

Guidance for Integrating Occupational Health and Safety into Public Health Practice at the State Level

*The results of a work group of the CSTE Occupational Health Sub-Committee held on 12/7/2016
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Introduction

Since adults spend much of their waking lives working, the health of our population can be improved by focusing on the environment and conditions in which people work. Injuries and illnesses that occur as a result of exposure to workplace hazards, like toxic chemicals, dangerous equipment, and violence, all have direct impacts on a person's health. In addition, there is substantial evidence that the organization of work has an effect on health. Shift work; stress; the decreasing prevalence of stable, long-term, employer-employee relationships; the growing use of contract, contingent, part-time, and non-standard shift work; low-paying jobs; and jobs with high demand, low control, and poor social support all impact mental, physical, and emotional health directly, and also can indirectly affect health by influencing behaviors. The organization of work can affect commuting patterns, eating habits, leisure time exercise, sleep, and the ability to manage chronic disease. Leave and benefit schedules influence workers' access and propensity to seek healthcare, and their ability to care for their dependents. The burden of these occupational risks is not borne equally. It is widely recognized that low-wage workers, including many immigrant workers, minority workers, and women, are disproportionately employed in physically demanding, high-risk jobs that offer little opportunity to influence how or when they work; and jobs for which there are limited or no occupational health services. [1] At a population level, this amounts to work being a critical social determinant of health that needs to be addressed in any comprehensive approach to improve health.

Occupational safety and health (OSH) is a multidisciplinary public health field concerned with the safety, health, and wellbeing of workers. Many OSH concerns overlap with concerns that are the focus of other public health programs. For example, workers in some occupations and industries face the same hazards encountered by the general population (e.g., motor vehicle crashes, heat exposure). Many work-related injuries and illnesses are multifactorial health conditions for which workplace exposures are only one of many potential causal factors (e.g., asthma, musculoskeletal disorders, and lung cancer). Other public health disciplines are committed to reducing many of these same hazards and health conditions, and to improving the health of the same at-risk populations. These convergent priorities provide valuable opportunities for OSH and other public health colleagues to work together to prevent both work-related and non-work related injury and disease, improve health outcomes, and reduce health inequities.

In the United States, the Federal Occupational Safety and Health Administration (OSHA) and the state OSHA programs, which enforce health and safety standards in most workplaces, play a crucial and central role in reducing workers' exposure to hazards, but not to improving the overall wellbeing of workers. While it is important for public health agencies to have strong working relationships with their OSHA programs [2], as well as other workplace regulatory agencies, the enforcement and regulatory activities of OSHA and other agencies are only one component of a comprehensive public health approach to protecting the health of workers. State public health agencies have a critical and complementary role to play in using a public health approach to conduct surveillance of work-related injuries and illnesses and to promote the use of these data to improve worker safety and health

(<https://www.cdc.gov/niosh/docs/2008-148/pdfs/2008-148.pdf>). Additionally, the activities of OSHA and other workplace regulatory agencies often vary in scope by both jurisdiction and the currently adopted standards. As such, state public health agencies may have the ability and authority to identify and address hazards with a broader scope than existing regulatory and enforcement programs.

Scope and Purpose

Developing effective strategies to protect the health of workers begins with information about where and how workers are injured or made ill at work. Over the past decade, the Council of State and Territorial Epidemiologists (CSTE) and state members of CSTE have worked collaboratively with the Centers for Disease Control and Prevention's (CDC) National Institute for Occupational Safety and Health (NIOSH). The goals have been to increase public health capacity in states to conduct surveillance of work-related injuries and illnesses and to work with partners within public health departments, with OSHA and other agencies, and in the community to address identified OSH problems. Whereas in the 1990s few states had OSH programs, today close to half of the states and territories have some OSH surveillance capacity. In 2013, 20% of states reported surveillance and epidemiology capacity in occupational health. [3]

As states have increased their capacity to conduct OSH surveillance and prevention activities, collaboration with other public health programs to address OSH concerns has proven to be a valuable strategy for increasing the ability of OSH programs to promote the health and safety of workers. At the same time, this collaboration enables other public health programs to move towards their own prevention goals. This document draws on the experience of state-based public health programs in OSH, which have successfully worked with other programs within their public health departments. Its purpose is to provide guidance to states interested in building collaborations with public health programs in their department, including environmental health, infectious disease, chronic disease, and injury prevention. As the title states, the goal is to integrate OSH into public health practice. To that end, this document provides a framework for thinking about integration, examples of successful strategies, a list of useful tools for integration activities, and possible next steps. While it is important for OSH public health programs to continue collaborations with federal and other state government agencies, such as labor, environmental, and transportation departments, those activities are outside the scope of this document.

