The Office of Construction Safety and Health

At the National Institute for Occupational Safety and Health—NIOSH

Webinar Series:

Insurance and Workers Compensation for Construction—Untangling the Mysteries

Webinar 5: Applying Information on Workers' Compensation for Construction Safety and Health Research

April 12th, 2017

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health, and should not be construed to represent any agency determination or policy.

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National Institute for Occupational Safety and Health (NIOSH)

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Data Center Director
CPWR (The Center for Construction Research and Training)

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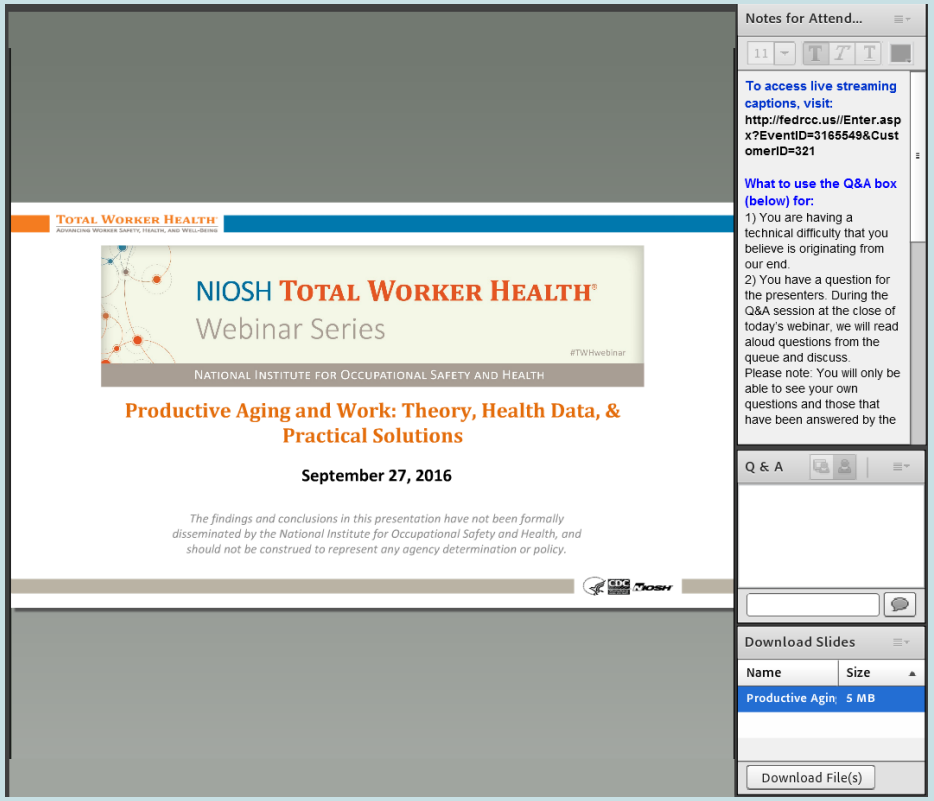

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Thank you!

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Applying Information on Workers' Comp for Construction Safety and Health Research

Steve Wurzelbacher
NIOSH-CWCS

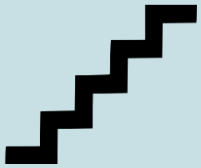
Sue Dong
CPWR

"The findings and conclusions in this report/presentation have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy."

Researcher Questions

- What injury, illness and related demographic and cost data are available from insurance sources (that is different from BLS data)?

- What information from workers' compensation data are particularly useful for construction safety and health researchers?



- What data can researchers and others get access to? Where or who would they contact to obtain the data?

- What are some practical tools, solutions and resources?

Types of Injury Claims Data

Researcher Questions

- What injury, illness and related demographic and cost data are available from insurance sources [that is different from BLS survey of occupational injury/illness (SOII) data]?
  - Incident narrative
    - Open text describes how the injury occurred
    - Can be mined and auto-coded
    - Act as short story to bring context on how to prevent
  - Cost, disability type
  - Detailed diagnoses (ICD codes)
  - Injured worker ID
  - Treatment information
  - Manual Class and NAICS

Manual Class + NAICS Codes

Manual class codes are mix of industry/occupation

- Can focus on specific types of tasks within employers
- Denominator = payroll for each class by each employer per year

NAICS industry codes can be directly compared to other data

- North American Industrial Classification System (NAICS)
- Occupational injuries and illnesses from the Bureau of Labor Statistics (BLS) annual survey
- Survey data on health and economic trends by NAICS industry

Each system has relative strengths

Use both codes to better:

- Identify injury/ illness risks
- Develop data-driven loss prevention strategies

WC Data VS. BLS SOII Data

Contents	WC	BLS SOII
Scope/Coverage	• Differ by state/ multiple carriers per state (NCCI and WCRI have some data for some but not all States) • According to State/Carrier WC rules	• Unify at national level • Covers cases that meet OSHA criterion for recordable
Injury/illness	Yes (coded by ICD)	Yes (Coded by OIICS)
Cost/claim	Yes	No
Reporting period	• "Waiting period"; claims files remain open for several years.	• Collect soon after the end of a reference year
Employer	Firm (single or multi-)	Establishment
Industry/Occupation	Manual+ NAICS/SOC	NAICS/SOC
Demographics	Incomplete	Some missing

Workers' Compensation System Potential

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CDC Workplace Safety and Health
NIOSH

Researcher Questions

- What information from workers' compensation data are particularly useful for construction safety and health researchers?
  - Claims Data
  - Employer Exposure/Control Databases
  - Outreach to Employers and Workers
  - Intervention Effectiveness Studies

Claims Data

Employer Data

Outreach to Workers

CWCS State WC Claims Data Studies

- NIOSH $5M grant for WC surveillance
  - Develop collaboration between state WC bureaus and departments of health
  - Trend data by industry and cause
  - CA, MA, OH, TN, MI now funded

Claims Data

- Ohio BWC claims analyses
  - Cause of injury by industry
  - Benchmarking data for employers
  - Focus research and prevention

Ohio Bureau of Workers' Compensation

https://www.ncbi.nlm.nih.gov/pubmed/27667651

- Insurers collect exposure data in many industries
- Opportunity to improve usability of data within insurers and for research
- CWCS conducting a number of studies

CWCS Insurer Exposure Assessment Studies

CWCS Insurer Risk Control Study

- CWCS conducting study to understand the risk control (RC) process used in a variety of WC insurers
  - Understand the potential impact of RC systems on workplace safety/health
  - Evaluate types of data being collected and formats
  - Encourage researchers to work more with insurers to evaluate risks/controls and disseminate best safety/health practices

Employer Data

Outreach

Future Exposure Assessment

- Centralized, searchable databases
- New big data technology

  - Wearables
    - Smart glasses/vests, contacts, fabrics, patches
    - Near field chips, proximity monitors to hazards, posture monitors
    - Heat, HR, respiration, pupil tracking
    - Real-time fatigue monitoring
  - Dash-cams, helmet-cams, vests
  - Google glass- use in risk control surveys
  - GPS enabled, smart factories

CWCS connecting public health researchers to insurers to encourage further research

Outreach Examples

NIOSH Ladder App

http://www.cdc.gov/niosh/topics/falls/mobileapp.html

CDC Workplace Safety and Health NIOSH

CWCS CENTER FOR WORKERS' COMPENSATION STUDIES

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

Prevention Effectiveness Studies

Ohio Bureau of Workers' Compensation (OHBWC) provides matching funds to employers to implement safety/health engineering controls

