

PtD

- ▶ Where good design is important to business success
- ▶ Where smart planning minimizes hazards and risks to workers

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Prevention through Design—a National Initiative

Welcome to the first *PtD in Motion* Newsletter! Prevention through Design is a collaborative initiative that lies on the principle that the best way to prevent occupational injuries, illnesses, and fatalities is to anticipate and “design-out” or minimize hazards and risks when new equipment, processes, and business practices are developed. This may be the most effective way of preventing or controlling occupational injury and disease. *PtD in Motion* is an important step towards focusing on this aspect of prevention at the national level.

The 2007 PtD Workshop (www.cdc.gov/niosh/topics/ptd) identified a number of action-oriented plans and committed individuals at many levels to move research and know-how on the concept into everyday occupational safety and health practice. The workshop took advantage of the growing knowledge base, number of experts, range of tools, and market-driven demand for mainstreaming PtD in many, if not all industry sectors. The purpose of this newsletter is to begin connecting the dots within and across sectors and disciplines to move towards a sustainable national strategy. We hope you find this and subsequent issues useful and look forward to your comments and future contributions.

By Paul Schulte, Director, Education and Information Division, NIOSH

What is *PtD in Motion*?

PtD in Motion is a newsletter published by the National Institute for Occupational Safety and Health to help foster communication among practitioners, researchers, and others about the tools and actions related to Prevention through Design. Each newsletter will focus on one industry sector or one of the broader functional areas: Practice, Policy, Research, or Education. This first issue spotlights PtD initiatives in the Health Care and Social Assistance Sector. The next issue will highlight the Construction Sector. Please feel free to contact the editors at ptd@cdc.gov with any PtD-related news or topics. We look forward to your input to make *PtD in Motion* truly a collaborative exchange!

By Rick Rinehart, Coordinator, PtD National Initiative

Healthy Health Care Design: NIOSH NORA Health Care and Social Assistance Sector Council

By Teri Palermo, NIOSH Health Care and Social Assistance Council
Coordinator



Designing out hazards before they enter a workplace is better than addressing them after problems occur. When considering the role of PtD in health care, the nature and organization of the work must be recognized. There is much variation in work

stations, procedures, tasks and physical layout. The settings for health care delivery are diverse, including hospitals, nursing homes, outpatient clinics, and patient homes.

Occupational, environmental, and patient safety hazards arise from the same source—health care procedures, products, equipment, practices, and built environments—so the development of comprehensive solutions requires an integrated approach. Integration of these factors is most effective at the design stage of all aspects of health care. PtD can be applied at all organizational levels in the health care sector, including:

- 1) **Product-User Interface:** Safe needles and other devices to prevent injuries and bloodborne pathogen exposures among workers and patients.
- 2) **Processes, Materials, Equipment and Associated Work Practices:** Design safer

cleaning equipment, practices, and chemicals for patient and exam rooms.

- 3) **Work Organization and Policies:** Success requires commitment at all levels. New designs won't be successful long-term without worker participation.
- 4) **Built Environments—Building Design, Construction and Maintenance:** A growing area of research in health care design is in evidence-based architecture, which uses findings from research linking the physical environment of hospitals to patient and staff outcomes. Examples include design for infection control; to maximize natural light to improve patient recovery and reduce worker fatigue; design to reduce noise; to prevent patient and worker slips/falls; and design of healing gardens for workers, patients, and their families.

The NIOSH NORA Health Care Sector Council has a subgroup focusing on ways design considerations have reduced or can be used to reduce hazards and risks to workers, keeping in perspective the relationships with patient safety and environmental issues. The Council is preparing a White Paper for the health care sector, which will have a significant section devoted to aspects of Prevention through Design. For more information please visit: <http://www.cdc.gov/niosh/nora/councils/hcsa/default.html>.