Increasingly, state health agencies are interested in using the workplace to reach workers with information about lifestyle risks and to implement systems changes that promote making healthy choices. From an OSH perspective, these programs miss their mark if they fail to address workplace hazards and organization factors that adversely affect health. NIOSH is supporting the development of new "Total Worker Health" models for comprehensive workplace programs that both protect workers from health and safety hazards and promote injury and illness prevention efforts to advance worker wellbeing. More information about Total Worker Health can be found at <https://www.cdc.gov/niosh/twh/default.html>. While this is important work, it is also outside the scope of this document.

A Framework for Integration

There are many opportunities for collaboration between OSH programs and other public health programs, both in conducting surveillance and implementing prevention activities. A conceptual framework for thinking about integration of OSH into public health practice classifies integration into two themes, convergence and access [2]. *Convergence* refers to opportunities where concerns of OSH and other public health disciplines intersect. *Access* refers to opportunities for reaching out to workers about OSH using public health networks such as community health centers or school-based health clinics or community health coalitions rather than traditional approaches of reaching workers through their employers or advocacy organizations. This can be an important avenue for reaching underserved workers such as immigrants, as well as workers who are hard to reach because they have non-standard work arrangements (such as working as a day laborer or for a temporary staffing agency), work for small businesses, and/or are not represented by a labor union. Using public health networks can also provide a valuable opportunity to create a two-way street for both providing OSH information to workers and hearing from them about their OSH concerns.

Shared hazards that affect both workers and the general public

- Air quality in schools that affects both teachers and students
- Distracted driving that threatens both truck or delivery drivers and the general public
- Lead exposure in the workplace, which is carried home on clothes and shoes posing risks for family members
- Mosquitos carrying Zika virus that affect outdoor workers as well as the community at large
- Drug use and abuse for work and non-work related health conditions

Shared health conditions where occupation is one of multiple risk factors

- Asthma that can be caused or aggravated by exposures in the workplace, within homes, other buildings, and the outdoor environment
- Heat-related illnesses due to excessive temperatures in the ambient environment that affect farm or construction workers as well as the public at large
- Lung cancer that can be caused by occupational exposures as well as smoking and air pollutants
- Musculoskeletal disorders that can be caused by both work and recreational activities
- Slips, trips, and falls that occur in work and non-work settings

Shared at-risk populations that other public health disciplines typically have programs to assist

- Youth
- Elderly
- Immigrants, migrants, and refugees
- Racial and ethnic minorities

Integration Strategies

Many state OSH programs are collaborating on projects of shared interest with other public health programs in their departments. These activities have resulted in the identification of strategies for integrating OSH into broader public health practice. Successful strategies that specific state OSH programs have used are listed below. Appendices A and B describe state examples of integration projects in detail, including which states have used these strategies.

1. *Create better information for decision making and policy development relevant to a shared hazard, shared health condition, or shared population*
2. *Focus on a timely issue in public health and emphasize the OSH component*
3. *Connect with public health emergency preparedness teams to implement interventions for shared populations or to bring attention to an OSH problem*
4. *Add questions about OSH to core public health surveys and surveillance data systems*
5. *Use syndromic surveillance to identify OSH problems*
6. *Use workforce development opportunities like fellowships and internships to build cross-discipline projects*
7. *Create compelling communication strategies to emphasize the burden of work-related hazards and the impact of work on health*
8. *Focus efforts on industries where there is a key connection between occupational health and population health including food service, animal handling, and health services*
9. *Take the time to learn about the goals and grant objectives of other public health disciplines to see how OSH activities can help them*

Integration Challenges

A common challenge to collaboration between OSH and other public health programs is a lack of familiarity about OSH within other public health programs. Many public health practitioners have had little training in OSH or the role of OSH in public health. Being able to clearly discuss OSH in terms that resonate with the goals and objectives of other programs in the state health department is important when initiating collaborations and during ongoing interactions with these other programs. Listening carefully to understand the perspectives and obligations of other programs and then sharing in their passionate commitment can be rewarding.

