

ADVANCING THE WELL-BEING OF WORKERS: AN INTRODUCTION TO *TOTAL WORKER HEALTH*[®] APPROACHES

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1 INTRODUCTION

1.1 *Total Worker Health*[®] Defined

Employers, workers, their families, and communities all have a stake in creating healthy jobs and safeguarding the well-being of workers. Crafting jobs that are inherently safe is the employer's responsibility and should be a *given* in any enterprise. Quality employers may also go beyond ensuring the safety of their workers by looking more broadly at the role that work and the workplace can play in advancing worker health and productivity – both on- and off-the-job. This expanded view represents the foundational tenet of the *Total Worker Health*[®] (TWH) approach. In this chapter, we describe a broadening of the traditional approaches common in many workplace wellness or workplace health promotion programs to introduce a holistic, integrated approach to worker health and well-being.

The Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (NIOSH) defines TWH as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being (1). Prioritizing a foundation of safety first, and then integrating workplace policies, programs, and practices that grow health, creates greater worker well-being, and is the cornerstone of the TWH field. Through investments in research and the application of

research into practice, TWH efforts seek to protect the safety and health of workers and to advance their well-being by engendering safer and healthier work environments and by addressing employment-related issues. The TWH approach is not consistent with efforts that place sole responsibility on the worker or that blame or penalize workers for any underlying health conditions.

1.2 History of TWH

Based on emerging evidence, in 2003, NIOSH started the Steps to a Healthier U.S. Workforce Initiative to explore the advantages of integrating worker safety and health protection efforts with those promoting health and preventing disease (2). Upon receiving important stakeholder support after a successful symposium, this initiative developed into the work-life initiative and a second highly successful symposium was convened. NIOSH later renamed its efforts to TWH and, in 2014, officially formed the Office for TWH Coordination and Research Support to lead the TWH mission, and help support and coordinate internal and external TWH efforts.

To build upon internal efforts and advance the TWH scientific evidence base through research and practice, NIOSH began funding Centers of Excellence to Promote Total Worker Health (Centers), beginning in 2006. Six Centers across the United States are currently funded (3).

These include the Harvard T.H. Chan School of Public Health's Center for Work, Health, and Well-Being; the University of Iowa Healthier Workforce Center for Excellence, the Center for the Promotion of Health in the New England Workplace (University of Massachusetts Lowell and University of Connecticut); the Oregon Healthy Workforce Center (Oregon Health and Science University); the Center for Health, Work and Environment (University of Colorado); and the Center for Healthy Work (University of Illinois-Chicago).

1.3 Scientific Evidence-based Rationale

The TWH field has been growing and evolving for some time. Emerging from earlier research in worksite health protection and health promotion (4–7), experts argued for a new ecological or systems approach to worker safety and health that would highlight the many causes of worker injury and illness which could benefit from coordinated interventions that took into account individual as well as occupational risk factors. Indeed, a growing scientific evidence base has demonstrated that risk factors in the workplace can contribute to both safety and health issues, on- and off-the-job. In addition to the more traditional workplace hazards which organizations have long confronted, such as traumatic injury, chemical exposures, and shift work, workers and employers must now also navigate novel work arrangements, a multigenerational and aging workforce, increasing levels of work-related stress, and growing work/life balance challenges (8). No longer are the traditional safety and health approaches adequate in protecting workers. For instance, new employment patterns show considerable growth in contingent or precarious work. In addition to being more often associated with more hazardous work than in traditional arrangements, these jobs are also marred with little job security, reduced earnings over time, minimal advancement and training, fewer benefits, and higher proportions of health insurance costs borne by the worker, even when insurance is provided (8, 9). Changes in the demographics of the workforce also highlight the value in examining the disparity of health outcomes seen among vulnerable populations. Despite the favorable impact that some traditional occupational safety and health (OSH) or worksite wellness programs have had, there is a need to address the work environment and its contribution to worker safety, health, and well-being in a more integrated and holistic fashion. As such, promising evidence (4–6, 10) has illustrated that integrating OSH protection activities with health-enhancing ones may be more effective at addressing wide-ranging issues facing today's workers than focusing on either of these activities on their own.

2 ISSUES RELEVANT TO ADVANCING WORKER WELL-BEING

Workers face many safety, health, and well-being issues, some longstanding and some more recently evolved, particularly due to emerging forms of employment and demographic changes modifying the nature of work and work itself. This makes it even more imperative for OSH professionals, industrial hygienists, employers, labor organizations, wellness educators, public health practitioners, human resource representatives, and other stakeholders to better recognize and understand the linkages between work and safety and health. Figure 1 displays *Issues Relevant to Advancing Worker Well-Being through TWH*, categorized as follows (8): control of hazards and exposures; organization of work; built environment supports; leadership; compensation and benefits; community supports; changing workforce demographics; policy issues; and new employment patterns.

2.1 Control of Hazards and Exposures

This category of issues consists of both persistent and new challenges that range from traditional chemical, physical, and biological agents to more newly recognized ones such as psychosocial and human factors. Work-related stress exposure, which is an increasingly prevalent issue among today's workforce (11), can contribute to distress, and mental, emotional, and psychosocial issues, all of which have implications for other acute and chronic health-related outcomes as well as safety issues. Prevention of injuries, illnesses, and fatalities and promotion of safe and healthy work through risk assessment and risk management efforts is fundamental to protecting workers in the workplace.