Integrating Occupational and Environmental Health and Safety into Health Care Design

By Margaret Quinn, Sustainable Hospitals Program, University of
Massachusetts Lowell



The Sustainable Hospitals Program (SHP) at the University of Massachusetts Lowell provides guidance to the health care industry in using products and practices that reduce occupational and environmental hazards, while maintaining

patient safety and cost-effectiveness. An approach called Pollution Prevention and Occupational Safety and Health (P²OSH) was developed to evaluate potentially hazardous products, their function in the work process, associated job requirements and work practices, and possible alternatives. Together with hospital staff, safer alternatives are piloted.

P²OSH merges occupational safety and health into medical product design to assess the differences between conventional materials and alternatives. OSH professionals become links between hospital workers and medical product designers, thereby expanding their role beyond hazard control to workplace innovation. An example related to PtD involves mercury manometers, which are used in pulmonary labs and blood gas machines. A P²OSH evaluation revealed mercury-free manometers did not give readings in the desired units of measure. The SHP team then bridged the gap between a mercury-free manometer manufacturer and the hospital. The manufacturer modified the device for the desired readout and the outcome was beneficial—and mercury-free. Please see <http://www.sustainablehospitals.org> for more information.

Protecting Health Care Workers from Infectious Diseases in Latin America

By Marie-Claude Lavoie and Dr. Maritza Tennessee, Pan American Health Organization

The health care sector employs more than 10 million workers in Latin America and the Caribbean. This group is routinely exposed to biological, chemical, physical, and psychological hazards. The number of occupational injuries and illnesses experienced by health care workers has risen over the past decade.

Exposure to blood from needlestick injuries is a major occupational hazard. The leading causes of needlestick injuries are two-handed recapping and unsafe disposal of needles and sharps waste. PtD can reduce or eliminate these injuries by controlling hazards directly at the source. Studies demonstrate that the use of

engineering controls such as appropriate sharps containers reduces injuries by almost 70%.



The World Health Organization, the Pan American Health Organization, the National Institute for Occupational Safety and Health and other collaborators launched initiatives in Latin America and the Caribbean related to protecting health care workers. These projects focus on building institutional and human capacity to strengthen occupational safety and health by emphasizing the importance of engineering and organizational controls in order to reduce infectious diseases in health care facilities. Some of the goals include raising awareness about the need for safety-engineered needles and safe waste disposal containers. Through these initiatives, health care managers and workers will receive training to identify, control, and effectively manage infectious diseases. For more information please visit the following website: http://www.who.int/occupational_health/activities/pnitoolkit/en/index.html <http://www.bvsde.ops-oms.org/sde/ops-sde/bv-saludtrab.shtml> (Spanish version)

Health Care Design Challenges

By Erica J. Stewart, Kaiser Permanente



Three areas in health care that pose significant hazards to workers are disinfection and sterilization, hazardous drugs, and anatomic pathology. Kaiser

Permanente and other organizations are applying PtD concepts to control hazards at the source through substitution, building and equipment design, and work process controls. Examples for each area are given below.

Disinfection and Sterilization—Biocides are designed to be toxic to living cells, making safe and effective alternatives a challenge to produce. While Kaiser Permanente supports the development of less toxic materials and leverages its purchasing power to encourage such materials to reach the market, steps are also taken during the design phase to reduce exposures by isolating reprocessing of materials from staff and patients and via ventilation controls. Kaiser employs closed liquid transfer systems and ample non-recirculating room exhaust under negative pressure to prevent fugitive emissions.

Hazardous Drugs—Special care is needed to ensure that cross-contamination does not occur during drug compounding. HEPA-filtration and high air-exchange rates reduce contamination in the critical compounding area. Environmental monitoring programs promptly identify sources of contamination. Fully-contained barrier isolators may supplant biological safety cabinets used in sterile compounding of hazardous drugs in the future.



Anatomic Pathology—Many toxic chemicals are used in anatomic pathology laboratories. Safe and effective substitutes have been slow to be adopted by pathologists.