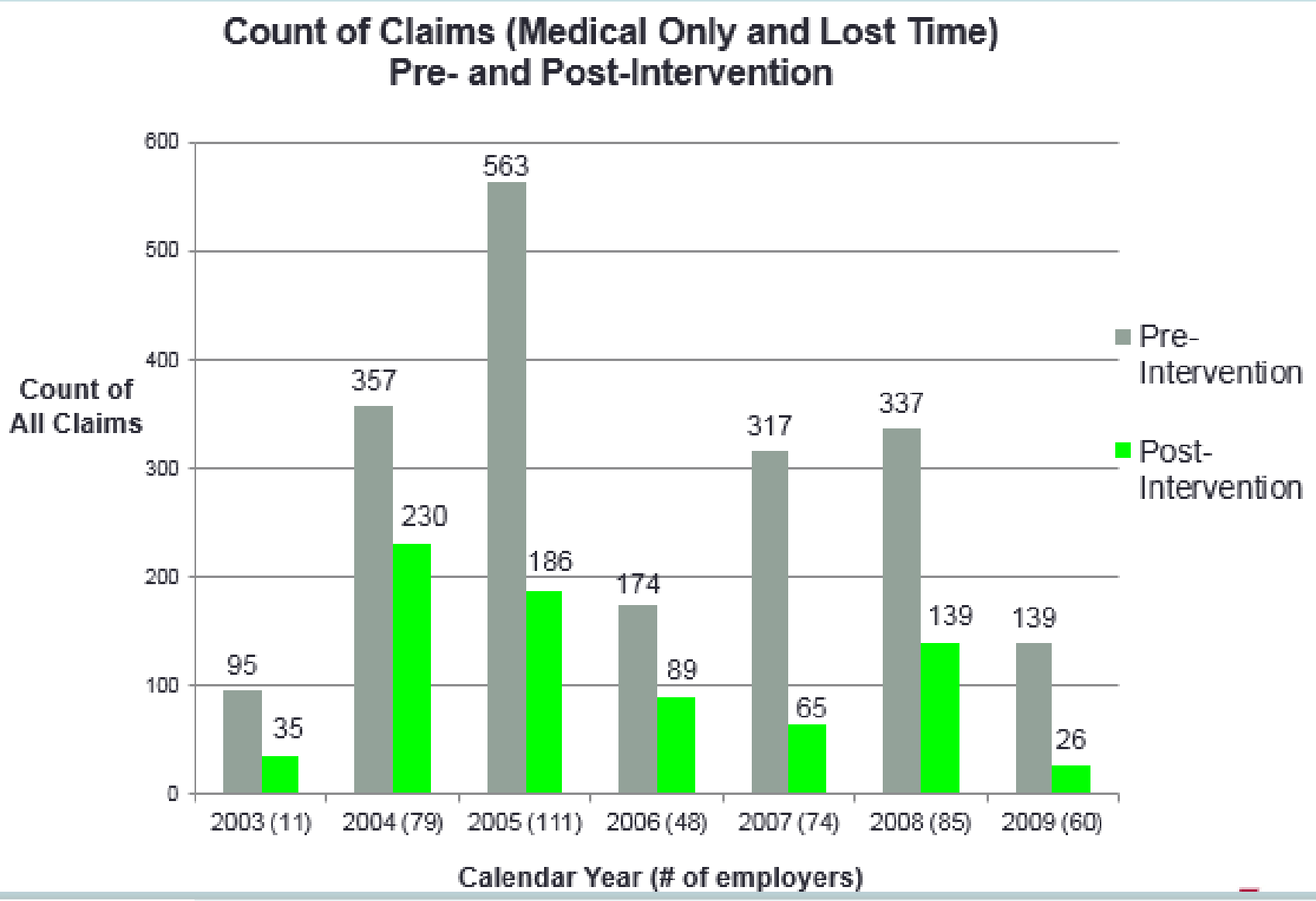
- Compared 468 employers before/after intervention from 2003-2009
- All workers' compensation outcomes for affected employees decreased significantly with interventions
- Most were ergonomic and safety controls
- Insurer quadrupled SIG budget, in 2014 provided $15 million to 535 employers
- Allocated additional $45 million for fiscal years 2015-17

http://www.ncbi.nlm.nih.gov/pubmed/25223846

Claims Data

Employer Data

Outreach


Count of Claims (Medical Only and Lost Time)
Pre- and Post-Intervention
Count of All Claims
600
500
400
300
200
100
0
95
35
357
230
563
186
174
89
317
65
337
139
139
26
2003 (11)
2004 (79)
2005 (111)
2006 (48)
2007 (74)
2008 (85)
2009 (60)
Calendar Year (# of employers)
Pre-Intervention
Post-Intervention

WC Data Sources and Access

Researcher Questions

- What data can researchers and others get access to?
- Where or who would they contact to obtain the data?

  - **State and National Surveys**
  - **State WC Bureaus**
  - **WC Organizations**
  - **Private Insurers**
  - **State-Fund Insurers**
  - Self-Insured Funds
  - Self-Insured Private Employers
  - Health Care Providers
  - Other Organizations
  - Academic Researchers
  - Unions

Related Data Sources

Survey of Occupational Injuries and Illnesses (SOII)

Health insurance data

Safety and health training records

National surveys collecting information on WC

- Current Population Survey (CPS)
- Health and Retirement Study (HRS)
- Medical Expenditure Panel Survey (MEPS)
- National Longitudinal Survey of Youth, 1979 cohort (NLSY79)
- National Compensation Survey (NCS)
- Survey of Income and Program Participation (SIPP)

Combining WC and BLS Data (1)

Table 3b
Construction injury events with the 10 highest per-DFW costs

BLS event code	Event of injury	2002 N	Cost/DFW	Total cost of DFW cases ($)	Rank by total cost of DFW		Rank by cost per DFW	
					Construction	All industry	Construction	All industry
Top 10 per DFW costs								
25	Bodily conditions, n.e.c.	202	136222	19590981	19	16	1	7
31	Contact with electrical current	613	86829	38966117	17	21	2	13
43	Pedestrian, nonpass. struck by vehicle, mobile equipment	901	81914	54175112	14	15	3	19
61	Assaults and violent acts by person(s)	206	80755	12152785	22	12	4	15
23	Repetitive motion	2866	75254	158270350	8	5	5	9
3	Caught in or compressed by equipment or objects	6950	69041	352174918	6	7	6	11
51	Fire-unintended or uncontrolled	81	67924	3968810	30	28	7	10
52	Explosion	348	63332	15880844	20	24	8	6
11	Fall to lower level	22421	58019	953379260	1	6	9	20
42	Nonhighway accident, except rail, air, water	1364	57965	57921496	11	14	10	16

Waehrer et al. 2007. Costs of occupational injuries in construction in the United States. *Accid Anal Prev*. 2007 Nov;39(6):1258-66.

Combining WC and BLS Data (2)

TABLE 2

Construction Trades Occupations With the Ten Highest Total Costs of DFW and Fatal Occupational Injuries

Occupation Code	Detailed Occupation	Total Cost of Fatal + DFW (Millions)	Ranked by Total DFW + Fatal Cost	% Independent Contractor	% On-Call/Day Labor	% Temp Agency	% Contract	% of Industry Cost
869	Construction laborers	$3,290	1	3	9	1	0	25.9
567	Carpenters	$1,945	2	22	4	0	1	15.3
575	Electricians	$971	3	9	6	1	2	7.6
585	Plumbers, pipefitters, and steamfitters	$602	4	14	3	1	0	4.7
595	Roofers	$598	5	10	6	2	0	4.7
558	Supervisors, n.e.c.	$525	6	41	0	1	1	4.1
804	Truck drivers	$431	7	8	1	3	0	3.4
579	Painters, construction and maintenance	$412	8	29	8	2	0	3.2
597	Structural metal workers	$400	9	5	9	0	4	3.2
866	Helpers, construction trades	$380	10	6	4	0	0	3.0

Waehrer et al. 2007. Occupational injury costs and alternative employment in construction trades. *J Occup Environ Med.* Nov;49(11):1218-27.

Linking WC to Health Insurance Data and Training Records

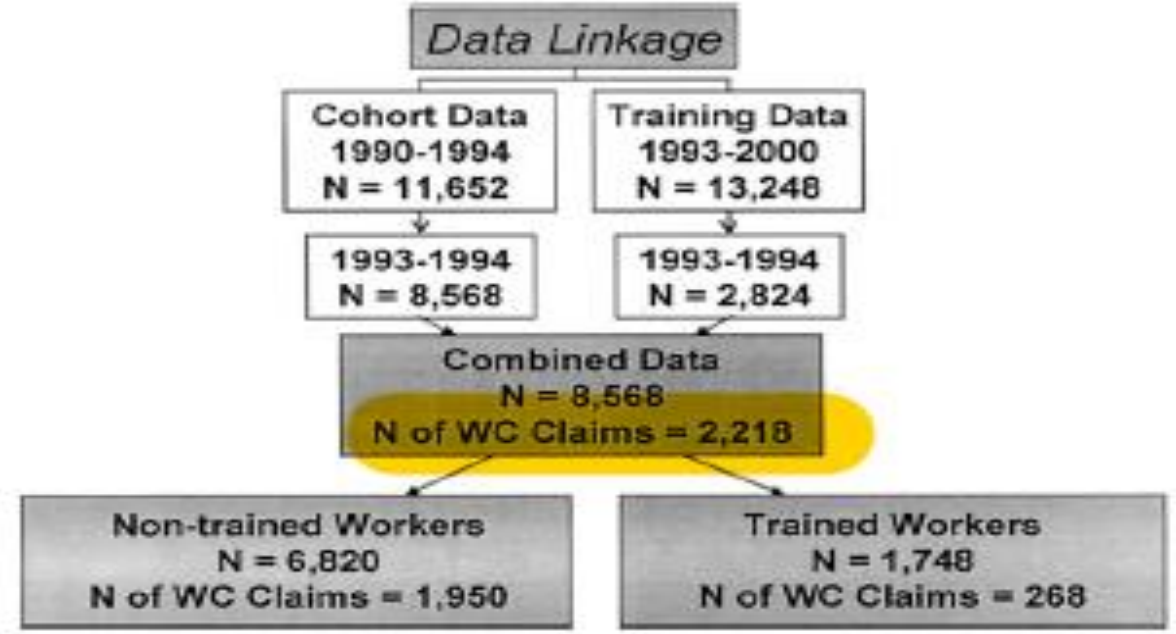


Fig. 1. Linkage of cohort, training, and workers compensation (WC) datasets.

