

Improving Occupational Health in Oregon: Turning Data to Action

Final Progress Report

Principal Investigators: Jae P Douglas, MSW, PhD
Curtis G Cude
Public Health Division,
Oregon Health Authority
800 NE Oregon Street, Suite 640
Portland, OR 97232
Phone: 971-673-0975
Email: curtis.g.cude@state.or.us

Award Institution: Public Health Division,
Oregon Health Authority
800 NE Oregon Street, Suite 640
Portland, OR 97232

Grant Number: U60 OH008472

Project Period: 07/01/2010 – 06/30/2015

Report Completed: September 24, 2015

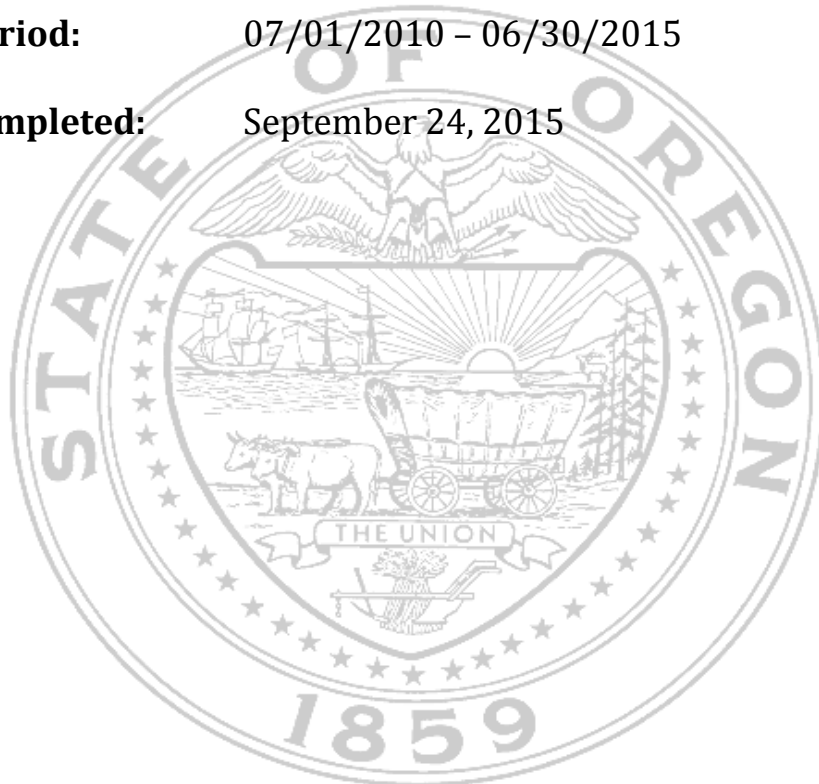


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List of Terms and Abbreviations

ABLES	Adult Blood Lead Epidemiology and Surveillance Program
ASSE	American Society of Safety Engineers
BLS	Bureau of Labor Statistics
CFOI	Census of Fatal Occupational Injuries
CPWR	Center for Protection of Workers' Rights
EPHT	Environmental Public Health Tracking
NAICS	North American Industry Classification System
NIOSH	National Institute for Occupational Safety and Health
OIICS	Occupational Injury and Illness Classification System
OHI	Occupational Health Indicators
OHSU	Oregon Health & Science University
OPHP	Occupational Public Health Program
OR-FACE	Oregon Fatality Assessment and Control Evaluation
Oregon OSHA	Oregon Occupational Safety and Health Division
OSHA	U.S. Occupational Safety & Health Administration
O[yes]	Oregon Young Employee Safety Coalition
PFD	Personal Flotation Device
PNASH	Pacific Northwest Agricultural Safety and Health Center
SHARP	Washington Safety & Health Assessment & Research for Prevention
SOC	Standard Occupational Classification

Abstract

This final progress report summarizes accomplishments for the fundamental and expanded fatal work-related injury state-based surveillance projects of the Oregon *Occupational Public Health Program (OPHP)* cooperative agreement (U60 OH008472) between July 1, 2010 and June 30, 2015.

During the 5-year project period, the Oregon Health Authority and collaborators at Oregon Health & Science University sought to characterize and assess the magnitude of work-related injuries and illnesses in the state through enhanced occupational health surveillance. In addition, the program used findings to raise awareness about occupational health issues and develop intervention recommendations to prevent new injuries, conditions, and deaths.

Through fundamental surveillance, staff generated up to 21 primary occupational health indicators throughout the project period. The program obtained and analyzed over two dozen sources of work-related injury and illness data to better characterize and calculate the magnitude of and trends in work-related injuries and illnesses in the state. In addition, staff made efforts to estimate the cost associated with specific work-related injuries, such as amputations and carpal tunnel syndrome.

The Oregon Fatality Assessment and Control Evaluation (OR-FACE) program continued its core activities in occupational fatality surveillance, investigation, assessment, and outreach. Surveillance scientific discoveries included the identification of increased risk of fatal transportation incidents among workers 65 and older and potential contributing factors. Surveillance was expanded with new online data resources, including impactful interactive fatality maps. Additional capacity and resource building included new undergraduate and graduate student research project internships. In the 5-year grant period, OR-FACE published and disseminated annual reports of trends in occupational fatalities, in-depth fatality investigation reports and hazard alerts, and developed new toolbox talk guides to help supervisors share fatal events and recommendations. During the funding period, OR-FACE greatly expanded conference and event presentations on safety issues; safety materials were featured on several occasions in news stories and trade publications.

The overall program regularly convened a state-wide advisory board to guide prioritization of the state's occupational health issues, raise awareness and discuss emerging occupational health issues, and brainstorm and develop prevention strategies. This led to state funding for adult lead poisoning surveillance. Staff worked closely with program partners through the advisory committee, coalitions, and other groups to utilize and leverage expertise and resources to improve worker health and safety. Special multi-stakeholder focus was made on young workers through a partnership with the Oregon Young Employee Safety Coalition (O[yes]), a non-profit coalition of agencies, educational institutions, employers, insurers and other organizations.

OPHP staff developed a wide-range of articles and publications on various occupational health issues for health care providers, employers, workers, researchers, and legislators. Presentations on occupational health subjects, including injuries to young workers, prevention of lead poisoning, persistent and emerging industrial hygiene issues and total

worker health were presented at numerous national, state and regional conferences and meetings. OPHP also provided significant assistance to Oregon's emergency preparedness efforts, developing guidance for healthcare and emergency responders for events such as H1N1, Fukushima radiation response, wildfires and Ebola. This assistance improved internal responder safety and health plans.

Section 1

I. Overall and Occupational Health Indicators component

Significant Findings

OPHP maintained and strengthened Oregon's surveillance system to capture Occupational Health Indicator (OHI) activities. Notable system improvements included migration of blood lead test data to a new division-wide database that is used for all reportable conditions, support of reporting pesticide exposure data to the National Institute for Occupational Safety and Health (NIOSH), and the development of tools to extract data directly from federal datasets to reduce federal reporting delays. This work allowed us to analyze surveillance data, including analysis of occupational injuries and illnesses among young workers aged 14-24, finding need for targeted interventions for workers at age 18. Other analyses defined the burden of and trends in exposures to pesticides.

OPHP conducted comprehensive and rigorous analysis of Oregon-specific OHI data to assess the state of occupational health and safety in Oregon. Staff found that high blood lead levels (25 µg/dL or greater) were more likely to have an occupational source, commonly related electrical equipment, appliance, and component manufacturing. Staff conducted a spatial analysis suggesting areas of high or low injury clusters, defining spatial distribution of young worker injuries and contributing factors. Trend analysis of Oregon Survey of Occupational Injuries and Illnesses showed decreases in total injury and illness rate consistent with published Bureau of Labor Statistics (BLS) studies. OPHP explored economic costs associated with amputations, carpal tunnel syndrome, work-related hospitalizations, burns, and pneumoconiosis.

OPHP developed and implement a comprehensive communication and outreach effort to disseminate the findings of the program. While the program successfully delivered outreach regarding OHI findings, greater impact was realized when conducting outreach with partner programs. Highlighted collaborative outreach efforts included an exhibit about worker safety and appropriate glove use and a symposium on Inherently Safer Technology. OPHP conducted multiple outreach efforts with O[yes] related to young worker safety, and with Oregon Public Health Division's Health Security, Preparedness, and Response section related to respiratory protection, personal protective equipment plans, and emergency response plans for responders on a variety of hazards.

OPHP maintained and strengthened the Occupational Public Health Program (OPHP) Advisory Committee to enhance and expand collaboration, particularly to investigate young workers' views regarding workplace safety and health and develop resources to maintain reporting of adult blood lead data. OPHP evaluated effectiveness of the Advisory Committee and determined priority areas of focus, need for clarity on the role of the committee, and need for increased representation from industry organizations and labor.

Translation of Findings

Findings from the fundamental surveillance program were shared at many venues for a wide variety of audiences. Stakeholder meetings, peer-reviewed journal manuscripts, the program website and listserv, university lectures, and public presentations were some of the ways data were disseminated. In particular, dissemination of information about injuries to young workers in Oregon highlights the success in this arena. Using workers'

compensation claims, staff analyzed disabling injuries to workers younger than 25 years. This information was shared with O[yes] to inform topic areas of interest for the annual young worker public service announcement video contest.

Emergency response planning and preparedness efforts by OPHP staff have been leveraged and implemented by OHA responders and partner agencies such as local health departments, volunteer groups, and healthcare facilities. OPHP currently provides safety and health services for all of OHA's emergency responders including training, maintaining updated response and compliance plans, providing annual respirator fit testing, and serving as the administrator of the agency's respiratory protection program.

OPHP increased collaboration with Oregon Occupational Health & Safety Administration (Oregon OSHA) during this project period. In particular, data on adult lead exposure was shared with Oregon OSHA through quarterly updates and communication of high blood lead levels on a regular basis.

