

**University of Cincinnati**

**EDUCATION AND RESEARCH CENTER FOR OCCUPATIONAL  
SAFETY AND HEALTH**

**SUMMARY ANNUAL REPORT**

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**NIOSH Training Grant**

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**SUBMITTED BY:**

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The University of Cincinnati (UC) Education and Research Center (ERC) provides education, consultation, community service and research for workers, employers and residents throughout our DHHS region of Ohio, Indiana, Illinois, Michigan, Wisconsin and Minnesota, across the United States and in several other countries. The ERC has a full complement of Core Programs—Occupational Health Nursing, Occupational Hygiene, Occupational Medicine Residency, Occupational Safety and Health Engineering. The ERC provides three component training programs—Biomonitoring, Hazardous Substances Academic Training, and Pilot Research Training Program. Continuing Education and Outreach involves all of the academic programs. In 2007-08, enrollment and graduates numbered: Occupational Health Nursing--2 MS and 4 Ph.D. students, 3 Ph.D. graduates; Occupational Hygiene--5 MS and 3 Ph.D. students, 2 MS and 1 Ph.D. graduates; Occupational Medicine--5 MS students, 3 graduates; Occupational Safety--7 MS and 5 Ph.D. students, 7 MS and 1 Ph.D. graduates; Biomonitoring--1 Ph.D. student; Hazardous Substances--3 MS students, 1 MS graduate. Continuing Education served 5,044 participants in 140 courses.

The ERC programs bring together three colleges: Engineering (Occupational Safety and Health Engineering), Medicine (Occupational Hygiene, Occupational Medicine

Residency, Biomonitoring, Hazardous Substances, Pilot Research Program, Continuing Education and Outreach), and Nursing (Occupational Health Nursing). All three colleges are within close proximity on a single campus. Dollars provided to the ERC through the National Occupational Research Agenda (NORA) support additional multidisciplinary activities.

Research findings relevant to this region have been reported in the literature, and gained attention in the press, providing much wider distribution to stakeholders. Twelve brief examples follow:

-For many years, vermiculite shipped to Ohio from Libby, Montana was used in lawn treatment products. A recent follow-up of the Libby workers showed that low-level exposure to fibers in vermiculite caused radiographic changes.

- Short-term air sampling at a suburban Cincinnati junior high school located adjacent to major interstate and county roadways showed higher concentrations of respirable airborne particles, carbon and other elements associated with automobile and school bus traffic than in a rural location.

-Personalized messages sent through electronic communications systems increased levels of physical activity among participants.

-Health of nurses and patients may be compromised due to fatigue. Insufficient pre-shift sleep and limited work breaks were documented to contribute to fatigue among these health care workers. Significant numbers of hospital nurses working a 12-hour shift experienced moderate to high levels of acute fatigue, insufficient inter-shift recovery, and chronic fatigue. More than one third experienced an average heart rate above 100 beats per minute during most hours of the 12-hour shift.

-Oil tanker workers removing crude oil residues have increased internal dose of polycyclic aromatic compounds. These may contain carcinogens.

-Physical stress while conducting farming chores at a young age may lead to bone disease in adulthood.

-Treatment of moldy surfaces with gaseous chlorine dioxide was found to increase the amount of endotoxin and other compounds that increase the risk of respiratory reaction. Therefore this method of mold remediation is not recommended.

-In simulated studies of particles in the size range of bacteria and viruses that may be in a health care setting, filtering face piece respirators did not provide a protection factor of 10. Workers using these protective masks may be exposed to more toxic particles than predicted.

-Ergonomic stresses were identified among workers processing telephone orders using a keyboard and touch screen.

-Training that is used is retained. In work with nurses and clinical research coordinators, those who used training during the four months following classroom sessions scored higher on cognitive tests, compared those who reported no use.

-Simple engineering controls (barriers) designed for long-wall mining resulted in 7.3 dB(A) reduction in noise and a 96% reduction in respirable dust. Substantial increases in ventilation to the mine were not needed to achieve this dust reduction.

