

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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SECTION I

ERC Summary

Since inception in 1982, the University of Michigan Center for Occupational Health and Safety Engineering (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.

Our success as a center of excellence is predicated on (1) an outstanding and dedicated faculty; (2) interdisciplinary curricula that prepare our graduates for modern practice; (3) vibrant extramurally funded research programs in many NORA-related areas that train next-generation research leaders; (4) multifaceted outreach and CE programs that meet the needs of professionals in our region and beyond; (5) strong institutional support; and (6) active and engaged alumni, many of whom are leaders in their fields.

Highlights of the past year (2015-2016) include: numerous scholarly publications by faculty and students; new courses on core and special topics; research fellowships that recruit students from other disciplines to NORA-relevant research; and a Visiting Partners Program that links regional health and safety professionals with ERC faculty. During this period, 82 graduate students were enrolled, and 17 masters and 5 doctoral degrees were awarded. Fifteen classroom-based CE programs were attended by 761 participants and an additional 28 one-hour webinars were attended by over 6,600 participants. Five Pilot Research Projects were funded. Goals for the next 5 years include: (1) continuing to enhance our curricula to meet evolving training needs; (2) increasing enrollment in all programs; (3) augmenting ERC financial support for trainees; (4) initiating new program specialties to expand our impact; (5) continuing to offer high quality CE courses and events; (6) increasing alumni engagement in recruitment and career placement; and (7) maintaining research programs at the cutting edge of occupational health science.

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 thereby helps to reduce the incidence and severity of occupational injury and illness.

Key Personnel

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ERC website

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SECTION II – Program Highlights in 2015-2016

Industrial Hygiene

Curriculum

Prof. Zellers offered a new course entitled “*Global Dimensions of Occupational Health*” to introduce students to the policies, regulations, and guidelines set by national and international governmental organizations; corporate social responsibility (CSR) and sustainability practices; labor migration and labor union activities; initiatives mounted by non-governmental organizations, foundations, and professional societies/associations; and cultural norms.

Prof. Neitzel offered a new course entitled “E-Waste and Health” addressing the electronic waste recycling industry in developing countries that covered OH&S, as well as economic and cultural aspects of this hazardous industry.

Research

The first wearable micro gas chromatograph was developed by Prof. Zeller’s group, which involves students and faculty from Chemistry, Environmental Health Sciences (Industrial Hygiene), and Mechanical Engineering. These belt-mountable μ GC prototypes are capable of autonomously monitoring up to 15 VOCs every 6 minutes. A small company, VGC Chromatography, headquartered in Dayton, OH, built the prototypes and will be commercializing the instruments.

A research-to-practice (R2P) project on electronic waste recycling, and its occupational and public health hazards, initiated by Prof. Neitzel, is exploring solutions with a team of scientists, engineers, government/community officials and industry experts. In its first phase, a comprehensive e-waste community assessment was conducted in Thailand with hospital staff, community health volunteers, and a research team involving the University of Michigan and two Thai universities.

Prof. John Meeker’s group published the first study linking exposure to endocrine-disrupting chemicals (EDC) to vitamin D levels in U.S. adults. The *Journal of Clinical Endocrinology & Metabolism* publication notes the widespread implications for public health of this finding.

Outreach, Networking, and Service

Global occupational health initiatives included: (1) The University of Michigan Industrial Hygiene Student Association (UMIHSA) forming the first student chapter of Workplace Health Without Borders through its new US branch, WHWB-US, headquartered in Ann Arbor. (2) The IH program also networked with *Developing World Outreach Initiative* (DWOI) members. (3) UMIHSA members are helping the *Occupational Health Training Association* (OHTA) with (Spanish, Hindi, and Mandarin) translations of educational materials within their W201 and W501 course modules. (4) IH students have had summer internships and research projects with international collaborators and five of nine 1st-year IH Masters student internships addressed exposures among vulnerable populations

either abroad or in the US. (5) UMIHSA co-hosted Maryanne Levitsky, President of WHWB, for a seminar. (6) Prof. Zellers gave a talk at the first annual *Meeting of the Asian Network for Occupational Health* in Hanoi, Vietnam in June, 2016.

Occupational Epidemiology

Enrollment

Six new MPH students (3 in the Department of Epidemiology and 3 in the Department of Environmental Health Sciences (EHS)) and three new PhD students (2 in Epidemiology and 1 in EHS) were admitted, and five MPH and two PhD students graduated in 2015-16.

Research

Exposome and environment-wide association study experts presented in the Occupational Health seminar series, including Gayle DeBord from NIOSH, Hien Le from Chemours, and David Balshaw from NIEHS

The OE Research Seminars featured faculty and trainees presenting their research, and also hosted a notable presentation on the “Flint Drinking Water Crisis: Background and Next Steps” by Dr. Mona Hanna-Attisha on February 3, 2016.

