavior that significantly correlated with weight loss was MI-nonadherent language ($r = .53$, $p < .05$), which occurred only 17 times, but 10 of these occurred with participants who were at or above the 80th percentile for weight loss. Health

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coaching behavior was also significantly related to dietary changes. Specifically, the ratio of coach's reflections versus asking questions was significantly related to changes in fast food consumption ($r = -.49, p = .04$). In analyses of driver language during sessions, the ratio of change talk to counterchange talk was positively associated with weight loss ($r = .50, p = .03$). In addition, the frequency and intensity of reasons provided for not making lifestyle changes was associated with lower reductions in sugary drink consumption ($r = -.51, p = .03$).

Other patterns in the data set were discussed, including within-session patterns in change talk, descriptive comparisons between study dropouts and finishers, and mixed or inconclusive results. Regression models that incorporate information from both coach and driver language, and from additional sessions, were also presented.

UNION PERSPECTIVES

Union Management Cooperation in Wellness Programs

Panel Discussion

Edward Watt, *Transport Workers Union of America*; Ron Z. Goetzel, *Emory University/Thomson Reuters*; Paul Landsbergis, *State University of New York Downstate*; Daria Luisi, *Consolidated Edison Company of New York, Ltd.*; and June M. Fisher, *Trauma Foundation*

A healthy workforce is one that can be productive and focuses on safety and health both for themselves and for the public. The reality in the United States shows how far such a goal is from being achieved. The workforce is far from healthy. A healthy workforce is also critical because of both the possible career-ending ramifications of poor health among commercial drivers and the potential for increased risk of accident or injury.

Research has demonstrated that the roles of lifestyle, genetics, the environment, home and work challenges, and access to health care are all determinative of the onset and severity of these adverse health conditions. The successful design of a wellness program depends on the proper evaluation of all of these factors. A fully integrated wellness program can develop an environment that encourages healthy choices, provides access to health-promoting resources, and makes healthy activity a priority. The panel members discussed various aspects of such a program.

Edward Watt The Transport Workers Union of America (TWU) knows that its members work in physically challenging environments. The union is dedicated to protecting the health, safety, and welfare of its members. A comprehensive wellness program can reduce the effects of occupational stressors by both offering healthier opportunities for eating, exercise, and other methods of stress reduction and improving the work environment. In 2007–2008, lengthy discussions, and, eventually, negotiations took place between TWU Local 100 and Metropolitan Transit Authority New York City Transit on the development and implementation of a wellness program. These discussions were the direct result of the experience of the New York City Department of Health and Mental Hygiene Wellness at Work (WAW) program. A white paper was produced and discussed.

Paul Landsbergis reported on the results of a survey of 4,402 retired New York City transit workers. Self-reported disease status was presented by type of job and compared with national estimates from the National Health Interview Survey. In addition, he discussed recent studies and recommendations by the National Institute for Occupational Safety and Health, the National Institutes of Health, and the American Heart Association on the importance of integrating workplace wellness programs with occupational health and safety programs in order to reduce the risk of chronic disease.

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Ron Goetzel presented the findings from a study focused on New York City employers who introduced worksite wellness programs to their workers. One participant in the study was the TWU, whose workers operate and maintain bus and subway systems for the city. To support employer health promotion efforts, the New York City Department of Health and Mental Hygiene developed the WAW program to provide employers with technical assistance in developing tools, resources, and expertise to design, implement, and evaluate evidence-based, worksite health promotion programs. The study examined health risk changes over a 3-year time horizon for a cohort in the WAW program. This study was carried out with funding from the Centers for Disease Control and Prevention and was led by Emory University.

Daria Luisi described the implementation of a pilot project in a large public utility company based in New York City, which is integrating health promotion programs into occupational health and safety. In 2009, the targeted population was composed of approximately 14,524 employees, of which 9,401 were members of the utility workers union. Commercial driver's licenses are held by 4,000 to 5,000 employees, and noncommercial driver's licenses regulated under the U.S. Department of Transportation (U.S. DOT) are held by 1,500 to 3,000 employees. This discussion has reviewed the results of individual health promotion interventions aimed at reducing smoking rates and improving nutrition for employees regulated under the U.S. DOT. Eighty-one percent of smoking cessation participants and approximately 60% of nutrition services participants are union employees.

June Fisher discussed the intersection between occupational health and health promotion by assessing 25 years of research on the working conditions and health status of San Francisco transit operators. She discussed the impact of the work environment on health behaviors such as smoking, alcohol use, and diet.

BUS ISSUES

Sleepiness Among Express Bus Drivers

Association with Body Mass Index, Sleep Quantity, and Sleep Quality

Kulanthayan Mani, *University Putra Malaysia*

Sleepiness is recognized to be among the most important causative factors in road crashes. Statistics from Malaysia Royal Police show that the number of road crashes for the country is increasing from past years, standing at 397,194 in 2009. These crashes resulted in 6,218 fatalities. Bus accidents are a major issue in Malaysia, and 40.29% of the buses involved in road accidents are express buses. Sleepiness can cause crashes because it impairs performance and can ultimately lead to the inability to resist falling asleep at the wheel. The main objective of this study was to determine the association between body mass index (BMI), sleep debt, and sleepiness among express bus drivers.

This cross-sectional study was conducted with drivers of two main express bus companies at their respective bus depots in the city of Johor Bahru in the state of Johor. A total of 85 respondents were chosen from a simple random sampling. For data collection, the respondents were based at their respective bus depots. After their consent to participate was obtained as part of the ethics requirements, their height and weight were measured and the questionnaire and sleep log were distributed. The sleep log was collected every 2 days within a week. In terms of sleepiness level, 21.2% of the drivers were sleepy. As to BMI, 27.1% of the respondents had a normal BMI, whereas more than half of them, 72.9%, were overweight. With respect to sleep quantity, it was found that 78.8% of the respondents had adequate sleep, with an average of 7 h and more, and 21.2 % had inadequate sleep, with average sleeping hours of less than 7 h per day. For sleep quality, 91.8% of the respondents claimed that they had high-quality sleep and only 8.2% of them claimed low sleep quality per day.

Seven variables were tested in this study to determine association with sleepiness: BMI, average sleep quantity, average sleep quality, working experience, age, driving duration, and driving distance. From the results, only three of the variables (BMI, sleep quantity, and working experience) had a significant association with sleepiness. Drivers who are overweight are more likely to be sleepy compared with drivers with normal weight. Next, drivers with inadequate sleep (less than 7 h) and less experienced (fewer than 21 years) drivers are prone to be sleepy.

Sleepiness and driving are a dangerous combination. Most people do not realize that drowsy driving can be just as dangerous. Bus drivers have to take care of their health by having a normal BMI. Drivers themselves have to ensure readiness in performing their job. Every driver should get adequate sleep to maintain proper alertness and performance. Drivers also can plan ahead to reduce the risk of drowsy driving in other ways.

BUS ISSUES

Wellness Lessons from Transportation Companies

Asbjorn Osland, *San José State University and Mineta Transportation Institute*

From the perspective of the triple bottom line (Elkington 1994), wellness programs fall directly under the social aspect in that they are to improve the well-being of employees (and family members such as spouses where eligible to participate). Wellness programs also indirectly affect the environment in that walking and cycling, which may supplant trips made in vehicles, and reduced caloric intake, particularly of red meat, associated with weight loss, all reduce one's carbon footprint. Wellness programs often encourage walking roughly 5 mi or 10,000 steps daily, including what one normally walks completing one's job responsibilities and daily routine tasks. When one has to decide whether or not to drive a short distance or walk a distance—say under several miles—the wellness participant may choose to walk or cycle. Overweight people can eat thousands of calories extra each day, whereas on a wellness regimen few would need more than 1,500 to 1,800 daily depending on acceptable weight in relation to height. A rough approximation is 10 calories daily per pound of desired weight. On the economic front, employers commonly state that they sponsor wellness programs to reduce health care costs, which one hears repeatedly are out of control.

A discussion of the implementation of wellness programs was presented, with specific reference to obesity given the problems it poses for the United States (see <http://www.cdc.gov/obesity/data/index.html> for state and race data as well as county-based information on diabetes). Smoking is of course a terrible problem, but the topic has received a great deal of attention, so for the sake of brevity it will not be discussed at length. Brief case studies of transportation companies included the Union Pacific Corporation, focused on rail transportation, and Con-way Freight, focused on truck transportation, which were included because they were willing to share information and are large, publicly traded companies. The Utah Transit Authority was included on the recommendation of other transit authorities; it has a long history in wellness as part of local government and it too chose to participate. In conclusion, a few comments highlighting wellness implementation successes described in the case studies and a discussion of remaining issues of interest were provided.

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EDITOR'S NOTE: A full-length version of Osland's paper, published as Mineta Transportation Research Institute Report WP 11-01, was submitted as a white paper for inclusion in these proceedings. The abstract from that report appears in Appendix A, and the full report can be located along with PowerPoint slides at the web link (<http://www.trb.org/Calendar/Blurbs/162759.aspx>).

BUS ISSUES

Managing the Fog of Fatigue

Gregory Belenky, *Washington State University*

This presentation summarizes the state of the art of the scientific study of fatigue as it applies to sustaining performance in operational environments. There is a large variety of operational settings. These include military operations, maritime operations, medicine, the various modes of land transportation (trucking, motorcoach), aviation, security work, energy generation, resource extraction (mining and drilling), financial markets, and industrial production. In brief, any 24/7 operation and any operation involving extended work hours or shift work is an operational setting. Since human physiology is human physiology, there is no “platform-specific” science, and research on one type of operational worker applies to other types as well.

Fatigue is operationally defined both subjectively and objectively. Subjectively, fatigue is operationally defined by self-report; that is, someone says, “I am tired” or endorses a high level of fatigue on a fatigue scale (e.g., the Samn–Perelli). Objectively, fatigue is operationally defined as degraded performance. This degraded performance can be measured by either added or embedded measures. Added metrics are those that are not intrinsic to the workplace but are ported to the workplace from the laboratory. An example is the porting of the psychomotor vigilance task to the Palm Centro smartphone and using this to measure vigilance performance in the field. In contrast, embedded metrics are metrics that are taken from actual workplace performance and are seamless and invisible; therefore they do not interrupt the normal flow of work. An example of such an embedded metric is lane deviation as an indicator of driver performance in the commercial motorcoach and trucking industry. Another embedded metric, fuel economy, may also be modulated by fatigue.

Fatigue is the result of the interaction of a number of factors. These factors include sleep and wake history (time awake), circadian rhythm phase (time of day), and workload (time on task). Further, there are traitlike, persistent individual differences in sensitivity to all these factors.

With respect to sleep loss as a factor in fatigue, adequate sleep (7 to 8 h of actual sleep) sustains performance across multiple days. Evidence is accumulating that it is total sleep in 24 h that matters in terms of sustaining performance; in other words, split sleep consisting of anchor and nap sleep can sustain performance as effectively as sleep consolidated into a single sleep period. Even mild sleep restriction degrades performance over days. Sleep disorders (e.g., sleep apnea) degrade performance even in the face of adequate sleep opportunity.

Effectively managing fatigue to sustain operational performance requires managing the interaction of fatigue-producing factors. In the context of the discussion of the factors generating fatigue, this management means providing adequate opportunity for sleep, placing these sleep opportunities at points of the clock when the person will be able to sleep, and placing work periods at the point of the clock when the person will be able to perform well.

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The risk of fatigue-induced errors, incidents, and accidents has been largely managed by hours-of-service regulations, one-size-fits-all regulations that attempt to ensure adequate sleep opportunity and tolerable workloads by limiting duty hours. Hours-of-service regulations typically do not take into account circadian rhythm factors and thus can be at times overly restrictive and at times unsafe.

As a means of optimizing scheduling within the context of hours-of-service regulations, and alternatively as a replacement for these regulations, systems of fatigue risk management are being developed. These systems involve ongoing collection of data on sleep, shift timing, and workload as they relate to performance and predicting from these data, using mathematical models, the likelihood of fatigue-related degradation in performance. These data and models can be incorporated into rostering and scheduling software to generate fatigue-minimizing schedules.

TECHNOLOGY ISSUES

Creating Social Networking Health Outreach Program for Commercial Motor Vehicle Drivers

Justin F. Morgan, Tammy E. Trimble, Myra Blanco, and Richard J. Hanowski,
Virginia Tech Transportation Institute

The work performed in the ongoing creation of a social networking–based health and wellness outreach effort directed at commercial motor vehicle (CMV) drivers was described. It is anticipated that this effort will result in greater acceptance among target audiences and more effective use of health and wellness information as well as foster mutual support within the target audience. Included was an overview of CMV driver health literacy, the means of accessing health information in a mobile environment, and the use of social marketing techniques in the design and implementation of health education resources. An understanding of these factors is expected to have a beneficial effect on the overall success of a CMV health outreach program. The effectiveness of this program will be seen through greater CMV driver empowerment and engagement in regard to person health and wellness.

TECHNOLOGY ISSUES

Peak Performance for Commercial Driver Health *Resilience Model*

Barbara Moquin, *U.S. Department of Health and Human Services*

For commercial drivers, extended hours on the road can prove challenging when the promotion and maintenance of health and wellness are considered. Health cannot be simply the absence of disease but rather be defined as achieving high levels of balance and performance across physical, emotional, mental, and spiritual spectrums. Numerous behavioral science researchers, such as Herbert Benson, from Harvard University, and Kenneth Cooper, from the Cooper Institute, have reported that to achieve and sustain high performance, each person must consider his or her realistic, individual health capacity. The sustained high functioning and resilience evidenced by athletes and military service members can be a model for peak performance for commercial driver health. Loehr and Schwartz, after two decades of work with world-class athletes, have proposed an integrated theory of performance management that includes focusing on energy rather than time management to achieve superior performance.

Commercial drivers deserve the same optimal health outcomes. If they are to perform at high levels over long hauls, commercial drivers will benefit from learning and practicing evidence-based interventions for self-care addressing important areas such as sleep, management of stress, blood pressure, weight, and chronic pain. Resilience describes a dynamic process whereby individuals can recover from physical, emotional, and mental stress aided by specific competencies. Competencies are healthy skills and abilities that an individual can learn and practice to promote optimal health. The author's resilience model has been successfully introduced and utilized by the military and their family members, health care staff, and athletes across the age span. By integrating evidence-based cognitive behavioral skills that foster recovery, refocusing, and renewal, the resilience model can effectively be employed for prevention as well as health promotion and maintenance. Commercial drivers who routinely practice effective, brief interventions such as relaxation breathing, guided imagery, and exercise can realize the same beneficial health outcomes and return for their time investment now acknowledged and routinely included in military and athletic training.

TECHNOLOGY ISSUES

Developing Intelligent In-Vehicle Systems to Monitor, Manage, and Motivate the Aging Operator's Health and Well-Being

Panel Discussion

Joseph F. Coughlin, Bryan Reimer, and Bruce Mehler, *Massachusetts Institute of Technology*; and James Purvis, *Healthways*

Health and wellness are important issues for society as a whole, but they are particularly acute for commercial drivers because of both the nature of the work environment and the rapid aging of the operator workforce. Although impressive advancements are being made in the understanding of various factors that affect wellness and medical capabilities for treating many disease conditions, significant challenges are confronted in bringing these insights and capabilities to bear in effective interventions. Operators are increasingly expressing less happiness and satisfaction with driving; alongside fatigue, distraction, anger, and other factors, driver stress is emerging as a new impairment. Similarly, as the population ages, chronic disease management will become a greater issue for driver performance; combinations of medical conditions, medication uses, as well as physiological changes behind the wheel in response to highway conditions will be greater factors affecting both individual and system performance as well as safety. Massachusetts Institute of Technology, in collaboration with the U.S. Department of Transportation and industry researchers, has been developing the concept of driver wellness and well-being in the private operator; however, this concept is at least as significant for commercial drivers and transit operators.

This panel discussed the development of intelligent in-vehicle interventions to produce improvements in operator well-being and traffic safety and to reduce health-related costs. Current approaches to monitoring of the vehicle and the operator (e.g., scheduling, theft prevention, safe operation) are largely centered around providing information back to support staff, supervisors, and customers. In most instances, the driver is treated as a passive source of information rather than considered as an active component of the system who might also benefit from access to information. In actuality, however, this information has the potential to help operators better manage health conditions, improve performance, and adjust to fluctuating operating demands. A critical component of successful implementation will require appropriate motivation of the operator to engage actively in health-promoting and safe operating practices. In other words, the operator needs to feel both that he or she is an integral player in this process and that there will be personal benefit from the utilization of the technology and program. Implementation of these concepts will need to integrate

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information from the driver, vehicle, and environment to form a more comprehensive measure of operating conditions and foundation for the implementation of personalized driver feedback. The use of ambient technology as a component of this application was illustrated. Also presented were early findings from a behavior change program pilot conducted with a major rail company. The pilot is testing the impact of a social–emotional approach focusing on the benefits of mindfulness, self-awareness, and rewiring of thoughts to decrease weight and increase the overall well-being of railroad employees. Ultimate outcomes include the correlation between improved well-being and the associated impact on safety within the industry. Issues of health assessment, outcomes, personal information privacy, and incentives were considered.

