



# Using Workers' Compensation Data and Systems to Improve Safety and Health

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*The findings and conclusions in this presentation are those of the author(s) and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention nor participating states and other partners.*

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# Presentation Outline

- WC system potential
- WC study updates
  - Claims
  - Health Services
  - Risk-Exposure Assessment
  - Prevention Effectiveness
  - Outreach
- Partnership opportunities



# NIOSH Center for Workers' Compensation Studies (CWCS) Mission

- Maximize the use of WC data and systems to improve workplace safety and health
- Build partnerships between public health, insurance, employer, and worker communities



# Workers' Compensation System Prevention Potential



*Claims*



*Health Services*



*Risk Assessment*



*Risk Control*



*Outreach*

***Insights for employers and workers***

# Potential Collaborations Summarized



ELSEVIER

Contents lists available at [ScienceDirect](#)

Journal of Safety Research

journal homepage: [www.elsevier.com/locate/jsr](http://www.elsevier.com/locate/jsr)



Workers' compensation insurer risk control systems: Opportunities for public health collaborations☆☆☆

Libby L. Moore, \* Steven J. Wurzelbacher, Taylor M. Shockey

*Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, 1090 Tusculum Ave., Cincinnati, OH 45226, USA*



<https://www.ncbi.nlm.nih.gov/pubmed/30121100>

# Claims



# Workers' compensation (WC) systems are the largest databases of workplace injuries in the US

First report of injury

Subsequent report of injury

Medical reports

Disputed claims information

Millions of claims in some single states containing

- Narratives describing how injury occurred
- Industry and occupation
- Diagnoses
- Patient demographics
- Costs



# State WC Claims Data Studies

- NIOSH \$5M grant for WC claims analyses
  - Developed collaborations between state WC bureaus, departments of health, and unemployment insurance (UI)
  - Trend data by industry and cause
  - CA, MA, OH, TN, MI funded
  
- **Most states linked WC data to UI data via the Federal Employer Identification Number (FEIN)**
  - **Employer industry and # of employees**
  - **WC claim counts and rates at employer and industry level**



Links to currently available WC grant data reports:

- MA <https://www.mass.gov/doc/dph-dia-and-dls-release-new-study-on-utilization-of-workers-compensation-data/download>
- TN <https://sites.google.com/site/tennesseewc20142016/>
- MI <https://mitracking.state.mi.us/>

# Key WC Data Fields-

## General Conclusions from WC Grants

### Injury Codes and Incident Narratives

- Generally complete, accurate, useful
- Crosswalks between WCIO and Bureau of Labor Statistics (BLS) Occupational Injury and Illness Classification System (OIICS) codes possible at the 1-digit level\*
- Incident narratives can be auto-coded- several free algorithms available to use\*

### Worker Data

- Limited but complete, accurate, useful
- Occupation narratives can be auto-coded to Standard Occupation Codes (SOC)\*
- Crosswalks being developed between manual class codes and SOC and industries\*

\* See Tool Kit

# Key WC Data Fields- General Conclusions

## Employer Data

Industry (NAICS)



Employee counts



Public vs Private



Location information



May be  
missing or  
incomplete



Additional  
QC  
Advised



Use  
other  
sources to  
verify

Un-employment  
insurance  
(UI)  
best

# TN Perspective

Table 16: 2014-2016 FROI Claims: Top 10 Three-Digit NAICS Industries By Burden Rank Matched Private (Type Known)

Burden.Rank	Burden.Idx	Naics	Description	Year	UnadjRate.Rank	Claim.Rank	LT.Rank
1	7.333	484	Truck Transportation	2014-2016	11	4	7
2	9.000	492	Couriers and Messengers	2014-2016	10	9	8
3	17.333	238	Specialty Trade Contractors	2014-2016	30	7	15
4	19.000	481	Air Transportation	2014-2016	2	52	3
5	22.000	336	Transportation Equipment Manufacturing	2014-2016	17	5	44
6	24.667	425	Wholesale Electronic Markets and Agents and Brokers	2014-2016	27	26	21
7	25.000	423	Merchant Wholesalers, Durable Goods	2014-2016	33	10	32
8	26.000	237	Heavy and Civil Engineering Construction	2014-2016	36	32	10
9	27.000	321	Wood Product Manufacturing	2014-2016	24	35	22
10	27.333	424	Merchant Wholesalers, Nondurable Goods	2014-2016	40	18	24