Prof. Marie O’Neill published “Michigan Climate and Health Profile Report 2015” (April 25, 2015).

Prof. Sara Adar gave invited talks entitled “From Tailpipe to Windpipe: Characterizing the Health Impacts of Motor Vehicles” at *Johns Hopkins University* and *NIEHS*.

Prof. Sara Adar received three new grants, including from the National Institute of Allergy and Infectious Disease (R21AI117371: *Characterizing the respiratory microbiome via a novel, non-invasive technique*); Alzheimer’s Association (*Neighborhood noise, socioeconomic context, and Alzheimer’s disease*); and the American Heart Association (*Neighborhood noise as a modifiable risk factor for incident hypertension: Evidence from two population-based cohort studies*).

Prof. Thomas Robins initiated *The West Africa-Michigan CHARTER II for GEOHealth-USA*, as PI of a new U2R grant that has the objective of building occupational and environmental health research and training capacity and collaborations between academic and government partner institutions in West Africa. Prof. Robins and Center Director Stuart Batterman had a kick-off meeting with collaborators from Ghana, Benin, Nigeria and Cameroon in Ghana, Accra. The meeting included a visit to a large E-waste recycling facility, which will be studied in this 5-year grant.

Trainee internships

OE MPH student Patricia Maina was sponsored by the Occupational Health Internship Program to work on research related to occupational health among temporary workers in Chicago. OE MPH student Douglas Kim was sponsored by

the Department of Epidemiology for his internship on automated occupational coding for large scale epidemiologic research.

Occupational Health Nursing

Enrollment

OHN student enrollment and graduation continues to grow with four new students admitted in 2015-16 and a total program of 15 students. Two MSN students graduated in 2015-16, who are employed in clinical practice positions that include caring for workers.

Curriculum

Recent curriculum changes in the School of Public Health resulted in changes in courses required for the concentration in occupational health nursing, expanding the concentration from 12 to 15 credits.

Faculty

Assistant Professor Marie-Anne Rosemberg has joined the OHN faculty. Her research focuses on management of chronic disease among low-income service workers. She also co-teaches NURS 572 Issues in Occupational Health Nursing.

Prof. Marjorie McCullagh, OHN Program Director, was promoted to full professor. She is serving as a *Director* in *Noise Free America*, a nonprofit organization dedicated to fighting noise.

Prof. Christopher Friese, Associate OHN Director, was recently promoted to full professor. He also was selected as a *Robert Wood Johnson Health Policy Fellow*, and will join a select group of eight health professionals in spending a year in Washington, D.C., working on health-related legislative and regulatory issues with members of Congress and the executive branch. In addition, Prof. Friese is the 2016 recipient of UM's *Henry Russell Award*, which recognizes early-career faculty who have demonstrated excellence in research and teaching, and which is one of the highest honors for junior faculty at UM. He is the first Nursing faculty to win the award since the award's inception in 1926.

Occupational Safety Engineering

Faculty

Xi Jessie Yang was hired as an Assistant Professor after completing a postdoc with the Interactive Robotics Laboratory at The Massachusetts Institute of Technology. Her teaching and research interests are in cognitive ergonomics with specialization in human-robot interactions and human factors in health care.

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*. Her research and teaching focus on cognitive ergonomics, transportation safety, and systems safety.

Prof. Paul Green served as a Director of the Board of Certified Professional Ergonomics.

Curriculum

Prof. Tom Armstrong developed a new course “*Volunteer Work: Work Design and Ergonomics.*”

Prof. Henry Wang from the Department of Chemical Engineering developed a new seminar “*Chemical Process Safety.*”

Students and Alumni

Ph.D. student Nadine Moacdieh received a “Best Paper” award at the 2015 meeting of the Human Factors and Ergonomics Society. OSE students continue to receive external support and recognition for outstanding scholarship. Yadianna D’Acosta-Soto is a recipient of the highly-prestigious National Science Foundation Graduate Research Fellowship (NSFGRF). Two Ph.D. students successfully defended their dissertations. Two under-represented minorities were supported by the NIOSH traineeship. Graduate Brandon Pitts accepted a faculty position at Purdue University, and graduate Vernnaliz Carrasquillo accepted a faculty position at Eastern Michigan University. Six new Ph.D. students matriculated in September 2015, representing the largest ergonomics/safety doctoral cohort in over a decade.

Research to Practice

Program faculty developed models and approaches to improve safety in the workplace, including: vibrotactile feedback devices to assist in the prevention of falls; computer-aided tools for the high-fidelity modeling of human motions; wearable microsensors to measure postural stress; and computer-aided motion capture systems to improve construction safety. This research is producing new training strategies to modify behaviors and practices of construction workers.

Continuing Education

We conducted 15 live programs and 28 webinars, which attracted 7,382 individuals and resulted in 27,317 person-hours of training.