Convincing others that something can be done to improve OSH can be challenging. Success stories are helpful when engaging stakeholders and in remaining engaged. A lack of resources, within both OSH and other public health programs compounds this problem. The decreasing resources available for prevention activities has been coupled with a focus on immediate results, and in dropping successful activities that OSH and public health colleagues agree should continue. Maintaining ongoing relationships and communication with other programs can be key so that discussions can happen quickly when resources become available, such as at the end of funding cycles or when new proposals are being written.

Another fundamental challenge, particularly when dealing with programs focused on reducing health disparities, is that work is considered part of the solution. It is well documented that unemployment is associated with poor health outcomes [4]. For people living in poverty, a steady income and other employment benefits and potential sources of social support are critical to improving their health status. In this context, it is critical to talk about safe and healthy jobs. Dangerous jobs and poor working conditions can reinforce or widen existing health disparities. Possible useful analogies are that increasing access to food is important or that blood transfusions can save lives, but poor quality food or blood products contaminated with bloodborne pathogens are not acceptable.

Because the inclusion of OSH in state health departments is relatively new compared to more traditional public health programs, OSH is often not at the table when addressing convergent hazards and conditions. These challenges can be compounded at the federal level due to silos between federal funding programs that fund OSH and other programs. This can lead to missed opportunities at the state and federal level for collaboration. Staff turnover at the state and federal level can compound this challenge, and points to the need to codify partnerships in legislation and regulation.

A final and very important challenge that OSH programs need to be mindful of is that increasing collaboration with other state public health programs may move the limited resources in OSH away from hazards and conditions that are only caused by work and which do not overlap with other disciplines. This is a real concern as many recognized hazardous work situations may not be addressed in certain states by any other program or agency.

Integration Tools

Several important tools for integrating OSH into public health practice, identified by participants of the CSTE Occupational Health Subcommittee meeting on December 7, 2016, are described below.

Occupational Health Indicators

CSTE and NIOSH recommend that states generate a standard set of occupational health indicators (OHIs) [5]. These indicators describe the occupational health status of the working population and are a starting point for conducting OSH surveillance statewide. The recommended OHIs are broken down into defined categories.

1. Occupational injury and illness indicators
2. Occupational exposure and hazard indicators
3. Occupational intervention indicators
4. Socio-economic indicators

The OHIs are helpful to a state health department that is initiating an OSH program. They allow a new OSH program to become familiar with the available data sources, gather data about the health status of the workers in the states, and help identify priorities. The OHIs provide a sense of what is going on at the state level and nationally. They allow states to identify target populations, industries, and occupations within their state for intervention and health education efforts, and can be used to help prioritize integration projects. OHIs can be incorporated into state reports demonstrating the availability of OSH data and how OSH data contribute in topic areas like injury, environmental health, and chronic disease. Some states have been successful in adding some of the OHIs as part of the state health status measures and ongoing documentation required for public health accreditation.

NIOSH Industry and Occupation Computerized Coding System (NIOCCS)

The NIOSH Industry and Occupation Computerized Coding System (NIOCCS) is a Web-based software tool designed to translate industry and occupation (I&O) text to standardized numerical codes. It is used by occupational researchers, federal government agencies, state health departments, and other organizations that collect or evaluate I&O information. Its purpose is to reduce the cost and time to manually code I&O information, while simultaneously improving uniformity of the coding [6]. This software increases the utility of I&O data that are mainly collected as text, for example on death certificates, in cancer registries, in workers' compensation systems, and on health surveys like the Behavioral Risk Factor Surveillance System (BRFSS). Using NIOCCS to generate standard codes facilitates the wider use of data on occupation and industry collected by OSH programs and collected in other public health documents and surveys.

Existing Occupational Safety and Health Survey Questions

The OSH community has been successful in adding occupational health questions, including industry, occupation, and work-related injury questions, in many existing surveys including the Behavioral Risk Factor Surveillance System (BRFSS), National Health Interview Survey (NHIS),

Pregnancy Risk Assessment Monitoring System (PRAMS), and the National Violent Death Reporting System (NVDRS). Standard ways of asking about work status, industry, occupation, work-related injury and illnesses, and work arrangement have been developed for use in these and other state and national surveys. A list of some of these questions and their origin is in Appendix C. Questions like these can be used or adapted by states for local population-based or outbreak investigation surveys. Many state and local outbreak survey tools already include questions about occupation to assess the path or risk of infection transmission. However, those local questions may not be collecting I&O in a way that is standardized, and easy to analyze and interpret. Further, the data collected about illness and injury by industry and occupation from national surveys can often be very helpful for OSH programs looking to do targeted outreach around conditions covered in these surveys.

