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Implementation of Safety and Health on Construction Sites

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Reducing construction-related injuries and illnesses through education

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ABSTRACT: In the United States, construction workers experience one of the highest occupational fatality rates as well as rate of injuries and illnesses resulting in lost work days. Young workers, particularly those under 18 years and those with less than two years of experience in the trade are at high risk for injury or death. Training programs in occupational health and safety are seen as an effective means of increasing the awareness of workers and managers alike of work hazards and of methods of preventing injuries and illnesses. A variety of approaches are being used to develop training programs to address the many health and safety risks encountered on the construction site. Programs to prevent falls, musculoskeletal disorders and respiratory diseases, three principal causes of morbidity and mortality among construction workers are described.

1. BACKGROUND

More than 7 million workers (about 6 percent of the total U.S. labor force) are currently employed in the construction industry. Compared with other industries, construction workers experience one of the highest occupational fatality and injury and illness rates resulting in lost work days (BLS, 1996). Of all work-related deaths in 1996, 16.9% (or 1,039) occurred among construction workers; falls were the leading cause (31%). By trade, ironworkers and roofers accounted for more than 75% of deaths due to falls in the industry (CPWR, 1998).

Nonfatal injuries also occur frequently among construction workers. In 1995, construction workers experienced more than 182,000 illnesses and injuries causing lost work days. Having contact with or being struck by an object and musculoskeletal disorders account for more than 50% of all traumatic injuries; backs, hands/fingers, and eyes are the body parts most affected (BLS, 1998; Lipscomb,1996).

In partnership with researchers throughout the United States, NIOSH is developing and evaluating methods to reduce work-related injuries and illnesses among construction workers. One approach is to develop and disseminate educational programs, training materials, and methods that address the needs of construction workers and the industry as a whole.

1.1 *Future construction workers*

In the United States, the injury rate among adolescent workers is 5.8 per 100 full-time equivalents. To reduce this rate and increase the safety awareness and education of vocational, technical, and post-secondary industrial school teachers and administrators, NIOSH is creating a comprehensive set of trade-specific teaching materials with an occupational safety and health emphasis. Currently, six trade-specific curricula are planned: electrical work, drywall and plastering (both installation and finishing), and carpentry.

Thus far, the developed material contains thirteen modules on general safety and health topics relating to vocational shops: noise and hearing conservation, personal protective equipment overview, employee right-to-know/MSDS, PPE—hearing conservation, PPE—eye, hand, foot, disconnecting, locking and tagging-out, respiratory protection, dangers and prevention of silicosis, lead hazards, ergonomics, compressed gases safety, safety and health committees, and first aid. These modules will be evaluated for their effectiveness. This program has the potential for reaching more than 11 million students enrolled in more than 20,000 programs throughout the country. Through such programs, NIOSH will help safeguard the health and life of young workers and begin to create a culture that values safety and health on the job.

1.2 *Respiratory protection program handbook for small businesses and contractors*

Pulmonary diseases and cancers, particularly asbestosis, lung cancer, mesothelioma, bronchitis and occupational asthma consistently cause disability, morbidity and death among U.S. construction workers. These conditions may be attributed to on-the-job exposure of construction workers to asbestos, crystalline silica, diesel fumes, wood dust, paint fumes, resin adhesives and other respiratory hazards.

In 1998, OSHA implemented a new respiratory standard to reduce such exposures (29 CFR 1910 and 1926 [1988]). This standard requires that both large and small employers have respiratory protection programs if their work sites pose specific respiratory hazards to workers. Whereas large companies will most likely have a well-established respirator protection program, small contractors may not.

NIOSH has designed a series of easy-to-read handbooks that will provide small contractors with the tools for establishing and maintaining good respiratory protection programs. The first handbook in the series will target drywall finishing contractors. Drywall finishers may be exposed to high concentrations of dust that may contain silica and may exceed current OSHA standards for total and respirable dusts. A draft outline of the handbook is included in Table 1. The handbook may be accompanied by other materials such as videos and CD ROMs.

