New Challenges and Opportunities in Occupational Safety and Health

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Greetings

Good morning, ladies and gentlemen, delegates, industry, labor and government leaders in the audience this morning. On behalf of Dr. John Howard and my colleagues at the National Institute for Occupational Safety and Health (NIOSH), I want to express my personal appreciation to Dr. Park and our KOSHA hosts for this opportunity to address the Congress. It is an honor to represent NIOSH and the United States at this 18th World Congress on Health and Safety at Work. We have had a long and successful collaborative effort with KOSHA and it has been our great pleasure to host your scientists who work side-by-side with their NIOSH counterparts on the important research challenges facing our two nations.

Introduction

In the early 1900s, the following classified ad appeared in the London Times: "Men wanted for hazardous journey. Low wages, bitter cold, long hours of complete darkness. Safe return doubtful. Honour and recognition in the event of success. Signed E. Shackleton."

The next morning 5,000 men were lined up outside the Times' offices ready to sign on for the dangerous mission, whatever it might be. Ernest Shackleton was seeking crew members for an expedition to reach the South Pole on a ship called the Endurance.

As safety and health professionals, our mission for the 21st Century is not to lead men and women into hazardous territory on an once-in-a-lifetime journey to achieve a moment of glory. Rather, we want to sustain every day a quality of life for workers that brings them home whole and healthy every night. Our mission doesn't draw huge crowds overnight. But our numbers are expanding and public support for our efforts is strong and growing.

Though Shackleton never reached the South Pole, he achieved fame for his explorations because he responded to the challenge by seizing opportunities as they arose and executed so well his carefully thought out plan. He proved himself exceptionally adept in finding creative, life-saving solutions for impossible situations.

As we work in the third millennium, do we have a plan, a strategic plan, to guide us? Like Shackleton, we should be prepared to modify that plan as we move

forward to achieve our objectives. Our goals are simple: We want to reduce injuries and illnesses, create safety-conscious workplace cultures in our nations and workplaces and secure public confidence in our efforts.

Ladies and gentlemen take a moment and look around; everyone in this auditorium today shares these goals, as we consider our joint mission of safe work for the 21st Century. In the next few minutes I want to talk briefly about just a few of the challenges and opportunities we face in our global efforts.

Background

Many of the 2.9 billion workers across the globe are exposed to hazardous risks at their workplaces. Through out the world, most adults and many children spend most of their waking hours at work. Work provides a number of economical and other benefits. At the same time, people at work face a variety of hazards owing to chemicals, biological agents, physical factors, adverse ergonomic conditions, allergens, a complex network of safety risks and many and varied psychosocial factors. In addition to injuries, more than 100 occupational diseases have been identified.

It is important to emphasize the importance of urging the continued importance of research and action to ensure that workers are better protected against longstanding health hazards (e.g., working at excessive heights, under extreme physical and psychological stress, around heavy machinery and motor vehicle traffic, in confined spaces, around excessive levels of noise, and with processes involving ionizing radiation and toxic materials and contaminants). In addition, research is needed that focuses on protecting worker populations that have high risks of occupational injury or disease as a result of susceptibilities (e.g., those associated with sex, age, disability, genetics, socioeconomics, and level of education) and on populations that are disproportionately engaged in hazardous work (e.g., low-wage workers, newly arrived immigrants, undocumented workers, and minority workers).

Work-related injuries and diseases take a significant toll on human health and the U.S. economy. Each day in the United States, nearly 11,000 workers are treated in emergency departments, and approximately 200 of these workers are hospitalized. An estimated 6,300 private-sector workers require time away from their jobs each day as a result of workplace injury and 15 workers die from their injuries. An average of 134 Americans die of work-related diseases every day. Annually, these losses account for nearly $73 billion in workers' compensation claims and have an overall economic impact of $155 billion. In addition, public health professionals recognize that workers typically are exposed “first and worst” to toxicants and which eventually become general environmental hazards (e.g. lead, asbestos, polychlorinated biphenyls [PCBs], and dioxin).

What are some of our important challenges?

Reduce Fatal and Non Fatal Injuries of Young Workers

We must continue to identify specific risk factors associated with fatal and nonfatal injuries of our young workers. More specifically develop, evaluate and share the effectiveness of interventions to prevent occupational injuries, and evaluate factors that can influence the adoption of proven technologies and strategies for protecting workers.