2.2 Organization of Work

The way work is organized refers to the processes associated with job structure and the organizational practices that impact job design and human resource policies. Examples can include healthier shift work, safe staffing levels, overtime management, adequate meal and rest breaks, and flexible work arrangements. These efforts are vital to help prevent work-related burnout, fatigue, and stress as well as possible adverse safety and health outcomes (i.e. accidents and chronic illnesses) from stress-related disorders.

2.3 Built Environment Supports

Increasingly, workplace health programs are exploring ways to "build-in" defaults that support individual efforts to safeguard and improve the health of workers. To support the built environment, provisions, and conditions that promote

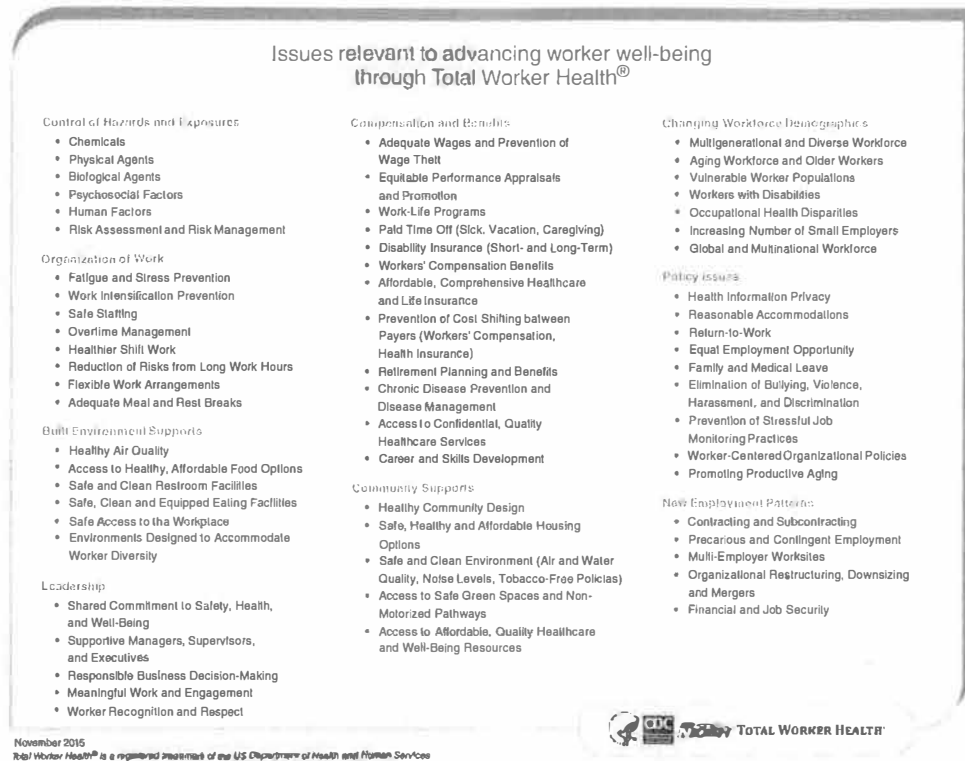


FIGURE 1 Issues relevant to advancing worker well-being through *Total Worker Health®*.

safe and healthy places and spaces where individuals work are critical. These include safe access to work, healthy air quality, safe and clean eating and restroom facilities, adequate break rooms and rest spaces, shade and shelter from the elements for outdoor workers, and a supportive infrastructure designed to accommodate workers of varying abilities. Additional supports can include access to affordable and healthy food options and spaces promoting and enabling physical activity and exercise (e.g. active workstation designs, walking trails, well-equipped fitness facilities, and group instruction).

2.4 Leadership

Those in leadership and management (middle and upper) positions play a vital role in their workers' lives and in their organization's success. In fact, healthy leadership (or the lack thereof) is a top reason that workers remain or leave an organization (12). Leadership sets the vision, mission, norms, and overall climate of the work environment. By supportively supervising, directing, and evaluating workers, managers, supervisors, and executives can drastically impact daily work and optimize the environments under which workplace demands are crafted, essential to a TWH approach. Leaders can further support workers and advance

their well-being by recognizing and respecting them and by providing meaningful work.

2.5 Compensation and Benefits

Limited organizational resources and increasing health-care costs have forced employers to do more with less, sometimes resulting in negative consequences for their workers. Receiving compensation and benefits ranging from adequate wages and prevention of wage theft to career and skills development are indispensable to workers' overall development, growth, and well-being. A shift away from employer-offered programs and services may threaten important worker resources such as disability insurance, paid time-off (e.g. sick or caregiving-related leave, vacation), access to workers' compensation, affordable and comprehensive healthcare and life insurance coverage, chronic disease prevention and disease management, and retirement benefits. With an aging working population, some of the latter compensation and benefits are becoming increasingly vital for workers (13).

2.6 Community Supports

Both on- and off-the-job issues impact worker safety, health, and well-being. The TWH approach highlights the need to

better understand and manage this interface between work and life and consider workers in the context of their families and communities. A safe, clean, healthy, and accessible community and environment design with affordable, proximate housing options (where workers can live) and green spaces and nonmotorized pathways (where workers can engage in physical activity) are key for advancing overall worker and family well-being at work and beyond. Adequate child and dependent care options and quality educational offerings also support a thriving workforce.

