

Welcome!



Scott Earnest

NORA Construction Sector Council Co-Chair

NIOSH Office of Construction Safety and Health

NORA Construction Sector Council

Disclaimer – 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

NORA National Occupational Research Agenda



Photo by Martin Barraud/Getty Images

<https://www.cdc.gov/nora/councils/const>



Third Decade of NORA

10 Sectors and 7 Cross-Sectors

Industry Sectors

Agriculture, Forestry and Fishing
Construction
Healthcare and Social Assistance
Manufacturing
Mining
Oil and Gas Extraction
Public Safety
Services
Transportation, Warehousing and Utilities
Wholesale and Retail Trade

Health & Safety Cross-Sectors

Cancer, Reproductive and Cardiovascular
Hearing Loss Prevention
Immune, Infectious & Dermal
Musculoskeletal Health
Respiratory Health
Traumatic Injury Prevention
Healthy Work Design and Well-being



Purpose of NORA Councils

Exchanging Information

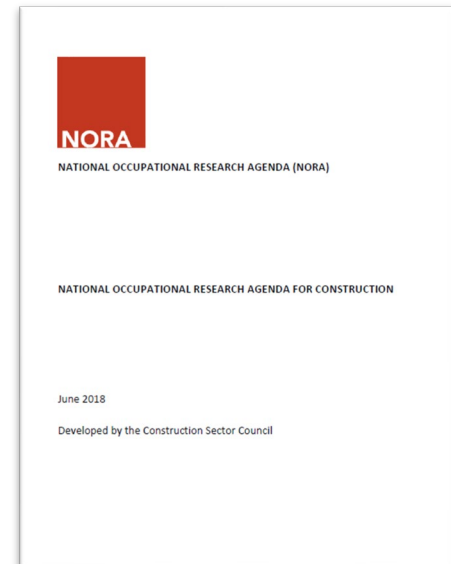
Forming Partnerships

Enhancing dissemination and implementation

NIOSH Strategic Plan and NORA Research Agenda



- The Construction Program priorities for NIOSH work
 - Based on burden, need, and impact
 - Determined in collaboration with other NIOSH programs
- Preventing harmful **noise** exposure
- Reducing occupational **musculoskeletal disorders**
- Reducing occupational **respiratory** diseases
- Improving workplace safety to reduce **traumatic injuries** such as falls
- Promoting safe and **healthy work design**



Agenda - Wednesday AM



Wednesday, May 15

9:30	Welcome and Overview	Scott Earnest, Co-chair, NIOSH
10:00	Mental Health Interventions and Suicide in the Construction <u>Industry</u>	Hope Tiesman, NIOSH
10:30	National Construction Center Opioids/Suicides plan	Chris Cain, CPWR
11:00	Reproductive Hazards	Carissa Rocheleau, NIOSH
11:30	Discussion of Stand-down events and WG activities	SC and WG leadership
	Falls and Struck-by	

12:00-1:00 LUNCH BREAK

Agenda - Wednesday PM



12:00-1:00

LUNCH BREAK

1:00	Automation and Robotics in Construction	Henning Roedel, formerly DPR Construction
1:30	Work-related fatigue: Considerations for the Construction Sector	Imelda Wong, NIOSH
2:00	Prevention through Design Research	Prof Sang Choi, George Mason U
2:30	Wrap up and adjourn	Chris Cain, Co-chair, CPWR

NIOSH Construction Program Update

Scott Earnest, PhD, PE, CSP

Director, NIOSH Office of Construction Safety and Health
Manager, NORA Construction Sector

Doug Trout, MD

Deputy Director, NIOSH Office of Construction Safety and Health

Christina Socias-Morales, DrPH

Research Epidemiologist, NIOSH, DSR

Scott Breloff, Ph.D.

Senior Biomechanical Research Engineer, NIOSH, DFSE



May 2024

NIOSH Office of Construction Safety & Health

National Construction Center Request for Proposals (RFP)



- 5-year cooperative agreement
- Expected budget of approx. \$29M
- Announced in Grants.gov in **August 2023**
- Due Date **December 1, 2023**
- Selection **August 2024**

Centers for Disease Control and Prevention ([CDC](#))

The policies, guidelines, terms, and conditions of the HHS Centers for Disease Control and Prevention (CDC) stated notice of funding opportunity (NOFO) might differ from those used by the HHS National Institutes of Health (NIH). If written guidance for completing this application is not available on the CDC website, then CDC will direct applicants elsewhere for that information.

National Institute for Occupational Safety and Health ([NIOSH](#))

National Center for Construction Safety and Health Research and Translation (U54)

[U54](#) Specialized Center- Cooperative Agreements

Reissue of [RFA-OH-19-001](#)

None

[RFA-OH-24-001](#)

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NORA Construction Sector Work Groups



Preventing Falls

Co-Chairs:

Rich Trewyn

Cheryl Ambrose

Monthly Zoom meetings



Preventing Struck-by

Co-Chairs:

Brad Sant

Alanna Klein

Monthly Zoom meetings

*If interested in joining, reach out to Doug Trout DT Trout@cdc.gov

NORA

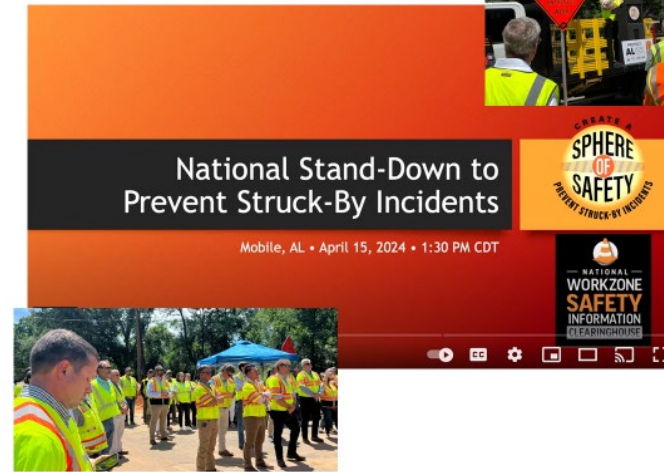
Struck-by & Falls Stand-down Activities/Outputs