## Industries

When considering the total burden of claim count, claim rate, and the proportion of lost-time claims, the top five consisted of four transportation industries and Motor Vehicle Manufacturing NAICS 3361.

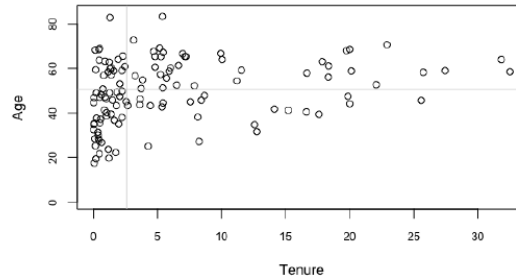
## Tenure

>40% claims, workers had less than 1 year tenure

Construction focused report with CPWR

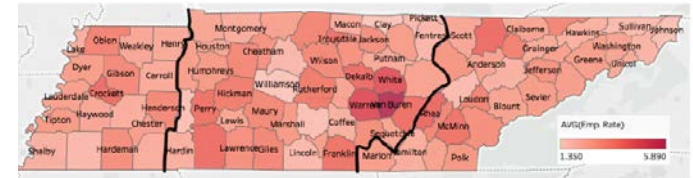
- <https://www.cpwr.com/sites/default/files/publications/SS2019-Tennessee-new-employee-injury.pdf>

Fatality Victims Age and Employment Tenure



Note: Employer Tenure is defined as (Date of Death - Hire Date)/365

Figure 6: 2014-2016 FROI Average Claim Density By County - Matched Private



### 5.1 Summary of Findings

- Access to workers' compensation insurance records at the state level combined with employment information from federal insurance records provide an important supplement to other statistical sources such as the BLS Survey of Occupational Injuries and Illnesses (SOII) for data on employment related injuries.
- Employee tenure with the employer plays an important role in explaining construction industry injuries. In Tennessee, for 2014-15 some 44.5 percent of reported injuries were sustained by workers with tenure of one year or less.



# Ohio Bureau of Workers' Compensation (OHBWC) Claims Data

- **Study population**

- 2001 to 2018 claims
- >2 million claims
- OHBWC insures 2/3 Ohio workers
- Small- & medium-sized
- Private and public employers

- **Sub-populations**

- Industry Sector – 6 sectors well represented
- NAICS Industry codes (5-digit)
- Employer size (number of employees and estimated full-time equivalents, FTEs)
- Occupations, manual class codes



# Recent OH Claims Analyses

## ■ Multi-Industry

- Rates methods <https://pubmed.ncbi.nlm.nih.gov/27667651/>
- Basic cause, 2001-2015 <https://pubmed.ncbi.nlm.nih.gov/28953071/>
- Detailed cause, 2007-2017 *In press, Journal of Safety Research*



## ■ Specific Industries

- Ambulance services <https://onlinelibrary.wiley.com/doi/full/10.1002/ajim.22917>
- Temporary services <https://onlinelibrary.wiley.com/doi/full/10.1002/ajim.23049>
- Schools <https://doi.org/10.1007/s41542-020-00057-2>
- Nursing homes <https://onlinelibrary.wiley.com/doi/full/10.1002/ajim.23193>
- Landscaping services <https://onlinelibrary.wiley.com/doi/full/10.1002/ajim.23261>

## ■ Specific Diagnoses

- Traumatic brain injuries <https://onlinelibrary.wiley.com/doi/full/10.1002/ajim.23073>