2.7 Changing Workforce Demographics

TWH tenets encourage organizations to protect and advance the safety, health, and well-being of their existing workforce. That said, the demographic makeup of the United States has been rapidly changing and thus needs to be understood and addressed anew. These shifts in population demographics and the multigenerational nature of the workforce – by 2020, one in four US workers will be over the age of 55 – can be beneficial as well as create new challenges for workers and their organizations (13). Older workers are especially concerned with aging productively, their ability to remain in the workforce as long as they have to or desire to, and preparing for a healthy retirement. Facing additional and unique concerns, the number of workers considered vulnerable in some way make up a substantial portion of the workforce. These include differently abled workers, young workers, workers confronting occupational health disparities and risks, those who are low-income, and veterans who are transitioning from military to civilian careers. Additional information about the demographics of the workplace can be found in **Managing Workplace Demographics**.

2.8 Policy Issues

Instituting and then enforcing worker-centered organizational policies are significant steps to initiating and maintaining TWH efforts and addressing worker issues, as outlined in Figure 1. Such policies can range from preventing, addressing, and eliminating bullying, violence, harassment, and discrimination across all levels of an organization, to ensuring health information privacy, equal employment opportunities, paid family and medical leave, and return-to-work policies after injury or illness. Championing policies related to worker health in a comprehensive way is also critical. Workplace tobacco-free policies, healthier vending and cafeteria standards, lactation policies and supports for new mothers, work flexibility and family leave programs, and formal support for participation in workplace health screenings, support groups, and training programs represent promising practices in the policy space.

2.9 New Employment Patterns

Just as the demographic makeup of the workforce is changing, so too are employment patterns. Both require an understanding of, and focus on, the entire working life of individuals, a principle of TWH. Owing to economic, societal, and organizational pressures, these twenty-first century employment patterns have created far-reaching changes in work conditions across the life-span and widespread transformation of the relationship between workers and employers. This shift has produced a greater emphasis on contracting and subcontracting work, multiemployer worksites, organizational restructuring, mergers, and downsizing, often leading to precarious or contingent work. These job types and associated characteristics can produce more uncertainty due to repeated periods of involuntary unemployment, which may lead to unfavorable health effects that may also carry over to other jobs (14). In addition, during a working lifetime, the average US worker holds more than 11 jobs, some separated by periods of unemployment (15). The resultant job insecurity has implications for a variety of worker safety (i.e. injuries due to less or no job training), health, and well-being (i.e. stress and distress due to financial insecurity) outcomes.

3 TWH AND THE DAILY PRACTICE OF INDUSTRIAL HYGIENE

In many ways, industrial hygienists are the “utility players” of the safety and health discipline given their broad, general knowledge of hazards, skills in managing and assessing risks, and comfort working among leadership, supervisors, and frontline staff as interventions are applied. This “generalist” approach finds the industrial hygiene (IH) professional well suited to help carry out TWH interventions that comprehensively address the safety, health, and well-being challenges workers face.

The American Industrial Hygiene Association describes IH professionals as scientists and engineers devoted and committed to protecting the safety and health of people, by addressing worksite environmental factors and stressors that may cause worker illness or discomfort and impair health and well-being in the workplace and the community (16). Likewise, applying the TWH model in workplaces demands an understanding of the strong connections and interfaces between work, health, and well-being and their connections beyond the workplace to the families, friends and loved ones, and to their broader communities.

An appreciation of risks and hazards is essential to the TWH model since safe work is the foundation upon which all other advancements of worker health and well-being can be built. IH professionals are expert at characterizing traditional

workplace hazards. The TWH model encourages a broader view of and responses to risks to include psychosocial hazards, work organization factors, the terms or characteristics of employment (contract, part-time, gig work – series of short-term work assignments), individual health conditions and behaviors, and family dynamics (8).

The IH professional's comfort with the participatory approach in assessing and managing risks aligns closely with a key tenet of TWH – the recognition that those closest to the problem are very likely the source of the most effective, sustainable solutions in addressing it. A tool to assist safety professionals in maximizing outcomes from the participatory approach has been developed by researchers at the Center for Protection of Health of the New England Workforce (17).

Cumulative risk assessment (CRA) is an emerging approach that is gaining momentum to help in safety and health decision-making for working populations. CRA views risks and hazards from a wide, holistic standpoint as such risks accumulate over the working life, and it represents a potentially useful way to characterize and account for hazards and challenges workers face, both on- and off-the-job. This approach evaluates the combined effects of multiple stressors rather than focusing on single compounds or individual hazards in isolation and though it can be quantitative, it is not necessarily so. It also often focuses on population-based assessments rather than source-based assessments making it useful in developing strategies for groups, industries, and large organizations. Typically, CRA extends beyond assessments of chemicals to include psychosocial, physical, and other factors (18). Such an approach can help employers more fully recognize and prioritize assessments and interventions by recognizing the complex interactions among work/occupational, personal, and community risk factors. Emerging CRA models provide a framework for the assessment of multiple risk factors coming from multiple domains that ideally enable employers and workers to develop more effective controls and prevention strategies.

Given the far-ranging inputs useful in characterizing and responding to risks, often a multidisciplinary team is advantageous. In addition to industrial hygienists, others with valuable inputs and perspectives include occupational health professionals, safety engineers, ergonomists, employee assistance specialists, and human resources and benefits personnel. An integrated team approach offers opportunities to address a broader set of challenges, avoid duplicate activities, limit efforts that are at cross-purposes, and more efficiently use resources.