In the U.S by the year 2010, nearly 18 million young workers aged 16 to 19 will work, up from 16 million in 2000. Young workers suffer a disproportionate share of injuries and fatalities, especially in the first year on the job. In 2005, 54 young workers under 18 died from work-related injuries. In 2003, an estimated 54,800 work-related injuries and illnesses among young workers less than 18 years of age were treated in hospital emergency departments. As a rule, working teens receive little or no formal safety education and training, either in school or on the job. Every year approximately 84,000 youth are injured on the job seriously enough to seek emergency room treatment.

To fill this gap, NIOSH has recently made available on our website a new high school curriculum, "*Youth@Work -- Talking Safety*," designed especially for young workers. The curriculum is available to schools at no charge and can be downloaded from the NIOSH web page. Materials include a range of educational materials tailored for teachers in each U.S. State; an electronic course booklet, a PowerPoint teaching presentation and overheads for teachers, student handouts, and an informational video. The curriculum is customized for each State and Puerto Rico to reflect state-specific rules and regulations for preventing work-related injuries among young workers. The curriculum is the culmination of many years of work by a consortium of partners dedicated to reducing occupational injuries and illnesses among youth.

NIOSH is fortunate to have one of it industrial hygienists stationed with the International Labor Organization (ILO) Regional Office in Cairo, Egypt where he is beginning to work with local partners there to examine whether the curriculum might be modified to adapt to a community of young workers facing new and very different workplace hazards.

Strengthen Knowledge Translation of Existing Evidence-based Research

- Musculoskeletal Disorders (MSDs)

  MSDs provide a clear need to work globally to identify, evaluate and share the effectiveness of intervention strategies intended to prevent MSDs through better cost-effective tools and equipment designs, work-rest periods, or changes to the organization of work. We must develop and share more effective methods to promote the adoption of intervention strategies in the workplace.

Construction workers are a top priority for NIOSH. Construction is a physically demanding occupation, but a vital part of our nation and the US economy. In 2006, the total annual average number of workers employed in construction rose to an all time high of nearly 7.7 million, according to the U.S. Bureau of Labor Statistics data. This large workforce handled tasks that range from carrying heavy loads to performing repetitive tasks, placing them at risk of serious injury. The physically demanding nature of this work helps to explain why injuries, such as strains, sprains and work-related musculoskeletal disorders are so prevalent and are the most common injury resulting in days away from work.

Although the construction industry presents many workplace hazards there are contractors in the U.S. who are successfully implementing safety and health programs to address these issues, including work-related musculoskeletal disorders. NIOSH recently developed an evidence-based practical booklet derived from known research to help reduce the risk of repetitive stress injury in common construction tasks. The booklet contains easy to read tip sheets that describe simple solutions for performing various tasks safely; description of a problem, one possible solution, its benefits to the worker and employer, and how much it costs.

- Global Road Safety at Work

Motor vehicle crashes are a significant occupational safety and health problem in the U.S. They are consistently the leading cause of workplace fatalities, accounting for almost 35% of the total, and they are the leading cause in almost every industry group. Between 2003 and 2005, 5,304 U.S. workers died in work-related crashes on public roads. In the U.S., nearly 80% of those who die in work-related crashes are vehicle occupants. Generally, about 40% of the decedents are truck drivers.

Deaths from road traffic injuries are projected to increase globally from 1.2 million in 2002 to 1.9 million in 2030, with low- and middle-income nations bearing most of the increase. If effective interventions are not implemented, WHO and the World Bank estimate that by the year 2030 road traffic injuries will become the 8th leading cause of mortality worldwide. Road crashes cost approximately 1 to 3 percent of a country's annual Gross National Product. It is estimated that developing countries currently lose in the region of $100 billion every year. The World Bank estimates that this is almost twice as much as the total development assistance received worldwide by the developing countries.

NIOSH is currently working on a project to demonstrate the injury reduction and economic benefit of workplace initiatives to prevent road traffic injuries among workers in the U.S. and globally. NIOSH offers an online library,

www.roadsafetyatwork.org, which houses resources from around the world such as employer policies and guidance documents on road safety at work, research reports, and statistics about worker injuries and fatalities on roads. In February 2009, NIOSH and partners will hold an International Conference on Road Safety at Work in Washington, DC to share best practices in both the industry and policy areas.

The two examples of MSDs and Road Safety offer an opportunity for a more focused approach on research translation (a conceptual framework derived from the social theory of the diffusion of innovation) which involves pulling together a pool of evidence-based knowledge generated over years of research that is currently underutilized and not organized or disseminated in a way that can be useful for local adaptation and use by the targeted worker community.

