The National Institute for Occupational Safety and Health Workers' Compensation Leaders Research Colloquium, December 11, 2014

Proceedings

Michael Dworsky

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Preface

The National Institute for Occupational Safety and Health (NIOSH) has long recognized the value of administrative data from workers' compensation (WC) systems and currently supports a wide range of research and surveillance based on WC data. For a variety of reasons, however, the full potential of WC data to improve research and practice in occupational safety and health (OSH) has not yet been realized. In recent years, NIOSH has undertaken a focused effort to advance the use of WC data, including the creation of the Center for Workers' Compensation Studies (CWCS) in 2013.

These conference proceedings summarize key points made at the NIOSH Workers' Compensation Leaders Research Colloquium, which was held on December 11, 2014, at the NIOSH Office of the Director in Washington, D.C. The goal of the colloquium was to elicit input from thought leaders and key stakeholders in the OSH and WC communities to help NIOSH's CWCS maximize the impact of its research activities. This document, which summarizes the input of a diverse group of stakeholders and experts, should be of value to NIOSH in setting strategic priorities for CWCS. It might also be of interest to members of the researcher and practitioner communities represented at the colloquium.

NIOSH funded both the Workers' Compensation Leaders Research Colloquium and preparation of this document. Any opinions and conclusions discussed in the report are those of the authors and do not necessarily reflect those of the sponsor.

RAND Center for Health and Safety in the Workplace

The RAND Center for Health and Safety in the Workplace is dedicated to reducing workplace injuries and illnesses. The center provides objective, innovative, cross-cutting research to improve understanding of the complex network of issues that affect OSH and WC. Its vision is to become the nation's leader in improving workers' health and safety policy. Program research is supported by government agencies, foundations, and the private sector.

The center is housed in the RAND Safety and Justice Program, which addresses all aspects of public safety and the criminal justice system, including violence, policing, corrections, courts and criminal law, substance abuse, occupational safety, and public integrity. The center also draws on the expertise of RAND Health, one of the most trusted sources of objective health policy research in the world.

Questions or comments about this report should be sent to the project leader, Michael Dworsky (mdworsky@rand.org). For more information about the RAND Center for Health and Safety in the Workplace, see www.rand.org/jie/centers/workplace-health-safety or contact the director (chsw@rand.org).

Contents and Table

Summary

Workers' compensation (WC) provides medical care, cash benefits, and rehabilitation services to workers who experience occupational injury or illness. Because WC systems are intended to cover most occupational injuries and illnesses for most of the workforce, data produced in the operation of WC systems can be valuable for research, surveillance, and prevention activities that promote occupational safety and health (OSH). Such entities as academic and government researchers, public health authorities, and the insurance industry already use administrative data from WC systems for research and surveillance. For a variety of reasons, however, the full potential of WC data to improve research and practice in OSH has not yet been realized.

In recent years, the National Institute for Occupational Safety and Health (NIOSH) has undertaken a focused effort to advance the use of WC data, including the creation of the Center for Workers' Compensation Studies (CWCS). On December 11, 2014, NIOSH and the RAND Corporation hosted a colloquium designed to elicit input from key stakeholders in the OSH and WC communities on how CWCS could maximize the impact of its research activities.

Participants offered examples of how CWCS and others currently use WC data. Several colloquium participants cited successful uses of WC data for surveillance and primary-prevention activities by state departments of public health. Early CWCS activities have focused on surveillance. Most CWCS work has involved working with key partners to develop and share methods. Although the primary focus of CWCS to date has been on insurance claim data, participants discussed many different sources of WC data in the course of the colloquium as well.

As a source of occupational injury and illness data in the United States, WC data offer many unique advantages. Participants noted that few other data sources systematically identify injured workers. In contrast to WC data, data sets centered on the health care system seldom contain detailed information about patients' work environments or economic outcomes. Several participants also identified the ability to link WC data to outside data sources on the basis of worker, firm, or health care provider identifiers as a strength of WC data. In short, WC data are the best available resource for many surveillance activities and research questions.

Participants also identified many limitations of WC data, however. They raised concerns about usefulness of WC data as a resource for surveillance and research and identified legal, contractual, and other barriers to the utilization of these data. One concern was that many injured workers do not file WC claims, so the universe of injuries that appear in WC data is a subset that is not necessarily representative of an industry or enterprise as a whole. Furthermore, changes in financial incentives, law, or administrative procedures for handling claims can also change the relationship between claim data and underlying injuries. Several participants also pointed out

that the state-specific nature of WC systems makes it challenging to pool data from multiple state systems for some surveillance or research purposes. WC data often must be combined with other data sets to estimate quantities of interest, such as incidence rates, and some participants described incompatibilities between WC data and other data systems that can lead to difficulties. Because, in the vast majority of states, WC systems are privately financed and administered, participants identified fragmentation of data across payers and employers as a notable barrier to full utilization of WC data for research and surveillance. Participants also discussed other technical and institutional limitations of WC data.

Participants discussed emerging trends within WC systems and the insurance industry and broader societal changes and innovations in analytic methods and data availability. They identified improvements in the quality of WC data, particularly the adoption of standardized electronic reporting systems, as an important trend that has increased the utility of WC data for analysts. Participants also discussed reforms to state WC systems and innovations in the WC insurance industry, noting that such changes can alter what WC data capture, so analysts must attend to them closely. Some participants suggested that CWCS might be interested in several new sources of occupational injury data that should be available in the future, and several participants voiced enthusiasm for expanded NIOSH support of linkages between WC data and administrative earning records, electronic medical records, or other external data sources. Participants also identified broader trends, such as population aging, health care reform, and changes in labor relations, as relevant to CWCS and the OSH research community.

Participants formulated a variety of strategic and tactical considerations for CWCS in light of the issues discussed above. Participants articulated several features that make NIOSH unique, including its focus on workers, its mission to promote prevention of workplace injury and illness, and its nationwide scope. Although some participants argued that these considerations should urge NIOSH to focus narrowly on activities intended to prevent the occurrence of workplace injury and illness (or *primary prevention*), others argued that NIOSH could make a larger impact by focusing on disability prevention and occupational health services research as well.

Participants identified a range of areas in which CWCS could make valuable contributions, including translation and dissemination of best practices in surveillance and prevention; facilitating partnerships between researchers and data providers; developing and evaluating interventions to improve workplace safety and return to work; research on institutional factors, including the design of WC systems and the organization of occupational health care; collaboration with the Occupational Safety and Health Administration; and investment in methodological research and the development of new worker-centered data sources. They also discussed suggestions for CWCS to promote these objectives in the short term.

Acknowledgments

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Abbreviations

BLS	Bureau of Labor Statistics
BWC	Ohio Bureau of Workers' Compensation
CWCS	Center for Workers' Compensation Studies
EDI	electronic data interchange
EHR	electronic health record
ERSO	Economic Research and Support Office
FROI	first report of injury
FTE	full-time equivalent
HIPAA	Health Insurance Portability and Accountability Act
IAIABC	International Association of Industrial Accident Boards and Commissions
IWH	Institute for Work and Health
KTE	Knowledge Transfer and Exchange
L&I	Washington State Department of Labor and Industries
NCCI	National Council on Compensation Insurance
NIOCCS	National Institute for Occupational Safety and Health Industry and Occupation Computerized Coding System
NIOSH	National Institute for Occupational Safety and Health
OSH	occupational safety and health
OSHA	Occupational Safety and Health Administration
SDS	Supplementary Data System
SOII	Survey of Occupational Injuries and Illnesses
SROI	subsequent report of injury
UI	unemployment insurance
WC	workers' compensation
WIR	Work Injury Report
YLD	year lived with disability

Chapter One. Background on Workers' Compensation, the National Institute for Occupational Safety and Health, and the Center for Workers' Compensation Studies

Workers' compensation (WC) provides medical care, cash benefits, and rehabilitation services to workers who experience occupational injury or illness (Sengupta, Baldwin, and Reno, 2014). Every state (and the District of Columbia) has its own distinct WC system that is governed by state law without federal involvement in the financing or administration of benefits (Sengupta, Baldwin, and Reno, 2014).[1] In 2012, the vast majority (90 percent) of the American civilian workforce was covered by one of the state WC systems, which paid injured workers an estimated $61.9 billion in wage loss and medical benefits (Sengupta, Baldwin, and Reno, 2014).[2]

Because WC systems are intended to cover most occupational injuries and illnesses for most of the workforce, data produced in the operation of WC systems can be valuable for research, surveillance, and prevention activities that promote occupational safety and health (OSH). Such entities as academic and government researchers, public health authorities, and the insurance industry already use administrative data from WC systems for research and surveillance. The National Institute for Occupational Safety and Health (NIOSH) has long recognized the importance of WC data and currently supports a wide range of research and surveillance based on WC data.[3]

For a variety of reasons, however, the full potential of WC data to improve research and practice in OSH has not yet been realized. In recent years, NIOSH has undertaken a focused effort to advance the use of WC data, including the creation of the Center for Workers' Compensation Studies (CWCS). This report presents the proceedings of a colloquium hosted by NIOSH and the RAND Corporation on December 11, 2014. The goal of the colloquium was to elicit input from key stakeholders in the OSH and WC communities to help CWCS maximize the impact of its research activities.

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[1] The Federal Employees' Compensation Act (Pub. L. 64-267, 1916) covers federal civilian employees, and disability compensation systems cover military veterans injured while on active duty. Several other federal WC programs cover specific populations of private-sector workers as well. For simplicity, we disregard the federal WC programs for the remainder of this report, and references to WC should be assumed to refer to state WC programs.

[2] The National Academy of Social Insurance estimates that WC covered 128 million workers in 2012, amounting to 90 percent of the 142 million civilian workers in 2012 (Bureau of Labor Statistics, 2015). (Later in this report, we discuss exemptions to WC coverage.) Federal programs paid an estimated $3.8 billion of this total.