Dong et al. 2004. Effects of safety and health training on work-related injury among construction laborers. *J Occup Environ Med.* Dec;46(12):1222-8.

WC Cost among Construction Workers (MEPS)

TABLE 5
Sources of Payment for Medical Costs of Work-Related Injuries

Source	All Construction[a] (%)	Hispanic (%)	White, Non-Hispanic (%)	Total Construction[b] (Sum, $ millions)
Out-of-pocket	8.7	23.0	5.9	118.7
Workers' compensation	46.2	26.8	49.5	630.4
Private insurance	31.8	45.7	29.9	433.9
Medicare	0.2	0.0	0.2	2.7
Medicaid	0.4	0.1	0.5	5.5
Other sources[c]	12.2	4.1	12.9	166.5
Total expenditure per injured worker per yr[d]	1694.6 (100)	1896.6 (100)	1687.4 (100)	
Total expenditures in construction ($ millions)		290.6 (21.3)	914.1 (67.1)	1364.4 (100%)[d]

Source: Medical Expenditure Panel Survey, 1996–2002.
[a]Average for per injured worker per year during the study period, includes workers in other races and ethnicities (eg, black).
[b]Weighted sum for all construction includes workers in other races and ethnicities (eg, black).
[c]Includes the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), the Civilian Health and Medical Program of the Department of Veterans Affairs (CHAMPVA), Veterans Affairs (VA), other Federal and state or local public sources, and sources unknown.
[d]Totals may not add to 100% because of rounding.

Dong et al. 2007. Medical costs and sources of payment for work-related injuries among Hispanic construction workers. *J Occup Environ Med.* Dec;49(12):1367-75.

WC Filing and Collecting among Construction Workers (NLSY)

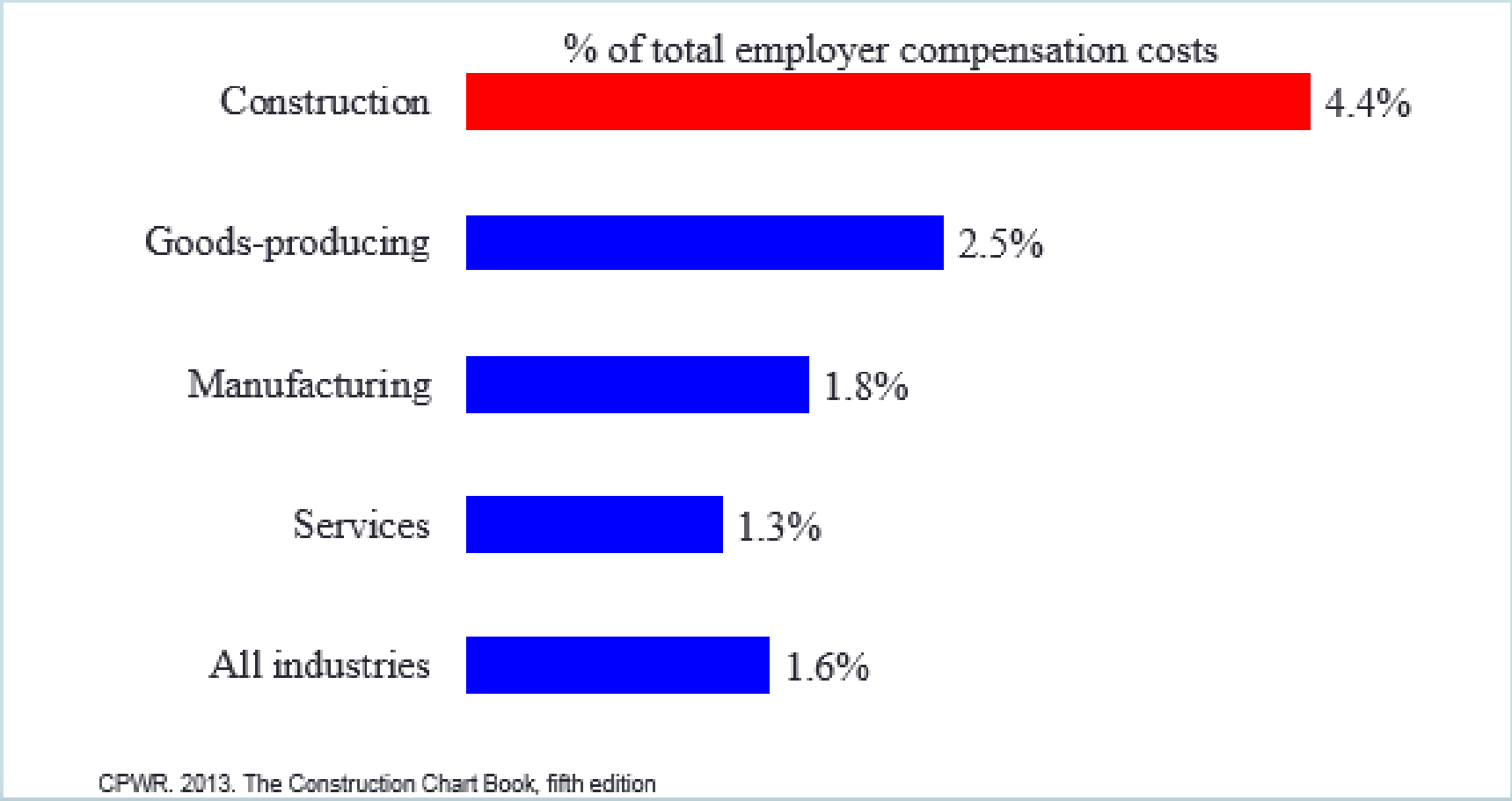
TABLE I. Short-Term Consequences of Work-Related Injuries, Construction Versus Non-Construction, 1988–2000

Characteristics	Construction (n = 4,062)	Non-construction (n = 51,123)	Total (n = 55,185)	*P*-value[a]
Injury status				<0.001
Days away from work	7.8%	4.7%	4.9%	
No days away from work	4.3%	3.3%	3.4%	
Non-injured	87.9%	92.0%	91.7%	
Consequences among injured workers				
File workers' compensation	54.3%	60.4%	59.7%	0.031
Collect workers' compensation	28.7%	24.6%	25.0%	0.080
Lost wages	43.8%	30.4%	31.9%	<0.001
Unable to do normal duties	31.0%	34.3%	33.9%	0.237
Work less than full-time	23.6%	18.3%	18.9%	0.024
Laid off	10.0%	6.1%	6.5%	0.006
Assigned to other job	8.1%	12.1%	11.6%	0.041
Change occupation	6.9%	7.9%	7.8%	0.567
Quit	5.6%	5.6%	5.6%	0.996
Fired	2.4%	2.8%	2.8%	0.678

[a]*P*-value represents χ^2 tests comparing totals for construction versus non-construction.