Outcomes/Relevance/Impact

A potential outcome of OPHP's partnership with O[yes], is amplified reach by sharing data and information at various events and conferences in Oregon. O[yes] created a pool of safety and health professionals who have been trained in delivering occupational safety and health curriculum to teens. These speakers are available for events and high school classroom presentations around the state.

An intermediate outcome of OPHP support for emergency preparedness is an increased level of awareness and preparedness for Oregon responders. Public health responders now have comprehensive and detailed Oregon OSHA-compliant plans for respiratory protection and personal protective equipment. OHA responders have a clear understanding of their roles and expectations, and have the tools to succeed in those roles. Healthcare partners, in addition to being more prepared for emergencies, now have a source for high quality consultation on emerging infections. One especially significant impact is that OPHP helped Oregon hospitals prioritize the use of limited N95 respirator supplies during the H1N1 response. OPHP worked with experts from around the country to develop respiratory protection guidance that, while deviant from existing CDC guidelines, identified tasks that could be performed safely without a respirator. These efforts allowed hospitals to protect their employees while dealing with an unfortunate supply issue.

A newly-established intergovernmental agreement between OPHP and Oregon OSHA resulted in an intermediate outcome of a more rapid response to occupational lead exposures by Oregon OSHA. While Oregon OSHA valued quarterly updates from OPHP, in some cases they were not leading to an improved response. OPHP and Oregon OSHA negotiated a more frequent reporting system for significantly elevated blood levels (>25 µg/dL) or multiple employees with elevated levels from the same employer. This new reporting has allowed Oregon OSHA to perform compliance inspections for temporary worksites, including bridges actively being repainted. Previously, these worksites often went uninspected, even for cases of extreme lead poisoning, because Oregon OSHA simply wasn't aware with enough time to conduct an inspection.

II. Fatality Assessment and Control Evaluation component

Significant Findings

The expanded occupational fatality surveillance of the OR-FACE program addresses gaps in existing Oregon surveillance systems. For example, in a prior evaluation analysis conducted by our program, only 46% of fatalities identified by OR-FACE were also registered by the state workers' compensation system.

During the project period we produced new web-based interactive surveillance fatality maps to visualize pockets of risk and the burden of occupational fatalities in Oregon. Website visitors can select and display data by year, industry, occupation, or event.

OR-FACE built substantial new investigations capacity through a new unique agreement with Oregon OSHA, new and renewed contracts with industry experts, and recruitment of a seasoned Certified Safety Professional as project manager and field investigator.

Our surveillance and intervention development research resulted in three scientific publications related to workplace fatalities. Findings included the identification of increased risk of transportation fatalities among older workers (≥ 65 years). After controlling for employment in high-risk industries, older workers remained nearly four times more likely to die in transportation events. Four possible contributing factors were investigated through additional research in the paper (see potential outcomes below).

To reach front-line construction workers with stories and recommendations from Oregon fatal cases, three field studies were conducted to create a new evidence-based toolbox talk format (manuscript under review).

We continued significant work in other high risk industries, including production of new hazard alerts in logging (snag hazards) and crab fishing (personal flotation devices), and in depth fatality investigations in logging.

Translation of Findings

New interactive fatality maps were disseminated through a multi-channel campaign, including Facebook, Twitter, the "Oregon and the Workplace" blog, and Oregon Health & Science University research news. Total website traffic generated by outreach campaigns, such as the one dedicated to interactive mapping, increased by 20 times since 2013 when current tracking system began.

Efforts to build investigation capacity, including our agreement with Oregon OSHA, resulted in a joint observation of a fatality site where a supervisor was killed in a residential construction truss collapse. This case and others were presented at a jointly planned workshop titled, "Research and Resources on Traumatic Occupational Incidents," with an Oregon OSHA fatality investigator at the Oregon GOSH conference, which is the largest professional safety event in the region.

Following our research on elevated transportation fatality risk among older workers, we established new training partnerships with the Oregon Trucking Association's "Leadership and Safety Summit" and the SAIF Corporation's (an Oregon workers compensation insurance provider) "Agricultural Safety Seminar Series" that reached over 2000 transportation safety professionals and owners, company/farm owners, and workers. In agriculture, the event used fatal cases to illustrate the importance of safety communication

(social modeling, safety voice) across generations and status on farms (e.g., grandfather to grandson, employee to supervisor).

After publishing an initial set of construction toolbox talks in our new format, the talks quickly became the most popular monthly downloads on the OR-FACE website. The popularity of the program resulted in extending the program to logging, which shares a similar tradition of brief safety meetings.

Our outreach efforts were greatly expanded in the project period through increased presentations, posters, and talks for safety professionals (19 safety & health conferences/meetings, 4 industry/community advisory committees, 3 Oregon OSHA Agency meetings, 4 scientific conferences) that included engagement with Associated Oregon Loggers, Home Builders Association, the local chapter of American Society of Safety Engineers, and the Mid-Oregon Construction Safety Summit. The use of social media to disseminate fatality prevention recommendations also increased, including 16 blogs related to OR-FACE resources and events. Logging and young worker safety resources remained in high demand and were requested and distributed across the state and beyond.

Outcomes/Relevance/Impact

Several potential outcomes were produced by OR-FACE through surveillance research findings and in depth fatality investigations. For example, our research on older workers identified four potential contributing factors to elevated transportation deaths, including the organization of work in small businesses (e.g., diminished safety resources), physical fragility, and normative physiological and cognitive changes with aging. To illustrate the many potential outcomes from our investigations program, we identified practices to prevent residential construction truss collapses, including bracing to manufacturer recommendations and preventive building practices, such as sheeting trusses on the ground and the use of interior or exterior scaffolding. OR-FACE also participated in successful O[yes] Coalition annual safety video contests for high school students.

Intermediate outcomes include observed impacts of our new toolbox talk guides. Relative to talks given with long-form investigation reports, the new talks were preferred by over 80% of supervisors and saved 15 minutes of preparation and presentation time. All talks based on fatal events impacted workers' intentions to take preventive actions. Other intermediate outcomes include our impact on the "Washington State Logger Safety Initiative." The OR-FACE logging safety consultant from Oregon State University is serving as an auditor for logging firms, and was invited to speak at the Washington Contract Loggers Association Safety Conference, titled "OR-FACE History, Mission, and Logging Safety," where we distributed 150 Fallers Logging Safety booklets, 50 Snag Hazard Alerts and 50 each of three logging Toolbox Talk Guides.

The end outcome of fatal workplace incidents continued to be monitored through expanded OR-FACE surveillance. It is complex and difficult to attribute direct impacts of our small, yet incredibly active, OR-FACE research program on rare and dispersed fatal events that result from complex and multi-level factors. However, Oregon fatality counts and rates generally declined during the project period (count from 49 [in 2010] to 43 [in 2013]; rate from 2.9 to 2.4 per 100,000). Provisional data from 2014 are on the boundary of this range but higher than 2013.

Section 2

I. Overall and Occupational Health Indicators Scientific Report

Background

Work can impact your health. The hours you work, the tasks you perform on the job and your workplace environment can be healthy and safe, or these factors can lead to injury, illness, or death. Of Oregon's 1.8 million workers, approximately 42,900 were hurt on the job or experienced a work-related illness in 2012. That same year, 43 workers in the state died as a result of traumatic workplace injuries.

Specific aims

To prevent future injuries, illnesses and deaths in Oregon, the Oregon Health Authority operates the Occupational Public Health Program (OPHP) that includes fundamental surveillance of Occupational Health Indicators (OHI) through the state-based occupational health and safety surveillance cooperative agreement NIOSH. Through this cooperative agreement, program staff conducted occupational health surveillance to better gauge the extent of and characterize work-related injuries, illnesses, and deaths. OHI data and other findings were shared with partner and stakeholder groups to raise awareness about occupational health and safety issues and inform prevention efforts. Staff also worked in collaboration with partners to devise and implement intervention strategies.

The specific aims of the fundamental occupational health and safety surveillance program are listed below:

- Aim 1: Maintain and strengthen Oregon's surveillance system to capture OHI activities.
- Aim 2: Conduct comprehensive and rigorous analysis of Oregon specific OHI data to assess the state of occupational health and safety in Oregon.
- Aim 3: Develop and implement a comprehensive communication and outreach effort to disseminate the findings of the program.
- Aim 4: Maintain and strengthen the OPHP Advisory Committee to enhance and expand collaboration.
- Aim 5: Explore economic costs associated with specific conditions.
- Aim 6: Evaluate the Fundamental surveillance system and other aspects of the Oregon Occupational Public Health Program.

State-based surveillance of occupational illness and injury has been an integral part of Oregon's Public Health Division since 1987, when Oregon began its development of an innovative occupational health surveillance system. Oregon's system includes unique data sources that provide essential information for state and nationwide occupational surveillance. These state surveillance data exceed the national data standards and add value by providing the opportunity to evaluate differences in public and private industry data sources. The accuracy, completeness and detail the data provide are critical for targeting intervention efforts at the local and state level and for measuring their impact.

Aim 1. Maintain and strengthen Oregon’s surveillance system to capture Occupational Health Indicator (OHI) activities.

OHI maintained its core surveillance activities during the project period, and provided all indicators to NIOSH. Existing data sources were maintained, and efforts were initiated to obtain occupational data from new sources, including non-disabling claims and syndromic surveillance of occupational injuries and illnesses. Blood lead test data was migrated to a newer database that is used for all reportable conditions (with the sole exception of pesticide exposure) at the Oregon Public Health Division. This will ensure a functional database for the future.

In 2011, due to a long delay in release of Bureau of Labor Statistics (BLS) Geographic Profile of Employment and Unemployment, staff explored using DataFerrett, a data analysis and extraction tool, to get data for parts of the Employment Profile in 2007. Staff explored using industry and occupation variables (P9 and P10), labor force variables (P3), and class of worker variables (P2) directly from the Current Population Survey to calculate these values. To test the validity of this method, data from prior years with published values from the official Geographic Profile were calculated using the new methods. Values were found to be nearly identical. The methods were shared with other state-based surveillance grantees.

