Translating Research to Practice: Motivating the Reduction of Occupational Safety and Health Risks

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Abstract

The protection of workers from occupational exposure to toxic chemicals, physical hazards, and biological agents is generally prescribed by legal requirements, standards established by voluntary consensus standards-setting organizations, and recommendations from current scientific research. The existence of legal standards alone does not ensure compliance by employers, nor assures safe and healthful workplaces. New strategies employing broad government, industry, and labor partnerships combined with the use of social media to communicate risks and best practices for risk reduction, motivates adoption of best practices for control of workplace hazards. In partnership with employers, unions, government agencies, and other associations, technology transfer activities are being promoted that have resulted in demonstrated improvement. To achieve effective diffusion of technologies, and to motivate beneficial changes reducing risks, a wide variety of health communications tools are used including Internet resources such as Google, Wikipedia, YouTube, and Flickr and other forms of social media. Additionally, application of economic analysis, prevention through design initiative, and other technology transfer approaches are used to motivate and empower employers, health professionals, and workers to implement best practices for the reduction of occupational safety and health risks.

1. Introduction

Controlling many recognized occupational safety and health risks is required by established laws and governmental regulations. Additionally, voluntary compliance with rules and limits set by consensus standards organizations, professional and trade associations, insurance risk management programs, and various contractual requirements provide additional protection when applied. Safety codes enacted through laws or promulgated as regulations by governmental agencies establish minimum specifications for operations designed to reduce risks of injury and fatality. Health risks are generally controlled through enforcement of performance-based standards that establish maximum allowable concentrations for exposure to toxic chemicals and dusts, known generally as occupational exposure limits (OELs). However, the existence of a legal standard or an established OEL does not ensure compliance by employers to assure safe and healthful workplaces. The low probability of inspection combined with low penalties for violations has often not provided sufficient motivation for compliance with such standards. Existing legal standards are often outdated due to the cumbersome processes needed to update or add new standards (Howard, 2005). Additionally, there are no requirements to follow the generally more protective codes and limits recommended by voluntary consensus standards organizations, or to apply current research recommendations for newly recognized hazards.

In the United States, the Occupational Safety and Health Act of 1970 (U.S. Government, 1970) created both the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and


2 The findings and conclusions in this report 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.
Health Administration (OSHA). OSHA is in the U.S. Department of Labor and is responsible for developing and enforcing workplace safety and health regulations. The Federal Coal Mine Health and Safety Act of 1969 and the Federal Mine Safety and Health Amendments Act of 1977 established the Mine Safety and Health Administration (MSHA) to establish and enforce health and safety regulations in U.S. mines.

NIOSH is in the U.S. Department of Health and Human Services and is an agency established to help assure safe and healthful working conditions for working men and women by providing research, information, education, and training in the field of occupational safety and health. NIOSH’s programs apply to both general industry and mining. In order to demonstrate effectiveness of research, information, education and training programs in occupational safety and health, the National Institute for Occupational Safety and Health (NIOSH) adopted a logic model to connect these activities, projects, and information dissemination to demonstrated workplace impacts for reducing fatalities, injuries and illnesses.

2. Logic Model

The U.S. President’s Management Agenda for the Executive Departments requires agencies to demonstrate their effectiveness in carrying out the purposes for which they were created. In order to demonstrate effectiveness of research programs in occupational safety and health should demonstrate their impact in reducing fatalities, injuries and illnesses. However, for a research and information organization, such as NIOSH, the connection between research, demonstration, and dissemination activities and such impacts are difficult to establish. To better assess effectiveness, NIOSH adopted a logic model (Whooley, 2004) to connect the activities of research project performance and results to demonstrated workplace impacts for reducing fatalities, injuries and illnesses. The logic model (Figure 1), provides a connection between the research program activities of the organization through production of recognized outputs such as peer-reviewed publications, and describes transfer activities, working through partners, to produce intermediate outcomes (risk reducing activities) that lead to the ultimate end outcomes of reductions of fatalities, injuries and disease. Thus, the overall program of the research program, absent the authority to compel through regulation and enforcement, can be shown to produce measurable impacts toward the ultimate goals of the Agency through transfer activities working through various partners and stakeholders to produce intermediate and final products that affect the outcome: the prevention of fatalities, injuries and disease.

Fig. 1: NIOSH Logic Model
3. Partnerships for Prevention

Working in partnership with employers, unions, government agencies, and other associations, technology transfer activities have been promoted that have resulted in demonstrated risk reductions in the workplace - establishing a program of “Research to Practice” or “r2p” that endeavors to move research findings and products into practical use. Key partners in occupational safety and health are the established Federal partners OSHA and MSHA. In 1996, NIOSH, OSHA, and MSHA established a joint health communications and prevention program for the elimination of silicosis. Silicosis is a long-known lung disease that affects workers exposed to respirable dust containing crystalline silica (silicon dioxide). In 1996 the agencies recognized three facts about silicosis: 1) the disease is preventable, 2) once a person has the disease there is no cure, and 3) prevention of the disease requires a sustained effort. The cause of silicosis is the well-known response of the body to excessive exposure to respirable-size dust containing crystalline silica, sometimes called quartz, cristobalite, or tridymite. Levels of exposure known to cause the disease have been described since early in the 20th century, and regulatory OELs exist in the U.S. and globally. In order to present a consistent message, the three U.S. agencies partnered with each other and with the American Lung Association. The special emphasis program was tagged with the common theme, “Silica: It’s not just dust.” Industrial hygienists on questioning employers and dust-exposed workers often encountered the sentiment that exposure was not a problem because “…it’s just dust.”