Encourage and Support Safe Work Design

An old idea that needs renewed attention. We can continue to strengthen efforts to investigate and share ways to enhance the prevention of work-related injuries and diseases through improvements to the designs of the physical workplace and its equipment, tools, and systems that support the elimination and reduction of hazards.

Many European countries lead the way in this area and we can learn much by active collaboration with our international partners. At NIOSH, our new initiative is based on the belief that the best way to prevent occupational injury is to anticipate and "design-out" hazards when new equipment processes and business practices are developed, not after worker exposure occurs. Even though this may be the most effective prevention tool we could ever have, little sustained interest has been focused at the national level on this initial step in the hierarchy of prevention. NIOSH, working collaboratively, has launched a *Prevention-through-Design* Initiative leveraging existing partnerships and forming new ones. For example, one effort targets engineering, architecture and technology schools and their accrediting bodies to support the inclusion of occupational safety and health information and safe design criteria in their curricula.

Promote and Integrate "Protection" as a Key Element of Health Promotion

It is important to continue to determine the potential effects of work organization on workers' mental and physical health and safety, and identify and share intervention strategies to promote better overall health though workplace programs. This involves conducting etiological research to better understand how the psychological and physical health and safety of workers is being impacted by current approaches to work organization, and determining through intervention effectiveness studies how to control adverse effects and develop and

encourage the use of approaches that protect and promote the health and safety of workers.

At NIOSH, the *WorkLife* Initiative envisions workplaces that are free of recognized hazards, with health-promoting and sustaining policies, programs and practices that both protect their health and safety as well as promote their well being. A recent International Labor Organization publication notes:

"Throughout the world, there is growing acceptance that both workplace accidents and worker ill health impact not only the lives of individual workers, their families, and their potential for future work, but also the productivity and profitability of their enterprises and ultimately the welfare of the society in which they live."

The NIOSH *WorkLife* Initiative is an effort to respond to this reality by supporting research, policy development and the sharing of best practices in an integrated approach to worker safety and health; moving beyond our current legal paradigm of work-related injury and illness.

No better example of the need for an integrative approach exists than that fact that sudden cardiac death represents the most common cause of on-duty fire fighter fatalities, killing about 45 fire fighters each year. The recently-issued NIOSH Alert, "Preventing Fire Fighter Fatalities Due to Heart Attacks and Other Sudden Cardiovascular Events, incorporates findings from 131 NIOSH investigations into sudden cardiac-related deaths in fire fighters, an extensive review of scientific, professional and medical literature, and review from 12 outside experts in fire service and the occupational health community.

The Alert states that, for fire fighters, coronary artery disease and sudden cardiac death involve a combination of personal and work-related factors. Personal factors can include age, gender, family history, diabetes, hypertension, smoking, high cholesterol, obesity and lack of exercise. Work-related factors can include exposure to fire smoke, heavy physical exertion, heat stress, and other physical stresses.

As an example of how we need to approach worker safety and health in a holistic manner, the Alert makes numerous, detailed recommendations for fire departments, fire fighters and fire fighter candidates to reduce the risk of heart attacks. Some of these recommended measures include medical evaluation programs, comprehensive wellness and fitness programs, proper use of personal protective equipment,and proper management of the fire scene to reduce hazardous exposures

Emergency Preparedness

We continuously need to be alert to improving our understanding of the role and burden of workplace disease exposures, and determine sector-specific risk factors, mechanisms and effective prevention strategies but to this we must add emerging pandemic concerns and hazards in the workplace resulting from changes in work practices and technologies, and develop, evaluate and share successful intervention practices.

NIOSH supports the larger efforts in this area by the Occupational Safety and Health Administration, U.S. Department of Health and Human Services, the U.S. Department of Homeland Security, the White House's Homeland Security Council and many of our private partners.

In addition to providing scientific input to an "all-hazards" approach to emergency preparedness, one recent mission that NIOSH has been given is to provide scientific input into preparedness for seasonal influenza, and the possibility of the emergence of a strain of influenza A—derived from a strain of avian influenza--against which there would be no or very little immunity among the American population--the so-called pandemic influenza.

Last year in October, the U.S. Department of Health and Human Services posted on the *pandemicflu.gov* website, a new document entitled "*Interim Guidance on Planning for the Use of Surgical Masks and Respirators in Healthcare Settings during an Influenza Pandemic*."