Staff analyzed accepted disabling workers’ compensation claims among Oregon young workers by age group (10-18, 19-21, and 22-24 year olds) and calculated rates by employment using Quality Workforce Indicators data from the U.S. Census Bureau and Local Employment Dynamics. The results of this analysis demonstrate that targeted prevention strategies need to be developed for older teens and young adult workers, especially because child labor laws do not apply and offer protection after 18 years of age. The findings of this analysis were presented at several regional and national conferences. In addition, the results and prevention recommendations were synthesized into a manuscript, “Occupational injuries to Oregon workers 24 years and younger: An analysis of workers' compensation claims, 2000-2007,” and published in a July 2010 edition of the American Journal of Industrial Medicine.

Oregon was able to participate in the NIOSH Sentinel Event Notification System for Occupational Risk (SENSOR) - Pesticides program, even though the state does not receive NIOSH funding for this effort. Oregon’s Pesticide Exposure, Safety & Tracking Program utilizes SENSOR’s case definition and classification criteria for reports of acute pesticide exposure cases it investigates, and exports de-identified case data to SENSOR-Pesticides annually. As a result, since August 2010, the reported burden of occupational acute pesticide exposure in Oregon has been included in four articles published in peer-reviewed journals by NIOSH SENSOR-Pesticide staff and participating data providers, including Oregon.

In August 2014, Pesticide Exposure, Safety & Tracking released an analysis of confirmed cases of acute pesticide exposure reported to it from July 2009 thru June 2011, which found that, of 29 confirmed cases occupational acute pesticide exposure over 62% occurred because of a pesticide misapplication by a co-worker. In partnership with OHI and Oregon

OSHA, Pesticide Exposure, Safety & Tracking intends to bolster efforts to increase worker-safety and communication between co-workers.

Aim 2. Conduct comprehensive and rigorous analysis of Oregon specific OHI data to assess the state of occupational health and safety in Oregon.

In 2010 staff began an analysis of Adult Blood Lead Epidemiology and Surveillance Program (ABLES) data. An examination of 33,400 recorded blood lead tests between 2006 and 2010 showed that nearly 14% were greater than or equal to 10 µg/dL. The number of adults with elevated blood lead levels (≥ 10 µd/dL) had decreased, although not significantly. Individuals with blood lead of 25 µg/dL or greater were more likely to have an occupational source. For cases related to a person's work, the most common industry reported was electrical equipment, appliance, and component manufacturing. The results of this analysis were published on the OHI website. A notice also went out over the state-based surveillance listserv in addition to the ABLES listserv. A link was also sent to our partners at Oregon OSHA, who posted it on their website.

To expand on the above mentioned epidemiologic analysis of young worker injuries, staff conducted a spatial analysis using workers' compensation data and then produced maps of injury rates by county, and spatial statistics suggesting areas of high or low injury clusters. The analysis is significant since it provides important information about the distribution of young worker injuries and other factors that may influence their distribution in the state. Staff repeated the spatial analysis when they obtained and incorporated medical only claims from a commercial insurance carrier. The results were shared with members of the O[yes] coalition and presented at the Oregon Public Health Association Conference in the fall of 2010.

Program staff completed a trend analysis of Oregon Survey of Occupational Injuries and Illnesses based on a general approach provided by NIOSH. Staff examined six years of Survey of Occupational Injuries and Illnesses data (2003-2008) for rates of injuries and illnesses combined, and rates for injuries only and illnesses only. The total injury and illness rate decreased by 3.9%; the total injury rate decreased by 3.2%; and the total illness only rate decreased by 10.3%. These results are consistent with published BLS studies, showing a consistent downward trend in injury and illness rates since 2003.

Staff, in partnership with OR-FACE, collaborated on an analysis of elevated occupational fatalities among older workers (over age 65) in Oregon. The project used data from OR-FACE, BLS, Oregon Workers' Compensation, Census of Fatal Occupational Injuries (CFOI), and peer reviewed literature to address research gaps and recommend evidence-based guidance interventions. After controlling for male employment levels in high-risk industries, elevated risk remained. Empirical analyses of other potential contributing factors included the organization of work in small businesses (including diminished safety resources), physical fragility, and normative physiological and cognitive changes with aging. Seventy percent of events occurred in businesses with fewer than fifty employees, and agricultural cases were prevalent.

Aim 3. Develop and implement a comprehensive communication and outreach effort to disseminate the findings of the program.

Early in the project period, program staff began working with the CDC-funded Oregon Environmental Public Health Tracking (EPHT) program and other state-based occupational health surveillance grantees to incorporate a selected number of OHIs into the state and national EPHT portals. Two Oregon program staff participated in a workgroup formed to integrate work-related lead poisoning data into the portal. The group assessed the completeness of each state's data, identify a denominator to calculate rates, and evaluate the best possible way to present these data on the portal. Oregon staff drafted a how-to guide and data dictionary for the other states to use in piloting an indicator of adult elevated blood lead levels. Unfortunately, the effort stalled at the national level. OPHP and EPHT remained engaged to develop occupational health indicators for the Oregon EPHT portal.

Staff presented the OHIs and findings from special analyses, such as the epidemiologic analysis of young worker injuries in Oregon, to various partners throughout the project period. Our partners report these presentations to be of high value and important for understanding the true magnitude of work-related injuries and illnesses in the state. In some instances, our program partners have reported using our results in their own presentations to raise awareness and illustrate the extent of work-related injuries and illnesses.

Program staff collaborated with program partners to increase exposure to shared topics of interest. Significant examples of outreach collaboration follow. OPHP collaborated with the Oregon Hazardous Substances Incident Surveillance program and O[yes] on an exhibit about worker safety and appropriate glove use at the January 2011 Annual Northwest Agricultural Show in Portland, Oregon. OPHP and Oregon Hazardous Substances Incident Surveillance program co-sponsored a symposium on Inherently Safer Technology with Oregon Health & Science University (OHSU) in June, 2012. A further collaboration with O[yes] was started late in the funding year. OPHP, O[yes], and members from the Oregon Institute for Occupational Health Sciences co-presented program materials at regional occupational health and safety conferences throughout Oregon. OPHP also partnered with the Oregon Institute for Occupational Health Sciences to organize a symposium entitled "Sedentary, Stationary and Physically Demanding Work: Health Consequences and Workplace Solutions". This event brought traditional public health advocates together with occupational health and safety professionals to discuss Total Worker Health issues around physical activity.

OHI was heavily involved with the O[yes] during the funding period. O[yes] incorporated as a 501(c)(3) non-profit during this time, and OHI coordinator Dan Cain continues to serve as a founding board member. OHI played an active role in administering a video contest soliciting safety videos from Oregon high school students. OHI also co-sponsored this annual event, and served on judging panels. Additionally, OHI and O[yes] partnered with the University of Oregon to train teachers on the Talking Safety occupational safety and health curriculum. These efforts appear to coincide with a downward trend in injury rates for young workers (under 25 years of age).

OPHP provided significant support to the Health Security, Preparedness, and Response section, OHA's emergency preparedness responders, during the entire course of this grant. OPHP regularly served on the agency Incident Management Team, filling both Safety Officer

and Subject Matter Expert roles. OPHP developed templates for respiratory protection and personal protective equipment plans, and shared with other response agencies and health departments. Staff from OPHP also revised and expanded emergency response plans for OHA employees to ensure the safety and health of agency responders. Recommendations were issued by OPHP staff for a variety of hazards, including H1N1, Ebola, wildfires, radiation, and extreme weather events for public health, healthcare, and other responders.

Aim 4. Maintain and strengthen the Occupational Public Health Program (OPHP) Advisory Committee to enhance and expand collaboration.

OPHP established an advisory committee in 2005 and regularly convened this group over the years to discuss occupational injuries, illnesses, and fatalities with members dedicated to improving workplace safety and health. During this funding period, OPHP combined their advisory committee with the OR-FACE program in order to increase collaboration. The group consists of representatives from academia (OHSU Institute of Occupational Health Sciences, Oregon State University, Portland State University, and the University of Oregon's Labor Education and Resource Center), the state chartered workers' compensation insurance company, the largest private workers' compensation insurance company, and other state agencies (Oregon Occupational Safety & Health Division) and the Information Management Division). Our newest members include representatives from the Office of Migrant Health and the Office of Equity and Inclusion. While the major purpose of this group has been to advise the program on occupational health issues, meetings have also been a unique forum for members to network and identify new opportunities for collaboration with their colleagues. Two examples of the value of collaboration among OPHP Advisory Committee member's institutions follow.

With support from O[yes], program staff in collaboration with OHSU Institute of Occupational Health Sciences conducted focus groups to investigate young workers' views regarding workplace safety and health. Seventeen high school students from the Architecture, Construction and Engineering (ACE) Academy in Portland participated. Participants were asked about current jobs and work history, as well as about job training and injuries at work. Many of them were currently employed (35%), and industry sectors included food service, retail, construction, agriculture and childcare. Students worked a broad range of hours per week, reporting from 8 to 25 hours. The majority (71%) reported past employment and industry sectors included the above plus manufacturing, forestry, and work for a retirement home, ski resort and moving service. Most of the students reported receiving safety and health training from either current or past employers (76%). Some of them had been hurt at work (18%), while a majority (60%) reported almost being hurt on the job (near misses). Of those who had been injured, 33% did not report the injury to their employers, and they stated that their injuries were minor when asked why they did not report. Those who reported an injury stated that their employers' responses were either positive or neutral. The results from this qualitative research provide preliminary information about how young workers experience work and their knowledge and attitudes about workplace health and safety. This information was used to evaluate the O[yes] coalition's current activities and strategies for youth engagement and advance their understanding and development of future prevention interventions for young workers.