Recycling spent solutions can reduce the quantity of new chemicals and the amount of hazardous waste. Local exhaust ventilation is the primary method for reducing exposure to hazardous vapors during use and recycling. Other engineering controls include safety scalpel blade dispenser and retrieval mechanisms. Ergonomic hazards in the lab are addressed using adjustable height grossing stations and adjustable chairs. For more information please contact Erica Stewart (Erica.Stewart@kp.org).

Comprehensive Workplace Violence Programs Include Attention to Environmental Design

By Kate McPhaul, Work and Health Research Center, University of Maryland School of Nursing

The University of Maryland’s Work and Health Research Center conducts innovative intervention studies examining workplace violence in health care and social assistance workplaces. Two projects involve an architect who, after an initial walkthrough, shadows staff on each shift in order to “live” the job while developing design solutions and recommendations. This technique improves involvement from direct care staff and management and also ensures that the design recommendations are feasible and acceptable. In one facility the architect observed firsthand the violence associated with patients sharing one phone. He was able to recommend a low-cost transparent enclosure than improved privacy and reduced violence.

Furthermore, the walk-through phase occurs in tandem with other programmatic and hazard analysis activities, which communicates the importance of the environment (i.e. design) in workplace violence hazard analysis and control.

The architect’s recommendations, along with findings from other hazard analysis activities (e.g., staff focus groups, management key informant interviews, employee surveys), are prioritized and then provided to the violence prevention task forces in each facility. Examples of recommendations which were implemented include assistance with upcoming renovation projects, changes in furniture placement and room use, attention to lighting, handling of dangerous materials, and security technology (e.g., locks, alarms, video surveillance).

When expensive, long-term capital improvements are not possible, procedural, technological, and staff solutions are implemented. In an effort to translate important intervention research to practice, WHRC staff and researchers work with employers

to translate findings into workable, cost-effective programs. The WHRC believes that environmental design plays a crucial role in workplace violence prevention and calls for increased evaluation of the role and impact of design on workplace violence prevention. Please see <http://nursing.umaryland.edu/excellence/whrc/> for more information.

Regenstrief Center for Health Care Engineering—Purdue University

By James D. McGlothlin, Purdue University

Purdue University created the Regenstrief Center for Health Care Engineering (RCHE) in 2005 to design, implement, and sustain interdisciplinary solutions to achieve a transformed health care delivery system that optimizes occupational safety and health, quality, cost-effectiveness, and access for all persons. While the diagnosis and treatment of patients must remain in the hands of health care professionals, the application of engineering, management and scientific principles has the potential to reshape the health care delivery landscape.

Core research areas include operational efficiency and effectiveness of health care delivery, enhancement of safety and quality of health care delivery to patients and workers, and security and interoperability of health information technology. Systems analysis is used to structure and study complex issues in health care, providing a basis to engineer new solutions in the delivery system. RCHE uses an interdisciplinary approach which includes all professions and disciplines involved in health care research and design.

RCHE evaluates whether research recommendations achieve sustainable and desirable operational results, and contributes to the body of knowledge pertaining to health care delivery and engineering by conducting and publishing original research and citing relevant reported research and publicly disseminating research findings through industry partners. Additional information can be found on the RCHE Web site (<http://www.purdue.edu/dp/rche>).

User-Based Design: A Case Study in Prevention of Occupational Exposure to Blood

By June M. Fisher, San Francisco General Hospital

The Training for Development of Innovative Control Technology (TDICT) project was started in 1990, funded by a series of cooperative agreements with NIOSH. TDICT is a collaborative effort of frontline health care workers, product designers, and industrial hygienists dedicated to preventing occupational exposure to blood and bloodborne pathogens through the design and evaluation of control technology.

From its inception, TDICT has promoted the participation of frontline clinicians in all phases of the design process for development of medical devices to assure both patient and health care worker health and safety. Involving health care workers in all phases of control technology development assures that products are user-friendly and effective, systems improve compliance, and that they improve patient care.

