

NIOSH ANNUAL REPORT

**THE UNIVERSITY OF MICHIGAN
Education and Research Center for
Occupational Health and
Safety Engineering**

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Submitted by:
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ERC Summary

Since inception in 1982, the *University of Michigan Center for Occupational Health and Safety Engineering* (UM COHSE) has provided comprehensive graduate-level educational programs to trainees, practitioners and researchers in *Industrial Hygiene* (IH), *Occupational Health Nursing* (OHN), *Occupational Safety Engineering* (OSE), and *Occupational Epidemiology* (OE) to help meet the nation's needs for qualified professionals. Our academic programs are complemented with our highly effective *Pilot Project Research Training* (PPRT), *Continuing Education* (CE), *Outreach*, and *Research-to-Practice Programs*.

The mission of the Center is to serve the region, nation, and world as a center of excellence for research and graduate education in Occupational Health and Safety (OHS). Our success as a center of excellence is predicated on an outstanding, dedicated and stable faculty; interdisciplinary curricula that prepare our graduates for modern practice; vibrant extramurally funded research programs in many NORA-related areas that train next-generation research leaders; multifaceted outreach and CE programs that meet the needs of professionals in our region and beyond; strong institutional support; and active and engaged alumni, many of whom are leaders in their fields. The aims of the Center are to: (1) promote excellence in our academic training and research training programs in each program area; (2) enhance the quality of our CE courses and other service and outreach activities; (3) increase external research funding to improve our research infrastructure and expand opportunities for research training; (4) increase the financial resources needed to improve the number, quality and diversity of graduate students in each program area; (5) provide an organizational structure to coordinate, promote and evaluate multidisciplinary educational activities in OHS; (6) promote OHS education in undergraduate and graduate courses in other departments and other regional schools; (7) promote OHS research in our region, especially among junior researchers; and (8) assist Center programs and affiliated academic units in recruiting and promoting faculty associated with the Center. Our constituencies include our students (both full time students enrolled in our graduate degree programs and those engaged in CE); industry, labor and professional interests in our region; UM academic units that provide critical teaching and research resources (including tenured faculty positions) necessary for Center success; and NIOSH.

Highlights of the past year include: promotion of IH and OE Program faculty and the hire of a new faculty member in OSE; faculty awards and distinctions; new courses on *Risk Analysis* and *Human Factors in Health Care*; numerous scholarly publications by faculty and students; new grants on NORA-relevant research; the upcoming launch of specializations in *Process Safety and Risk Management* and *Globalization, Labor, and Health*, and the *Joint Research Symposium Occupational Health and Safety*, which included the ERCs from Chicago and Cincinnati. During the project period, 93 graduate students were enrolled; 26 masters and 6 doctoral degrees were awarded; 21 classroom-based CE programs and an additional 23 webinars were conducted and attended by a total of 4,516 participants; and 5 new Pilot Project Research Projects were funded.

Relevance

The US workforce carries a disproportionate burden of preventable job-related morbidity and mortality. By training high-quality practitioners and researchers, the University of Michigan COHSE helps to meet critical shortfalls in health and safety services in most small and many larger workplaces, and thus helps to reduce the incidence and severity of occupational injury and illness.

Key Personnel

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ERC Website

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Industrial Hygiene

Faculty Promotions and Awards

IH Program faculty **Richard Neitzel** was promoted to Associate Professor with tenure, and he was appointed as Associate Chair of Environmental Health Sciences Department in SPH. He also received the *Excellence in Teaching Award* from the SPH in April 2017. Prof. Neitzel was an invited speaker at the *Callier Award Conference* in April 2017. IH Program Prof. **John Meeker** was named to the CDC/ATSDR/NCEH Board of Scientific Counselors, which provides guidance on goals, objectives, strategies and priorities for these agencies. IH Program Director **Edward Zellers** was an invited speaker at the Pittcon '17 Invited Symposium on Microscale Chemical Analysis Systems in March, 2017.

Enrollment and Curriculum

The IH Program admitted 11 new Masters students, bringing its total enrollment to 22 Masters students and 5 PhD students.

As a prelude to the fall 2017 launch of a focus area in Globalization, Labor, and Health (GLH), Prof. **Zellers** offered a course entitled "Global Dimensions of Occupational Health" for a second time in Winter 2017.

Research and New Grants

Prof. **Zellers** was awarded a \$1.4M grant from the Intelligence Advanced Research Projects Activity (IARPA) to develop a novel, ultra-low-power collector-injector technology for next-generation micro-analytical systems for air contaminants. His group continues to test the first-ever wearable micro gas chromatograph prototypes. Prof. **Neitzel** received pilot grants from the UM Office of Research and the UM NIEHS P30 Lifestage Environmental Exposures and Disease Center to evaluate emissions of asbestos associated with the demolition of abandoned residential structures in Detroit, Michigan, and from the Swedish agency AFA/Forsäkring to study the cardiovascular effects of noise and hearing loss among pulp and paper mill workers in Sweden.