PLENARY SESSION

Medical Cost Savings and Impact of Behavioral Adherence on Clinical Improvement and Functional Status in Disease Management Programs

Calvin C. Wilhide, *Nationwide Better Health*

The impact of a telephonic-based disease management (DM) program across multiple conditions was evaluated by using a claims-based, pre-post historical control return-on-investment (ROI) methodology. Population size was approximately 15,000 covered lives. Members were identified through medical and pharmacy claims data and health risk assessment for potential enrollment into a DM program for any of the following conditions: diabetes, coronary artery disease, congestive heart failure, asthma, low back pain, chronic obstructive pulmonary disease, depression, hypertension, and hyperlipidemia. Members were asked to participate in the DM program via telephonic outreach and participation was voluntary. Participation in the DM program was 16.6% of those identified and completion of the program was 71%. ROI analysis was performed across the chronic population identified with any of the previously listed conditions. The results demonstrated a 4.95-to-1 ROI. To further evaluate the impact of the DM program, the ROI analysis was performed on the chronic population split into participants who enrolled in a DM program and nonparticipants. This evaluation resulted in a 3.53-to-1 ROI for program participants compared with a 0.88-to-1 ROI for nonparticipants. In addition, in-patient admissions for those members identified with a chronic illness were reduced by 36.9% compared with the base period while during the same period nonchronic in-patient admissions increased by 20.9%.

To further evaluate the impact of a telephonic DM program across the collection of clients, a prospective, observational study of 1,289 members completing an evidence-based diabetes management program was evaluated for the clinical effectiveness and cost impact. The program consisted of direct contacts from nurse educators who worked with the members to complete modules in a specific order based on the individual's readiness to change and specific standards of diabetes care behaviors lacking adherence. A total of 668 members were at glycated hemoglobin (HbA1c) target values ($HbA1c < 7\%$) at baseline. This total improved to 899 members at follow-up who either reached the target level or improved their values by one percentage point. At baseline 516 members recorded normal blood pressure. At follow-up 755 members either met the target level of less than 130/80 mmHg or reduced their blood pressure by at least 10/5 mmHg. Claims data indicated that 89% ($n = 233$) of those who had a hospitalization during the prior year did not have a hospitalization during the program year compared with 3% ($n = 32$) of those who did

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not have a hospitalization during the previous year and needed a hospital visit during the program year. There were statistically significant improvements in other health behaviors and quality-of-life measures. Cost avoidance was estimated at \$7,402,578 for the 1,289 members who completed the program and reported their results. This figure includes those who were in compliance before the start of the intervention. The study supported the results from large multicentered trials on diabetes management when translated to an intervention program in a standard business environment.

PLENARY SESSION

Measuring the Return on Investment of Wellness Initiatives

J. Michael Vittoria, *Sperian Protection USA, Inc.*

The presentation was delivered in a case study format to demonstrate how employers of all sizes can leverage their health plan design to achieve high levels of employee participation in wellness and prevention initiatives in a way that will produce significant return on investment in terms of a reduction in health claims cost and improvements in productivity. Although the case study was based on the workforce in a manufacturing and distribution center, the process described and the results achieved can be replicated by industries of all types, including the truck and bus industries.

Sperian Protection is a leading global manufacturer of personal protective equipment such as safety eyewear, hearing protection, protective gloves, respirators, and fall protection. With approximately 1,270 employees at plants in eight states, it has achieved 96% active employee participation in its wellness and prevention programs while spending about \$100 per employee per year on these programs. As a result, its health claims costs are about \$650 per employee lower than national benchmark averages, and they have seen an estimated reduction of \$1,300 per employee in productivity lost due to health problems over the past 4 years. These results were achieved despite the fact that the average Sperian employee is 46 years old, 3 years older than the average benchmark employee.

Sperian has achieved these results by modifying its health plan design in a way that combines aspects of consumer-driven health plan design, value-based benefits design, and wellness and prevention programs that require employees to become active partners in maintaining their health. The goal of the program is to avoid the natural progression of disease as people age by addressing and reducing their health risk factors. An analysis of a control group of 238 employees over 4 years showed a 27% reduction in the number of employees classified as high risk and a 64% improvement in the number of employees classified as low risk among those who participated during the entire study period.

Included in the presentation was a review of one of Sperian's most popular weight loss, exercise, and walking programs, which is designed to engage employees as team members and give them an opportunity to challenge and compete against other employee teams. The program has generated an average health claims reduction return on investment of 4.2 during the past 2 years, even without factoring in the positive impact it has had on employee morale and retention and the significant cost saving associated with reduced absenteeism.

PLENARY SESSION

Adoption of and Results from an Incentive-Based Wellness Strategy

Cathy Murphy, *Blue Shield of California*

Blue Shield of California is a not-for-profit health insurance company with annual earnings over \$9 billion and serving more than 3 million Californians. Our mission is to ensure that all Californians have access to quality health care at an affordable price. Wellness is a key strategy and part of our mission. We believe that a healthy California starts with us. We need to run a healthy business, support healthy communities, and support a healthy workforce who can be at their most productive level. We therefore believe that the workplace is a perfect place to start a “Wellvolution” (well + evolution = Wellvolution). However, there are additional opportunities beyond reducing the cost of health care. These include assisting employees with work–life balance, deepening employee engagement, and becoming socially responsible by addressing a global issue of declining health as a result of modifiable lifestyle factors and increased health risk.

Before launching the Wellvolution, we were like every other company. Our health premiums were rising and our employees’ baseline health status mirrored the national population with obesity, hypertension, elevated blood sugar levels, and undesirable cholesterol levels. At that point, we embraced a Wellvolution using a model that we expect to have materially better results than those from the decades of failed wellness efforts. Our approach is of an interdisciplinary expertise using organizational behavior expertise and drawing on behavioral, economic, and adult learning theories; clinical health expertise; and benefit design expertise. With this approach, we hope to achieve the next-generation wellness program. Our goals are to optimize physical and emotional well-being, walk the talk as a health care company, support employee engagement and reputation, and align with our mission of affordable health care.

We treat wellness as personal. Everyone is at a different level of readiness. We will journey together by meeting you where you are, giving you the tools you need, and going there with you. We use a level of engagement approach with states of awareness, understanding, acceptance, and commitment. Our program focuses on four areas that if managed will reduce the prevalence of major preventable diseases such as coronary heart disease, stroke, diabetes, and cancer. Those areas include healthy eating, emotional well-being, getting moving, and being tobacco free. Our launch point engaged absolutely every people manager in the company and put them through a wellness “immersion” over the course of 2 days, weaving the social, business, and company reasons that wellness was strategic. This immersion was immediately followed by the Wellvolution launch to employees. In just 3 years, our successes included leading the industry in high participation, achieving health goals, and reduction in modifiable risk factors including hypertension, sedentary activity, and tobacco use.

PLENARY SESSION

Commercial Motor Vehicle Driver and Family View of Health and Wellness

Panel Discussion

Rebecca M. Brewster, *American Transportation Research Institute*; and Charles Norman Littler, *American Bus Association*, presiding

Panel members: Ralph Garcia, ABF Freight Systems; Frank Silo, Covenant Transport; Michael McDonal and Norm Littler on behalf of bus and motor coach operators; and Karen Heaton, University of Alabama, Birmingham, on behalf of spouses and families.

The panel of commercial motor vehicle (CMV) drivers and family members described and discussed topics pertaining to a variety of more personal health and wellness issues for drivers. Among the many topics discussed were these:

- Drivers often are under severe scheduling time constraints.
- Recognition of becoming obese prompts drivers to change their lifestyles in attempt to regain their health.
- Sometimes clever strategies are needed to ensure healthy eating on the road (e.g., obtain a small refrigerator, cooking grill, rice cooker, and steamer for one's truck and learn to prepare one's own healthy meals);
- It is important to locate a clean place to prepare meals and to clean up the dishes.
- Healthy grocery shopping on the road is not always easy but is doable.
- Parking one's vehicle a mile from restaurants necessitates a 2-mi walk.
- Motor coach drivers bring 50 passengers to an all-you-can-eat restaurant, and the driver's meal is free, and therefore tempting.
- Loading and unloading one's own truck expends significant amounts of physical energy.
- Attending to healthy back training and dealing with back pain are crucial.
- Twenty-four-hour access to gyms is important for physical exercise and fitness programs.
- Employer-sponsored competitions like "biggest loser" encourage weight management.
- Wellness is a family issue and it begins at home.
- Drivers must have a supportive home and family life.
- Juggling family time with work time is difficult for drivers and families.
- Taking care of the house while the driver-spouse is away is an issue.
- Family problems and house crises seem to occur when the driver is farthest away from home.

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- Planning family activities upon return from trips is very important as well as not forgetting or missing birthdays and anniversaries and special children's events.
- Families need to recognize that drivers are trying to earn a living for the family and are not purposely avoiding them at home.
- High divorce rates seem to accompany the lives of CMV drivers.
- Bus and motor coach drivers often enter the workforce as a second career and therefore are considerably older (>55 years), and they have an older person's ailments.
- New older drivers bring with them a lifetime of bad health habits.
- Access to health care providers is important to all drivers, particularly so for over-the-road drivers, who find it difficult to make and keep medical appointments.
- Programs are encouraged to send health care providers (e.g., nurses, physician assistantss) to where the drivers are most often found.
- Carriers need to partner with organizations to educate health care providers about the requirements of the jobs of CMV drivers.
- More communication between health care providers and drivers and employers is needed regarding the importance of use-compliance and of the performance effects implicit in taking prescription medications.
- Company newsletters and audiotapes are effective ways to convey important information and learning materials to over-the-road drivers.
- Bus drivers cannot always pull over to rest if they are tired due to tight schedules.
- States closing many rest stops to CMV drivers are adding to driver fatigue concerns.
- Drivers need more flexibility in hours-of-service (HOS) rules, especially hazardous materials drivers, to locate a safe place to rest.
- Sleeper berth policies (re: HOS) should be more flexible for CMV drivers.

PLENARY SESSION

NIOSH Perspective on Commercial Driver Health and Wellness

Keynote Address

Christine M. Branche, *National Institute for Occupational Safety and Health*

The National Institute for Occupational Safety and Health (NIOSH) has a unique interest in the health and well-being of U.S. workers, given that its mission is to generate new knowledge in the field of occupational safety and health and to transfer that knowledge into practice for the betterment of workers. Historically, NIOSH focused its efforts almost exclusively on prevention of exposure to toxic substances and hazardous conditions found at work. This approach has had substantial success in contributing to reductions in occupational disease and injury. As the nature of work in the United States changes, however, the limitations of this narrow focus have become more apparent. We understand more clearly that the overall health of workers is influenced by factors both inside and outside the workplace: stress at work and home, physical and chemical exposures, energy imbalance from diet and limited exercise, smoking, medications, hypertension, and alcohol use, to name a few. The presenters will address NIOSH's efforts to transfer research findings to practical application including in the area of sustaining and improving worker health through better work-based programs, policies, and practices (WorkLife). In addition, value assessments and return-on-investment analyses have demonstrated recently the utility of worker safety and health efforts. Examples of these will be included in the presentations.

OBESITY AND COMMERCIAL DRIVERS: RESEARCH PERSPECTIVE

Obesity in the Commercial Trucking Population

Lawrence Cheskin, *Johns Hopkins University*

Obesity has rapidly become the leading preventable cause of morbidity and mortality in the United States. Two-thirds of U.S. adults are now overweight or obese, and obesity itself accounts for nearly 17% of medical costs. This condition is no more prevalent than among the nation's commercial truckers, particularly among African-Americans, who make up 12% of the U.S. population but account for 23% of the extremely obese.

Prevention and treatment of obesity and its associated medical complications, such as Type 2 diabetes, require lifestyle changes, especially in diet and physical activity. Unfortunately, education of at-risk individuals is often unsuccessful, possibly because the risk is abstract to those who are as yet unaffected. Traditional intensive lifestyle interventions also suffer from high costs and intrusiveness. Because of the growing epidemic of obesity and Type 2 diabetes in the United States, it is necessary to investigate new ways to prevent and treat these conditions. This presentation discussed the causes of and treatments for obesity and suggested applications of particular relevance to commercial drivers. Environmental alterations hold particular promise to assist commercial truckers in making lasting changes that will prevent and treat obesity.

OBESITY AND COMMERCIAL DRIVERS: RESEARCH PERSPECTIVE

Challenges and Opportunities in Addressing Diet, Obesity, and Chronic Disease in Commercial Drivers

Maureen Murtaugh, Anita Kinney, Matthew Thiese, Eric Wood, and Kurt T. Hegmann, *University of Utah*

Commercial truck drivers are an underserved, understudied sector of the workforce. The diverse attributes and work environments of truck drivers make them a challenging and unique population requiring different information from other populations (e.g., truck drivers need information about how to eat healthy and be physically active in different locations throughout the week). Furthermore, drivers also require different modes of intervention and follow-up than do traditional employees of fixed-location employment sectors. Although this sector represents a relatively small share of the workforce, they are a high-impact group because of (a) their poor health and low utilization of the traditional health care system, (b) the considerable mortality and morbidity impacts of truck accidents on the community, and (c) the greater direct medical cost of overweight and obesity among truck drivers.

The exact prevalence of obesity and other risk factors for chronic disease among truck drivers is poorly documented. Preliminary data from an ongoing surveillance study of commercial truck drivers by the National Institute for Occupational Safety and Health, Preventing Work Injuries and Chronic Illnesses in Truckers, provides an estimate from 650 drivers. The prevalence of obesity (body mass index >30.0) was over 50% and the prevalence of overweight and obesity together was greater than 75%. Nearly 75% of these drivers had a waist circumference >40 in. and the average neck circumference was 16.5 in. Almost 50% had elevated triglycerides (>200 mg/dL) and slightly more than 50% had an elevated LDL cholesterol (>100 mg/dL). Fat intake estimated with the National Cancer Institute fat screener indicates an average fat intake of approximately 34%. Walking was the most commonly reported form of exercise. More than half (59%) reported engaging in some kind of exercise on a regular basis. The most commonly reported activities were household activities such as maintenance, housework, and gardening as opposed to leisure time activities such as basketball (4.3%). Thus, a high proportion of the sample is at increased risk for chronic diseases such as cancer, cardiovascular disease, and sleep apnea.

The work environment of commercial drivers with respect to healthy lifestyle is rife with challenges and opportunities. A recent needs assessment supports the idea that most truck drivers are interested in living a healthy lifestyle but they identified many barriers to such a lifestyle. The barriers include operational limitations from space to park a large truck to time and economic pressures. Challenges differ slightly for individual and team drivers as well as for independent and company drivers. Communication ability is limited in remote areas via

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cell phone or Internet service. Truck drivers communicated a range of abilities to overcome these challenges with solutions such as power refrigerators, cooking equipment in the cab, storage of exercise equipment such as a bicycle, and commitment to regular exercise such as jogging or walking. An element of fatalism was present in attitudes about availability of healthy food at truck stops and feasibility of having workout facilities at locations convenient for commercial drivers.

Many opportunities exist. Knowledge deficits exist. For example, drivers did not seem to know or understand how much food (calories) they needed and how to obtain that amount nor what a healthy weight, waist circumference, and neck circumference are. Some obese drivers did not recognize that they were obese. Simple tools to navigate the commercial driver's environment are needed so that drivers can choose a healthy diet and obtain routine physical activity to maintain energy balance.

OBESITY AND COMMERCIAL DRIVERS: RESEARCH PERSPECTIVE

Truckers and Occupational Health Disparities

Health Promotion for an Obesogenic Trucking Sector

Yorghos Apostolopoulos, Sevil Sonmez, Mona Shattell, Robert Strack, Lauren Haldeman, and Victoria Jones, *University of North Carolina, Greensboro*

Trucking has been linked to a multitude of health conditions, exemplified by high morbidity and mortality rates. The trucking milieu places a plethora of strains on underserved truckers and creates barriers for healthier living, which in turn create risks for excess weight gain and obesity-associated morbidities. Despite growing recognition of the importance of environmental determinants in shaping health behaviors, the role of the transportation environment (including government regulations, trucking operations, and corporate policies affecting trucking settings) in elevating truckers' risks for obesity-associated morbidities remains largely unknown.