4 A NEW LOOK AT THE HIERARCHY OF CONTROLS

For decades, industrial hygienists have relied upon the overarching, guiding principles delineated in the *Hierarchy of*

Controls as a framework for eliminating and controlling risks in a prioritized, systematic fashion. The traditional *Hierarchy of Controls* (19) calls preferentially for the elimination of hazards as the most effective control. When this is not possible, substitution, or replacing the offending hazard with something less hazardous, is the next desirable intervention. This is followed by the use of engineering controls, which serves to isolate workers from the hazard using structural and process designs. It is only after these initial steps are taken that safety officials turn to those controls that rely upon human behavior, such as administrative controls or use of personal protective equipment. These are considered the least effective means of protection.

To strengthen the link between traditional OSH approaches and TWH, and to further illustrate the value of this kind of approach to practitioners who are quite familiar with this approach to risk mitigation, NIOSH developed the *Hierarchy of Controls Applied to NIOSH TWH* (Figure 2) (20). It should be noted that this new hierarchy does not replace the original version, but rather highlights the potential to improve the quality and conditions of work in a step-wise fashion to help employers prioritize their efforts to advance worker safety, health, and well-being.

As in the traditional hierarchy, the controls and strategies are presented in a descending order of likely effectiveness and protectiveness. Hand-in-hand with Figure 1, Figure 2 begins with elimination of workplace conditions which cause or contribute to worker illness or injury or otherwise negatively affect worker well-being. This first step closely mirrors the traditional hierarchy but expands the concept to include elimination of a more comprehensive set of hazards that might threaten both the immediate risk for injury or illness and cause threats to health and well-being over time; this could include nontraditional hazards such as the demands of work or psychosocial conditions of work. Next, the model focuses on replacement of unsafe or unhealthy work practices or working conditions with health-enhancing or safety-enhancing policies, programs, and management practices that improve the culture of safety and health within organizations. Examples might include redrafting work policies around shift length or rotation, improving benefits design, and implementing new management practices that might enhance flexibility or improve recognition or teamwork. Redesigning the work/built environment where needed for safety, health, and well-being is the third level of control. Providing equipment, spaces, adequate restrooms, breakrooms and other facilities, and related environmental supports are examples of this level of the controls. The least effective approaches to TWH, as in the traditional hierarchy, rely solely or mostly on the education of workers on safety and health protections and upon the actions or personal behaviors of individuals for improvements to safety, health, and well-being. Ideally, in these final layers of the hierarchy, awareness-raising campaigns,

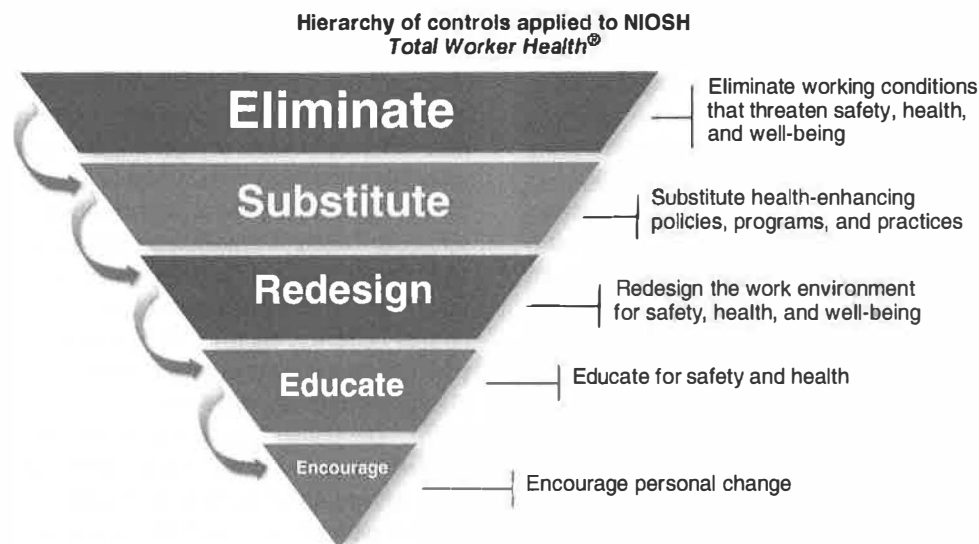


FIGURE 2 Hierarchy of controls applied to NIOSH *Total Worker Health®*.

training programs, and educational efforts are also enhanced by environmental supports that assist workers in making healthier choices. Many traditional wellness programs focus largely on the lower rungs of the hierarchy. The TWH approach encourages planners to begin efforts at the top of the inverted pyramid, where interventions are more likely to safeguard and influence the largest number of workers within an organization, and where controls are more likely to be sustained within the culture of the organization over time.

Using the TWH hierarchy, an industrial hygienist's efforts to design a program targeting reductions in musculoskeletal disorders (MSDs) in her/his workplace might approach the hazards and risks as follows. First, the industrial hygienist would visit the workspace and evaluate the work process closely, getting input from the individuals performing the task. Next, focus would be placed on redesigning the work to eliminate or minimize repetitive movement and awkward postures. Improving workstation design and the use of mechanization or technology to reduce risks could follow. Then, efforts at reorganizing work, examining work demands, and building in opportunities for rest and task rotation would be explored. Following this, one could provide ergonomic consultations to individual workers to improve the job and task interface, along with ergonomic training and opportunities for workers to participate in design efforts. Evaluating the age profile and associated health needs of the workforce, especially those components that could be related to joint and muscle function, providing screenings for arthritis and other common MSDs, and educating workers on self-management strategies or prevention efforts might conclude the effort.