OPHP leveraged a strong existing partnership with the Oregon OSHA when funding for the ABLES program was eliminated by NIOSH. Oregon OSHA uses this data to investigate employers and industries that may be exposing employees to high levels of lead. Oregon OSHA valued the data received from ABLES and OPHP and, after negotiations, offered to fund adult blood lead surveillance. An interagency agreement is now in effect to fund the sharing of this data.

Aim 5. Explore economic costs associated with specific conditions.

Occupational injuries and illnesses are costly. Having information on the economic costs of injuries and illnesses (including missed time from work as well as medical payments) allows us to more fully gauge the impact they have on the state. Oregon's Department of Consumer and Business Services shared data on closed medical and indemnity costs. The cost data were linked back to claimant information via each claim's unique identifier. Program staff summarized cost data for indicator conditions of interest (amputations; carpal tunnel syndrome). The average cost of amputations went up around 41% between 2001 and 2010; for carpal tunnel syndrome, 55%. In addition, staff analyzed Hospital Discharge Index for cost of all work-related hospitalizations; burns; and pneumoconiosis. These data show that average charges for work-related hospitalizations increased as well during the time period.

Aim 6. Evaluate the Fundamental surveillance system and other aspects of the Oregon Occupational Public Health Program.

OPHP administered a survey of our advisory committee. The purpose of the survey was to gauge member satisfaction with how the advisory committee worked in the past and gain insight into how better to structure the advisory committee in the future. Out of 20 members who were sent the survey, 10 attempted to complete it. Those who responded to the survey were satisfied with their involvement in the advisory committee. All responding members reported that they saw value in being a member of the committee, while 60% stated they would be moderately or definitely likely to continue being a member. Many noted that this was the only statewide forum to raise occupational health issues among interested stakeholders. Priority areas to focus on in the future were identified as health care workers, especially non-English speakers, as well as home health workers. Clearer guidance on members' role in the advisory committee, and increased representation from other groups (e.g., industry organizations, unions) were also changes thought to be needed.

II. Oregon Fatality Assessment and Control Evaluation Scientific Report

Background

Oregon Fatality Assessment and Control Evaluation (OR-FACE) conducts surveillance, investigation, and assessment of traumatic occupational fatalities in Oregon, and engages in educational outreach activities to help prevent traumatic occupational fatalities and promote safety. OR-FACE 5-year grant period – July 1, 2010 to June 30, 2015 – operated with the following aims.

- Aim 1. Maintain the core occupational fatality surveillance, investigation, assessment, and prevention activities of the existing OR-FACE program.
- Aim 2. Develop intervention strategies designed to reduce occupational fatalities associated with falls, particularly involving ladders and construction.
- Aim 3. Develop intervention strategies to reduce occupational fatalities for older workers (aged 65 and over), particularly involving operation or work around large trucks and mobile machinery.
- Aim 4. Continue interventions in current areas of concern related to young workers, immigrant workers, commercial fishermen, and logging; and develop other outreach activities in priority areas as appropriate.
- Aim 5. Collaborate with institutional partners to develop effective intervention strategies.
- Aim 6. Evaluate program activities.

Procedures/Methodology

1. Surveillance

The OR-FACE surveillance system uses: (a) a Google alert keyword search, (b) quarterly reports of death certificates marked “at work” from Oregon Vital Records, (c) Oregon OSHA fatality notification reports, (d) a daily search of numerous websites, and (e) fatality reporting from the Oregon Emergency Response System. The use of the Google alert keyword search has improved our first-notification system and significantly augmented the span of our surveillance. Primary data sources include death certificates, Oregon OSHA, Medical Examiner, police investigation, and news reports, Workers’ Compensation records, and occasionally other records, such as photo disks, business profiles, hospital or emergency response records, or investigation reports from other sources. OR-FACE shares de-identified data comparing OR-FACE to Oregon CFOI fatalities.

2. Investigation

Incident investigation continued with the support of three independent expert investigators: one for logging, one for construction and another for machine-related and other incidents. In 2014 OR-FACE hired a Certified Safety Professional as project manager and field investigator. OR-FACE staff or a contracted investigator developed the first draft of each investigation report using all gathered evidence and input from the Oregon OSHA investigator when applicable and from industry experts or other safety professionals as necessary. Reports were published following an iterative review process, with final review by the program director and the OR-FACE publications review board composed of safety and health professionals and agency regulators.

Fatalities were analyzed using a root cause model to find ideal ways to eliminate or control the hazard, considering factors from the broad environment to individual perspectives. Safety recommendations in the investigation reports were prioritized according to the accepted hierarchy of controls—elimination, substitution, engineering, administrative, personal protective equipment. The focus is on hazards that may be eliminated or substituted by employers; followed by conditions and actions the worker could control; and finally, as appropriate, best industry practices and regulatory controls that government, equipment manufacturers, or other agencies should consider implementing.

3. Assessment

OR-FACE analyzes incident data to identify and summarize trends, grouping incidents by coded industry (North American Industry Classification System (NAICS)), occupation (Standard Occupational Classification (SOC)), and event (Occupational Injury and Illness Classification System (OIICS)), and by demographic and other variables, such as a specific source or setting of the injury. Fatal case data were independently coded by two raters for all variables measured. Disagreements between scorers were reconciled in consultation with original evidence prior to analysis and publication. Each OR-FACE incident is summarized with an abstract. Abstracts and incident data are presented in an annual report. Safety recommendations for particular incidents are developed in investigation reports, hazard alerts, safety booklets, toolbox talk guides, and other materials.

4. Outreach

OR-FACE safety materials were published on the OR-FACE website (<http://www.ohsu.edu/xd/research/centers-institutes/oregon-institute-occupational-health-sciences/outreach/or-face/>), and in printed products. Along with electronic circulation to e-publication subscription list, materials were also circulated by regular mail, and included in industry publications and local newspapers, and at conferences and events. Direct mail lists were developed, and samples were mailed along with a postage-paid card for individuals to order additional copies. Members of the OR-FACE team attended conferences and events to give presentations on safety issues and provide safety materials. OR-FACE also participates in the Oregon Institute of Occupational Health Sciences outreach activities; the outreach team maintains tables at numerous work and safety conferences in every region of the State and presents OR-FACE safety materials.

Results

Aim 1. Maintain the core occupational fatality surveillance, investigation, assessment, and prevention activities of the existing OR-FACE program.

In the 5-year grant period (July 1, 2010- June 30, 2015) OR-FACE recorded 227 (62 provisional) traumatic occupational fatalities in 222 (55 provisional) incidents – an average of 45 fatalities in 44 incidents per year. OR-FACE regularly identified more fatalities than that reported by Oregon OSHA as “program-related” fatalities. In the 5-year grant period OR-FACE published 12 investigation reports. These investigation reports covered established priority areas, with an emphasis on forestry/logging and construction. Table 1 lists the number of investigation reports by priority industry. If the incident was not in a listed industry then they are included in a priority event (fall and machine-related) or other. The number of investigations where a Hispanic worker was fatally injured is

provided. They are accounted for in a priority industry or event and not included in the total.

Table 1. OR-FACE Priority Areas and Investigation Reports, July 2010-June 2015

Priority Areas	Investigation Reports
Forestry/Logging	4
Construction	2
Agriculture	1
Falls	1
Machine-related	2
Other	2
Hispanic	4*
Total	12

*These are not included in the Total. They are accounted for in the following priority areas: Agriculture, Logging, Other and Falls.

All OR-FACE publications are posted on the website. Once posted, a campaign of distribution for e-publication subscribers (approximately 280) was initiated. In addition, notification of these publications was included in the Oregon Institute of Occupational Health Sciences Facebook page, Twitter, and blog. Selected print materials are distributed at conferences, events, and by mail upon request. Many of these publications are highlighted in trade publications and news stories (see Publications). A database with all OR-FACE cases coded for industry, occupation, and event along with an abstract is available for download. The incident abstracts page includes a search function and industry filter. A new feature added in 2014 allows a keyword search of the database. Where available, abstracts are linked to investigation reports.

New web-based interactive surveillance fatality maps were produced to visualize pockets of risk and the burden of occupational fatalities in Oregon. Website visitors can select and display data by year, industry, occupation, or event.

Further information about the circulation of safety materials is provided under subsequent aims in specific areas of concern, and in the annotated list of publications. Outreach activities are itemized in the Publications section below.

Aim 2: Develop intervention strategies designed to reduce occupational fatalities associated with falls, particularly involving ladders and construction

OR-FACE proposed three components to accomplish this aim: (1) prepare media campaign related to fall prevention and ladder safety to raise awareness; (2) collaborate with industry associations and Oregon OSHA to produce significant safety recommendations for principal fall hazards; and (3) develop recommendations and if possible a tool for safe

ladder set up. In 2011, the new OR-FACE project director adjusted the components for accomplishing this aim to focus on the development and field testing of evidence-based toolbox talks for construction supervisors. This adjustment focused on front-line supervisors as the communication medium for fatality prevention information instead of the media or Oregon OSHA. The plan also aimed to leverage existing OR-FACE prevention recommendations from previously published investigation reports. The component to develop a tool for safe ladder set up was abandoned due to NIOSH plans to develop an “app” for exactly that purpose. Instead of the tool component, OR-FACE focused on supporting national and regional fall prevention efforts that aligned with our falls prevention aim. All of these efforts are summarized below.

Full-length FACE investigation reports are typically 5-7 pages long and written for safety professionals. To reach front-line construction workers with stories and recommendations from fatal falls, we used field studies to develop and evaluate a new evidence-based toolbox talk format. OR-FACE developed and began evaluating one-page toolbox talk guides to help supervisors tell stories of Oregon construction fatalities during pre-shift safety talks. First we collected data to investigate current pre-shift briefing practices in the Oregon residential construction industry and gather feedback for our initiative. These data were collected from construction leaders and workers (n=28) at the Mid Oregon Construction Safety Summit in Bend, OR (January 2012). Survey results showed that there are opportunities to increase the frequency of safety as a topic in pre-shift briefings, and that most construction supervisors would prefer receiving materials from OR-FACE in a paper format. Next Olson (Program Director) oversaw the development of initial 1-page guides in partnership with the Portland State University Occupational Health Psychology program and Hoffman Construction. Using evidence-based hazard communication principles, graduate student-led teams produced fourteen draft 1-page guides. Experimental field research was conducted to evaluate the draft guides at residential construction sites.