NIOSH's preparedness efforts for an influenza pandemic also resulted in our asking the Institute of Medicine of the National Academy of Sciences to examine the issue of personal protective equipment (PPE) for healthcare workers. Their Report was released on September 18th, 2007. The Institute of Medicine acknowledged that personal protective equipment is just one component in the continuum of safety efforts that includes engineering and administrative controls. The report's recommendations, though, focused on three major areas requiring urgent action to ensure the safety of healthcare workers:

- First**,** a better understanding of the mechanism of influenza transmission is urgently needed. There currently is a paucity of knowledge about the roles of airborne, droplet and contact transmission in influenza, significantly hindering prevention efforts.

- Second, a commitment to worker safety and appropriate use of PPE is needed. Healthcare facilities should establish and promote a culture of safety by identifying the institutional issues that prevent, allow or even favor non-compliance.

- Third, innovation and strengthening PPE design, testing, certification and use is needed. This entails an integrated life-cycle

approach from design to pre-market testing through post-market evaluations of actual use in healthcare facilities.

NIOSH preparedness goals also encompass lessons from the World Trade Center disaster. Perhaps the most important lesson learned from the World Trade Center is that it is critical to ensure that responder safety and health is treated with as much importance as victim rescue and recovery. An equivalent proportionality between victim and responder needs to be built into our national response culture. NIOSH bases this finding on the continuing health issues for World Trade Center responders, volunteers and the nearby community of residents and other building occupants.

Appropriate Exposure and Hazard Controls for Nanotechnology

There is increasing recognition that the world's workplaces are changing. Emerging hazards have been identified in a variety of workplaces and processes in the U.S.

- New technologies are introduced, re-engineered or require the use of new chemicals in commerce, such as new solvents proposed to replace ozone depleting chemicals,
- Novel industrial processes such as those involving nanomaterials are already introducing 'new-to-the-world' chemicals with unique properties that have never been experienced before in the workplace.
- Newly discovered hazards associated with existing chemicals and technologies may arise, or public perception of the hazards associated with existing technologies may change.

Nanotechnology, which is, in fact, a group of technologies that focus upon the creation or manipulation of material at the nanometer, or near-atomic scale, where unique phenomena enable novel applications. At the nanoscale, the physical, chemical and biological properties of materials differ in fundamental and valuable ways from the properties of individual atoms and molecules or bulk matter.

The NIOSH Nanotechnology Research Center continues to advance the science elucidating the occupational health implications of nanotechnology. In 2007, the Center published "Progress Toward Safe Nanotechnology in the Workplace." The Report chronicles the progress of the Center's activities since its inception in 2004 to determine the potential toxicity of nanoparticles, to develop exposure assessment tools, to establish effective hazard controls methods and to chart an overall risk management strategy for this emerging technology. Implementing appropriate engineering controls, using effective personal protective equipment and establishing safe handling procedures are paramount. Additional efforts to

monitor employee health may be warranted and NIOSH will be issuing guidelines for medical surveillance of nanotechnology workers shortly.
Research has shown that the physiochemical characteristics of particles can influence their effects in biological systems. Nanoparticles have very high surface area, increased biologic activity, and have the ability to translocate to other organs in laboratory animals following inhalation. Research to explore these new effects and the impact they may have on the workplace is occurring (http://www.cdc.gov/niosh/topics/nanotech/default.html). In addition, NIOSH has developed a research agenda that is exploring 10 critical areas specific to evaluating the hazard posed by nanomaterials (http://www.cdc.gov/niosh/topics/nanotech/strat_plan.html).

Because of the growing concern being expressed by industry, labor and academia over potential health hazard posed by exposure to nanomaterials, NIOSH has undertaken a focused agenda or research to investigate multiple areas of nanotechnology. One of NIOSH's first actions was to develop the interim guidance document "Approaches to Safe Nanotechnology" (http://www.cdc.gov/niosh/topics/nanotech/safenano/). This guidance document uses research being conducted by NIOSH and other occupational research institutes, such as the UK Health and Safety Laboratory, to provide nanomaterial researchers, manufacturers, and users with basic guidance based on a combination of current research results and historical knowledge of the nature of ultrafine particles.

As nanotechnology is developing globally with the same speed and concerns about potential hazards and methods for control, we have an opportunity for discussion and collaboration. It is an area where an a global approach could be developed to deal with industrial processes that are used to manufacture nanomaterials and an evaluation of process that use nanomaterials to create nano-enabled products, rather than focusing on specific materials, and thus take a more holistic approach to the issue.

The ISSA and NIOSH will be sponsoring Symposium #7 later today that will address emergent areas of concern focusing on nanoparticles and nanotechnology.