Similarly, a TWH program reducing work-related stress might consider the following approach. First, the intervention would focus on implementing organizational and

management policies that give workers more flexibility and control over their work and their day-to-day schedules, as well as opportunities to identify and eliminate root causes of stress within their teams. Next, team leaders and supervisors would be provided training on recognizing or assessing for common causes of stressful working conditions, and provided with tools and approaches for preventing or addressing them. Only after the preventive efforts are made would workers be offered knowledge-raising interventions, screenings for common health conditions associated with stress, and referrals to appropriate sources of care, such as an employee assistance program (21).

In summary, workplace programs that adopt a TWH approach first emphasize elimination or control of workplace hazards and the other broad contributors to poor safety, health, and well-being outcomes. The emphasis on addressing system-level or environmental determinants of health *before* utilizing individual-level approaches is a crucial tenet of the TWH approach and fully aligned with traditional IH priorities.

5 EXPLORING THE FUNDAMENTALS OF TWH

As noted above, industrial hygienists are well prepared and often well positioned within organizations to champion and successfully execute TWH programs. To assist organizations in launching and sustaining programs, NIOSH has developed guidance centered on five fundamental steps essential to the TWH approach (22). The five defining elements of TWH should be viewed as guiding principles that provide practical direction for organizations seeking to develop policies,

programs, and practices that contribute to worker safety, health, and well-being.

5.1 Demonstrate Leadership Commitment

Demonstrate leadership commitment to worker safety and health throughout all levels of an organization, as reflected in words and actions (6). Organizational leaders should acknowledge and communicate widely the value of worker safety and health as a core function of the organization, prioritizing worker safety and health on the same level as quality of services and products.

5.2 Eliminate Hazards and Promote Well-being

Design work to eliminate or reduce safety and health hazards and promote worker well-being. A TWH approach prioritizes a hazard-free work environment for all workers. It applies a prevention approach that is consistent with traditional OSH prevention principles of the *Hierarchy of Controls Applied to NIOSH TWH*, as outlined in Figure 2.

5.3 Engage Workers in Program Design and Delivery

Promote and support worker engagement throughout program design and implementation. Ensure that workers involved in daily operations as well as supervisory staff are engaged in identifying safety and health issues, contributing to program design, and participating in all aspects of program implementation and evaluation.

5.4 Ensure Confidentiality and Privacy

Ensure confidentiality and privacy of all workers, at all levels. Workplace policies that discriminate against or penalize workers for their individual health conditions, or create disincentives for improving health are inconsistent with the TWH approach. Protecting private health information from unauthorized use should be mandated.

5.5 Integrate Systems Effectively

Integrate relevant systems to advance worker well-being. TWH emphasizes the role that organizations have in shaping worker safety and health outcomes, recognizing that a multilevel perspective that includes policy, environmental, organizational, and social concerns may be best for tackling complex challenges to worker safety, health, and well-being (23).

For organizations ready to implement a TWH program, NIOSH has developed tools for self-assessment and action planning. The first is a worksheet allowing workplace health professionals to gauge how existing programs, policies, and practices could be adjusted or expanded to more effectively implement TWH within an organization. The second tool leads to the development of an action plan and provides guidance, through pointed questions and use of the defining elements, for getting started.

Many organizations embark upon the TWH journey in response to organizational challenges. These may include high rates of injury or illness, rising healthcare costs, or new demographic realities such as an aging workforce. Regardless of the motivation, the nine steps below offer a common starting point for launching a TWH program:

1. Establish an integrated team to shepherd the program.
2. Obtain leadership and worker buy-in and support for the effort.
3. Conduct an organizational assessment.
4. Ask workers about their safety, health, and well-being challenges, needs, and interests.
5. Use all inputs to develop goals and prioritize interventions.
6. Select science-based interventions to help meet worker and organizational goals.
7. Prioritize organizational level interventions over individual behavior change efforts.
8. Gauge success, inviting feedback from all levels within the organization.
9. Use continuous feedback and organizational assessment to continue, improve, or change future interventions.

6 IMPLEMENTING TWH

In many organizations, the nature of work and the demands placed upon workers change frequently, often because of the economic and competitive conditions within and among organizations. Therefore, implementing a TWH approach must also be an ongoing effort that adapts and responds to the needs of workers as work demands alter. Many TWH programs begin with some type of organizational assessment to determine a baseline of the safety, health, and well-being challenges present within the organization. Such assessments should be participatory in nature, giving workers a voice in the assessment of their conditions of work, and a say in workplace offerings to address them. After this, ideally, the TWH approach is a responsive constellation of policy enhancements, leadership and management practices, and programs that create a robust culture of safety, worker protection, and

greater health opportunities and outcomes for workers over time. TWH champion efforts that are voluntary and participatory in nature and that place emphasis on organizational and system-wide factors are the starting point for improvements, rather than focusing first on individual behavior-change programming.

A number of organizations have introduced and adapted new TWH interventions to benefit their workers in a variety of occupational settings and industries, large, and small. Some have built TWH concepts into existing, traditional safety or health promotion programs. In this section, the authors offer a case example highlighting a multicomponent approach to MSD risks in retail/warehousing, several promising practices resources, and two vignettes where TWH approaches could address emerging areas of particular occupational risk: impaired sleep and opioid use/misuse.