A new course, Ergonomics Symposium: Updates in Ergonomics: Demonstrating Economic Value, attracted 85 participants representing a wide range of companies and professional roles. We co-sponsored this course with the Southern California ERC, and provided administrative, program and marketing support and program faculty.

A new workshop, Health and Safety of Temporary Workers, was co-sponsored with the ERCs at the University of Cincinnati and University of Illinois-Chicago. This free workshop provided an overview of the current status of health and safety of temporary workers, and discussed the challenges of providing safe work environments to this vulnerable population. This program attracted 62 participants.

A new program, Ergonomic Principles and Trends for the Office Environment, was offered as a pre-conference workshop at the Applied Ergonomics Conference in Orlando, Florida. The program addressed work-related musculoskeletal disorders associated with computer workstations, ergonomic principles for office workstation design, the evolution of furniture, equipment and programs (i.e., alternative work environments, technology developments and the wellness focus), and numerous illustrative case studies.

A two-day workshop, Using the 3D Static Strength Prediction Program™, was conducted in Melbourne, Australia prior to the International Ergonomics Association conference. Twenty-seven people attended the workshop and many stated that this was the best CE program they ever attended. This workshop was co-sponsored by a local human factors and ergonomics society chapter (HFESA).

Outreach

Program outreach activities undertaken including curriculum and research assistance to other academic institutions, professional consultations, the Detroit Environmental Tour: A Tour of Toxic Sites in Detroit, ergonomics assistance to small and medium sized Michigan companies, and publication of seminars on websites open to the public.

OHN Prof. Marjorie McCullagh collaborated with a non-profit agency, AgriSafe, to provide hearing health education services at no cost to farm operators and rural healthcare providers; collaborated with experts at the American Academy of Nursing to develop partnerships and write new federal policy to prevent unwanted noise; and provided a live national online broadcast for rural healthcare professionals (January 20, 2016) entitled "*Increasing the use of hearing protection among farmers: Research on best practices.*"

We sponsored a film and topical workshop examining temporary workers. This included a screening of *A Day's Work*, a film documenting the workplace death of 21-year-old Day Davis, a temporary employee killed on his first day of the job. The film was followed by a panel discussion, involving David DeSario (the film's producer), OHN Prof. Rosemberg, and a representative from Michigan OSHA. Students, faculty, community members, government and industry representatives attended this April 7, 2016 event, which was also coordinated with a live video feed of a workshop on the same subject at the University of Cincinnati.

Pilot Project Research Training

In the current period, 11 proposals were received from the University of Michigan, Wayne State University, and Purdue University, the largest number to date, of which the five highest-scoring applications were selected for funding. The funded PPRT projects address a wide range of OH&S topics, including: a multi-variable detector for a direct-reading worker exposure monitoring of volatile organic chemicals; inertial sensor-based postural demand profiles for cumulative physical workload estimation; evaluation of use of smartphones as noise

dosimeters; assessment of gastrointestinal modification of transition metal nanoparticles after oral exposure; and evaluation of the impact of welding material and exposure controls on manganese exposure and olfactory function.

We hosted our first-ever occupational health and safety Research Symposium at the University of Michigan. The event featured a keynote address by a previous PPRT funding recipient, 19 posters by current and former PPRT recipients and COHSE trainees, extensive trainee and staff interaction, and over 60 attendees.

Research to Practice (R2P)

The Visiting Partners Program continues to sponsor collaboration between mid-career OS&H professionals and faculty and professionals at UM. Prof. Dhitinut Ratnapradipa at the Southern Illinois University is evaluating the effectiveness of current risk communication approaches within the context of organizational behavior of individual labs at small- to medium-sized colleges and universities, which will result in recommendations and revised risk communication materials.

The Interdisciplinary Research Training Program attracted and supported three first-year PhD students: Aubrey Langeland in Industrial Hygiene, Zoey Laskaris in Occupational Epidemiology, and Justin Haney in Occupational Safety Engineering.

Center-Wide Activities

ERC Center Director Prof. Stuart Batterman initiated a program of regular Regional Collaboration with the nearby ERCs at Chicago and Cincinnati. This program shares ideas and successful models, coordinates needs assessments, helps to leverage support for speakers, promotes outreach and other events, PPRT research presentations, etc. Since October 2015, the three ERCs have been having conference calls with a standing agenda, written minutes, and rotating coordination. In addition, we have promoted both regular and special seminars, jointly conducted webinars, sponsored travel for faculty development, coordinated needs assessments activities, and initiated planning for a R13 conference grant.

The Michigan ERC initiated development of a comprehensive evaluation plan with the assistance of the Curtis Center, a professional organization specializing in program evaluation, at the University of Michigan. The plan uses a common approach across each of the ERC's programs.