# COVID-19 WC Studies

- Many states ([FL](#), [TX](#), [VA](#), [WA](#)) and organizations ([NCCI](#), IAIABC, [CWCI](#)) sharing WC COVID data- NIOSH hosts monthly calls



- **WC Study Goals**

- How is the illness related to worker factors (occupation, age, job tenure, sex) and employer factors (industry, firm size, geographic region)?
- What is the impact on injured worker care and the overall WC system?
- What are the long-term illness impacts on workers?
  - Detailed diagnoses, treatments, disability, costs, work status, hospitalizations, deaths and other outcomes

- **Partners**

- Six states (CA, IL, MI, OH, WA, WI)
- Workers' Compensation Research Institute (WCRI)

- **Outputs**

- Ongoing data being shared in several states, formal reports from partners

# WC Claims Data Solutions

- Machine learning
- Narrative text mining
- Data visualization





# WC Claims Machine Learning

## ■ Cause

- Adaptable to any narrative data and code set
  - Basic Cause
    - <https://www.ncbi.nlm.nih.gov/pubmed/23206504>
  - Detailed Cause
    - <http://www.ncbi.nlm.nih.gov/pubmed/26745274>

## ■ Industry/Occupation

- Being adapted for WC
  - [CDC - NIOSH Industry and Occupation Computerized Coding System \(NIOCCS\) – NIOSH](#)
  - <https://wwwn.cdc.gov/nioccs3/Default.aspx>





## Artificial Intelligence (AI) Crowdsourcing Competition 2019

### CDC Text Classification Marathon

Created several new  
and improved text  
coding approaches

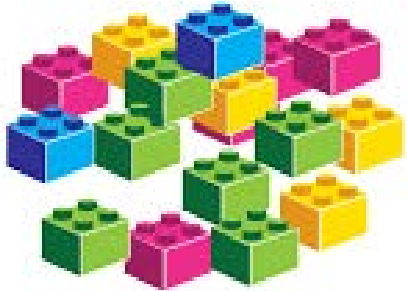
[https://www.cdc.gov/niosh/  
updates/upd-02-26-20.html](https://www.cdc.gov/niosh/updates/upd-02-26-20.html)