6.1 A Case Example

Beginning in 2013, L.L. Bean, Maine's quintessential outdoor clothing and equipment company, noticed their workforce was growing older, quickly. This was partly because of the change in the US age distribution but also because individuals enjoyed working at the company and rarely left. Low turnover at L.L. Bean meant that workers who were hired in their twenties still had physically demanding jobs 25 or 30 years later. With an average worker age of 50, L.L. Bean's team shares many of the age-related challenges common in workplaces nationwide (13). Reduced flexibility of the neck and spine, lower grip and lifting strength, and limits to range of motion all become more likely as workers age. Older workers are also more likely to have one or more chronic diseases such as arthritis, diabetes, and obesity. These issues make a focus on injury and illness prevention an absolute necessity. Although advancing age improves problem-solving and teamwork skills, it can also add risk, especially for older workers with physically demanding tasks. Given this, L.L. Bean looked beyond its traditional safety and health infrastructure and began taking decisive steps to optimize work processes and prevent injury and illness for all their workers, old and young alike. An early assessment of the most demanding work, conducted by the company's ergonomists and certified safety specialists, led to a focus on one of the highest-risk areas: materials handling in the warehouse. L.L. Bean already had some critical preventive strategies in place; for instance, most workers usually were assigned materials-handling activities only twice a week and were rotated to other tasks every couple of hours. Workers were also given three sets of paid five-minute rest and stretch breaks a day. However, L.L. Bean decided to do more. They turned to a variety of technologies to further reduce the safety and health risks to workers. Solutions for work improvements were proposed

by their safety team and included a mix of robotics, vacuum-driven lift-assist devices, and adjustable pallet lifts. This approach aligned well with the space, capital, and sustainability needs of the business. Now, for much of the year, a single robot and an operator are sufficient for handling products, but at peak volume, the robot along with three workers using vacuum lift-assist devices and pallet lifts can safely do the work. This mix has helped the company to reduce risk while working with existing floor space and meeting changing demands. The vacuum lifts reduce weights to less than 10 pounds, and the pallet positioners allow loads to be at optimal height; since installation in 2014, no back injuries have been reported. Worker feedback has been very positive, particularly from those using the vacuum lift-assist devices, which make the work safer, and still provide a sense of individual-level control.

Almost simultaneously, L.L. Bean piloted *Jump Start*, a voluntary conditioning program to benefit workers on- and off-the-job. Its goal was to increase cardiovascular fitness and endurance, build muscle mass, and improve flexibility with a 12 week supervised aerobic activity and strength-training program. Sessions were voluntary, offered three times a week, and workers were given 45 minutes of paid company time during their work shift to participate. Besides providing a qualified fitness instructor, L.L. Bean also consulted with physical therapy professionals to add customized program components to meet the physical demands of specific jobs. At the end of the 12 week program, participants showed improvements in muscle strength, endurance, and flexibility, as well as improvements in resting heart rate and cardiovascular endurance. Although weight reduction was not a goal of the program, 29% of the participants lost weight. In addition, 62% of workers reported having more energy and 29% reported less stress. The other focus of the program was to "jump start" workers into their own exercise program or get them interested in existing classes. In the same time period, the company also reported diminished workers' compensation cases, lower overall medical costs, and estimated a sizable positive return on their investment (24).

6.2 TWH Promising Practices Resources

The TWH Essentials video series, developed by the NIOSH-funded University of Iowa's Healthier Workforce Center, addresses development, implementation, and evaluation of integrated approaches in small businesses. The videos show employers innovative ways to support TWH efforts in their workplaces (25).

The community of practice and safety support (COMPASS) program, led by the NIOSH-funded Oregon Healthy Workforce Center, aims to improve social support structures for caregivers. Home care workers are an isolated and vulnerable occupational group who lack access to traditional safety and health resources. COMPASS combines

tactics from peer-led social support groups with scripted team-based programs. Initial findings show that this highly repeatable workplace program improves social resources and prompts safety and health actions, such as talking about hazards with employers, using ergonomic tools, and increasing health-promoting behaviors (26).

At a medium-sized manufacturing firm in the Upper Midwest, the SafeWell project (created by the NIOSH-funded Harvard T. H. Chan School of Public Health Center for Work, Health, and Well-being) formed a committee of all those responsible for all elements of safety, health, and well-being within the organization. The goal was for them to find ways to more closely and efficiently work together and better understand each other's role and functions. They shared summaries of their initiatives and responsibilities and recognized critical overlaps and the potential for synergies. Working together saved time and helped them understand and support each other. One program coordinator noted, "It was a light-bulb moment for me ... this is exactly what we should be doing. Couldn't believe we weren't doing it already." (27).

The NIOSH-funded Center for Promotion of Health in the New England Workforce developed a Healthy Workplace Participatory Program toolkit to assist employers in planning, designing, implementing, and evaluating integrated programs that promote overall safety, health, and well-being. The toolkit, which includes worksheets and quick reference guides, draws upon a structured planning process that uncovers root causes to safety and health issues and engages workers in designing solutions (28).

6.3 Select TWH Strategies and Workplace Interventions for Emerging Health Conditions

6.3.1 Intervening for Inadequate and Poor-quality Sleep

Inadequate or poor-quality sleep can have a number of serious health consequences for workers. Ongoing research connects sleep timing, length, and quality to a number of OSH outcomes, including acute worker injuries, motor vehicle crashes, and other acute and long-term health consequences. The risks vary considerably by industry and occupation as well (29). This overlap makes it an ideal topic for a multifaceted TWH intervention. The NIOSH Training for Nurses on Shiftwork and Long Work Hours is a free online program that covers the complex relationships between work hours, sleep, and circadian rhythms and associated risks to safety and health from fatigue. Developed by researchers within the Institute, the training provides ways for managers and nurses to reduce risks, such as improving the scheduling and organization of work (30).