Occupational Epidemiology

Enrollment

The OE program admitted 8 new MPH students, 4 in the Department of Epidemiology (EPID) and 4 in the Department of Environmental Health Sciences (EHS), and 4 new PhD students (2 in EPID and 2 in EHS). A total of 14 MPH and 14 PhD students were enrolled during the reporting period. We graduated 6 MPH students and 2 PhD students in the reporting period.

Faculty Promotions and Awards

OE Program Director **Marie O'Neill** was promoted to Professor in the Departments of Environmental Health Sciences and Epidemiology; she also received the 2017 Eugene Feingold Award for Excellence in Diversity. Associate OE Program Director **Sung Kyun Park** was promoted to Associate Professor in the Department of Epidemiology. Prof. **Sara Adar** was promoted to Associate Professor in the Department of Epidemiology;

she also was elected as the Secretary-Treasurer of the *International Society of Environmental Epidemiology*. A paper of Prof. Adar's published in the *Lancet* was awarded the Best Environmental Epidemiology Paper by the *International Society of Environmental Epidemiology* and recognized as a best paper of the year by the National Institute of Environmental Health Sciences.

Research and New Grants

The OE Program invited Dr. **Adam Finkel** for the Occupational Health seminar series to give a talk on: "How OSHA Can Reduce Occupational Exposures and Disease with the Cards it Has Been Dealt". He also gave a special lecture, "Risk-Based Governance Options for Improving National Football League (NFL) Worker Health" for Prof. O'Neill's Occupational and Environmental Epidemiology class. Prof. **Laura Rozek** hosted a training course on cancer epidemiology in Indonesia. Former OE trainee Dr. **Carina Gronlund** presented a poster at Drexel University's Urban Health Conference "Heat-mortality vulnerability by individual air conditioning and residential housing characteristics in two Industrial Midwestern American cities, 2006-2013". **Meredith Pedde**, currently an OE PhD student, published the results of her internship and capstone project from her MPH degree in the journal *Epidemiology*.

Prof. **Sioban Harlow** was awarded a Fulbright Scholarship to study gender-based violence in the Democratic Republic of Congo. Prof. **Adar** began a new project funded by the UM MCubed program to study exposures and health impacts related to e-waste recycling in Chile. She also received R01 funding to study the cognitive impacts of outdoor and indoor air pollution in India in collaboration with researchers at the University of Southern California. OE student **Meredith Pedde** was awarded an American Heart Association graduate fellowship to continue her studies in the OE program with Dr. Adar on "*Long-Term Coarse Particulate Matter Exposure as a Risk Factor for Cardiovascular Disease: Evidence from the Multi-Ethnic Study of Atherosclerosis*". She also received a UM fellowship for a summer internship at Ben Gurion University in Israel to train in techniques to be used in her PhD dissertation, and will presenting her results at the International Society of Exposure Science conference in October. OE trainee **Zoey Laskaris** received a UM Dow Sustainability Fellowship for her dissertation research, entitled 'Electronic waste and the workers that dig its grave' that involves Prof. **Tom Robins** and Center Director **Stuart Batterman**.

Trainee Internships

Placements for OE MPH student internships included: **Lauren Smith** in Chile to work on exposures at an electronic-waste site; **Amanda Schoonover** in Lebanon to work on environmental health issues in refugee camps; and **Jacqueline Cardoza** in Nashua, NH to work on local emergency management.

Occupational Health Nursing

Enrollment

The OHN Program student enrollment and graduates continue to grow. Five new students were admitted, and 18 students were enrolled during the reporting period. A total of 7 MS students graduated in the project period, and 2 additional students transferred to continue their graduate studies. All OHN graduates are either employed

in clinical practice positions that include caring for workers, continuing their graduate education, or seeking employment in clinical practice positions that include caring for workers.

Faculty Awards

OHN Associate Director **Christopher Friese** was recently appointed as the *Elizabeth Tone Hosmer Professor of Nursing*. He completed a one-year health policy *Robert Wood Johnson Foundation fellowship* with the US Senate in Washington, DC working on health-related legislative and regulatory issues.

Occupational Safety Engineering

Enrollment and Alumni

Two PhD students graduated from the program. One started a position as an Assistant Professor of Industrial Engineering at Purdue University. The second accepted a position with an international consulting company. Four Masters students graduated: two are officers returning to the Coast Guard; one accepted a position at Ford Motor Company; and one entered a PhD program at the University of Maryland.

