University of Cincinnati
University of Cincinnati Education and Research Center
Annual Program Highlights
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Center Highlights

Occupational Hygiene
Program Director: Kermit G. Davis

Occupational Hygiene students and faculty are involved in several projects that are making an impact on worker health. Two projects are highlighted.

J'ai Watson measured noise levels in three intensive care units at Cincinnati's Children's Medical Center. Her Master's thesis identified the locations, sources, and activities of noise levels above known thresholds (75 dBA). Gathering rooms and patient rooms had routine noise levels exceeding recommended threshold values (above 60% of the time). Equipment in the room and nurse conversations were the sources many elevated noise levels (more than 50% of reading above threshold). The results have provided the hospital with target areas and activities for noise remediation for the protection of the staff and comfort of the patients.

Angela Wills documented the ergonomic stressors for waitresses and waiters in restaurants. The wait staff had high levels of discomfort in the upper back, lower back, and neck (all above 55%). On average, the servers carried about 16 kg per hour and remained on their feet (either walking or standing) more than 90% of the time. As a first study to investigate ergonomic stressors in this service industry, the 3 restaurants were provided with reports with recommendations to help mediate the heavy loads lifted (e.g. use smaller size trays) and provide routine seated breaks to reduce time on feet.
Enhancing the interdisciplinary aspect of our ERC has been a priority for our faculty. After a semester of didactic courses, building teams, and industrial site visits, all the NIOSH trainees are taking Interdisciplinary Worksite Evaluations where under Dr. Elizabeth Maples' direction interdisciplinary teams are conducting independent evaluations at designated worksites. The goal is to have the teams solve real-world occupational health and safety problems with reasonable, achievable controls. Recently, an interdisciplinary team advised by Dr. Shaun Crawford was asked to determine possible sources of cadmium exposures at a foundry in north Birmingham, AL. The site uses recycled steel and serves the southeast market with over 600,000 tons of annual production capacity. The area of concern for the Interdisciplinary Team was the increase in cadmium (Cd) exposures since 2008. Cadmium personal monitoring results ranged from 2.5 – 5 µg/m3. It was hypothesized that the increased exposure was due to increased levels of cadmium in the scrap metal. However, no changes have been made in the suppliers in the past years and spot monitoring of the scrap did not reveal any important Cd sources. After more research it was determined by the team that a new charge-carbon was used in recent years and its Cd content was significantly higher compared with the previous one. Recommendations were made to use a different supplier of charge-carbon. The results of this investigation were communicated at the annual AIH Conference and Exposition in Montreal, CA.

Occupational Health Nursing
Program Director: L. Sue Davis

Occupational Health Nursing Master's students and faculty are involved in several projects that are making an impact on worker health. Three projects are highlighted.

Due to the broad range and type of noise exposures in fire fighting, protecting the hearing of firefighters is a complex and difficult phenomenon for occupational health professionals to address. From September 2012 to April 2013, an interdisciplinary team of graduate students from occupational health nursing (OHN), occupational medicine (OM), and occupational hygiene (OH) at the University of Cincinnati met with firefighters about hearing hazards and protective behaviors. The team then created an interactive training program of three modules designed to engage firefighters in learning about hearing, hearing hazards and strategies to protect hearing. Geunjae Lee, an occupational health nurse, continued the work to translate the training into a format to use in social media outreach efforts targeted to firefighters. The goal is to engage and empower firefighters to protect their hearing.

A team of Occupational Health Nursing students, Greg Douglas, Guenjae Lee, Christy Miller and Darcie Rockstroh, at the University of Cincinnati are working on an exciting new innovative project on Total Worker Health (TWH). TWH incorporates worker safety, health promotion and protection as a primary prevention method against illness and injury to the worker. The team, with guidance from Dr. Jane Christianson, is currently working with two small businesses within the Greater Cincinnati area, a traveling circus company and an architecture firm. Small businesses were targeted for the TWH project because this working population generally lacks access to employee health centers and employer-led health promotion activities. Several worker health topics are being assessed at each company, including worksite assessment of occupational hazards, worker injuries, health risk appraisal, biometric screenings, on site health fairs, and health education presentations. Interventions will be designed to address identified injury and health needs.

An appreciation for occupational health and safety on worker health needs to occur in undergraduate nursing programs. To achieve this goal a team of undergraduate Community Health nursing students and their instructor, Dr. Christianson, are working with OH Master's students on implementation of a portion of the TWH project for small businesses. The Undergraduate students conducted a needs assessment survey and are using the results to plan health fairs. Health risks identified for the circus were: smoking, alcohol use, nutrition, and muscle health; and for the architectural firm, they were smoking, exercise, child care, and stress. Because of different health concerns, learning opportunities, and biometric tests were tailored for each business. Expert presenters, informational handouts, individual feedback were selected implementation strategies. Evaluation will be conducted in the Spring semester.

Occupational Medicine
Program Director: Andrew Freeman

During the past year, the Occupational Medicine Residency program has initiated new relationships with 3 clinics providing Occupational Medicine urgent care treatment and consultations. These clinics are located in southern Ohio and northern Kentucky. The residents rotate through each of these three clinics throughout the course of their residency. The residents continue to rotate at the Center for Occupational Health at the University of Cincinnati (UC), which is a regional referral center for Occupational Medicine consultative services, drawing patients from throughout Ohio and neighboring states.