6.3.2 Addressing the Opioid Crisis in Workers

Opioid misuse and resultant overdose deaths are another serious public health crisis that is specifically affecting the working-age population (31). Among workers, the opioid crisis is especially complex; opioid use can be a consequence of work-related injury and/or related to the causation of one. Workers in all industries or sectors may face unique risks as injuries sustained at work are increasingly treated with powerful prescription drugs, including opioids. Historically, workers' compensation studies showed an increasing use of prescription drugs in workers compensation claims, with narcotics accounting for 25% of drug costs in such claims. Indeed, work-related issues associated with increased opioid use are on the rise; these include the potential for work-related injuries to initiate prescription drug (including opioid) use and possibly subsequent misuse, as well as increases in worker injuries associated with use of such drugs as contributing or causative factors (32, 33). Complex, multifaceted challenges like substance misuse are especially amenable to integrated interventions that account for work and nonwork factors. A worker-centered TWH approach to the opioid crisis could unfold as follows:

1. Convene a multifaceted team to assess the challenge within the organization, including the safety and occupational health team, human resources, and the employee assistance program or other well-being professionals.
2. Ensure privacy and worker confidentiality considerations at every step of program planning and execution.
3. Focus early efforts on decreasing working conditions that may predispose to worker injury or illness or that lead to increased levels of worker stress or excessive work demands.
4. Educate occupational health providers, onsite and community-wide, of the organization's policies related to work after the prescribing of opioids.
5. Educate leaders, managers, and supervisors about the crisis, likely manifestations and red flags to note. Provide them with confidential sources for referral and assistance.
6. Examine the impacts, risks, and challenges of safety-sensitive jobs and specific worker duties, and pre-employment/ongoing requirements as all decisions and policies are crafted.
7. Provide education for workers and their families on the use of opioids, both at work and away from work.

6.3.3 Mindfulness and Worker Well-being

The benefits of providing mindfulness trainings and related interventions have gained increasing attention, especially in

international settings. Growing evidence suggests significant positive effects of mindfulness interventions and initiatives in the workplace and their impact on myriad worker health and well-being outcomes across varied industries and occupations, including benefits for employers (34, 35). In their systematic review, Lomas et al. (35) reviewed 153 studies comprising 12571 participants and found that practicing mindfulness was typically associated with positive outcomes in relation to most well-being and performance measures observed. Another review that included 19 studies ($n = 1981$) on educators examined outcomes such as burnout, anxiety, depression, and stress, as well as well-being measures such as life satisfaction, and found that mindfulness was also generally associated with positive outcomes across most measures (35). Aikens et al. (36) implemented an online mindfulness intervention for The Dow Chemical Company employees and found that it was effective in decreasing employee stress, and in improving vigor, resiliency, and worker engagement, thus advancing overall employee well-being. What's more, a study examining the feasibility and effectiveness of implementing workplace mindfulness training across four companies found that the intervention was associated with greater reductions in perceived stress and burnout, improvements in mindfulness and well-being, and increases in team and organizational climate, and individual performance (37). As is the case with newer areas of inquiry, there is a need for additional high-quality studies, especially randomized control trials to further explicate the relationships between mindfulness and worker issues (35). Still, the evidence-to-date on the impact that mindfulness may have on numerous worker outcomes is encouraging and should therefore be considered for further exploration by researchers, practitioners, and employers alike who focus on worker safety, health, and well-being.

7 MAKING THE BUSINESS CASE FOR TWH

As emphasized throughout this chapter, the TWH approach is an integrated and comprehensive one that prioritizes a foundation focused on improved worker safety, health, and well-being. Organizational efforts or programs with cost-savings as a primary motivation are not aligned with the TWH paradigm. That said, national health-care related costs endured by both employers and workers are increasing, and organizational resources are strained (9). Many industrial hygienists and other OSH professionals working closely with employers are often faced with the reality of needing to make the "business case" to employers regarding how their proposed safety and health efforts will help a company's bottom-line. These stakeholders can help convince employers and organizations that incorporating TWH approaches can engender a safer and

healthier workforce, translating into greater organizational productivity and profitability. To be sure, an increasing body of evidence has found that establishing policies, programs, and practices in the workplace that focus on advancing the overall well-being of the workforce may not only be beneficial for workers, but also for their families, communities, employers, the economy, and the Nation as a whole (6).

Employers can attract, foster, and retain a safe, healthy, and productive workforce using a number of TWH approaches and are ever more inspired to do so given that organizations with exemplary safety, health, and environmental programs outperform those that do not, thereby creating a competitive advantage (38). Indeed, organizations with high worker engagement have been found to perform better than those with low worker engagement, across several important metrics, including safety incidents, customer ratings, quality, turnover, productivity, and profitability (39). Simply put, companies that are more profitable tend to have safer and healthier workers, and a climate that consistently supports the safety and health of workers leads to companies that are more profitable.

Focusing on sustained organizational level changes is tantamount. For instance, mandating and enforcing key policies such as paid sick leave for workers may help reduce the high prevalence of worker nonfatal illness and injury and reduce the economic burden such incidents place on organizations. In one study, with all other variables held constant, workers with access to paid sick leave were 28% less likely than workers without access to paid sick leave to be injured. Importantly, the association between the availability of paid sick leave and the incidence of occupational injuries varied across sectors and occupations, with the greatest differences occurring in high-risk sectors and occupations (40). Management policies that provide workers with more flexibility and control over their schedules and remove obstacles to well-being may also lead to a healthier, more productive workforce. Providing training for leaders, supervisors, and managers on approaches to reducing stressful working conditions has favorable implications for worker health, reduced turnover, and increased worker retention (41, 42).