[3] For examples of recent NIOSH-supported activities involving WC data, see the papers collected in the proceedings of two conferences held by NIOSH in 2009 and 2012 (Utterback and Schnorr, 2010, 2013).

The remainder of this chapter provides additional background on the objectives of NIOSH and CWCS and defines some basic concepts in public health and OSH that were important topics of discussion.

The Mission of the National Institute for Occupational Safety and Health and Workers' Compensation Data

NIOSH "conducts research and makes recommendations to prevent worker injury and illness" (Centers for Disease Control and Prevention, 2013). NIOSH leadership stated that NIOSH construes *prevention* broadly to include not only *primary prevention* (i.e., preventing workplace injury and illness from occurring) but also *secondary prevention* (i.e., facilitating early detection and timely intervention following injury, presentation of symptoms, or early-stage disease onset) and *tertiary prevention* (i.e., minimizing longer-term impairment and disability through improved medical care and rehabilitation) ("Prevention," 2014). The scope of NIOSH has broadened since the institute's creation in 1970, and NIOSH leadership is interested in paying more attention to life-cycle issues associated with workers. The fact that WC data capture rich information about the occurrence, nature, and consequences of occupational injuries and illness makes WC data a valuable resource for research and surveillance in support of all of these prevention aims.

NIOSH has already invested substantially in supporting the use of WC records for surveillance, and it is interested both in building further surveillance capacity in the states and in finding novel ways to use WC data for research. Besides capturing information about occupational injuries and illness, WC data are also critically important for research on the performance of state WC systems themselves. Although many questions about the operation of state WC systems are beyond NIOSH's purview, state WC systems are designed in part to create incentives for safe workplaces and to improve health, functional, and economic outcomes for workers following injury (Thomason, Schmidle, and Burton, 2001). WC systems can be viewed in part as a public policy with the potential to further NIOSH's goals, and NIOSH is accordingly interested in the effects that WC systems can have on worker safety and health.

The Center for Workers' Compensation Studies

CWCS was established in the spring of 2013 to coordinate WC resources throughout NIOSH. At the outset of the colloquium, CWCS leadership described NIOSH's vision for the center. Because other entities within NIOSH also use WC data for research, other NIOSH staff provided additional context for CWCS's role within NIOSH.

CWCS leadership stated that CWCS's initial focus would be on the use of WC data in NIOSH research. *WC data* refers primarily to claim data but should also be taken to encompass other data generated by WC systems, such as insurer data on policy-level exposures. For

example, insurers might collect data on employer participation in loss-management programs meant to improve safety or return to work. In Chapter Two, we further discuss the specific features and sources of WC data. CWCS has four main objectives:

- Maximize the use of WC data for prevention purposes.
- Communicate new study findings.
- Develop new research collaborations.
- Share best study practices in WC.

CWCS plans to accomplish this by integrating NIOSH's traditional public health approach to prevent worker injury and illness with WC industry efforts to provide loss-control services, medical care, and wage benefits to workers. CWCS leadership views the main goal of the center with respect to surveillance as identifying and tracking work-related conditions. The first step toward this goal is capacity-building, both for the states and for NIOSH internally. NIOSH views its roles in surveillance as consisting of two related activities: developing new surveillance methods internally and disseminating new methods that the states develop. In this context, CWCS could contribute to state surveillance efforts by building capacity for states to use their own WC data for public health surveillance and providing support. Once data have been collected for surveillance, they can also be used to prioritize OSH research. CWCS is particularly interested in expanding the evidence base for safety and health interventions, and WC data provide a natural way to measure the effectiveness of these interventions.

WC programs are state-specific, and private insurers pay the majority of benefits. CWCS therefore must rely on partnerships with organizations that possess claim data, potentially including state WC agencies, insurers, or insurance rating organizations.

CWCS is not the only entity within NIOSH that supports research involving WC data. NIOSH's Economic Research and Support Office (ERSO) has done multiple research projects on WC. ERSO focuses on the total burden of occupational injury and illness, as well as intervention effectiveness. ERSO's mission is to prevent worker injury and illness through collaboration with partners and through a focused program of economic research, including its transfer to practice. One specific goal of ERSO is to increase investment in the prevention efforts that result in the biggest improvement in worker safety and health for the least cost. Evaluating the cost-effectiveness of prevention efforts requires *burden estimation*, i.e., measurement of the population-level impact of occupational injury and illness. CWCS and ERSO see WC data as a valuable input to burden estimation because WC data can be informative about both the incidence and the consequences of occupational injury and illness. ERSO also seeks to reduce the adverse impact that economic factors can have on the incidence and severity of worker injury and illness.

Chapter Two. What Are Workers' Compensation Data Sources, and How Does the National Institute for Occupational Safety and Health Currently Use Them?

This chapter provides a brief overview of the different sources of WC data that were discussed in the course of the colloquium and provides some examples that illustrate how CWCS and others currently use WC data.

Overview of Workers' Compensation Data Sources

WC data refers primarily to administrative data generated in the operation of WC systems. A worker who files a WC claim might interact with many different organizations over the course of the claim: An employer or physician might file a WC claim with an insurer; the worker will receive medical care and might visit a hospital; the insurer will pay health care providers and might pay the worker cash benefits if temporary or permanent disability results from the injury. All of these events might be captured in various administrative data systems.

This section is intended to provide context for the discussion in the colloquium and is not meant to be comprehensive. The following draws heavily from NIOSH's *Workers' Compensation Insurance: A Primer for Public Health* (Utterback, Meyers, and Wurzelbacher, 2014). Readers seeking additional detail should review that document and the sources cited therein.

Claim Data

WC insurers and *third-party administrators* (entities that manage WC plans for self-insured employers) maintain databases in order to manage claims and disburse benefits. At a minimum, to serve this basic accounting function, these data must contain accurate records of indemnity benefits paid to workers and medical expenses paid to health care providers. In practice, insurers and third-party administrators (collectively referred to here as *claim administrators*) typically collect far richer information about the circumstances surrounding a claim. This information might include "the nature of the injury or disorder, the part-of-body, the event or exposure, industry sector, occupation, and the worker's ability to continue working or disability status" (Utterback, Meyers, and Wurzelbacher, 2014, p. 2). Claim administrators might use this information to determine benefits, for loss adjustment, or for actuarial or underwriting purposes.

Policyholder Data

Data capture in WC systems does not begin just with the occurrence of an occupational injury. Most WC benefits are provided through commercial insurance policies, so companies must track information about policyholders. WC insurance carriers maintain databases of policyholders containing information used for pricing and underwriting. Much of this information could be meaningful for OSH research. This is particularly true of risk classifications, often referred to as *manual classifications*; employer participation in safety programs, work-site visits, or other loss-reduction measures; and *experience modifiers*, which are used to incorporate an employer's claim experience into premiums. Insurers must also keep track of premiums collected, insurance coverage status, and the level of payroll reported.

First and Subsequent Reports of Injury

Every state has a government agency that is responsible for regulatory oversight of the WC system. These agencies require that various parties report the occurrence of new claims using a form generically referred to as a *first report of injury* (FROI). Employers or claim administrators generally have a legal responsibility to submit a FROI to the state shortly after the filing of a new WC claim. States might also require that treating physicians or other parties complete FROIs. In addition to quantitative fields describing the claim, the FROI generally includes a free-text *accident-narrative* field eliciting a description of the sequence of events that led to the occurrence of the injury or illness.

After a claim is initiated, the claim administrator is responsible for submitting *subsequent reports of injury* (SROIs) notifying the state of major changes in the status of the claim, including the payment of indemnity benefits, return to work, or death of the claimant. States also collect medical bills associated with WC claims, which might contain diagnosis codes, procedure codes, dates of service, provider identifiers, and other line billing information (i.e., procedure-specific charges) in addition to total billed amounts.

The format of the FROI and SROI can differ from state to state, but most states have adopted a standard known as *electronic data interchange* (EDI). EDI for WC data was developed by the International Association of Industrial Accident Boards and Commissions (IAIABC). Not all states use EDI, and even states that use EDI might add or remove data elements to suit specific features of their WC systems.

Rating Agency Data

To develop pure premium rates, rating agencies must collect and aggregate representative and accurate claim data from all the insurers that participate in a state market. One organization, the National Council on Compensation Insurance (NCCI), serves a majority of states, but other

states have their own independent rating agencies as well.[4] NCCI is a private organization that provides actuarial services to the WC insurance industry. Although NCCI serves a variety of other administrative and analytic functions for insurers and state WC systems, the most relevant to CWCS is NCCI's role as a rate-making body active in a majority of states. NCCI accordingly has established standards for reporting data on insured losses and other claim characteristics.

To Date, How Has the National Institute for Occupational Safety and Health Used Workers' Compensation Data?

In a narrow sense, the primary function of WC data is to enable the administration of WC insurance policies. NIOSH and its partners already use WC data for a wide range of additional purposes, some of which we discussed above in introductory remarks about CWCS. This subsection provides further detail on past and present uses of WC data that participants described. The presentation here is limited to uses of WC data by CWCS and partners that participants discussed in detail during the colloquium; it should not be interpreted as a comprehensive review of the actual and potential uses of WC data. In particular, we have omitted many successful applications of WC data for research.

Center for Workers' Compensation Studies Activities to Date

CWCS leadership described CWCS activities to date. Early CWCS activities have focused on surveillance. For example, CWCS has made methodological contributions to state surveillance activities by developing algorithms to classify detailed information about the nature and cause of WC claims into categories that are meaningful for prevention and by supporting linkages to employment data that allow estimation of incidence rates based on the number of full-time-equivalent (FTE) workers at risk.