OBJECTIVES

Grounded in ecosocial theoretical frameworks, this study examined how the environmental attributes of trucking work settings influence truckers' food and eating behaviors and physical and recreational activities and brought to the fore a worksite health-promotion paradigm grounded in an approach for multistakeholders and levels that incorporates occupational hazards and health with health promotion strategies.

METHODS

The HEATWAI audit instrument was used to collect environmental-level data from 25 trucking work settings in south-central North Carolina around Interstate highways I85 and I40. HEATWAI is a 250-item instrument that measures the presence or absence, number, and condition of corporate, built, and social environments of trucking work settings that can influence the dietary and physical activity patterns of truckers (interrater reliability $k = 0.87$). Data analysis included descriptive statistics and interrater correlation analysis so that the psychometric attributes of the environmental health promotion measure HEATWAI were established.

RESULTS

Because of the large number of items, summary scales were established. When the total score of a scale represents 90% to 100% of the maximum score, the trucking work setting is fully supportive of healthy living; for 75% to 89.9%, mostly supportive; for 50% to 74.9%,

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partially supportive; for 35% to 49.9%, barely supportive; and for less than 35%, not at all supportive. Within this framework, abbreviated findings are presented across HEATWAI components:

1. **Healthful eating environment:** Most restaurants, vending machines, and minimarts failed to meet the minimum standards for healthful choices because of their high calorie and fat content. Moreover, lunch-break rooms and drivers' lounges did not provide the resources necessary for healthful eating. The summary scale reflected an 11.9% support for healthful items and resources.

2. **Active living environment:** None of the 25 settings had fitness facilities or even rooms with exercise equipment, most had lockers and showers, and a very few had areas designated for walking, pedestrian or running trails, playgrounds, or recreational facilities. The summary scale reflected a 20.6% support rating for attributes promotive of physical and recreational activities.

3. **Information environment promoting healthy living:** Bulletin boards, brochures, and fliers with information messages on exercise classes, nutrition, and weight management were recorded, and the summary scale reflected a 19.2% support rating for active living and 25.5% for healthful eating.

4. **Social environment promoting healthy living:** Worksite social supports such as onsite nutrition education, wellness screenings, or other organized clubs sponsored by worksites and employers were limited. The active-living support scale was only 8.2%, and the healthful-eating support was only 19.8%.

5. **Environment of surrounding communities promoting healthy living:** Overall few physical-activity resources and healthful food venues or stores were available near the trucking settings. The community support for resources and amenities for physical and recreational activities was only 14.2%, and support for healthful dietary choices was only 12.4%. Finally, the overall rating was only 17%, a dreadfully low performance, indicating that trucking settings are highly obesogenic environments.

CONCLUSIONS

Findings corroborate evidence supporting the conclusion that trucking work settings remain healthy-living deserts and contribute much to truckers' high obesity-associated comorbidities. From the physical to the social and information environments, only meager opportunities for healthful food and eating practices and recreational opportunities exist. This study places the highly underserved truckers firmly within the discourse of worksite health promotion and occupational health disparities. It calls for comprehensive multistakeholder, multilevel wellness strategies that encompass the plethora of intertwined risk factors linked with individual, organizational, and environmental domains of truckers and the transportation environment.

INDEPENDENT OPERATORS: HEALTH AND WELLNESS ISSUES

Barriers to Successful Healthy Living and Thinking on the Road

Gary Hull, *Truckers for a Cause—A.W.A.K.E.*

The commercial driver profession consists of people with all levels of knowledge and understanding. As these drivers work each day, sometimes in conditions very adverse to a healthy lifestyle, they feel used, abused, and beat up. It takes an open dialogue between a health care provider (paid by the company) and the driver to have a successful outcome. Many barriers need to be dealt with before even seeing or talking to an employee. Some of those barriers and the physiological impact of policy and regulations are as follows:

1. Job security or the lack thereof: Will employees give truthful answers if they feel that the answers may jeopardize their income? They will not. This problem has manifested itself in the “free” confidential health screenings, when drivers have been take off the road for weeks with no support from the employer.
2. Medical appointments: It should not take months to see a doctor because of one’s work schedule. Why would it take months? Because drivers cannot tell their employers that they need a doctor’s appointment for fear of being taken off the road.
3. Work cycle issues that do not match up to what seems to be normal: There are times when the average person would think the safety performance of a driver would be at its peak, and that is not the case at all.
4. Some very practical problems under certain conditions may create adverse safety outcomes: The easiest way to determine this situation is to ask: “Have I made the employee angry at the system with this treatment?” This problem is caused by poor education and follow-up after treatment.
5. Lack of proper emotional rest: This is rest that cannot be obtained in the parking lot of a truck stop.
6. Driver’s family at home: The family is vitally important. Does the driver’s family situation affect his safety performance?
7. The company’s office staff: Do they affect the thinking and safety performance of drivers?
8. The attitude and demeanor of law enforcement officers: Do they affect the safety performance of drivers and their attitudes about everything going on around them?

These are just a few of the barriers that commercial drivers face every day, which affect their willingness to enter into any program associated with a trucking company. They also seriously affect safety performance. Because the drivers feel like pawns, the rest of the establishment will need to take the initiative in removing these barriers. Together these barriers can be removed.

INDEPENDENT OPERATORS: HEALTH AND WELLNESS ISSUES

Peer-to-Peer Small-Group Counseling as an Effective Technique for Long-Term Health and Wellness Improvements

Case Study of “Truckers for a Cause”

Brian Chute, *Consultant*

The audience that any health and wellness (H&W) program will have to reach may be identified as drivers like me.

WHAT IS A WORKING TRUCK DRIVER?

My “home” is not in the same place every night. Tonight my house (truck) may be in Baltimore, Maryland, and tomorrow in Columbus, Ohio—my house moves almost daily.

It might be difficult to get me to attend meetings (e.g., for H&W topics) on a regular schedule back “home” in Missouri.

WHAT ARE THE MAJOR PROBLEMS THAT A WORKING DRIVER FACES?

Because I deliver freight at appointed times here, there, and everywhere, I do not have an actual schedule and therefore I do not have much time to waste on things not directly related to accomplishing my job.

While my health is very important, where do I find time to get the education and information I need to manage that? It is a challenge to get us ever-mobile truckers the needed H&W information in a form we can use. Seminars and webinars are not amenable to our needs. Truckers live in an audio world: we listen to the radio, talk on the phone, often converse with other drivers.

“TRUCKERS FOR A CAUSE”

“Truckers for a Cause” is a support group for transportation workers with particular interests in achieving personal weight loss and dealing with sleep apnea, striving to help truckers and their families to live healthier lives. “Truckers for a Cause” eventually spun off into a chapter of A.W.A.K.E. (Alert, Well And Keeping Energetic), one of a nationwide network of support groups organized by the American Sleep Apnea Association.

In one initiative, “Truckers for a Cause” and A.W.A.K.E convene Saturday “town hall conference calls” via cell phone to discuss various related topics.

INDEPENDENT OPERATORS: HEALTH AND WELLNESS ISSUES

LESSONS LEARNED

Drivers are about the only workforce that has federal regulations to make them stop working!

Drivers have a basic set of skills to support their livelihood. If they lose this ability, there is no backup plan. Thus, drivers are a paranoid group, reluctant to become involved in anything that might potentially endanger their commercial driver's license or their job (e.g., fill-in-the-blank health screenings).

Commercial drivers are special people with special needs. How do we reach them? What works and what doesn't? You are not one of us unless you have "been there, done that" in a rig on the road.

Just planning and preparing a special meal at one's truck and cleaning up afterwards can be a big deal. Drivers are not rich and most drivers think eating healthy is expensive.

SOME CONCLUSIONS

Dealing with mavericks: Successful H&W programs have to both "talk the talk" and "walk the walk." Are you serious? Drivers must be convinced that you are truly interested in helping them, not just out to make a buck or will put their license in jeopardy.

H&W programs should not lead to punishment for drivers who are proactive about their health (e.g., proactively managing pre-diabetes can inadvertently lead to adverse health-related job hiring, retention, and promotion consequences).

H&W programs must have practical value with reachable goals, contain basic "nuts and bolts," and be doable in the driving world. Show drivers that your ideas can save him money, make him more productive, and feel better at the same time.

WRAP-UP

Peer-to-peer counseling helps drivers overcome the myriad of special challenges inherent in the unique lifestyle of a truck driver. That is a shared experience we attempt to convey through "Truckers for a Cause" as well as through the A.W.A.K.E. chapter.

INDEPENDENT OPERATORS: HEALTH AND WELLNESS ISSUES

Trucking Solutions

Topics on Behalf of Independent Owner–Operators

Rick Ash, *Trucking Solutions Group*

1. Finding time to exercise :
 - a. Long hours and days,
 - b. Changes in driving hours (daytime driving then switching to night driving),
 - c. Delays at loading/delivering destinations, and
 - d. Being tired at the start and end of a day;
2. Eating properly:
 - a. Taking the time to eat on a healthy schedule,
 - b. Snacking in a healthy way throughout the day, and
 - c. Overcoming the unhealthy food choices offered at truck stops;
3. Proper sleep:
 - a. Adjusting to changes in driving hours, and
 - b. Finding a place to park;
4. Owner–operator health insurance and costs:
 - a. High cost of insurance (high deductibles to keep rates down),
 - b. Exclusion from insurance due to pre-existing health conditions,
 - c. Privacy concerns with your carrier regarding those health conditions, and
 - d. New health care reform bill may cause dramatic increase in those rates;
5. Finding health care and treatment on the road:
 - a. Finding a hospital or dentist or clinic (parking doesn't usually accommodate trucks), and
 - b. Hours-of-service (HOS) changes: HOS used to allow for splitting sleeper berth time (taking naps). New HOS do not allow these changes.

Probably the biggest challenge of all would be getting carriers and the drivers themselves to care more about their health and that of their drivers. Health and wellness programs are available. Getting the information to companies and drivers and getting them to utilize it is vital. According to the Centers for Disease Control, the life expectancy of a truck driver living an unhealthy lifestyle is 61 years.

INDEPENDENT OPERATORS: HEALTH AND WELLNESS ISSUES

Mortality Among Members of a Truck Driver Trade Association

Jan Birdsey, Toni Alterman, Jia Li, Martin R. Petersen, and John Sestito, *National Institute for Occupational Safety and Health*

Previous research suggests that truck drivers are at increased risk for numerous preventable diseases, including lung cancer, heart disease, and hypertension. Truck drivers also face extraordinary risk for on-the-job mortality. In 2008, the fatality rate for driver-sales workers and truck drivers was 22.8 per 100,000 workers compared with a rate of 3.6 per 100,000 for all workers, and drivers of heavy and tractor-trailer trucks had more fatalities (715 deaths) than any other single occupation (Bureau of Labor Statistics data).

Truck drivers who own their own vehicles may face different risks than employee drivers do, yet few studies have targeted owner-operators as a study population. This study examined the overall and cause-specific mortality ratios for a cohort in which owner-operator truck drivers make up 69% of the study population.

METHODS

The study population consisted of 156,241 members of a trade association primarily serving owner-operator truck drivers. The National Institute for Occupational Safety and Health Life Table Analysis System was used to calculate standardized mortality ratios (SMRs) for 26 major disease classifications and 92 specific causes of death. In addition, SMRs were calculated for all causes of death combined and all cancers combined. The data were stratified by age (5-year age groups), racial group (white and nonwhite), sex, and calendar period (5-year intervals). The general U.S. population served as the reference population.

RESULTS

The most common causes of death were ischemic heart disease ($n = 1,084$, 25% of deaths), lung cancer ($n = 557$, 13% of deaths), and transportation accidents ($n = 319$, 7% of deaths). Only mortality due to transportation accidents was significantly elevated compared with the general U.S. population (SMR = 1.52, 95% CI = 1.36 to 1.70).

CONCLUSIONS

Transportation accidents pose a particular hazard for members of the trade association. The absence of excess disease mortality deserves careful interpretation and may be due to both a strong healthy worker effect and a short follow-up period. Limitations in the data do not allow for conclusions based on one study. Future longitudinal research should be conducted to examine changes in excess mortality due to heart disease and lung cancer among truck drivers, along with measurements of environmental and occupational exposure.

OBESITY AND COMMERCIAL DRIVERS: COMPANY AND PILOT PROGRAM PERSPECTIVES

Relationships Between Personal Factors and Obesity in Cross-Sectional Study of Drivers

Matthew Thiese, Kurt T. Hegmann, Maureen Murtaugh, and Eric Wood, *University of Utah*; and Arun Garg, *University of Wisconsin, Milwaukee*

Commercial truck drivers are an understudied population that represents a significant portion of the workforce. Because of the nature of the job, drivers often have a constellation of health-related issues including obesity, cardiovascular disease, diabetes mellitus, and hypercholesterolemia. Obesity is a factor that has been associated with common health issues among professional drivers. This study aimed to assess relationships between personal factors, including age, gender, education level, diabetes mellitus, hypercholesterolemia, years driving a truck, and physical activity and psychosocial factors as they relate to obesity [body mass index (BMI) = 30.0 kg/m²]. Obesity and related disorders are understudied in this population and insights into relationships between personal factors and obesity may provide opportunities for targeted research to reduce the morbidity and mortality associated with this condition.

METHODS

Preliminary analyses were reported from an ongoing cross-sectional study of personal factors and their relation to occupational injuries and diseases in commercial truck drivers. The current data set includes 299 drivers; however, additional drivers are being enrolled weekly and it is expected that the target enrollment of 1,000 drivers will be achieved within 3 months. All participants had their height and weight measured. Blood was drawn and cholesterol and hemoglobin A1C were measured. All participants underwent a computer-administered questionnaire about past medical history, physical activity, diet, and psychosocial factors. Odds ratio (OR) and 95% confidence interval (CI) were calculated using logistic regression. Univariate and multivariate models were created to assess potential relationships.

RESULTS

The current data include 299 drivers, 163 (54.5%) with a BMI = 30.0 kg/m². Univariate analyses found statistically significant relationships between female gender (OR = 2.25, 95% CI 1.01, 5.20), diabetes mellitus (OR = 2.55, 95% CI 1.16, 5.62), hypercholesterolemia (OR = 2.28, 95% CI 1.28, 4.05), and years as a professional driver (OR = 1.02 per year, 95% CI 1.01, 1.04). The highest level of education was trending toward statistical significance ($p = 0.096$). These relationships remained after adjustment for other factors, including age.

CONCLUSIONS

Many statistically significantly related factors are associated with obesity in these data. Because of the nature of obesity-related disorders among commercial drivers, these data indicate that obesity occurs in a constellation of factors and that specific groups, including women or those with lower education levels, may be more likely to be obese. Therefore, targeted screening and interventions may be more cost-effective when aimed at these drivers. Additional analyses are planned.

OBESITY AND COMMERCIAL DRIVERS: COMPANY AND PILOT PROGRAM PERSPECTIVES

Driver Weight-Loss Programs That Are Working

Robert Perry, *Roadside Medical Clinic + Lab*

Driver wellness programs are in place today with drivers across the country and are providing real-time data and proof of their effectiveness through lower driver weight, reduced body mass index and cholesterol levels, reduced health care costs, and improved driver health status.

The following topics were discussed:

1. What are roadside medical driver wellness programs? What do they involve? How they are being implemented? Why are they working?
2. Data collected between January and October 2010: real-time, recent data for the industry on driver health; data not just on the wellness program but also on the current health status of drivers not in these programs (i.e., control groups).
3. Testimonials from participating drivers and trucking companies.
4. Best practices for implementing driver wellness programs in your company: here's what we learned and here's what we recommend companies do to get their drivers on a better road to health.

CASE STUDIES ON HEALTH AND WELLNESS IN THE COMMERCIAL DRIVERS' WORLD

Minimizing Employee Benefit Cost

Conceptual Statement

Chelle Pfiffner, *Fusion Sleep*

The objective was to explore the association between wellness program participation and the direct medical costs within a cohort of over-the-road drivers electing health insurance coverage through an employer-sponsored health plan. From 1998 to 2005, the company's medical cost had increased an average of 15% per year. To offset this cost and maintain the current profit level, the company would need to increase its sales by about 10% over the next 5 years.

METHOD

In 2007, a comprehensive wellness program was launched for 600 company drivers and 125 in-house associates employed at a flatbed trucking company. After 24 months, a quasi-experimental study was conducted by a third party. Specifically, medical and pharmacy claims were compared between an intervention group including drivers who participated in the program and a control group (age and gender matched) before and after the introduction of the wellness program.

RESULTS

For the study group, the medical and pharmacy cost went down 5% and for the control group it increased 21%. In addition, health improvement was noted at relatively low level of program intensity.

Without the wellness program, drivers gained an average of 8.6 lb per year. With the program, the rate of weight gain was slowed by half and reversed at a medium to high level of program intensity.