- The Struck-by Stand-down
 - [Struck-by \(ITCP\) Science Blog](#)
 - [Kick-off event in Mobile, AL](#)
 - [ITCP Webinar](#)
 - Comms products
 - Social media
- The Falls Campaign and Stand-down
 - [Ladder Safety Webinar](#)
 - [Science Blog](#)
 - [Falls Campaign Promotion video](#)
 - Kick-off Webinar
 - Comms products
 - Social media

www.stopconstructionfalls.com



<https://www.cpwr.com/struck-by-hazards>



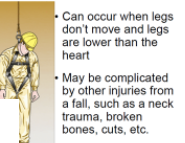
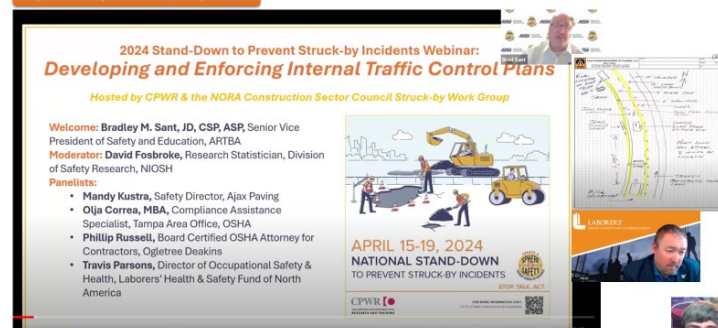
Falls Campaign video, National Stand-Down



Falls Campaign Kick-off



<https://www.cpwr.com/struck-by-hazards>



NIOSH Science Blogs

 Centers for Disease Control and Prevention
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NIOSH Science Blog

Prevention Through Design to Address Continuing Construction Workplace Deaths and Injuries

February 5, 2024 by Amber Trueblood, Babak Memarian, Trudi McCleery, Douglas Trout, G. Scott Earnest

Nearly 1 in 5 of all workplace fatalities occur in the construction industry (BLS, 2024). In 2022 there were 1,092 fatalities in the construction industry (BLS, 2024); in 2021 and 2022 there were 144,480 cases of construction industry workers missing days away from work from a non-fatal injury or illness (BLS, 2023). These and [other statistics](#) show that construction remains one of the most dangerous industries for workers. What if we could “design out” or minimize hazards and risks to prevent injury and death in construction? That is the goal of [Prevention through Design](#) or PtD.

Prevention through Design

An important way to prevent occupational injuries in all industries, including construction, is by implementing prevention measures based on the [hierarchy of controls](#). PtD is reflected at the top of the hierarchy and is the process of designing OUT a hazard early in a project’s life cycle. PtD is the most reliable and effective way to protect workers. Since 2007, the National Institute for Occupational Safety and Health (NIOSH) has led the PtD [National Initiative](#) which has the goal of preventing or reducing occupational injuries and fatalities by promoting prevention designs that protect workers. PtD is also referred to as ‘design for safety,’ ‘design for construction safety,’ and ‘safety by design.’

Some examples of engineering out hazards in construction include installing embedded safety features such as [anchor points](#) and [parapet walls](#) to prevent falls, installing a [prefabricated staircase](#) rather than use of fixed ladders, and installing [skylights with shatterproof glass or permanent guarding](#).

<https://blogs.cdc.gov/niosh-science-blog/2024/02/05/ptd-construction-2/>



Supporting Mental Health in the Workplace

April 15, 2024 by Emily Kirby, BPH, and L. Casey Chosewood, MD, MPH

Work plays a significant role in workers’ mental health. This impact is so substantial that managers impact workers’ mental health more than doctors or therapists do, according to the Workforce Institute’s [Mental Health at Work study](#). The [U.S. Surgeon General](#) even emphasizes the role of workplaces in shaping our mental and physical well-being, noting that the average full-time U.S. worker spends about half of their waking life at work. Employment arrangements, wages, and working conditions are powerful social determinants of health, including our mental health.

Mental health is a critical part of worker well-being and is [central to overall health](#). The National Institute for Occupational Safety and Health’s (NIOSH) long-standing research program in [work stress](#) shows that mental health worsens with chronic exposure to occupational stress. Research also shows that workplace risk factors can contribute to health problems outside of work. Harmful physical and emotional responses can happen when job requirements do not match a workers’ capabilities, resources, or needs.

Mental health matters to workers

- The American Psychological Association’s [2023 Work in America Survey](#) found that 95% of workers said it is very or somewhat important to them to work for an organization that respects the boundaries between work and nonwork time. In addition, 92% said it is very or somewhat important to them to work for an organization that provides support for employee mental health and that values their emotional and psychological well-being.
- Workers want healthy work cultures, not self-care perks, according to Mind Share Partners’ [2023 Mental Health at Work](#)

<https://blogs.cdc.gov/niosh-science-blog/2024/04/15/workplace-mental-health-resources/>

New FACE Reports and Videos



Kentucky Injury Prevention and Research Center
Bona fide agent for Kentucky Department for Public Health
333 Waller Avenue, Suite 242 • Lexington, KY 40504 • 859-257-5839



REPORT#: 23KY005

REPORT DATE: 12/12/23

INCIDENT HIGHLIGHTS

DATE:	January 17, 2023
TIME:	12:11 p.m.
VICTIM:	27-year-old roofing worker
INDUSTRY/NAICS CODE:	Roofing contractors/238160
EMPLOYER:	Roofing contractor
SAFETY & TRAINING:	Unknown
SCENE:	Commercial office building
LOCATION:	Kentucky

Roofer in Boom Lift Electrocuted by Overhead Electrical Line — Kentucky

SUMMARY

Two roofers were using a telescoping boom lift to descend when they contacted overhead electrical lines. The head operator, a 27-year-old roofing worker, contacted one of the lines and was fatally electrocuted. The other roofer in the lift, a 27-year-old male, suffered 2nd degree electrical burns to his left elbow.