Dong et al. 2016. Economic consequences of workplace injuries in the United States: Findings form the National Longitudinal Survey of Youth. AJIM, 59:106-118

Employer Spending on WC, Selected Industries, 2010 (Private wage-and-salary workers) (NCS)



CPWR. 2013. The Construction Chart Book, fifth edition

Analyzing WC Information Directly Collected by Other Partners

State WC Bureaus

All US states collect WC claims data from employers

- First and subsequent reports of injury (FROI, SROI),medical reports
  - Join WC data with industry denominator data
  - Cause rates by industry
- 26 state DOHs already supported by NIOSH for surveillance
- 5 states funded for NIOSH WC surveillance grant

Partner Strengths: SURVEILLANCE

- Within-State population data trending by industry/ occupation
- Employer benchmarking
- Safety/ health policy effectiveness studies

WC Organizations

IAIABC (Int'l. Assoc. of Industrial Accident Boards & Commissions)**:**

- Key partner that coordinates standardized WC reporting for 40 states
- Fosters collaborations with state WC bureaus and DOHs
- NIOSH works with IAIABC to coordinate data calls

NCCI (National Council on Compensation Insurance):

- Analyzes WC data in 38 states for developing experience modification ratings and maintaining risk classes
- NIOSH collaborates with NCCI on analyses

Partner Strengths: SURVEILLANCE

- Across-State data trending by industry/occupation, employer benchmarking
- Communications with WC industry (State regulators, actuarial staff)

Private WC Insurers

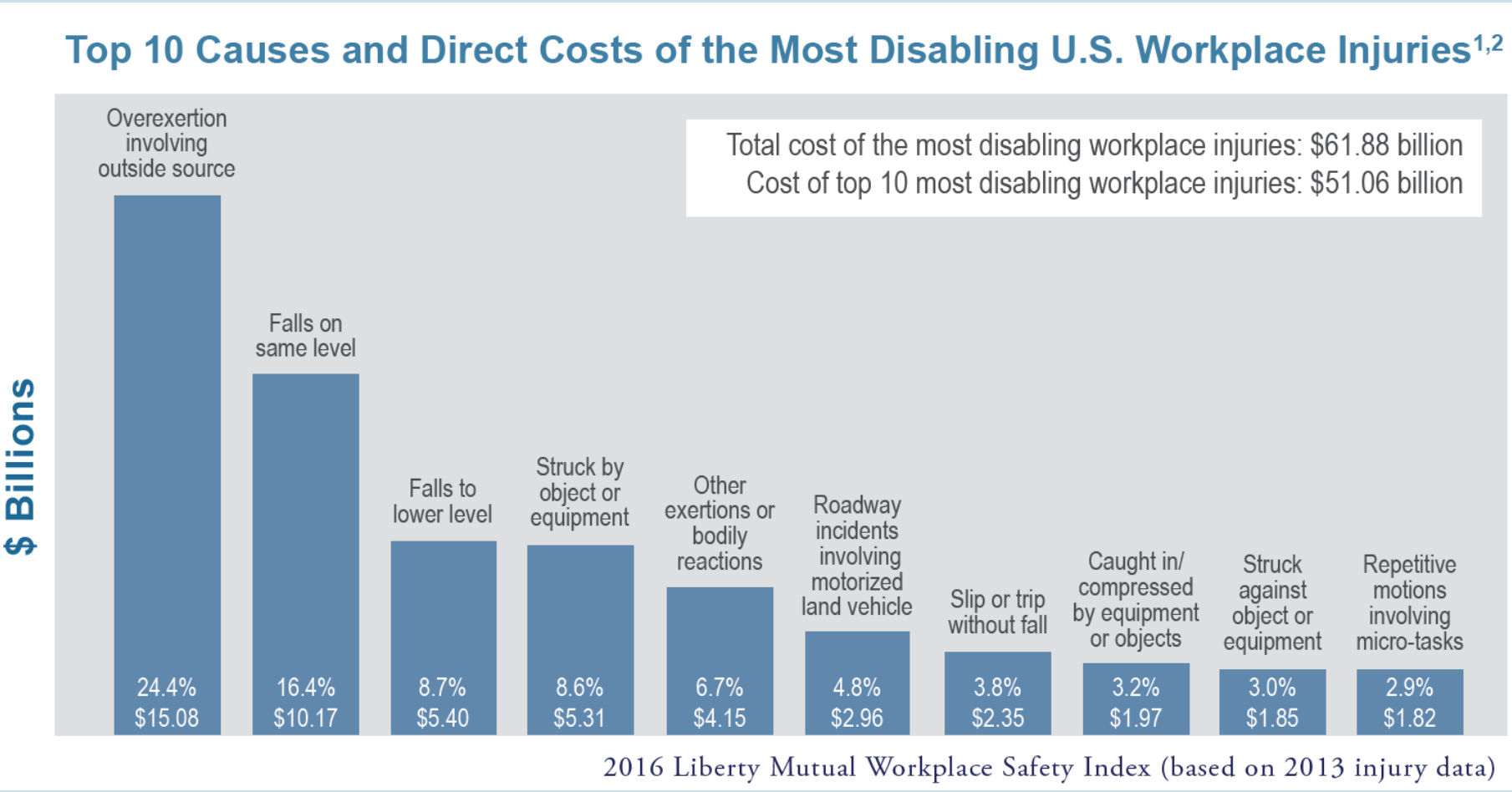
Several insurers currently partner with NIOSH

- NORA council members
- Collaborative research projects
- Travelers
- Liberty Mutual
  - Research Institute for Safety
  - Workplace Safety Index
- CNA
  - Ergonomic Guidelines for Manual Material Handling
    - http://www.cdc.gov/niosh/docs/2007-131/pdfs/2007-131.pdf

Partner Strengths: RESEARCH

- Across-State data trending by industry/occupation, employer benchmarking
- Prevention effectiveness studies
- Safety/health consulting outreach

Liberty Mutual All Industry Cost Summary



https://www.libertymutualgroup.com/about-liberty-mutual-site/research-institute-site/Documents/2016WSI.pdf

State-Fund WC Insurers

Twenty-six states have state-fund insurers represented by the American Association of State Compensation Insurance Funds (AASCIF)

- Four states are exclusive markets for state funds
  - ND, OH, WA, and WY
- Data on both WC claims and employer safety/ health exposures and control programs

Partner Strengths: SURVEILLANCE AND RESEARCH

- Within-State data trending by industry/occupation, employer benchmarking
- Predictive analytics
- Prevention effectiveness studies with long-term insured employers
- Exposure assessment standardization
- Safety/health consulting outreach

Claims Costs Example
Washington State 2002-2010 by Major Industry

NORA Sector	Lost Time Claim Rate / 100 FTE	Median Cost
All	1.9	$9,532
Construction	**4.8**	**$14,828**
Transportation, Warehousing & Utilities	3.5	$9,586
Manufacturing	2.4	$9,786
Wholesale & Retail Trade	1.8	$9,001
Services	1.3	$8,173
Agriculture, Forestry & Fishing	2.9	$9,785
Healthcare & Social Assistance	1.7	$8,043

http://www.lni.wa.gov/Safety/Research/Files/bd_3F.pdf

Claims Count and Rate Example
Ohio BWC 2017-2011 by Construction Sub-Sectors

2012 NAICS Code Name	2012 NAICS Industry Code	Claims Rate per 100 FTE	Rate Rank	Claims Count	Count Rank	Rank of Prevention Index	Rank of Prevention Index Percentile
Foundation, Structure, and Building Exterior Contractors	2381	8.56	31	24131	8	7	97%
Building Equipment Contractors	2382	7.23	62	46277	4	13	95%
Building Finishing Contractors	2383	6.53	80	14770	16	29	88%
Nonresidential Building Construction	2362	6.32	87	14883	15	32	87%
Utility System Construction	2371	6.81	69	7796	43	39	84%
Highway, Street, and Bridge Construction	2373	7.04	66	4949	58	44	82%
Residential Building Construction	2361	5.85	106	12417	22	47	80%
Other Specialty Trade Contractors	2389	5.44	119	11058	25	54	78%

OHBWC-insured private employers, single- and multiple-location — 2007–2011 NAICS 23