CONCLUSIONS

Upon implementation of the wellness program, the company's health care trend was less than an 1% increase compared with its historical trend of 15% annually. The wellness program demonstrated a return on investment of 1.8 within the first 24 months because of avoided employee benefit cost and savings.

CASE STUDIES ON HEALTH AND WELLNESS IN THE
COMMERCIAL DRIVERS' WORLD

Healthcare Reform's Effect on Corporate America

What Every Employer Should Know

Holly Shaffer, *Words of Wellness, LLC*

An overview was provided of how health care reform will affect employers as it relates to corporate wellness. Participants learned best practice strategies that would help them utilize the wellness and preventive care incentives offered in the health care reform bill. This presentation also included practical recommendations for improving the health and well-being of their workforce through workplace wellness.

CASE STUDIES ON HEALTH AND WELLNESS IN THE COMMERCIAL DRIVERS' WORLD

Multiple Health and Wellness Initiatives at J.B. Hunt

Greer Woodruff, *J.B. Hunt Transport, Inc.*

J.B. Hunt Transport, Inc. has the health and safety of the driving force as a top priority, with many supporting initiatives in the health and wellness area. J.B. Hunt has a fully integrated electronic data entry and document storage system that provides an efficient method for monitoring the components of the U.S. Department of Transportation (DOT) medical examination. The web-based application from RoadReady, Inc. allows the medical clinic and the employer to efficiently manage the medical exam records. Through reporting and statistical analysis, the system can identify drivers who are in need of wellness intervention or education programs, allowing the driver the opportunity to correct and maintain the requirements for medical qualification under the federal regulations.

J.B. Hunt has also collaborated with RoadReady, Inc., to develop a comprehensive U.S. DOT physical exam combining the standard U.S. DOT physical components, plus a more-thorough functional musculoskeletal evaluation, cardiovascular testing, and job-specific testing related to the essential job functions in order to determine the driver's ability to perform job tasks. This procedure is expected to reduce turnover and reduce on-the-job injury, since the test is directly related to the tasks that will be performed.

J.B. Hunt has partnered with various vendors to provide multiple options for assisting employees in improving their health condition. Some of these options include help with smoking cessation, health coaching for weight management, diabetes or hypertension management, and behavioral changes to create a lifestyle that supports health and wellness. J.B. Hunt also recently completed enrolling drivers in a sleep apnea trial to test and treat drivers for this condition. Results are to be gathered on the effectiveness of the ambulatory testing, monitoring of their treatment and compliance with U.S. DOT regulation, and health and safety improvements after being treated for sleep apnea.

In addition, J.B. Hunt recognizes the negative consequences that illegal drug use can have on an individual's health and safety, relationships with friends and family, and quality of life. Illegal drug use among commercial motor vehicle drivers poses a significant public safety risk. According to the 2007 Large Truck Crash Causation Study, 3,000 fatal and injury crashes had illegal drug use as an associated factor to the crash. Yet from 1997 to 2005, the positive rate on U.S. DOT-required random urine tests remained relatively unchanged (between 1.5% and 2.0%). J.B. Hunt initiated company policy hair testing for employees in 2006 to deter illegal drug use among employees. J.B. Hunt will share results of U.S. DOT urine testing compared with company policy hair testing. The comparative results of these two specimen types support a change to the federal testing regulations for safety-sensitive transportation workers.

TRUCKING COMPANY HEALTH AND WELLNESS SUCCESS STORIES

Effective Wellness Program Designed to Improve Health, Wellness, and Safety of All Con-way Employees

Brad Springer, *Wellness Coaches USA*; and Robert Petrancosta, *Con-way Freight*

Con-way Freight and Wellness Coaches USA have collaborated on the planning and implementation of an intense, comprehensive, and highly effective workplace wellness program to improve the health, wellness, and safety of Con-way's employee population. The wellness program is now provided for more than 8,000 Con-way employees working in or from 83 separate terminals in 30 states throughout the country. More than 75% of employees eligible for the program are commercial truck drivers. The program itself has been implemented with Wellness Coaches USA's proprietary "coach-embedded" on-site delivery methodology in partnership with Con-way's extensive and dedicated environmental health and safety staff and industry-leading safety and injury prevention programming. Program outcomes and return on investment have been outstanding.

Though the program includes many safety and injury prevention components, one of its primary objectives is improving employee health and wellness. Since it is now generally recognized that healthier employees (especially those who exercise and keep their weight under control) are safer employees, improving employee health and wellness has become a fundamental injury prevention strategy. Lately there have been a number of interesting studies that confirm this relationship between health and safety. For example, in a recent study of a large employee population by Pollack et al. (2007) at the Johns Hopkins Bloomberg School of Public Health, approximately 85% of injured workers were classified as overweight or obese.

During this panel discussion participants had the opportunity to learn and ask questions regarding the following major discussion components:

- Sample studies of the association between lifestyle and health risk factors and the incidence of workplace injury;
- The fundamentals of workplace wellness success, including (a) very high levels of employee engagement in efforts to improve lifestyle behaviors and health risks, and (b) wellness coaching to help them succeed;
- The current status of the workplace wellness marketplace, including available wellness resources, those resources most commonly in use today, and their respective strengths and weaknesses;
- The Con-way "on-site coach-embedded" approach to workplace wellness for its employees, including wellness philosophy, concept (especially as related to alternative wellness approaches), organization and planning, logistics, implementation, ongoing operations, and best practices;

TRUCKING COMPANY HEALTH AND WELLNESS SUCCESS STORIES

- Relevant program statistics, including participation and engagement rates and improvements in health risk factors and lifestyle behaviors; and
- Con-way's impressive return on investment from its workplace wellness initiative (calculated by using Thompson Healthcare's proprietary Health and Productivity Management Return on Investment Tool).

REFERENCE

Pollack, K. M., G. S. Sorock, M. D. Slade, L. Cantley, K. Sircar, O. Taiwo, and M. R. Cullen. 2007. Association Between Body Mass Index and Acute Traumatic Workplace Injury in Hourly Manufacturing Employees. *American Journal of Epidemiology*, Vol. 166, pp. 204–211.

TRUCKING COMPANY HEALTH AND WELLNESS SUCCESS STORIES

Wellness*The Intersect of a Productive Worker*

Drew Bossen, *Atlas Ergonomics*; and Christine Schneider, *Schneider National, Inc.*

Wellness is a popular discussion point within organizations these days. Understanding the implications of a “well” workforce is vital in developing a productive workforce; ignoring the implications can be very costly to an organization. This presentation reviewed the intersection of the aging workforce, obesity, and the metabolic disease states (diabetes, cardiovascular disease, etc.) that affect a worker’s ability to perform his or her job, specifically in their roles as commercial truck drivers.

Today the nation is fast approaching a state where 70% of the population will be considered overweight or obese. As the undeniable relationship among obesity, the prevalence of related health issues, and the associated costs of chronic disease is considered, it is clear that the nation is facing a monumental challenge. Within the transportation industry, the illumination of this issue is even greater. The dynamics of sedentary work, fast food, disrupted sleep patterns, and the lack of an ongoing, sustainable support structure all contribute to the higher prevalence of obesity among the ranks of the workforce.

During the past 2 years Schneider National has been developing a platform from which to launch their wellness initiative across the organization. They have approached the construct of wellness in much the same fashion as with any new technology or forward-looking endeavor: measurement, assessment, and realignment. It is a systematic approach that measures the prevalence of the problem, aligns the relative risks, and provides support and education to employees, guiding them toward improvements in the key metrics of their personal health. It is deemed a critical health and safety program to reduce illness, injuries, and costs for the company into the future.

Understanding the implications and challenges of a geographically dispersed workforce and then developing active strategies to intervene are at the foundation of the Schneider wellness program. Core to the program is the belief that wellness is not a passive endeavor that can be solely spoon-fed via electronic communications. Rather, it is an active endeavor that requires consistent and ongoing coaching for sustained success. The coaching strategies and interventions are a function of the before-mentioned key metrics of an individual’s personal health.

Learning objectives for this presentation included an understanding of the following:

- The aging process and its effect on workers (vision, hearing, cognition, strength);
- The implications of the obesity epidemic and its relationship to the metabolic disease states (diabetes, cardiovascular disease, etc.);
- The data relating obesity, illness, workplace injuries, and worker’s compensation costs;
- The importance of intervening; and
- The measurement methodology to track ongoing success or failure.

HEALTH AND WELLNESS: CONTINUING CONCERNS

Commercial Truck Driver Mounting and Dismounting Behavior Related to Falls

Andrew Merryweather, *University of Utah*

There are an alarming number of fall-related injuries and fatalities in the commercial trucking industry. According to a study done by Jones and Switzer-McIntyre (2003), three specific types of falls—from the back of the truck or trailer, during cargo handling, and from the truck cab—made up 83% of total falls. Nearly one-fourth of all injuries of truck drivers resulting in days away from work occur from mounting and dismounting from a vehicle. Falls are the second most common cause of workplace fatalities and have been steadily increasing since 1992. Injuries sustained from falls from stationary vehicles have an average cost of \$15,000 per injury with 4.5% of workers still off work or on modified duty 1 year after the injury. The current research is part of a more comprehensive investigation of truck driver health and an investigation of ingress and egress biomechanics and behavior on conventional truck cabs.

METHODS

Descriptive statistics were presented from survey data collected from 654 commercial truck drivers and biomechanics data from a pilot study conducted in a laboratory ($n = 2$). Questions directed at identifying exposure differences between short-haul (SH) and long-haul (LH) drivers were summarized. Questions about health and behavior were correlated with self-reported data about near-miss falls and falls from mounting and dismounting activities. Self-reported factors believed to have contributed to a fall were also summarized. In the laboratory study, a simulated truck cab was constructed to provide a realistic model to collect three-dimensional kinematics and hand and foot forces. Slip probability was measured as the ratio of shear forces to normal force and balance condition was examined as a function of mounting and dismounting technique, where technique represented three-point contact mounting facing the cab, one-handed mounting facing the cab, dismounting the cab facing outward, and dismounting the cab with an object in one hand. A biomechanical model was generated using three-dimensional motion data and ground reaction forces from two force platforms.

RESULTS

SH drivers reported mounting and dismounting a truck 1.6 times more often each day compared with LH drivers, resulting in a significant increase in the number of reported falls while dismounting. Drivers reporting feeling physically exhausted “always” or “often” also reported a significantly higher number of falls compared with those reporting “never.” Drivers reporting experiencing low back pain while driving “always” reported a significant

RESEARCH ON THE HEALTH AND WELLNESS OF COMMERCIAL TRUCK AND BUS DRIVERS

increase in the reported number of falls. Environmental factors such as ice, snow, rain, and mud contributed to a significant proportion of falls. The required coefficient of friction on steps was significantly affected by mounting and dismounting technique. Driver behavior, including foot and hand placement and number of hands utilized, has a notable influence on frictional requirements for truck steps.

CONCLUSIONS

Significant differences were found between LH and SH drivers, especially for dismounting. It was hypothesized that SH drivers would have an increased number of fall events because of a larger number of opportunities for mounting and dismounting. This hypothesis was supported by the survey results. Controlling the effects of environmental factors including rain, snow, ice, and mud on steps would likely reduce slip potential leading to a smaller number of fall injuries in both LH and SH drivers. Results from the pilot study indicate that controlling the available coefficient of friction on the steps and increasing awareness about mounting and dismounting technique will reduce the likelihood of a slip-induced fall. Cab design changes and worker training may also help reduce the number of fall injuries to commercial truck drivers.

REFERENCE

Jones, D., and S. Switzer-McIntyre. 2003. Falls from Trucks: A Descriptive Study Based on a Workers Compensation Database. *Work*, Vol. 20, No. 3, pp. 179–184.

HEALTH AND WELLNESS: CONTINUING CONCERNS

Measurement of Noise Level, Whole-Body Vibration from Driver and Passenger Seats, and In-Cab Air Quality of Heavy-Duty Diesel Vehicles

Joshua Fu, James Calcagno, and Wayne Davis, *University of Tennessee, Knoxville*

Noise level, whole-body vibration from driver and passenger seats, and the air quality inside the cab of Class 8b heavy-duty diesel vehicles (HDDV) were evaluated while the vehicle was parked during a long-duration engine idling episode at a commercial truck stop rest area and while it was driven over a prescribed route, which included a mixture of Interstate and state highway driving over relatively flat and moderately steep terrain. Twenty-seven vehicles were tested. Model years were between 2006 and 2008; the sample included vehicles from four manufacturers. All HDDVs were conventional engine-ahead-of-cab design and had sleeping berths, generally used by drivers during long-distance freight hauling for their restorative rest periods, which are federally mandated by hours-of-service regulations. Data were collected to serve as a baseline from which future similar studies may determine if new truck designs have changed the existing state of these conditions for drivers. Data were also evaluated by using workplace occupational standards or other guidelines for personal or public safety and health management. The HDDV cab area is not considered an occupational workplace setting. Also, doubt exists as to whether the sleeping berth area and the workplace setting are in fact identical environments.

Maximum measured peak noise level was 138.8 dBC. Overall average L_{eq} noise levels were 61.2 and 76.8 dBA, respectively, for measurements with the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) sound level meter. Permissible exposure limit values from neither OSHA nor NIOSH recommendations were exceeded by any test truck. Two assessment methods were used to evaluate whole-body vibration: root mean square (RMS) and vibration dose value (VDV). For the driver seat cushion in the x -, y -, and z -axes, overall average RMS were 0.22, 0.34, and 0.29 m/s^2 , respectively; overall average VDV_s were 4.0, 5.4, and 5.8 $m/s^{1.75}$, respectively. For the passenger seat cushion in the x -, y -, and z -axes, overall average RMS were 0.20, 0.23, and 0.30 m/s^2 , respectively; overall average VDV_s were 3.5, 3.2, and 6.3 $m/s^{1.75}$, respectively. Differences between truck manufacturers with respect to vibration were somewhat more pronounced than the noise-level differences observed between the manufacturers. However, the vibrations from the driver and passenger seats were generally well below the European Union standard for an 8-h-driving-day exposure level. The comfort index of the seats, by and large, fell within the “a little uncomfortable” region, one step removed from the best possible index, which is the “not uncomfortable” region.

Carbon monoxide (CO), oxides of nitrogen (NO_x), and particulate matter less than 2.5 μm in aerodynamic diameter (PM_{2.5}) were measured to determine in-cab air quality. During

RESEARCH ON THE HEALTH AND WELLNESS OF COMMERCIAL TRUCK AND BUS DRIVERS

parked engine-idling tests, several heating and air conditioning system modes of operation with engine on and engine off were considered. When the engine was idling, overall average in-cab concentrations were approximately 522 ppb CO, 577 ppb NO_x, and 30 µg/m³ PM_{2.5}. When the engine was off, overall average in-cab concentrations were approximately 396 ppb CO, 120 ppb NO_x, and 10.5 µg/m³ PM_{2.5}. The results demonstrated that the LH trucks have a tendency to self-pollute the cab during extended periods of parked-idling conditions. Nonetheless, measured concentrations of CO and NO_x were well below occupational or industrial exposure limits. However, during several parked-idling scenarios, the PM_{2.5} concentrations were around the limits set by the U.S. Environmental Protection Agency for the National Ambient Air Quality Standards for the 24-h and annual means, which are outside air monitoring standards that were set to protect the general public health and were used only for comparison purposes because industrial or workplace PM_{2.5} limits have not been established by OSHA. During on-road tests, overall average in-cab concentrations were approximately 353 ppb CO, 82 ppb NO_x, and 9.9 µg/m³ PM_{2.5}. The in-cab overall average concentrations of CO, NO_x, and PM_{2.5} during parked engine-idling were approximately 1.5, 7.1, and 3.0 times greater, respectively, than the overall average concentrations during on-road driving. These results suggest that less of a chance exists for the exhaust of the truck to self-pollute the cab while the truck is driven than while it is parked and idling for extended periods of time.

HEALTH AND WELLNESS: CONTINUING CONCERNS

Musculoskeletal Issues in the Commercial Driver Industry

Benisse Lester, *Federal Motor Carrier Safety Administration*

The primary mission of the FMCSA is to reduce crashes, injuries, and fatalities involving large trucks and buses in the United States. Toward this purpose, medical certification is required at least every 2 years for commercial drivers in order to ensure that they meet physical qualification standards. Truck industry workers experience the third-highest fatality rate of all occupations in the United States. About two-thirds of fatally injured truck workers are involved in highway crashes.

Musculoskeletal conditions are common. They vary greatly in severity and type and may affect an individual's ability to safely operate a commercial motor vehicle, the driver's quality of life, or both.