... [READ THE FULL REPORT>](#) (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation:

- Overhead electrical hazards in work area
- Windy conditions
- Exposure to energized lines
- Lack of appropriate personal protective equipment
- Need for electrical hazards training

... [LEARN MORE>](#) (p.9)

RECOMMENDATIONS



Occupational Health Branch • California Department of Public Health
850 Marina Bay Parkway, P-3, Richmond, CA 94804
510-620-5757 • fax 510-620-5743



REPORT#: 22CA003

REPORT DATE: November 1, 2022

INCIDENT HIGHLIGHTS

DATE:	September 14, 2022
TIME:	11:30 a.m.
VICTIM:	34-year-old day laborer
INDUSTRY/NAICS CODE:	Plumbing / 238220
EMPLOYER:	Plumber
SAFETY & TRAINING:	None
SCENE:	Walkthrough within a mobile home park
LOCATION:	California

Day Laborer Dies in a Collapsed Trench Being Dug to Repair a Sewer Line — California

SUMMARY

On September 14, 2022, a 34-year-old Hispanic day laborer, along with three other day laborers, dug an eight-foot-deep trench to expose a damaged sewer line. Unexpectedly, while digging, they exposed and broke a water line. Water and dirt filled the trench and created a thick mud. The victim became submerged under the mud and was unable to be extracted by co-workers or rescue personnel.

... [READ THE FULL REPORT>](#) (p.3)

CONTRIBUTING FACTORS

- Lack of competent person onsite.
- Permits were not requested or issued for the work being performed.
- Workers were in an eight-foot-deep trench with no shoring.
- Water line was not turned off before or during work.
- Lack of training for workers in trenching safety.

... [LEARN MORE>](#) (p.6)

RECOMMENDATIONS



Kentucky Injury Prevention and Research Center
Bona fide agent for Kentucky Department for Public Health
333 Waller Avenue, Suite 242 • Lexington, KY 40504 • 859-257-5839



REPORT#: 23KY096

REPORT DATE: November 3, 2023

INCIDENT HIGHLIGHTS

DATE:	August 9, 2023
TIME:	2:45 p.m.
VICTIM:	52-year-old Hispanic carpenter
INDUSTRY/NAICS CODE:	Finish carpentry contractor / 238350
EMPLOYER:	Finish carpentry contractor
SAFETY & TRAINING:	No formal program
SCENE:	Commercial restaurant dining room
LOCATION:	Kentucky

Carpenter Dies After Fall from 6-Foot Ladder—Kentucky

SUMMARY

On August 9, 2023, a 52-year-old carpenter (victim) and his co-worker were obtaining measurements in preparation for a plywood installation project in a restaurant being constructed. In the process, the victim's ladder overturned and he fell and struck the concrete surface below.

... [READ THE FULL REPORT>](#) (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Unrecognized job hazards,
- Safety training,
- Reaching outside ladder side rails.

... [LEARN MORE>](#) (p.9)

RECOMMENDATIONS



Articles of Interest



5 reasons why falls in construction keep happening (and what to do about it)

By Kevin Druley, associate editor

It's not a surprise: Falls continue to be the leading cause of death in the construction industry.

A recent report from CPWR – The Center for Construction Research and Training shows the number of fatal falls in the industry rose more than 50% during a recent 12-year period.

"It's definitely a difficult issue and it's hard to change, quite frankly," said G. Scott Earnest, associate director of the NIOSH Office of Construction Safety and Health. "We're just trying to communicate with the industry at large on the steps they should take to prevent falls in the future."

Here are five factors that contribute to construction worker falls.

1 Not making time for safety

A CPWR analysis of Bureau of Labor Statistics data found that 397 fatal falls to a lower level occurred in the construction industry in 2022. That's a 52.7% increase from 2011.

Especially vulnerable: workers employed by smaller construction companies. CPWR says 70% of the fatal falls occurred within organizations with 10 or fewer employees.

Why?

"I think some of it relates to the fact that they're so busy just trying to get the next job," Earnest said. "Some of these small businesses are not putting the resources and the time into safety because they're so busy just trying to go from one job to the next and bring money into the organization."

"And for that matter, that could be the case with the workers, too, where they're just trying to put food on the table for their family, so they're not really taking time to really consider their own safety."

The 11th annual National Safety Stand-Down to Prevent Falls in Construction – an initiative created by NIOSH, OSHA and CPWR – is slated for May 6-10 (see box). A poster created for the event encourages employers to:

- Train all workers.
- Plan a toolbox talk or other safety activity.
- Take a break to talk about how to prevent falls.

2 Not wearing PPE

A 2022 CPWR survey of 495 people who either were involved in, witnessed or investigated a fall incident showed that workers who believed fall protection was required by their employer were eight times more likely to use it than those who thought it was optional.

"What we hear a lot from contractors is: 'Well, we provide the fall protection and then I come to the jobsite and it's still on the truck. The workers aren't using it. They have a brand-new harness and it's on the ground while they're on the roof,'" said Jessica Bunting, director of the Research to Practice initiative at CPWR. "While this may be true on the surface, our survey findings showed that if you enforce that employees need to wear the fall protection, then they'll do it. Just giving it to them isn't enough."

"They have to be trained on its use. They have to know that it's required by their employer, and there's that expectation from their leadership."

Doug Trout, deputy director of the NIOSH Office of Construction Safety and Health, says employers should examine the safety climate at their jobsites. Do workers' perceptions of what the company says or writes about safety and health align with what's practiced?

"That's something employers can be working on regularly to decrease falls and improve all safety and health issues on the job," Trout said.

3 Not focusing on leading edges

OSHA requires workers constructing leading edges at least 6 feet above a lower level to be protected by a guardrail, safety net or personal fall arrest system.

Experts find, however, that because the opportunity for overhead anchorage doesn't exist, workers may tie off at foot level. This can lead to problems. Although ANSI Class II self-retracting lifelines designed for leading-edge use are tested to withstand greater fall forces, those not approved for abrasive-edge use may eventually fray – and snap.

"It's still a complicated topic because there really isn't a great one-size-fits-all solution out there," Bunting said. "It is an area, I think, that needs some more research and that maybe could benefit from some new advancements from manufacturers. It's a challenging issue to address."

The recent death of a worker whose lanyard was severed by an exposed edge as he fell prompted OSHA to issue a hazard alert. Recommendations include:

- Identify and document all potentially hazardous edges during the safety evaluation and walkarounds at the jobsite.
- When possible, avoid working in areas where lifelines could contact potentially hazardous edges if a fall occurred.
- Identify possible solutions to prevent establishing anchors at foot level.
- Protect lifelines and lanyards against being severed or damaged by covering exposed edges with protective material in areas where workers could fall.