Faculty

Prof. **Jessie Yang** joined the IOE faculty in September 2016. Her research and teaching interests include human-robot interaction, human-automation interaction, and patient safety. **Nadine Sarter**, Professor of Industrial and Operations Engineering and Director of the U of M Center for Ergonomics, was appointed to the *National Academy of Science's Expert Panel* on FAA staffing standards. Professor **Yili Liu** revised his co-authored and widely used ergonomics textbook "*Introduction to Human Factors Engineering*" with the revised edition to be published in fall 2017.

Research

Faculty and students produced 69 publications and presentations, with students serving as sole-author or co-author on 24. Faculty were awarded \$450,000 in new research grants and contracts during the 12-month period, with sponsorship including the Toyota Research Institute, NIH, Ulsan National Institute of Science and Technology, and the State of Michigan. PhD student **Yadrianna Acosta-Sojo** received continuing support from the National Science Foundation as a *NSF Graduate Research Fellow*.

OSE alumnus Dr. **Neil Wiggerman** received the 2017 "*User Centered Produce Design Award*" from the Human Factors and Ergonomics Society for a hospital bed that improves safety for both patients and health care providers.

Curriculum

New courses included IOE 591 "*Risk Analysis I*" offered during the Winter 2017 term, and IOE 591 "*Human Factors in Healthcare*" also offered Winter 2017 term by Prof. **Yang**.

Planning was undertaken for a new Masters specialization option in *Process Safety and Risk Management*. With the support of the ERC's *External Advisory Board* and employers who recruit our graduates, and collaboration with the UM Department of

Chemical Engineering, we developed this option for students with undergraduate engineering degrees with a planned launch in Fall 2018.

Continuing Education

Short courses/webinars

We offered 21 live programs and 23 webinars that enrolled 4,516 individuals, resulting in 29,801 person-hours of training. For example, we conducted the two-day workshop, *Using the 3D Static Strength Prediction Program™*, three times for UAW-Ford, and once as an open enrollment course. The demand and interest in this course remains strong.

YouTube

Our YouTube channel, **C4E TV**, now contains more than 70 ergonomic case studies examining job types in the manufacturing, service, office, non-profit and other sectors. This resource has a growing influence on learning and improving workplace safety. These online videos have many uses: companies use them for training; consultants use them as examples in developing and delivering training programs; students use them as resources for studying OHS issues; and occupational health nurses use them to “view” jobs similar to their patients’ work and to learn about workplace safety. As a specific example, one of our CE course attendees became aware of the C4E TV YouTube channel through our email marketing, found case studies similar to jobs at his worksite, and then forwarded the links to engineers, supervisors and others at his company to highlight potential workplace interventions. As a second example, an engineering professor at the University of Wisconsin regularly uses these examples when teaching occupational ergonomics.

Symposia and Conferences

We conducted our first *Joint Research Symposium Occupational Health and Safety*, which included the ERCs from Chicago and Cincinnati. (Please see Center-Wide Activities below.)

For the first time, we co-sponsored the *Michigan Industrial Ventilation Conference* (following contact from the conference development committee due to our long history of conducting high quality CE courses). Conducted in February 2017 in Lansing, MI, this conference brings together industrial ventilation experts from across the U.S. and Canada for instruction and lectures on the design, construction, use and testing of ventilation systems, a 4-day introductory course, and two advanced design workshops. This was the 66th year of this highly regarded conference.

Outreach

Many outreach activities were undertaken by COHSE Center faculty and staff, including curriculum and research assistance to other academic institutions, professional consultation, tours (e.g., Detroit Environmental Tour: A Tour of Toxic Sites in Detroit, Ford Rouge Factory Tour), ergonomics assistance to Michigan companies, seminars on public websites, and press interviews. Several examples are provided below.

Undergraduate students **Danielle Marzetti** and **Shelby Hubbell** developed and presented an ergonomics module at *Safety Day for SA Automotive*, a small manufacturer. Graduate students **Justin Haney** and **Cooper Greene** developed a booth and poster on office ergonomics for the *Detroit FDA Wellness Day*.

Our nail salons initiative expanded with **Stephanie Saylor**, IH Research Specialist, developing training materials and chemical spreadsheets on health and safety hazards, establishing the *Michigan Health Nail Salon Cooperative*, and conducting health and safety awareness training for local nail salon workers.

With *Workplace Health Without Borders – US Branch*, **Stephanie Saylor** helped develop an educational video, created an educational pamphlet, and developed and managed a social media page to increase awareness of OHS issues for underserved populations and in low and middle-income countries. She also assisted with website development with addressing worker OHS issues on electronic waste recycling.

In the area of noise exposure, outreach activities of IH Associate Director, Prof. **Richard Neitzel**, included delivering a webinar via *AudiologyOnline* on noise exposures in January 2017, providing consultation services to the World Health Organization on their new "Make Listening Safe" initiative, and presenting on the health effects of noise at the 2017 Callier Prize ceremony in Dallas in May 2017.