Systematic review was performed to evaluate several key questions developed by FMCSA pertaining to musculoskeletal conditions for the purpose of identifying evidence-based impacts on driver safety. A comprehensive literature search was performed using seven databases. This presentation reviewed these questions and findings. In addition, an overview of commonly occurring orthopedic conditions that affect driver health and wellness were presented, including countermeasures to improve health and wellness.

CLOSING PLENARY SESSION

Organizational Influences of Truck-Driver Health

Reviewing the Evidence

Michael Quinlan, *University of New South Wales, Australia*

In order to effectively promote health and well-being in road transport it is important to identify the underlying sources of ill health as well as health-promoting work practices. Evidence on organizational influences on health outcomes for truck drivers was reviewed, including recent studies in Europe, North America, and Australia.

Specifically, international research on health outcomes was reviewed pertaining to three broad areas of work organization: working-hour arrangements, supply chain and scheduling pressures, and subcontracting and payment regimes. Although there has been extensive research into the working-hour arrangements of truck drivers, attention was focused on more recent research examining hour irregularity and control over working hours and the association between working hours and fatigue and sleep deficit, eating behavior, and obesity (Buxton et al. 2009; Jensen and Dahl 2009), and use of stimulant drugs. Similarly, although research on scheduling pressures can be traced back to the 1980s, it is only comparatively recently that researchers have addressed the role played by supply chain arrangements in affecting health outcomes (Mayhew and Quinlan 2006). Finally, mirroring research pointing to an association between low pay and incentive payment systems and poorer safety outcomes, more recent studies have linked mileage- and kilometer-based payment to increased fatigue and stimulant drug use (Williamson 2007). There is a need to place these findings in the context of other studies of health outcomes of road transport workers [such as the landmark San Francisco transit study undertaken by Fisher and colleagues [see the study by Cunradi et al. (2003)] and the more general occupational health and safety research literature (for example that pertaining to irregular working hours and incentive payment systems).

Taken as a whole, recent research suggests important interconnections between the aspects of work organization just mentioned (such as hours, fatigue, and payment systems) as well as an overlap between safety risks and health-damaging behavior. There is an urgent need for further research to investigate and test these connections and to enhance the knowledge of how aspects of work organization in road transport affect health outcomes. There is also a need to investigate how work organization interacts with important demographic changes such as the aging of the transport workforce. In conclusion, the implications of recent research for interventions by industry and government to improve health outcomes in road freight transport (and potential synergies with environmental and sustainable energy policies) were briefly considered.

CLOSING PLENARY SESSION

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CLOSING PLENARY SESSION

Road and Bus Athlete Systems

Mark Everest, *Occupational Athletics, Inc.*

Road athlete training addresses all the lifestyle factors that drivers experience every day when they take to the road. This training will have a lasting impression on drivers to make the necessary behavioral changes for them to become healthier, safer, and more productive drivers. Just as in the occupational athlete system, each employee receives an interactive health and safety system in which they become “road athletes.” This gamebook is patterned to meet the needs of professional truck drivers. The road athlete gamebook focuses on specific factors that relate to life on the road such as nutrition, conquering substance abuse, staying motivated, managing sleep and preventing fatigue, maximizing personal time, relaxation, and of course safety measures on the road. This training is perfect for driver safety meetings or industry seminars and conventions.

By using the bus athlete system, bus drivers and operators have the opportunity to become involved in improving their own health and safety. They are “bus athletes.” Their playing field is the road; they are the quarterback of their bus, and each work day is a new game with a new opportunity to achieve their goals. The bus athlete interactive health and safety system focuses not only on personal lifestyle factors but also on safety factors that include weather conditions, driving regulations, passenger safety, compliance, pre- and posttrip inspections, injury prevention, and employee–employer relations.

CLOSING PLENARY SESSION

Evidence-Based Lifestyle Health Coaching

Program Design, Implementation, Determinants of Success, and Outcomes

Neil F. Gordon, *Nationwide Better Health*

Despite impressive recent technologic advances in the field of medicine, potentially preventable noncommunicable chronic diseases remain the leading cause of death, disability, and avoidable health care costs in the United States and other industrialized countries. Because many chronic diseases are lifestyle-related, unprecedented attention is being focused on lifestyle health coaching (LHC). Nationwide has spent more than 15 years developing, testing, and implementing evidence-based LHC programs. The programs were originally modeled after protocols utilized as part of several landmark studies and are now being provided to employees from numerous U.S.- and foreign-based employers. The evolution of the LHC program design and core features was discussed together with key factors identified as determinants of success. Outcome data were presented from several studies documenting the benefits of LHC in various populations, including commercial drivers, in terms of improvements in lifestyle practices, self-reported health status, clinical status, and return on investment.

Learning objectives were as follows:

1. Participants will understand the rationale for incorporating the principles of evidence-based medicine into LHC and be able to cite ways of accomplishing this objective.
2. Participants will become familiar with the core components of an evidence-based LHC program and the key determinants of program success.
3. Participants will learn about the magnitude of benefit that can be expected with LHC in various populations, including commercial drivers, in terms of improvements in lifestyle practices, self-reported health status, clinical status, and return on investment.

APPENDIX A: SUPPLEMENTAL INFORMATION

Driver Health and Wellness*Why Don't the Good Carriers Do More?*

Jeremy Kahn, *Kahn and Kahn*

Although it is neither politically correct nor academically valid, sometimes it's easy to draw a line and use it bluntly to assign almost anyone to one of two groups and from that to draw some quick—often reasonably valid—assumptions. One ready example is to separate those who like dogs from those who don't and ascribe positive personality traits to those in the former group and negative ones to those in the latter. As a rough analytical tool, it's not bad. In the same vein, from more than 35 years of law practice representing commercial motor carriers, I have found that one can quickly lump carriers into those generally committed to safety and the concurrent obligations to their workers and the public that go along with a government transportation license and those who, when it comes to safety and related matters, could well be characterized by a Rhett Butler-like response, "Frankly, my dear, I don't give a damn." From my experience, the universe of commercial carriers consists of both types.

To assess the carrier industry's views on driver health and wellness (DHW) with any degree of statistical validity, one would need to seek out and study both the committed and the "I don't give a damn" carriers, and then try to analyze and make sense out of what in many instances would still at best be only anecdotal evidence. Responses from such a disparate group would likely be all over the place. If, instead of a fair picture of the industry, we want to explore DHW "best practices" as followed—or at least pursued—by responsible, forward-looking carriers, the statistically valid responses by the "I don't care" carriers aren't of much help.

However statistically invalid, this study analyzes the views of a handful of carriers already wholly on board with the concept. Their desire to promote DHW is a given; their struggle is how practically to implement such programs within the legal, financial, and organizational constraints imposed on them. In other words, this study looks only at a select group of responsible, committed carriers (who are almost certainly also dog lovers) and their view of DHW, for whatever broader lessons such a study might provide.

METHODOLOGY BEHIND THE MADNESS OF THIS PAPER

For this study, I ignored those "I don't give a damn" carriers and instead made a conscious decision to question in depth a small group who I knew from personal experience are committed to responsible positions on safety and best possible treatment of their workers, as well as committed to modern technology and modern ways of doing business. I knew they would be candid with me (so long, of course, as their individual responses remained confidential).

Of those carriers interviewed, eight are trucking companies, and two are bus companies. One carrier, whose safety director is known to be committed to safety, initially agreed but

APPENDIX A: SUPPLEMENTAL INFORMATION

then declined to participate on concerns that the questions asked were intrusive and couldn't be answered without the aid of the carrier's general counsel. The survey was intended to address the lay views of the head of safety, so this carrier was dropped. Seven are carrier "groups" (i.e., two or more commonly owned FMCSA-registered carriers). Among truckers, with one exception, all carriers had revenues above \$130 million, most far above (bus revenues are by nature far less). Whether working for privately (i.e., family) owned or public company, each of those interviewed was zealous in his commitment to DHW, and in all but one instance, the zealous commitment was shared by management. Each of the carriers had some component of a DHW program already in place. Most of those questioned not only focus on their own companies but also voluntarily participate in various industrywide groups to identify best practices and to enhance DHW throughout the industry.

WHY DON'T THESE GOOD CARRIERS DO MORE?

While every respondent said his company was committed to and active in pursuing DHW (the survey asked about exactly what carriers were doing), more interesting than what each is now doing is that each respondent said his company could be doing more, if it were not for

The "if not for" reasons can be lumped in broad categories (discussed later), but to understand constraints, one needs first to acknowledge the 800-lb gorilla lurking in the room, namely, the comprehensive federal safety rules that apply to commercial carriers and their drivers, known as the Federal Motor Carrier Safety Regulations (FMCSRs). It is simplistic and misguided to view the carrier industry as similar to others for which employee wellness is a concern, because unlike other industries, each carrier's treatment of its drivers is circumscribed to the *n*th degree by the FMCSRs and the legal issues they create, and so any DHW activity must be viewed in the context of the FMCSRs, not as a program painted on a blank canvas.

As examples, the FMCSRs impose legal requirements that carriers limit the hours their drivers may work; have their drivers pass medical exams testifying to the drivers' physical well-being; have their drivers be subject to periodic testing for controlled substances and alcohol (and provide an employee assistance program for those who don't pass the test); have their drivers follow safe operating practices; and generally speaking, provide a safe working environment. [Federal policy is itself inconsistent. One would think regulating hours worked would be an essential element of DHW, but while FMCSRs limit the number of hours a driver can work, the "motor carrier" exemption to the federal Fair Labor Standards Act, 29 U.S.C. §213(b)(1), makes it economically more feasible for motor carriers to have their drivers work more than 40 h a week than is true for industries not covered by such an exemption.]

Each of the carriers in this study is committed to safety compliance, because it's the right thing to do, but for other carriers that may need a prod, violating the FMCSRs can lead not only to money fines but also to a qualified FMCSA safety rating and concurrent adverse consequences in the market (some customers will not use a carrier with a qualified safety record) or to personal injury lawsuits where a carrier's reputation for safety—as reflected

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in the safety rating—can adversely affect a defense. Thus, from experience, many carriers comply with the FMCSRs following the “carrot” of operating safely or motivated by the “stick” of penalties for noncompliance, but either way they spend a great deal of effort to comply.

Many carriers view the FMCSR requirements as the maximum, and so they go no further. Good carriers (like those surveyed) usually want to go further, but for sound business reasons they don’t, because the trouble they likely invite exceeds any benefits to their drivers.

As one example, cases hold that a carrier can refuse to employ a driver with a disqualifying (under FMCSR rules) hearing loss, but only if he drives a vehicle covered by the FMCSRs. UPS operates large trucks subject to all the FMCSRs and smaller vans subject to only a few. It imposed FMCSA hearing standards for all drivers, but was successfully sued under an expensive-to-defend Americans with Disabilities Act (ADA) “nonaccommodation” claim. The courts held that where the FMCSRs don’t expressly apply, a carrier cannot rely on their physical standards. That’s a lesson learned: to tread beyond the actual FMCSRs only with the greatest of caution.

Another example is the hot topic of sleep apnea. FMCSRs say a driver may not operate a vehicle while fatigued, but the FMCSRs are silent on sleep apnea, and the required physical exam does not expressly address apnea. [The actual rule says a carrier may not allow a driver to operate “while the driver’s ability or alertness is so impaired, or so likely to be impaired, through fatigue, illness, or any other cause, as to make it unsafe for him/her to begin or continue to operate the commercial motor vehicle” (49 CFR §392.3).] There is an almost universal awareness of the importance of apnea, but most carriers are reluctant to go further than mere awareness. [One carrier said it was negotiating with its health insurance carrier to include apnea tests as a covered procedure, but it had no present intent to use the results of such tests for anything beyond educational purposes.] They don’t establish their own criteria for which a certain body mass index would automatically disqualify a driver, because disqualification without an express legal basis in the FMCSRs invites lawsuits.

Further, carriers fear some sort of regulatory overkill. Carriers already invest much time and effort in FMCSR compliance and safety (including now educating drivers about changing compliance standards and new programs like FMCSA’s Compliance, Safety, Accountability 2010), which have a major impact on the carriers; that leaves little opportunity to educate drivers about not-legally required DHW. Carriers believe that drivers—who chose a driving career in part because of the relative freedom from workplace supervision that it offers—can and will only absorb so much. Six carriers indicated as one of their most important constraints, “It is difficult enough to get drivers to participate in safety programs; trying to get them to participate in DHW programs is not worth the effort and hassle.”

FINANCIAL CONSTRAINTS

If we lived in a perfect world of unlimited resources, money would not serve as a deterrent to DHW programs, but we don’t, and so it is. Transport company efforts to trim costs are as vigorous as those of other industries, but the good news is that respondents were almost

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unanimous in saying that their DHW expenditures are not under any more scrutiny than other costs. All the carriers funded their safety departments, which deal with wellness. Most budgets were in the range from \$100,000 to \$300,000; three were \$1.5 million or more; each corresponded to the carrier's size. When asked how the squeeze on budgets played out across the company, six said theirs were squeezed about the same as those of other departments, and two said they were squeezed even less. In general, respondents said their DHW budgets were subject to no more scrutiny than were those of other departments. Most all department expenses must be justified on a return on investment or cost–benefit basis; respondents were split on whether it is more difficult or less difficult to justify the DHW budget than those of other departments. When asked to speculate how DHW spending might fare when the economy and company profits pick up, respondents were split as to whether their companies would likely increase DHW funding or resources.

Yet costs matter. Driven by unceasing financial concerns, several respondents explained how they seek to leverage their limited budgets. One carrier teamed with a local hospital to develop at no cost a prototype heart-healthy program for its drivers; the relationship worked because the hospital developed a product it hoped to sell to others. Another respondent said that it consciously participated in industry and government programs to raise awareness of the company as forward-thinking, which led vendors with new programs and products (the new BOSE lessened-vibration seats were one example cited) to seek out this carrier and provide the program or product at little or no cost to conduct real-world tests. Several carriers mentioned that their insurers made DHW information and strategies available at no cost as a part of the insurer's overall offering.

On the flip side, added costs—either direct or indirect—are a significant disincentive to DHW programs. Three respondents specifically observed, “There are no measurable benefits from a DHW program in terms of lower workers' comp rates.” One carrier considered building a gym at its main terminal but abandoned the idea, not because of the cost of building it but because of workers' compensation premium concerns (i.e., a broken leg during a pickup game of basketball at lunch would be an injury covered by workers' comp, and already high trucking industry premiums would be affected by such injuries). Costs for full apnea testing and treatment are well beyond the budget of some who would like to offer them.

Six respondents relied on no-cost information provided by potential vendors (though in each case, that free information was only one of many sources of information they used, in addition to conferences and trade publications).

IMPACT ON OWNER–OPERATOR INDEPENDENT CONTRACTOR STATUS

Some successful trucking companies choose to operate with a percentage (in many cases 100%) of owner–operators (i.e., individuals who own their trucks and lease them with a driver to a carrier), whereas other successful carriers choose to operate with company-owned fleets and hire their own drivers. In legal terms, drivers in the owner–operator group are considered to be independent contractors; those who drive for company-owned fleets are considered to be employees. Either way, the carrier's obligation to have its driver adhere to the FMCSRs is the same. Of the truckers interviewed, two are exclusively owner–operator,

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and the others use owner–operators as a relatively small percentage of their overall fleets.

Today, for a variety of reasons, the owner–operator business model is being challenged by those who assert that owner–operators should properly be classified as employees. The additional costs to any carrier from such reclassification would be potentially devastating. Thus, owner–operator carriers go to great extremes to ensure that none of their policies and actions detract in any way from the independence that is the hallmark of the owner–operator relationship. “Offering a DHW program could compromise the ‘independent contractor’ status of our owner operators” was the second-most-mentioned constraint; it was the constraint mentioned most often as “most important.” One could plausibly argue that the carriers’ fear is misplaced, but the economic significance of reclassification is so great that carriers using owner–operators always err on the side of caution when it comes to exercising any sort of control.

Defining driver status is far more an art than a science, but control is one key issue. Courts say that a carrier may demand compliance with the FMCSRs without exercising too much control, but carriers fear that requiring an independent to participate in any way in any DHW program or activity that is not expressly required by the FMCSRs could likely be viewed as exerting too much control and undermining the independent contractor relationship, and many carriers believe that it would be taking a significant stride along the slippery slope toward reclassification.

Thus, even among the best carriers most committed to DHW, the most they can do is to make drivers aware of DHW information and resources; they dare not take any affirmative action that might in any way be construed as requiring the drivers to act or refrain from acting in a particular way. Concerns about possible reclassification are so great that even the slightest perception that a particular carrier program might lead to reclassification is enough for management to keep any DHW program at the proverbial 10-ft-pole distance, if not further.