Some of this work builds on the NIOSH Industry and Occupation Computerized Coding System (NIOCCS), an application that utilizes machine learning for the automatic classification (or *autocoding*) of unstructured industry and occupation text fields. CWCS is also engaged in applications of machine learning for the autocoding of accident-narrative information (which is captured in an unstructured text field) into information about the cause and nature of accidents. These two autocoding tools allow large numbers of records to be coded quickly, making previously unusable text available for analysis.

Most CWCS work has involved working with key partners to develop and share methods. To date, CWCS partnerships have centered on two states where the WC benefits are provided

[4] Discussion of insurance rating data focused on NCCI, in part because NCCI representatives participated in the colloquium and in part because NCCI's engagement with a large number of states makes it possible to use NCCI data for cross-state research. See, e.g., Meyer, Viscusi, and Durbin, 1995.

Notwithstanding the focus on NCCI data at the colloquium, data from other rating bodies have also been used successfully for research. See, e.g., Levine, Toffel, and Johnson, 2012.

exclusively by a single state agency: Washington and Ohio. The Washington State Department of Labor and Industries (L&I) has been a leader in the use of claim data for surveillance and research. CWCS leadership noted that L&I's construction of incidence rates by detailed industry and detailed cause of accident has been particularly valuable for prevention. CWCS has been working with Washington L&I officials to learn how L&I's activities could be translated to other settings. Since 2010, NIOSH has been working closely with the Ohio Bureau of Workers' Compensation (BWC) to extend the research and surveillance model developed by L&I. CWCS has also been working with Ohio to analyze medical and clinical information on diagnosis jointly with information on the cause of the accident.

CWCS also sees the development and evaluation of safety interventions as a promising way to use WC data. For instance, NIOSH partnered with BWC to evaluate the effectiveness of BWC's safety intervention grant program, under which the WC insurer (BWC) financed implementation of engineering controls at selected employers. NIOSH's partnership with BWC also highlights the potential value of state partnerships in expanding the scope of feasible research: As of the day of the colloquium, 16 NIOSH researchers were engaged in collaborative research with BWC researchers on a variety of questions.

Ohio and Washington are both *exclusive-state-fund states*, meaning that WC insurance is provided by a single state agency rather than by a marketplace of competing private insurers. This means that WC claim data are more centralized and uniform than is typical in states with competitive WC markets. Nonetheless, CWCS notes that other states (e.g., California, Illinois, Massachusetts, and Michigan) have also made good use of WC data for surveillance and prevention. CWCS would like to encourage other states to pursue similar analyses, both through grants for surveillance and through dissemination of best practices.

NIOSH has a national grant program for funding states to do surveillance with WC data to produce incidence rates by race, industry, and cause. The focus of this grant is within-state analyses, rather than the development of data that are comparable across state lines, because CWCS recognizes the difficulties of making cross-state comparisons with WC data.

What Lessons Can Be Learned from Past Federal Workers' Compensation Data Initiatives?

In introductory remarks, the moderator provided some reflections on past federal efforts to collect and analyze state WC data. He described two systems that operated in the 1980s: the Supplementary Data System (SDS) and the Work Injury Report (WIR) system. Under the SDS, the Bureau of Labor Statistics (BLS) collected WC data from up to 36 participating states for analysis. WIR was a primary data-collection effort that NIOSH and the Occupational Safety and Health Administration (OSHA) operated jointly, under which mail surveys were sent to workers

involved in certain types of workplace accidents (Panel on Occupational Safety and Health Statistics, 1987).[5]

The SDS and WIR programs were both discontinued in the 1980s. The moderator stated that the SDS was discontinued in part because resources to analyze WC data were lacking at BLS and in part because data quality was considered low.[6] One participant concurred that state WC data tend to have insufficient quality checks, leading to large amounts of unusable data being collected. In contrast, the WIR system led to meaningful input into OSHA rule-making, and the moderator deemed it more successful. A participant added that the SDS contributed to OSHA's lockout or tagout rule. However, the WIR system relied on the SDS as its sampling frame and was therefore discontinued when the SDS was discontinued.

[5] See pp. 32–33 for descriptions of the SDS and the WIR system.

[6] Another participant noted that the SDS data were used in more than 100 published studies, however, suggesting that the data were valuable despite their limitations.

Chapter Three. What Are the Strengths and Limitations of Workers' Compensation Data?

As a source of occupational injury and illness data in the United States, WC data offer many unique advantages. However, they also have many limitations.

Strengths of Workers' Compensation Data

Several participants observed that WC data are unambiguously good at identifying injured workers, meaning that essentially every worker whom the data capture has, in fact, experienced an occupational injury or illness. A corollary is that WC data offer the possibility of identifying workers at elevated risk of permanent disability very early in the course of their injury or illness. Other administrative data sources capturing the disabled population, such as Social Security Administration records, often do not capture information about disabled workers until their disabilities have progressed to the point at which rehabilitation efforts are frequently ineffective. WC data could thus have an important role to play in the study of disabled populations and disability policy more broadly.

One participant noted that the availability of risk classifications, such as manual class codes, in WC data also offers some advantages over other systems for classifying workers (e.g., industry codes at the establishment level). In certain situations in which an employer is assigned multiple manual class codes, the manual class code enables analysts to attribute injury occurrence to specific jobs within an establishment. Temporary-help agencies, for instance, have one six-digit North American Industry Classification System code, 56132, and this industry has a relatively low injury rate overall. Analysis by manual classes within the temporary agencies, however, reveals that injury rates for temporary workers are much higher than those of their full-time counterparts within the same class code (Smith et al., 2010).

Several participants stated that WC data play a unique role in capturing information about occupational injury that is not observed in any other data sources. Hospital discharges, for example, lack narrative information available in FROI data. The ability to combine medical or clinical information about diagnosis and information about the cause and circumstances surrounding an injury or illness enables public health officials, insurers, and researchers to address many questions about prevention that would not be answerable with medical records alone.

Participants noted that WC data are unique in capturing the financial cost of injuries in terms of both medical spending and indemnity payments for temporary and permanent disability. Although medical spending in WC is captured in some commercial health claim databases, other hospital discharge data often lack medical costs, which should be available in SROI data.

Medical sources in general do not report information on disability duration or return to work. WC data thus offer an important advantage over data from the health care system alone for estimating the total burden of work-related injury and illness. The incorporation of economic outcomes into health care outcome research for occupational conditions also becomes a possibility with WC data.

Participants also discussed some advantages of WC data over data from the Survey of Occupational Injuries and Illnesses (SOII), which is the primary nationwide system for estimating incidence rates of occupational injury and illness. BLS administers the SOII and estimates incidence rates using data based on OSHA Form 300 (commonly referred to as *OSHA logs*) collected from a sample of employers. The primary concern voiced about the SOII is that employer compliance with reporting requirements is highly imperfect, and research suggests that the quality of reporting varies across states and with other employer characteristics that might also be correlated with injury risk. Although the OSHA logs have denominator information included on them, there is also concern about the quality of reporting for this information. Finally, the SOII also does not capture the kind of accident narratives that WC data do. For these reasons, some participants suggested that WC data might have significant advantages over SOII data for prevention research and comparisons across industries. That said, participants also noted that WC data might have similar patterns of differential undercounting to those from the SOII—for instance, in small businesses. One participant not affiliated with BLS stated that WC data have neither more nor fewer limitations than BLS data when it comes to measuring incidence rates.

Several participants identified the ability to link WC data to outside sources on the basis of worker, firm, or health care provider identifiers as a strength of WC data. Firm-level linkage to unemployment insurance wage records enables the development of employer-level incidence rates, which CWCS and participants identified as a highly valuable resource for research and surveillance. The impact that economic factors, such as the nature of the employer–employee relationship, can have on the incidence and consequences of workplace injury can also be studied more effectively when information about employers is combined with WC data. The potential for linkages to worker-level earning data might make it possible to investigate the longer-term consequences of occupational injury and illness, particularly in terms of economic outcomes for the worker and participation in other social programs, such as Social Security Disability Insurance.

Limitations of Workers' Compensation Data

Participants identified many limitations of WC data. For clarity, this section distinguishes between *technical* and *institutional* limitations of WC data. *Technical limitations* refers to concerns about the usefulness of WC data as a resource for surveillance and research activities of interest to colloquium participants. *Institutional limitations* refers to legal, contractual, and other

barriers that pose additional challenges to goals that CWCS and colloquium participants have articulated.

Technical Limitations of Workers' Compensation Data

Many participants argued that the distinction between WC claims and injuries limits the value of WC data for many research and surveillance purposes. There is a wide variety of reasons an injured worker might not file a WC claim, so the universe of injuries that appear in WC data is a subset that is not necessarily representative of an industry or enterprise as a whole. As an illustration, one participant described the experience of a state public health department that tracked WC claims for occupational heat-related illness. The department found that the rates and types of occupational heat illness differed significantly between firefighters and agricultural workers, suggesting that differential reporting might account for some of the variation: Although WC claim rates for heat-related illnesses were higher among firefighters, agricultural workers accounted for most of the heatstroke deaths. The lesson the participant drew from this experience is that targeting of occupations for prevention and intervention efforts based on WC claim data should take into account barriers to reporting, especially among nonunion and low-wage workers.

A related problem is that many interventions of interest might themselves change WC claiming behavior, while other legal and administrative changes in claim handling can also change the relationship between claims and underlying injuries. Some participants strongly urged NIOSH to exercise caution in aggregating WC data to reach any conclusions about the incidence of injuries and illnesses or the effectiveness of prevention strategies in the aggregate. Using the Ohio Safety Intervention Grant Program as an illustration, one participant asked how researchers could be sure that the safety intervention did not also lead employers to change other OSH or human resource practices that might discourage workers from filing claims. However, a participant familiar with this research countered that safety interventions that BWC had evaluated in recent years either had no effect on injury frequency or actually led to short-term increases in the filing of injury claims because safety interventions raised awareness of good practices regarding injury reporting. Regardless of whether changes in reporting that result from a safety intervention are inherently bad for workers, a participant argued, it might not be possible to understand whether reporting changes that could affect the validity of safety research are occurring without looking outside WC data to other data sources. In such a scenario, data-collection efforts that are centered on workers, rather than insurance claims or employers, might be necessary to make sense of outcomes captured in WC data.