Occupational Data for Health

NIOSH has been working to enhance OSH data collection and surveillance using information collected during clinical care in electronic health records (EHR). This is a multi-faceted endeavor that includes collaborating with the groups and people who are developing methods for electronic case reporting, creating and implementing the technical requirements to collect and store occupational data for health, defining the correct triggers to disseminate the data, and supporting prevention, diagnosis, management, and treatment in clinical and public health settings. CSTE has also formed an electronic health reporting workgroup to help with this effort, specifically assisting with subject matter expertise needed when creating default content for reportable conditions. While this is a work in progress, significant progress has been made in the underlying steps needed to collect, standardize, and transmit occupational data for health and in making the case for the importance of occupation in infectious disease prevention, transmission, and intervention.

Making Decisions about Integration Projects

Opportunities to collaborate can be the result of many years of building relationships or they can happen quickly and organically because of a new outbreak, funding source, or focus area. During the CSTE Occupational Health Subcommittee meeting on December 7, 2016, the subcommittee members discussed their experiences collaborating with other public health programs, and how state OSH programs can set priorities for integration activities. Figure 1 outlines questions OSH programs found helpful while deciding where and when to develop integration opportunities. Different programs may have different reasons for investing time and resources into integration, but these questions were found to have universal application across states.

Figure 1. Key questions for state OSH programs to consider when deciding which collaborations have the greatest potential to foster integration



Moving Forward

Additional tools and strategies are needed or are currently being developed to assist state OSH programs' integration efforts. The following is a list of future activities the CSTE Occupational Health Subcommittee considers useful to assist integration efforts. CSTE and individual CSTE members plan to work on these issues in the future.

1. Emphasize occupational health surveillance and OSH variables in all surveillance systems
2. Include work-related variables in electronic health records
3. Include requirements for collaboration between public health and occupational health in future announcements for CDC funding
4. Develop guidance documents for local health departments on occupational health perspectives in both communicable and non-communicable diseases
5. Write a primer for adding, asking, and standardizing industry and occupation data for public health surveillance
6. Develop modules about OSH that can be delivered to public health professionals in other disciplines
7. Utilize existing and novel communication channels to disseminate information about occupational health
8. Collaborate with surveillance and informatics groups to develop public health decision support for occupational health conditions in the Reportable Conditions Knowledge Management System
9. Create case definitions for occupational injuries and illnesses
10. Generate a list of potential and common ICD-10 codes for occupational health surveillance
11. Develop tools for other groups, like communicable disease, to collect OSH information and include OSH in planning, advisory, and response task groups and teams.

Conclusion

State health departments have access to many data sources such as vital records, cancer and trauma registries, health surveys, hospital data, and case reports that are potentially valuable sources of information about work-related as well as non-work-related health outcomes. They also have many public health prevention programs addressing issues that overlap with OSH concerns including infectious disease, environmental health, maternal and child health, chronic disease, injury and violence, and substance abuse.

The effectiveness of public health departments in protecting the health of the public will be improved by integrating OSH in multiple public health domains. State health agencies are in a unique position to integrate occupational health into public health practice. Building surveillance programs at the state level that are actively linked to intervention efforts provides an opportunity to integrate OSH into mainstream public health. Some states have been very successful in this integration work. This document advocates the need for integration, offers a framework for thinking about integration, provides guidance about how to identify priorities, shares strategies and tools for integration, and makes recommendations for future work.

References

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7. Association of Occupational and Environmental Clinics. *Occupational Health Internship Program (OHIP)*. 2017 [cited 2017 May 30]; Available from: <http://aoec.org/ohip/>.
8. Council of State and Territorial Epidemiologists. *Applied Epidemiology Fellowship Overview*. 2017 [cited 2017 May 30]; Available from: <http://www.cste.org/?page=Fellowship>.

Additional Information

Please direct questions or comments to the CSTE Occupational Health Surveillance Subcommittee co-chairs, Rebecca Jackson (Rebecca.jackson@cdph.ca.gov) and Ken Rosenman (Ken.Rosenman@hc.msu.edu).