OTHER LEGAL CONSTRAINTS

Carriers committed to DHW seem to be well above industry average when it comes to comprehensive risk management. Those interviewed are committed to DHW not only because it reduces risk but also because they seem to be aware that DHW and risk management go hand in hand.

Carrier management decisions are disproportionately driven by concerns of defense against personal injury lawsuits brought on the carrier that arise from automobile accidents. Viewed from the “accident defense” perspective, some carriers are meticulous about doing everything the law requires, but not one whit more, because if one voluntarily takes steps above and beyond the legal minimum, one is obligated to a correspondingly higher standard of conduct, deviation from which can result in imposition of severe liability. As a DHW example, if a carrier voluntarily establishes a sleep apnea program, it may invite potential liability if a claimant asserts fatigue as a cause and the carrier’s knowledge of but no treatment of apnea as a basis for negligence.

Doing more than the FMCSRs require (i.e., identifying baselines for hearing as a disqualifying medical condition for drivers of small commercial vehicles) may subject the

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carrier to expensive ADA nonaccommodation claims, as mentioned earlier.

The second-most-common constraint identified was “offering a DHW program could subject my company to concerns with compliance with privacy and other similar issues.” The most well known are fair credit and health information privacy laws, but even the FMCSRs include privacy constraints [i.e., FMCSA rules governing pre-employment driver history at CFR 391.23(k)(2)], but the seemingly never-ending list of such laws is expanded almost every day. Carriers exhibit a palpable “no good deed goes unpunished” mentality that limits their DHW action.

WHAT IS DRIVER WELLNESS?

The preceding discussion about constraints assumes some sort of commonly accepted definition of wellness. There may or may not be a common definition, but it is safe to say that DHW begins with safety, as it is prescribed in the FMCSRs.

For all but one carrier, I sought to contact the individual with direct responsibility for safety. (For the smallest one, I interviewed the president.) In one case, I spoke with the heads of both the safety and human resources departments. Their titles bespeak at least a reasonable context of safety’s status in responsible carrier organizations. Titles included (a) Vice President Safety and Claims Management; (b) Vice President Safety and Compliance; (c) Director of Safety and Compliance; (d) Vice President, Chief Compliance, Security and Safety Officer; (e) Safety Manager; and (f) Vice President, Safety and Security. [In terms of constraints, only one respondent identified intracompany competition for funding and status with the company’s human resources department as a concern, but that might reflect the fact that motor carrier transportation is only one part of this particular company’s overall business.]

From their titles, one can infer that (a) for most, safety (and DHW) is just one area of the department’s responsibility, and (b) these carriers have enough commitment to safety in most cases to confer the title “Vice President” on the one in charge. That’s supported by their response to the “approximate percentage of effort and resources devoted to various tasks.” For safety (FMCSRs and other “pure” safety issues), answers ranged from 40% to 80%; for DHW beyond safety, from 5% to 35%; for general employee issues ordinarily in a human resources department, from 5% to 40%; for other transportation-related activities (security, international issues, cargo issues, etc.), from 5% to 20%.

The potential breadth of DHW is reflected in the response to the question as to what exactly is included in DHW. All nine respondents said (a) apnea and (b) fatigue; eight said obesity; seven said (a) basic driving safety, (b) health impact of sedentary lifestyle, and (c) health impact of poor diet; six said stress; five said how to better manage (a) off-duty time and (b) personal relationships; two said how to better manage personal finances; and one said (a) how to better manage business finances, and (b) issues with the Employee Assistance Program.

From that list, respondents ranked the three most important: for “most important,” six chose safe driving, two chose poor diet, and one obesity. For “second most important,” four chose fatigue, two chose apnea, and two chose diet. For “third most important,” two chose apnea, two chose sedentary lifestyle, and five each chose a unique topic.

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WHAT CAN WE LEARN FROM THIS LIMITED STUDY?

I know from experience that there are many responsible motor carriers that want to do the right thing with regard to DHW, and from conducting this survey I find that they are reasonably knowledgeable about what the right thing may be and how to get information to their people. Respondents say that they address DHW in initial orientation meetings, periodic safety meetings, through company newsletters and magazines, and other means. Even though one can only learn so much from a limited, anecdotal study of this sort, I'll go ahead and hazard a few suggestions:

- Those presenting DHW information should present it in the industry context, taking into account the externally imposed hurdles that carriers face and offering ways to deal with the constraints rather than addressing DHW issues in a vacuum as though wearing blinders. Respondents said that they obtained DHW information from all the usual sources (trade publications, conferences, vendors, etc.) and all said that the amount of material seems sufficient, but one respondent expressly pointed out there seems to be no source of DHW information that addresses the issue in the context of the identified constraints.
- Those presenting DHW information should understand that many carriers are already fully committed to the value of DHW, so information about the value is only preaching to the choir; the carriers need information about how to implement DHW, not simply information that DHW is good.
- Cost does matter. Look to promote leveraging opportunities, whether traditional information provided by insurers to their insureds or nontraditional ideas (partnering with a hospital to develop a heart-healthy program).
- Tie DHW to safety. Carriers do. The good ones will be more receptive if DHW programs can be linked to the safety programs in which they've already invested so much.

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Health, Safety, and Wellness of Truck Drivers in Canada

Results of a Pilot Study

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No systematic approach exists in Canada to assess the health and safety of commercial drivers. The major objective of this three-phase pilot project was to determine the feasibility of conducting a national survey that would gather information on the prevalence and risk factors for health conditions, risk factors for crashes and occupational injury, and barriers to achieving improved health, safety and well-being. In Phase 1 of the project, drivers and health professionals in the transportation sector were interviewed to gather information on their perceptions of the scope and relative importance of specific risk factors related to motor vehicle injuries, non-motor-vehicle injuries (e.g., musculoskeletal), occupational disease, and driver wellness. In Phase 2, this information along with a literature review informed the development of a pilot questionnaire. In-person interviews were conducted with drivers to determine if the questionnaire content addressed their concerns and to gain feedback on the clarity and appropriateness of individual questions. Interview questions also addressed what they thought were the most appropriate locations to administer the survey, the most appropriate way to contact and approach drivers, as well as the best mode of administration and level and type of incentive to encourage participation. A revised version of the questionnaire was produced based on this feedback. In Phase 3, 107 drivers were recruited at two truck stops in southern Ontario and they completed a pencil-and-paper version of the questionnaire.

The findings from interviews conducted during Phase 1 indicated that respondents were aware of most of the major risk factors for commercial drivers that have been reported in the peer-reviewed literature. Long hours of work along with increased stress and fatigue were viewed by a majority of respondents as major health problems for drivers and a barrier to adopting a healthy lifestyle. Although a few respondents reported concern about sleep quality and its impact on driver health and safety, sleep apnea was not mentioned in any of the interviews, nor was the use of illegal and legal drugs highlighted by any respondents as concerns. Drivers did not mention obesity or cancer as important health or wellness issues, but these were highlighted as important by health and safety professionals within the workers' compensation-funded prevention system. Slips, trips, and falls were viewed

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as major causative factors in musculoskeletal disorders and pain. Age was not mentioned by drivers but was discussed by health and safety professionals as a factor influencing the likelihood of musculoskeletal problems.

Interviews with drivers in Phase 2 were helpful in adapting questions to the context of driving in Canada and for improving the overall acceptability of the survey instrument. Initially, the instrument contained the 12-item General Health Questionnaire, a measure of current mental health, but this scale was removed because drivers felt it was inappropriate. The revised questionnaire was typically completed in 30 min and addressed the work tasks performed, work organization, injury and collision history, ease of access to medical care, health conditions, musculoskeletal pain, sleep patterns and problems, and exposures to physical and psychosocial hazards.

Pilot testing of the questionnaire was carried out at two truck stops located on a major highway close to the city of Toronto. The approach that was the most acceptable to drivers involved working with truck stop management and setting up an area where investigators could approach drivers and where drivers could sit and complete the questionnaire.

The overall findings of this project indicate that stakeholders are aware of the risks facing drivers and are supportive of a nationwide survey to gather baseline information. Health and safety professionals in the sector believed that the data from baseline and routine driver health, safety, and wellness surveys would be useful in their prevention efforts. Although initial interviews with drivers indicated some apprehension regarding future use of study findings (e.g., more regulations), when they were approached in Phase 3, response rates were very high. Thus the feasibility of a nationwide truck driver health survey was established.

INTRODUCTION

An epidemiological study of over 450,000 Canadian workers employed between 1965 and 1971 identified truck drivers as being at significantly elevated risk of death from motor vehicle accidents, colon cancer, laryngeal cancer, lung cancer, diabetes, ischemic heart disease, and nonalcohol cirrhosis (1). Other more recent investigations provide evidence that truck drivers remain at increased risk of occupational injury and disease and of developing a number of preventable diseases and health conditions. In Ontario alone, the rate of occupational injuries in the general trucking sector is high, and overall 3,700 lost-time injuries were reported in 2002. In addition to the injury and illness burden borne by drivers themselves, their increased risk of involvement in motor vehicle collisions (MVCs) also affects the health and safety of others using the public transportation system. Despite the significance of both the occupational health of drivers and the safety of the driving public, little is known about relationships of, or prevalence of, risk factors hypothesized to be related to driver health and safety or involvement in MVCs.

The transportation sector in Canada is highly regulated and data are routinely collected on a variety of topics and outcomes ranging from industry characteristics, compliance with labor standards, accidents, injuries, and MVCs to public perceptions of the safety of trucks. These data are important for the specific reasons they are collected and also provide an upper-level view of the major trends that are occurring in the sector. What is lacking are data

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that are collected from individual drivers on specific issues, conditions, and concerns they face in their employment. If data such as the prevalence of risk factors for diabetes, cancer, and other chronic conditions as well as knowledge of exposure to risk of physical injury were routinely collected, an understanding would be developed of how they affect the health and safety of drivers. In addition, by a routine collection of such information from drivers, findings would facilitate the development and evaluation of risk reduction programs.

The transportation sector is integral to the economies of Ontario, Canada, and the United States, and therefore the health, safety, and wellness of truck drivers is of vital concern. Unfortunately, surveillance and research on truck drivers' health and safety in North America has been minimal despite the known risks they face and changes in the industry that may be adding to their risk. The U.S. National Institute for Occupational Safety and Health, along with stakeholders in the U.S. transportation industry, has recognized the need for more detailed data on the prevalence of health conditions, work environments, and injuries and their associated risk factors among truck drivers and has recently initiated the development of a national truck driver survey.

In Ontario, the Workplace Safety and Insurance Board (WSIB) recognizes the importance of research focusing on driver health and safety. They have supported projects that include one that will lead to better understanding and prevention of musculoskeletal disorders in the sector and another that aims to improve data linkages between WSIB and the Ministry of Transportation to advance research in the causation of MVCs and occupational injury. Findings from these studies highlighted gaps in available data sources and recently the study team received a grant from the WSIB to explore the development of a nationwide survey of truck drivers.

The nature of truck driving, with long hours on the road and erratic work schedules, makes it difficult to study the health and safety of drivers. However, it is important to learn ways to keep drivers healthy for the sustainability of the trucking industry and for the safety of those who share the road with commercial drivers. Findings are presented from the first and second phases of an ongoing project focused on gathering information from stakeholders about their role in the health and safety of truck drivers and their perceptions about the key problems facing drivers and their ideas about the content of a truck driver survey. Preliminary findings from the third phase of the project, administration of the survey to 107 drivers, are also presented.

METHODS

The study was carried out in three phases. The aim of Phase 1 was to gather information from stakeholders to inform the development of the content of a survey tool. Because it was felt that health and safety professionals working in the transportation sector would have the most direct knowledge of injury and illness risk factors as well as the current prevention efforts, they made up a majority of the respondents. A number of truck drivers were also interviewed as it was believed that their opinions and perceptions of the risks they face, as well as their

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involvement in employee wellness and health and safety programs, would be important information to collect. A purposive sampling approach was used to identify potential subjects to participate in telephone or in person, semistructured interviews. Interviews were conducted by three of the research team members and detailed notes were recorded during each interview. The notes were transcribed after each interview and the transcripts analyzed to identify similar responses and themes.

Phase 2 involved the development and pilot testing of a draft questionnaire. Information from Phase 1 along with findings from a literature review and examination of surveys used in other truck driver studies informed the content of the initial draft questionnaire. The field component of Phase 2 involved approaching drivers at one truck stop on a major freeway in Ontario and inviting them to complete the questionnaire and respond to some interview questions afterward (potential respondents were first asked if they were commercial drivers). They were informed that they would receive a \$10 gift coupon for food or merchandise upon completion of the interview. The semistructured interview focused on whether the items in the draft questionnaire addressed their concerns, were understandable, and used terminology that was relevant to their work. Interview questions also addressed the logistics of survey administration including the appropriate level and type of incentive, how and where best to initially contact drivers, locations where surveys could be completed, and how best to communicate findings back to drivers. The iterative process of gaining feedback on a draft questionnaire and then modifying and garnering more feedback was ended when drivers believed that the questions addressed their concerns and were easy to understand, and that overall the survey could be completed in 20 to 30 min.

In Phase 3, drivers at two truck stops along Highway 401 in southern Ontario were approached and invited to complete the final version of the questionnaire. Management of both truck stops provided space for drivers to complete the questionnaires. Drivers were given a \$10 voucher for food or products sold at the rest stop upon return of their completed questionnaire.

The study protocol was approved by the Human Research Ethics Committee at the University of Waterloo and Humber College Institute of Technology and Advanced Learning.

RESULTS

Phase 1

Three truck drivers and nine occupational health and safety (OHS) professionals working directly with carriers, commercial drivers, or both were interviewed. One driver was an owner–operator primarily involved in long-haul operations; the other two participants were company drivers, one in the for-hire sector and one within a private fleet. Five of the OHS professionals were employed by private carriers (size of companies ranged from less than 40 to over 15,000 drivers), two were consultant–advisors within Ontario’s health and safety prevention system (this system includes the WSIB, the six sector-specific Safe Work Associations, the Institute for Work and Health, and Occupational Health Clinics for Ontario Workers), one was employed by a nonprofit organization providing services

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to the sector, and one was employed by a company that provided health and safety service and information to drivers and carriers. For the purposes of the analysis of interview data, participants were grouped into the following categories: drivers ($n = 3$), OHS professionals in Ontario's prevention system (later referred to as OHS-PS) ($n = 2$), OHS professionals within transportation firms (OHS-Firm) ($n = 5$), and OHS professionals providing information, consulting services, or both to drivers of carriers (OHS-Consult) ($n = 2$).

A review of the literature on truck driver health and wellness identified the following major categories of health conditions and concerns for truck drivers:

Health, wellness, and disease:

- Heart or cardiovascular,
- Obesity,
- Poor diet,
- Cancer,
- Stress,
- Social support and work life balance,
- Fatigue,
- Sleep apnea, and
- Illegal and legal drug use;

Occupational injury or illness concerns:

- High rate of fatality and injury (MVC-related);
- Slips, trips, and falls;
- Musculoskeletal disorders and pain;
- Cancer (from workplace exposure); and
- Workplace violence.

Drivers reported heart attacks, chronic fatigue, and stress as the most important chronic health concerns they face. Two OHS professionals mentioned that drivers typically are in poorer health than others in the general population, and thus many health conditions are of concern. In terms of health and wellness issues facing drivers, all respondents reported the problem of long hours and time away from home as a problem. The lack of opportunity for exercise, quality sleep, availability of healthy food choices, and increased stress were issues that were raised by respondents in all of the groups. One OHS professional discussed drivers' limited social support as being a contributing factor for poor health outcomes in this population. Participants from other groups also indirectly referred to issues of social support among drivers (e.g., being away from home makes it difficult to regularly participate in recreational, sports, and family activities). Lack of access to a family physician was mentioned by two OHS professionals as a barrier to driver health and wellness.

Drivers believed that slips, trips, and falls related to getting out of the cab and the trailer were the most common non-MVC injuries in drivers. They went into detail about the injury risks faced during specific tasks such as tarping and cranking the legs of the dolly. They mentioned that sitting for long periods and then jumping out of the cab and performing tasks with little warmup was a problem. One of the drivers mentioned that he often fell out of his

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cab after long drives, but because he was young, he did not experience problems. Drivers also discussed the dangers and injuries that occur when checking their truck and trailer when on the road (struck by other vehicles, slipping and tripping while around the trailer). OHS professionals believed that musculoskeletal injuries resulting from overexertion, slips, trips, and falls were most common. Back injuries were also reported as a frequent occupational injury that was associated with significant time lost for employees. OHS professionals discussed the causes of musculoskeletal injuries as being related to slippery conditions (including weather related), failure to maintain three-point contact when entering and exiting vehicles, awkward postures and need to lift heavy loads, failure to follow safety rules, time pressures at loading and unloading locations, and complacency. Age was identified as an important, nonmodifiable risk factor for musculoskeletal injuries.