Head protection: Understand the options

DO YOU KNOW THE DIFFERENCE between a hard hat and a helmet?

"Depending on where you look or who you talk to, the terminology used around hard hats and helmets can be confusing and sometimes contradictory," says CPWR – The Center for Construction Research and Training.

The center notes that OSHA's standard uses the words "protective helmet" and "head protection," and the ANSI/ISEA Z89.1 standard uses "protective helmets" or "head protection devices" – and neither use the term "hard hat."

"Despite this, many in the industry have historically referred to protective headgear as 'hard hats,' and are now using the term 'helmets' to refer to the newer styles of headgear," CPWR says.

Pointing out that neither ANSI nor OSHA outline the difference between a hard hat and a helmet, and that the determination is made by the manufacturer, CPWR uses these definitions:

Hard hats: Typically refers to the traditional style of head protection, which often includes a bulkier shell and a brim. Hard hats may have a chin strap. "Part of the reason some hard hats may feel bulkier," the center says, "is they're often built with a webbed ribbon-style suspension system with a gap built in to absorb impacts or penetration."

Helmets: Typically refers to a climbing style of headgear that's more rounded and consistently has a chin strap. "Instead of a webbed suspension, they may have a foam liner or a combination of a webbed suspension and a foam liner."

What OSHA's head protection standard (1926.106) does require, though, is that all protective headgear be "tested and designated as either Type I or Type II, according to the guidelines in the ANSI/ISEA Z89.1 standard."

Go to <https://www.osha-slc.gov> to learn more.



Photos show examples of suspension and padding types only and should not be considered a comprehensive list or guide. Images courtesy of Dr. Michael Bofflon.

Keep workers hydrated

Proper hydration is essential for preventing heat-related illnesses.

In a recently published tip sheet, OSHA explains that our bodies heat up as we work and cool down through

sweating. This can lead to dehydration and a heat-related illness.

Tips for employers:

- Educate workers on the importance of hydration and what to avoid.
- Equip all work areas with accessible and visible cool water (less than 60° F).
- Encourage workers to drink at least 1 cup (8 ounces) of water every 15-20 minutes while working in the heat, not just when they're thirsty.
- Maintain a cool or shaded location for rest breaks.

- Designate a relief person so workers can take a water break, or have water brought directly to workers who can't leave their work area.
- Encourage workers to keep a sealable bottle of cool water in their work area so they can hydrate.
- Consider providing electrolyte products when workers perform strenuous, sweat-producing job tasks for extended periods of time.

Taking scheduled meal breaks, OSHA adds, will help replace lost electrolytes.



Articles of Interest

WORKER PROTECTION
Peer-Reviewed

A FALL PREVENTION & PROTECTION PARADIGM SHIFT

By Russell Duren, Peter Ferguson, Thomas Kramer and David Thomas

IT IS TIME TO ESTABLISH NEW THINKING around the planning and execution of work at height. In the U.S. today, two protection methods lie at opposite ends of the control spectrum with too wide a chasm between them. At one end of the spectrum, the preferred method is to eliminate or engineer out the hazards during the design and construction phases to the extent that they simply do not exist or are dramatically reduced. At the other end, harness-based controls occupy a virtually unchallenged role in attempting to protect workers against the outcomes of fall incidents. The phrase "The worker wasn't wearing fall protection" assumes too much about the effectiveness of PPE controls for work at height exposures.

Safety professionals are in a unique position to lead the conversation toward a paradigm shift, especially for those who only associate fall protection with PPE. Two fundamental changes can drastically improve safety for work at height. First, organizations should focus on methods to control fall hazard risk without the use of harness-based systems. Second, when these systems are the only feasible option, organizations must provide for more comprehensive application of these tools.

Background

Falls are the second leading cause of occupational fatalities among American workers, behind only transportation incidents. Citations related to fall protection have held the number one spot on OSHA's top 10 list for the past 12 years (OSHA, 2022b). Despite significant updates to fall protection regulations and standards and continual advances in fall protection equipment, the number of fatalities continues to increase in the U.S. So, why do falls continue to occur at this rate and how can organizations better manage fall hazards?

First, a more successful way exists to control fall hazards. By embracing successful tactics from around the world, the lives of hundreds of American workers could be saved every year, not to mention reducing the number of workers affected by serious injuries and days away from work.

The U.K. has demonstrated the feasibility of achieving a decrease in fall

fatalities. Figure 1 (p. 18) highlights differences in key statistics between the U.S. and the U.K. This is a comparison of two well-understood industrialized nations within the G7 intergovernmental political forum. While the economies are similar, the U.S. is roughly five times larger in population, and the gross domestic product figures show that while the U.S. produces more, the increase in production does not align with the dramatic difference in workplace fatalities. These numbers illustrate the urgent problem in the U.S. that needs attention.

While other countries such as Australia have also had enormous success, most have followed the U.K.'s lead, so it becomes a useful and simplified comparison point. The way the U.K. has developed and implemented these changes is well documented, and work at height regulations apply across the country and to all industries, rather than having different rules by location or industry.

A Paradigm Shift: A Refined Hierarchy of Controls

The improvements seen in the U.K. were not achieved as an overnight success or after one government directive, but rather after a determined drive across industry to reduce injuries and fatalities. In addition, the better workplace fatality figures were not achieved by simply using harnesses more effectively, but rather with PPE considered a last resort.

U.K. regulations specifically dictate that PPE should be the least preferred option for protecting workers at heights: "PPE

should be regarded as the last resort to protect against risks to health and safety. Engineering controls and safe systems of work should be considered first" (U.K. HSE, 2022a).

In large part, the improved statistics are a result of a paradigm shift that included new construction methods, increased expectations and demands from owners, improved guidance and standards, targeted enforcement, increased fiscal penalties and implementation of the hierarchy of controls, with the development and acceptance of a different risk management culture across industry.

The elements of the U.K.'s paradigm shift share a common theme not yet prevalent in the U.S. workforce. At its core, U.K. risk management culture is less willing to assign workers to exposures with potentially catastrophic or fatal outcomes. When such exposure must occur, the investment made in preventing a harmful outcome more closely approaches the incalculable cost of the loss of human life. Because the cost of a workplace fatality is so horrible, U.K. risk management stakeholders are willing to spend more money, time or resources to prevent such an occurrence. The U.K. has put regulations in place to motivate industry to do better (Thomas, 2015). By comparison, the U.S. has few drivers of change.