Appendix A: Integration Examples by Integration Strategy

The CSTE Occupational Health Subcommittee requested information from states about occupational safety and health integration efforts, focusing on the aspects that could be translatable to other states, such as strategies, challenges, and lessons learned. Below is a list of state examples organized by common integration strategies.

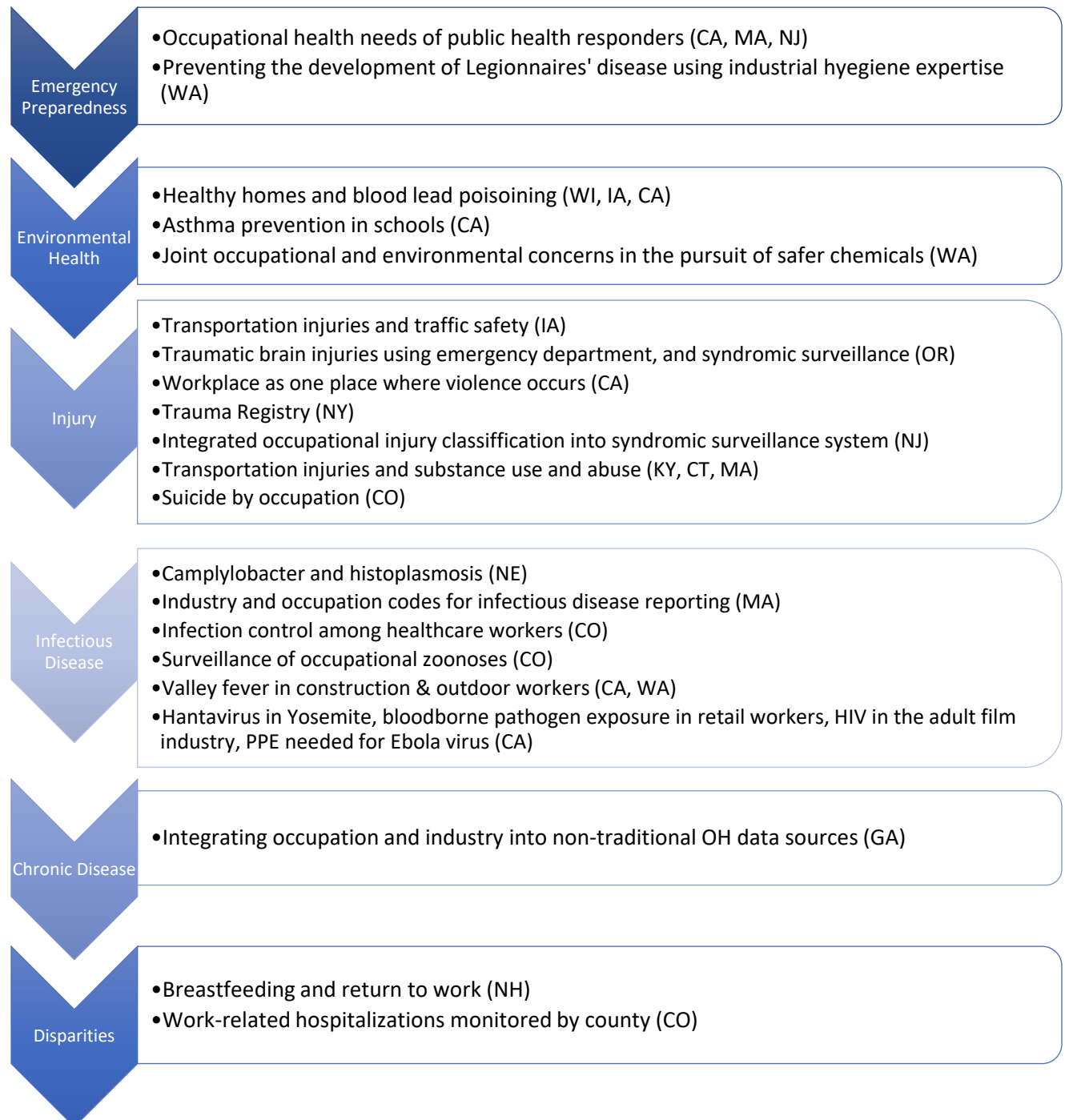
1. *Create better information for decision making and policy development relevant to a shared hazard, shared condition, or shared population*
 - The rate of immediate work-related hospitalization is one of several public health metrics used to track statewide progress towards healthy and safe communities (WA). The OHI for work-related hospitalizations is calculated at the county level to aid local health departments in developing community health improvement plans. (CO)
 - Adult blood lead surveillance data were added into the Healthy Homes and Lead Poisoning Surveillance System in order to improve linkage detection between adults and children. (WI, IA)
 - Occupational transportation fatalities were included in roadway safety planning and policy documents, health education materials, and prevention efforts. (IA, KY)
2. *Focus on a timely issue in public health and emphasize the OSH component*
 - Incidence of suicide by occupation was investigated by using NIOCCS to code occupation in the Colorado Violent Death Reporting System. (CO)
 - The first recognized outbreak of mosquito-borne transmission of Zika virus in the continental United States was identified because of individuals who worked in the same neighborhood but had no other epidemiologic connections. (FL)
 - Collaborations between substance use researchers and occupational health developed occupational health and safety guidelines and recommendations for the new and expanding retail marijuana grow and sales industry. (CO)
3. *Connect with public health emergency preparedness groups to create interventions for shared populations or to bring attention to an OSH problem*
 - Legionella bacteria exposure from air-conditioning units of large buildings can cause Legionnaires' disease in building occupants and visitors. OSH provided industrial hygiene expertise and assisted with health department investigations and recommendations. (WA)
 - Occupational health staff members have been mobilized to fulfill responsibilities related to worker protection during emergency responses involving healthcare workers at risk of exposure to novel pathogens. (CA)
4. *Add questions about OSH to core public health surveys and surveillance data systems*
 - Occupation and industry questions were added to state-based public health disease registries, syndromic surveillance systems, and trauma registries. (GA, NY, NJ)