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<td>Coal</td>
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<td>Nonmetal</td>
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<td>Stone</td>
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<tr>
<td>Sand and Gravel</td>
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Tab. 1: Percent of Samples Exceeding the Permissible Exposure Limit

Thus it was recognized that the combined program needed to address several important points: first, there needed to be an educational awareness campaign to address the lack of knowledge about the dangers of the disease and exposures; second, there needed to be educational efforts to document and describe how exposures could be reduced by substitution or engineering controls; and third, there needed to be a sustained targeted enforcement effort to address the most egregious exposure settings. The silicosis prevention programs that were begun in 1996 have contributed to the continuing decline in silicosis deaths in the U.S. which has declined by 83% from 1968 to 2003 (NIOSH 2006). The use of silica sand for sandblasting has been reduced by 47% from 1996 to 2004 (Dolley 2004), and there has been a marked reduction in the percent of inspector samples in mining that exceeds the permissible exposure limit (Table 2) (NIOSH 2006).

4. Research to Practice

Research to Practice (r2p) is a NIOSH initiative focused on the transfer and translation of research findings, technologies, and information into highly effective prevention practices and products which are adopted in the workplace. The goal of r2p is to reduce illness and injury by increasing workplace use of effective NIOSH and NIOSH-funded research findings. NIOSH has several examples of r2p that demonstrate the effectiveness of this approach.

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One example of r2p is the translation of a laboratory technique for the direct measure of respirable dust to the field application now in process of being deployed in U.S. coal mines. In collaboration with manufacturers, labor and industry, NIOSH developed a new personal dust monitor (PDM) for assessing coal miners’ exposure to coal dust in underground coal mines. The first advancement in more than 30 years for monitoring exposures, the PDM provides real-time exposure data during a work shift. It warns of potential over-exposures in time for mine operators to reduce exposures that might lead over time to development of coal workers’ pneumoconiosis or “black lung,” a debilitating lung disease that caused 14,000 deaths between 1991 and 2000. NIOSH plans to commercialize the device, following additional testing this year to verify its performance (Volkwein 2004).

Another r2p success was carried out through a broad partnership to reduce exposures to asphalt paving fumes. In a departure from the traditional regulatory approach, a unique government, industry, and labor partnership was formed to reduce worker exposure to asphalt fumes during paving operations. The research partnership included all U.S. manufacturers of highway-class asphalt paving equipment, numerous paving contractors, and the full participation of labor unions representing paving workers. This partnership team including NIOSH engineers was successful in developing practical, effective control systems to control asphalt fume exposures and a voluntary agreement to incorporate these controls on all newly manufactured highway pavers.

5. Communicating Solutions

To achieve effective diffusion of technologies, and to motivate beneficial changes reducing exposures, a wide variety of health communications vehicles are needed. The Internet is extensively used to provide wide access to information. Emphasis is placed on developing communications products that translate research findings into useful practical solutions. For example, a number of “Workplace Solutions” have been developed that provide simple solutions that can be applied with little modification or need for additional engineering services. Another initiative is to communicate with engineers and architects on ways that they can, through their original designs, minimize risks to the workers who will construct buildings and facilities from their drawings, and workers who will later operate the systems once built. By thinking through potential operating hazards, tools, buildings, and/or factories can be engineered to be safer by design.

To communicate risks to workers, stories and interviews with peers have been used to make the case from worker-credible sources on the need for using safe and healthful work practices. Additionally, NIOSH has provided script material that has been incorporated into Spanish language “Telenovelas” which are short-run serialized stories that are very popular in the Latin community (NIOSH 2008). By interjecting a family-impact story concerning the consequences of a safety hazard, information is disseminated to potentially influential family members to combat the cultural factors that otherwise lead to risk taking. Workers in the 21st Century have grown up with new information sources and media including Wikipedia, YouTube, and Flickr. NIOSH is making use of these resources and others to market occupational safety and health messages to workers.

A potentially fruitful area for motivating beneficial workplace changes is the development of business cases for health and safety. Effective cost-benefit analysis can be used to demonstrate to employers that investments in health and safety may provide a substantial return on investment when one considers not only reduced costs for employer provided health insurance benefits, but also in increased productivity and reduced training costs arising from employee turn-over. Programs promoting the welfare of workers often require up-front commitment of resources for which the benefits may not appear for some time. Nevertheless, cost-benefit analysis, if appropriately communicated can be used to document the positive return on investment that can be had from providing appropriately for safety and health (Washington State, 2008)
6. Summary

In summary, prevention of occupational fatalities, injuries and illnesses can be achieved through multiple pathways: 1) establishing laws and regulations that must be followed and are enforced by the government; 2) developing and following voluntary consensus standards; 3) translating current research findings and recommendations and through partnerships, effective risk communication, and/or cost-benefit analysis can motivate the application of prevention technology. Effective prevention begins with an understanding of the risks and the need for risk-reducing changes; it requires the availability and understanding of appropriate protective technology by the employer; and it requires cooperation and partnerships to motivate and empower employers, health professionals, and workers to apply best practices to reduce occupational safety and health risks.

References