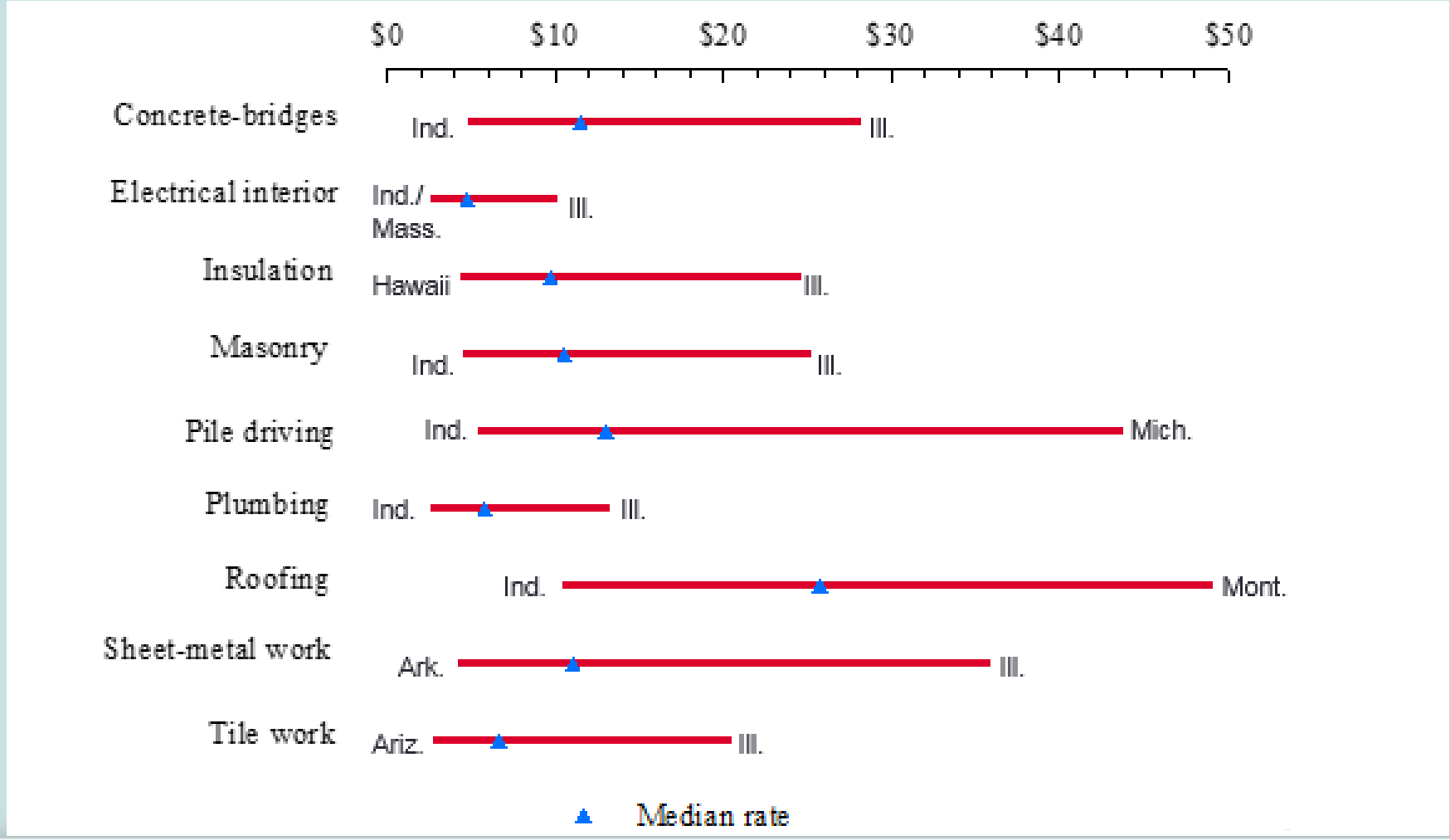
https://www.ncbi.nlm.nih.gov/pubmed/27667651

Manual Class Example: Washington State 2002-2010

Risk Class	WIC Industry	FTE	# Claims (COUNT)	Claim Rate / 10,000 FTE (RATE)	Median Cost
0510	Wood Frame Building Construction	98,996	9,181	927.4	$8,799
7201	State Patient or Health Care Personnel, N.O.C.	31,685	3,810	1,202.5	$5,531
0507	Roofing Work - Construction and Repair	23,645	3,193	1,350.4	$10,579
1102	Trucking, N.O.C.	81,173	5,876	723.9	$10,979
0516	Carpentry, N.O.C.	51,082	3,558	696.5	$12,006
5001	Logging Operations, N.O.C.	6,287	1,739	2,766.2	$11,605
0101	Excavation and Grading, N.O.C.	61,182	3,855	630.1	$12,792
0540	Wallboard Installation - Discounted Rate	9,614	1,506	1,566.5	$15,606
0518	Non Wood Frame Building Construction	53,485	3,300	617.0	$15,742
7117	Temporary Help - Machine Operation	9,120	1,396	1,530.6	$5,109
0504	Painting: Building and Structures - Exterior Work	22,910	1,689	737.2	$12,231

http://www.lni.wa.gov/Safety/Research/Files/bd_3F.pdf

Range of WC Insurance Base Rates in 45 Jurisdictions, Selected Occupations



CPWR. 2013. The Construction Chart Book, fifth edition. Data from Tom Nicholson, 2011. ENR 267(9):34-35

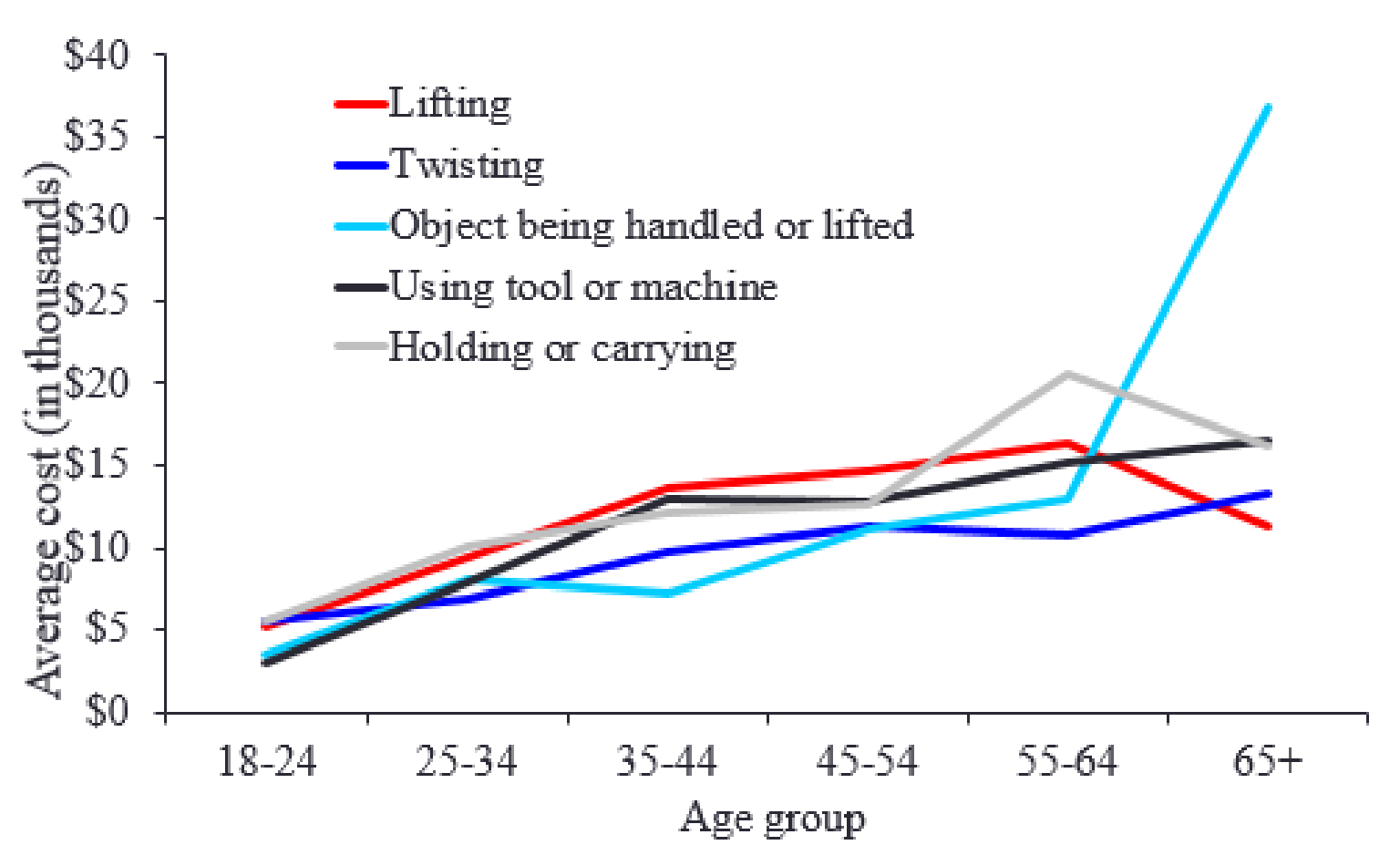
Basic Cause Example in Construction
Washington State 2002-2010

Table 3. Distribution of claims by Injury Type in the NORA Construction Sector in WA SF, 2002 - 2010.