Further difficulties arise from the fact that, for purposes of calculating incidence rates, WC data typically have no denominator (i.e., no direct measure of hours worked among the population at risk). Measurement of the population at risk is a necessary first step for the construction of incidence rates, but participants noted that different measures of FTE employment might have biases that differ across categories of interest, potentially reducing the

validity of comparisons of incidence rates along these dimensions. For instance, one participant noted that data from the U.S. Census Bureau's American Community Survey are systematically less reliable for younger workers and for temporary workers than for other types of workers. There might also be differences between the target population of certain denominator data sources and the population captured by WC data: The different "filters" that determine inclusion in different data sources can further exacerbate comparability problems (Azaroff, Levenstein, and Wegman, 2002).

Many participants identified comparability of coding systems between WC data and other data sources as an important limitation. Because manual class codes are unique to WC, the absence of more–widely used occupation codes, such as the Census Bureau's Standard Occupational Classification, make it a challenge to use WC data to conduct surveillance by occupation. To the extent that the same occupation might have similar safety issues across many different industries (e.g., drivers or manual laborers), some see occupation-based surveillance as a potentially valuable opportunity that current WC data-coding practices hamper. However, it was also maintained that the manual class system itself offers a way to investigate occupations across industries if data on payroll by occupation and industry can be used to proxy for exposure after correcting for wage differences across industries. Although some participants urged states and insurers to collect Standard Occupational Classification or other more–widely used codes on claims or FROIs, participants familiar with the insurance industry indicated that this would be burdensome and was unlikely ever to happen.

Participants also voiced differing opinions about the representativeness of WC data with respect to small businesses. One limitation is that the very smallest businesses might be exempt from WC coverage mandates. However, the fact that WC data capture the entire population of covered employers might make such data more suitable for studying small employers than other data sources, coverage exemptions notwithstanding. A participant familiar with the Ohio Safety Intervention Grant Program also pointed out that most participating employers in that program were small businesses.

A related concern that was voiced was that some employer-specific surveillance and prevention approaches might not be appropriate for small businesses, which might average one severe claim every ten years because the population at risk is small. Financial incentives, such as experience rating, might also be less applicable to small businesses because they might not be able to absorb the financial risk that experience rating poses. However, small and medium-sized enterprises might be particularly important for prevention efforts because they have been shown to be more dangerous for workers. Small employers are much harder to study in general, and some participants raised the point that interventions developed for large employers might not be effective for small businesses that might have less-sophisticated information technology, different types of equipment, or different management structures.

A theme that emerged throughout the colloquium was that WC systems are state-specific, making it very risky to pool data from multiple state systems for surveillance or research

purposes. Most obviously, there are statutory differences across states in WC system parameters, such as the waiting period before temporary total disability benefit receipt begins or which employers the WC system covers. These kinds of policy differences will make the relationship between claim rates and injury rates or injury severity differ across states for purely mechanical reasons. Analysts who are not sufficiently cautious to account for these limitations run the risk of confounding policy differences with safety differences. However, participants argued that even carefully accounting for differences in statute law is generally insufficient to draw valid inferences from cross-state comparisons. This is because there are many subtle differences in state WC systems that can also affect how data are reported. Examples include differences in reporting requirements and incentives for compliance and differences in how insurance companies estimate losses for purposes of reserving. Many participants argued forcefully that understanding WC data needs to be a state-by-state enterprise. CWCS leadership made it clear that NIOSH takes the limitations of cross-state comparability of WC data very seriously and that these concerns are a compelling reason for the state-by-state approach embodied in the CWCS surveillance grant program.

This is a limitation for the research value of WC data because, as several participants noted, many important research questions about statewide policies could be answered much more straightforwardly if it were possible to combine data from multiple states. Questions about general equilibrium or long-run effects of statewide policies, such as experience-rating or safety regulations, might not be directly answerable using only within-state policy variation.

Data standards, such as EDI or the NCCI data calls, might seem to promise an improved ability to study multiple states concurrently, but participants also raised concerns that many of the most-uniform data systems have important gaps that limit their value for surveillance and research. One participant described his experience working with IAIABC-standardized forms in Florida: Despite substantial interest from economists in the timing of benefit payment, this participant asserted, the IAIABC system that was adopted in Florida actually led the state to *stop* collecting annual data on benefit payment. He offered this anecdote to illustrate that consistency is a necessary but not sufficient condition for WC data to be useful for research.

Participants also raised concerns about the NCCI data. Participants commented that NCCI has the highest-quality data for purposes of cross-state comparisons. Several participants also commented that the NCCI data are the best source for tracking the cost of benefits—which is their primary purpose. However, one limitation is that NCCI covers only the insured sector, leaving out self-insured employers (which systematically differ from insured employers). One participant raised a larger conceptual problem with NCCI data, which is that the amount of insured losses on a claim (which are captured in NCCI's cost-per-claim data) is not an accurate measure of the total cost incurred by either workers or employers. The NCCI data do appear to be the most promising resource for cross-state analyses of questions related to the costs of the WC system, but many participants pointed out that monitoring and controlling the cost of the WC system might not be an appropriate objective for public health officials or NIOSH.

However, others countered that monitoring the financial costs of the WC system is an important NIOSH function because it relates to burden estimation and understanding the impact that injury and illness have on individual workers.

Institutional Limitations of Workers' Compensation Data

The state-specific nature of WC data also leads to many institutional challenges for public health authorities, researchers, and CWCS itself. Participants described enormous state-by-state variability in the degree of centralization and quality of WC data. Participants noted that exclusive-state-fund states, such as Washington and Ohio, have the highest-quality and most-accessible data. However, only four states in the United States use an exclusive-state-fund model, and several participants urged that WC research and surveillance activities cannot be limited to exclusive-state-fund states. In states with competitive WC markets, the highest-quality data might consist of proprietary insurance company records that are fragmented across all market participants. This is one reason the conversation centered on FROI and SROI data, which have the advantage of being centralized inside state WC agencies.

Research focused on a single insurer or a single large employer promises internal data consistency: Several participants identified the Liberty Mutual Research Institute for Safety as an excellent illustration of the potential uses of WC data for research and prevention. Participants noted, however, that the Liberty Mutual Institute might not be a scalable model for CWCS to follow, and the unrepresentative nature of single-company data might limit their value for surveillance.

Surveillance and research activities must also be compatible with the incentives of the organizations that control the data, an issue that several participants identified as a barrier that CWCS must confront. Insurers and rating agencies might focus narrowly on costs, while state agencies might face political pressures that rule certain questions out of bounds.

CWCS must also take into account the many legal barriers to the use of WC data. The federal Health Insurance Portability and Accountability Act (HIPAA) (Pub. L. 104-191, 1996) makes it challenging to link non-WC health care data and health records with WC claims. HIPAA exempts WC data, but states have their own privacy laws that place additional constraints on data-sharing and research activities. A trend that several participants noted is the removal of linkable identifiers (e.g., Social Security number) from WC data and other data sources, such as hospital discharge records, which could sharply limit some analytic opportunities. Participants identified linkage to other economic and health data sets as a highly promising application of WC data, and so CWCS and affiliated researchers might need to advocate for retention of linkable identifiers in other data sets.

Participants also pointed out that an absence of general protocols for making data available to the research community has limited WC research and data-sharing. WC data access might be difficult for individual academic researchers not affiliated with institutions that own data. The

need for case-by-case decisions to grant access to proposed research is also administratively burdensome for state agencies (WC agencies and health departments) that control these data.

What Methodological Contributions Could the Center for Workers' Compensation Studies Make?

Participants offered many illustrations of the potential value of WC data in spite of the limitations stated above. Several colloquium participants cited successful uses of WC data for surveillance and primary-prevention activities by state departments of public health. One example was an analysis that used WC data to identify high injury rates in certain industries. This eventually led to the redesign of equipment that reduced burns in coffee shops. The participant who provided this example pointed out that the coffee shops reduced burns without any data on costs. Both participants and CWCS leadership viewed the creation and analysis of incidence rates for population surveillance as a valuable objective.

Surveillance and prevention uses of WC data, in particular, might be feasible without accurate cost data, suggesting that some of the problems noted above with EDI might not rule out the use of WC data for these public health purposes. A participant drew a distinction between population and case-based surveillance. Concerns about representativeness and completeness that participants raised about the use of WC data for population surveillance are less of an obstacle to case-based surveillance, the practice of following up with affected workers and employers through periodic interviews, site visits, or other qualitative methods. Case-based surveillance thus places lower requirements on the representativeness and completeness of WC data than population surveillance does, and some participants stated that many states currently use WC data for case-based surveillance.

Conversely, it was asserted that many research objectives can be achieved with data that might not be appropriate for surveillance. A participant suggested that case studies comparing costs captured in WC data (primarily insured losses) with broader measures of social cost could improve the value of WC data, particularly the NCCI data, for research on OSH.

A counterpoint to the widespread concern about comparisons across state lines is that many research objectives can be accomplished with data from a single state. The effects of employer-level or *microinterventions*, such as the Ohio Safety Intervention Grant Program, might best be measured relative to those from other employers in the same state (which would be a plausible control group for grant recipients because of their exposure to a common economic and regulatory environment) even if cross-state data were available.