- Seventeen states included the NIOSH-sponsored BRFSS industry and occupation (I&O) module to collect demographic and occupational data about workers and their health behaviors, health outcomes, and access to care.
 - A standardized occupational reference code list was included in the Web-based disease surveillance and case management system used for reportable infectious diseases. (MA, see Appendix D)
 - Occupational cases of valley fever (coccidioidomycosis) infections were discovered by sharing data between OSH and the communicable disease program. (WA, CA)
 - Structured occupation and industry questions to help recognize and assess occupational zoonoses were developed during a revamp of the state electronic infectious disease reporting system. (CO)
 - A variable was added to the Traumatic Emergency Medical Services Information System to capture when an ambulance event was work-related. (NH)
5. *Use syndromic surveillance to identify OSH problems*
- Key words to identify occupational injuries were added into the state-based syndromic surveillance systems as part of a collaboration between OSH and communicable disease programs. (NJ)
 - Trauma registries and emergency department syndromic surveillance systems were used to conduct surveillance of occupational traumatic brain injuries. (OR)
6. *Use workforce development opportunities like fellowships and internships to build cross-discipline projects*
- Academic partnerships with local universities place students and new graduates into internships, public health practicums, and medical rotations.
 - States can apply for a fellow through the Occupational Health Internship Program (OHIP) and the CSTE Applied Epidemiology Fellowship. [7, 8]
7. *Create compelling communication strategies to emphasize the burden of work-related hazards and the impact of work on health*
- A Zero Fatalities campaign focuses on reducing work-related and non-work-related motor vehicle crashes. (IA)
 - Digital stories developed to kick off worker training sessions are hosted on the state health department YouTube channel and promoted through social media. Toxic paint removers are a risk to workers and do-it-yourself home repairers. (CA)
 - The Youth Employment and Safety Team created a social media campaign to engage teen and adult workers about workplace health and safety. (MA)
8. *Focus efforts on industries where there is a key connection between occupational health and population health including food service, animal handling, and health services*
- Immunizing health care workers against vaccine-preventable diseases is essential to prevent the spread of disease in hospitals and communities. (CO, NH)
9. *Take the time to learn about the goals and grant objectives of other public health disciplines to see how OSH activities can help them*

- o Women with a low income or less education face barriers, including a lack of familial support and insufficient workplace accommodations that may lead them to stop breastfeeding early. Understanding the reasons for these disparities was crucial for identifying, developing, and implementing strategies to increase breast-feeding. (NH)

Appendix B: Integration Examples by Public Health Program Area

In this section, the examples are organized by public health topic area to provide a different visual assessment of where opportunities might exist. This diagram does not include all examples of integration activities done by OSH state-based surveillance programs.