UC's Occupational Medicine Residents, with faculty mentors, have been identifying potentially hazardous occupational exposures associated with the high-volume hydraulic fracturing process "fracking" used to extract natural gas in the region. The secondary goal has been to disseminate this information to workers and to the surrounding communities. Potentially hazardous exposures (chemical, particulate, and noise) as well as safety issues associated with this process were identified via an initial literature review. Postulating that the exposures associated with "fracking" are similar to that seen in shale oil and gas drilling, another review of the literature was performed to see if additional associated exposures had been reported. The results of this

analysis identified several potential exposures of concern for both workers and the surrounding communities. On February 2013, one Occupational Medicine Resident presented the results of this review to an audience of community members, undergraduates, and faculty at the University of Cincinnati as part of the Office of Sustainability Lecture Series. In addition, during the last year, Occupational Medicine Residents and DEH faculty have also participated in several forums in the southwest Ohio region, addressing the various issues and health concerns associated with the "fracking" process.

The Residents and the other students in UC's interdisciplinary Occupational Health and Safety Workshop class have also started an ongoing relationship with the low wage workers at the Cincinnati Interfaith Workers Center. They are focused on job-related hazards in low wage restaurant workers, and they have developed a survey to collect the nature and prevalence of worker-identified hazards. The students have overcome cultural and language barriers in the development of this survey. Through their continued attendance of monthly meetings at the Center, they plan to finish data collection and continue to raise awareness of the unique occupational health risks in these workers.

Outreach Program
Program Director: Kermit G. Davis

Outreach program started a new initiate to utilize social media in distributing information on occupational safety and health to the community and continued collaboration with the Interfaith Workers Center.

Ashutosh Mani (OH) and Guenjae Lee (ON) are finalizing videos about recent research projects that will be distributed to firefighters. One video provides an overview of noise exposure and protection for firefighters, based on a Health & Safety Workshop class project. The second video provides information about heat stress and how firefighters can protect themselves. The heat stress video is based on the Target Research Training project on heat stress in firefighters. Both videos are in the final stages of editing and with links being placed on the UC ERC website. The web links will then be distributed to local fire chiefs and firefighters.

Ifeanyi Nwaneshiudu (OM) and Robin Saxon (ON) continued to work with the Interfaith Center by providing expertise in health and safety to low wage restaurant workers. The students attended monthly meetings of the Worker Justice Committee as well as continued the stocking of the bulletin board where OSHA Quick Tip cards were displayed for distribution.

Pilot Research Training Program
Program Director: Amit Bhattacharya

The Pilot Research program (PRP) at the University of Cincinnati thrives in increasing the research capacity of research trainees and young investigators in occupational health and safety and encouraging those in related disciplines to pursue occupational health and safety research. Since 1999, the PRP program has awarded close to $1 million in pilot grants that have resulted in bringing close to $30 million in additional research support to the region. Additionally, it has facilitated the transition of 27 new investigators from other disciplines to occupational health and safety field. The pilot projects have resulted in research-to-practice applications that help the surrounding community and open up new research avenues and collaborative linkages. Below are are examples of projects that were conducted during the past year.

Aerosol Contamination at Fire Scenes, PI: Barbara M. Alexander, PhD, PE (UC):
Chemical exposures may be partly responsible for firefighters' high rates of adverse health outcomes such as coronary heart disease and cancer. This research suggests that firefighters may be exposed to DEHP and

PBDE flame retardants at levels much higher than the general population.

Rapid Neutralization of Organophosphate Nerve Gas Agents, PI: Daqing Gao, PhD (Anthony Arment, PhD, Co-I) (Central State University).
Chemical Warfare Agents, particularly organophosphate (OP) nerve agents, have been used in warfare and terrorist activities since World War II. Recent examples include the Aum Shinrikyo cult attack on the Tokyo subway using Sarin gas and the exposure of United States troops to nerve agents during the Gulf War. We generated library of organisms which hold enzymes for potential usage in degrading OP nerve agents in the field. Fast acting and environmentally safe methods for the neutralization of these compounds is of importance to our military and law enforcement agencies, first responders, health professionals and civilians.

Light Emitting Diode Ultraviolet (UV LED) Disinfection of Water, PI: LeeAnn Racz, PhD, Maj, USAF (Air Force Institute of Technology).
This project gave important insight into understanding the feasibility of using UV LEDs in disinfecting water. In addition, the experiments using the pulsed configuration revealed the effectiveness of that configuration in water disinfection as well as whether it will extend the life of the LEDs.

An Examination of the Work-Family Interface among Farming Dyads, PI: Justin Sprung (Bowling Green State University)
Farmers are relatively neglected in psychological and occupational research outside the realm of safety issues. Furthermore, specifically regarding occupational health research concerning work-family issues, the primary focus, to date, has been on white-collar, professional occupations. This study advanced previous work-family research by examining a novel, dyadic population's experience of positive work-family experiences.

Profiling of Effector Cell Types in Nanoparticle- and Asbestos-exposed Lung, PI: Evan Frank (UC)
While carbon nanotubes and asbestos are understood to have potentially deleterious effects in the lung, the underlying cellular and molecular mechanisms are unknown. Several studies have attempted to delve into these mechanisms with varying success. This study used a cell-type specific screening approach which will further understanding in the basic science of fiber-related lung disease and aid in the application of treatment strategies for these occupational health issues.