U.S. regulatory agencies do not differentiate between the quality and reliability of the method of working at height (OSHA, 2016). When all options are considered acceptable, the industry has developed a culture that accepts whatever is the perceived cheapest method of working at height, rather than what is truly the safest. This culture of harness use has evolved, driven by cost effectiveness, simplicity, ease of use, a highly motivated equipment supply industry, and a lack of perceived need to change by designers, constructors and clients.

While OSHA regulations have yet to take a firm stance on an ordered hierarchy of controls for fall hazards, the safety profession's growing acceptance of the hierarchy of controls is illustrated in ANSI/ASSP Z359.2-2023. To build on the general hierarchy of controls provided in the ANSI/ASSP consensus standard, effectively managing hazards in any harness-based work at height task requires implementation of a more nuanced approach.

The control sequence shown in Figure 2 (p. 19) is adapted from the ANSI/ASSP Z359.2 hierarchy of controls and adds a work positioning element as the missing piece to help achieve more consistent worker protection in harness-based work at height. Rope access guidance provided by the ANSI/ASSP Z459 standard, the Society of Professional Rope Access Technicians and the International Rope Access Trade Association embraces this approach, which contributes to the high safety record that rope access enjoys.

This refined hierarchy of controls calls for improved hazard management, including more intentional management of personnel, equipment, work methods and incident responses. It also acknowledges that there is a role for the proper use of harness-based systems, including fall arrest, work restraint, rope access (as defined in ASSP Z359.0-2023) and positioning systems. However, these systems require significant supervision and cannot perform their crucial roles when called upon unless the user has configured them within the scope of the use, limitations and restrictions assigned by the components' manufacturer.

Required Changes

Acknowledging the drastic discrepancies between fall fatalities in the U.S. compared to the U.K., it is important to consider the possible reasons for the disparity between the outcomes. Imparting fundamental change requires cooperation at a systemic level from all stakeholders—regulators, industry influencers, employers and users—which takes time to establish. Still, the following three areas provide the greatest opportunity for safety professionals to influence improvements in the U.S. today.

1. Emphasize Prevention Through Design

While it is easier to see fall hazards in an existing structure, safety practitioners around the world have found that it is safer and more cost effective to implement fall protection solutions before structures or processes are built. This concept, referred to as prevention through design (ANSI/ASSP, 2021a) in the U.S., ensures that safety measures are evaluated and implemented during the programming and design phases of a project. In the U.K., this is achieved through construction (design and management) regulations (U.K. HSE, 2015).

Applying prevention through design has proven to decrease risk and reduce life cycle cost for both the builder and the building owner. Risk is minimized by eliminating hazards



FIGURE 1
COMPARISON OF WORKPLACE FATALITIES BETWEEN U.S. & U.K.

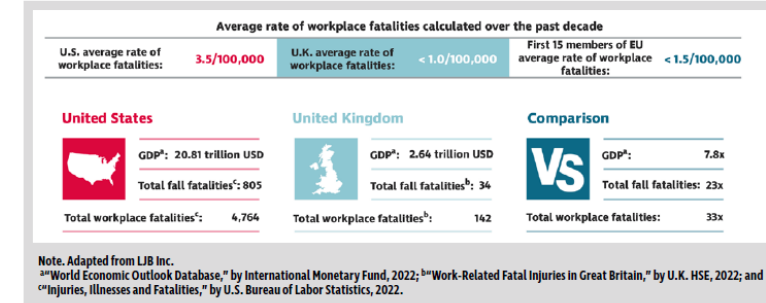
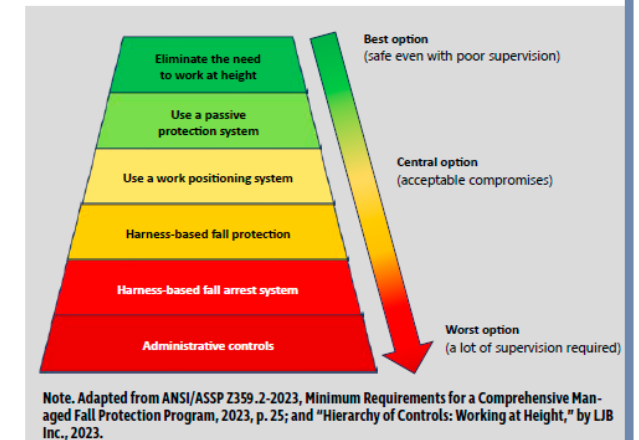


FIGURE 2
REFINED HIERARCHY OF CONTROLS FOR WORK AT HEIGHT



Note. Adapted from ANSI/ASSP Z359.2-2023, Minimum Requirements for a Comprehensive Managed Fall Protection Program, 2023, p. 25; and "Hierarchy of Controls: Working at Height," by LJB Inc., 2023.

New Journal Articles of Interest

NORA



Article

Automated Classification of the Phases Relevant to Work-Related Musculoskeletal Injury Risks in Residential Roof Shingle Installation Operations Using Machine Learning

Amrita Dutta¹, Scott P. Brelhoff², Dilruba Mahmud¹, Fei Dai^{1,*}, Erik W. Sinsel², Christopher M. Warren² and John Z. Wu²

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* Correspondence: fei.dai@mail.wvu.edu; Tel.: +1-(304)-293-9940

Abstract: Awkward kneeling in sloped shingle installation operations exposes roofers to knee musculoskeletal disorder (MSD) risks. To address the varying levels of risk associated with different phases of shingle installation, this research investigated utilizing machine learning to automatically classify seven distinct phases in a typical shingle installation task. The classification process relied on analyzing knee kinematics data and roof slope information. Nine participants were recruited and performed simulated shingle installation tasks while kneeling on a sloped wooden platform. The knee kinematics data were collected using an optical motion capture system. Three supervised machine learning classification methods (i.e., k-nearest neighbors (KNNs), decision tree (DT), and random forest (RF)) were selected for evaluation. The KNN classifier provided the best performance for overall accuracy. The results substantiated the feasibility of applying machine learning in classifying shingle installation phases from workers' knee joint rotation and roof slope angles, which may help facilitate method and tool development for automated knee MSD risk surveillance and assessment among roofers.