Injury Type (OIICS* Event or Exposure Codes)	# Claims	% of Claims	Claim Rate / 10,000 FTE	Median Cost
All Injury Types	53,781	-	477.5	$14,828
Work-related Musculoskeletal Disorders**	19,852	36.9%	176.2	$21,764
Struck By/Against (010 - 029)	9,962	18.5%	88.4	$7,102
Fall from Elevation (100 - 129)	7,632	14.2%	67.8	$22,695
Other (9999)	3,807	7.1%	33.8	$12,953
Fall Same Level (130-139)	3,611	6.7%	32.1	$19,155
Overexertion±	2,433	4.5%	21.6	$8,530
Exposure to Loud Noises (350-352)	2,148	4.0%	19.1	$145,348
Caught In/Under/Between (030- 049)	1,562	2.9%	13.9	$11,309
Motor Vehicles (400 - 490)	1,108	2.1%	9.8	$22,105
Abraded (050 - 069, 230)	382	0.7%	3.4	$1,668
Bodily Reaction (210-219)	354	0.7%	3.1	$14,104
Extreme Temperatures (320-324)	245	0.5%	2.2	$3,608

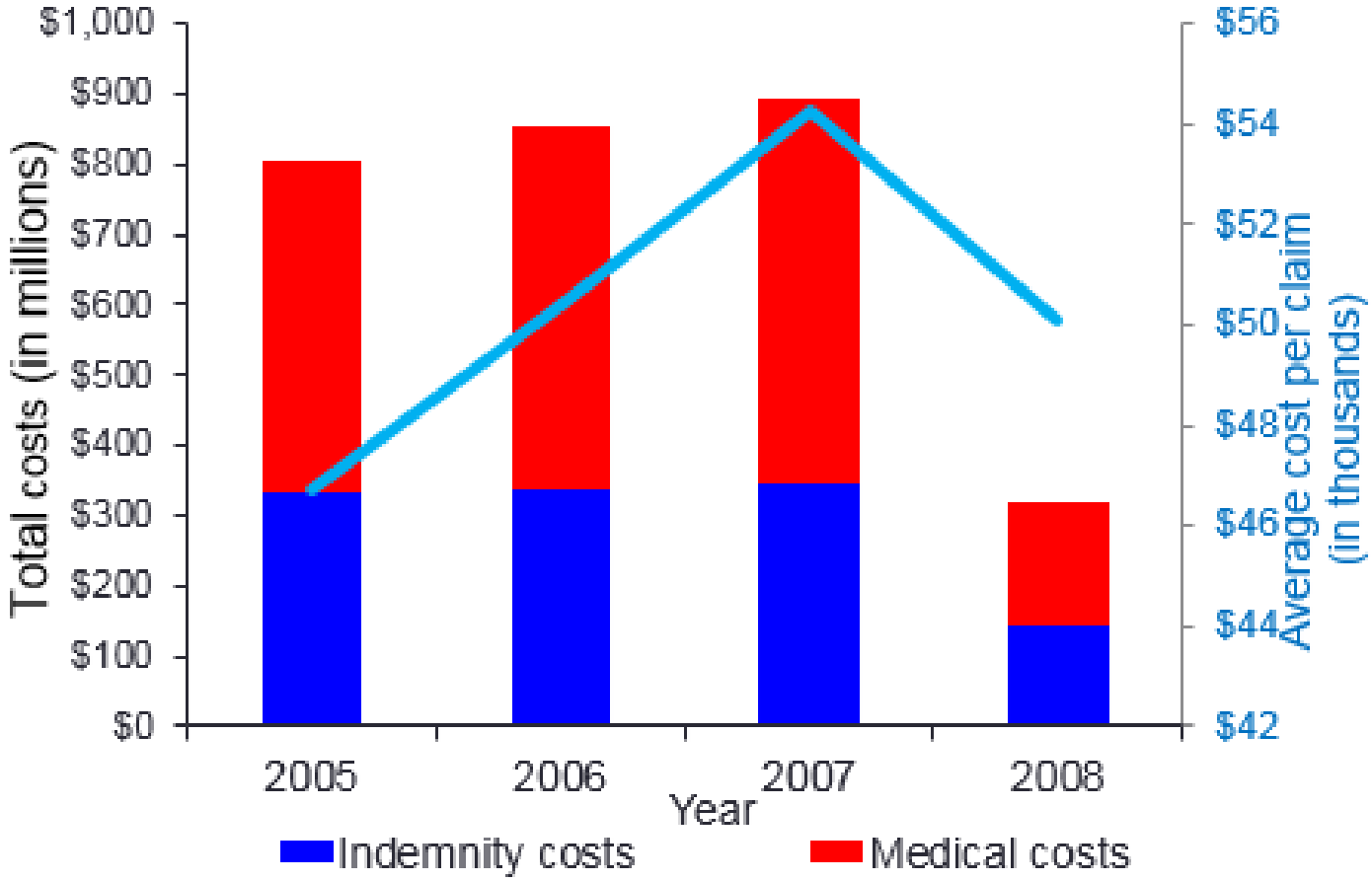
http://www.lni.wa.gov/Safety/Research/Files/bd_3F.pdf

CPWR Example:
Cost of Strain Injuries in Construction, by Age Group



Source: Rosecrance et al. 2011. The role of age on the cause, type, nature and cost of construction injuries. CPWR Small Grant Final Report. Data are from Pinnacol Assurance, Colorado.

OSHA Example:
Workers' Compensation Costs for Fall Injuries in Construction



Occupational Safety and Health Administration. Workers' compensation costs of falls in construction (38 states)
http://www.osha.gov/doc/topics/residentialprotection/2012_fall_costs/index.html

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Practical Tools, Solutions and Resources

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Researcher Questions

- What are some practical tools, solutions and resources?
  - Claims Auto-Coding Programs
  - Data Visualization
  - Online Tools
    - Solutions Databases
    - ROI Calculators
    - Training
    - Program and Risk Assessments

WC Claims Auto-Coding

Adaptable to any narrative data and code set

Basic Cause

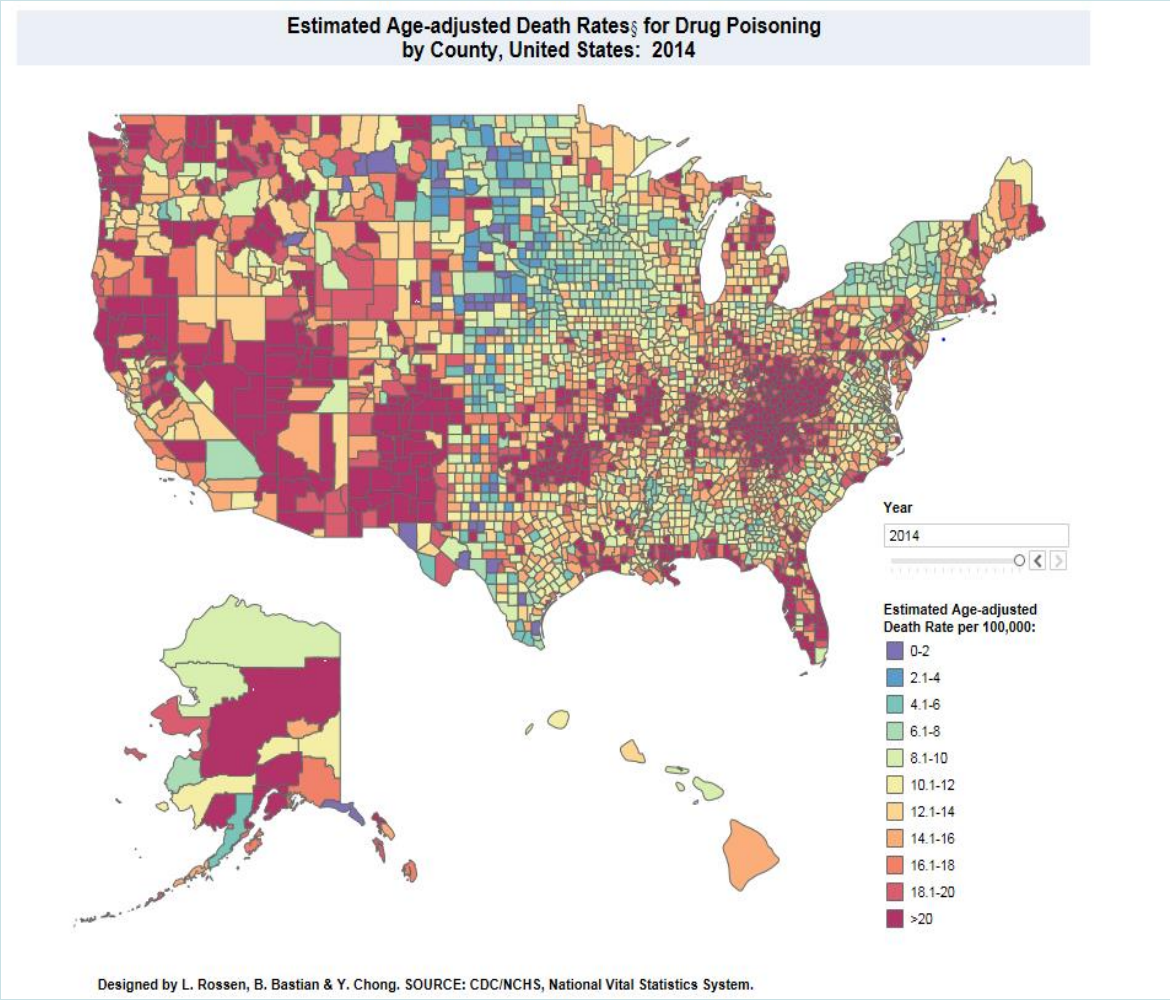
- 3 levels
- Ergonomic, slip/trip/fall, other
- 85% accuracy
  - https://www.ncbi.nlm.nih.gov/pubmed/23206504