A number of OHS professionals and one driver mentioned that truck stops provide easy access to high-fat foods, which makes it difficult for drivers to eat well. One OHS professional mentioned that a barrier to healthy eating was the lack of available information on where nutritious foods can be obtained by drivers. A driver mentioned that some drivers themselves do not have healthy lifestyles and, for example, go out the night before their shift and so start off being tired. Also, it is very easy to eat fast food and it takes greater effort to eat healthy. One OHS professional mentioned that sometimes long-haul drivers are able to get into a routine that involves healthy lifestyle choices but this may be more difficult for short-haul drivers since they work long hours, have responsibilities at home, and must commute to work. OHS professionals reported that they are active in identifying barriers and facilitators to wellness issues in drivers and are incorporating these into training and prevention measures.

Respondents categorized within the OHS-Firm group primarily accessed injury and surveillance data from their own company. They mentioned accident investigation and injury data as information they routinely used. Some used summary information provided by the Ministry of Transportation. Individual drivers' records were also reported to be used by a number of OHS professionals. The OHS professionals in the OHS-PS and the OHS-Consult groups reported more extensive use of Ministry of Transportation data as well as injury data from the WSIB. They mentioned close contact with officials at the Ministry. The respondents in the OHS-PS group reported making use of summary information from Transport Canada, the Ontario Ministry of Labour, the Ontario Road Safety Annual Report, and Human Resources and Development Canada.

Health and safety professionals did not provide detailed critiques of the weakness of the data they currently use, although the professionals in both the OHS-PS and OHS-Consult groups did mention that the problem with much of their information was that it is lagging (based on data obtained a few years ago). The OHS professionals generally thought that more information is useful and listed the following topics specifically as in need of more data: diet and sleep patterns and solutions to improve sleep, general solutions to fatigue, driver knowledge of rules of the road and safety, lifestyle and nutrition of drivers and how to improve them, and prevalence of musculoskeletal disorders and how to prevent them. Data and findings that could be utilized to assess the effectiveness of prevention programs and interventions were mentioned by one respondent in the OHS-PS group.

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Phase 2

The aim of Phase 2 was to utilize information gained from drivers and OHS professionals in the industry along with what is known about the risks facing drivers in the development of a questionnaire. A number of existing data collection instruments focusing on the health of truck drivers or on the health issues shown to affect drivers were reviewed. An initial draft questionnaire included items addressing all identified as important from the peer-reviewed literature.

All drivers were approached at the inside entrance of the truck stop and invited to participate. None of the individuals approached directly refused to participate, although a number were too busy to talk and two said they were not commercial truck drivers. In total, 12 individuals were approached and four drivers completed the first draft of the questionnaire and participated in the interview. They spent an average of 40 min completing the draft questionnaire and 10 to 15 min in dialogue with the investigator afterward.

The first draft of the questionnaire contained the 12-item General Health Questionnaire, which provides a measure of the mental health of a population. Two of the drivers interviewed during this phase of the study believed that these questions were inappropriate.

Questions on quality of sleep and particular sleeping behaviors were of concern to two of the drivers. They believed that research on this topic could be used to develop criteria that could be used in medical examinations, possibly resulting in more restrictions on commercial drivers. One respondent reported that the questions on musculoskeletal disorders and pain were too detailed.

A second draft of the questionnaire was prepared and addressed the drivers' comments and suggestions. The number of items was also reduced to keep the time for completion under 30 min. Five drivers, recruited in the same manner as describe earlier, completed this second draft and discussed the questionnaire and survey administration with investigators. This iteration identified a number of items on the questionnaire that were of concern and these were modified. This draft was completed by all drivers within 30 min.

Drivers had a number of suggestions for the logistics of a national truck driver health survey. They thought that truck stops along major freeways were ideal locations to recruit long-haul drivers. Other locations like weigh stations and border crossings were not recommended because it was believed that it may be difficult to approach drivers when they are in their cabs. Truck stops also are places where drivers may have more time to participate as compared with other locations where they are require to stop. Completing the questionnaire with pen and paper was preferred as compared with interviewer-administered; it was believed that more time to think about responses is an advantage of the self-administered method. When discussing the incentives, drivers thought that a gift certificate around \$10 in value was reasonable and would improve participation. Drivers were asked if they preferred gift certificates (or gift cards) to particular chain restaurants and they expressed concern that some chains have locations that are inaccessible because of lack of parking for trailers. Providing gift cards to the truck stop chain where the respondents are recruited was viewed very positively.

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Phase 3

A total of 107 drivers at two truck stops completed and returned questionnaires. Time for completion of the questionnaire ranged from 20 min to over 1 h. The two individuals who required more than 1 h completed their questionnaires while eating lunch and more typically the time taken was around 30 min. Similarly to Phase 1, potential respondents who did not wish to participate most often said they were too rushed or were not commercial truck drivers. Two potential respondents were French speaking and were not comfortable completing the questionnaire in English. Investigators did note that a number of individuals who refused to participate on the basis of not being a driver or being too busy may also have had concerns because they were approached in English.

Drivers completing the questionnaire ranged in age from 23 to 67 years (mean 50.5), and there were only two women in the sample. Overall they were experienced in the occupation; the mean number of years as a commercial driver was 18.4 and on average drivers reported 9.5 years with their current employer. Most respondents were company drivers (62%) and 28% reported being owner-operators. Most reported that they primarily drove irregular routes and long distances (63%) although 17% were long-haul drivers with regular routes. Local drivers made up 12% of the sample. Drivers reported usually carrying a variety of goods including general freight (55%), specialized freight (26%), household goods (11%), and forest products (5%). Just over 5% of respondents reported that they were usually a team driver. Unionization was low at 5%.

When asked if they experienced any of a list of symptoms in the last 30 days, the highest rates were for headache (44%), heartburn (30%), leg cramps (30%), ease to anger (30%), colds or flu (19%), depression (19%), frequent urination (16%), anxiety (16%), chest pain (12%), and shortness of breath (15%). Drivers were asked to report previous diagnoses of a number of illnesses or conditions; and those with the highest rates were high blood pressure (22%), high blood cholesterol (15%), diabetes (14%), hearing loss (10%), heart attack (7%), and sleep apnea (7%).

The questionnaire contained items that asked respondents to rate how important each condition is for all truck drivers. These items allowed for responses from 1 (no problem) to 5 (major problem). The conditions of most concern along with their mean values were as follows: poor diet (3.8), lack of exercise (3.8), stress (3.6), being overweight (3.6), and sleeping problems (3.1). Conditions of least concern to all drivers included sexually transmitted infections (1.8), use of illegal drugs (2.1), and cancer from diesel exhaust (2.6).

When asked about some of their own exposures to various risk factors and health-related behaviors, over half reported exposure to diesel exhaust always or often. Only 21% reported always or often consuming five or more fruits or vegetables per day. Close to half reported always or often that friends told them they work too much and that they believed that work takes so much time that it has a negative effect on their private lives.

APPENDIX A: SUPPLEMENTAL INFORMATION

DISCUSSION OF RESULTS

A major objective of this pilot study was to gather information from stakeholders in the transportation sector about their perceptions of the health, safety, and wellness issues faced by drivers. Although this sample was small, the responses indicate that both drivers and OHS professionals are aware of the major risks for MVCs, non-MVC injuries, as well as the chronic health issues of drivers. All are aware of the high rates of injuries and disorders in truck drivers and the link between the health of drivers and the driving public. Long hours of work along with associated stress and fatigue were viewed by a majority of respondents as a major problem for drivers and a barrier to adopting a healthy lifestyle. Risk factors associated with these long hours (poor-quality sleep, fatigue, stress, inattention, mistakes) were discussed both in terms of driver health and wellness and in terms of MVCs. The survey results also supported these findings in terms of respondents' perceptions of the importance of health problems for all drivers and their own exposures to psychosocial risk factors and health behaviors. Overall, these perceptions of the injuries and major risk factors are in concordance with what is published in the peer-reviewed literature.

There were a few risk factors that have appeared in the literature that were not raised by the study respondents. Australian and U.S. studies (2) have reported higher illegal and legal drug use in truck drivers, but this issue was not discussed in any depth by respondents and in the survey they believed it to be of little concern. One driver did mention that fellow drivers would sometimes consume alcohol during their off hours and that this behavior may affect their performance and well-being. The fact that respondents did not report drug or alcohol consumption as a problem, which contradicts what appears in the literature, may be due to new and strengthened drug testing that was not present when the scientific studies were performed. Smoking was not discussed by respondents as a problem although the literature is quite clear in providing evidence that smoking rates are higher in truck drivers than in other occupations (3–5). There is the possibility that smoking rates in drivers have declined, but there is also some likelihood that respondents did not consider the risks of smoking to be significant as compared with other high and catastrophic risks that drivers face (MVCs, acute injuries).

Respondents mentioned heart attacks and stress as common chronic adverse outcomes associated with truck driving. Although these factors are supported by the literature (6, 7), obesity is well documented as having a high prevalence in truck drivers (8). Cancer was mentioned by only one respondent in the OHS-PS group yet concern is reported in the peer-reviewed literature (9); this result again may be due to the delayed onset and relative low importance associated with the outcome as compared with MVCs. Obstructive sleep apnea, which has been the subject of recent accident causation studies in commercial drivers (10, 11), was not mentioned by respondents either. This clinical condition may have been mistakenly associated with regular fatigue or respondents were simply unaware of the disorder. The survey results indicate that poor diet, stress, being overweight, and sleeping problems are perceived as major concerns for all drivers. Cancer was not a particular concern expressed by drivers in the survey. The high rates of chest pain, shortness of breath, high blood pressure, and high cholesterol as well as reports of relative poor dietary habits of survey drivers indicate that concerns regarding chronic health conditions are valid.

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Differences in responses of drivers and OHS professionals were apparent for many of the interview questions. OHS professionals often listed numerous risk factors and needed to be redirected to encourage them to select what they thought were the key factors. Although the sample of drivers was small, they did tend to focus quickly on their perceptions of the top factors and provided detailed examples and experiences. It is likely that the OHS professionals are more aware of the contemporary scientific literature, whereas the drivers are forming their opinions from first-hand experience. The differences in responses between drivers and OHS professionals support the need to allow drivers to talk about their experiences since they can provide rich information.

The finding of overall positive support for a truck driver survey as well as data from the pilot survey is an important first step in the initiation of a collaborative partnership. A provincial or national survey of drivers will require buy-in from a wide range of stakeholders with diverse interests and points of view. Although the sample used here was small and allows for only limited generalizability, the paucity of significant discussion of potential negative consequences of a truck driver survey is encouraging.

The next phase of the research project will be to initiate the partnerships that are necessary to develop and implement a large-scale survey. The research team is collaborating with investigators from the U.S. National Institute for Occupational Safety and Health as they share interests in the health and safety of drivers and are in the process of conducting a national truck driver survey (12). The team has been in contact with investigators in Washington State, who have recently completed a statewide health and safety survey of truck drivers (13). The experience, as well as expertise, from U.S. colleagues may help identify successful pathways and facilitators to success in multistakeholder collaborate research in the trucking sector. An important group of stakeholders for this partnership are Canadian scientists currently working in the area of truck driver health and safety and those who have expertise in the content areas of concern identified by respondents in this pilot study.

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APPENDIX A: SUPPLEMENTAL INFORMATION

Wellness Lessons from Transportation Companies

Asbjorn Osland, *San Jose State University and Mineta Transportation Institute*; and Lauren Ramsay, Nanette Clinch, and Pamela Wells, *San Jose State University*

The purposes of the paper are to describe wellness programs and offer two suggestions for improving how they are delivered to commercial drivers and operators. It is not a large-sample empirical study from which generalizations can be made. The Mineta Transportation Institute commissioned brief case studies of transportation companies to show what several organizations have done.

Stress, nicotine use, sleep apnea, obesity, and lack of information are significant barriers to wellness in commercial drivers–operators. Many wellness programs ask the individual driver–operator to lose weight, exercise more, and monitor blood pressure, glucose, cholesterol, and other such indicators of health. However, little is done to change the environment or adopt structural interventions such as forbidding nicotine use, as is possible in 20 states. Other structural interventions include those possible at the levels of the company and community, including access to healthy food rather than the junk food drivers often can find on the road. At the societal level, more public transit that gets people walking and out of their cars, cities that are designed for people to walk and cycle in rather than drive from work to a sprawling suburb, and encouraging food manufacturers to make healthy food (rather than a toxic mix of sodium, fat, and sugar to boost one’s craving for a particular food) are just a few measures that could improve health and well-being of the public.

The Union Pacific Corporation (rail transportation), and Con-way Freight (trucking) are included because they were willing to share information and are large, publicly traded companies. The Utah Transit Authority is included because other transit authorities recommended it to the authors; it has a long history in wellness as part of local government and it too chose to participate.

Two issues are discussed that we believe are perhaps added value in that they have not been emphasized in other discussions of commercial drivers–operators: the first is the importance of using the mitigation of erectile dysfunction in the promotion of wellness programs to commercial drivers–operators. Drivers would likely find it more compelling rather than the fear of disease down the road. The second issue is to urge employers to consider banning tobacco use, both on and off the job, where legal.

Tobacco use is a serious health problem and within the individual’s control. Eliminating tobacco users as employees would improve wellness in a marked manner. There are a host of problems associated with eliminating tobacco users including employee allegations of invasion of privacy by employers, legal barriers in 29 or 30 states and the District of Columbia where laws were passed to protect the privacy of tobacco users, union opposition, the interstate nature of commercial transportation (which states’ laws apply in what situation), court challenges, and so forth.

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RESEARCH ON THE HEALTH AND WELLNESS OF COMMERCIAL TRUCK AND BUS DRIVERS

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APPENDIX C

Conference Agenda

November 8–10, 2010
Baltimore, Maryland

Monday, November 8

8:30 a.m.–10:00 a.m.

Welcome and Plenary Session

Eric Wood, University of Utah, *presiding*

Welcome from TRB

Eric Wood, University of Utah

Welcome and Introduction

Albert Alvarez, Federal Motor Carrier Safety Administration

Welcome Keynote

Anne S. Ferro, Administrator, Federal Motor Carrier Safety Administration

Keynote Address: Zero Trends: Health As a Serious Business Strategy

Dee W. Edington, University of Michigan

10:30 a.m.–noon

Medical Issues

Karen Heaton, University of Alabama, Birmingham, *presiding*

Driving with Cardiovascular Disease: Implications for Commercial Motor Vehicle Operators

Elaine Papp, Federal Motor Carrier Safety Administration; Mary Gunnels, U.S. Department of Transportation; Stephen Tregear, Manila Consulting, Inc.

Implementing a Sleep Apnea Program for Commercial Motor Vehicle Drivers: Lessons Learned from Two Programs

Jessica Mabry, Jeffrey Hickman, and Richard Hanowski, Virginia Tech Transportation Institute

An Employer-Driven Sleep Apnea Disease Management Program in Commercial Trucking

Mark Berger, Precision Pulmonary Diagnostics, LLC

APPENDIX C: CONFERENCE AGENDA

Comparative Use of Healthcare in Patients Diagnosed with Obstructive Sleep Apnea Syndrome: Receiving and Not Receiving Treatment with CPAP in an Urban County Hospital Setting

Rajesh Harrykissoon, Consultant

10:30 a.m.–noon

Commercial Drivers' Health and Wellness Status and Dealing with It

Gerald P. Krueger, Krueger Ergonomics Consultants, *presiding*

Health Profile of Commercial Drivers

Eric Wood, University of Utah

Health, Safety, and Wellness of Truck Drivers in Canada: Results of a Pilot Study

Philip Bigelow, University of Waterloo, Canada; Diane Betts, Humber Institute of Technology and Advanced Learning; Benjamin Amick, Institute for Work and Health; W. Karl Sieber, NIOSH; Sheilah Hogg-Johnson, Institute for Work and Health; Mark Skinner, Infrastructure Health and Safety Association of Ontario; Paul Jakubicek, University of Waterloo, Canada

Practical Hurdles Confronting Trucking Companies in Implementing Driver Health and Wellness Programs

Jeremy Kahn, Kahn and Kahn

Wellness Framework: The Four R's

Todd McGuire, incentaHEALTH

1:00 p.m.–2:30 p.m.