-Stakeholders participated in developing strategies to reduce noise in cattle, dairy, hog and poultry farms. Options included engineering controls, substitution of equipment with units producing less noise and use of personal protective equipment. Earlier work showed high compliance of hearing protection, if it was located close to the noise source.

Many of the results noted above or from previous years led to further funded investigations. For example, possible impact of vermiculite exposure among lawn care products worker is being explored and further study of exposures during leaching of crude oil residues is underway. Also funded are an intervention study to reduce violence in hospital emergency rooms, a project to improve case management and improve the quality and coordination of health care services, a project to design and fabricate mock nuclear fuels to aid in developing instrumentation and measurement techniques, an investigation of adverse health effects of smoke that may be emitted in residential and automobile fires, exposures and effects of popcorn flavorings, studies of respiratory protective devices and exposures to mold and other particulates in housing.

The University of Cincinnati ERC translates research findings to practice, improving health and reducing health care costs. Six selected recent examples are:

-Small scale demolition workers implemented the use of water and other work practices following training. These actions should reduce dust exposure, including silica.

-Measuring the body burden of radiation following industrial accidents requires instrument calibration with a “phantom” facsimile of bone and tissue. Using research data, new anthropometric phantoms have been developed for deposits in wounds and in axillary lymph nodes.

-Data showing continued use of lead-based pigments in paints outside the US have resulted in higher awareness and empowered citizens.

-Use of protective equipment reduced skin exposure to oil and other compounds during oil tanker cleaning and maintenance.

-Training technique learning objectives have been added to several OSHA trainer courses used by the regional training centers.

-A webcast specifically for farm youth on ergonomics has been developed and disseminated on the NIOSH webpage as a resource for 4-H leaders, extension agents and other adults providing training to youth.

Education of MS and PhD students is a critical component of the ERC. During the past year, the Occupational Medicine Residency was accredited by ACGME and the Occupational Hygiene program was accredited by ABET. Enhancements to the education mission include:

-A research track has been introduced in Occupational Safety and Health Ergonomics for students who develop practical engineering solutions to workplace stressors.

-Students in Occupational Health Nursing gained practice in developing training programs by creating a session on “The Older Worker and Productivity” for occupational health nurses. This included the needs assessment, program development, marketing, evaluation and securing continuing education credits.

-Electronic classroom elements have been added to three Occupational Health Nursing courses.

-Hands-on indoor air quality evaluation techniques were introduced to occupational hygiene students in a laboratory exercise. A walkthrough observational assessment was followed by ventilation system assessment.

Interdisciplinary interaction occurs at many levels at the UC ERC. Four selected opportunities funded through NORA are:

-The Pilot Research Training Project Symposium, provides meeting and discussion time for all recipients from the ERC and the 11 other participating organizations. These are: Purdue University, Western Kentucky University, University of Kentucky, Eastern Kentucky University, US Air Force Institute of Technology (AFIT), Ohio University, Bowling Green State University, Central State University, Kentucky State University, Murray State University, and University of Toledo-Health Sciences. At the 8<sup>th</sup> Annual Symposium, 28 presenters described their work to more than 100 attendees. Over the past year, nine recipients published findings in peer review journals; a \$1.95M award was received by one faculty member, using the data from two pilot investigations completed by students.

-Two-day trip to a coal processing plant and surface and underground mines. This unique experience is facilitated by the District MSHA office personnel.

-Workshop on the Sago (WV) Mine Explosion. Students and faculty from all ERC disciplines participated in a day-long workshop exploring the causes of the disaster. Authors of the West Virginia report, an MSHA mine inspector and a family member of a victim provided unique perspective on the event and prevention strategies to the 50 attendees.

-A workshop to describe examples and needs for translating research to practice (r2p) brought together NIOSH personnel, ERC students and faculty, and stakeholders from industry and the service sector. The 26 participants identified strategies to increase future r2p translation successes.