The original efforts were directed at defining user-based criteria for safety features for a broad variety of devices that were needed to prevent exposure to blood. These criteria were developed

collaboratively by health care worker mentors, product design/industrial hygienists, and focus groups with a wide variety of frontline health care workers. The criteria have been widely disseminated and were included in the OSHA Enforcement Procedures for Bloodborne Pathogens (CPL 02-02-069, Appendix B). Resulting criteria sheets have become the de facto benchmarks for the medical device industry.

Other outcomes of the project include: performance standards; systematic simulation methods for testing devices; a task analysis instrument for assessing clinical usage of sharps; systematic user-based methods for



evaluation, selection, and implementation of safer medical devices; training programs for clinicians; and a trigger video for systematic assessment of kits and trays for appropriate safety devices. Over the course of the project TDICT collaborated with the School of Engineering, Product Design Program at Stanford University, which included mentoring of over 500 design students by health care workers. Additional information can be found on the TDICT Web site (<http://www.tdict.org>).

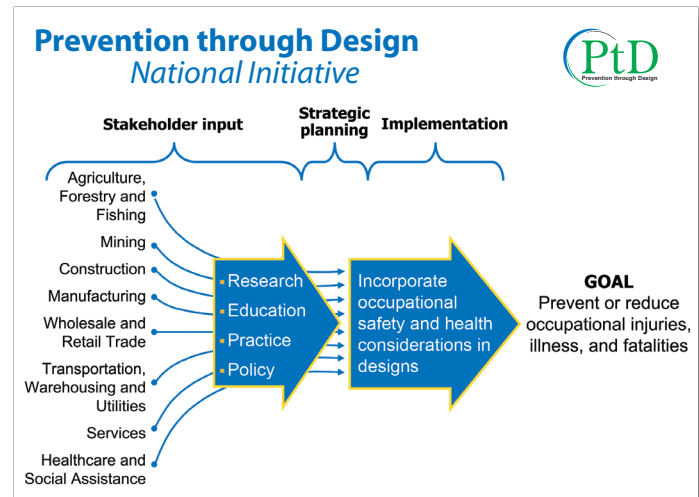
New Publication

NIOSH has released a new publication (*Simple Solutions: Ergonomics for Construction Workers*) that is intended to aid in the prevention of common job injuries that can occur in the construction industry. The solutions in this booklet are practical ideas to help reduce the risk of repetitive stress injury in common construction tasks. The booklet contains tip sheets that show how using different tools or equipment may reduce the risk of injury. All of the items described in this booklet have been used on working construction sites. The booklet is available on the NIOSH Web site (<http://www.cdc.gov/niosh/docs/2007-122>).

PtD Progress and Activities

PtD has been designated a Coordinated Emphasis Area within NIOSH to formally support the Institute's Sector and Cross-Sector programs, which are driven by strong involvement of partners and stakeholders.

The 12 Rapporteurs' reports from the July PtD Workshop (8 reports by industry sector and 4 by



The approach that will be used to develop and implement the PtD National Initiative will be framed by industry sector and within four functional areas: Research, Education, Practice, and Policy. As this diagram indicates, this process encourages stakeholder input through a sector-based approach consistent with the one used under the National Occupational Research Agenda (NORA).

The ultimate goal of the PtD Initiative is to prevent or reduce occupational injuries, illnesses, and fatalities through the inclusion of prevention considerations into all designs that impact workers. Along the way, intermediate goals will be identified to provide a path toward achieving the ultimate goal. NIOSH will serve as a catalyst to establish this Initiative, but in the end, the partners and stakeholders must actively participate in addressing these goals to make PtD business as usual in the 21st century.

functional area—Research, Education, Practice, and Policy) are completed. They will form the foundation of a PtD National Strategic Plan. The Workshop Proceedings are being prepared for publication in the April issue of the *Journal of Safety Research*.

A collaborative effort is underway that targets engineering schools and their accrediting bodies to support the inclusion of occupational safety and health information and PtD concepts in curricula.

The next issue of *PtD in Motion* will focus on the Construction Sector.

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