Appendix C: Occupation, Industry, Work Arrangement, and Occupational Injury Questions from Existing Surveys

Domain	Question	Survey
Employment Status	Are you currently...? ☐ Employed for wages ☐ Self-employed ☐ Out of work for 1 year or more ☐ Out of work for less than 1 year ☐ A Homemaker ☐ A Student ☐ Retired ☐ Unable to work ☐ Refused	BRFSS
Employment Status	Which of the following were you/was your spouse doing last week? ☐ Working at a job or business ☐ With a job or business but not at work ☐ Looking for work, or ☐ Not working at a job or business? ☐ Refused ☐ Don't know	NHANES
Employment Status	Are you currently in school or working? ☐ No, I don't go to school or work ☐ Yes, I go to school or work outside the home ☐ Yes, I go to school or work from home	PRAMS
Employment Status	LAST WEEK, did this person work for pay at a job (or business)? ☐ Yes ☐ No – Did not work (or retired)	ACS
Employment Status	Was this person: ☐ An employee of a PRIVATE FOR-PROFIT company or business, or of an individual, for wages, salary, or commissions? ☐ An employee of a PRIVATE NOT-FOR-PROFIT, tax-exempt, or charitable organization? ☐ A local GOVERNMENT employee (city, county, etc.)? a state GOVERNMENT employee? ☐ A Federal GOVERNMENT employee? ☐ SELF-EMPLOYED in own NOT INCORPORATED business, professional practice, or farm? ☐ SELF-EMPLOYED in own INCORPORATED business, professional practice, or farm? ☐ Working WITHOUT PAY in family business or farm?	ACS

Employment Status	Which of these best describes the job you held most recently? ☐ Employee of a PRIVATE company for wages ☐ A FEDERAL government employee ☐ A STATE government employee ☐ A LOCAL government employee ☐ Self-employed in OWN business, professional practice or farm ☐ Working WITHOUT PAY in a family-owned business or farm ☐ Refused ☐ Don't know	NHIS
Work Arrangement	Which of the following best describes your work arrangement? ☐ You work as an independent contractor, independent consultant, or freelance worker ☐ You are paid by a temporary agency ☐ You work for a contractor who provides workers and services to others under contract ☐ You are a regular, permanent employee (standard work arrangement) ☐ Some other work arrangement ☐ Refused ☐ Don't know	2015 NHIS
Work Arrangement	Which of the following best describes the hours you usually work? ☐ A regular daytime schedule ☐ A regular evening shift ☐ A regular night shift ☐ A rotating shift ☐ Refused ☐ Don't know	2015 NHIS
Injury	During the past 12 months, were you injured seriously enough at your job that you received medical treatment from a doctor, nurse or other health care professional? ☐ Yes ☐ No ☐ Don't know/Not Sure ☐ Refused	BRFSS
Injury	For your most recent work-related injury, who paid for the majority or most of your medical expenses? ☐ Workers' compensation ☐ You or your family's own health insurance plan, or other health insurance coverage plan (includes Medicare and Medicaid) ☐ You or your family's out of pocket ☐ Your employer WITHOUT a workers' compensation claim ☐ Other source – not Medicare or Medicaid (specify)	BRFSS

	- o Who will pay is still in process or not resolved - o States that want to “customize” a response, can add something here, like Indian Health Insurance or State Insurance Fund - o No one paid, no treatment - o Don’t know/Not sure - o Refused	
Injury	During the past 12 months, have you had dermatitis, eczema, or any other red, inflamed skin rash? - o Have you ever seen a doctor or other health professional for your skin condition? - o Have you been told by a doctor or other health professional that your skin condition was probably work-related? - o Do you think your skin condition was probably work-related? - o Did you tell a doctor or health professional that your skin condition was work- related? - o During the past 12 months, did you stop working, change jobs, or make a major change in your work activities, such as taking on lighter duties, because of your skin condition?	BRFSS
Injury	Previously you said you were told by a doctor, nurse or other health professional that you had asthma. - o Was your asthma caused by chemicals, smoke, fumes or dust in your current job? - o Was your asthma made worse by chemicals, smoke, fumes or dust in your current job? - o Did you ever change or quit a job because chemicals, smoke, fumes, or dust caused your asthma or made your asthma worse? - o Were you ever told by a doctor or other health professional that your asthma was related to any job you ever had? - o Did you ever tell a doctor or other health professional that your asthma was related to any job you ever had?	BRFSS
Industry	What kind of business or industry was this? (For example: TV and radio mgt., retail shoe store, State Department of Labor) o Verbatim response	NHIS
Industry	Thinking about your MAIN job during your most recent pregnancy, what type of company did you work for (what did the company do or make)? o Type of company:	PRAMS
Industry	What kind of business or industry was this? Describe the activity at the location where employed. (For example: hospital, newspaper publishing, mail order house, auto engine manufacturing, bank)	ACS