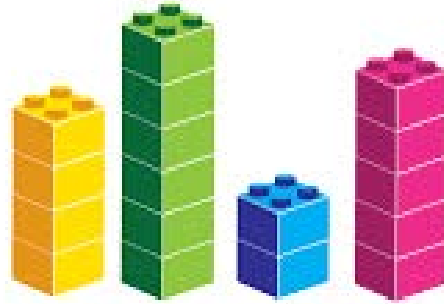
# Data Visualization

Nhut Nguyen

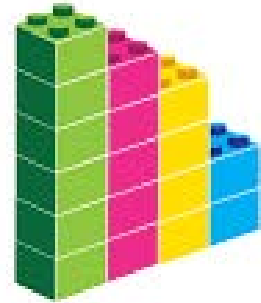
# Data Visualization



Data

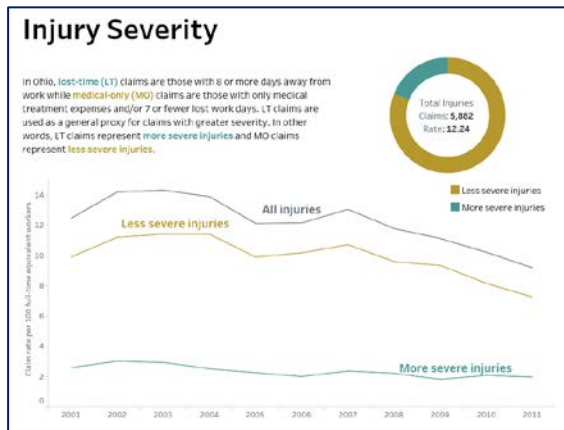


Sorted & Arranged

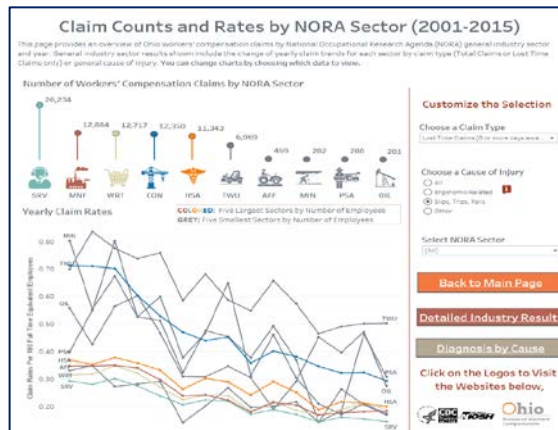


Visualized

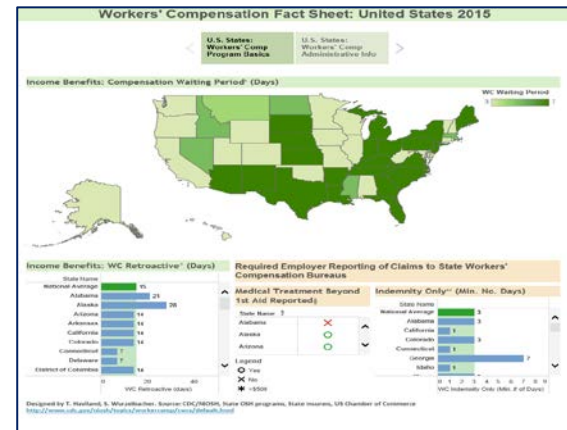
# WC Summary Dashboards



Ohio workers' compensation injury claims in the private ambulance industry (2001 - 2011)



Ohio Workers' Compensation injury Summary - Private Industries



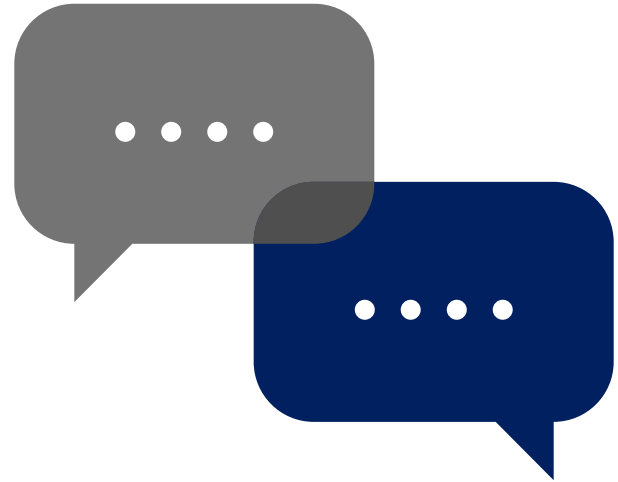
Workers' Compensation Fact Sheet: United States 2015

# Internal dashboards using Power BI



# Collaboration

- University of Cincinnati, Center for Business Analytics
- The International Association of Industrial Accident Boards and Commissions
- Elevator Industry Safety Partners
- Wyoming Department of Labor
- Opioids and COVID-19 - Community Intervention and Critical Populations Task Force



# Health Services





# Health Services Research

- Assess the impact of healthcare factors on worker health outcomes:
  - Functional status, return-to-work, pain, RX use, and cost
- Healthcare factors under study include:
  - Access and quality of care
  - Conventional and alternative treatments
  - Care coordination, re-injury
  - Injury cause and diagnoses
  - Patient occupation/industry, employer size
- Current studies-
  - OHBWC chiropractic effectiveness, PT studies (WA LNI)



# Preventing Opioid Use Disorders Among Workers

- Serve on NIOSH opioids data framework group
- Hosted 2019 meeting to discuss use of WC and other data systems to prevent OUD
- Sponsored two Workers Compensation Research Institute (WCRI) studies
  - Correlates of opioid dispensing
    - <https://www.cdc.gov/niosh/topics/opioids/default.html>
  - Impact on worker outcomes
- Share research from other WC organizations
  - NCCI, WCIRB, IAIABC, CWCI etc.