Many stakeholders affirmed validation of WC data for surveillance and research purposes as a potentially valuable activity for CWCS to undertake. One such activity would be assessing the biases in alternative denominators used to calculate incidence rates. As noted above, data sources on FTE employment have different strengths and weaknesses, and research that documents the implications of these biases for surveillance or other uses of WC data could be valuable. There

were also some suggestions for work NIOSH could do to validate WC data themselves (the numerator of incidence rates), and some participants voiced misgivings that NIOSH promotion of WC data as a numerator for incidence rates could exacerbate confusion between WC claims and injuries that is already widespread in some states. Although it was argued that the existence of an undercount of occupational illness and injury was settled fact and that NIOSH should not pursue research on the overall magnitude of the undercount, some participants suggested that studies on *differential* underreporting across types of workers or types of injuries could be a valuable methodological contribution.

Besides validation studies, participants urged NIOSH to develop specific guidance for the states on how to construct incidence rates and conduct effective surveillance. Several participants raised the public health concept of a *sentinel event* as a useful idea for guiding surveillance activities. One definition of a sentinel event is that it is a rare but serious event that serves as a meaningful signal of broader factors that can lead to elevated risk for other adverse occurrences. For example, WC data might capture the occurrence of a cluster of serious injuries in a certain job setting. Participants voiced strong support for the idea of sentinel-event surveillance as a powerful tool both for primary prevention (in which the sentinel event would consist of certain patterns of WC claim filing captured in FROI data) and for secondary or tertiary prevention (in which the sentinel event might be substandard care captured in medical billing data, such as inappropriate spine surgery or early opioid prescribing). A potential contribution for NIOSH and its partners could include identifying the most-appropriate metrics for sentinel-event surveillance and identifying best practices from studies in particular WC systems for broader dissemination.

Sentinel-event surveillance could have synergies with more worker-centered forms of data collection that many participants advocated. Several participants suggested that qualitative research should be added to consideration for CWCS. Examples of potentially useful qualitative activities include focus groups or one-on-one interviews of employers and employees. NIOSH could help public health authorities by suggesting when these follow-up activities could have the greatest value, perhaps using the occurrence of sentinel events in WC data as a sampling frame.

Participants urged that CWCS should also continue its work on the harmonization of coding systems between WC and other data sources, particularly occupation coding. One participant who had applied NIOCCS to occupation coding in a jurisdiction that uses different manual codes from the NCCI system reported that the resulting crosswalk to occupation codes was not sufficiently high quality to be helpful. Successful extension of NIOCCS to cover more manual class and occupation coding systems, which is an active research area for NIOSH, appears warranted on this view. Some participants also voiced support for more methodological work by NIOSH to identify the cause of injury from claim data, including narrative data.

As for institutional barriers, some participants raised the idea that CWCS could require the production of deidentified research data sets as a condition for participation in surveillance grants and other activities.

Chapter Four. What Changes Are Relevant?

We asked participants to identify emerging trends that CWCS should take into account in developing its strategic plans. They discussed emerging trends within WC systems and the insurance industry and broader societal changes.

Emerging Trends in Workers' Compensation Systems

Participants discussed a wide range of state-level policy changes in WC systems that have both substantive and methodological implications for CWCS activities. One participant observed that causation requirements for compensability are increasing in many states. This is likely to lead to an increased focus on determining what is work-related, age-related, or congenital in WC systems. As a substantive matter, these changes can modify access to care and adequacy of benefits for injured workers and, in some cases, can make systems more litigious. Methodologically, these changes can complicate CWCS efforts by changing what is measured in claim data (because noncompensable claims might not be filed). This is especially true because changing causation requirements will differentially affect certain types of claims, including illnesses and conditions that nonoccupational comorbidities exacerbate.

Another important trend that many participants mentioned is the development of alternatives to WC insurance in some states. In all states except Texas, participation in the WC system has been mandatory for most employers for decades. However, Oklahoma recently enacted a reform that allows an employer to opt out of the WC system if it provides an alternative equivalent occupational benefit plan; a similar plan is also under debate in Tennessee and other states. These plans, which the federal Employee Retirement Income Security Act (ERISA) (Pub. L. 93-406, 1974) authorizes, might look different from WC insurance in terms of benefits, care delivery, and financing. These plans could affect incentives for safety and outcomes for injured workers, and migration of employers away from the WC system would dramatically change what WC data capture if adoption of ERISA plans is correlated with other employer characteristics. However, the Oklahoma system remains in its infancy, and its implications are not currently well-understood.

WC provision is also changing in states where participation in the WC system remains mandatory. Very high-deductible WC policies have become increasingly widespread, but their effects on safety and claim-filing behavior remain unknown. They might also represent a hidden form of solvency risk to the extent that employers that might not be able to obtain state approval to self-insure can obtain very high-deductible plans.

Participants also identified long-term changes in the level and distribution of occupational injury risk. One participant noted that, although overall rates of reported injury and illness have

declined in the long term, high-hazard industries remain high-hazard. In one participant's view, high-risk occupations, such as mining, roofing, nursing, and processing meat and poultry, have not seen much reduction in injury and illness rates. Meanwhile, Hispanic workers continue to face elevated risk of injury and death in some jurisdictions. Changes in the industry and occupational mix—for example, the anticipated growth of the health care workforce—might also change prevention priorities. These differential trends might warrant closer examination of occupational or employer risk factors among narrowly defined high-risk settings. Discussion among participants suggested that overall trends in injury frequency and severity might not be consistent across all data sources.

The effectiveness of medical care delivery models is a policy concern and area of broad interest. Many participants voiced serious concern about the provision of low-quality medical care to injured workers, sometimes leading to iatrogenic harms. One trend is the emergence in WC of new and potentially more-effective care-delivery models that affect WC cost and claims. It was observed that most medical care in WC is provided by solo practitioners and small practices and reimbursed on a fee-for-service basis, which might lead to inefficiencies. A participant contrasted this status quo with an example from California, where the largest WC provider is an integrated health system (Kaiser) that also operates in the group health insurance market as a health maintenance organization and tries to integrate WC care with health insurance care. Another participant observed that interest in similar "24-hour care" approaches was increasing among large employers, such as state governments.

Participants identified improvements in data in the WC world, particularly the adoption of EDI, as a very significant change. The movement away from paper reporting in favor of electronic reporting has enormous potential for research and surveillance, although EDI implementation remains a work in progress in many jurisdictions. Policy changes to improve compliance and data quality are an important consideration for researchers because such changes can directly affect what the WC data capture.

Broader Social Changes That Affect Occupational Safety and Health and Workers' Compensation

Labor Markets

Many changes in the labor market were identified as challenges for safety, surveillance, and research. Contracting and outsourcing relationships can lead to situations in which there is ambiguity about the employer of record and who is responsible for prevention and WC. Some participants pointed out that international businesses have more extraterritorial employees. It was suggested that multiemployer worksites also create measurement challenges because Employer Identification Number data might not reveal what kind of work the worker is doing. In a similar vein, participants asserted that trends, such as the spread of contingent workers, rising wage

inequality, decreasing unionization rates, and decreasing job security, might affect safety and reporting. One participant characterized this as a business model of "avoiding having an employee" in order to reduce the costs of labor law, safety, and WC compliance.

These trends can make populations of workers in certain industries extremely vulnerable: One participant identified the seafood industry as one in which the move toward temporary, frequently undocumented, workers has created challenges in terms of reporting and surveillance. Similarly, changes in the organization of temporary employers for big public-works projects were also identified as a factor that could affect both reporting and safety. Finally, immigration reform might lead to changes in the workforce, as well as what the WC data capture.

Public Health

Participants suggested that increases in the prevalence of comorbidities associated with the aging workforce led to higher costs within the WC system. They identified obesity and diabetes, in particular, as comorbidities that can make medical care in the WC system much more challenging. Several participants raised the point that privacy laws, such as HIPAA, prevent physicians from notifying employers and insurers about nonoccupational comorbidities that could affect safety and return to work. In light of population aging, the importance of tertiary prevention for reducing the burden of occupational injury and illness could increase.

Some broader public health challenges are also likely to affect safety and WC claiming behavior. The rise of opioid abuse and drug poisoning in the general population is likely to have consequences for the WC system. Possible changes in marijuana laws were also mentioned as a factor that could affect WC. Emerging infectious diseases and the appearance of tropical diseases in the United States might be an issue for occupational health and WC. Finally, the issue of quarantine time for highly infectious diseases, such as ebola, might pose interesting legal and operational challenges for WC systems. Traumatic brain injury, including mild traumatic brain injury, was identified as an emerging issue in auto claims that seems likely to affect WC as well.

Health Care

Major changes in health policy and the U.S. health care system also have the potential to affect workplace safety and the functioning of WC systems. Aggregate trends in the cost of health care directly affect the cost of providing WC medical benefits. In particular, participants voice concern about the cost of prescription drugs. The expansion of insurance coverage under the Patient Protection and Affordable Care Act of 2010 (Pub. L. 111-148) has the potential to affect WC claiming behavior if there is cost-shifting between WC and group health insurance, as conventional wisdom and some research suggest. Accounting for such changes would be important for analysts using WC data for surveillance or research. Finally, there have been substantial changes in opioid prescribing behavior in recent decades, and these are likely to have consequences for injury and disability incidence rates, as well as the outcomes of WC treatment.

Changes in Data and Analytic Technology

New Data Sources and Data Linkages

Participants suggested that CWCS might be interested in several new sources of occupational injury data that should be available in the future. Starting in 2015, OSHA has implemented new recordkeeping requirements for employers that will dramatically expand incident reporting to OSHA. A participant reported that these new data would contain accident-narrative information, as well as an employer identifier that would be linkable to other employer-level data. The creation of a new nationwide data set of serious accidents will present opportunities to enrich the understanding of WC data.