Research has shown that workers who are less likely to be injured while on the job (6) are more inclined to believe their employers are trustworthy. In turn, they feel more supported, less stressed, happier, and report an overall better work environment (42). As a result, they are also more likely to not only remain in their positions but to do so for longer durations (41). This increased staff retention and reduced turnover has the added benefit of attracting more qualified candidates (41).

Moreover, employers can integrate additional organizational level safety and health-enhancing options by investing in their worksite built environment, which contributes to worker-level outcomes. Making available, accessible, and affordable onsite health advancing offerings such as

healthier food options, physical activity opportunities, and stress prevention and management tactics (e.g. mindfulness strategies) contributes to an overall safer and healthier work environment, better worker experience, and more profitable organization bottom-line (38).

8 EXPANDING TRADITIONAL WORKPLACE HEALTH PROMOTION PROGRAMS

For decades, many companies have seen the value in addressing the health challenges facing their workers by focusing on common health risks, by providing screenings and health education, and by offering programs and services to support improvements in health behaviors and choice-making. According to the Workplace Health in America survey, more than 90% of large businesses (more than 500 employees) in the United States have some type of workplace health promotion program, compared to almost 6 in 10 among smaller businesses (50–99 employees) (43). Traditional programs have commonly focused on tobacco cessation, obesity prevention, work–life balance, and efforts to increase physical activity and improved nutrition. Newer programs have expanded the challenges addressed to include interventions related to work stress, emotional and mental health conditions, financial well-being, parenting and caregiving, and substance abuse beyond tobacco. Others have focused on improving the design of benefits, including health insurance, sick leave, family leave, and additional work flexibilities.

In 2017, CDC launched a new Workplace Health Resource Center detailing a wide range of workplace health promotion tools, strategies, and interventions, both traditional and new. This Center highlights evidence-based and consensus-based strategies for improving worker health and well-being for organizations of all sizes, but with a special emphasis on small business solutions (44). Of particular value, the site includes employer- and employee-level assessments, which can provide a strong baseline related to current program offerings, employee health status, and insights into any organizations culture and climate, including:

- The *CDC Worksite Health Scorecard*, a tool designed to help employers assess the extent to which they have implemented evidence-based health promotion interventions or strategies in their worksites to prevent heart disease, stroke, and related conditions such as hypertension, diabetes, and obesity (45).
- *CAPTURE™*, an employee health assessment is a tool to assess employee health status, health behaviors, readiness to change, needs and interests related to

worksite health and safety, and work-related health history (46).

- *INPUTS™*, a measure of employee perceptions of their work environment, working conditions, and the attitudes of supervisors and coworkers that support a healthy worksite culture (47).

9 TWH GOALS FOR THE NATION

For over 20 years, NIOSH has partnered with varied stakeholders to identify and set out national priorities for the most salient issues impacting workers across diverse occupations and industries, using an OSH research framework known as the National Occupational Research Agenda (NORA). The first TWH NORA entitled: *National TWH Agenda* (48) was created to stimulate the diverse stakeholders committed to simultaneously protecting workers from hazards in the workplace and advancing their well-being; these include all OSH practitioners, labor organizations, health promotion and wellness professionals, academics, researchers, employers, health-care providers, educators, policymakers, and many more. In keeping with NORA tradition, the *National TWH Agenda* was not only developed based on a number of sources in the peer-reviewed literature (2, 6, 49–51) (as well as two workshops (52, 53)) but also based on broad stakeholder input. This ensured that it highlighted stakeholder priority areas in TWH as well as capture the many issues relevant to advancing worker well-being (Figure 1).

The fulfillment of these goals by national stakeholders is meant to better safeguard the safety, health, and well-being of workers, support overall workforce vitality, and foster national economic prosperity. Four strategic goals – each supported by a number of intermediate and activity/output goals – are grouped into the following domains: Research, Practice, Policy, and Capacity-Building.

- **Research:** Advance and conduct etiologic, surveillance, and intervention research that builds the evidence base for effectively integrating protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being.
- **Practice:** Increase the implementation of evidence-based programs and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being.
- **Policy:** Increase adoption of policies that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being.

- **Capacity-building:** Build capacity to strengthen the TWH workforce and TWH field to support the development, growth, and maintenance of policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being.

10 CONCLUSION

Industrial hygienists are well trained and ideally positioned within the structure of workplaces to enact TWH strategies and interventions across many industries and occupations. TWH approaches offer organizations an opportunity to better safeguard workers, and prevent injury and illness, while advancing overall health and well-being. The TWH focus places primary emphasis on safer workplaces and the foundation for any health improvement or health promotion efforts. It prioritizes organizational-level interventions over individual ones for greatest, sustained health impact. TWH principles and approaches can be used to expand the focus on more traditional workplace health promotion programs, bringing new energy and opportunities for improved safety and health outcomes for workers, on, and off the job.

Building upon the traditional tools already within the toolbox of the typical IH professional, TWH may also offer the opportunity for industrial hygienists to learn new and complementary skills, a broader appreciation of work and nonwork risks and their interactions, and new paths for improving the safety, health, and well-being of workers.

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