Statistical analyses of three field studies to develop and evaluate evidence-based toolbox talk guides to prevent fatal construction falls was completed. In the third and final field study the impact of supervisor talks using the one page guides was evaluated relative to supervisor talks using a full OR-FACE fatality investigation report. Both talks produced similar favorable worker reactions, perceptions of importance/urgency, and intentions to change behavior. However, one page guides saved supervisors nearly 15 minutes of preparation (7.3 min savings) and presentation (5.9 min savings) time. Observations showed that time savings did not shorten safety meetings, but rather the saved time was spent discussing prevention recommendations. Moreover, 81.8% of supervisors and 66.4% workers preferred the talks given with one page guides. The manuscript has been submitted for publication and is under peer review.

Seven construction toolbox guides based on OR-FACE investigations were created during the budget period. Three of these were based on fatalities associated with ladders. Media campaigns for these tools included publishing on the website, distribution to e-publication subscribers, and posting to the Oregon Institute of Occupational Health Sciences blog, Facebook and Twitter. They were also made available at state-wide safety conferences and events.

In April 2014 OR-FACE blogged and posted videos provided by Center for Protection of Workers' Rights (CPWR) on the website for the national safety stand down campaign for fall prevention in construction. In 2015, OR-FACE collaborated with the Pacific Northwest Occupational Safety & Health Administration (OSHA) Education center and local construction groups and suppliers to enhance participation in the national campaign for fall prevention (see Aim 5). Further construction outreach was accomplished when OR-FACE presented at the January 2015 Oregon Construction Safety Summit where published toolbox talk guides and other OR-FACE construction resources were distributed.

In December 2014 OR-FACE blogged the online inventory of fall protection equipment. The Fall Protection Resource for New Home Construction website was developed by faculty members at Washington University in St. Louis and supported by CPWR through a NIOSH cooperative agreement. This catalogue of fall prevention devices utilized in residential construction contains links to equipment manufacturer/distributor websites.

Aim3: Develop intervention strategies to reduce occupational fatalities for older workers (aged 65 and over), particularly involving operation or work around large trucks and mobile machinery.

The OR-FACE intervention strategy for older workers proposed several components. These included (1) a research project to define the target population and distinguish risk factors and coping mechanisms, designed to maximize the opportunity for family communication; (2) collaboration with the Institute on Aging at Portland State University to adapt its research design on driving cessation for older drivers to older workers in rural areas; and (3) development of a research plan to obtain external funding for the research project. As planned, the project began with a research project to specify the risk and review evidence for contributing risk factors and identify potential intervention levers. In 2011, the new OR-FACE director abandoned component (2) above, as driving cessation for people who make their living operating vehicles did not seem to be a high leverage starting point for intervention. Component (3) above was adjusted to focus on training partnerships to expand outreach impact rather than pursuit of external grants.

In response to an observed elevated risk of fatal transportation events among workers over the age of 65, we conducted research on potential causal factors and intervention strategies and presented preliminary results (Olson, R., Walters, J., Karr, J., & Zoller, E., 2012). The research investigated evidence from several Oregon and National datasets regarding several factors that may explain the elevated mortality in this population, including exposure/employment level; organization of work factors; increased physical fragility; and age-related cognitive, sensory, and psychomotor changes. Findings showed that elevated risk is not entirely due to older workers being employed in hazardous transportation jobs, and suggests future interventions related to the organization of work among small employers may have leverage for reducing transportation deaths in this population. In April 2013, the manuscript was published in *Accident Analysis and Prevention*. The research investigated evidence from several Oregon and National datasets regarding several factors that may explain the elevated mortality in this population, including exposure/employment level; organization of work factors; increased physical fragility; and age-related cognitive, sensory, and psychomotor changes.

OR-FACE presented findings on increased risk of older worker deaths in transportation incidents at the Oregon Agriculture Show (Jan 2011) and at the Governor's Occupational Safety and Health Conference, Oregon's largest safety event (Mar 2011).

OR-FACE partnered with SAIF Corporation and the Oregon Trucking Associations to participate in their established annual training series to prevent transportation and mobile machinery fatalities. OR-FACE collaborated with SAIF to produce a training module presented in English and Spanish in the 2014-2015 annual SAIF Ag Safety Seminar Series. Consistent with original plans that recognized the value of family communication on farms, topics included communication across generations (safety voice, and social modeling) and cause analysis of a tractor fatality. Twenty-seven sessions were held around the State from November 2014 through March 2015 with a total of 2,223 attendees. Eight of these sessions were conducted in Spanish. In May 2, OR-FACE presented, "Preventing Transportation Fatalities: Lessons learned from Oregon Cases," at the 2015 Oregon Trucking Association Leadership and Safety Summit.

Aim 4: Continue interventions in current areas of concern related to young workers, immigrant workers, commercial fishermen, and logging; and develop other outreach activities in priority areas as appropriate.

OR-FACE proposed to pursue opportunities to circulate hazard alerts as flyers or brochures to target worker populations on a single topical issue with a clear safety message and to develop news releases as a cost-effective method to reach larger audiences. Existing resources were also leveraged to maintain active outreach in current areas of concern.

Young workers

In August 2010 OR-FACE partnered with several OHSU and governmental safety centers at the Safety Streets event, where over 1,700 children learned about injury prevention.

OR-FACE published additional copies of the popular brochure, "*Talking, dialing, texting... know the hazards of driver distraction*," in collaboration with a safety trainer from SAIF Corporation, to use in statewide safety seminars (Nov 2010). Additional dissemination of the brochure included the Oregon Department of Transportation, school-based driver education programs, and the Oregon Department of Administrative Services. OR-FACE partnered with several Oregon Health & Science University (OHSU) and governmental safety centers at the *Safety Streets event*, where over 1,700 children learned about injury prevention (Aug 2010).

OR-FACE continued to participate in O[yes] by leading two projects: (a) conducting several focus groups to engage young workers in discussing workplace hazards, issues impacting their health and safety, and outreach strategies (Apr 2011), and (b) conducting a needs assessment with employers (Mar 2011).

Hispanic workers

Two investigations reports ["Vineyard worker killed in fall from trailers," (Feb 2015) and "Contract sanitation worker killed cleaning meat blending equipment" (Dec 2014)], and two toolbox talk guides ["Logger killed under rigging when carriage drops" (Jun 2014) and "Novice drywall installer dies in 7-foot fall from scaffold" (Mar 2013)] that involved

Hispanic worker were published and distributed. A standard media campaign was used to distribute these documents.

Commercial fisherman

In collaboration with partners at the University of Washington with funding from the Pacific Northwest Agricultural Safety & Health (PNASH) center, we published a final report of the Oregon Crab Fishing Safety Assessment study (Croteau & Zoller, December 2011). The report highlighted current levels of PFD use, barriers to use, worker evaluations of 5 personal flotation device (PFD) types and recommendations for improved use. Fifty copies of the report were distributed to the US Coast Guard, the Oregon Dungeness Crab Commission, NIOSH, and PFD manufacturers. Future fishing fatalities may be prevented if key partners respond to the report, such as the Coast Guard increasing enforcement of PFD use, the Oregon Dungeness Crab Commission distributing report findings to its members, or manufacturers enhancing their offerings (price, availability, or choice) of PFD types preferred by workers.

As follow-up, OR-FACE published a “Crab Fishing Hazard Alert” (August 2014) and disseminated via the website to e-publication subscribers. Future dissemination plans include targeted distribution in Oregon port cities.

Logging

OR-FACE published the Oregon OSHA-funded, “*Yarding Logging Safety Handbook*” (Oct-2010). The handbook tells the stories of 18 fatal incidents in yarding operations in Oregon over 6 years, 2003-2008, with accompanying safety recommendations. The handbook is currently used to instruct fieldwork operations in the Oregon State University Forest Engineering Program.

As part of the Washington State Logger Safety Initiative, OR-FACE logging toolbox guides were distributed by the Washington Safety & Health Assessment & Research for Prevention (SHARP) program to approximately 200 logging contractors in Washington State. Furthermore, the OR-FACE contracted logging safety specialist from Oregon State University was asked to present to 500 attendees at the Washington Contract Loggers Association Safety Conference on January 2015 where toolbox talk guides, alert and the booklet, “Fallers Logging Safety” were distributed. During 2014-2015, seven logging toolbox talk guides based on OR-FACE logging investigations were published and distributed through the established media campaign—e-subscriber notification, Facebook, blog and Twitter.

A Snag Hazard alert was published September 2013 that provided safety tips along with a description of four fatal cases. The Alert was made available on the website and was distributed through e-subscriber notification and at the 2014 Associated Oregon Loggers safety conference and the 2015 Washington Contract Loggers Association Safety Conference.

Other logging efforts included the peer reviewed publication of a video analysis of expert and novice tree fallers at work.

Aim 5: Collaborate with institutional partners to develop effective intervention strategies.

OR-FACE partnered with industry groups, Portland State University, and three key agencies to develop effective intervention strategies to enhance core activities – investigation and outreach and Aim 2, preventing falls in construction.

Industry and Portland State University

OR-FACE partnered with Hoffman Construction, Fortis Construction, and Portland State University in the creation of toolbox talk guides based on OR-FACE investigations. Field studies to develop and evaluate a new evidence-based toolbox talk format included a needs assessment survey with construction supervisors (n=28), developing an evidence-based structure with the Portland State University Occupational Health Psychology program (NIOSH training grant 5T01 OH008435-08; L. Hammer, PI), measuring worker reactions and viewing distances for different types of images with Hoffman Construction (n=30), and a quasi-experimental evaluation study at eight construction sites with Fortis Construction (n=118). The manuscript is currently under peer review.