<https://www.cdc.gov/niosh/topics/opioids/default.html>

# Preventing Opioid Use Disorders Among Workers

- Current NIOSH Studies
  - OHBWC on opioid RX in construction and other industries
  - NAVIPPRO (National Addictions Vigilance Intervention and Prevention Program)

[NAVIPPRO Research & Analytics | IBH  
\(ibhsolutions.com\)](https://www.cdc.gov/niosh/topics/opioids/default.html)

- WY Miners' Hospital



<https://www.cdc.gov/niosh/topics/opioids/default.html>

# Risk and Exposure Assessment



# Insurer Risk Assessment Studies

- Insurers collect occupational risk and exposure data in many industries
- Opportunity to improve usability of data within insurers and for research
- Two CWCS studies evaluated the use of industrial hygiene data and are creating create standardized air and noise sampling forms

<https://www.ncbi.nlm.nih.gov/pubmed/29580189>

<https://www.ncbi.nlm.nih.gov/pubmed/29985777>



# WC Insurers Industrial Hygiene Practice Survey

- First study surveyed private and state-based WC insurers about industrial hygiene (IH) data practices:
  - The majority...
    - had a standardized data collection form
    - used IH data to provide information to customers
    - filed collected IH data as separate forms, not in a database
  - The minority...
    - used IH data to examine trends in exposure



<https://www.ncbi.nlm.nih.gov/pubmed/29580189>

# Standardizing Industrial Hygiene Data Collection

- Second study identified a core list of data fields for air/noise survey forms among WC insurers, NIOSH and others
  - Fields aligned with 1996 ACGIH-AIHA recommendations
- Next steps: Dissemination and Implementation
  - Technology has greatly improved since 1996
    - Easy to share list via email
    - Incorporation of fields into data collection software programs



<https://www.ncbi.nlm.nih.gov/pubmed/29985777>

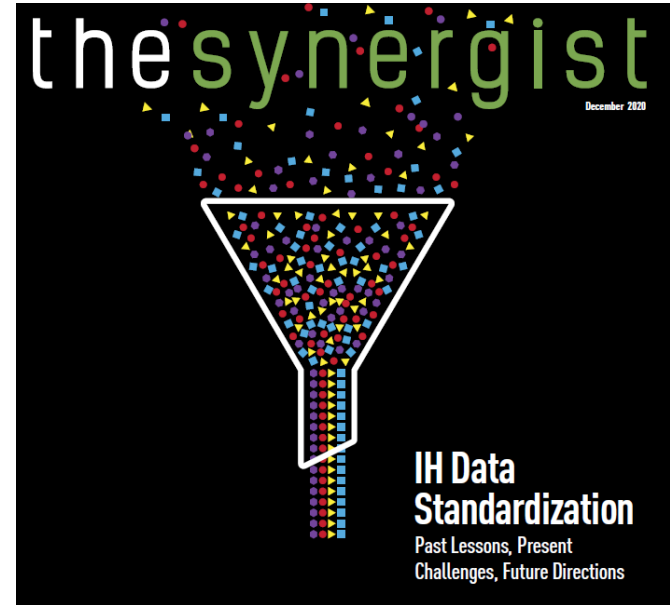
# Washington State Report – Example of Aggregated Standardized Results from IH Data

- Rationale: To show the value of being able to query and analyze the IH data for trends and high- risk industries/jobs/tasks
- Extracted 9 years of personal exposure (IH) data taken by compliance and safety officers in Washington State
  - <https://lni.wa.gov/safety-health/safety-research/files/2018/WorkerExposureAssessmentInWashingtonState.pdf>
- Results showed...
  - IH inspections with samples by year, region, and industry
    - Exposure levels varied by substance