Many participants noted that broader adoption of electronic health records (EHRs) will create research opportunities, especially if EHRs can be linked to individual-level WC claims. As noted in "Limitations of Workers' Compensation Data" in Chapter Three, however, HIPAA and state privacy laws could make linkages of health data challenging to carry out. The fragmentation of the EHR marketplace and the lack of standardized EHR formats could also present obstacles to researchers seeking to use EHRs together with WC data. A related difficulty that participants noted is that the transition from International Classification of Diseases, 9th rev. (ICD-9) (Health Care Financing Administration, 1979), to International Classification of Diseases, 10th rev. (ICD-10) (Health Care Financing Administration, 1999), coding in nonoccupational health systems will create some comparability challenges.

Participants also noted that Massachusetts and several other states have recently created all-payer databases that aim to cover all health care settings. Although many states have all-payer hospitalization databases, this new generation of all-payer databases might open new opportunities in occupational health services research: A substantial amount of WC care is provided outside the hospital setting. However, linkage of WC data to these databases is likely to face institutional barriers, and the exclusion of WC from some databases will limit the scope of questions that can be answered with these data.[7] However, all-payer data could be a powerful new resource if it were possible to link to employers, individuals, or health care providers in the WC data.

Several participants voiced enthusiasm for expanded NIOSH support of linkages between WC data and administrative earning records, primarily unemployment insurance (UI) wage records. Several participants who have used UI records for surveillance and research argued that these data are the best available denominator for constructing employer-level incidence rates. The ability to measure long-term employment and earning outcomes for injured workers also opens up significant opportunities for burden estimation and research on disability prevention.

[7] The Massachusetts All Payer Claims Database excludes WC claims (Center for Health Information and Analysis, 2015).

Another external data source that several researchers highlighted is claims from other disability systems, primarily Social Security Administration records. Participants discussed Social Security Disability Insurance claims in two contexts. First, there was interest in the contribution of occupational injury and illness to Social Security Disability Insurance. The state of knowledge on this question could be advanced both with analyses that combine aggregate statistics from WC and Social Security Disability Insurance and with individual-level data linkages that examine Social Security Disability Insurance claiming behavior jointly with workers' WC claim histories. Second, Social Security Disability Insurance data are vastly more comparable across states than WC data, and one participant urged researchers to consider using Social Security Disability Insurance data to address some OSH questions that require cross-state research designs. Finally, death certificates are linkable and can be very important for measuring the long-term impact of occupational injury and illness.

Advances in Technology and Methods

Improvements in data processing and storage (commonly referred to as big data) will present opportunities, as well as some challenges, for NIOSH and WC stakeholders. Successful applications of machine learning to narrative data suggest that new, computationally intensive methods could be valuable with other elements of WC data. Another suggestion was closer integration of predictive analytics with primary-prevention efforts. A participant stated that insurers (and others) are eager to have access to validated, easy-to-use tools that they could use for primary prevention. CWCS could promote this effort by collecting true field observations to validate leading indicators in all the industries in which the majority of risk resides.

The challenge is that some data sets are getting very large by the standards of social science and epidemiology. One participant who works with insurance industry data described working with systems that generate petabytes of data.[8] This creates enormous opportunities for analysts, but it also creates technical challenges. Petascale data are unwieldy and cannot be analyzed entirely within desktop computing environments and can be costly to store and analyze in other common environments. This could lead to challenges for users of WC data because cloud storage and other tools frequently used to handle large data sets might be difficult or impossible to apply in the secure computing environments required by privacy laws. Some participants suggested that WC research needs more data science.

[8] One petabyte is 1 million gigabytes.

Chapter Five. Implications for the Center for Workers' Compensation Studies

This chapter discusses some strategic and tactical considerations that participants raised. Participants identified areas in which CWCS could make valuable contributions. They also discussed suggestions for specific activities that CWCS could pursue in the short term.

What Goals Should the National Institute for Occupational Safety and Health Pursue with Workers' Compensation Data?

A theme that many participants articulated is that consideration of what characteristics make NIOSH a unique organization and what NIOSH objectives others are unlikely to serve should inform NIOSH strategy. One way in which NIOSH is unique is that it is a worker-centered research organization with access to the workplace. In this view, NIOSH has an advantage in studying health and health care in conjunction with features of the work environment. NIOSH is also unique in its focus on prevention of workplace injury and illness: It is the only source of federal research funding for these goals. The third consideration that participants raised is that NIOSH is federal and nationwide, whereas other government bodies engaged with research and surveillance involving WC data are likely to be state-specific.

Although there was little disagreement about these principles, participants voiced opposing views about the implications for NIOSH's priorities. The strongest disagreement about strategic priorities was between a group that urged NIOSH to focus its attention on primary prevention and a group that urged NIOSH to deepen its engagement with research and policy efforts on disability-prevention and occupational health services research. Both groups' arguments were well-reasoned, and it is worth presenting both cases.

The Case for Primary Prevention

Some argued for restricting NIOSH's focus to primary prevention. The basic argument is that NIOSH is the only source of federal research funding for primary prevention of workplace injuries and illnesses, whereas other problems that are amenable to study with WC data are—or should be—of interest to other funders given their missions and financial interests. NIOSH's resources are limited and therefore should be directed toward activities that do not have support from other funding bodies.

In this view, the Agency for Healthcare Research and Quality should conduct research on health care quality and outcome research in occupational medicine. The insurance industry and allied organizations, particularly NCCI, Insurance Services Office, and Liberty Mutual, should conduct research on measurement of WC claim rates (which differ from injury incidence rates

for reasons discussed in "Limitations of Workers' Compensation Data" in Chapter Three) and on controlling the cost of the WC system through loss reduction or more-efficient benefit delivery. Research on reducing the social cost of disability through medical management, return-to-work programs, and other disability-prevention interventions should be employers' and insurers' responsibility. In contrast, primary-prevention research has no champion outside NIOSH. Participants sketched a stark trade-off: Allocating scarce NIOSH resources toward these other research priorities runs the risk that primary prevention will be neglected entirely.

NIOSH's activities with WC data, then, should be designed with circumscribed, well-defined goals in mind: supporting primary-prevention efforts, developing interventions to improve safety, and evaluating the primary-prevention effects of public policy toward workplace safety (such as OSHA enforcement, OSHA regulations, and targeted safety interventions). Investments in the quality of WC data, in tools that make WC data easier to work with or interpret, or in infrastructure that makes WC data more accessible to researchers could have substantial payoffs in improving the evidence base on primary prevention.

The Case for Disability Prevention

Others argued that secondary and tertiary prevention (or disability-prevention and occupational health services research) warrants substantially increased attention and investment from NIOSH. A premise of this line of argument is that NIOSH should invest resources where they can most effectively reduce the total burden of workplace injury and illness. Primary prevention would be ideal, but it is likely that there are high-impact, low-cost opportunities for intervention at the secondary- and tertiary-prevention stages. Participants stated that a small minority (approximately 5 percent) of injured workers are responsible for 80 percent of cost in WC systems. Many of these workers become permanently disabled even though the health conditions the workers have when they enter the WC system are nonserious and amenable to treatment.

Participants suggested why researchers and policymakers neglect these areas in spite of large social payoffs. Even though insurers and states have data that would enable research that could have a meaningful impact on the burden of disability that these workers experience, these entities might lack sufficient incentives to invest in such research. For instance, cost spillovers onto Social Security Disability Insurance and other public programs mean that employers and insurers are unlikely to internalize the full social benefit of improved disability prevention within their own caseloads. Similarly, research that expands the evidence base for disability prevention also creates benefits for society beyond those that any individual insurance company could appropriate. Some participants also took the view that the parties that might possess the best data for research purposes (insurers and rating agencies) might not be the most qualified to carry out disability-prevention research and might not be in the best position to put the findings into action.

If NIOSH is interested in the most cost-effective levers for reducing the total burden of workplace injury and illness, then secondary and tertiary prevention must play a role in the CWCS research agenda. Secondary- and tertiary-prevention research aimed at improving the productivity and work outcomes of disabled workers would fit well with NIOSH's interest in the health of the workforce (including Total Worker Health). Improved health, functional, and economic outcomes for injured workers could ultimately have large fiscal payoffs through reduced Social Security Disability Insurance utilization as well.

Participants also raised the point that, as with primary prevention, research focused on disability prevention does not have a competing dedicated funding source or central entity responsible for dissemination of best practices. There is a significant research gap on effectiveness of physical therapy, vocational rehabilitation, and return-to-work programs. Similarly, research on how to deliver high-quality health care and avoid iatrogenic harm to injured workers within the WC system could have substantial impacts on the burden of occupational injury and illness, especially in conjunction with more-effective dissemination and translation activities. These types of secondary- and tertiary-prevention efforts thus face a leadership void at the federal level comparable to that facing primary prevention, and NIOSH could substantially further its mission by positioning itself as a point of coordination for federal, employer, and worker efforts to reduce the burden of disability caused by occupational injury and illness. Advocates of this view also suggested that, rather than detracting from primary-prevention objectives, NIOSH research that yields meaningful improvement in disability outcomes could strengthen political support for NIOSH and, eventually, help to stabilize NIOSH's funding stream.

Research and Policy Goals: How Can the Center for Workers' Compensation Studies Maximize Impact?

This subsection describes some specific activities that participants advocated, as well as some cautionary suggestions.

Translation and Dissemination

Participants agreed that NIOSH has a special role to play as a centralized resource of prevention and surveillance best practices that might not ordinarily be shared across state lines. Translation of surveillance findings—for instance, how to prevent burns in coffee shops—would be one way for NIOSH to contribute to public health. Another strategy would be to publicize state-based activities that have been successful, such as teaching states about best practices learned from other states' data. NIOSH has also served a role in dissemination of stakeholder perspectives, new findings, and best practices.