Potential Health Effects of Food Flavorings

A second example of an emerging hazard that is of significant concern in the U.S. relates to the hazardous effects of exposure to food flavorings, particularly those involving exposure to diacetyl, a butter flavoring used in popcorn production.

Data have been evolving for several years that indicate that certain food flavorings result in significant lung damage to exposed employees. Although the toxicology research is not totally conclusive at this point to pinpoint a single

cause, diacetyl seems to be of significant enough concern that the U.S. Food and Drug Administration launched an investigation into a possible consumer case of lung disease and several major food manufacturers plan to remove diacetyl from their products. On a more general note, food flavorings are generally complex mixtures, and synergistic effects of exposure may be a concern. There have been suggestions that regulation may be needed in this area, but there are many questions about the cause/effect relationship for diacetyl and other food flavoring components specific to human health effects, and about the actual dose/response relationship. This complex issue provides another opportunity for sharing information and developing joint global approaches in dealing with this emerging issue. An approach based on collaborative research that focuses on modifying identified processes, rather than having a specific exposure limit for one component, may also be an appropriate and novel approach to dealing with this concern. NIOSH has developed preliminary guidance that may be potentially useful for collaboration between the U.S. and its global partners on this topic.

Harness Social Media Venues for Knowledge Translation

Lastly, I want to describe for you some of the new ways NIOSH is working to better translate its research into your practice. As we look for better and more creative areas for global collaboration I hope we will consider expanding our efforts in the implementation and evaluation of utilizing new avenues of social media.

Social media is a new term for many of us in occupational safety and health, but it is one we can and should understand and utilize. Social media refers to the new kinds of participatory interactions between the provider of information and the recipient. Social media allows the recipient to do more than merely receive information—it allows the recipient to respond to the information. Together with other recipients, it allows the recipient to engage directly with the information source, even to shape and refine the message, thereby increasing its utility for the individual user. As we move from a static media world of merely reading or listening to a source, to the new world of interacting with the source and others who are receiving the same information, we are creating the virtual *Wiki-Safe Workplace*.

NIOSH is currently engaging in podcasts and webinairs with our partners, and putting our scientific research on interactive platforms like *Wikipedia* and our safety videos on *YouTube* (both global entities) to encourage interaction with the visitor and bring our science to a wider audience. Both of these new social media outlets provide a platform to disseminate electronic products to a global audience.

Five months ago the *NIOSH Science Blog* was launched to showcase a science paper published by a NIOSH scientist or a topical area such as nanotechnology, the young worker curriculum, food flavorings, and engage in an interactive way

communication with you. Twenty thousand visitors can't be wrong. The NIOSH Science Blog provides an expeditious system for our national and global partners to present ideas to NIOSH scientists and engage in robust scientific discussion about important safety and health matters. We are keenly aware that knowledge transfer cannot be guaranteed just because a scientific paper is published in a journal somewhere; the results must be diffused to practitioners.

Social media tools like YouTube, podcasts, webinars, Wikipedia and blogs represent tools for 21st century research translation and diffusion. Each of these tools need to be explored to ensure that all of us in workplace safety and health, some of us with our science gained from a laboratory, some of us with our everyday field experience about what can work and what won't, can remain connected between these joint conferences. A *Wiki-Safe Workplace* is the future and it is here now—it is just not evenly distributed yet. We must not be afraid to explore such social media tools, realizing that our first attempts may fall short of the mark; rather we should be afraid of our future if we do not engage in such exploration.

How might this work? The WHO Global Network of Collaborating Centers in Occupational Health includes the active participation of 64 collaborating occupational health centers on all continents, the ILO, and three international occupational non-governmental organizations (NGOs) that have a formal relationship with the WHO occupational program, the International Commission on Occupational Health, the International Occupational Hygiene Association, and the International Ergonomics Association. The Collaborating Centers are engaged in research and research translation.

The ILO supported International Occupational Safety and Health information Centers (CIS) established in over 100 countries is another important knowledge transfer activity. Together with other information transfer bodies we might think strategically how best we might share information in the public space….sort of an "Occupedia" of best practices.

In conclusion, returning to the last century… Ernest Shackelton envisioned planting a Union Jack on the South Pole. At the beginning of the first decade of the 21st Century, our global vision is not to brave dangers but reduce them for every worker in every workplace.

Thank you very much for your attention…enjoy the Congress that our hosts have so graciously organized and stop by the NIOSH booth where we are showcasing a few products to address our many challenges. I wish each of you a healthy and safe *lifestyle,* and a safe, healthful and secure *workplace*.