Agencies

Oregon OSHA - An official collaborative investigations agreement was signed by leaders of OR-FACE, Oregon OSHA, and the Environmental Public Health Section of the Public Health Division of the Oregon Health Authority (July 2013). The overall purpose of the agreement is to enhance fatality investigations and outreach materials in Oregon. Key terms of the agreement include:

- i. Oregon OSHA investigators will provide employers at the opening conference an informational pamphlet on the OR-FACE research and investigation program.
- ii. OR-FACE researchers will be provided access to participate as a silent observer for selected Oregon OSHA fatality investigation. During these investigations, OR-FACE researchers will be allowed to make suggested investigation question requests of the Oregon OSHA fatality investigator.

In addition, under the agreement Oregon OSHA fatality investigators may share information with OR-FACE program researchers throughout the investigation instead of only post-publication. Further two way exchanges of information between investigations program are supported in the agreement with sensitivities for protecting respective program priorities and processes. The agreement led to a joint site observation of a construction truss collapse fatality case with OR-FACE and Oregon OSHA, an investigation report for that case, and a joint conference workshop on fatality prevention that included presentations from both OR-FACE and Oregon OSHA fatality investigators (described below with *Oregon Department of Consumer and Business Services* partnership).

Pacific Northwest OSHA Education Center - OR-FACE partnered with the Pacific Northwest OSHA Education center to develop an outreach strategy for the national safety stand down campaign for fall prevention in construction. In addition to OR-OSHA and a local safety equipment supplier (Capital Safety), local advocacy groups (American Society of Safety Engineers (ASSE) Columbia-Willamette Chapter, Associated General Contractors, Home Builders Association and SafeBuild Alliance) were contacted for collaboration and participation.

- SafeBuild Alliance sponsored a Kick-Off event on May 1, with approximately 100 attendees. Posters were displayed of employer planned safety activities. Proclamations by cities, counties, and state for Safety Week were posted.
- Free training, OSHA 7405, Fall Prevention Awareness in construction was conducted on May 8. There were 40 attendees. Speakers included OSHA Region X Director, Cecil Tipton, OR-FACE, and Oregon OSHA. The day included a question/answer session with a panel comprised of the speakers and partner representatives.
- Campaign information dissemination included posting on OR-FACE and partner (Associated General Contractors, Home Builders Association, SafeBuild Alliance) websites, announcements at association meetings with emails to members, article in ASSE newsletter, and articles on the Oregon and the Workplace Blog.

Oregon Department of Consumer Business Services -OR-FACE collaborated with an Oregon OSHA fatality investigator and Oregon's Workers Compensation Ombudsman on a four-hour workshop, "Research and Resources on Traumatic Occupational Incidents." The workshop was held during the biennial, Oregon's Governor's Occupational Safety & Health Conference.

Aim 6: Evaluate program activities.

Ongoing evaluation of the OR-FACE website and reports was accomplished through tracking the number of visits, and feedback from responses to the website survey. In 2013 attempts by external hackers created problems with the system. Recent redesign/update of the OHSU system created broken links and OR-FACE continues to correct the problems. In 2010 the number of recorded visitors to the website was 103. Since then it has been steadily increasing. In 2014-2015 budget period 11,371 visitors were recorded.

OR-FACE tracks circulation of all safety materials. Postage-paid cards to order sample publications provided an opportunity for user comments that helped evaluate the quality of the materials. The recent focus to promote resources on the website has enabled electronic evaluations of the website and documents. Tables 2, 3, 4, and 5 present results of evaluations submitted by 101 visitors online.

Table 2. Public Rating of OR-FACE Safety Materials

	Excellent	Very good	Good	Fair	Poor	No Response
Website						
Overall	26%	41%	13%	0	0	21%
Usefulness	24%	46%	8%	2%		21%
Readability	29%	41%	7%	2%	0	22%
Online Reports						
Overall	33%	46%	4%	1%	1%	16%
Usefulness	30%	48%	5%	1%	0	17%
Readability	39%	39%	5%	1%	0	17%

Table 3. Type of organization providing evaluation

Type	Percent
Consulting	8
Government	29
Specialty Trade/Industry	45
University/Research	4

Table 4. How the information will be used

Information use	Percent*
Training or toolbox talks	89%
Distribute to employees/others	51%
Personal awareness	53%
Post on bulletin board	29%
Filed for future reference	28%

*Several responses can be selected

Table 5. Some positive comments

Position	Comment
H&S Professional	Great information--thank you for collecting it and sharing it. Charts and graphs are very helpful, and I use for trainings.
H&S Professional	The new distracted driving brochure is very timely and well written.
Hourly employee	I use the safety books for my work study students to read and understand the importance of safety on the job. The back of the book with the chart of hours and times that students can work is very useful. I often have students coming back and letting me know how it has helped to inform them of what their rights are as youth workers.
Owner	We have a sharpening and small gas engine repair shop and I like having the books available for our customers for when they go out and saw down trees. It is a very good reminder for people who have been cutting down trees for years for things they might have forgotten because of habit. My husband and I and our customers are very gratefull for the books. Thanks
H&S Professional	thank you for using your dollars on things we really need. safety is number one. asking me to overlook a minor safety violation is asking me to evaluate the value of your life. i live by that slogan.
H&S Professional	This is a great service and consistently applicable to manufacturing, and wood products in particular. The tailgate guides with this edition will be very helpful and informative for our 20-25 internal construction crew.
Management	This is the first time I have seen these publications, and I was very impressed. The ideas for questions that managers can ask their employees to gain both involvement and provoke both conversation and awareness are really good! My only constructive comment regards the exclamation point after the title "Fatal Hazard". Personally, I only use exclamation points when what I type is positive, happy, etc; so it hit me oddly - as if it was a happy thing. Keep up the great work!
H&S Professional	Regarding the toolbox talks, I especially like the follow-up questions for the presenter to ask his/her audience.
H&S Professional	I do a lot of volunteer speaking on the subject of fatigue, sleep deprivation, shift work and the effects of common sleep disorders on employee health and safety. I use the face reports as part of my ongoing research and training improvements. Thank you, Derek Davis

Discussion

During the project period OR-FACE was successful at accomplishing its 6 Specific Aims, which were to:

- Aim 1. Maintain the core occupational fatality surveillance, investigation, assessment, and prevention activities of the existing OR-FACE program
- Aim 2. Develop intervention strategies designed to reduce occupational fatalities associated with falls, particularly involving ladders and construction.
- Aim 3. Develop intervention strategies to reduce occupational fatalities for older workers (aged 65 and over), particularly involving operation or work around large trucks and mobile machinery.
- Aim 4. Continue interventions in current areas of concern related to young workers, immigrant workers, commercial fishermen, and logging; and develop other outreach activities in priority areas as appropriate.
- Aim 5. Collaborate with institutional partners to develop effective intervention strategies.
- Aim 6. Evaluate program activities.

The significant accomplishments related to each specific aim, as described in sections above, took place during a period where the program experienced significant staff turnover, including a change in director in late 2011 and project manager turnover in 2012 and 2013. Certain core activities and publications were delayed in early project years due to the timing of staff turnover, but have since fully recovered. Annual reports of occupational fatalities were brought to currency in 2013 with the publication of three reports in that year. Investigations had also lagged due to a loss in capacity in this highly skilled specialty area. In 2011-12 capacity began to be rebuilt with new and renewed contracts with investigators in priority industries. Capacity was further built through the unique investigations agreement with Oregon OSHA and the hiring of a Certified Safety Professional as the OR-FACE project manager and field investigator in 2014. The investigations program is now vibrant and on track to meet its goal of investigating 4-6 cases annually (roughly 10% of cases).

In addition to the success of core surveillance and investigation processes in the face of challenges, highlights of accomplishments during the current period included new web-based interactive surveillance fatality maps to visualize pockets of risk and the burden of occupational fatalities in Oregon, three scientific publications related to workplace fatalities, training partnerships with agriculture and transportation events to reach at-risk populations identified in peer reviewed research, new popular evidence-based toolbox talk guides for construction and logging supervisors, and continued dissemination of existing and new resources for high-risk industries and priority areas. These resources included new hazard alerts in logging (snag hazards) and crab fishing (personal flotation devices) and distribution of unique Oregon fatality prevention resources, such as the Fallers Safety Handbook in both Oregon and Washington. The project period was also characterized by expanded presentations and communications with scientific peers, industry, and safety professionals, as well as increased social media activity through the Oregon and the

Workplace Blog and Oregon Institute of Occupational Health Sciences Facebook and Twitter.

Conclusions

The Oregon Fatality Assessment and Control Evaluation Program (OR-FACE), founded in 2002, is a strong and productive component of the overall Oregon Occupational Public Health Program and a valued partner as a community resource for injury prevention. The OR-FACE mission is to prevent traumatic work-related deaths through surveillance, investigation, assessment, and targeted outreach. Our research is prioritized to understand and impact high-risk industries (e.g., construction, logging, agriculture, transportation) in Oregon and beyond. Particular ORFACE strengths include the depth of surveillance data produced, strong partnerships that result in high-quality products, and the innovative use of field studies to develop and recommend interventions. In just over a decade, OR-FACE has built substantial fatality surveillance capacity, produced an outstanding portfolio of resources, been awarded supplemental funding, and continuously striven to impact policy.

Inclusion of gender and minority study subjects

Male and female subjects were included in the OHI and OR-FACE components. The distribution of study subjects by gender is provided on the *PHS 2590, Inclusion enrollment report*. A separate report has been prepared for each component of the cooperative agreement.