1.3 *Fall-Safe: an intervention program*

In the United States, more than 30% of all fatalities and 20% of injuries with days off work are caused by falls. The Fall-Safe Construction Program was designed by researchers, educators, and

Table 1: Respiratory Protection Programs Handbook for Drywall Contractors (DRAFT)

I. Introduction.
- A. Health Hazards of the Trade.
- B. Legal—Introduction to the Respirator Program Required by 1910.134.
- C. Liability.

II Requirements for a Respirator Program.
- A. Procedures : Selecting Respirators.
- B. Employee Medical Evaluations
- C. Fit Testing Procedures.
- D. Procedures :Proper Respirator Use
- E. Procedures : Cleaning, Storage, Inspecting, Repairing, Discarding and Maintaining Respirators.
- F. Procedures to Ensure Adequate Air Quality, Quantity, and Flow for Atmosphere-Supplying Respirators.
- G Training of Employees in the Proper Use of Respirators.
- H. Procedures: Program Evaluation.

II. Checklists, Forms, Useful Tools.

practitioners at the West Virginia University Health and Safety Extension (Fall-Safe Construction Program, 130 Tower Lane, P.O. Box 6615, Morgantown, WV 26506-6615) in collaboration with NIOSH and the Center to Protect Workers' Rights. The program was created as a comprehensive fall hazard management system to (1) increase fall safety knowledge, awareness, accountability, and communication among different levels of workers in an organization or at a job site, and (2) provide a systematic approach to training and managing fall-prevention activities. The Fall-Safe system includes specific modules for training all levels of the workforce: contractors and safety coordinators, competent persons or field supervisors, and workers. At the end of the program, contractors participating in Fall-Safe are awarded the status of Fall Safe Contractor. West Virginia University audits their performance by quarterly site audits. Poor performance on two successive site audits results in withdrawal of Fall-Safe status. Currently, the program is being evaluated for effectiveness in increasing awareness of fall safety and the reduction of falls among workers employed by trained contractors..

1.4 *Reducing musculoskeletal disorders through training*

Musculoskeletal disorders among construction workers account for 22.5% of injuries resulting in lost work days (BLS, 1998). In a recent survey of 3,000 construction workers in Eastern Iowa, more than 70% reported having symptoms related to musculoskeletal pain in the 12 months before the survey (Cook, 1992).

Through its extramural program with universities, NIOSH currently sponsors five research projects to develop training programs and materials that teach workers and managers how to identify risk factors for musculoskeletal disorders and how to change the work environment to reduce or eliminate them. Due to the large variety of hazards on the construction site, most projects concentrate on trade-specific risk factors. Steps for developing training materials include symptom surveys of workers and work-site assessments to identify and quantify risk factors associated with musculoskeletal disorders. These risk factors include repetitive tasks, awkward postures, forceful exertions, lifting, vibration and cold work environments. Detailed discussions with retired and current workers, supervisors, trainers and other knowledgeable individuals detail job activities, stresses and possible solutions to identified job and task-related problems and concerns.

Using this information, researchers at the University of Massachusetts-Lowell (UML), University of Iowa (UI), University of Oregon (UO), University of Cincinnati (UC), and the United Brotherhood of Carpenters and Allied Trades (UBC) have taken a variety of approaches in the development of course work and training materials. Most of these approaches encourage participatory training and include sections on the identification of musculoskeletal disorders and the associated risk factors and methods on prevention.

To date, the programs target carpenters, drywall installers, bricklayers, and operating engineers. Two programs target carpenter groups. The UBC created a module to be added to their apprenticeship program; UC produced tool box talks for on-the-job training and instructor's guides for carpenter apprentices for drywall installation and scaffold erection, two jobs identified jobs which place considerable stress on the body. Two additional jobs performed by carpenters and identified as physically demanding include pile driving and concrete form work were addressed by the UBC program.