# Current Status of IH Data Standardization

- American Industrial Hygiene Association (AIHA) recommended the creation of a guidance document
- Proposal just accepted
  - Currently in the development stage



<https://synergist.aiha.org/202012-ih-data-standardization>

# Machine Learning for Exposure Assessment

- Similar approach has been developed at NIOSH to code free text descriptions of job exposures for epidemiologic studies
- Can be used to QC and flag exposures that may have been inaccurately coded by manual reviewers
- Points out importance of collecting clean narratives as part of standardized IH data collection forms for future data mining



[Santiago-Colón A, et al. Testing and Validating Semi-Automated Approaches to the Exposure Assessment of Polycyclic Aromatic Hydrocarbons. \*Annals of Work Exposures and Health\* 2011.](#)

# Intervention Effectiveness



# Insurer Partner Studies

- Insurers provide services and grants and are ideal research partners <https://pubmed.ncbi.nlm.nih.gov/30121100/>
- Ohio BWC
  - Safety Intervention Grant (SIG) since 1999- provides funds for employers to put in place engineering controls
  - NIOSH and BWC have partnered on several studies to understand effectiveness



# Risk Control Effectiveness Studies



- Ohio BWC
  - Safety Intervention Grant (SIG)
    - Overall effectiveness <https://www.ncbi.nlm.nih.gov/pubmed/25223846>
    - Case study reviews <https://ascelibrary.org/doi/10.1061/%28ASCE%29CO.1943-7862.0001782>
    - Manual material handling effectiveness <https://doi.org/10.1016/j.apergo.2020.103139>
    - Barriers and aids to implementing interventions
  - Risk control onsite consultation effectiveness
  - Employer Wellness Program <https://www.ncbi.nlm.nih.gov/pubmed/31205207>
  - Safety program self assessment questionnaires
- Others- SCIF (CA) targeted onsite visits; in-vehicle monitoring systems

# Case Studies of Employer Experiences

- Reviewed SIG information from 153 construction employers 2003 – 2016
- Equipment associated with higher effectiveness scores included:
  - Electrical cable pulling equipment
  - Skid steer attachments for concrete breaking
  - Concrete sawing equipment
  - Boom lifts
  - Trailers with hydraulic tilting/ramps



<https://ascelibrary.org/doi/10.1061/%28ASCE%29CO.1943.62.0001782>

# Effectiveness of Ergo Interventions in Material Handling

- Evaluated impact of ergo equipment in heavy material handling operations 2012–2017 among 33 employers
- Employees asked to complete surveys:
  - Low back/upper extremity pain and safety incidents
  - Material handling tasks and use of interventions
  - At start of study, every 3 mo., and annually for up to 2 yrs.
- Among 535 employees, 32.5% completed at least one survey; 13.6% completed all nine surveys over two years
- Interventions when used routinely were effective in reducing pain symptoms for employees performing heavy material handling
  - Upper extremity pain frequency and severity
  - Low back pain frequency



<https://doi.org/10.1016/j.apergo.2020.103139>

# Barriers and Aids to Intervention Effectiveness

- Identify steps employers took that may have contributed to effectiveness of equipment:
  - Qualitative information obtained in development-phase interviews with 22 employers and final interviews with 20 employers
- Findings from development-phase interviews:
  - Nearly all equipment was successful as described by employers
    - Reduced turnover, injury acute risk, task time, awkward postures and exertion
  - Aids: Steps related to effectiveness included selection, implementation, and training
  - Barriers: 3 companies reported obstacles to effectiveness
    - Not viewing equipment in person, custom equipment





# Reliability and Validity of a Safety Management Self-Assessment

- Evaluating a survey completed in 2012 - 2015 by Ohio policyholders who participated in safety programs
- Survey contains 10 scales with three items each, and 32 hazards.
  - Outcomes: Claim rates and costs
  - Scaling and predictive validity data from employers with claims that completed the survey > 1 time
  - 2,295 employers and 6,362 surveys
- Support for convergent/discriminant validity and internal consistency reliability
- Some support for predictive validity of scales and stronger support for hazard identifications