Part of this effort could involve better communication to stakeholders of the value of good WC data. One participant noted that few WC commissioners outside the states of Washington

and Ohio have recognized that WC data can be used for prevention. In some states, this reflects the poor quality of WC data, but, in other states, it might simply reflect unawareness that educational efforts from NIOSH could overcome. Indeed, many participants stated emphatically that NIOSH needs to do a much better job making a policy argument that WC research and surveillance matter in order to stimulate greater effort from state WC commissioners, employers, and other stakeholders that control data. A participant characterized WC policymaking as being almost entirely driven by concerns about money that often resembled a zero-sum game between parties narrowly focused on reducing system costs (insurance carriers and employers) and parties narrowly focused on increasing benefit generosity (applicants' attorneys and labor unions). In this political environment, it can be difficult to convince stakeholders of the value of investments in surveillance, prevention, and research activities.

Accordingly, many participants identified the formulation and dissemination of a "business case" for prevention as a top strategic priority for CWCS and for NIOSH more broadly. One suggestion was for CWCS to include more-explicit marketing and dissemination requirements among its funding criteria for extramural projects. Another suggested strategy was for NIOSH to focus on publicizing the public health benefits of good WC data. The following line of argument was suggested as an example: If states can track trends in incidence rates and identify case clusters with WC claims, they can react very quickly to outbreaks of occupational injury or illness and improve prevention. Others also noted that research that uses WC data to identify what factors drive the overall costs of injury and illness can also be invaluable in setting priorities for public health and that such prevention benefits of good WC data might be salient to policymakers.

More broadly, some participants suggested that improved dissemination of NIOSH-produced or -supported burden estimates could also help draw policymaker attention to the continuing challenges that OSH pose. *Years lived with disability* (YLDs) is a recently developed burden concept that might be particularly well-suited to capturing the burden of occupational injury and illness. Referencing a ranking of the causes of disability that the Global Burden of Disease study team published, one participant noted that musculoskeletal disorders and mood disorders that are leading causes of disability in WC also dominated the rankings for the overall global burden of disability (see Vos et al., 2013). NIOSH could improve public understanding of its mission by encouraging the use of YLD and similar concepts in burden estimates.

Facilitating Partnerships

Several participants suggested that NIOSH might have a role to play in making state-level differences in WC systems comprehensible across state lines so that researchers and stakeholders can better judge the generalizability of findings from one state and the feasibility of research that compares outcomes across state lines. This is important for the following reason: It is not possible to answer all relevant questions about how to improve safety without conducting some comparisons across state lines. Some policies (e.g., experience rating of WC) that can have an

important effect on safety have long-term or general equilibrium effects that cannot be studied by looking solely at within-state variation. A primer on public health for the WC community (as a companion to NIOSH's primer on WC for the public health community) was suggested as a way to help insurers communicate more effectively with public health officials and researchers.

Good relationships with the entities that control WC data are fundamental to all of CWCS's goals. Several participants suggested that NIOSH should continue to reach out to organizations, such as NCCI and IAIABC, to track emerging issues and develop new applications for data. The idea of a permanent external advisory board for research on specific topics (such as prevention, safety enforcement, or health care delivery) was also advanced.

Developing and Evaluating Interventions

Participants saw an important role for CWCS in conducting and supporting research on best practices, translation, and evaluation of microlevel interventions. The development of tool kits for employers can have a large practical impact. One participant suggested that the translation activities of Canada's Institute for Work and Health (IWH) could provide a useful model for NIOSH. IWH has developed a program called Knowledge Transfer and Exchange (KTE). This program led to creation both of prevention tool kits that are useful in Ontario, the primary province with which IWH works, and of universally applicable conceptual models and materials to help employers achieve return to work and other primary- and disability-prevention goals.[9] This participant suggested that the KTE model of developing generalizable guidance from state- or region-specific studies could be highly relevant to CWCS and that it might represent a useful departure from NIOSH's traditional role. Another participant added that collaboration with the U.S. Department of Labor could be valuable in such an effort.

Another specific intervention that was suggested was the development of tools (including software) to make data on leading indicators, exposures, or hazards actionable for prevention. CWCS could also support methodological work toward stratification of risks (within industries) to better target prevention. CWCS could develop additional surveys and on-site assessments. Intervention development should be followed up with analyses of relevance and active dissemination, possibly including mandating product licensing if outside parties develop useful interventions.

Participants offered similar suggestions in relation to disability prevention. NIOSH could support research to develop screening instruments for identifying the risk of disability. An additional goal could be developing evidence-based best practices to prevent disability. As examples of potential priority areas, a participant drew a contrast between the large evidence base on cognitive behavioral therapy and the limited evidence base on spine surgery and opioids.

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[9] IWH defines KTE as "the process of sharing timely, useful, evidence-based research findings with decision-makers and others who use research. KTE also involves actively engaging external audiences in research to make studies more relevant" (IWH, undated).

Occupational Health Services Research and Outcome Research

Participants also suggested that interventions in occupational health services and outcome research would be a promising area in which CWCS could invest. Several participants noted a research gap on which forms of medical treatment are most effective for occupational injury and illness. In addition to clinical studies on particular treatments, participants suggested that NIOSH should be interested in how the organization of occupational health care providers affects patient outcomes. For instance, the participant who had introduced the example of Kaiser's occupational health practice drew an interesting contrast between what he described as high-quality care provided through Kaiser's health maintenance organization model and less-successful care provided through "off-the-shelf" preferred-provider organizations that also served WC patients. Differences in the performance of these two managed-care models raise interesting questions that could be important for improving occupational health outcomes. The large amount of experimentation with new delivery models that has accompanied the Affordable Care Act could provide useful ideas for reforming occupational care delivery.

There are also gaps in outcome research, and it is not clear who besides NIOSH is willing to take leadership in promoting research on primary and secondary prevention to reduce the incidence and burden of occupational injuries and illnesses. New burden concepts, such as YLD, could be particularly appropriate for occupational health services research.

Safety Impacts of Workers' Compensation System Design and Economic Factors

The primary-prevention and disability-prevention effects of the WC system warrant attention from NIOSH because creating incentives for safety is a stated goal of many WC systems. One important unresolved research question that several participants identified is the effect that experience rating can have on safety. A participant posed several questions about experience rating that remain unanswered. Does experience rating "work" as intended to incentivize better safety? Does it have unintended consequences, such as encouraging employers to contest claims instead of improving safety? Another important question that participants identified was the effect of emerging alternatives to WC on safety and disability—for example, occupational benefit plans in Texas and Oklahoma.

Similarly, primary-prevention research does not need to be limited to explicit safety interventions. Many of the labor market trends identified in "Broader Social Changes That Affect Occupational Safety and Health and Worker's Compensation" in Chapter Four have shifted the balance of power in the workplace away from workers, and participants suggested that the safety effects of these changes could be important for NIOSH to study. Additional research on how the rise of professional employer organizations and the fissured workplace affect safety could be valuable.

Collaboration with the Occupational Safety and Health Administration and Evaluation of Occupational Safety and Health Administration Activities

Some participants argued that prevention effects of OSHA enforcement can and should be evaluated using WC data because OSHA might lack the resources and incentives to evaluate its own activities rigorously. On this view, implementation of the new OSHA incident-reporting regulations is an especially important occasion for new collaborations between NIOSH and OSHA. Some participants recommended that NIOSH be actively engaged in helping OSHA ensure that these data are high-quality and in identifying and implementing surveillance opportunities that these new data will create.

Methodological Research

Entities other than NIOSH might not have strong incentives to invest in foundational research on how to use WC data well. Many participants viewed the types of methodological contributions discussed in "What Methodological Contributions Could the Center for Workers' Compensation Studies Make?" in Chapter Three as appropriate activities for CWCS. Improvement and sharing of NIOCCS and other efforts to improve the compatibility of WC data with other data sources are the kind of unglamorous but important work that outside researchers might underprovide. Validation studies were also seen as a way for CWCS to enhance the value of WC data.

Data Linkage and Data Collection

Some participants suggested that a good principle for CWCS to follow would be to maximize impact by conducting surveillance with WC data that adds value and fills gaps left by other existing injury surveillance and research data systems. The presence on WC data of linkable individual identifiers creates great opportunities in this regard: Some participants advocated linkage to UI records as an activity that CWCS should prioritize. Linkages to EHRs, hospital discharges, or all-payer databases could also have major research payoffs, and these could be good investments for CWCS as well.

In a different vein, participants also suggested that NIOSH could play an effective role in primary data collection by developing questions to add to existing national surveys fielded by other agencies, such as the Current Population Survey (collected by BLS) or the Behavioral Risk Factor Surveillance System (collected by the Centers for Disease Control and Prevention). This might be a good option for CWCS if the center can identify questions that would illuminate issues about workers' interactions with the WC system and what happens to injured workers beyond outcomes captured in WC data.

More worker-centered forms of data collection, including qualitative research, were among the suggestions advanced for CWCS consideration. Examples that were offered included worker focus groups and interviews of employers and employees, potentially using occurrence of

sentinel events in WC data to define a sampling frame. For fishery workers and other highly vulnerable populations, employee surveys are likely to be much more reliable for research and prevention than WC claim data.

Choosing the Number of State Partners

Many participants raised the important point that different surveillance and research goals require very different levels of data quality and comparability. This is especially relevant to the question of whether CWCS should focus on creating data that are comparable across state systems. The discussion in "Limitations of Workers' Compensation Data" in Chapter Three included barriers to combining WC data from different states. However, a participant distinguished between three levels of interventions that could be studied using WC data. Microinterventions, such as the Ohio Safety Intervention Grant Program, might target a particular industry or a particular outcome, and these can be studied using variation across employers within an individual state. However, interventions that involve changes in state policy (e.g., two-tiered benefits that penalize poor rates of return to work) might need to be uniform within a state at a given point in time. These are more challenging to study with single-state data, although some research designs might be feasible. More-fundamental questions, such as the impact of experience rating, are more likely to require multistate data. To the extent that NCCI data are appropriate, they might be preferable to anything that CWCS could create. However, NCCI data are not appropriate for all questions, and NCCI's ability to share data is constrained by its data-use agreements with member insurers.