The UML developed a train-the-trainer course with emphasis on operating engineers, but which may be applied to other trades. This course has been so well-received that they anticipate that more than 2500 workers and trainers will have taken the course over the next year. Using results of a musculoskeletal symptom survey of approximately 3000 construction workers in Eastern Iowa, researchers conducted in-depth analyses of job sites of bricklayers, sheetmetal workers and operating engineers and presented class-based lectures to union members. In addition, they are working with a large contractor to modify excavation equipment to make the equipment more ergonomically sound. Finally, researchers at UO are working with a variety of contractors in the Portland, Oregon area in an attempt to develop site-specific interventions to reduce

musculoskeletal disorders. Their approach varies depending upon the type of work being performed, but includes regular on-site audits of ergonomic conditions on the worksite and the use and refinement of standard training modules that integrate ergonomic principles, body mechanics and exercise training for delivery to foremen and craft workers on construction sites.

Each of these programs have been immensely successful in that they, by default, increase the awareness of workers and management regarding musculoskeletal disorders and associated risk factors. However, more work is needed to evaluate the effectiveness of the various approaches in the long-term prevention of work-related musculoskeletal disorders among construction workers.

2. WHERE DO WE GO FROM HERE?

Although many safety and health training programs and courses are designed for construction workers, more research is needed to determine their effectiveness in reducing work-related injuries and illnesses. Furthermore, more work is needed to identify the safety and health training needs of each employee in the construction industry (including young adults who are not yet in the industry) and to determine how the information is most effectively translated and transmitted to them.

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FROM THE SAME PUBLISHER:

Alves Dias, L. & Richard Coble (eds.) 90 5410 847 9
Implementation of safety and health on construction sites – *Proceedings of the first international conference, Lisbon, 4-7 September 1996*
1996, 25 cm, 616 pp., EUR 126.50 / $149.00 / £89
In any country or culture, if the construction industry is going to flourish, continuous improvement of work conditions of construction labor is an essential issue that must not be overlooked. Workers must not only be kept alive, but healthy as well. In addition, it must be recognized that quality of life for its workers will inevitably affect the quality and productivity of construction. This book summarizes the most recent research on the subject matter by specialists from a number of countries. Topics covered: Safety and health regulations and statistics; Planning and controlling construction safety; Social and human issues on construction safety; Health issues in the construction process; Technological innovations in construction safety; Safety training and education; etc.

Penny, R.K. (ed.) 90 5410 874 6
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1997, 25 cm, 328 pp., EUR 104.50 / $123.00 / £74
Topics covered: Life assessment techniques; Asset management; Damage mechanics applications; Life extension of aged plants; Ageing effects; Materials development; Non-metallic materials. Together with case studies, applications to problems of corrosion, cracks and other damaging processes affecting performance: assessment and extension. Contributors are leading experts from various parts of the world, reporting up-to-date research and development results as well as their applications in major industries. The book will be of interest to risk and loss prevention engineers, inspectors, maintenance engineers, consultants, operations managers and others whose professional capacities are concerned with the safe and economic performance of high capital cost plant.

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Penny, R.K. (ed.) 90 5410 977 7
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1998, 25 cm, 380 pp., EUR 77.50 / $90.00 / £55
Contributions from 13 countries report recent research and development results as well as techniques and applications involved in many industries - from power generation and petrochemical installations, to water distribution systems, power connections and vehicles. In these, metallic, non-metallic and shape memory alloy materials are involved. Throughout the volume, there are major emphases on risk-based asset management techniques in dealing with materials, components and systems subject to ageing and environmentally assisted damage processes. The book will be of interest to risk and loss prevention engineers, inspectors, maintenance engineers, consultants, insurance assessors, researchers and others whose professional capacities are impacted upon by failures and all aspects of safety. It will be essential reading for owners of plant and others concerned with rational asset management.

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