Detailed Cause

- 48 levels
- 2-digit BLS OIICS event/exposure

http://www.ncbi.nlm.nih.gov/pubmed/26745274

Data-Visualization



Interactive

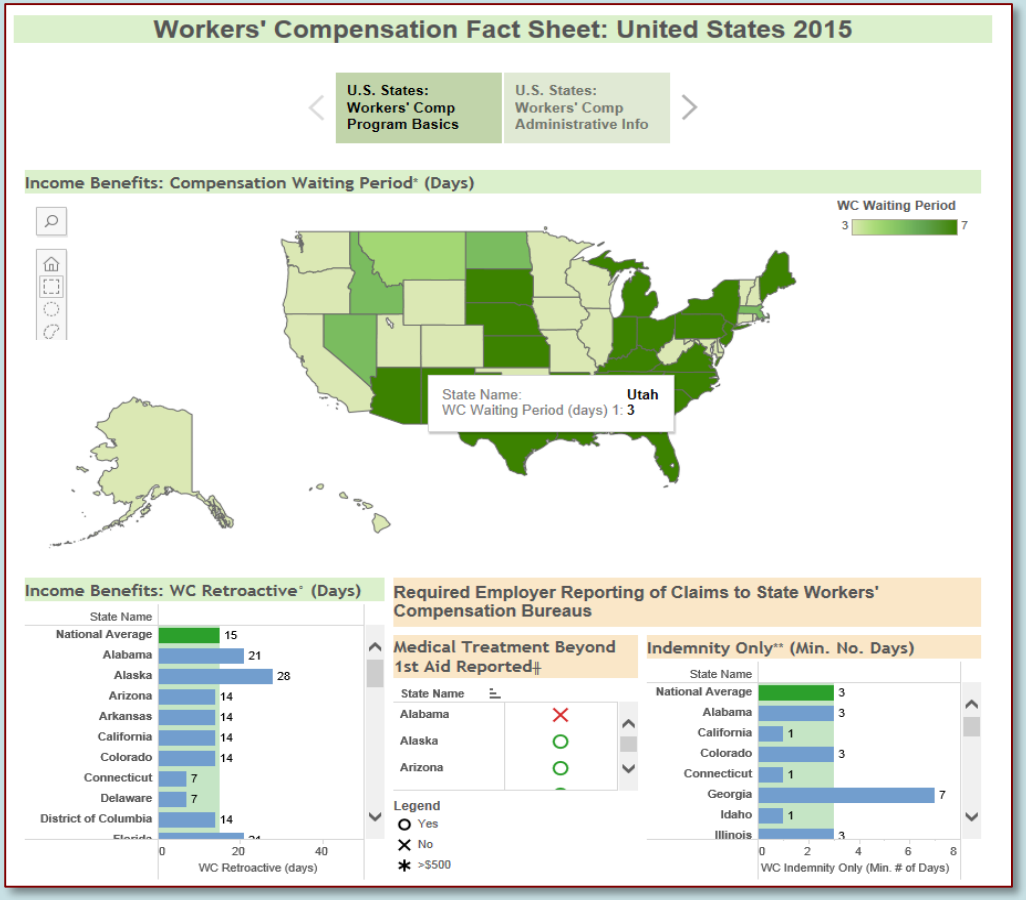
Accessible

Easy to Use

Fast

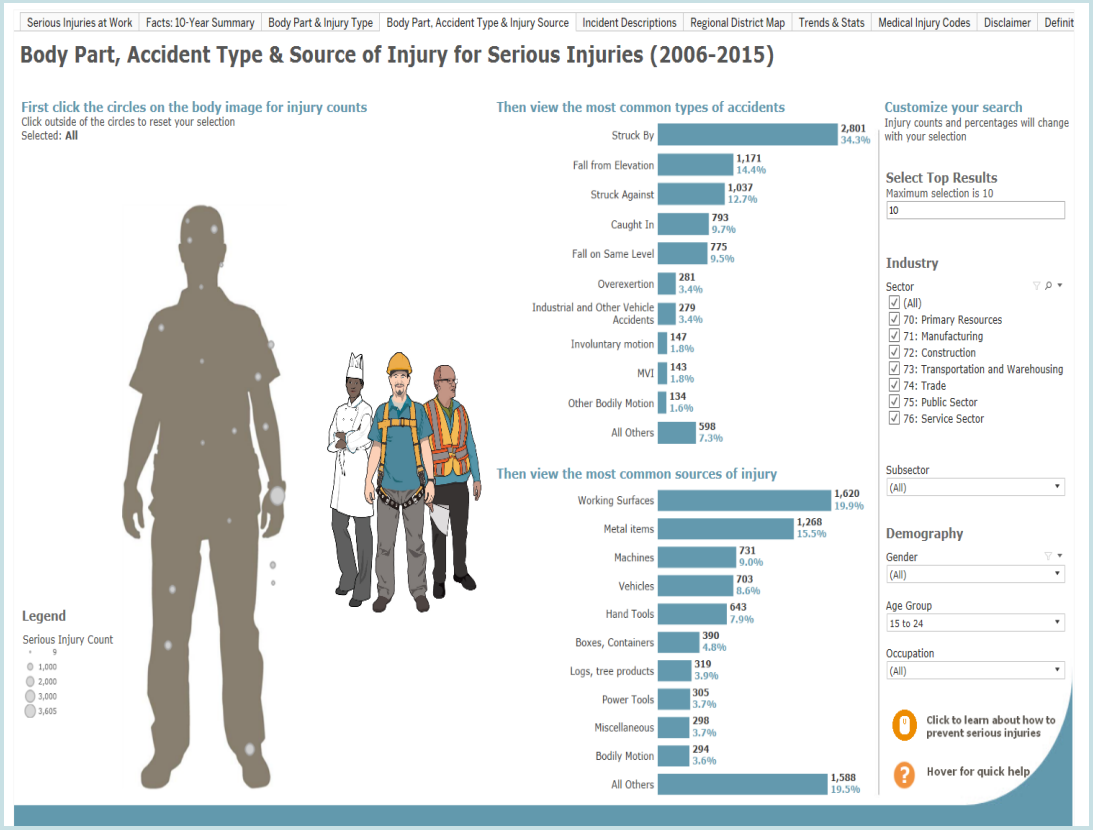
Adaptable

WC Data-Visualization



http://www.cdc.gov/niosh/topics/workercomp/cwcs/dashboard.html

WorkSafe BC Example



Model for engaging dashboards for OSH data

- Fully accessible public dashboards:
- https://public.tableau.com/profile/worksafebc#!/vizhome/SeriousInjuryDashboard/SeriousInjuriesatWork