Many participants seemed to agree that CWCS should not seek to build a nationwide database of WC claims, or even a data set that would support pooled analysis across multiple state systems. A participant did suggest, however, that there was potential to create more–carefully drawn cross-state comparison groups, perhaps following careful panel data analysis of claim rates in different states. Cross-state comparison groups would facilitate research on important macrolevel policies, so this approach might be worth looking at more closely.

Even within the realm of state-specific efforts, participants disagreed about how broadly CWCS should target its resources. One participant recommended that the CWCS surveillance grant open to application at the time of the colloquium could be improved by awarding it to fewer states. This suggestion amused other participants, but it was offered as serious strategic advice and justified by concerns that many states would not be able to achieve anything useful and that the money would be more effective in the form of deeper investment in the highest-capacity states. Several participants opined that NIOSH should prioritize states with state funds (including competitive state funds) and that state funds might be particularly valuable partners for studying secondary and tertiary prevention. Meanwhile, another participant recommended that the CWCS surveillance grant be accelerated and expanded to far more than nine states with increased funding.

Activities That Might Be Inappropriate for the National Institute for Occupational Safety and Health to Pursue

There was also some discussion about activities that NIOSH should avoid. We described many of these above, but we repeat them here for convenience. Participants urged that NIOSH avoid measuring WC costs because NCCI and the Workers Compensation Research Institute already do an excellent job of this. Participants also viewed additional estimation of the overall undercount of occupational injuries and illnesses unfavorably because there is already substantial research on the overall undercount. Research on differential underreporting across types of workers, employers, or injuries could be valuable, however. Finally, concern was voiced that NIOSH research risks falling into the trap of descriptive studies on the limitations of WC data without making a constructive case for what could be achieved with WC data.

Next Steps and Tactical Considerations for the Center for Workers' Compensation Studies

In the interest of translation and dissemination, an immediately actionable suggestion for CWCS was to create and publicize simple metrics that would track which states are routinely using WC data for surveillance and the extent to which they are achieving anything useful with their activities. Some very basic but informative metrics suggested were the number of states with meaningful surveillance efforts and the fraction of the population that those efforts covered.

In terms of the surveillance grants, several participants urged that NIOSH require more than the basic data deliverable from states that receive surveillance funding from NIOSH. The grants could be restructured to require dissemination and sharing of methods. Alternatively, the surveillance grant criteria could be changed to reward applicants that partner with academic researchers, thus encouraging greater access to WC data for research. Attention from researchers can often help identify and remedy data problems that might be overlooked. Conversely, several participants mentioned the pitfalls of researchers who ignore state-specific institutional details misusing WC data. NIOSH could reduce the risk of this by requiring that proposals to use WC data include someone with deep state-specific expertise as a consultant or research team member.

A more ambitious idea is to tie surveillance grants to production of deidentified research data sets or creation of broader data-sharing protocols. This would be ideal in some ways, but some participants and CWCS leadership viewed this as highly unlikely in light of state privacy laws and other institutional constraints.

Some participants suggested that creation of surveillance and prevention infrastructure that would outlive NIOSH funding should be a priority. A participant raised the question of whether capacity-building would collapse when NIOSH funding dissipates, and similar concerns about the durability of NIOSH investments were widely voiced. Some argued that the National Institutes of Health Research Project Grant Program mechanism was not well-suited to promoting the sustained long-term commitment needed for CWCS's vision to succeed. Some

held the view that entirely different mechanisms from the standard NIOSH funding vehicles might be needed to achieve persistent engagement.

A related suggestion made was that NIOSH should focus on creating and disseminating generalizable approaches to WC surveillance rather than starting from the ground up with each successive grant competition. NIOSH could advance this goal by using NIOSH funding in states with good data to identify sentinel events that could be monitored in other states. Requiring the production of materials that would support dissemination or translation across state borders might also support this goal.

Some participants suggested that CWCS seek to improve the capacity to reduce injuries. A focus on a specific condition that has a broad impact for many stakeholders was recommended as a way for CWCS to maximize its initial impact and demonstrate its value. Musculoskeletal disorders and soft-tissue injuries were advanced as potentially high-impact focus areas for both primary prevention and disability prevention.

NIOSH might be well-positioned to make WC data accessible to a wider range of users. An alternative, low-cost strategy that one participant suggested was for NIOSH to build infrastructure to make the new OSHA incident-reporting data accessible to others. The provision of a new database could allow NIOSH to leverage the funding and interest of outside researchers and thus provide a scalable model for improving data access.

There was much agreement that NIOSH could contribute to research on the consistency of WC data, the definition of uniform quality measures, and evaluations of data validity and completeness. NIOSH could also help map these issues out for researchers and public health authorities to make WC data easier to use.

Roles of Internal and External Researchers

Participants also discussed which roles are most appropriate for internal NIOSH researchers versus external researchers.

Participants suggested that internal researchers could have an advantage in many areas related to translation and dissemination. They identified training, research to practice, and health hazard evaluations as areas in which NIOSH excels and should continue to specialize. NIOSH staff could also have an advantage in liaising with OSHA to identify opportunities to evaluate OSHA interventions and fill gaps in OSHA's analytic capacities. NIOSH's position as a federal agency should enable it to take a broad view of topics and trends that affect many states. Finally, NIOSH could coordinate prevention efforts to reduce incidence of a specific high-burden condition (e.g., musculoskeletal disorders) across the United States with use of WC data and tools. Current prevention efforts are fragmented at the state level, and NIOSH could play a role in identifying and promoting effective models that might already exist in some states.

Some participants believed that external researchers have an advantage in state-specific work because many of them are immersed in state WC systems and possess critical institutional

expertise. Some participants also urged NIOSH to promote collaboration between essential NIOSH staff and external researchers.

Appendix A. List of Colloquium Attendees

Table A.1. List of Colloquium Attendees

Name	Organization	Stakeholder Type
Ibraheem Al-Tarawneh	BWC	State-funded WC insurer
Karen Ayres	NCCI	WC organization
Stephen Bertke	NIOSH	Federal government
Leslie I. Boden	Boston University School of Public Health	Academic researcher
David Bonauto	L&I	State-funded WC insurer
John F. Burton, Jr.	Rutgers University School of Management and Labor Relations and Cornell University School of Industrial and Labor Relations	Academic researcher
Tim Bushnell	NIOSH	Federal government
Theodore K. Courtney	Liberty Mutual Research Institute for Safety	Private WC insurer
Letitia Davis	Massachusetts Department of Public Health	State department of health
Michael Dworsky	RAND	Other organization
Jeff Eddinger	NCCI	WC organization
Kathleen Fagan	OSHA	Federal government
Michael P. Foley	L&I	State-funded WC insurer
Linda Forst	University of Illinois at Chicago School of Public Health	Academic researcher
Gary M. Franklin	L&I	State-funded WC insurer
Eric Frumin	Change to Win	Union
Abay Getahun	NIOSH	Federal government
Robert Harrison	California Department of Public Health	State department of health
Douglas J. Holmes	Unemployment and Workers' Compensation	WC organization
John Howard	NIOSH	Federal government
Michael P. Lampl	BWC	State-funded WC insurer
John Mendeloff	RAND	Other organization
Alysha R. Meyers	NIOSH	Federal government
Kathryn L. Mueller	American College of Occupational and Environmental Medicine	Other organization
Lee Newman	Colorado School of Public Health	Academic researcher
Thad Nosal	Verisk Analytics	WC organization
Rene Pana-Cryan	NIOSH	Federal government
John Rabovsky	Liberty Mutual Insurance	Private WC insurer
Kenneth D. Rosenman	Michigan State University	Academic researcher
Stephen P. Scheetz	CNA Insurance	Private WC insurer
Teresa M. Schnorr	NIOSH	Federal government

Name	Organization	Stakeholder Type
Hilery Z. Simpson	BLS	Federal government
Emily A. Spieler	Northeastern University School of Law	Academic researcher
Kenneth A. Stoller	American Insurance Association	Other organization
Tim Tucker	NCCI	WC organization
Gregory Wagner	NIOSH	Federal government
Chia Wei	NIOSH	Federal government
Steve Wurzelbacher	NIOSH	Federal government
Cate Yoon	RAND	Other organization

Appendix B. Colloquium Agenda

7:30 a.m. Registration
8:00 a.m. Welcome (John Howard, NIOSH director)
8:30 a.m. Introductions—all attendees (moderator—John Mendeloff, RAND)
9:00 a.m. Overview of CWCS and ERSO (Steve Wurzelbacher, CWCS director; Rene Pana-Cryan—ERSO director)
9:30 a.m. Breakout session 1
(Attendees will be divided into three smaller subgroups led by moderators.)

- What current CWCS research and surveillance goals should be emphasized?
- What areas of needed research and surveillance are not represented by current CWCS goals?

10:15 a.m. Discussion (moderator—John Mendeloff; begin with a 5-minute summary by each subgroup)
10:45 a.m. Break
11:00 a.m. Breakout session 2
(Attendees will be divided into three smaller subgroups led by moderators.)

- What are the key emerging issues in WC in the next five to ten years?

11:45 a.m. Discussion (moderator—John Mendeloff; begin with a 5-minute summary by each subgroup)
12:15 p.m. Lunch
1:15 p.m. Breakout session 3
(Attendees will be divided into three smaller groups led by moderators.)

- How can CWCS maximize impact?
- What are the main barriers to WC research and surveillance?
- What are the key roles for internal CWCS scientists and external CWCS partners?

2:00 p.m. Discussion (moderator—John Mendeloff; a 5-minute summary by each subgroup)
2:30 p.m. Break
2:45 p.m. Open question and answer (moderator—John Mendeloff)
3:15 p.m. Summary of key points (John Howard; Steve Wurzelbacher; Rene Pana-Cryan)
4:00 p.m. Closing remarks (John Howard)

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