	☐ Verbatim response	
Industry	Is this mainly: ☐ Manufacturing? ☐ Wholesale trade? ☐ Retail trade? ☐ Other (agriculture, construction, service, government, etc.)?	ACS
Occupation	What kind of work were you doing? (For example: farming, mail clerk, computer specialist.) ☐ Verbatim response	NHIS
Occupation	What were the most important activities on this job or business (For example: sells cars, keeps account books, operates printing press.) ☐ Verbatim response	NHIS
Occupation	Please tell us about your MAIN job during your most recent pregnancy. What was your job title and what were your usual activities or duties? ☐ Job title: ☐ Job duties:	PRAMS
Occupation	What kind of work was this person doing? (For example: registered nurse, personnel manager, supervisor of order department, secretary, accountant) ☐ Verbatim response	ACS
Occupation	What were this person's most important activities or duties? (For example: patient care, directing hiring policies, supervising order clerks, typing and filing, reconciling financial records) ☐ Verbatim response	ACS

BRFSS = Behavioral Risk Factor Surveillance System

NHANES = National Health and Nutrition Examination Survey

PRAMS = Pregnancy Risk Assessment Monitoring System

ACS = American Community Survey

NHIS = National Health Interview Survey

Appendix D: MAVEN Occupation Category List

The Massachusetts Virtual Epidemiologic Network (MAVEN) was deployed in 2006 by the Massachusetts Department of Public Health, Bureau of Infectious Disease to serve as an integrated, Web-based disease surveillance and case management system used by Massachusetts public health epidemiologists and local boards of health for reportable infectious diseases. MAVEN utilizes a standardized occupational reference code list for demographic and risk purposes. While this list was developed specifically for Massachusetts, other states could use a similar process to develop their own lists of occupation categories that are useful for their own communicable disease surveillance.

Complete Occupation Category List		
Administrative and office support	Food Service - Cook/food prep worker	Medical Professional - Phlebotomist
Animal Related - Animal care and service workers	Food Service - Dishwasher	Medical Professional - Physical therapist
Animal Related - Animal control officer	Food Service - Food processing plant worker	Medical Professional - Physician
Animal Related - Farming or fishing	Food Service - Host/Hostess	Medical Professional - Physician assistant
Animal Related - Veterinarian	Food Service - Retail food worker (e.g., grocery store worker)	Nail technician
Animal Related - Veterinary assistant	Food Service - Supervisor/Manager	Other
Barber	Food Service - Waiter/Waitress	Plumber
Business and financial operations	Hair dresser	Police Officer
Child/minor/infant	Human Services Worker	Postal worker
Commercial sex worker	Landscaper/Grounds maintenance worker	Public health worker
Computer specialist	Medical Professional - Chiropractor	Retired
Construction	Medical Professional - Dental hygienist	Sales and related occupations
Correctional officer	Medical Professional - Dentist	Student
Daycare worker (adult)	Medical Professional - Medical assistant	Teacher
Daycare worker (child)	Medical Professional - Medical or clinical laboratory tech	Teacher Assistant
Engineers (e.g., chemical, civil, electrical, industrial, mechanical)	Medical Professional - Nurse (NP, RN, LPN)	Transportation and material moving occupations(e.g., bus driver, taxi driver, truck driver, pilot)
Firefighter	Medical Professional - Nursing, psychiatric and home health aides	Unemployed
Food Service - Bartender	Medical Professional - Occupational therapist	Unknown
Food Service - Cashier	Medical Professional - Paramedic/EMT	
Food Service - Caterer	Medical Professional - Pharmacist	