Keywords: machine learning; computer-based methods; construction safety; roofing industry; automated assessment; musculoskeletal disorders

1. Introduction

About 33% of cases of days away from work and physical disabilities in the construction industry are due to work-related musculoskeletal disorders (WMSDs) [1]. WMSDs cause immense losses to injured workers, their employers, and also to society, as workers' compensation is partially shared by society [2]. Postures that are awkward, prolonged, or repetitive are generally considered a major contributor to increases in MSD risks [3]. Residential roofers typically perform repetitive tasks on sloped surfaces ranging from 10°

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Updated assessment of occupational safety and health hazards of climate change

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ABSTRACT

Workers, particularly outdoor workers, are among the populations most disproportionately affected by climate-related hazards. However, scientific research and control actions to comprehensively address these hazards are notably absent. To assess this absence, a seven-category framework was developed in 2009 to characterize the scientific literature published from 1988–2008. Using this framework, a second assessment examined the literature published through 2014, and the current one examines literature from 2014–2021. The objectives were to present literature that updates the framework and related topics and increases awareness of the role of climate change in occupational safety and health. In general, there is substantial literature on worker hazards related to ambient temperatures, biological hazards, and extreme weather but less on air pollution, ultraviolet radiation, industrial transitions, and the built environment. There is growing literature on mental health and health equity issues related to climate change, but much more research is needed. The socioeconomic impacts of climate change also require more research. This study illustrates that workers are experiencing increased morbidity and mortality related to climate change. In all areas of climate-related worker risk, including geoeconomics, research is needed on the causality and prevalence of hazards, along with surveillance to identify, and interventions for hazard prevention and control.

KEYWORDS

Health equity; heat; mortality; productivity; work

Introduction

Climate and weather patterns are changing (Dahl et al. 2019b; Moda et al. 2019; IPCC 2021). As a result, the

may be longer and greater than for the rest of the population because often work environments are difficult to modify, work must continue, and tasks must

National Vital Statistics Reports

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Drug Overdose Mortality by Usual Occupation and Industry: 46 U.S. States and New York City, 2020

Rachael M. Billock, Ph.D., Andrea L. Steege, Ph.D., and Arialdi Minifio, M.P.H., Division of Vital Statistics

Abstract

Objective—This report describes deaths from drug overdoses in 2020 in U.S. residents in 46 states and New York City by usual occupation and industry.

Methods—Frequencies, death rates, and proportionate mortality ratios (PMRs) are presented using the 2020 National Vital Statistics System mortality data file. Data were restricted to decedents aged 16–64 for rates and 15–64 for PMRs with usual occupations and industries in the paid civilian workforce. Age-standardized drug overdose death rates were estimated for usual occupation and industry groups overall, and age-adjusted drug overdose PMRs were estimated for each usual occupation and industry group overall and by sex, race and Hispanic-origin group, type of drug, and drug overdose intent. Age-adjusted drug overdose PMRs were also estimated for individual occupations and industries.

Results—Drug overdose mortality varied by usual occupation and industry. Workers in the construction and extraction occupation group (162.6 deaths per 100,000 workers, 95% confidence interval: 155.8–169.4) and construction industry group (130.9, 126.0–135.8) had the highest drug overdose death rates. The highest group-level drug overdose PMRs were observed in decedents in the construction and extraction occupation group and the construction industry group (145.4, 143.6–147.1 and 144.9, 143.2–146.5, respectively). Differences in drug overdose PMRs by usual occupation and industry group were observed within each sex, within each race and Hispanic-origin group, by drug type, and by drug overdose intent. Among individual occupations and industries, the highest drug overdose PMRs were observed in decedents who worked as fishers and related fishing occupations and in fishing, hunting, and trapping industries (193.1, 166.8–222.4 and 186.5, 161.7–214.1, respectively).

Conclusions—Variation in drug overdose death rates and PMRs by usual occupation and industry in 2020 demonstrates the disproportionate burden of the ongoing drug overdose crisis on certain sectors of the U.S. workforce.

Keywords: worker health • proportionate mortality ratios • census codes • National Vital Statistics System

Introduction

Deaths from drug overdoses are a major public health concern in the United States (1,2), particularly in the working-age population (1). The drug overdose death rate increased in most years from 1999 through 2020 (3). This trend intensified during the COVID-19 pandemic; the U.S. drug overdose death rate in 2021 was 50% higher than in 2019 (1). Increases in drug overdose deaths in 2020 and 2021 contributed to the overall rise in deaths involving drug overdose, suicide, or alcohol abuse during the pandemic (4).

Drug overdose mortality risks vary by occupation, industry, and work-related characteristics, including workplace injury, work-related psychosocial stress, precarious employment, employer-provided health insurance status, and access to paid sick leave (5–8). Workers in each occupation and industry also experienced unique stressors during the COVID-19 pandemic that impacted prevalence and management of substance use disorders (9–12). This report describes U.S. drug overdose mortality by usual occupation and industry for 2020 to expand on and update historical estimates (5). Drug overdose death rates and proportionate mortality ratios (PMRs) are estimated for each occupation and industry group overall. Drug overdose PMRs are also estimated for each individual occupation and industry and for each occupation and industry group within each sex, within each race and Hispanic-origin group, by drug type, and by drug overdose intent.



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Health Statistics
National Vital Statistics System



NCHS reports can be downloaded from: <https://www.cdc.gov/nchs/products/index.htm>.

<https://www.mdpi.com/2075-5309/13/6/1552>

<https://www.tandfonline.com/doi/full/10.1080/15459624.2023.2205468>

<https://www.cdc.gov/nchs/data/nvsr/nvsr72/nvsr72-07.pdf>

Construction Webinars

National Institute for Occupational Safety and Health



FHWA Webinar Series Practice Innovation in Project Delivery

Head Protection Devices and Work-related Traumatic Brain Injury in Construction

Douglas Trout, MD
NIOSH Office of Construction Safety and Health
January 2024

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.