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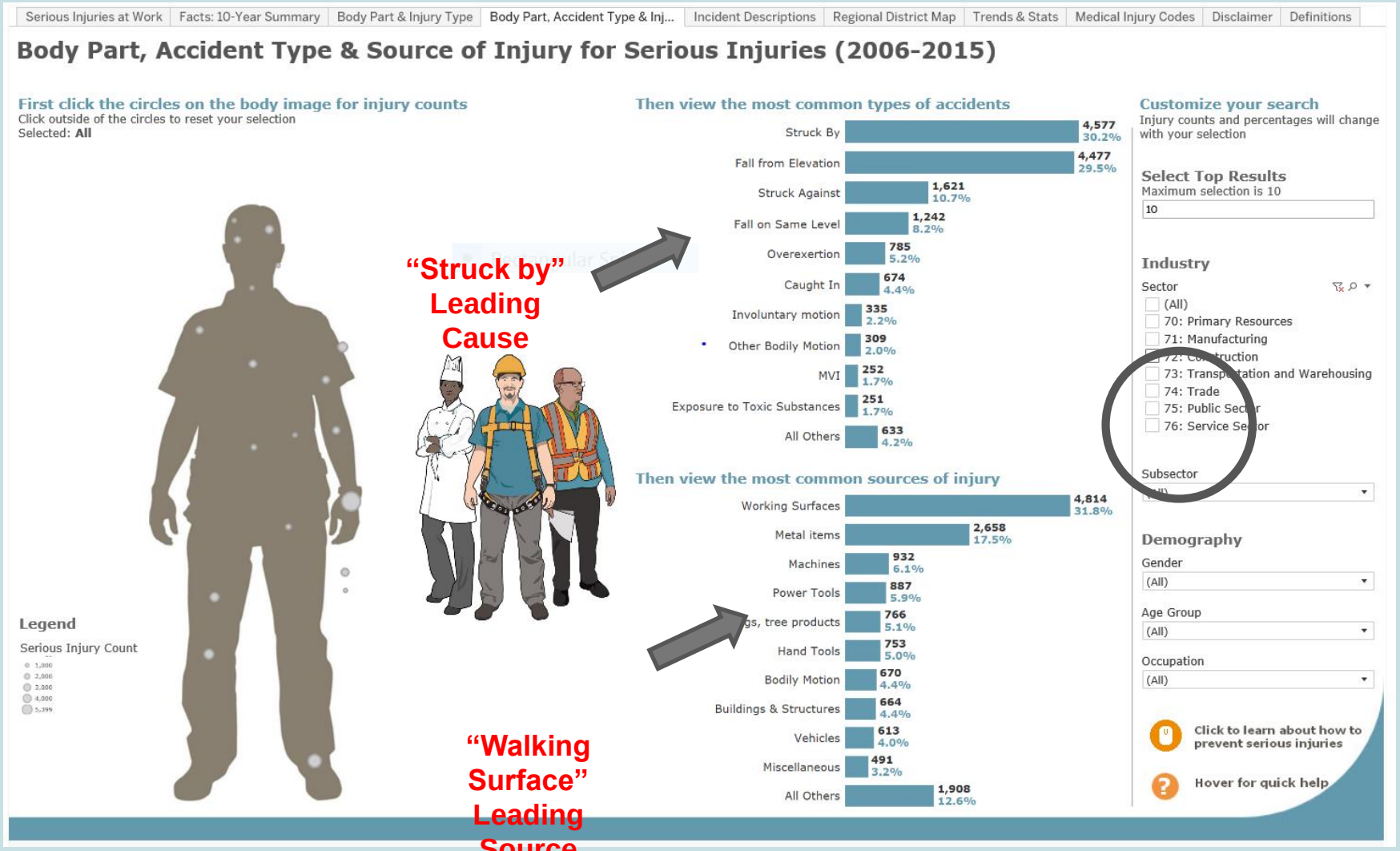
CDC Workplace Safety and Health
NIOSH

Construction, all Ages



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CPWR ROI Calculator (1)

construction solutions ROI CALCULATOR

Register | Forgot Password?

Email Password Login

The ROI Calculator helps evaluate the financial impact of new equipment introduced to improve safety. Materials and work practices can also be evaluated. Click here to see a demonstration of the Calculator.

- Enter costs for equipment, materials, training, productivity and injuries
- View total costs
- Enter data per project or annually
- Compare cost assumptions
- Click on the ? for guidance
- Register to save results

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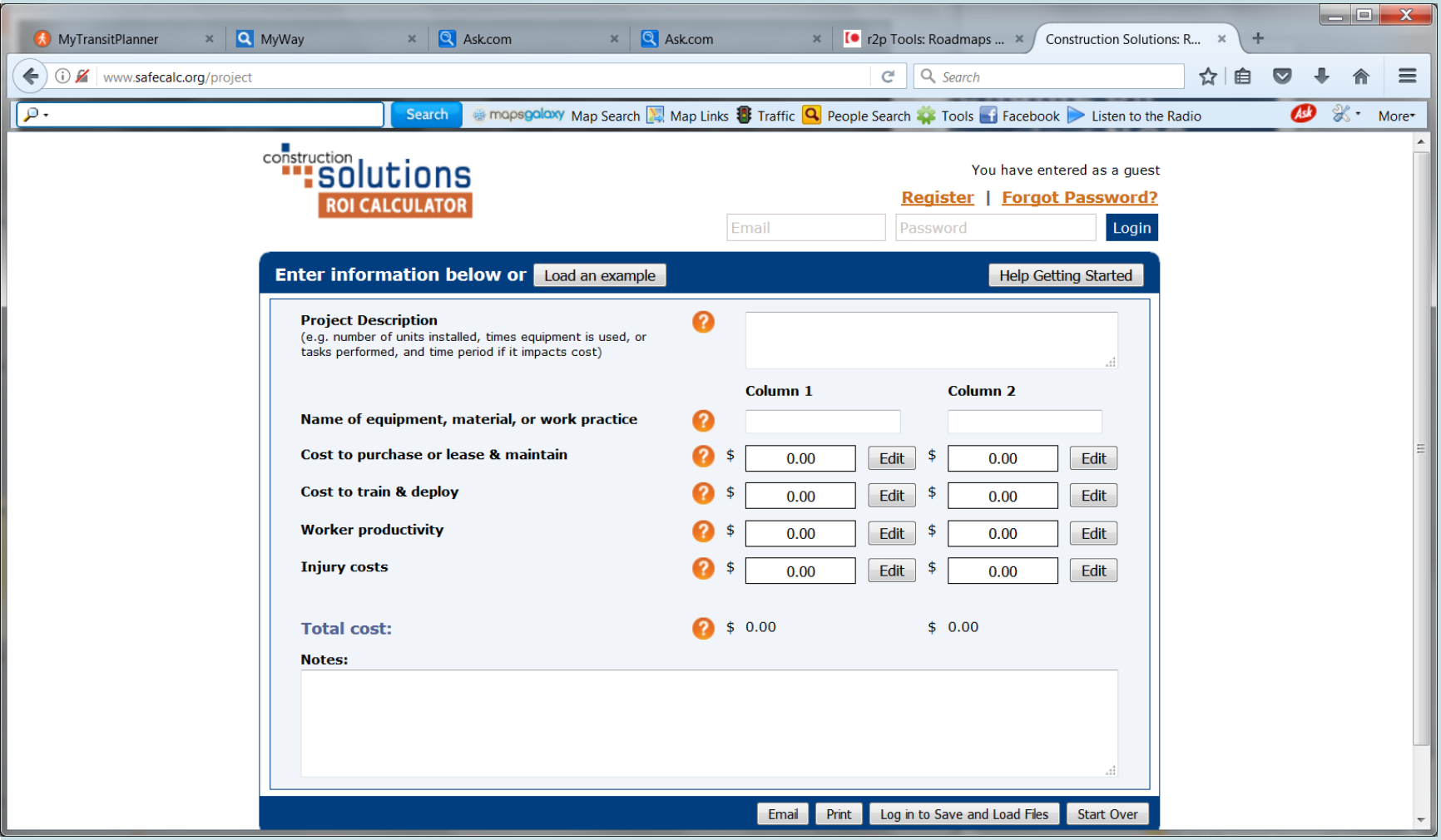
CPWR ROI Calculator (2)



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Ohio BWC Safety Grants

Portable Board Milling Machines

Simplify the process of cutting and shaping drywall

OHBWC Best practice video link:

https://www.bwc.ohio.gov/basics/videos/safety/LoadVideo.asp?txtVName=SafeGrantOCP

Automatic Rebar Tier

Reduce back bending or twisting

OHBWC Case Study link:

https://www.bwc.ohio.gov/downloads/blankpdf/SafetyHygiene6074%20Mohawk%20Rebar.pdf

Before

After

Other Construction Safety Grant Summaries

Automated, self-climbing hydraulic platform scaffolding

Truck lift-gate systems

Hydro-mobile scaffolding

Mobile work stands

Articulating boom lift

https://www.bwc.ohio.gov/Employer/Services/SHBestPractices/BestPractices

Partnership Opportunities

Claims and employer data

- Analyze available data
  - Industry, occupation, cause, counts and rates
- Develop data dashboards
- If you can Predict, you can Prevent

Claims Data

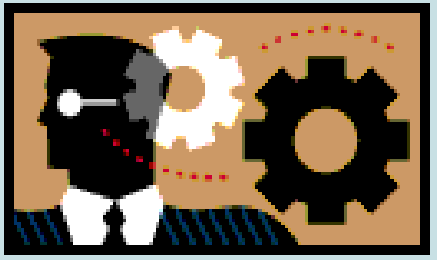
Employer Data

Intervention effectiveness studies

- Funded grant programs
- Other partnerships with insurers and construction employers

Outreach

Questions?



More information:

- **CPWR Website**
  - **http://www.cpwr.com/**
- **CWCS Website**
  - **http://www.cdc.gov/niosh/topics/workercomp/cwcs**

Questions?

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