Behavioral Issues

Toni Alterman, National Institute for Occupational Safety and Health, *presiding*

Two Behavioral Red Flags: Driver Single-Vehicle Crash Involvement and Safety Belt Nonuse

Ronald R. Knipling, Consultant

Improving Commercial Driver Health and Driving Performance Through Digital Coaching Health and Wellness Interventions

John Lenneman, Central Michigan University

Behavior-Based Safety Strategy for New Zealand Truck Drivers: An Ongoing Program

Rebecca Everdon, Louis Leland, Jr., and Brent Alsop, University of Otago

RESEARCH ON THE HEALTH AND WELLNESS OF COMMERCIAL TRUCK AND BUS DRIVERS

SHIFT Pilot Study: How Motivational Interviewing Affected Driver Weight Loss

Ryan Olson and Brad Wipfli, Oregon Health and Science University; Lindsey Alley, Portland State University; Kevin Murphy, Eastern Oregon University; Denise Ernst, Health Future Health Management Services; and Verna Burden, Health Future

1:00 p.m.–2:30 p.m.

Union Perspectives on Commercial Drivers' Health and Wellness

Edward Watt, Transport Workers Union of America AFL-CIO, *presiding*

Union Management Cooperation in Wellness Programs: A Panel

Edward Watt, Transport Workers Union of America, AFL-CIO; Ron Z. Goetzel, Emory University; Paul Landsbergis, State University of New York; Daria Luisi, Consolidated Edison Company of New York, LTD; and June M. Fisher, Trauma Foundation

3:00 p.m.–4:30 p.m.

Bus Issues

Kenneth E. Presley, United Motorcoach Association, *presiding*

Sleepiness Among Express Bus Drivers: Association with Body Mass Index, Sleep Quantity, and Sleep Quality

Kulanthayan Mani, University Putra Malaysia

Wellness Lessons from Transportation Companies

Asbjorn Osland, San José State University

Managing the Fog of Fatigue

Greg Belenky, Washington State University

3:00 p.m.–4:30 p.m.

Technology Issues

Jessica Mabry, Virginia Tech Transportation Institute, *presiding*

Creating a Social Networking Health Outreach Program for Commercial Motor Vehicle Drivers

Justin F. Morgan, Tammy E. Trimble, Myra Blanco, and Richard Hanowski, Virginia Tech Transportation Institute

Peak Performance for Commercial Driver Health—The Resilience Model

Barbara Moquin, Department of Health and Human Services

Developing Intelligent In-Vehicle Systems to Monitor, Manage, and Motivate the Aging Operator's Health and Well-Being: A Panel

Joseph F. Coughlin, Bryan Reimer, and Bruce Mehler, Massachusetts Institute of Technology; and James Purvis, Healthways

APPENDIX C: CONFERENCE AGENDA

4:30 p.m.–7:00 p.m.

Reception and Exhibits

Tuesday, November 9

8:30 a.m.–10:30 a.m.

Plenary Session

Gerald P. Krueger, Krueger Ergonomics Consultants, *presiding*

Medical Cost Savings and Impact of Behavioral Adherence on Clinical Improvement and Functional Status in Disease Management Programs

Calvin C. Wilhide, Nationwide Better Health

Measuring the Return on Investment of Wellness Initiatives

J. Michael Vittoria, Sperian Protection USA, Inc.

Adoption of and Results from an Incentive-Based Wellness Strategy

Cathy Murphy, Blue Shield of California

11:00 a.m.–12:15 p.m.

Plenary Session (continued): Commercial Driver and Family View of Health and Wellness

Rebecca M. Brewster, American Transportation Research Institute; and Charles Norman Littler, American Bus Association, *presiding*

Commercial Driver and Family Panel

Ralph Garcia, ABF Freight System; Frank Silo, Covenant Transport; and Karen Heaton, University of Alabama, Birmingham

12:15 p.m.–1:30 p.m.

Lunch with Keynote Speaker, Christine Branche, NIOSH

Richard F. Pain, Transportation Research Board, *presiding*

NIOSH Perspective on Commercial Driver Health and Wellness

Christine M. Branche, National Institute for Occupational Safety and Health

1:30 p.m.–3:00 p.m.

Obesity and Commercial Drivers: Research Perspective

Jennifer E. Lincoln, National Institute for Occupational Safety and Health, *presiding*

Obesity in the Commercial Trucking Population

Lawrence Cheskin, The Johns Hopkins University

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Challenges and Opportunities in Addressing Diet, Obesity, and Chronic Disease in Commercial Drivers

Maureen Murtaugh, Anita Kinney, Matthew Thiese, Eric Wood, and Kurt T. Hegmann, University of Utah

Truckers and Occupational Health Disparities: Health Promotion for an Obesogenic Trucking Sector

Yorghos Apostolopoulos; Sevil Sonmez, Mona Shattell, Robert Strack, Lauren Haldeman, and Victoria Jones, University of North Carolina at Greensboro

1:30 p.m.–3:00 p.m.

Independent Operators: Health and Wellness Issues in Our World

Gerald P. Krueger, Krueger Ergonomics Consultants, *presiding*

Barriers to Successful Healthy Living and Thinking on the Road

Gary Hull, Truckers For A Cause–A.W.A.K.E Chapter

Peer-to-Peer Small-Group Counseling as an Effective Technique for Long-Term Health and Wellness Improvements: A Case Study of “Truckers for a Cause”

Brian Chute, Consultant

Trucking Solutions: Presentation Topics on Behalf of Independent Owner–Operators

Rick Ash, Trucking Solutions Group

Mortality Among Members of a Truck Driver Trade Association

Jan Birdsey, Toni Alterman, Jia Li, Martin R Petersen, and John Sestito, National Institute for Occupational Safety and Health

3:30 p.m.–5:00 p.m.

Obesity and Commercial Drivers: Company and Pilot Program Perspectives

Jennifer E. Lincoln, National Institute for Occupational Safety and Health, *presiding*

Relationships Between Personal Factors and Obesity in a Cross-Sectional Study of Drivers

Matthew Thiese, Kurt T. Hegmann, Maureen Murtaugh, and Eric Wood, University of Utah; and Arun Garg, University of Wisconsin–Milwaukee

Driver Weight-Loss Programs That Are Working

Robert Perry, Roadside Medical Clinic + Lab

APPENDIX C: CONFERENCE AGENDA

3:30 p.m.–5:00 p.m.

Case Studies: Health and Wellness in the Commercial Drivers' World

Rebecca M. Brewster, American Transportation Research Institute, *presiding*

Case Study: Minimizing Employee Benefit Cost—Conceptual Statement: Healthy Drivers Mean a Healthy Bottom Line

Chelle Pfiffner, J&K Health Consulting, LLC

Healthcare Reform's Effect on Corporate America: What Every Employer Should Know

Holly Shaffer, Words of Wellness, LLC

Multiple Health and Wellness Initiatives at J.B. Hunt

Greer Woodruff, J. B. Hunt Transport, Inc.

Wednesday, November 10

8:30 a.m.–10:00 a.m.

Trucking Company Health and Wellness Success Stories

Rebecca M. Brewster, American Transportation Research Institute, *presiding*

Wellness Coaches USA and Con-way Freight Design Effective Wellness Program to Improve Health, Wellness, and Safety of all Conway Employees

Brad Springer, Wellness Coaches USA; Bob Petrancosta, Con-way Freight

Wellness: The Intersect of a Productive Worker

Drew Bossen, Atlas Ergonomics; and Don Osterberg, Schneider National, Inc.

8:30 a.m.–10:00 a.m.

Health and Wellness: Continuing Concerns

Elaine Papp, Virginia Tech Transportation Institute, *presiding*

Commercial Truck Driver Mounting–Dismounting Behavior Related to Falls

Andrew Merryweather, University of Utah

Measurement of Noise Level, Whole-Body Vibration from Driver and Passenger Seats, and Air Quality in the Cabin of Heavy-Duty Diesel Vehicles

Joshua Fu, Jimmy Calcagno, and Wayne Davis, University of Tennessee–Knoxville

Musculoskeletal Issues in the Commercial Driver Industry

Benisse Lester, Federal Motor Carrier Safety Administration

RESEARCH ON THE HEALTH AND WELLNESS OF COMMERCIAL TRUCK AND BUS DRIVERS

10:30 a.m.–noon

Closing Plenary Session

Eric Wood, University of Utah, *presiding*

Organizational Influences of Truck-Driver Health: Reviewing the Evidence

Michael Quinlan, University of New South Wales, Australia

The Road and Bus Athlete Systems

Mark Everest, Occupational Athletics, Inc.

Evidence-Based Lifestyle Health Coaching: Program Design, Implementation, Determinants of Success, and Outcomes

Neil F. Gordon, Nationwide Better Health

Concluding Remarks and Where We Go from Here

Albert Alvarez, FMCSA

Planning Committee Biographical Information

ERIC WOOD, *chair*, is Residency Program Director and Assistant Professor at the Rocky Mountain Center for Occupational and Environmental Health, University of Utah. He is a graduate of the University of Utah School of Medicine and holds a master's degree in public health (with an emphasis on industrial hygiene) from the University of Hawaii. He is board certified in preventive medicine (occupational and environmental medicine) and family medicine. Before joining the faculty at the University of Utah, he worked as an occupational medicine physician for Intermountain Healthcare and as a professional industrial hygienist in private consulting, and for the Utah Occupational Safety and Health Administration program.

REBECCA M. BREWSTER is the President and Chief Operating Officer of the American Transportation Research Institute (ATRI, formerly the American Trucking Associations Foundation), where she leads the research activities of the institute and its affiliated organizations in the areas of safety and human factors, environmental factors, technology and innovation, transportation security, and economic analysis. Brewster serves on the Executive Committee of TRB and on the Board of Trustees of the Mineta Transportation Institute. She is also a charter member of the National Traffic Incident Management Coalition. Before joining ATRI, Brewster was the Public and Governmental Affairs Director for the Cary, North Carolina, Chamber of Commerce and a fleet analyst with Moen, Inc. She holds a B.A. from Wofford College and is a fellow of the North Carolina Institute of Political Leadership.

LAMONT BYRD has been the Director of Safety and Health, International Brotherhood of Teamsters (IBT) since 1996. He is actively involved in developing the IBT's safety- and health-related policies. He is also responsible for managing a staff of technical professionals who provide technical and regulatory support to rank-and-file Teamster members, IBT trade divisions, and local union affiliates on issues including, but not limited to, transportation safety, occupational safety and health, drug and alcohol testing, and worker safety and health training. In addition, Byrd works closely with IBT trade division leadership during collective bargaining and various organizational initiatives. Previously Byrd served as an industrial hygienist at IBT (1990–1995) and as a principal investigator in IBT's worker training program (1995–1996). He obtained an M.S. in industrial hygiene at the University of Cincinnati and a B.S. in environmental health from East Carolina University. He is a member of the Academy of Industrial Hygiene, American Industrial Hygiene Association, National Advisory Committee on Occupational Safety and Health, and American Society of Safety Engineers; and past member, Board of Directors, Academy of Industrial Hygiene, and past member, American Industrial Hygiene Ethics Committee.

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RICHARD J. HANOWSKI is a research scientist at the Virginia Tech Transportation Institute and serves as the director of the Center for Truck and Bus Safety. Hanowski earned a Ph.D. in industrial and systems engineering from Virginia Tech. His research, which has had an impact on national transportation policy (e.g., hours of service for truck drivers, driver distraction and texting), has been featured in the media. He currently serves as the fatigue subject matter expert for the National Surface Transportation Safety Center for Excellence. Hanowski has received several research awards including the 2008 Society of Automotive Engineers Lloyd L. Withrow Distinguished Speaker Award and both the 2000 and 1997 First Place Awards for Outstanding Research in the Physical Sciences and Engineering at Virginia Tech. Hanowski is currently a member of the Human Factors and Ergonomics Society and SAE.

KAREN HEATON is an Assistant Professor in the Department of Community Health, Outcomes, and Systems, University of Alabama at Birmingham. She is the Occupational Health Nursing Program Director at the Deep South Center for Occupational Safety and Health, funded by the National Institute of Occupational Safety and Health (NIOSH). In her faculty practice role, Heaton serves as a nurse practitioner at the City of Birmingham Occupational Health Clinic, and she has experience as a staff nurse and nurse practitioner in emergency nursing and as a nurse practitioner in a facility providing occupational health services to more than 20 businesses in the Louisville, Kentucky, area. Heaton received a B.S.N. from the University of Alabama at Birmingham, an M.S.N. from the University of Louisville, a post-master's Family Nurse Practitioner certificate from George Washington University, and a Ph.D. in nursing from the University of Kentucky. Her program of research on sleep and risk factors for injury and cardiovascular disease in workers has resulted in opportunities as an invited participant to NIOSH's Public Meeting on the Survey of Truck Driver Injury and Health and as a consultant for the Sleep Educator Program of the American College of Chest Physicians.

CHARLES NORMAN LITTLER is Vice President, Regulatory and Industry Affairs, for the American Bus Association, where he also serves as Executive Director of the Bus Industry Safety Council. He currently chairs the Highway and Motor Carrier Sector Coordinating Council, a primary advisory body to the U.S. Department of Homeland Security. He has 38 years of transportation experience, 30 years of which have been in the motor coach industry. He is certified through the Insurance Institute of America as a risk manager. Other professional affiliations include full membership in SAE, where he serves on the Truck and Bus Council; TRB's Commercial Truck and Bus Safety Synthesis Program Committee; and the International Association for Counterterrorism and Security Professionals. Before moving to Washington, D.C., he worked for nearly 17 years at Motor Coach Industries in Illinois.

BIOGRAPHICAL INFORMATION

THOMAS L. MOORE is Vice President of Education at the National Private Truck Council (NPTC). He has more than 30 years of transportation-related experience in a variety of public relations, journalism, and lobbying capacities. He began his career with the American Trucking Association in 1978. In 1984, he joined the Private Carrier Conference and 2 years later was promoted to executive director. In 1989, he joined *Fleet Owner* as the Washington editor before becoming the director of public affairs for the Georgia Ports Authority. He rejoined *Fleet Owner* in 1995 as editor and served in a similar capacity with Randall Publishing until June 2001, when he started his own strategic marketing communications company. He joined NPTC in his current role in January 2007. He obtained his Certified Treasury Professional Designation in 1997.

PETER ORRIS serves as Professor and Associate Director of the Great Lakes Center for Occupational and Environmental Safety and Health of the University of Illinois School of Public Health and is the Director of its Occupational Health Service Institute and Global Toxics Policy Program. He maintains an active clinical and teaching practice in occupational medicine and is the chief of the clinical department at the University of Illinois Medical Center. He is a fellow of the American College of Physicians and the American College of Occupational and Environmental Medicine and holds additional faculty appointments as a Professor of Internal and Preventive Medicine at Rush University Medical College and Preventive Medicine at Northwestern University Feinberg School of Medicine. He has edited and authored numerous articles, book chapters, and governmental reports in the field of occupational and environmental medicine. Orris graduated from Harvard College, Yale School of Public Health, and the Chicago Medical School of Rosalind Franklin University.

KENNETH E. PRESLEY is Vice President of Industry Relations for the United Motorcoach Association, where his duties include representing the nation's bus and motorcoach industry before Congress and the many regulatory agencies that oversee the industry; consulting with members regarding legislative, regulatory compliance, and business issues; and assisting in the development of national and state policies. Before joining the United Motorcoach Association, he was an insurance broker and industry advocate for the motorcoach industry for 22 of his 28 years in the insurance industry. Along with his duties as Vice President of Industry Relations, he currently serves on the Board of Directors of the Alabama, Georgia, South Carolina, South Central Motorcoach Association (which includes Arkansas, Louisiana, Mississippi, and Texas) and New York bus and motorcoach associations. Presley also serves as the Executive Director of the Bus and Motorcoach Academy.

MICHAEL GARRY QUINLAN is a professor in the School of Organization and Management at the University of New South Wales, Australia, and honorary professor with the Work and Health Research Team at the Faculty of Health Sciences, University of Sydney. In 2001 he undertook an inquiry into long-haul truck driver safety for the New South Wales government, which led to a number of policy changes (including a chain of responsibility-based fatigue regulation). In 2008, together with Lance Wright, he prepared a report on

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remuneration and safety in the Australian heavy vehicle industry for the National Transport Commission on behalf of the federal government. He has also presented expert testimony on truck driver health and well-being to courts and tribunals and published widely on occupational health and safety.

CALVIN C. WILHIDE III currently serves as the lead program developer for Nationwide Better Health medical management programs. These programs include disease management, utilization review, case management, and wellness programs. Tailoring programs to improve health and decrease overall health care costs, Wilhide has developed an award-winning cost avoidance model along with various disease management programs that have earned accreditation from the Utilization Review Accreditation Commission. Wilhide earned his Ph.D. in microbiology from Clemson University. He has more than 9 years of postdoctoral fellowships from Johns Hopkins School of Medicine in cardiology, oncology, hematology, molecular biology, and genetics. Wilhide has published numerous papers on clinical research as well as on disease management.



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