<https://www.cpwr.com/service/medical-screening/>

The Role of Technology in the Future of Work:

Construction is Change

NIOSH Future of Work Webinar
April 18th, 2024

Gavin H. West, MPH
Director, Health Research
CPWR – The Center for
Construction Research and
Training
gwest@cpwr.com

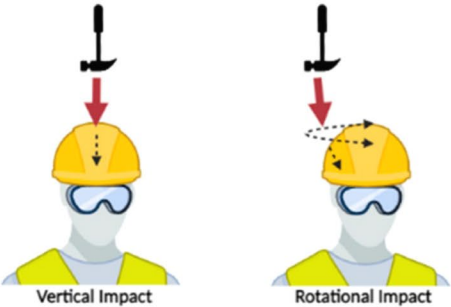


<https://www.cdc.gov/niosh/topics/future-of-work/webinar.html>



Selected Literature Review - PPE for Prevention of WR TBI

- Helmet design has been based on concern for linear acceleration; however, rotational acceleration is also implicated in the pathophysiology of brain injuries, including concussion.
- ‘Industrial safety helmets are beneficial for preventing head injury, but there is a gap in work-related injury research. Mechanistic understanding and appropriate injury models, including rotational acceleration, are required to develop more protective helmets for work-related traumatic brain injuries.’



From: Goutnik M, et al [2022]. Neurotrauma Prevention Review: Improving Helmet Design and Implementation. Biomechanics 2022, 2, 500–512.
<https://doi.org/10.3390/Biomechanics2040039>

Construction Webinars



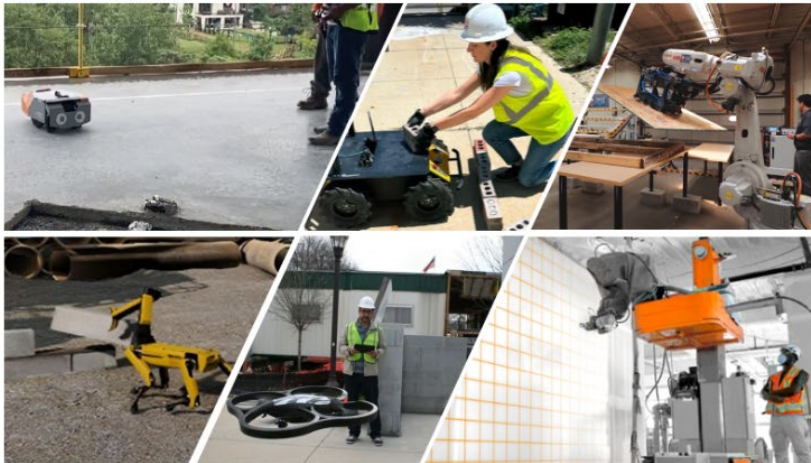
An NSF-Funded Webinar on

Safe Human-Robot Interaction in Construction

December 1, 2023, 11:00 - 14:00 ET

Organized by

Rinker School of Construction Management at UF
National Institute for Occupational Safety and Health (NIOSH)



About this Webinar:

In an era marked by the rapid integration of robotics and automation into the construction industry, the paramount concern is ensuring the safety of human-robot interaction. As these cutting-edge technologies find their place alongside human workers on construction sites, there is an urgent need to prioritize safety above all else.



National Institute for Occupational Safety and Health



The Role of Technology in the Future of Work

Gary A. Roth, M.S., PhD

National Institute for Occupational Safety and Health
Centers for Disease Control and Prevention
Department of Health and Human Services

NIOSH Future of Work Series

April 18, 2024

Disclaimer: The findings and conclusions presented here are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention. Mention of any company or product does not constitute an endorsement by NIOSH, CDC.

Keynote Presentation: The NIOSH Construction Program and Robotics

G. Scott Earnest, Ph.D., P.E., C.S.P.

Associate Director for Construction, NIOSH

Scott Earnest is the Associate Director for Construction Safety and Health at NIOSH. Prior to joining the Office of Construction Safety and Health in 2015, Scott was Engineering Branch Chief in the NIOSH Division of Applied Research and Technology for ten years. Scott has over 70 peer-reviewed publications and technical reports. He began his career as an active-duty, commissioned officer in the U.S. Army, Corps of Engineers. He is a registered Professional Engineer (PE) and Certified Safety Professional (CSP) with M.S. and Ph.D. degrees in industrial and mechanical engineering.

<https://www.youtube.com/watch?v=DbcVUqSq6n0>

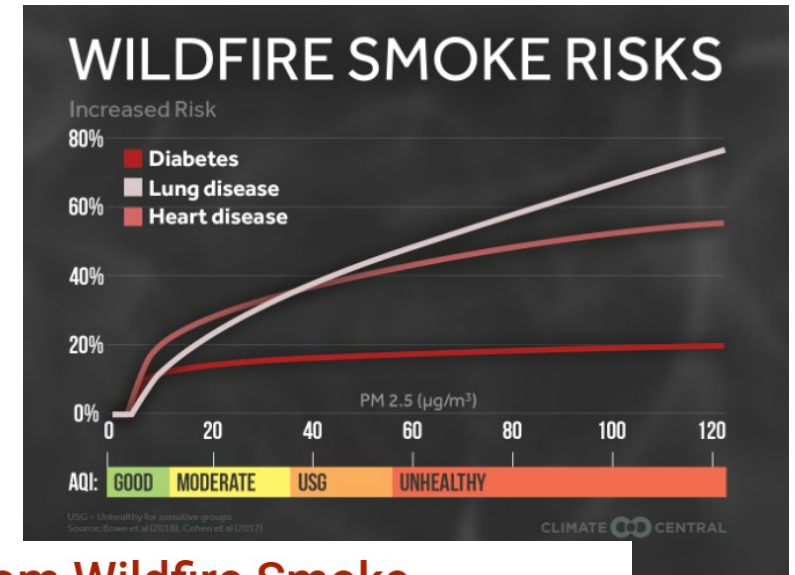
<https://www.cdc.gov/niosh/topics/future-of-work/webinar.html>