Nearly all of the secondary data used for the OHI component did not include ethnic or racial origin and so this information cannot be provided for this closeout report. However, staff was able to collect this information for the OR-FACE component. This data can be found in the *PHS 2590, Inclusion enrollment report*.

Inclusion of children

Children 15-21 years of age were included in the OHI and OR-FACE components since many 15-21 year olds have a job and there is evidence that this population is at greater risk for suffering a work-related injury than their older counterparts. For this cooperative agreement, cases of work-related injury, illness, and death among children were collected from existing data.

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title: Improving occupational health in Oregon: Turning data into action OHI component

Comments: Grant Number: 5U00H008472-08; Total enrollment (7/1/2010-6/30/2015)

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native	0	0	0	0	0	0	0	0	0	0
Asian	0	0	0	0	0	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0	0	0	0	0
Black or African American	0	0	0	0	0	0	0	0	0	0
White	0	0	0	0	0	0	0	0	0	0
More Than One Race	0	0	0	0	0	0	0	0	0	0
Unknown or Not Reported	0	0	0	0	0	0	69308	133023	0	202,331
Total	0	0	0	0	0	0	69,308	133,023	0	202,331

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title: Improving occupational health in Oregon: Turning data into action OR-FACE Component

Comments: Grant Number: 5U00H008472-08; Total enrollment (7/1/2010-6/30/2015)

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/Not Reported	Female	Male	Unknown/Not Reported	Female	Male	Unknown/Not Reported	
American Indian/Alaska Native	0	0	0	0	0	0	0	0	0	0
Asian	0	2	0	0	0	0	0	0	0	2
Native Hawaiian or Other Pacific Islander	0	1	0	0	0	0	0	0	0	1
Black or African American	0	2	0	0	0	0	0	0	0	2
White	20	168	0	0	4	0	0	0	0	192
More Than One Race	0	0	0	1	21	0	0	0	0	22
Unknown or Not Reported	8	131	0	0	0	0	0	0	53	192
Total	28	304	0	1	25	0	0	0	53	411

Publications

Overall and OHI

Peer-reviewed journal articles

1. Centers for Disease Control and Prevention (CDC), Wuellner SE, Walters JK, St. Louis T, Leinenkugel K, Rogers PF, Lefkowitz D, Davis LK, Gelberg K, Zak MJ, Castillo D (2011). Nonfatal occupational injuries and illnesses among older workers - United States, 2009. *MMWR* 60(16):503-508.
2. Centers for Disease Control and Prevention (CDC), Green MK, Harrison R, Leinenkugel K, Nguyen CB, Towle M, Schoonover T, Bunn T, Northwood J, Pratt SG, Myers JR (2011). Occupational highway transportation deaths - United States, 2003-2008. *MMWR* 60(16):497-502.
3. Walters, J. K., Olson, R., Karr, J., Zoller, E., Cain, D., & Douglas, J. P. (2013). Elevated occupational transportation fatalities among older workers in Oregon: An empirical investigation. *Accident Analysis and Prevention*, 53, 28-38.

Research Reports

1. Walters, JK. Adult Blood Lead Reporting in Oregon, 2006-2010. Oregon Public Health Division, November 2011.
2. Oregon Public Health Division. "Elevated Blood Lead in Oregon Adults." CD Summary, July 16, 2013.
[http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/CDSu
mmaryNewsletter/Documents/2013/ohd6215.pdf](http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/CDSu
mmaryNewsletter/Documents/2013/ohd6215.pdf) .

Annual Reports

1. OHI 2009-2010 Annual Report. <http://www.cdc.gov/niosh/oep/statereports.html>
2. OHI 2009-2010 Annual Report. <http://www.cdc.gov/niosh/oep/statereports.html>
3. OHI 2009-2010 Annual Report. <http://www.cdc.gov/niosh/oep/statereports.html>
4. OHI 2009-2010 Annual Report. <http://www.cdc.gov/niosh/oep/statereports.html>
5. OHI 2009-2010 Annual Report. <http://www.cdc.gov/niosh/oep/statereports.html>

OR-FACE

Peer-reviewed journal articles

1. Hammond, T., Rischitelli, G. & Zoller, E. (October 24, 2011). Assessing data sources for state-level occupational fatality rates: Oregon, 2003–2007. *American Journal of Industrial Medicine*, 55(4), 332-343.
2. Hammond T, Rischitelli G. (October-December 2011) Defining critical safety behaviors in a point of view video observation study of tree fallers at work. *Int'l J Occup Environ Health*, 17(4):201-6.

3. Walters, J., Olson, R., Karr, J., Zoller, E., Douglas, J., Cain, D. (2013). Elevated occupational transportation fatalities among older workers in Oregon: An empirical investigation. *Accident Analysis and Prevention*, 53, 28-38.

Investigations

Logging

1. OR-2006-24: *Logger killed under rigging when carriage drops* (Mar-2011)
2. OR-2008-7: *Rigging slinger killed by swinging log in yarding turn* (Mar-2011)
3. OR 2010-50: *"Timber faller killed while working under a hung tree limb"* (Jul 2013)
4. OR-2014-1: *"Driver killed when thrown from logging truck"* (March 2015)

Construction

5. OR 2013-27-1: *"Collapsed roof trusses kill carpenter foreman."* (July 2014)
6. OR 2008-1: *"Mechanic killed by excavator bucket during maintenance."* (Sep 2012)

Machine-related

7. OR-2012-18-1: *"Experienced journeyman machinist killed while operating an engine lathe."* (Apr 2014)
8. OR-2013-08-1: *"Sanitation worker killed cleaning meat blending equipment."* (December 2014)

Falls

9. OR-2007-57: *Temporary mill worker killed in fall down manlift shaft* (Sept-2010)

Other

10. OR 2010-6-1: *"Truck driver crushed between semi-trailer and loading dock."* (Mar 2013)
11. OR-2013-05-1: *"Vineyard worker killed in fall from moving trailer."* (December 2014)
12. OR-2011-16-1: *"Millwright fatality involving a hydraulic accumulator* (Dec 2013)

Annual Reports

1. OR-FACE Annual Report 2008 Occupational Fatalities (July 2011)
2. OR-FACE Annual Report 2009 Occupational Fatalities (February 2013)
3. OR-FACE Annual Report 2010 Occupational Fatalities (May 2013)
4. OR-FACE Annual Report 2011 Occupational Fatalities (September 2013)
5. OR-FACE Annual Report 2012 Occupational Fatalities (July 2014)

Toolbox Talk Guides

Logging

1. *Logger killed by falling sheave when yarder tower collapses* (June 2014)
2. *Timber faller killed while working under a hung tree limb* (June 2014)
3. *Rigging slinger killed by swinging log in yarding turn* (January 2015)

4. Logging worker killed while riding on step of skidder (January 2015)
5. Logger killed by a 41-foot pole sliding down steep hill (January 2015)
6. Mechanic killed pouring gasoline on fire (March 2015)

Construction

7. Home construction worker falls down elevator shaft (March 2013)
8. Roofing material lands on worker standing on ladder (March 2013)
9. Novice drywall installer dies in 7-foot fall from scaffold (March 2013)
10. Mechanic killed by excavator bucket (September 2014)
11. Load of lumber shifts and falls on construction worker (September 2014)
12. Excavation worker killed by flying rigging when hook fails (September 2014)
13. Construction worker dies when he leans out of the protective cage of a skid steer forklift (March 2015)

Transportation

14. Auto salvage worker killed by unsecured car on transporter (March 2015)
15. Truck driver crushed between semi-trailer and loading dock (September 2014)

Hazard Alerts

1. Snag Hazard Alert (Sep 2013)
2. Crab Fishing Hazard Alert (Sep 2014)
3. Know the Hazards of Driving Distraction (Nov 2010)

Posters

1. Cannon, A., Olson, R., Zoller, E. (Aug 2012). Out of Sight, Out of Mind: On-site Toolbox Talk Guides to Improve Construction Safety. Poster presented at the CROET Summer Internship Program Poster Competition, Portland, OR.
2. Gilbert-Jones, I. (Jan 28, 2014). Toolbox Talk Initiative, poster. Mid-Oregon Construction Safety Summit, Bend, OR.
3. Zoller, E., Croteau, G., Camp, J., Cohen, M., Murphy-Robinson, H., Lincoln, J., Teske, T. and Rishitelli, G. (Oct 2011). Oregon Crab Fishing Safety Evaluation: Dockside Safety Survey. Oregon Public Health Association Annual Meeting, Corvallis, OR.

Presentations

1. Zoller, E. *Oregon Commercial Crab Fishermen Safety Survey and PFD Evaluation*. (February 26, 2011). Presented at the 2011 Oregon Academy of Science Annual Meeting, Portland, OR.
2. Hammond, T. *Tree Fallers Point-of-View Video Observation Study*. (September 22, 2010). Presented at the Oregon Program Evaluators Network 2010 Conference. Portland, OR.
3. Zoller, E., Croteau, G. & Lincoln, J. (November 18, 2011). Oregon Commercial Crab Fishing Safety Assessment. Pacific Marine Expo. Seattle, WA.