Center faculty providing assistance to Detroit's large demolition program include Prof. **Neitzel** who is involved in a research project, *Health Risks to Vulnerable Populations from Exposures to Airborne Asbestos from the Demolition of Abandoned Homes in Detroit*, which includes providing recommendations for work practice modifications for the Detroit Land Bank Authority. In addition, Center Director **Batterman** serves on a City of Detroit Taskforce on the demolition program, and a City of Detroit-State of Michigan steering committee addressing health and environmental impacts and mitigation measures regarding demolitions and development in southwest Detroit.

OSH issues faced by health care work were addressed by OHN Program Prof. **Christopher Friese**, who gave interviews and wrote editorials regarding effects of inaccurate diagnoses and treatments, and protecting health care workers from hazardous drug exposures.

Pilot Project Research Training

In the reporting period, we received 14 complete proposals from investigators at the UM, Michigan State University, Oakland University, Purdue University, and the University of Wisconsin-Milwaukee, the highest number to date. The five highest-scoring applications were funded. These address a wide range of OSH issues, e.g., physiology-based dynamic fatigue modeling for construction tasks focusing on intensive upper limb work, assessment of cumulative stressors for Michigan public school teachers, evaluation of the allostatic load and health risks of hotel housekeepers and hotel laundry workers; development of a passive micro-sampler with on-site analysis for multi-vapor worker exposure monitoring, and occupational inhalation exposures in nail salons in Michigan. These projects resulted in several papers and presentations in conference proceedings, as well as follow-up proposals to potential funders.

The PPRT Program also helped organize our first *Joint Research Symposium on*

Occupational Health and Safety on March 17, 2017, which was attended by both current and previous recipients. (Please see Center-Wide activities below.)

Research to Practice (R2P)

The *Visiting Partners Program* continues to sponsor collaboration between mid-career OSH professionals and UM ERC faculty and professionals. We sponsored Prof. **Dhitinut Ratnapradipa** at Sam Houston University (previously at the University of Illinois-Carbondale) for work on laboratory safety and the development of training materials for risk communication programs at small- to medium-sized colleges and universities. New Visiting Partners included **Albert Tien** at *Workers Health Without Borders* for OSH R2P activities for nail salon workers, many of whom are undocumented and who may receive attention to workplace safety rules and regulations, and **Cheryl Schiller**, a workplace health and safety consultant who is developing instructional materials for volunteer organizations to train citizen volunteers regarding safety risks and best practices prior to on-site working.

The *Interdisciplinary Research Training Program* attracted and supported a first-year PhD student, **Chanese Forté**, in the Occupational Epidemiology Program.

Center-Wide Activities

Following the initiation of regular regional collaboration with nearby ERCs at the University of Illinois at Chicago and the University of Cincinnati in 2015, we conducted our first *Joint Research Symposium Occupational Health and Safety* on March 17, 2017 in Ann Arbor. The symposium included a poster session with 22 presentations by current and former COHSE PPRT recipients and trainees from all three ERCs, two morning panel sessions on the themes of underserved workers and global occupational health with speakers drawn across the three ERCs (e.g., **Lisa Brosseau, Joseph Zanoni, Marie-Ann Rosenberg, Richard Neitzel, Andrew Maier**) and outside speaker (**Albert Tien** from *Workers Health Without Borders*), a simulcast keynote featuring **Robert Radwin** (a former PPRT recipient at the University of Wisconsin-Madison) on the topic of computer vision for ergonomics exposure assessment, and extensive trainee and staff interactions. This event was attended by over 120 faculty, staff, and students from a variety of professional disciplines, including more than a dozen current or former PPRT trainees and all students currently funded by the ERC at the University of Michigan. Breaks and lunches, as well as social and educational events on the preceding and following days gave many opportunities for interactions and networking among students, staff and faculty across the OSH disciplines. On the following day, many participants headed to the *Ford Factory Tour and Museum* in nearby Dearborn.

We assisted *Workers Health Without Borders* in applying for a R13 grant that would develop a set of conferences addressing vulnerable workers.

As in prior years, we conducted two stimulating meetings with our *External Advisory Board* and undertook steps to increase diversity and representation by inviting several new members. The EAB is now 17 strong with members from industry, consulting, government and unions.

The Michigan ERC conducted extensive needs assessment and program evaluation activities. We conducted a comprehensive *Alumni Survey* that included responses from 76 individuals who graduated within in the last 15 years, developed a comprehensive center-wide *Evaluation Plan*, and used surveys, key informant interviews, focus groups, and other information to complete an *Exploratory Evaluation Findings Report* to summarize evaluation findings. The *Curtis Center Program Evaluation Group*, a professional organization specializing in program evaluation, at the University of Michigan, conducted the evaluation activities. The plan uses a common approach across each of the ERC's programs.