NIOSH Wildland Fire Smoke & Outdoor Worker Report

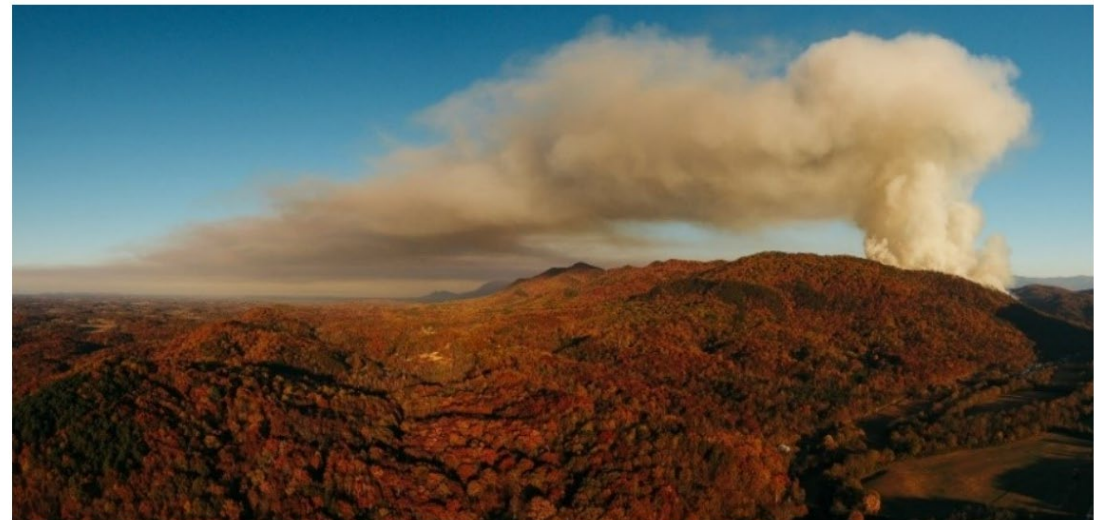


Wildfires may present a major health hazard to outdoor workers from exposure to smoke. Image by NIOSH.

[Outdoor Workers Exposed to Wildfire Smoke | NIOSH | CDC](#)



Worker Protection from Wildfire Smoke



Research Highlight

Characterizing Airborne Dust Generated From Grinding Engineered and Natural Stone Products

Outbreaks of silicosis (a serious lung disease) among workers in the stone countertop industry have been reported globally. This includes 52 silicosis cases and 10 fatalities in California in 2023. Due to the high crystalline silica content in some engineered stone products, overexposure to this

substance can still occur when workers use traditional dust control methods.

NIOSH researchers are developing control strategies as part of the effort to address this emerging public health threat. In this study, researchers systematically characterized dust emissions from grinding engineered and natural stone products in a laboratory testing system. The study was published in *Annals of Work Exposures and Health*. Results provided important scientific data to develop an overall exposure control strategy following the [NIOSH Hierarchy of Controls](#),



PHOTO BY NIOSH

A stone countertop worker uses a grinding tool to alter a countertop.

Young men making quartz countertops are facing lung damage. One state is taking action

JULY 24, 2023 · 11:49 AM ET



Nell Greenfieldboyce



This image, from a video produced by government safety researchers, shows a countertop worker using a machine with a spray of water that's intended to control dust.

NIOSH

Australia makes world-first decision to ban engineered stone following surge in silicosis cases

By the Specialist Reporting Team's [Leonie Thorne](#) and national consumer affairs reporter [Michael Atkin](#)
Posted Wed 13 Dec 2023 at 1:20am, updated Wed 13 Dec 2023 at 5:33am



for its affordability and durability. (Unsplash: Christian Mackie)

<https://www.abc.net.au/news/2023-12-13/engineered-stone-ban-discussed-at-ministers-meeting/103224362>

<https://www.npr.org/series/785708157/silicosis-in-u-s-countertop-workers>

PREVENTION THROUGH DESIGN (PtD)

Series of workshops funded by NIOSH in collaboration with Arizona State University



- (2020-2024) 5th Workshop August 27, 2024
- ASU Barrett and O'Connor Ctr, Washington DC



Prevention through Design | (asu.edu)



Prevention through Design Workshop 2023

Continuing the Journey - Proven Strategies for Design & Execution

Location: Liberty Mutual Insurance, 175 Berkeley St, Boston, MA 02116

Boston, MA
Sep 21, 2023
8 am – 4:30 pm

NIOSH Award #1 R13OH011707-01-00

AGENDA

REGISTER HERE

CONTACT:
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CONFIRMED KEYNOTE SPEAKERS

Jonathan A. Bach, PE, CSP, CIH
Safety Engineer, CDC/NIOSH PtD

Donna S. Heidel, CIH, FAIHA
Principal Industrial Hygienist, Amazon

Daniel Lavoie, CSP, ARM
Technical Director - Construction & Energy, Risk Control Services, Liberty Mutual Insurance

Bob Moser, PE, CSP, RA
Manager of Health & Safety by Design, Jacobs

Manuel Tender
Adjunct Professor, ISLA/Polytechnic of Porto

Corey Wallace, PE, SET
Principal Engineer, Southland Industries

About the 2023 PtD Workshop:

As part of the NIOSH-funded Prevention through Design (PtD) initiative, the fourth annual workshop on PtD will focus on regulation and proven strategies. The workshop will shed light on drivers and practices that have a proven positive impact on worker safety and project efficiency while propelling the momentum of the PtD journey forward. To this end, outstanding keynote speakers from academia and industry will share their vision, knowledge, and experiences with the attendees. During the workshop, participants will explore the need and implications of PtD legislation during breakout sessions facilitated by PtD experts, coupled with ample networking opportunities. Thus, the 2023 PtD workshop will continue the discourse from previous workshops, building on the 'what' and 'how' of PtD, and moving towards tangible recommendations for action. Through sharing novel research, proven strategies, and successful case studies, the workshop aspires to drive a deeper understanding and broader implementation of PtD principles, with the ultimate goal of reducing construction-related accidents, morbidity, and fatalities. The 2023 PtD workshop is a high-value platform for industry professionals and academics to engage in vital PtD discussions. Its overarching goal is to harmonize research, practice, and education, fostering the incorporation of PtD into US college programs and thereby promoting safer construction environments across the board.

More Information at: <https://ptd.engineering.asu.edu/ptd-workshop-2023/>

Questions?



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<https://www.cdc.gov/niosh/construction/>

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 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.