4. Zoller, E. (October 10, 2011). Oregon's Efforts to Prevent Young Worker Injuries and Fatalities. Oregon Public Health Association Meeting. Corvallis, OR.
5. Zoller, E. (October 10, 2011). Oregon Commercial Crab Fishing Safety Assessment. Oregon Public Health Association Meeting. Corvallis, OR.
6. Croteau, G. & Zoller, E. (June 26, 2011). Oregon Commercial Crab Fishing Safety Assessment. 2011 National Symposium on Agriculture, Forestry, & Fishing Health & Safety. Boise, ID.
7. Zoller, E. (March 20/April 26, 2012). Staying Safe and Healthy at Work: A Guide for Young Employees. Oregon Health & Science University. Portland, OR.
8. Olson, R., Walters, J., Karr, J., & Zoller, E. (May 27, 2012). Aging Workers at Increased Risk of Fatal Transportation-Related Injuries. Association for Behavior Analysis International. Seattle, WA.
9. Olson, R. (Oct 2012). The OR-FACE investigation program and current special emphasis projects. Presentation to the Oregon OSHA Construction Advisory Committee.
10. Olson, R. (Nov 2012). State of the OR-FACE program and current special emphasis projects. Presentation to the Oregon Occupational Public Health Program advisory board, Portland, OR.
11. Olson, R. (Dec 2012). The OR-FACE investigation program and current special emphasis projects. Presentation to the Oregon OSHA Portland field office.
12. Jones, J. & Olson, R. (Feb 2013). CROET and OR-FACE exhibitor booth. Mid-Oregon Construction Safety Summit, Bend, OR.
13. Olson, R. (Feb 2013). The OR-FACE investigation program and current special emphasis projects. Presentation to the Oregon OSHA Bend field office.
14. OR-FACE. (Mar 2013). The OR-FACE toolbox talk initiative. Poster presented at the Governors' Occupational Safety & Health Conference (GOSH), Portland, OR.
15. Olson, R. & Schoonover, T. (Apr 2013). Severe injury as a triggering event to engage residential contractors in fall prevention research and intervention: A multi-state FACE program proposal. Joint submission with WA-FACE to CPWR Construction Safety and Health Research Initiative's request for concept memos.
16. Olson, R. (Jun 2013). Proposed OR-OSHA and OR-FACE investigation collaboration agreement. Presentation to OR-OSHA field office managers, Salem, OR.
17. Olson, R. (Jun 2013). OR-FACE program overview. Presentation to the Education and Research Services Section of the Public Health Division of the Oregon Health Authority, Portland, OR.
18. Jones, J., et al. (Oct 14, 2013) Elevated Occupational Transportation Fatalities among Older Workers in Oregon; An Empirical Investigation. Oregon Public Health Association Conference.
19. Olson, R. (Dec 18, 2013). A Report on Current OR-FACE News and Projects. Oregon OSHA Portland field office, Portland, OR.

20. Olson, R. (Jan 15, 2014). Root cause analysis applied to Oregon FACE transportation cases. Instructional activity for Portland State University students enrolled in Professional Safety (Psy 410/510).
21. Gilbert-Jones, I., & Olson, R. (Jun 11, 2014). Proposal of OR-FACE collaboration with SAIF Corporation's Ag Seminar Series: Older workers killed in transportation-related events. SAIF Corporation, Portland, OR.
22. Gilbert-Jones, I., & Olson, R. (Jun 12, 2014). OR-FACE logging investigations and outreach materials. Monthly meeting of the OR-OSHA Logging Safety Advisory Committee. Associated of Oregon Loggers Office Building, Salem, OR.
23. Gilbert-Jones, I. (Nov 1, 2014). *OR-FACE mission, resources and proposed collaborative project*. Associated Oregon Loggers Safety Conference, Eugene, OR.
24. Gilbert-Jones, I. (Nov 2014). OR-FACE & OR-OSHA Collaboration on FACE investigations. Oregon OSHA Manager's Meeting, Salem, OR
25. Wimer, J. (Jan 2015) *OR-FACE History, Mission and Logging Safety*, Washington Contract Loggers Association Safety Conference, Olympia, WA.
26. Gilbert-Jones, I (Jan 2015) *OR-FACE Mission, Resources and Proposed Projects*. Construction Safety Summit, Portland, OR
27. Gilbert-Jones, I, Riffe, M., and Flood, J. (Mar 2015) *Research and Resources on Traumatic Occupational Incidents*. Oregon Governor's Occupational Safety & Health Conference, Portland, OR.
28. Gilbert-Jones, I (Apr 2015) *OR-FACE 2014-2015 Accomplishments and 2015-2020 Proposed Research*, Oregon Health Authority, Portland, OR
29. Gilbert-Jones, I, (Apr 2015) *OSHA 10: General Industry, machine guarding*. Community Experience for Career Education. Tualatin, OR.
30. Gilbert-Jones, I. (Apr 2015) *OR-FACE Mission, Research and Resources*. Columbia Willamette Chapter American Society of Safety Engineers. Tualatin, OR
31. Gilbert-Jones, I. (May 2015) *Lessons learned: safety stand-down to prevent falls in construction*, Portland, OR.
32. Olson, R., Gilbert-Jones, I (May 2015), "Preventing Transportation Fatalities: Lessons learned from Oregon Cases," *Oregon Trucking Association*, 2015 Oregon Trucking Association Leadership and Safety Summit. Gleneden Beach, OR.
33. Olson, R., Gilbert-Jones, I (May 2015) *Temporary/Contingent Worker fatal injuries, Case Studies and Prevention Recommendations*. Oregon Institute of Occupational Health Sciences Spring Symposium, Wilsonville, OR.

Oregon in the Workplace blog

1. (Sept 8, 2011). *Safety in Transportation: Increased risks for older workers?*
2. (Dec 29, 2011). *Research to Practice: Oregon Commercial Crab Fishing Safety Assessment*.

3. (Jan 30, 2012). *OR-FACE and CROET Participate in the Mid-Oregon Construction Safety Summit*
4. (Feb 2013) *"Resurfacing Bathtub Causes Death in Oregon"*
5. (September 2013) *Interactive occupational fatality maps launched by the OR-FACE Program*
6. (September 2013). *"OR-FACE Releases New Resources"*
7. (January 2014) *Partnering with Construction in Safety*
8. (January 2014) *"Paint Strippers Revisited"*
9. (Jan 2014) *"Just How Vulnerable are New Employees?"*
10. (February 2014) *"Partnering with Construction in Safety"*
11. (April 2014) *"National Safety Stand-Down to Prevent Falls in Construction"*
12. (December 2014) *"Online inventory of fall protection devices"*
13. (Feb 2015) *"OR-FACE presents at logging and construction safety events"*
14. (March 2015) *"SAIF Agricultural Safety Seminars"*
15. (May 2015) *"Tigard-Tualatin students learn about safety – OR-FACE teaches machine guarding"*
16. (June 2015) *"Oregon participates in National Stand-down to prevent falls in construction"*

News Media/Trade Publications

1. *Safety + Health*, (June 2011) National Safety council monthly magazine (circ. 86,000+) featured *"Face Value: Logger killed under rigging when carriage drops."*
2. *Safety + Health*, (September 2011) National Safety council monthly magazine featured OR-FACE investigation report, *"Face Value: Temporary mill worker killed in fall down manlift shaft."*
3. *Safety + Health*, (April 2012) National Safety council monthly magazine featured OR-FACE investigation report, *"Face Value: Bulldozer movement kills operator standing on track."*
4. *Safety + Health*, (Sep 2012) National Safety Council monthly magazine, featured, *"Janitor Using Propane Buffer Killed by Carbon Monoxide."*
5. *Safety + Health*, (Jul 2013) National Safety Council monthly magazine, featured, *"Mechanic killed by excavator bucket during maintenance"*
6. *Safety + Health*, (September 2013) National Safety Council monthly magazine article, *"Oregon worker deaths increased in 2011: report"* featured the OR-FACE 2011 Annual Report.
7. *Safety + Health*, (July 2013) National Safety Council monthly magazine highlighted, *"OR-FACE investigation report Mechanic killed by excavator bucket during maintenance."*
8. *Oregon Truck Advisor*, (September 2013), Oregon Trucking Association magazine, featured *"OR-FACE fatality alert: Parked Vehicles Kill."*

9. *NW Labor Press* (April 2014) featured “OR-FACE Program tracks and investigates work-related deaths.”
10. *Safety + Health*, (January 2015) National Safety Council monthly magazine “Oregon FACE issues 3 safety guides for logging industry.”
11. *Safety+ Health*, (April 2015) National Safety Council monthly magazine “3 fatalities prompt toolbox talks from Oregon FACE.”
12. *Safety + Health*, (April 2015) National Safety Council monthly magazine “FACE Value: Worker killed in fall from trailer platform”
13. *Safety + Health*, (Jul 2014) National Safety Council monthly magazine “FACE Value: Oregon logging deaths prompt toolbox talks.”
14. *Safety + Health*, (Jul 2014) National Safety Council monthly magazine “FACE Value: Worker deaths decline in Oregon.”
15. *Safety + Health*, (Sep 2014) National Safety Council monthly magazine “FACE Value: OR-FACE issues hazard alert on crab fishing.”
16. *Safety +Health*, (Jan 2015). National Safety Council monthly magazine “FACE Value: Oregon FACE issues 3 safety guides for logging industry.”
17. The National Truckers Association highlighted on their website *Safety Issues* (July 2015), OR-FACE Investigation “[Truck driver crushed between semi-trailer and loading dock.](#)”
18. The National Truckers Association highlighted on their website *Safety Issues*, (March 2015). OR-FACE Investigation, “Salesman killed when forklift fell of truck loading ramp.”
19. The Columbia-Willamette Chapter of the American Society of Safety Engineers highlighted the OR-FACE “*Occupational Fatalities in Oregon Annual Report 2010*” in its *Safety Emphasis* (Jun 2013) monthly newsletter.

Data Sets

OHI Datasets and calculation instructions available online at:

<http://public.health.oregon.gov/HealthyEnvironments/WorkplaceHealth/Pages/fundamental.aspx>

OR-FACE provides a dataset available for free download with industry, event, occupation, and abstract for every fatal case since 2003 on the program website. In 2014 a new feature was added to allow a keyword search of the database. Where available, search results include links to investigation reports.

Materials available for other investigators

Many materials and publications (toolbox talk guides, investigation reports, annual reports, hazard alerts and brochures) were created and published during the period and are available for free download online. A unique resource published during the project period

is the “Yarding and Loading Handbook” which can be accessed through the OR-FACE website (<http://www.ohsu.edu/xd/research/centers-institutes/oregon-institute-occupational-health-sciences/outreach/or-face/>). This booklet was produced with support from Oregon OSHA.