<https://www.bwc.ohio.gov/downloads/blankpdf/SH-26.pdf>

# Other Risk Control Effectiveness Studies

- Ohio BWC
  - Wellness Program- <https://www.ncbi.nlm.nih.gov/pubmed/31205207>
  - Risk control consultation effectiveness
    - Analyses complete, will submit paper in 2021
    - 4,606 employers, 2006-2017
- Others
  - SCIF (CA state WC fund) Targeted risk control effectiveness
  - In-vehicle monitoring systems (IVMS)
  - Smart ladder



# Outreach



# Outreach

- Connect insurer, public health, employer, and worker communities
  - Regular webinar series
  - State WC analyses work groups
  - Disseminate research findings for prevention and emerging hazards



<https://www.cdc.gov/niosh/topics/worker-comp/cwcs/publications.html>

# Recent Webinars

- [1/29/21: Cannabis & Workers' Compensation: Now What?](#)
- [12/10/20: Effective Interventions to Combat Opioid Misuse: Studies from the Field of Opioid Prescription Management](#)
- [7/10/20: Insurer Responses to COVID 19:](#)
  - Communicating prevention programs
  - Funding for engineering controls and PPE
  - Remote risk control services



The screenshot shows the Pinnacle Group website. At the top, there is a navigation bar with links for "Workers' Comp", "Our Difference", "Safety & Training", "Knowledge Center", "Blog", "Find an Agent", and "Get a Quote". Below the navigation bar is a large banner with the text "As Colorado navigates a way forward, we'll be here." and "As the world faces the impact and challenges brought on by COVID." To the right of the banner is an illustration of two healthcare workers wearing masks. Below the banner is a search bar and a "Get a quote" button. On the left side, there is a sidebar menu with links for "Safety and health", "Trainings", "Employer Guide", "Agent Guide", "Medical Provider Guide", "Worker Guide", "Guide for Employer", and "Get covered". The main content area features an article titled "Supporting workers and businesses through coronavirus" with a sub-headline "To the workers and businesses on the front lines and to everyone who is slowing the spread of coronavirus and saving lives by staying home: We thank you. We are stronger and safer when we all do our part." Below the sub-headline are three bullet points: "Coronavirus and workers' compensation", "Payroll reporting during the pandemic", and "Safety and health resources". To the left of the article is a photograph of a person wearing a blue face mask and a white shirt, working in a grocery store.

# Tool Kit

- **Auto-coders**
  - Basic cause
  - Detailed cause
  - Industry - occupation
- **Crosswalks**
  - WCIO X OIICS
  - Manual class codes X SOC X NAICS
- **Denominator Methods**
- **Data Viz Services**



Request Here:

[cwcs@cdc.gov](mailto:cwcs@cdc.gov)

# Opportunities for Collaborations



*Claims*



*Health Services*



*Risk Assessment*



*Risk Control*



*Outreach*

***Insights for employers and workers***

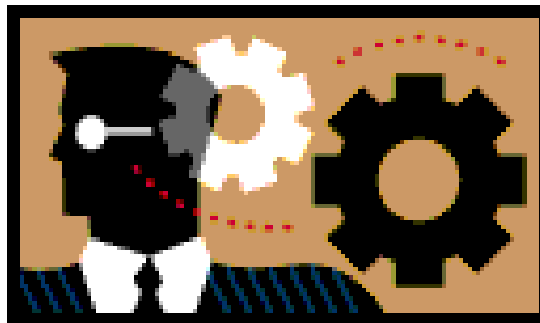
# Contact Information

## CWCS Website

<http://www.cdc.gov/niosh/topics/workercomp/cwcs>

[cwcs@cdc.gov](mailto:cwcs@cdc.gov)

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)



The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.